



(Accredited with Grade 'A' by NAAC)

Supporting Document of Metric No. 1.1.3

1.1.3 Total number of courses having focus on employability/ entrepreneurship/ skill development offered by the University during the year.

1.1.3.1 - Number of courses having focus on employability/ entrepreneurship/ skill development during the year

Following are Appended:

1. Mapping of the course to Employability/ Entrepreneurship/ Skill development.
2. Syllabus copies of the course highlighting the focus on employability/ Entrepreneurship / Skill Development along their course outcomes are provided.
3. List of MOU's focusing on Employability/ Entrepreneurship/ Skill Development
4. List of courses (Additional Information)

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List of courses 2022-23

Sl. No.	Programme Code	Name of Programme	Course Code	Course Name	Year
1	13064	Bachelor of Business Administration	MGT2151	Management Foundations	2022
2	13064	Bachelor of Business Administration	MGT2101	Computers in Management	2022
3	13064	Bachelor of Business Administration	MGT2102	Financial Accounting	2022
4	13064	Bachelor of Business Administration	MGT2103	Managerial Economics	2022
5	13064	Bachelor of Business Administration	COM2103	E-Commerce	2022
6	13064	Bachelor of Business Administration	MGT2104	Business Mathematics	2022
7	13064	Bachelor of Business Administration	ECO2104	Economic System and Society	2022
8	13064	Bachelor of Business Administration	MGT2130	Readings in Management	2022
9	13064	Bachelor of Business Administration	MGT2131	Term Paper	2022
10	13064	Bachelor of Business Administration	MGT2132	Project (with Presentation & Evaluation)	2022
11	13064	Bachelor of Business Administration	MGT2133	Workshop / Certification (Discipline Specific) (1credit per workshop)	2022
12	13064	Bachelor of Business Administration	MGT2134	Study Abroad	2022
13	13064	Bachelor of Business Administration	MGT2251	Marketing Management	2022
14	13064	Bachelor of Business Administration	MGT2201	Human Resource Management	2022
15	13064	Bachelor of Business Administration	MGT2202	Business Statistics	2022
16	13064	Bachelor of Business Administration	MGT2203	Corporate Accounting	2022
17	13064	Bachelor of Business Administration	MGT2204	Analysis & Design of Business System	2022
18	13064	Bachelor of Business Administration	MGT2205	Innovation & Creativity Management	2022
19	13064	Bachelor of Business Administration	MGT2206	Human Values & Professional Ethics	2022
20	13064	Bachelor of Business Administration	MGT2230	Readings in Management	2022
21	13064	Bachelor of Business Administration	MGT2231	Term Paper	2022
22	13064	Bachelor of Business Administration	MGT2232	Project (with Presentation & Evaluation)	2022

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Sl. No.	Programme Code	Name of Programme	Course Code	Course Name	Year
23	13064	Bachelor of Business Administration	MGT2233	Workshop / Certification (Discipline Specific) (1credit per workshop)	2022
24	13064	Bachelor of Business Administration	MGT2234	Study Abroad	2022
25	13064	Bachelor of Business Administration	MGT2351	Organizational Behavior	2022
26	13064	Bachelor of Business Administration	MGT2301	Financial Management	2022
27	13064	Bachelor of Business Administration	MGT2302	Management Information Systems	2022
28	13064	Bachelor of Business Administration	MGT2303	Cost Accounting	2022
29	13064	Bachelor of Business Administration	MGT2304	Analytical Decision Making	2022
30	13064	Bachelor of Business Administration	ECO2304	Mergers & Acquisitions	2022
31	13064	Bachelor of Business Administration	MGT2305	Industrial Psychology	2022
32	13064	Bachelor of Business Administration	MGT2331	Term Paper	2022
33	13064	Bachelor of Business Administration	MGT2332	Project (with Presentation & Evaluation)	2022
34	13064	Bachelor of Business Administration	MGT2333	Workshop / Certification (Discipline Specific) (1credit per workshop)	2022
35	13064	Bachelor of Business Administration	MGT2334	Study Abroad	2022
36	13064	Bachelor of Business Administration	MGT2451	Business Environment	2022
37	13064	Bachelor of Business Administration	MGT2401	Production & Operations Management	2022
38	13064	Bachelor of Business Administration	MGT2402	Research Methodology & Report Preparation	2022
39	13064	Bachelor of Business Administration	MGT2403	Management Accounting	2022
40	13064	Bachelor of Business Administration	MGT2404	Business Information & Data Base System	2022
41	13064	Bachelor of Business Administration	MGT2405	Personal Financial Planning	2022
42	13064	Bachelor of Business Administration	MGT2406	Sales & Distribution Management	2022
43	13064	Bachelor of Business Administration	MGT2431	Term Paper	2022


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Sl. No.	Programme Code	Name of Programme	Course Code	Course Name	Year
44	13064	Bachelor of Business Administration	MGT2432	Project (with Presentation & Evaluation)	2022
45	13064	Bachelor of Business Administration	MGT2433	Workshop / Certification (Discipline Specific) (1 credit per workshop)	2022
46	13064	Bachelor of Business Administration	MGT2434	Study Abroad	2022
47	13064	Bachelor of Business Administration	MGT2551	Operations Research	2022
48	13064	Bachelor of Business Administration	MGT2501	International Business Management	2022
49	13064	Bachelor of Business Administration	MGT2502	Entrepreneurship Development	2022
50	13064	Bachelor of Business Administration	MGT2535	Summer Internship Evaluation	2022
51	13064	Bachelor of Business Administration	MGT2503	Consumer Behaviour	2022
52	13064	Bachelor of Business Administration	MGT2504	Service Marketing	2022
53	13064	Bachelor of Business Administration	MGT2505	International Marketing	2022
54	13064	Bachelor of Business Administration	MGT2531	Term Paper	2022
55	13064	Bachelor of Business Administration	MGT2532	Project (with Presentation & Evaluation)	2022
56	13064	Bachelor of Business Administration	MGT2533	Workshop / Certification (Discipline Specific) (1 credit per workshop)	2022
57	13064	Bachelor of Business Administration	MGT2506	Financial Services	2022
58	13064	Bachelor of Business Administration	MGT2507	Principles of Investment Management	2022
59	13064	Bachelor of Business Administration	MGT2508	Financial Derivatives	2022
60	13064	Bachelor of Business Administration	MGT2509	Organizational Development & Change	2022
61	13064	Bachelor of Business Administration	MGT2510	Training & Development	2022
62	13064	Bachelor of Business Administration	MGT2511	International Human Resource Management	2022
63	13064	Bachelor of Business Administration	MGT2512	Relational Database Management System	2022
64	13064	Bachelor of Business Administration	MGT2513	Software Project Design & Analysis	2022


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Sl. No.	Programme Code	Name of Programme	Course Code	Course Name	Year
65	13064	Bachelor of Business Administration	MGT2514	Programming with Microsoft Visual Basic	2022
66	13064	Bachelor of Business Administration	MGT2515	Law of Crimes	2022
67	13064	Bachelor of Business Administration	MGT2516	Investment & Competition Law	2022
68	13064	Bachelor of Business Administration	MGT2517	Law & Technology	2022
69	13064	Bachelor of Business Administration	MGT2651	Business Law	2022
70	13064	Bachelor of Business Administration	MGT2601	Business Policy & Strategic Management	2022
71	13064	Bachelor of Business Administration	MGT2637	Dissertation	2022
72	13064	Bachelor of Business Administration	MGT2602	Brand Management	2022
73	13064	Bachelor of Business Administration	MGT2603	Advertising & Sales Promotion	2022
74	13064	Bachelor of Business Administration	MGT2604	Retail Management	2022
75	13064	Bachelor of Business Administration	MGT2631	Term Paper	2022
76	13064	Bachelor of Business Administration	MGT2632	Project (with Presentation & Evaluation)	2022
77	13064	Bachelor of Business Administration	MGT2633	Workshop / Certification (Discipline Specific) (1 credit per workshop)	2022
78	13064	Bachelor of Business Administration	MGT2605	Corporate Tax Planning	2022
79	13064	Bachelor of Business Administration	MGT2606	Banking & Financial Institutions	2022
80	13064	Bachelor of Business Administration	MGT2607	Advanced Corporate Finance	2022
81	13064	Bachelor of Business Administration	MGT2608	Industrial Relations & Labour Law	2022
82	13064	Bachelor of Business Administration	MGT2609	Performance Management System	2022
83	13064	Bachelor of Business Administration	MGT2610	Compensation & Reward Management	2022
84	13064	Bachelor of Business Administration	MGT2611	Object Oriented Programming with Java	2022
85	13064	Bachelor of Business Administration	MGT2612	Data Communication & Network	2022
86	13064	Bachelor of Business Administration	MGT2613	Web Database Programming with ASP	2022

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87	13064	Bachelor of Business Administration	MGT2614	Intellectual Property Rights	2022
88	13064	Bachelor of Business Administration	MGT2615	Human Rights	2022
89	13064	Bachelor of Business Administration	MGT2616	Industrial Relations & Labour Law	2022
90	13579	Bachelor of Business Administration (Banking & Finance)	MBF2101	Management Foundations	2022
91	13579	Bachelor of Business Administration (Banking & Finance)	MBF2102	Financial Environment	2022
92	13579	Bachelor of Business Administration (Banking & Finance)	MBF2103	Financial Accounting	2022
93	13579	Bachelor of Business Administration (Banking & Finance)	MBF2104	Managerial Economics	2022
94	13579	Bachelor of Business Administration (Banking & Finance)	MBF2105	Principles of Banking	2022
95	13579	Bachelor of Business Administration (Banking & Finance)	MBF2201	Marketing Management	2022
96	13579	Bachelor of Business Administration (Banking & Finance)	MBF2202	Human Resource Management	2022
97	13579	Bachelor of Business Administration (Banking & Finance)	MBF2203	Business Statistics	2022
98	13579	Bachelor of Business Administration (Banking & Finance)	MBF2204	Corporate Accounting	2022
99	13579	Bachelor of Business Administration (Banking & Finance)	MBF2205	Financial Services	2022
100	13579	Bachelor of Business Administration (Banking & Finance)	MBF2301	Organizational Behavior	2022
101	13579	Bachelor of Business Administration (Banking & Finance)	MBF2302	Financial Management	2022
102	13579	Bachelor of Business Administration (Banking & Finance)	MBF2303	Computers and Management Information Systems	2022


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Sl. No.	Programme Code	Name of Programme	Course Code	Course Name	Year
103	13579	Bachelor of Business Administration (Banking & Finance)	MBF2304	Cost Accounting	2022
104	13579	Bachelor of Business Administration (Banking & Finance)	MBF2305	Money and Banking	2022
105	13579	Bachelor of Business Administration (Banking & Finance)	MBF2306	Corporate Tax Planning	2022
106	13579	Bachelor of Business Administration (Banking & Finance)	MBF2401	Management Accounting	2022
107	13579	Bachelor of Business Administration (Banking & Finance)	MBF2402	Production & Operations Management	2022
108	13579	Bachelor of Business Administration (Banking & Finance)	MBF2403	Research Methodology & Report Preparation	2022
109	13579	Bachelor of Business Administration (Banking & Finance)	MBF2404	Banking Law and Practices	2022
110	13579	Bachelor of Business Administration (Banking & Finance)	MBF2405	International Financial Management	2022
111	13579	Bachelor of Business Administration (Banking & Finance)	MBF2501	Operations Research	2022
112	13579	Bachelor of Business Administration (Banking & Finance)	MBF2502	International Business Management	2022
113	13579	Bachelor of Business Administration (Banking & Finance)	MBF2503	Entrepreneurship Development	2022
114	13579	Bachelor of Business Administration (Banking & Finance)	MBF2504	Retail Banking	2022
115	13579	Bachelor of Business Administration (Banking & Finance)	MBF2505	Principles of Investment Management	2022
116	13579	Bachelor of Business Administration (Banking & Finance)	MBF2535	Summer Internship	2022
117	13579	Bachelor of Business Administration (Banking & Finance)	MBF2601	Business Law	2022


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Sl. No.	Programme Code	Name of Programme	Course Code	Course Name	Year
118	13579	Bachelor of Business Administration (Banking & Finance)	MBF2602	Business Policy & Strategic Management	2022
119	13579	Bachelor of Business Administration (Banking & Finance)	MBF2603	E- Banking	2022
120	13579	Bachelor of Business Administration (Banking & Finance)	MBF2604	Advanced Corporate Finance	2022
121	13579	Bachelor of Business Administration (Banking & Finance)	MBF2637	Project Work/ Dissertation	2022
122	13019	Master of Business Administration	MGT4101	Management Process & Organizational Behavior	2022
123	13019	Master of Business Administration	MGT4102	Accounting for Management	2022
124	13019	Master of Business Administration	MGT4104	Marketing Management	2022
125	13019	Master of Business Administration	MGT4106	Quantitative Techniques in Management	2022
126	13019	Master of Business Administration	MGT4107	Legal Aspects of Business	2022
127	13019	Master of Business Administration	MGT4108	Human Resource Management	2022
128	13019	Master of Business Administration	MGT4109	Information Technology & E-Commerce	2022
129	13019	Master of Business Administration	MGT4201	Financial Management	2022
130	13019	Master of Business Administration	MGT4203	Business Research Methods	2022
131	13019	Master of Business Administration	MGT4204	International Business Environment & Practices	2022
132	13019	Master of Business Administration	MGT4205	Operations Management	2022
133	13019	Master of Business Administration	MGT4207	Management Science	2022
134	13019	Master of Business Administration	MGT4209	Economics for Management	2022
135	13019	Master of Business Administration	MGT4210	Business Analytics	2022
136	13019	Master of Business Administration	MGT4211	Excel for Managers	2022
137	13019	Master of Business Administration	FIN4201	Corporate Financial Reporting & Analysis	2022
138	13019	Master of Business Administration	FIN4202	Financial Market & Institutions	2022
139	13019	Master of Business Administration	FIN4203	Financial Statement Analysis	2022
140	13019	Master of Business Administration	HRM4201	Measurement in Human Resource	2022
141	13019	Master of Business Administration	HRM4202	Talent Acquisition & Development	2022
142	13019	Master of Business Administration	HRM4203	Global Human Resource Management	2022
143	13019	Master of Business Administration	IBM4202	Growth Prospects of Thrust Areas of Indian Exports	2022

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Sl. No.	Programme Code	Name of Programme	Course Code	Course Name	Year
144	13019	Master of Business Administration	IBM4203	Principles of Global Business Management	2022
145	13019	Master of Business Administration	IBM4204	Global Human Resource Management	2022
146	13019	Master of Business Administration	IBM4205	International Commodity Management	2022
147	13019	Master of Business Administration	ITM4201	Fundamentals of Computers	2022
148	13019	Master of Business Administration	ITM4202	Management Information System	2022
149	13019	Master of Business Administration	ITM4203	Internet Fundamentals	2022
150	13019	Master of Business Administration	ITM4204	Web Design using HTML	2022
151	13019	Master of Business Administration	MKT4201	Marketing Research	2022
152	13019	Master of Business Administration	MKT4202	Marketing of Services	2022
153	13019	Master of Business Administration	MKT4203	Distribution & Logistics Management	2022
154	13019	Master of Business Administration	MKT4204	Strategic Brand Management	2022
155	13019	Master of Business Administration	ECM4201	E-Business Essentials	2022
156	13019	Master of Business Administration	ECM4202	Management Information System	2022
157	13019	Master of Business Administration	ECM4203	Internet Fundamentals	2022
158	13019	Master of Business Administration	ECM4204	Web Design using HTML	2022
159	13019	Master of Business Administration	MGT4301	Strategic Management	2022
160	13019	Master of Business Administration	MGT4335	Summer Internship Evaluation	2022
161	13019	Master of Business Administration	FIN4301	Advance Corporate Finance	2022
162	13019	Master of Business Administration	FIN4302	Business Valuation	2022
163	13019	Master of Business Administration	FIN4303	Corporate Restructuring	2022
164	13019	Master of Business Administration	FIN4304	International Financial Management	2022
165	13019	Master of Business Administration	FIN4305	Security Analysis & Portfolio Management	2022
166	13019	Master of Business Administration	FIN4306	Financial Modeling with MS-Excel	2022
167	13019	Master of Business Administration	FIN4307	Financial Risk Management	2022
168	13019	Master of Business Administration	FIN4308	Fixed Income Securities Analysis	2022
169	13019	Master of Business Administration	FIN4309	Management of Financial Services	2022
170	13019	Master of Business Administration	FIN4310	Project Planning Appraisal & Control	2022
171	13019	Master of Business Administration	HRM4301	Social & Industrial Psychology	2022
172	13019	Master of Business Administration	HRM4302	Industrial Relations	2022
173	13019	Master of Business Administration	HRM4303	Organizational Change & Development	2022
174	13019	Master of Business Administration	HRM4304	Performance & Competency Management	2022
175	13019	Master of Business Administration	HRM4305	Training & Development	2022

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176	13019	Master of Business Administration	HRM4306	Strategic Human Resource Management	2022
177	13019	Master of Business Administration	HRM4307	Collective Bargaining & Negotiation Process	2022
178	13019	Master of Business Administration	IBM4301	International Financial Management & Foreign Exchange Management	2022
179	13019	Master of Business Administration	IBM4302	Risk & Insurance in International Trade	2022
180	13019	Master of Business Administration	IBM4303	WTO and International Regulatory Environment	2022
181	13019	Master of Business Administration	IBM4304	Global Business Operations	2022
182	13019	Master of Business Administration	IBM4305	Foreign Trade Policy	2022
183	13019	Master of Business Administration	IBM4306	International Economics & Policy	2022
184	13019	Master of Business Administration	IBM4307	International Marketing	2022
185	13019	Master of Business Administration	ITM4301	Networking Fundamentals	2022
186	13019	Master of Business Administration	ITM4302	Database Management Systems	2022
187	13019	Master of Business Administration	ITM4303	Digital Marketing	2022
188	13019	Master of Business Administration	ITM4304	Introduction to Cloud Computing	2022
189	13019	Master of Business Administration	ITM4305	System Analysis & Design	2022
190	13019	Master of Business Administration	ITM4306	Dynamic Web Design & Development	2022
191	13019	Master of Business Administration	ITM4307	Cyber Security Systems	2022
192	13019	Master of Business Administration	ITM4308	Software Project Management	2022
193	13019	Master of Business Administration	MKT4301	Advertising & Sales Promotion	2022
194	13019	Master of Business Administration	MKT4302	Marketing of Financial Services	2022
195	13019	Master of Business Administration	MKT4303	Digital Marketing	2022
196	13019	Master of Business Administration	MKT4304	International Marketing	2022
197	13019	Master of Business Administration	MKT4305	Direct Marketing	2022
198	13019	Master of Business Administration	MKT4306	Retail Management	2022
199	13019	Master of Business Administration	MKT4307	Sales Management	2022
200	13019	Master of Business Administration	MKT4308	Consumer Behaviour	2022
201	13019	Master of Business Administration	ECM4301	Digital Marketing	2022
202	13019	Master of Business Administration	ECM4302	Database Management Systems	2022
203	13019	Master of Business Administration	ECM4303	Networking Fundamentals	2022
204	13019	Master of Business Administration	ECM4304	Software Development Methodologies	2022
205	13019	Master of Business Administration	ECM4305	Software Project Management	2022
206	13019	Master of Business Administration	ECM4306	Technology in Banking	2022

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207	13019	Master of Business Administration	ECM4307	Dynamic Web Design & Development	2022
208	13019	Master of Business Administration	ECM4308	System Analysis & Design	2022
209	13019	Master of Business Administration	ECM4309	Cyber Security Systems	2022
210	13019	Master of Business Administration	MGT4428	Total Quality Management	2022
211	13019	Master of Business Administration	MGT4429	Entrepreneurship Development	2022
212	13019	Master of Business Administration	MGT4437	Dissertation	2022
213	13019	Master of Business Administration	FIN4401	Financial Engineering	2022
214	13019	Master of Business Administration	FIN4402	Investment Banking	2022
215	13019	Master of Business Administration	FIN4403	Behavioural Finance	2022
216	13019	Master of Business Administration	FIN4404	Fintech-Technology Innovation in Financial Services	2022
217	13019	Master of Business Administration	FIN4405	Private Equity and Entrepreneurial Finance	2022
218	13019	Master of Business Administration	FIN4406	Corporate Tax Planning	2022
219	13019	Master of Business Administration	HRM4401	Compensation & Reward Management	2022
220	13019	Master of Business Administration	HRM4402	Psychological Testing	2022
221	13019	Master of Business Administration	HRM4403	Labour Legislations in India	2022
222	13019	Master of Business Administration	HRM4404	Dynamics of Leadership	2022
223	13019	Master of Business Administration	HRM4405	Organizational Design & Structural Processes	2022
224	13019	Master of Business Administration	HRM4406	Managerial Counselling	2022
225	13019	Master of Business Administration	IBM4401	Leveraging Information Technology in Global Business	2022
226	13019	Master of Business Administration	IBM4402	International Supply Chain Management	2022
227	13019	Master of Business Administration	IBM4403	International Trade Finance	2022
228	13019	Master of Business Administration	IBM4404	Global Sourcing & Business Development	2022
229	13019	Master of Business Administration	IBM4406	Cross Cultural Management & Management of Multinational Companies	2022
230	13019	Master of Business Administration	IBM4407	International Trade Procedures & Documentation	2022
231	13019	Master of Business Administration	ITM4401	Data Warehousing & Data Mining	2022
232	13019	Master of Business Administration	ITM4402	Leveraging IT in Global Business	2022
233	13019	Master of Business Administration	ITM4403	Marketing of IT Solutions	2022
234	13019	Master of Business Administration	ITM4404	Managerial Decision Support Systems	2022
235	13019	Master of Business Administration	ITM4405	Search Engine Optimization	2022

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Sl. No.	Programme Code	Name of Programme	Course Code	Course Name	Year
236	13019	Master of Business Administration	ITM4406	Tools for Business Intelligence	2022
237	13019	Master of Business Administration	MKT4401	Customer Relationship Management	2022
238	13019	Master of Business Administration	MKT4402	E-Supply Chain Management	2022
239	13019	Master of Business Administration	MKT4403	Industrial Marketing	2022
240	13019	Master of Business Administration	MKT4404	Competitive Marketing	2022
241	13019	Master of Business Administration	MKT4405	Marketing of Non-Profit Organization	2022
242	13019	Master of Business Administration	MKT4406	Business at Bottom of Pyramid	2022
243	13019	Master of Business Administration	ECM4401	Social Media Analytics	2022
244	13019	Master of Business Administration	ECM4402	M-Commerce and Mobile App Development	2022
245	13019	Master of Business Administration	ECM4403	E-Customer Relationship Management	2022
246	13019	Master of Business Administration	ECM4404	Tools for Business Intelligence	2022
247	13019	Master of Business Administration	ECM4405	Advancements in Electronic Payment Systems	2022
248	13019	Master of Business Administration	ECM4406	Search Engine Optimization	2022
249	13019	Master of Business Administration	ECM4407	E-Supply Chain Management	2022
250	13502	Master of Business Administration (Banking & Finance)	MBF4101	Management Process & Organizational Behavior	2022
251	13502	Master of Business Administration (Banking & Finance)	MBF4102	Accounting for Management	2022
252	13502	Master of Business Administration (Banking & Finance)	MBF4104	Marketing Management	2022
253	13502	Master of Business Administration (Banking & Finance)	MBF4106	Quantitative Techniques in Management	2022
254	13502	Master of Business Administration (Banking & Finance)	MBF4107	Financial Environment	2022
255	13502	Master of Business Administration (Banking & Finance)	MBF4108	Human Resource Management	2022
256	13502	Master of Business Administration (Banking & Finance)	MBF4109	Information Technology & E-Commerce	2022
257	13502	Master of Business Administration (Banking & Finance)	MBF4201	Financial Management	2022
258	13502	Master of Business Administration (Banking & Finance)	MBF4203	Business Research Methods	2022
259	13502	Master of Business Administration (Banking & Finance)	MBF4204	International Business Environment & Practices	2022
260	13502	Master of Business Administration (Banking & Finance)	MBF4205	Operations Management	2022
261	13502	Master of Business Administration (Banking & Finance)	MBF4207	General Banking Operations	2022

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262	13502	Master of Business Administration (Banking & Finance)	MBF4208	Legal & Regulatory Aspects of Banking	2022
263	13502	Master of Business Administration (Banking & Finance)	MBF4209	Economics for Management	2022
264	13502	Master of Business Administration (Banking & Finance)	MBF4210	Business Analytics	2022
265	13502	Master of Business Administration (Banking & Finance)	MBF4211	Excel for Managers	2022
266	13502	Master of Business Administration (Banking & Finance)	MBF4301	Strategic Management	2022
267	13502	Master of Business Administration (Banking & Finance)	MBF4303	Technology in Banking	2022
268	13502	Master of Business Administration (Banking & Finance)	MBF4305	Retail Assets and Rural Banking	2022
269	13502	Master of Business Administration (Banking & Finance)	MBF4335	Summer Internship Evaluation	2022
270	13502	Master of Business Administration (Banking & Finance)	MBF4306	International Financial Management	2022
271	13502	Master of Business Administration (Banking & Finance)	MBF4307	Management of Financial Services	2022
272	13502	Master of Business Administration (Banking & Finance)	MBF4308	Security Analysis & Portfolio Management	2022
273	13502	Master of Business Administration (Banking & Finance)	MBF4309	Project Planning, Appraisal and Control	2022
274	13502	Master of Business Administration (Banking & Finance)	MBF4310	Advance Corporate Finance	2022
275	13502	Master of Business Administration (Banking & Finance)	MBF4311	Business Valuation	2022
276	13502	Master of Business Administration (Banking & Finance)	MBF4312	Corporate Restructuring	2022
277	13502	Master of Business Administration (Banking & Finance)	MBF4313	Financial Modeling using MS-Excel	2022
278	13502	Master of Business Administration (Banking & Finance)	MBF4314	Financial Risk Management	2022
279	13502	Master of Business Administration (Banking & Finance)	MBF4315	Fixed Income Securities Analysis	2022
280	13502	Master of Business Administration (Banking & Finance)	MBF4401	Bank Accounting & Audit	2022
281	13502	Master of Business Administration (Banking & Finance)	MBF4403	Risk Management in Banking	2022
282	13502	Master of Business Administration (Banking & Finance)	MBF4404	Customer Relationship Management in Banking	2022
283	13502	Master of Business Administration (Banking & Finance)	MBF4405	Treasury Banking	2022

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284	13502	Master of Business Administration (Banking & Finance)	MBF4413	Entrepreneurship Development	2022
285	13502	Master of Business Administration (Banking & Finance)	MBF4437	Dissertation	2022
286	13502	Master of Business Administration (Banking & Finance)	MBF4406	Financial Engineering	2022
287	13502	Master of Business Administration (Banking & Finance)	MBF4408	Corporate Tax Planning	2022
288	13502	Master of Business Administration (Banking & Finance)	MBF4409	Investment Banking	2022
289	13502	Master of Business Administration (Banking & Finance)	MBF4410	Behavioural Finance	2022
290	13502	Master of Business Administration (Banking & Finance)	MBF4411	Fintech-Technology Innovation in Financial Services	2022
291	13502	Master of Business Administration (Banking & Finance)	MBF4412	Private Equity & Entrepreneurial Finance	2022
292	13622	Master of Business Administration (Executive for Working Professionals)	MWP4101	Marketing Management	2022
293	13622	Master of Business Administration (Executive for Working Professionals)	MWP4105	Accounting for Managers	2022
294	13622	Master of Business Administration (Executive for Working Professionals)	MWP4106	Business Statistics	2022
295	13622	Master of Business Administration (Executive for Working Professionals)	MWP4107	Economics for Managers	2022
296	13622	Master of Business Administration (Executive for Working Professionals)	MWP4108	Organizational Behaviour and Human Resource Management	2022
297	13622	Master of Business Administration (Executive for Working Professionals)	MWP4109	Information Technology for Managers	2022
298	13622	Master of Business Administration (Executive for Working Professionals)	MWP4133	Workshop	2022
299	13622	Master of Business Administration (Executive for Working Professionals)	MWP4204	Research Methodology & Report Preparation	2022
300	13622	Master of Business Administration (Executive for Working Professionals)	MWP4205	Fundamentals of Data Analytics	2022

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301	13622	Master of Business Administration (Executive for Working Professionals)	MWP4206	Business Environment	2022
302	13622	Master of Business Administration (Executive for Working Professionals)	MWP4207	Financial Management	2022
303	13622	Master of Business Administration (Executive for Working Professionals)	MWP4208	Operations and Supply Chain Management	2022
304	13622	Master of Business Administration (Executive for Working Professionals)	MWP4231	Term Paper	2022
305	13622	Master of Business Administration (Executive for Working Professionals)	MWP4233	Workshop	2022
306	13622	Master of Business Administration (Executive for Working Professionals)	MWP4209	MOOC Course	2022
307	13622	Master of Business Administration (Executive for Working Professionals)	MWP4302	Strategic Management	2022
308	13622	Master of Business Administration (Executive for Working Professionals)	MWP4311	Innovation and Entrepreneurship	2022
309	13622	Master of Business Administration (Executive for Working Professionals)	MWP4337	Project-I	2022
310	13622	Master of Business Administration (Executive for Working Professionals)	MWP4304	Marketing of Services	2022
311	13622	Master of Business Administration (Executive for Working Professionals)	MWP4312	Sales and Distribution Management	2022
312	13622	Master of Business Administration (Executive for Working Professionals)	MWP4313	Consumer Behaviour	2022
313	13622	Master of Business Administration (Executive for Working Professionals)	MWP4314	Advertising Management and Sales Promotion	2022
314	13622	Master of Business Administration (Executive for Working Professionals)	MWP4305	Mergers, Acquisitions & Re-Structuring	2022
315	13622	Master of Business Administration (Executive for Working Professionals)	MWP4315	Management of Banks and Financial Institutions	2022

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316	13622	Master of Business Administration (Executive for Working Professionals)	MWP4316	Security Analysis and Portfolio Management	2022
317	13622	Master of Business Administration (Executive for Working Professionals)	MWP4317	Corporate Valuation	2022
318	13622	Master of Business Administration (Executive for Working Professionals)	MWP4318	Compensation and Reward Management	2022
319	13622	Master of Business Administration (Executive for Working Professionals)	MWP4319	Learning and Development	2022
320	13622	Master of Business Administration (Executive for Working Professionals)	MWP4320	Organizational Development & Change	2022
321	13622	Master of Business Administration (Executive for Working Professionals)	MWP4321	Performance Management System	2022
322	13622	Master of Business Administration (Executive for Working Professionals)	MWP4322	Database Management System for Business	2022
323	13622	Master of Business Administration (Executive for Working Professionals)	MWP4323	E-Commerce Fundamentals	2022
324	13622	Master of Business Administration (Executive for Working Professionals)	MWP4324	System Analysis & Design	2022
325	13622	Master of Business Administration (Executive for Working Professionals)	MWP4325	Dynamic Web Design & Development	2022
326	13622	Master of Business Administration (Executive for Working Professionals)	MWP4326	Programming for Analytics using R	2022
327	13622	Master of Business Administration (Executive for Working Professionals)	MWP4327	Programming for Analytics using Python	2022
328	13622	Master of Business Administration (Executive for Working Professionals)	MWP4328	Visual Analytics Tableau/ Power BI	2022
329	13622	Master of Business Administration (Executive for Working Professionals)	MWP4329	Econometrics	2022
330	13622	Master of Business Administration (Executive for Working Professionals)	MWP4411	Environmental Governance and Sustainability	2022


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331	13622	Master of Business Administration (Executive for Working Professionals)	MWP4412	E-Business Essentials	2022
332	13622	Master of Business Administration (Executive for Working Professionals)	MWP4437	Project-II	2022
333	13622	Master of Business Administration (Executive for Working Professionals)	MWP4413	Retail Management	2022
334	13622	Master of Business Administration (Executive for Working Professionals)	MWP4414	Digital Marketing	2022
335	13622	Master of Business Administration (Executive for Working Professionals)	MWP4415	Strategic Brand Management	2022
336	13622	Master of Business Administration (Executive for Working Professionals)	MWP4416	Customer Relationship Management	2022
337	13622	Master of Business Administration (Executive for Working Professionals)	MWP4417	Fintech	2022
338	13622	Master of Business Administration (Executive for Working Professionals)	MWP4406	Strategic Financial Management	2022
339	13622	Master of Business Administration (Executive for Working Professionals)	MWP4418	International Finance	2022
340	13622	Master of Business Administration (Executive for Working Professionals)	MWP4419	Private Equity and Entrepreneurial Finance	2022
341	13622	Master of Business Administration (Executive for Working Professionals)	MWP4420	International Human Resource Management	2022
342	13622	Master of Business Administration (Executive for Working Professionals)	MWP4421	Leadership Development	2022
343	13622	Master of Business Administration (Executive for Working Professionals)	MWP4422	Strategic Human Resource Management	2022
344	13622	Master of Business Administration (Executive for Working Professionals)	MWP4423	Talent Management and Succession Planning	2022
345	13622	Master of Business Administration (Executive for Working Professionals)	MWP4424	Data Warehousing & Data Mining	2022

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346	13622	Master of Business Administration (Executive for Working Professionals)	MWP4425	ERP for Businesses	2022
347	13622	Master of Business Administration (Executive for Working Professionals)	MWP4426	Digital Marketing	2022
348	13622	Master of Business Administration (Executive for Working Professionals)	MWP4427	E-Supply Chain Management	2022
349	13622	Master of Business Administration (Executive for Working Professionals)	MWP4428	Predictive Analytics-I Machine Learning using R	2022
350	13622	Master of Business Administration (Executive for Working Professionals)	MWP4429	Predictive Analytics-II Machine Learning using Python	2022
351	13622	Master of Business Administration (Executive for Working Professionals)	MWP4441	Big Data Analytics Hadoop	2022
352	13622	Master of Business Administration (Executive for Working Professionals)	MWP4442	Data Mining	2022
353	13395	Master of Business Administration (Hospital & Healthcare Management)	HHM4101	Hospital Organization and Management Process	2022
354	13395	Master of Business Administration (Hospital & Healthcare Management)	HHM4102	Accounting for Management	2022
355	13395	Master of Business Administration (Hospital & Healthcare Management)	HHM4103	Marketing Management	2022
356	13395	Master of Business Administration (Hospital & Healthcare Management)	HHM4104	Biostatistics	2022
357	13395	Master of Business Administration (Hospital & Healthcare Management)	HHM4105	Medical Terminology & Medical Records	2022
358	13395	Master of Business Administration (Hospital & Healthcare Management)	HHM4106	Essentials of Healthcare Systems	2022
359	13395	Master of Business Administration (Hospital & Healthcare Management)	HHM4108	Human Resource Management	2022
360	13395	Master of Business Administration (Hospital & Healthcare Management)	HHM4109	Information Technology and E-Commerce	2022

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361	13395	Master of Business Administration (Hospital & Healthcare Management)	HHM4201	Financial Management	2022
362	13395	Master of Business Administration (Hospital & Healthcare Management)	HHM4203	Research Methodology	2022
363	13395	Master of Business Administration (Hospital & Healthcare Management)	HHM4204	Health Economics	2022
364	13395	Master of Business Administration (Hospital & Healthcare Management)	HHM4205	Hospital Planning	2022
365	13395	Master of Business Administration (Hospital & Healthcare Management)	HHM4206	Hospital Materials Management	2022
366	13395	Master of Business Administration (Hospital & Healthcare Management)	HHM4207	International Business Environment & Practices	2022
367	13395	Master of Business Administration (Hospital & Healthcare Management)	HHM4208	Epidemiology	2022
368	13395	Master of Business Administration (Hospital & Healthcare Management)	HHM4209	Excel for Managers	2022
369	13395	Master of Business Administration (Hospital & Healthcare Management)	HHM4231	Term Paper	2022
370	13395	Master of Business Administration (Hospital & Healthcare Management)	HHM4302	Medical & Health Laws	2022
371	13395	Master of Business Administration (Hospital & Healthcare Management)	HHM4303	Management of Clinical Services	2022
372	13395	Master of Business Administration (Hospital & Healthcare Management)	HHM4304	Strategic Management	2022
373	13395	Master of Business Administration (Hospital & Healthcare Management)	HHM4305	Operations Research	2022
374	13395	Master of Business Administration (Hospital & Healthcare Management)	HHM4307	Quality Management in Hospitals	2022
375	13395	Master of Business Administration (Hospital & Healthcare Management)	HHM4308	Management of Support & Utility Services	2022


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376	13395	Master of Business Administration (Hospital & Healthcare Management)	HHM4335	Summer Internship Evaluation	2022
377	13395	Master of Business Administration (Hospital & Healthcare Management)	HHM4401	Hospital Management Information System	2022
378	13395	Master of Business Administration (Hospital & Healthcare Management)	HHM4402	Health Insurance and Medical Tourism	2022
379	13395	Master of Business Administration (Hospital & Healthcare Management)	HHM4406	Entrepreneurship and Consultancy in Healthcare	2022
380	13395	Master of Business Administration (Hospital & Healthcare Management)	HHM4407	Hospital Service Marketing	2022
381	13395	Master of Business Administration (Hospital & Healthcare Management)	HHM4408	Disaster Management	2022
382	13395	Master of Business Administration (Hospital & Healthcare Management)	HHM4437	Dissertation	2022
383	131108	Master of Business Administration (Business Analytics)	BUA4101	Management Process and Organizational Behaviour	2022
384	131108	Master of Business Administration (Business Analytics)	BUA4102	Accounting for Management	2022
385	131108	Master of Business Administration (Business Analytics)	BUA4103	Marketing Management	2022
386	131108	Master of Business Administration (Business Analytics)	BUA4104	Statistical Techniques	2022
387	131108	Master of Business Administration (Business Analytics)	BUA4105	Excel for Decision Making	2022
388	131108	Master of Business Administration (Business Analytics)	BUA4106	Optimization Techniques	2022
389	131108	Master of Business Administration (Business Analytics)	BUA4107	Database Management System	2022
390	131108	Master of Business Administration (Business Analytics)	BUA4108	Human Resource Management	2022
391	131108	Master of Business Administration (Business Analytics)	BUA4201	Financial Management	2022
392	131108	Master of Business Administration (Business Analytics)	BUA4202	Operations and Supply Chain Management	2022
393	131108	Master of Business Administration (Business Analytics)	BUA4203	Econometrics	2022
394	131108	Master of Business Administration (Business Analytics)	BUA4204	Business Research Methods	2022

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395	131108	Master of Business Administration (Business Analytics)	BUA4205	Economics for Management	2022
396	131108	Master of Business Administration (Business Analytics)	BUA4206	Programming for Analytics using R	2022
397	131108	Master of Business Administration (Business Analytics)	BUA4207	Programming for Analytics using Python	2022
398	131108	Master of Business Administration (Business Analytics)	BUA4208	Consumer Behaviour	2022
399	131108	Master of Business Administration (Business Analytics)	BUA4301	Strategic Management	2022
400	131108	Master of Business Administration (Business Analytics)	BUA4302	Datamining	2022
401	131108	Master of Business Administration (Business Analytics)	BUA4303	Predictive Analytics-I Machine Learning using R	2022
402	131108	Master of Business Administration (Business Analytics)	BUA4304	Predictive Analytics-II Machine Learning using Python	2022
403	131108	Master of Business Administration (Business Analytics)	BUA4305	Big Data Analytics- Hadoop	2022
404	131108	Master of Business Administration (Business Analytics)	BUA4306	Financial Decision Analysis	2022
405	131108	Master of Business Administration (Business Analytics)	BUA4307	Visual Analytics- Tableau/ Power BI	2022
406	131108	Master of Business Administration (Business Analytics)	BUA4335	Summer Internship Evaluation	2022
407	131108	Master of Business Administration (Business Analytics)	BUA4401	Total Quality Management	2022
408	131108	Master of Business Administration (Business Analytics)	BUA4402	Financial Analytics	2022
409	131108	Master of Business Administration (Business Analytics)	BUA4403	Supply Chain Analytics	2022
410	131108	Master of Business Administration (Business Analytics)	BUA4404	HR Analytics	2022
411	131108	Master of Business Administration (Business Analytics)	BUA4405	Marketing Analytics	2022
412	131108	Master of Business Administration (Business Analytics)	BUA4406	Data Privacy and Data Security Laws	2022
413	131108	Master of Business Administration (Business Analytics)	BUA4437	Dissertation (Analytics Project)	2022
414	13182	Bachelor of Arts (Hons.) (Economics)	ECO2151	Micro Economics-I	2022
415	13182	Bachelor of Arts (Hons.) (Economics)	ECO2101	Mathematical Methods for Economics	2022
416	13182	Bachelor of Arts (Hons.) (Economics)	ECO2102	Economic History of India(1857-1947)	2022

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417	13182	Bachelor of Arts (Hons.) (Economics)	ECO2103	History of Economic Thought	2022
418	13182	Bachelor of Arts (Hons.) (Economics)	ECO2104	Economic System and Society	2022
419	13182	Bachelor of Arts (Hons.) (Economics)	MGT2101	Computers in Management	2022
420	13182	Bachelor of Arts (Hons.) (Economics)	COM2103	E Commerce	2022
421	13182	Bachelor of Arts (Hons.) (Economics)	ECO2131	Term Paper	2022
422	13182	Bachelor of Arts (Hons.) (Economics)	ECO2132	Project (with Presentation & Evaluation)	2022
423	13182	Bachelor of Arts (Hons.) (Economics)	ECO2133	Workshop / Certification (Discipline Specific) (1credit per workshop)	2022
424	13182	Bachelor of Arts (Hons.) (Economics)	ECO2134	Study Abroad	2022
425	13182	Bachelor of Arts (Hons.) (Economics)	ECO2251	Indian Economy	2022
426	13182	Bachelor of Arts (Hons.) (Economics)	ECO2201	Micro Economics-II	2022
427	13182	Bachelor of Arts (Hons.) (Economics)	ECO2202	Statistical Methods in Economics-I	2022
428	13182	Bachelor of Arts (Hons.) (Economics)	ECO2203	Environmental Economics	2022
429	13182	Bachelor of Arts (Hons.) (Economics)	ECO2204	Insurance and Economics	2022
430	13182	Bachelor of Arts (Hons.) (Economics)	MGT2204	Analysis & Design of Business System	2022
431	13182	Bachelor of Arts (Hons.) (Economics)	MGT2205	Innovation & Creativity Management	2022
432	13182	Bachelor of Arts (Hons.) (Economics)	MGT2206	Human Values & Professional Ethics	2022
433	13182	Bachelor of Arts (Hons.) (Economics)	ECO2230	Readings in Economics	2022
434	13182	Bachelor of Arts (Hons.) (Economics)	ECO2231	Term Paper	2022
435	13182	Bachelor of Arts (Hons.) (Economics)	ECO2232	Project (With Presentation & Evaluation)	2022
436	13182	Bachelor of Arts (Hons.) (Economics)	ECO2233	Workshop / Certification (Discipline Specific) (1credit per workshop)	2022
437	13182	Bachelor of Arts (Hons.) (Economics)	ECO2234	Study Abroad	2022

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438	13182	Bachelor of Arts (Hons.) (Economics)	ECO2351	Macro Economics-I	2022
439	13182	Bachelor of Arts (Hons.) (Economics)	ECO2301	Industrial Economics	2022
440	13182	Bachelor of Arts (Hons.) (Economics)	ECO2302	Statistical Methods in Economics-II	2022
441	13182	Bachelor of Arts (Hons.) (Economics)	ECO2303	Economics of Entrepreneurship	2022
442	13182	Bachelor of Arts (Hons.) (Economics)	ECO2304	Mergers & Acquisitions	2022
443	13182	Bachelor of Arts (Hons.) (Economics)	ECO2305	Agricultural Economics	2022
444	13182	Bachelor of Arts (Hons.) (Economics)	MGT2305	Industrial Psychology	2022
445	13182	Bachelor of Arts (Hons.) (Economics)	ECO2331	Term paper	2022
446	13182	Bachelor of Arts (Hons.) (Economics)	ECO2332	Project (With Presentation & Evaluation)	2022
447	13182	Bachelor of Arts (Hons.) (Economics)	ECO2333	Workshop / Certification (Discipline Specific) (1credit per workshop)	2022
448	13182	Bachelor of Arts (Hons.) (Economics)	ECO2334	Study Abroad	2022
449	13182	Bachelor of Arts (Hons.) (Economics)	ECO2403	Research Methodology	2022
450	13182	Bachelor of Arts (Hons.) (Economics)	ECO2401	Macro Economics-II	2022
451	13182	Bachelor of Arts (Hons.) (Economics)	ECO2402	Comparative Economic Development	2022
452	13182	Bachelor of Arts (Hons.) (Economics)	ECO2451	Public Finance	2022
453	13182	Bachelor of Arts (Hons.) (Economics)	ECO2404	Economics of Infrastructure	2022
454	13182	Bachelor of Arts (Hons.) (Economics)	MGT2404	Business Information & Data Base System	2022
455	13182	Bachelor of Arts (Hons.) (Economics)	MGT2405	Personal Financial Planning	2022
456	13182	Bachelor of Arts (Hons.) (Economics)	MGT2406	Sales & Distribution Management	2022
457	13182	Bachelor of Arts (Hons.) (Economics)	ECO2431	Term paper	2022
458	13182	Bachelor of Arts (Hons.) (Economics)	ECO2432	Project(With Presentation & Evaluation)	2022

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459	13182	Bachelor of Arts (Hons.) (Economics)	ECO2433	Workshop / Certification (Discipline Specific) * (1credit per workshop)	2022
460	13182	Bachelor of Arts (Hons.) (Economics)	ECO2434	Study Abroad	2022
461	13182	Bachelor of Arts (Hons.) (Economics)	ECO2551	Econometrics- Basic Theory & Application	2022
462	13182	Bachelor of Arts (Hons.) (Economics)	ECO2501	International Economics	2022
463	13182	Bachelor of Arts (Hons.) (Economics)	ECO2502	Money & Financial Markets	2022
464	13182	Bachelor of Arts (Hons.) (Economics)	ECO2503	Urban Economics	2022
465	13182	Bachelor of Arts (Hons.) (Economics)	ECO2535	Summer Internship Evaluation	2022
466	13182	Bachelor of Arts (Hons.) (Economics)	ECO2504	Demography	2022
467	13182	Bachelor of Arts (Hons.) (Economics)	MGT2507	Principles of Investment Management	2022
468	13182	Bachelor of Arts (Hons.) (Economics)	MGT2512	Relational Database Management System	2022
469	13182	Bachelor of Arts (Hons.) (Economics)	ECO2531	Term paper	2022
470	13182	Bachelor of Arts (Hons.) (Economics)	ECO2532	Project(With Presentation & Evaluation)	2022
471	13182	Bachelor of Arts (Hons.) (Economics)	ECO2533	Workshop / Certification (Discipline Specific) (1credit per workshop)	2022
472	13182	Bachelor of Arts (Hons.) (Economics)	ECO2534	Study Abroad	2022
473	13182	Bachelor of Arts (Hons.) (Economics)	ECO2601	Economic Growth & Development	2022
474	13182	Bachelor of Arts (Hons.) (Economics)	ECO2602	Labour Economics	2022
475	13182	Bachelor of Arts (Hons.) (Economics)	ECO2603	Banking & Financial Institutions	2022
476	13182	Bachelor of Arts (Hons.) (Economics)	ECO2637	Dissertation	2022
477	13182	Bachelor of Arts (Hons.) (Economics)	ECO2604	Health Economics	2022
478	13182	Bachelor of Arts (Hons.) (Economics)	ECO2631	Term paper	2022
479	13182	Bachelor of Arts (Hons.) (Economics)	ECO 2633	Workshop / Certification (Discipline Specific) (1credit per workshop)	2022

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Sl. No.	Programme Code	Name of Programme	Course Code	Course Name	Year
480	13182	Bachelor of Arts (Hons.) (Economics)	ECO2634	Study Abroad	2022
481	13301	Master of Arts (Economics)	ECO4101	Micro Economic Theory & Application	2022
482	13301	Master of Arts (Economics)	ECO4102	Macro Economic Theory & Application	2022
483	13301	Master of Arts (Economics)	ECO4103	Computer Application in Economic Analysis	2022
484	13301	Master of Arts (Economics)	ECO4104	Mathematics for Economics	2022
485	13301	Master of Arts (Economics)	ECO4105	Indian Economy-Issues & Policy	2022
486	13301	Master of Arts (Economics)	ECO4201	Statistics for Economics	2022
487	13301	Master of Arts (Economics)	ECO4202	Mathematical Economics	2022
488	13301	Master of Arts (Economics)	ECO4203	Public Finance in India	2022
489	13301	Master of Arts (Economics)	ECO4204	Advanced Micro Economic Theory & Application	2022
490	13301	Master of Arts (Economics)	ECO4205	Advanced Macro Economic Theory & Application	2022
491	13301	Master of Arts (Economics)	ECO4206	Economics of Growth & Development	2022
492	13301	Master of Arts (Economics)	ECO4231	Term Paper/Review of Dissertation-I	2022
493	13301	Master of Arts (Economics)	ECO4301	Fundamentals of Econometrics	2022
494	13301	Master of Arts (Economics)	ECO4302	Money & Financial Markets	2022
495	13301	Master of Arts (Economics)	ECO4303	Research Methods in Economics	2022
496	13301	Master of Arts (Economics)	ECO4331	Term Paper/Review of Dissertation-II	2022
497	13301	Master of Arts (Economics)	ECO4335	Summer Internship Evaluation	2022
498	13301	Master of Arts (Economics)	ECO4304	Industrial Economics	2022
499	13301	Master of Arts (Economics)	ECO4305	Agricultural Economics of India: Incentives & Decision Making	2022
500	13301	Master of Arts (Economics)	ECO4306	Economic Development & Policy in India	2022
501	13301	Master of Arts (Economics)	ECO4307	Labour Economics	2022
502	13301	Master of Arts (Economics)	ECO4308	Public Financial Administration	2022
503	13301	Master of Arts (Economics)	ECO4309	Environmental Economics	2022
504	13301	Master of Arts (Economics)	ECO4401	Advanced Econometrics	2022
505	13301	Master of Arts (Economics)	ECO4402	Monetary Economics	2022
506	13301	Master of Arts (Economics)	ECO4403	International Economics	2022
507	13301	Master of Arts (Economics)	ECO4437	Dissertation	2022
508	13301	Master of Arts (Economics)	ECO4404	Entrepreneurship & Small Scale Business	2022

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509	13301	Master of Arts (Economics)	ECO4405	Indian Agriculture-Markets, Institutions & Technology	2022
510	13301	Master of Arts (Economics)	ECO4406	Comparative Economic Development	2022
511	13301	Master of Arts (Economics)	ECO4407	Urban Economics	2022
512	13301	Master of Arts (Economics)	ECO4408	Applied Welfare Economics	2022
513	13301	Master of Arts (Economics)	ECO4409	Resource Economics	2022
514	13046	Bachelor of Commerce (Hons.)	COM2151	Financial Accounting-I	2022
515	13046	Bachelor of Commerce (Hons.)	COM2101	Business Organization & Management	2022
516	13046	Bachelor of Commerce (Hons.)	COM2102	Microeconomic Theory & Applications	2022
517	13046	Bachelor of Commerce (Hons.)	COM2104	Principles of Marketing	2022
518	13046	Bachelor of Commerce (Hons.)	COM2103	E-commerce	2022
519	13046	Bachelor of Commerce (Hons.)	COM2130	Readings in Management	2022
520	13046	Bachelor of Commerce (Hons.)	COM2131	Term Paper	2022
521	13046	Bachelor of Commerce (Hons.)	COM2132	Project (with Presentation & Evaluation)	2022
522	13046	Bachelor of Commerce (Hons.)	COM2133	Workshop / Certification (Discipline Specific) (1credit per workshop)	2022
523	13046	Bachelor of Commerce (Hons.)	COM2134	Study Abroad	2022
524	13046	Bachelor of Commerce (Hons.)	COM2251	Financial Accounting-II	2022
525	13046	Bachelor of Commerce (Hons.)	COM2201	Business Mathematics	2022
526	13046	Bachelor of Commerce (Hons.)	COM2202	Business & Economic Laws	2022
527	13046	Bachelor of Commerce (Hons.)	COM2205	Advertising Management	2022
528	13046	Bachelor of Commerce (Hons.)	COM2204	Computer Applications in Business	2022
529	13046	Bachelor of Commerce (Hons.)	COM2206	Analysis & Design of Business System	2022
530	13046	Bachelor of Commerce (Hons.)	COM2207	Innovation & Creativity Management	2022
531	13046	Bachelor of Commerce (Hons.)	COM2208	Human Values & Professional Ethics	2022
532	13046	Bachelor of Commerce (Hons.)	COM2230	Readings in Management	2022
533	13046	Bachelor of Commerce (Hons.)	COM2231	Term Paper	2022
534	13046	Bachelor of Commerce (Hons.)	COM2232	Project(with Presentation &Evaluation)	2022
535	13046	Bachelor of Commerce (Hons.)	COM2233	Workshop/ Certification (Discipline Specific) (1credit per workshop)	2022
536	13046	Bachelor of Commerce (Hons.)	COM2234	Study Abroad	2022
537	13046	Bachelor of Commerce (Hons.)	COM2351	Corporate Accounting	2022

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538	13046	Bachelor of Commerce (Hons.)	COM2301	Statistical Methods in Research – I	2022
539	13046	Bachelor of Commerce (Hons.)	COM2302	Corporate Law	2022
540	13046	Bachelor of Commerce (Hons.)	COM2303	Human Resource Management	2022
541	13046	Bachelor of Commerce (Hons.)	COM2304	Sales & Distribution Management	2022
542	13046	Bachelor of Commerce (Hons.)	COM2305	Mergers & Acquisitions	2022
543	13046	Bachelor of Commerce (Hons.)	COM2331	Term Paper(Evaluation)	2022
544	13046	Bachelor of Commerce (Hons.)	COM2332	Project (with Presentation & Evaluation)	2022
545	13046	Bachelor of Commerce (Hons.)	COM2333	Workshop / Certification (Discipline Specific) (1credit per workshop)	2022
546	13046	Bachelor of Commerce (Hons.)	COM2334	Study Abroad	2022
547	13046	Bachelor of Commerce (Hons.)	COM2451	Financial Management	2022
548	13046	Bachelor of Commerce (Hons.)	COM2401	Auditing	2022
549	13046	Bachelor of Commerce (Hons.)	COM2402	Statistical Methods in Research – II	2022
550	13046	Bachelor of Commerce (Hons.)	COM2403	Income Tax Law & Practice	2022
551	13046	Bachelor of Commerce (Hons.)	COM2404	Business Information & Data Base System	2022
552	13046	Bachelor of Commerce (Hons.)	COM2405	Personal Financial Planning	2022
553	13046	Bachelor of Commerce (Hons.)	COM2431	Term Paper	2022
554	13046	Bachelor of Commerce (Hons.)	COM2432	Project (with Presentation & Evaluation)	2022
555	13046	Bachelor of Commerce (Hons.)	COM2433	Workshop / Certification (Discipline Specific) (1credit per workshop)	2022
556	13046	Bachelor of Commerce (Hons.)	COM2434	Study Abroad	2022
557	13046	Bachelor of Commerce (Hons.)	COM2551	Cost Accounting	2022
558	13046	Bachelor of Commerce (Hons.)	COM2501	Macro Economics	2022
559	13046	Bachelor of Commerce (Hons.)	COM2535	Summer Internship Evaluation	2022
560	13046	Bachelor of Commerce (Hons.)	COM2502	Accounting Theory	2022
561	13046	Bachelor of Commerce (Hons.)	COM2503	Advanced Corporate Accounting	2022
562	13046	Bachelor of Commerce (Hons.)	COM2504	Corporate Tax Law and Practice	2022
563	13046	Bachelor of Commerce (Hons.)	COM2505	Business Taxation	2022
564	13046	Bachelor of Commerce (Hons.)	COM2651	Management Accounting	2022
565	13046	Bachelor of Commerce (Hons.)	COM2606	Security Analysis and Portfolio Management	2022
566	13046	Bachelor of Commerce (Hons.)	COM2637	Dissertation	2022
567	13046	Bachelor of Commerce (Hons.)	COM2602	Advanced Accounts	2022
568	13046	Bachelor of Commerce (Hons.)	COM2603	Advanced Cost Accounting	2022
569	13046	Bachelor of Commerce (Hons.)	COM2604	Indirect Taxes including GST	2022

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570	13046	Bachelor of Commerce (Hons.)	COM2605	Public Finance and Tax Practices	2022
571	13576	Master of Commerce	COM4101	Organization Theory & Behaviour	2022
572	13576	Master of Commerce	COM4102	Quantitative Techniques for Business Decisions	2022
573	13576	Master of Commerce	COM4103	Economic Analysis for Business	2022
574	13576	Master of Commerce	COM4104	Financial Management & Policy	2022
575	13576	Master of Commerce	COM4105	Auditing	2022
576	13576	Master of Commerce	COM4106	Computer Applications in Business	2022
577	13576	Master of Commerce	COM4201	Managerial Accounting	2022
578	13576	Master of Commerce	COM4202	Business Environment	2022
579	13576	Master of Commerce	COM4203	Corporate Accounting	2022
580	13576	Master of Commerce	COM4204	Marketing Management	2022
581	13576	Master of Commerce	COM4205	E-Commerce	2022
582	13576	Master of Commerce	COM4206	Human Resource Management	2022
583	13576	Master of Commerce	COM4301	Corporate Law	2022
584	13576	Master of Commerce	COM4302	Cost Accounting	2022
585	13576	Master of Commerce	COM4303	Advance Business Statistics & Research Methodology	2022
586	13576	Master of Commerce	COM4304	Income Tax Law & Practice	2022
587	13576	Master of Commerce	COM4335	Summer Internship Evaluation	2022
588	13576	Master of Commerce	COM4305	Tax Planning & Tax Management	2022
589	13576	Master of Commerce	COM4306	Management Control and Information System	2022
590	13576	Master of Commerce	COM4307	Financial Market and Institutions	2022
591	13576	Master of Commerce	COM4308	Project Management & Financial Services	2022
592	13576	Master of Commerce	COM4309	International Marketing	2022
593	13576	Master of Commerce	COM4310	Advertising and Sales Management	2022
594	13576	Master of Commerce	COM4311	Human Resource Development	2022
595	13576	Master of Commerce	COM4312	Industrial Relations	2022
596	13576	Master of Commerce	COM4401	International Business	2022
597	13576	Master of Commerce	COM4402	Corporate Tax Planning	2022
598	13576	Master of Commerce	COM4403	Strategic Management	2022
599	13576	Master of Commerce	COM4404	Industrial Law	2022
600	13576	Master of Commerce	COM4437	Dissertation	2022
601	13576	Master of Commerce	COM4405	International Accounting	2022
602	13576	Master of Commerce	COM4406	Principles & Practice of Taxation & Indian Tax System	2022

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603	13576	Master of Commerce	COM4407	Security Analysis & Portfolio Management	2022
604	13576	Master of Commerce	COM4408	International Financial Management	2022
605	13576	Master of Commerce	COM4409	Marketing Research	2022
606	13576	Master of Commerce	COM4410	Consumer Behaviour	2022
607	13576	Master of Commerce	COM4411	Training and Development	2022
608	13576	Master of Commerce	COM4412	Management of Transformation	2022
609	13289	Bachelor of Hotel Management	HMC2101	Food Production Foundation-I	2022
610	13289	Bachelor of Hotel Management	HMC2102	Food & Beverage Service Foundation-I	2022
611	13289	Bachelor of Hotel Management	HMC2103	Front Office Foundation	2022
612	13289	Bachelor of Hotel Management	HMC2104	Housekeeping Foundation	2022
613	13289	Bachelor of Hotel Management	HMC2105	Application of Computers	2022
614	13289	Bachelor of Hotel Management	HMC2106	Food Production Foundation Lab-I	2022
615	13289	Bachelor of Hotel Management	HMC2107	Food & Beverage Service Foundation Lab-I	2022
616	13289	Bachelor of Hotel Management	HMC2108	Front Office Foundation Lab	2022
617	13289	Bachelor of Hotel Management	HMC2109	Housekeeping Foundation Lab	2022
618	13289	Bachelor of Hotel Management	HMC2110	Application of Computers Lab	2022
619	13289	Bachelor of Hotel Management	HMC2111	Field Work Project-I	2022
620	13289	Bachelor of Hotel Management	HMC2201	Food Production Foundation-II	2022
621	13289	Bachelor of Hotel Management	HMC2202	Food & Beverage Service Foundation-II	2022
622	13289	Bachelor of Hotel Management	HMC2203	Front Office Operation-I	2022
623	13289	Bachelor of Hotel Management	HMC2204	Housekeeping Operation-I	2022
624	13289	Bachelor of Hotel Management	HMC2205	Food Science & Nutrition	2022
625	13289	Bachelor of Hotel Management	HMC2206	Fundamentals of Accounting-I	2022
626	13289	Bachelor of Hotel Management	HMC2207	Food Production Foundation Lab-II	2022
627	13289	Bachelor of Hotel Management	HMC2208	Food & Beverage Service Foundation Lab-II	2022
628	13289	Bachelor of Hotel Management	HMC2209	Front Office Operation Lab-I	2022
629	13289	Bachelor of Hotel Management	HMC2210	Housekeeping Operation Lab-I	2022
630	13289	Bachelor of Hotel Management	HMC2211	Field Work Project-II	2022
631	13289	Bachelor of Hotel Management	HMC2301	Food Production Operations-I	2022
632	13289	Bachelor of Hotel Management	HMC2302	Food & Beverage Service Operations-I	2022
633	13289	Bachelor of Hotel Management	HMC2303	Front Office Operation-II	2022
634	13289	Bachelor of Hotel Management	HMC2304	Housekeeping Operation-II	2022
635	13289	Bachelor of Hotel Management	HMC2305	Food Safety & Hygiene	2022

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636	13289	Bachelor of Hotel Management	HMC2306	Fundamentals of Accounting-II	2022
637	13289	Bachelor of Hotel Management	HMC2307	Hotel Engineering	2022
638	13289	Bachelor of Hotel Management	HMC2308	Food Production Operations Lab-I	2022
639	13289	Bachelor of Hotel Management	HMC2309	Food & Beverage Service Operations Lab-I	2022
640	13289	Bachelor of Hotel Management	HMC2310	Front Office Operation Lab-II	2022
641	13289	Bachelor of Hotel Management	HMC2311	Housekeeping Operation Lab-II	2022
642	13289	Bachelor of Hotel Management	HMC2401	Food Production Operations-II	2022
643	13289	Bachelor of Hotel Management	HMC2402	Food & Beverage Service Operations-II	2022
644	13289	Bachelor of Hotel Management	HMC2403	Front Office Management-I	2022
645	13289	Bachelor of Hotel Management	HMC2404	Housekeeping Management-I	2022
646	13289	Bachelor of Hotel Management	HMC2405	Hotel Information System	2022
647	13289	Bachelor of Hotel Management	HMC2406	Principles of Management	2022
648	13289	Bachelor of Hotel Management	HMC2407	Economics of Hospitality	2022
649	13289	Bachelor of Hotel Management	HMC2408	Food Production Operations Lab-II	2022
650	13289	Bachelor of Hotel Management	HMC2409	Food & Beverage Service Operations Lab-II	2022
651	13289	Bachelor of Hotel Management	HMC2410	Front Office Management Lab	2022
652	13289	Bachelor of Hotel Management	HMC2411	Housekeeping Management Lab	2022
653	13289	Bachelor of Hotel Management	HMC2501	Food Production Training Report	2022
654	13289	Bachelor of Hotel Management	HMC2502	Food & Beverage Service Training Report	2022
655	13289	Bachelor of Hotel Management	HMC2503	Front Office Management Training Report	2022
656	13289	Bachelor of Hotel Management	HMC2504	Housekeeping Management Training Report	2022
657	13289	Bachelor of Hotel Management	HMC2601	Advanced Food Production Operations-I	2022
658	13289	Bachelor of Hotel Management	HMC2602	Advanced Food & Beverage Service Operations-I	2022
659	13289	Bachelor of Hotel Management	HMC2603	Front Office Management-II	2022
660	13289	Bachelor of Hotel Management	HMC2604	Housekeeping Management-II	2022
661	13289	Bachelor of Hotel Management	HMC2605	Introduction to Tourism	2022
662	13289	Bachelor of Hotel Management	HMC2606	Hospitality Marketing	2022
663	13289	Bachelor of Hotel Management	HMC2607	Managerial Accounting	2022
664	13289	Bachelor of Hotel Management	HMC2608	Advanced Food Production Operations Lab-I	2022
665	13289	Bachelor of Hotel Management	HMC2609	Advanced Food & Beverage Service Operations Lab-I	2022
666	13289	Bachelor of Hotel Management	HMC2610	Front Office Management Lab-II	2022

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667	13289	Bachelor of Hotel Management	HMC2611	Housekeeping Management Lab-II	2022
668	13289	Bachelor of Hotel Management	HMC2701	Advanced Food Production-II	2022
669	13289	Bachelor of Hotel Management	HMC2702	Advanced Food & Beverage Service –II	2022
670	13289	Bachelor of Hotel Management	HMC2703	Advanced Front Office Management	2022
671	13289	Bachelor of Hotel Management	HMC2704	Accommodation Management	2022
672	13289	Bachelor of Hotel Management	HMC2705	Facility Management, Planning & Design	2022
673	13289	Bachelor of Hotel Management	HMC2706	Hospitality Law	2022
674	13289	Bachelor of Hotel Management	HMC2707	Human Resource Management	2022
675	13289	Bachelor of Hotel Management	HMC2708	Entrepreneurship Development	2022
676	13289	Bachelor of Hotel Management	HMC2709	Event Management	2022
677	13289	Bachelor of Hotel Management	HMC2710	Advanced Food Production Operations Lab-II	2022
678	13289	Bachelor of Hotel Management	HMC2711	Advanced Food & Beverage Service Operations Lab-II	2022
679	13289	Bachelor of Hotel Management	HMC2801	Basics of Revenue Management	2022
680	13289	Bachelor of Hotel Management	HMC2802	Indian Heritage	2022
681	13289	Bachelor of Hotel Management	HMC2803	Research Methodology	2022
682	13289	Bachelor of Hotel Management	HMC2804	Specialization Course Lab	2022
683	13289	Bachelor of Hotel Management	HMC2805	GDPI Sessions	2022
684	13289	Bachelor of Hotel Management	HMC2837	Research Project	2022
685	13407	Bachelor of Science (Clinical Psychology)	PSY2151	Introductory Psychology	2022
686	13407	Bachelor of Science (Clinical Psychology)	PSY2101	Elementary Statistics	2022
687	13407	Bachelor of Science (Clinical Psychology)	PSY2102	Experimental Psychology-I	2022
688	13407	Bachelor of Science (Clinical Psychology)	PSY2103	Psychological Practical-I	2022
689	13407	Bachelor of Science (Clinical Psychology)	PSY2104	System and Approaches in Psychology	2022
690	13407	Bachelor of Science (Clinical Psychology)	PSY2105	Human Rights, Values and Ethics	2022
691	13407	Bachelor of Science (Clinical Psychology)	PSY2130	Reading in Psychology	2022
692	13407	Bachelor of Science (Clinical Psychology)	PSY2132	Project (with Presentation & Evaluation)	2022
693	13407	Bachelor of Science (Clinical Psychology)	PSY2136	Article/ Feature Writing	2022

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694	13407	Bachelor of Science (Clinical Psychology)	PSY2251	Abnormal Psychology	2022
695	13407	Bachelor of Science (Clinical Psychology)	PSY2201	Advance Statistics	2022
696	13407	Bachelor of Science (Clinical Psychology)	PSY2202	Experimental Psychology-II	2022
697	13407	Bachelor of Science (Clinical Psychology)	PSY2203	Psychological Practical-II	2022
698	13407	Bachelor of Science (Clinical Psychology)	PSY2204	Industrial Psychology	2022
699	13407	Bachelor of Science (Clinical Psychology)	PSY2205	Organizational Behaviour	2022
700	13407	Bachelor of Science (Clinical Psychology)	PSY2230	Readings in Psychology	2022
701	13407	Bachelor of Science (Clinical Psychology)	PSY2232	Project (with Presentation & Evaluation)	2022
702	13407	Bachelor of Science (Clinical Psychology)	PSY2236	Article/ Feature Writing	2022
703	13407	Bachelor of Science (Clinical Psychology)	PSY2351	Basic Cognitive Psychology	2022
704	13407	Bachelor of Science (Clinical Psychology)	PSY2301	Social Psychology	2022
705	13407	Bachelor of Science (Clinical Psychology)	PSY2302	Psychological Practical-III	2022
706	13407	Bachelor of Science (Clinical Psychology)	PSY2303	Health Psychology	2022
707	13407	Bachelor of Science (Clinical Psychology)	PSY2335	Summer Project Evaluation-I	2022
708	13407	Bachelor of Science (Clinical Psychology)	PSY2304	Sports Psychology	2022
709	13407	Bachelor of Science (Clinical Psychology)	PSY2330	Readings in Psychology	2022
710	13407	Bachelor of Science (Clinical Psychology)	PSY2331	Term paper	2022
711	13407	Bachelor of Science (Clinical Psychology)	PSY2332	Project (with Presentation & Evaluation)	2022
712	13407	Bachelor of Science (Clinical Psychology)	PSY2333	Workshop / Certification (Discipline Specific) (1 Credit per workshop)	2022
713	13407	Bachelor of Science (Clinical Psychology)	PSY2336	Article/ Feature Writing	2022
714	13407	Bachelor of Science (Clinical Psychology)	PSY2451	Life Span Development	2022
715	13407	Bachelor of Science (Clinical Psychology)	PSY2401	Personality	2022

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716	13407	Bachelor of Science (Clinical Psychology)	PSY2402	Psychological Practical-IV	2022
717	13407	Bachelor of Science (Clinical Psychology)	PSY2403	Physiological Psychology	2022
718	13407	Bachelor of Science (Clinical Psychology)	PSY2404	Advance Cognitive Process	2022
719	13407	Bachelor of Science (Clinical Psychology)	PSY2405	Environmental Psychology	2022
720	13407	Bachelor of Science (Clinical Psychology)	PSY2406	Applied Social Psychology	2022
721	13407	Bachelor of Science (Clinical Psychology)	PSY2430	Readings in Psychology	2022
722	13407	Bachelor of Science (Clinical Psychology)	PSY2431	Term paper	2022
723	13407	Bachelor of Science (Clinical Psychology)	PSY2432	Project (with Presentation & Evaluation)	2022
724	13407	Bachelor of Science (Clinical Psychology)	PSY2433	Workshop / Certification (Discipline Specific) (1 Credit per workshop)	2022
725	13407	Bachelor of Science (Clinical Psychology)	PSY2436	Article/ Feature Writing	2022
726	13407	Bachelor of Science (Clinical Psychology)	PSY2551	Psychometric Testing	2022
727	13407	Bachelor of Science (Clinical Psychology)	PSY2501	Psychological Practical-V	2022
728	13407	Bachelor of Science (Clinical Psychology)	PSY2502	Clinical Psychology	2022
729	13407	Bachelor of Science (Clinical Psychology)	PSY2535	Summer Project Evaluation-II	2022
730	13407	Bachelor of Science (Clinical Psychology)	PSY2503	Educational Psychology	2022
731	13407	Bachelor of Science (Clinical Psychology)	PSY2504	Child Psychology	2022
732	13407	Bachelor of Science (Clinical Psychology)	PSY2505	Scientific Research Paper-I	2022
733	13407	Bachelor of Science (Clinical Psychology)	PSY2532	Project (with Presentation & Evaluation)	2022
734	13407	Bachelor of Science (Clinical Psychology)	PSY2651	Counselling Psychology	2022
735	13407	Bachelor of Science (Clinical Psychology)	PSY2601	School Counseling	2022
736	13407	Bachelor of Science (Clinical Psychology)	PSY2602	Psychological Practical-VI	2022
737	13407	Bachelor of Science (Clinical Psychology)	PSY2637	Dissertation	2022

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738	13407	Bachelor of Science (Clinical Psychology)	PSY2603	Psychology of Children with Special Needs	2022
739	13407	Bachelor of Science (Clinical Psychology)	PSY2604	Psychology of Exceptional and gifted Children	2022
740	13407	Bachelor of Science (Clinical Psychology)	PSY2605	Scientific Research Paper-II	2022
741	13407	Bachelor of Science (Clinical Psychology)	PSY2632	Project (with Presentation & Evaluation)	2022
742	13069	Bachelor of Arts (Hons.) (Applied Psychology)	PSY2151	Introductory Psychology	2022
743	13069	Bachelor of Arts (Hons.) (Applied Psychology)	PSY2101	Elementary Statistics	2022
744	13069	Bachelor of Arts (Hons.) (Applied Psychology)	PSY2102	Experimental Psychology-I	2022
745	13069	Bachelor of Arts (Hons.) (Applied Psychology)	PSY2103	Psychological Practical-I	2022
746	13069	Bachelor of Arts (Hons.) (Applied Psychology)	PSY2104	System and Approaches in Psychology	2022
747	13069	Bachelor of Arts (Hons.) (Applied Psychology)	PSY2105	Human Rights, Values and Ethics	2022
748	13069	Bachelor of Arts (Hons.) (Applied Psychology)	PSY2130	Readings in Psychology	2022
749	13069	Bachelor of Arts (Hons.) (Applied Psychology)	PSY2132	Project (with Presentation & Evaluation)	2022
750	13069	Bachelor of Arts (Hons.) (Applied Psychology)	PSY2136	Article/ Feature Writing	2022
751	13069	Bachelor of Arts (Hons.) (Applied Psychology)	PSY2251	Abnormal Psychology	2022
752	13069	Bachelor of Arts (Hons.) (Applied Psychology)	PSY2201	Advance Statistics	2022
753	13069	Bachelor of Arts (Hons.) (Applied Psychology)	PSY2202	Experimental Psychology-II	2022
754	13069	Bachelor of Arts (Hons.) (Applied Psychology)	PSY2203	Psychological Practical-II	2022
755	13069	Bachelor of Arts (Hons.) (Applied Psychology)	PSY2204	Industrial Psychology	2022
756	13069	Bachelor of Arts (Hons.) (Applied Psychology)	PSY2205	Organizational Behaviour	2022
757	13069	Bachelor of Arts (Hons.) (Applied Psychology)	PSY2230	Readings in Psychology	2022
758	13069	Bachelor of Arts (Hons.) (Applied Psychology)	PSY2232	Project (with Presentation & Evaluation)	2022
759	13069	Bachelor of Arts (Hons.) (Applied Psychology)	PSY2236	Article/ Feature Writing	2022


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760	13069	Bachelor of Arts (Hons.) (Applied Psychology)	PSY2351	Basic Cognitive Psychology	2022
761	13069	Bachelor of Arts (Hons.) (Applied Psychology)	PSY2301	Social Psychology	2022
762	13069	Bachelor of Arts (Hons.) (Applied Psychology)	PSY2302	Psychological Practical-III	2022
763	13069	Bachelor of Arts (Hons.) (Applied Psychology)	PSY2304	Sports Psychology	2022
764	13069	Bachelor of Arts (Hons.) (Applied Psychology)	PSY2335	Summer Project Evaluation-I	2022
765	13069	Bachelor of Arts (Hons.) (Applied Psychology)	PSY2303	Health Psychology	2022
766	13069	Bachelor of Arts (Hons.) (Applied Psychology)	PSY2330	Readings in Psychology	2022
767	13069	Bachelor of Arts (Hons.) (Applied Psychology)	PSY2331	Term paper	2022
768	13069	Bachelor of Arts (Hons.) (Applied Psychology)	PSY2332	Project (with Presentation & Evaluation)	2022
769	13069	Bachelor of Arts (Hons.) (Applied Psychology)	PSY2333	Workshop / Certification (Discipline Specific) 1 Credit per workshop)	2022
770	13069	Bachelor of Arts (Hons.) (Applied Psychology)	PSY2336	Article/ Feature Writing	2022
771	13069	Bachelor of Arts (Hons.) (Applied Psychology)	PSY2451	Life Span Development	2022
772	13069	Bachelor of Arts (Hons.) (Applied Psychology)	PSY2401	Personality	2022
773	13069	Bachelor of Arts (Hons.) (Applied Psychology)	PSY2402	Psychological Practical-IV	2022
774	13069	Bachelor of Arts (Hons.) (Applied Psychology)	PSY2405	Environmental Psychology	2022
775	13069	Bachelor of Arts (Hons.) (Applied Psychology)	PSY2406	Applied Social Psychology	2022
776	13069	Bachelor of Arts (Hons.) (Applied Psychology)	PSY2403	Physiological Psychology	2022
777	13069	Bachelor of Arts (Hons.) (Applied Psychology)	PSY2404	Advance Cognitive Process	2022
778	13069	Bachelor of Arts (Hons.) (Applied Psychology)	PSY2430	Readings in Psychology	2022
779	13069	Bachelor of Arts (Hons.) (Applied Psychology)	PSY2431	Term paper	2022
780	13069	Bachelor of Arts (Hons.) (Applied Psychology)	PSY2432	Project (with Presentation & Evaluation)	2022

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781	13069	Bachelor of Arts (Hons.) (Applied Psychology)	PSY2433	Workshop / Certification (Discipline Specific) 1 Credit per workshop)	2022
782	13069	Bachelor of Arts (Hons.) (Applied Psychology)	PSY2436	Article/ Feature Writing	2022
783	13069	Bachelor of Arts (Hons.) (Applied Psychology)	PSY2551	Psychometric Testing	2022
784	13069	Bachelor of Arts (Hons.) (Applied Psychology)	PSY2501	Psychological Practical-V	2022
785	13069	Bachelor of Arts (Hons.) (Applied Psychology)	PSY2503	Educational Psychology	2022
786	13069	Bachelor of Arts (Hons.) (Applied Psychology)	PSY2535	Summer Project Evaluation-II	2022
787	13069	Bachelor of Arts (Hons.) (Applied Psychology)	PSY2502	Clinical Psychology	2022
788	13069	Bachelor of Arts (Hons.) (Applied Psychology)	PSY2504	Child Psychology	2022
789	13069	Bachelor of Arts (Hons.) (Applied Psychology)	PSY2505	Scientific Research Paper-I	2022
790	13069	Bachelor of Arts (Hons.) (Applied Psychology)	PSY2532	Project (with Presentation & Evaluation)	2022
791	13069	Bachelor of Arts (Hons.) (Applied Psychology)	PSY2651	Counseling Psychology	2022
792	13069	Bachelor of Arts (Hons.) (Applied Psychology)	PSY2601	School Counseling	2022
793	13069	Bachelor of Arts (Hons.) (Applied Psychology)	PSY2602	Psychological Practical-VI	2022
794	13069	Bachelor of Arts (Hons.) (Applied Psychology)	PSY2637	Dissertation (based on Applied Psychology)	2022
795	13069	Bachelor of Arts (Hons.) (Applied Psychology)	PSY2605	Scientific Research Paper-II	2022
796	13069	Bachelor of Arts (Hons.) (Applied Psychology)	PSY2606	Positive Psychology	2022
797	13069	Bachelor of Arts (Hons.) (Applied Psychology)	PSY2607	Gender Psychology	2022
798	13069	Bachelor of Arts (Hons.) (Applied Psychology)	PSY2632	Project (with Presentation & Evaluation)	2022
799	13033	Master of Arts (Counselling Psychology)	PSY4101	History and Schools of Psychology	2022
800	13033	Master of Arts (Counselling Psychology)	PSY4102	Cognitive Psychology	2022
801	13033	Master of Arts (Counselling Psychology)	PSY4103	Advanced Social Psychology	2022
802	13033	Master of Arts (Counselling Psychology)	PSY4104	Personality Theory	2022

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803	13033	Master of Arts (Counselling Psychology)	PSY4105	Parametric Statistical Method	2022
804	13033	Master of Arts (Counselling Psychology)	PSY4106	Practicum - I	2022
805	13033	Master of Arts (Counselling Psychology)	PSY4107	Field Practice-I	2022
806	13033	Master of Arts (Counselling Psychology)	PSY4201	Psychopathology	2022
807	13033	Master of Arts (Counselling Psychology)	PSY4202	Psychological Assessment and Diagnosis	2022
808	13033	Master of Arts (Counselling Psychology)	PSY4203	Child Psychology	2022
809	13033	Master of Arts (Counselling Psychology)	PSY4204	Non-Parametric Statistical Method	2022
810	13033	Master of Arts (Counselling Psychology)	PSY4206	Positive Psychology	2022
811	13033	Master of Arts (Counselling Psychology)	PSY4207	Practicum - II	2022
812	13033	Master of Arts (Counselling Psychology)	PSY4208	Field Practice-II	2022
813	13033	Master of Arts (Counselling Psychology)	PSY4209	Scientific Research Paper	2022
814	13033	Master of Arts (Counselling Psychology)	PSY4301	Research Methods: Experimental Design	2022
815	13033	Master of Arts (Counselling Psychology)	PSY4302	Psychotherapy	2022
816	13033	Master of Arts (Counselling Psychology)	PSY4304	Counseling Psychology	2022
817	13033	Master of Arts (Counselling Psychology)	PSY4308	Practicum-III	2022
818	13033	Master of Arts (Counselling Psychology)	PSY4309	Field Practice-III	2022
819	13033	Master of Arts (Counselling Psychology)	PSY4335	Summer Internship Evaluation	2022
820	13033	Master of Arts (Counselling Psychology)	PSY4303	Clinical Psychology	2022
821	13033	Master of Arts (Counselling Psychology)	PSY4305	Developmental Psychology	2022
822	13033	Master of Arts (Counselling Psychology)	PSY4307	Educational Psychology	2022
823	13033	Master of Arts (Counselling Psychology)	PSY4401	Research Methods: Non-Experimental Design	2022
824	13033	Master of Arts (Counselling Psychology)	PSY4403	Advance and Applied Counselling Skills	2022

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825	13033	Master of Arts (Counselling Psychology)	PSY4412	Practicum-IV	2022
826	13033	Master of Arts (Counselling Psychology)	PSY4413	Field Practice-IV	2022
827	13033	Master of Arts (Counselling Psychology)	PSY4437	Dissertation	2022
828	13033	Master of Arts (Counselling Psychology)	PSY4402	Mental Retardation	2022
829	13033	Master of Arts (Counselling Psychology)	PSY4405	Childhood Pathology and Exceptional Children	2022
830	13033	Master of Arts (Counselling Psychology)	PSY4409	Employee Counselling and Empowerment	2022
831	13033	Master of Arts (Counselling Psychology)	PSY4410	Organizational Behaviour and Industrial Relations	2022
832	13033	Master of Arts (Counselling Psychology)	PSY4411	Psychological Practices in Personnel & Human Resource Management	2022
833	13166	Master of Arts (Applied Psychology)	PSY4109	Basic Psychological Processes	2022
834	13166	Master of Arts (Applied Psychology)	PSY4102	Cognitive Psychology	2022
835	13166	Master of Arts (Applied Psychology)	PSY4103	Advanced Social Psychology	2022
836	13166	Master of Arts (Applied Psychology)	PSY4104	Personality Theory	2022
837	13166	Master of Arts (Applied Psychology)	PSY4105	Parametric Statistical Method	2022
838	13166	Master of Arts (Applied Psychology)	PSY4106	Practicum-I	2022
839	13166	Master of Arts (Applied Psychology)	PSY4107	Field Practice-I	2022
840	13166	Master of Arts (Applied Psychology)	PSY4201	Psychopathology	2022
841	13166	Master of Arts (Applied Psychology)	PSY4202	Psychological Assessment & Diagnosis	2022
842	13166	Master of Arts (Applied Psychology)	PSY4210	Industrial-Organisational (I-O) Psychology	2022
843	13166	Master of Arts (Applied Psychology)	PSY4204	Non-Parametric Statistical Methods	2022
844	13166	Master of Arts (Applied Psychology)	PSY4205	Health Psychology	2022
845	13166	Master of Arts (Applied Psychology)	PSY4207	Practicum-II	2022
846	13166	Master of Arts (Applied Psychology)	PSY4208	Field Practice-II	2022

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847	13166	Master of Arts (Applied Psychology)	PSY4209	Scientific Research Paper	2022
848	13166	Master of Arts (Applied Psychology)	PSY4310	Applied Psychotherapy	2022
849	13166	Master of Arts (Applied Psychology)	PSY4311	Research Methods in Applied Psychology	2022
850	13166	Master of Arts (Applied Psychology)	PSY4312	Interviewing & Counselling Skills	2022
851	13166	Master of Arts (Applied Psychology)	PSY4308	Practicum-III	2022
852	13166	Master of Arts (Applied Psychology)	PSY4309	Field Practice-III	2022
853	13166	Master of Arts (Applied Psychology)	PSY4335	Summer Internship Evaluation	2022
854	13166	Master of Arts (Applied Psychology)	PSY4313	Applied Psychophysiology & Biofeedback	2022
855	13166	Master of Arts (Applied Psychology)	PSY4314	Human Factors Psychology & Ergonomics	2022
856	13166	Master of Arts (Applied Psychology)	PSY4315	Forensic & Legal Psychology	2022
857	13166	Master of Arts (Applied Psychology)	PSY4316	Community Psychology	2022
858	13166	Master of Arts (Applied Psychology)	PSY4317	Psychological Practices in Personnel & Human Resource Management	2022
859	13166	Master of Arts (Applied Psychology)	PSY4404	Rehabilitation Psychology	2022
860	13166	Master of Arts (Applied Psychology)	PSY4415	Psychometrics	2022
861	13166	Master of Arts (Applied Psychology)	PSY4412	Practicum-IV	2022
862	13166	Master of Arts (Applied Psychology)	PSY4413	Field Practice-IV	2022
863	13166	Master of Arts (Applied Psychology)	PSY4437	Dissertation	2022
864	13166	Master of Arts (Applied Psychology)	PSY4409	Employee Counselling & Empowerment	2022
865	13166	Master of Arts (Applied Psychology)	PSY4416	Psychology of Selling, Marketing & Advertising	2022
866	13166	Master of Arts (Applied Psychology)	PSY4417	Psychology of Criminal Behaviour & Criminal Profiling	2022
867	13166	Master of Arts (Applied Psychology)	PSY4418	Occupational Health Psychology	2022
868	13166	Master of Arts (Applied Psychology)	PSY4419	Guidance & Counselling	2022

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869	13408	Master of Science (Clinical Psychology)	PSY4101	History and Schools of Psychology	2022
870	13408	Master of Science (Clinical Psychology)	PSY4102	Cognitive Psychology	2022
871	13408	Master of Science (Clinical Psychology)	PSY4103	Advanced Social Psychology	2022
872	13408	Master of Science (Clinical Psychology)	PSY4104	Personality Theory	2022
873	13408	Master of Science (Clinical Psychology)	PSY4105	Parametric Statistical Method	2022
874	13408	Master of Science (Clinical Psychology)	PSY4106	Practicum-I	2022
875	13408	Master of Science (Clinical Psychology)	PSY4107	Field Practice-I	2022
876	13408	Master of Science (Clinical Psychology)	PSY4201	Psychopathology	2022
877	13408	Master of Science (Clinical Psychology)	PSY4202	Psychological Assessment and Diagnosis	2022
878	13408	Master of Science (Clinical Psychology)	PSY4203	Child Psychology	2022
879	13408	Master of Science (Clinical Psychology)	PSY4204	Non-Parametric Statistical Method	2022
880	13408	Master of Science (Clinical Psychology)	PSY4205	Health Psychology	2022
881	13408	Master of Science (Clinical Psychology)	PSY4207	Practicum-II	2022
882	13408	Master of Science (Clinical Psychology)	PSY4208	Field Practice-II	2022
883	13408	Master of Science (Clinical Psychology)	PSY4209	Scientific Research Paper	2022
884	13408	Master of Science (Clinical Psychology)	PSY4301	Research Methods: Experimental Design	2022
885	13408	Master of Science (Clinical Psychology)	PSY4302	Psychotherapy	2022
886	13408	Master of Science (Clinical Psychology)	PSY4303	Clinical Psychology	2022
887	13408	Master of Science (Clinical Psychology)	PSY4308	Practicum – III	2022
888	13408	Master of Science (Clinical Psychology)	PSY4309	Field Practice-III	2022
889	13408	Master of Science (Clinical Psychology)	PSY4335	Summer Internship Evaluation	2022
890	13408	Master of Science (Clinical Psychology)	PSY4304	Counselling Psychology	2022

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891	13408	Master of Science (Clinical Psychology)	PSY4305	Developmental Psychology	2022
892	13408	Master of Science (Clinical Psychology)	PSY4306	Neuro Psychology	2022
893	13408	Master of Science (Clinical Psychology)	PSY4401	Research Methods: Non-Experimental Design	2022
894	13408	Master of Science (Clinical Psychology)	PSY4402	Mental Retardation	2022
895	13408	Master of Science (Clinical Psychology)	PSY4412	Practicum-IV	2022
896	13408	Master of Science (Clinical Psychology)	PSY4413	Field Practice-IV	2022
897	13408	Master of Science (Clinical Psychology)	PSY4437	Dissertation	2022
898	13408	Master of Science (Clinical Psychology)	PSY4404	Rehabilitation Psychology	2022
899	13408	Master of Science (Clinical Psychology)	PSY4405	Childhood Pathology and Exceptional Children	2022
900	13408	Master of Science (Clinical Psychology)	PSY4406	Psychotherapeutic Intervention in Clinical setting	2022
901	13408	Master of Science (Clinical Psychology)	PSY4407	Differential Diagnostic Techniques	2022
902	13408	Master of Science (Clinical Psychology)	PSY4408	Community Psychology and Intervention	2022
903	13202	Master of Social Work	SCW4101	Social Work: History, Ideologies, Perspectives & Contemporary Concerns	2022
904	13202	Master of Social Work	SCW4102	Basics of Social Work	2022
905	13202	Master of Social Work	SCW4103	Work with Individuals & Families: Social Case Work	2022
906	13202	Master of Social Work	SCW4104	Working with Groups: Social Group Work	2022
907	13202	Master of Social Work	SCW4105	Research Methods in Social Work: Quantitative Approach	2022
908	13202	Master of Social Work	SCW4107	Field Work Practicum-I	2022
909	13202	Master of Social Work	SCW4108	Social Work Camp	2022
910	13202	Master of Social Work	SCW4201	Social Policy & Social Welfare Administration	2022
911	13202	Master of Social Work	SCW4202	Social Work with Communities	2022
912	13202	Master of Social Work	SCW4203	Project Formulation & Management	2022
913	13202	Master of Social Work	SCW4204	Community Organization & Social Action	2022
914	13202	Master of Social Work	SCW4205	Research Methods in Social Work: Qualitative Approach	2022

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915	13202	Master of Social Work	SCW4206	Skill Based Project	2022
916	13202	Master of Social Work	SCW4207	Field Work Practicum-II	2022
917	13202	Master of Social Work	SCW4302	Social Justice & Empowerment	2022
918	13202	Master of Social Work	SCW4303	Communication & Counselling	2022
919	13202	Master of Social Work	SCW4304	Field Work Practicum-III	2022
920	13202	Master of Social Work	SCW4335	Summer Internship Evaluation	2022
921	13202	Master of Social Work	SCW4305	Human Resource Development & Employee Wellness	2022
922	13202	Master of Social Work	SCW4306	Mental Health & Psychiatric Social Work	2022
923	13202	Master of Social Work	SCW4307	Social Work with Families & Children	2022
924	13202	Master of Social Work	SCW4308	Correctional Administration & Services	2022
925	13202	Master of Social Work	SCW4309	Population & Environment	2022
926	13202	Master of Social Work	SCW4310	Management of Development & Welfare Services	2022
927	13202	Master of Social Work	SCW4401	Human Rights & Social Work Practice	2022
928	13202	Master of Social Work	SCW4402	Gender & Development	2022
929	13202	Master of Social Work	SCW4403	Social Work with Urban, Rural & Tribal Communities	2022
930	13202	Master of Social Work	SCW4404	Field Work Practicum-IV	2022
931	13202	Master of Social Work	SCW4437	Dissertation	2022
932	13202	Master of Social Work	SCW4405	Industrial Relations & Labour Legislation	2022
933	13202	Master of Social Work	SCW4406	Rehabilitation & After Care Services	2022
934	13202	Master of Social Work	SCW4407	Social Work with PWD	2022
935	13202	Master of Social Work	SCW4408	Social Work with HIV/AIDS	2022
936	13202	Master of Social Work	SCW4409	Human Growth & Development	2022
937	13202	Master of Social Work	SCW4410	Disaster Management	2022
938	13109	M.Phil (Clinical Psychology)	PSY5101	Psychosocial Foundation of Behaviour & Psychopathology	2022
939	13109	M.Phil (Clinical Psychology)	PSY5103	Psychiatry	2022
940	13109	M.Phil (Clinical Psychology)	PSY5104	Practical: Psychological Assessment including Viva-Voce	2022
941	13109	M.Phil (Clinical Psychology)	PSY5106	Statistics & Research Methodology	2022
942	13109	M.Phil (Clinical Psychology)	PSY5105	Submission of Psychodiagnostic Records	2022
943	13109	M.Phil (Clinical Psychology)	PSY5301	Psychotherapy & Counselling	2022

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944	13109	M.Phil (Clinical Psychology)	PSY5302	Behavioural Medicine	2022
945	13109	M.Phil (Clinical Psychology)	PSY5304	Practical: Psychological Therapies including Viva-Voce	2022
946	13109	M.Phil (Clinical Psychology)	PSY5306	Biological Foundation of Behaviour	2022
947	13109	M.Phil (Clinical Psychology)	PSY5305	Submission of Psychotherapy Records	2022
948	13109	M.Phil (Clinical Psychology)	PSY5337	Dissertation	2022
949	13832	Professional Diploma in Clinical Psychology	PCP3101	Psychosocial Perspectives of Mental Disorders	2022
950	13832	Professional Diploma in Clinical Psychology	PCP3102	Counseling and Therapy	2022
951	13832	Professional Diploma in Clinical Psychology	PCP3103	Psychiatry	2022
952	13832	Professional Diploma in Clinical Psychology	PCP3104	Practical-I: Psychological Assessment including Viva-Voce	2022
953	13832	Professional Diploma in Clinical Psychology	PCP3105	Practical-II: Psychological Interventions including Viva-Voce	2022
954	13832	Professional Diploma in Clinical Psychology	PCP3106	Submission-I: Psychodiagnostic Records	2022
955	13832	Professional Diploma in Clinical Psychology	PCP3107	Submission-II: Psychotherapy Records	2022
956	13055	Bachelor of Technology (Aerospace Engineering)	ASE2113	Engineering Mathematics-I	2022
957	13055	Bachelor of Technology (Aerospace Engineering)	ASE2115	Engineering Chemistry	2022
958	13055	Bachelor of Technology (Aerospace Engineering)	ASE2105	Introduction to Computers & Programming in C	2022
959	13055	Bachelor of Technology (Aerospace Engineering)	ASE2118	Basics of Electrical & Electronics Engineering	2022
960	13055	Bachelor of Technology (Aerospace Engineering)	ASE2120	Elements of Mechanical Engineering	2022
961	13055	Bachelor of Technology (Aerospace Engineering)	ASE2110	Programming in C Lab	2022
962	13055	Bachelor of Technology (Aerospace Engineering)	ASE2117	Engineering Chemistry Lab	2022
963	13055	Bachelor of Technology (Aerospace Engineering)	ASE2119	Basics of Electrical & Electronics Engineering Lab	2022
964	13055	Bachelor of Technology (Aerospace Engineering)	ASE2121	Elements of Mechanical Engineering Lab	2022
965	13055	Bachelor of Technology (Aerospace Engineering)	ASE2209	Engineering Mathematics-II	2022
966	13055	Bachelor of Technology (Aerospace Engineering)	ASE2210	Engineering Physics	2022

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967	13055	Bachelor of Technology (Aerospace Engineering)	ASE2215	Workshop Technology	2022
968	13055	Bachelor of Technology (Aerospace Engineering)	ASE2216	Engineering Mechanics	2022
969	13055	Bachelor of Technology (Aerospace Engineering)	ASE2212	Engineering Graphics Lab	2022
970	13055	Bachelor of Technology (Aerospace Engineering)	ASE2214	Engineering Physics Lab	2022
971	13055	Bachelor of Technology (Aerospace Engineering)	ASE2217	Workshop Practice	2022
972	13055	Bachelor of Technology (Aerospace Engineering)	ASE2218	Engineering Mechanics Lab	2022
973	13055	Bachelor of Technology (Aerospace Engineering)	ASE2313	Engineering Mathematics-III	2022
974	13055	Bachelor of Technology (Aerospace Engineering)	ASE2314	Engineering Thermodynamics	2022
975	13055	Bachelor of Technology (Aerospace Engineering)	ASE2315	Strength of Materials	2022
976	13055	Bachelor of Technology (Aerospace Engineering)	ASE2321	Introduction to Aerospace Engineering	2022
977	13055	Bachelor of Technology (Aerospace Engineering)	ASE2322	Fluid Mechanics and Dynamics	2022
978	13055	Bachelor of Technology (Aerospace Engineering)	ASE2317	Strength of Materials Lab	2022
979	13055	Bachelor of Technology (Aerospace Engineering)	ASE2323	Fluid Mechanics and Dynamics Lab	2022
980	13055	Bachelor of Technology (Aerospace Engineering)	ASE2324	Aircraft Manufacturing Processes	2022
981	13055	Bachelor of Technology (Aerospace Engineering)	ASE2325	Measurement Techniques	2022
982	13055	Bachelor of Technology (Aerospace Engineering)	ASE2326	Introduction to Heat Transfer	2022
983	13055	Bachelor of Technology (Aerospace Engineering)	ASE2412	Numerical Analysis and Programming	2022
984	13055	Bachelor of Technology (Aerospace Engineering)	ASE2415	Low Speed Aerodynamics	2022
985	13055	Bachelor of Technology (Aerospace Engineering)	ASE2416	Aircraft Propulsion	2022
986	13055	Bachelor of Technology (Aerospace Engineering)	ASE2417	Aerospace Structures-I	2022
987	13055	Bachelor of Technology (Aerospace Engineering)	ASE2418	Introduction to Space Sciences	2022
988	13055	Bachelor of Technology (Aerospace Engineering)	ASE2419	Low Speed Aerodynamics Lab	2022


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989	13055	Bachelor of Technology (Aerospace Engineering)	ASE2420	Aircraft Propulsion Lab	2022
990	13055	Bachelor of Technology (Aerospace Engineering)	ASE2421	Numerical Analysis and Programming Lab using MATLAB	2022
991	13055	Bachelor of Technology (Aerospace Engineering)	ASE2422	Fuels & Combustion	2022
992	13055	Bachelor of Technology (Aerospace Engineering)	ASE2423	Control Systems	2022
993	13055	Bachelor of Technology (Aerospace Engineering)	ASE2424	Mechatronics	2022
994	13055	Bachelor of Technology (Aerospace Engineering)	ASE2510	Turbomachinery	2022
995	13055	Bachelor of Technology (Aerospace Engineering)	ASE2511	High Speed Aerodynamics	2022
996	13055	Bachelor of Technology (Aerospace Engineering)	ASE2512	Aerospace Structures-II	2022
997	13055	Bachelor of Technology (Aerospace Engineering)	ASE2513	Flight Mechanics	2022
998	13055	Bachelor of Technology (Aerospace Engineering)	ASE2514	Computer Aided Drafting Lab	2022
999	13055	Bachelor of Technology (Aerospace Engineering)	ASE2515	Structural Analysis Lab	2022
1000	13055	Bachelor of Technology (Aerospace Engineering)	ASE2535	Summer Internship Evaluation-I	2022
1001	13055	Bachelor of Technology (Aerospace Engineering)	ASE2516	Satellite Communication	2022
1002	13055	Bachelor of Technology (Aerospace Engineering)	ASE2517	Aircraft Systems and Instrumentation	2022
1003	13055	Bachelor of Technology (Aerospace Engineering)	ASE2518	Introduction to UAVs	2022
1004	13055	Bachelor of Technology (Aerospace Engineering)	ASE2609	Aircraft Maintenance & Quality Assurance	2022
1005	13055	Bachelor of Technology (Aerospace Engineering)	ASE2613	Computational Fluid Dynamics	2022
1006	13055	Bachelor of Technology (Aerospace Engineering)	ASE2614	Aerospace Materials	2022
1007	13055	Bachelor of Technology (Aerospace Engineering)	ASE2651	Aircraft Stability & Control	2022
1008	13055	Bachelor of Technology (Aerospace Engineering)	ASE2612	Computational Fluid Dynamics Lab	2022
1009	13055	Bachelor of Technology (Aerospace Engineering)	ASE2615	Aeromodelling Lab	2022
1010	13055	Bachelor of Technology (Aerospace Engineering)	ASE2637	Minor Project	2022


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1011	13055	Bachelor of Technology (Aerospace Engineering)	ASE2616	Introduction to Avionics	2022
1012	13055	Bachelor of Technology (Aerospace Engineering)	ASE2617	Propellant Technology	2022
1013	13055	Bachelor of Technology (Aerospace Engineering)	ASE2618	Finite Element Method	2022
1014	13055	Bachelor of Technology (Aerospace Engineering)	ASE2702	Flight Dynamics	2022
1015	13055	Bachelor of Technology (Aerospace Engineering)	ASE2709	Aircraft Design	2022
1016	13055	Bachelor of Technology (Aerospace Engineering)	ASE2712	Principles of Helicopter Engineering	2022
1017	13055	Bachelor of Technology (Aerospace Engineering)	ASE2713	Vibration Engineering	2022
1018	13055	Bachelor of Technology (Aerospace Engineering)	ASE2714	Vibration Engineering Lab	2022
1019	13055	Bachelor of Technology (Aerospace Engineering)	ASE2735	Summer Internship Evaluation-II	2022
1020	13055	Bachelor of Technology (Aerospace Engineering)	ASE2737	Major Project	2022
1021	13055	Bachelor of Technology (Aerospace Engineering)	ASE2811	Spacecraft Propulsion	2022
1022	13055	Bachelor of Technology (Aerospace Engineering)	ASE2812	Aerospace Navigation, Guidance and Control	2022
1023	13055	Bachelor of Technology (Aerospace Engineering)	ASE2837	Project-Dissertation	2022
1024	13055	Bachelor of Technology (Aerospace Engineering)	ASE2813	Aeroelasticity	2022
1025	13055	Bachelor of Technology (Aerospace Engineering)	ASE2814	Aerospace Industrial Management	2022
1026	13055	Bachelor of Technology (Aerospace Engineering)	ASE2815	Civil Aviation Requirements (CAR)	2022
1027	13052	Bachelor of Technology (Computer Science & Engineering)	CSE2110	Engineering Mathematics-I	2022
1028	13052	Bachelor of Technology (Computer Science & Engineering)	CSE2111	Engineering Physics	2022
1029	13052	Bachelor of Technology (Computer Science & Engineering)	CSE2104	Introduction to Computers & Programming in C	2022
1030	13052	Bachelor of Technology (Computer Science & Engineering)	CSE2114	Elements of Mechanical Engineering	2022
1031	13052	Bachelor of Technology (Computer Science & Engineering)	CSE2107	Programming in C Lab	2022
1032	13052	Bachelor of Technology (Computer Science & Engineering)	CSE2112	Engineering Physics Lab	2022

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1033	13052	Bachelor of Technology (Computer Science & Engineering)	CSE2115	Elements of Mechanical Engineering Lab	2022
1034	13052	Bachelor of Technology (Computer Science & Engineering)	CSE2211	Engineering Mathematics-II	2022
1035	13052	Bachelor of Technology (Computer Science & Engineering)	CSE2212	Engineering Chemistry	2022
1036	13052	Bachelor of Technology (Computer Science & Engineering)	CSE2216	Engineering Mechanics	2022
1037	13052	Bachelor of Technology (Computer Science & Engineering)	CSE2217	Basics of Electrical & Electronics Engineering	2022
1038	13052	Bachelor of Technology (Computer Science & Engineering)	CSE2204	Object Oriented Programming using C++	2022
1039	13052	Bachelor of Technology (Computer Science & Engineering)	CSE2208	Object Oriented Programming using C++ Lab	2022
1040	13052	Bachelor of Technology (Computer Science & Engineering)	CSE2215	Engineering Chemistry Lab	2022
1041	13052	Bachelor of Technology (Computer Science & Engineering)	CSE2218	Basics of Electrical & Electronics Engineering Lab	2022
1042	13052	Bachelor of Technology (Computer Science & Engineering)	CSE2219	Engineering Graphics Lab	2022
1043	13052	Bachelor of Technology (Computer Science & Engineering)	CSE2302	Database Management Systems	2022
1044	13052	Bachelor of Technology (Computer Science & Engineering)	CSE2303	Operating Systems	2022
1045	13052	Bachelor of Technology (Computer Science & Engineering)	CSE2304	Data Structures using C	2022
1046	13052	Bachelor of Technology (Computer Science & Engineering)	CSE2314	Digital Electronics	2022
1047	13052	Bachelor of Technology (Computer Science & Engineering)	CSE2305	Data Structures Using C Lab	2022
1048	13052	Bachelor of Technology (Computer Science & Engineering)	CSE2307	Database Management Systems Lab	2022
1049	13052	Bachelor of Technology (Computer Science & Engineering)	CSE2308	UNIX Programming Lab	2022
1050	13052	Bachelor of Technology (Computer Science & Engineering)	CSE2315	Digital Electronics Lab	2022
1051	13052	Bachelor of Technology (Computer Science & Engineering)	CSE2310	Electronic Devices & Circuits	2022
1052	13052	Bachelor of Technology (Computer Science & Engineering)	CSE2311	Electronic Devices & Circuits Lab	2022
1053	13052	Bachelor of Technology (Computer Science & Engineering)	CSE2312	E-Commerce & ERP	2022
1054	13052	Bachelor of Technology (Computer Science & Engineering)	CSE2316	Statistics & Probability Concepts	2022

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1055	13052	Bachelor of Technology (Computer Science & Engineering)	CSE2317	Software Vulnerability Analysis #	2022
1056	13052	Bachelor of Technology (Computer Science & Engineering)	CSE2403	Discrete Mathematics	2022
1057	13052	Bachelor of Technology (Computer Science & Engineering)	CSE2412	Artificial Intelligence	2022
1058	13052	Bachelor of Technology (Computer Science & Engineering)	CSE2418	Analysis & Design of Algorithm	2022
1059	13052	Bachelor of Technology (Computer Science & Engineering)	CSE2419	Data Communication & Computer Networks	2022
1060	13052	Bachelor of Technology (Computer Science & Engineering)	CSE2413	Artificial Intelligence Lab	2022
1061	13052	Bachelor of Technology (Computer Science & Engineering)	CSE2420	Data Communication & Computer Networks Lab	2022
1062	13052	Bachelor of Technology (Computer Science & Engineering)	CSE2421	Analysis & Design of Algorithm Lab	2022
1063	13052	Bachelor of Technology (Computer Science & Engineering)	CSE2410	Artificial Neural Network	2022
1064	13052	Bachelor of Technology (Computer Science & Engineering)	CSE2411	Artificial Neural Network Lab	2022
1065	13052	Bachelor of Technology (Computer Science & Engineering)	CSE2414	Communication Systems	2022
1066	13052	Bachelor of Technology (Computer Science & Engineering)	CSE2415	Communication Systems Lab	2022
1067	13052	Bachelor of Technology (Computer Science & Engineering)	CSE2422	Web Designing Technologies	2022
1068	13052	Bachelor of Technology (Computer Science & Engineering)	CSE2423	Web Designing Technologies Lab	2022
1069	13052	Bachelor of Technology (Computer Science & Engineering)	CSE2424	Applied Statistical Analysis #	2022
1070	13052	Bachelor of Technology (Computer Science & Engineering)	CSE2425	Applied Statistical Analysis Lab #	2022
1071	13052	Bachelor of Technology (Computer Science & Engineering)	CSE2502	Computer Architecture	2022
1072	13052	Bachelor of Technology (Computer Science & Engineering)	CSE2503	Java Programming	2022
1073	13052	Bachelor of Technology (Computer Science & Engineering)	CSE2515	Microprocessor	2022
1074	13052	Bachelor of Technology (Computer Science & Engineering)	CSE2516	Theory of Automata & Computation	2022
1075	13052	Bachelor of Technology (Computer Science & Engineering)	CSE2505	Java Programming Lab	2022
1076	13052	Bachelor of Technology (Computer Science & Engineering)	CSE2517	Microprocessor Lab	2022


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1077	13052	Bachelor of Technology (Computer Science & Engineering)	CSE2535	Summer Internship Evaluation-I	2022
1078	13052	Bachelor of Technology (Computer Science & Engineering)	CSE2506	VHDL Programming	2022
1079	13052	Bachelor of Technology (Computer Science & Engineering)	CSE2507	VHDL Programming Lab	2022
1080	13052	Bachelor of Technology (Computer Science & Engineering)	CSE2514	Fuzzy Logic & Genetic Algorithm	2022
1081	13052	Bachelor of Technology (Computer Science & Engineering)	CSE2518	Advanced Web Designing Technologies	2022
1082	13052	Bachelor of Technology (Computer Science & Engineering)	CSE2519	Advanced Web Designing Technologies Lab	2022
1083	13052	Bachelor of Technology (Computer Science & Engineering)	CSE2520	Big Data with Hadoop Lab #	2022
1084	13052	Bachelor of Technology (Computer Science & Engineering)	CSE2604	Advanced Java Programming	2022
1085	13052	Bachelor of Technology (Computer Science & Engineering)	CSE2613	Software Engineering	2022
1086	13052	Bachelor of Technology (Computer Science & Engineering)	CSE2618	Data Mining	2022
1087	13052	Bachelor of Technology (Computer Science & Engineering)	CSE2608	Advanced Java Programming Lab	2022
1088	13052	Bachelor of Technology (Computer Science & Engineering)	CSE2615	Software Engineering Lab	2022
1089	13052	Bachelor of Technology (Computer Science & Engineering)	CSE2637	Minor Project-I	2022
1090	13052	Bachelor of Technology (Computer Science & Engineering)	CSE2610	VLSI Design	2022
1091	13052	Bachelor of Technology (Computer Science & Engineering)	CSE2611	VLSI Design Lab	2022
1092	13052	Bachelor of Technology (Computer Science & Engineering)	CSE2616	Open Source Technologies	2022
1093	13052	Bachelor of Technology (Computer Science & Engineering)	CSE2617	Open Source Technologies Lab	2022
1094	13052	Bachelor of Technology (Computer Science & Engineering)	CSE2614	Internet of Things & Wireless Sensor Networks	2022
1095	13052	Bachelor of Technology (Computer Science & Engineering)	CSE2619	Network and Wireless Sensor #	2022
1096	13052	Bachelor of Technology (Computer Science & Engineering)	CSE2710	Computer Graphics	2022
1097	13052	Bachelor of Technology (Computer Science & Engineering)	CSE2713	Cryptography & Network Security	2022
1098	13052	Bachelor of Technology (Computer Science & Engineering)	CSE2714	System Programming & Compiler Construction	2022


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1099	13052	Bachelor of Technology (Computer Science & Engineering)	CSE2712	Computer Graphics Lab	2022
1100	13052	Bachelor of Technology (Computer Science & Engineering)	CSE2715	Network Security Lab	2022
1101	13052	Bachelor of Technology (Computer Science & Engineering)	CSE2716	System Programming & Compiler Lab	2022
1102	13052	Bachelor of Technology (Computer Science & Engineering)	CSE2735	Summer Internship Evaluation-II	2022
1103	13052	Bachelor of Technology (Computer Science & Engineering)	CSE2737	Minor Project-II	2022
1104	13052	Bachelor of Technology (Computer Science & Engineering)	CSE2707	Mobile Computing	2022
1105	13052	Bachelor of Technology (Computer Science & Engineering)	CSE2717	Robotic Process Automation Design & Development	2022
1106	13052	Bachelor of Technology (Computer Science & Engineering)	CSE2718	Responsive Web Design	2022
1107	13052	Bachelor of Technology (Computer Science & Engineering)	CSE2719	Responsive Web Design Lab	2022
1108	13052	Bachelor of Technology (Computer Science & Engineering)	CSE2720	Learning with Bayesian Networks #	2022
1109	13052	Bachelor of Technology (Computer Science & Engineering)	CSE2837	Project-Dissertation	2022
1110	13052	Bachelor of Technology (Computer Science & Engineering)	CSE2803	Digital Image Processing	2022
1111	13052	Bachelor of Technology (Computer Science & Engineering)	CSE2805	Digital Image Processing Lab	2022
1112	13052	Bachelor of Technology (Computer Science & Engineering)	CSE2804	Dot Net Programming	2022
1113	13052	Bachelor of Technology (Computer Science & Engineering)	CSE2806	Dot Net Programming Lab	2022
1114	13052	Bachelor of Technology (Computer Science & Engineering)	CSE2812	Advance Robotic Process Automation Design & Development	2022
1115	13052	Bachelor of Technology (Computer Science & Engineering)	CSE2813	Intrusion Detection & Prevention System #	2022
1116	13051	Bachelor of Technology (Electronics & Communication Engineering)	ECE2112	Engineering Mathematics-I	2022
1117	13051	Bachelor of Technology (Electronics & Communication Engineering)	ECE2114	Engineering Chemistry	2022
1118	13051	Bachelor of Technology (Electronics & Communication Engineering)	ECE2104	Elements of Mechanical Engineering	2022

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1119	13051	Bachelor of Technology (Electronics & Communication Engineering)	ECE2105	Introduction to Computers & Programming in C	2022
1120	13051	Bachelor of Technology (Electronics & Communication Engineering)	ECE2117	Basics of Electrical & Electronics Engineering	2022
1121	13051	Bachelor of Technology (Electronics & Communication Engineering)	ECE2109	Elements of Mechanical Engineering Lab	2022
1122	13051	Bachelor of Technology (Electronics & Communication Engineering)	ECE2110	Programming in C Lab	2022
1123	13051	Bachelor of Technology (Electronics & Communication Engineering)	ECE2116	Engineering Chemistry Lab	2022
1124	13051	Bachelor of Technology (Electronics & Communication Engineering)	ECE2118	Basics of Electrical & Electronics Engineering Lab	2022
1125	13051	Bachelor of Technology (Electronics & Communication Engineering)	ECE2209	Engineering Mathematics-II	2022
1126	13051	Bachelor of Technology (Electronics & Communication Engineering)	ECE2210	Engineering Physics	2022
1127	13051	Bachelor of Technology (Electronics & Communication Engineering)	ECE2203	Object Oriented Programming using C++	2022
1128	13051	Bachelor of Technology (Electronics & Communication Engineering)	ECE2204	Engineering Mechanics	2022
1129	13051	Bachelor of Technology (Electronics & Communication Engineering)	ECE2206	Object Oriented Programming using C++ Lab	2022
1130	13051	Bachelor of Technology (Electronics & Communication Engineering)	ECE2208	Engineering Graphics Lab	2022
1131	13051	Bachelor of Technology (Electronics & Communication Engineering)	ECE2211	Engineering Physics Lab	2022
1132	13051	Bachelor of Technology (Electronics & Communication Engineering)	ECE2310	Engineering Mathematics-III	2022
1133	13051	Bachelor of Technology (Electronics & Communication Engineering)	ECE2302	Analog Electronics-I	2022

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1134	13051	Bachelor of Technology (Electronics & Communication Engineering)	ECE2303	Circuits & Systems	2022
1135	13051	Bachelor of Technology (Electronics & Communication Engineering)	ECE2311	Data Structure using C	2022
1136	13051	Bachelor of Technology (Electronics & Communication Engineering)	ECE2305	Analog Electronics- I Lab	2022
1137	13051	Bachelor of Technology (Electronics & Communication Engineering)	ECE2306	Circuits & Systems Lab	2022
1138	13051	Bachelor of Technology (Electronics & Communication Engineering)	ECE2312	Data Structure using C Lab	2022
1139	13051	Bachelor of Technology (Electronics & Communication Engineering)	ECE2313	Virtual Instrumentation	2022
1140	13051	Bachelor of Technology (Electronics & Communication Engineering)	ECE2314	Virtual Instrumentation Lab	2022
1141	13051	Bachelor of Technology (Electronics & Communication Engineering)	ECE2315	Measurement & Measuring Instruments	2022
1142	13051	Bachelor of Technology (Electronics & Communication Engineering)	ECE2316	Measurement & Measuring Instruments Lab	2022
1143	13051	Bachelor of Technology (Electronics & Communication Engineering)	ECE2317	Statistics & Probability Concepts	2022
1144	13051	Bachelor of Technology (Electronics & Communication Engineering)	ECE2318	Basics of Nanoscience and Nanomaterials #	2022
1145	13051	Bachelor of Technology (Electronics & Communication Engineering)	ECE2402	Communication Systems	2022
1146	13051	Bachelor of Technology (Electronics & Communication Engineering)	ECE2403	Analog Electronics-II	2022
1147	13051	Bachelor of Technology (Electronics & Communication Engineering)	ECE2404	Electromagnetic Field Theory	2022
1148	13051	Bachelor of Technology (Electronics & Communication Engineering)	ECE2411	Digital Electronics	2022


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1149	13051	Bachelor of Technology (Electronics & Communication Engineering)	ECE2417	Signals & Systems	2022
1150	13051	Bachelor of Technology (Electronics & Communication Engineering)	ECE2406	Communication Systems Lab	2022
1151	13051	Bachelor of Technology (Electronics & Communication Engineering)	ECE2407	Analog Electronics- II Lab	2022
1152	13051	Bachelor of Technology (Electronics & Communication Engineering)	ECE2412	Digital Electronics Lab	2022
1153	13051	Bachelor of Technology (Electronics & Communication Engineering)	ECE2414	PCB Fabrications	2022
1154	13051	Bachelor of Technology (Electronics & Communication Engineering)	ECE2418	Electronic Workshop & PCB Lab	2022
1155	13051	Bachelor of Technology (Electronics & Communication Engineering)	ECE2415	Database Management Systems	2022
1156	13051	Bachelor of Technology (Electronics & Communication Engineering)	ECE2416	Database Management Systems Lab	2022
1157	13051	Bachelor of Technology (Electronics & Communication Engineering)	ECE2419	Java Programming	2022
1158	13051	Bachelor of Technology (Electronics & Communication Engineering)	ECE2420	Java Programming Lab	2022
1159	13051	Bachelor of Technology (Electronics & Communication Engineering)	ECE2421	Artificial Neural Network	2022
1160	13051	Bachelor of Technology (Electronics & Communication Engineering)	ECE2422	Artificial Neural Network Lab	2022
1161	13051	Bachelor of Technology (Electronics & Communication Engineering)	ECE2423	Synthesis and Characterisation of Nanomaterials #	2022
1162	13051	Bachelor of Technology (Electronics & Communication Engineering)	ECE2501	Digital Circuits & Systems	2022
1163	13051	Bachelor of Technology (Electronics & Communication Engineering)	ECE2502	Digital Communications	2022


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1164	13051	Bachelor of Technology (Electronics & Communication Engineering)	ECE2503	Control Systems	2022
1165	13051	Bachelor of Technology (Electronics & Communication Engineering)	ECE2509	Microprocessor Systems	2022
1166	13051	Bachelor of Technology (Electronics & Communication Engineering)	ECE2504	Digital Circuits & Systems Lab	2022
1167	13051	Bachelor of Technology (Electronics & Communication Engineering)	ECE2505	Microprocessor Systems Lab	2022
1168	13051	Bachelor of Technology (Electronics & Communication Engineering)	ECE2506	Control Systems Lab	2022
1169	13051	Bachelor of Technology (Electronics & Communication Engineering)	ECE2535	Summer Internship Evaluation-I	2022
1170	13051	Bachelor of Technology (Electronics & Communication Engineering)	ECE2507	Operating System	2022
1171	13051	Bachelor of Technology (Electronics & Communication Engineering)	ECE2508	Computer Architecture	2022
1172	13051	Bachelor of Technology (Electronics & Communication Engineering)	ECE2513	Computer Networks	2022
1173	13051	Bachelor of Technology (Electronics & Communication Engineering)	ECE2514	Fuzzy Logic & Genetic Algorithm	2022
1174	13051	Bachelor of Technology (Electronics & Communication Engineering)	ECE2515	Application of Nanomaterials #	2022
1175	13051	Bachelor of Technology (Electronics & Communication Engineering)	ECE2601	VLSI Design	2022
1176	13051	Bachelor of Technology (Electronics & Communication Engineering)	ECE2602	Digital Signal Processing	2022
1177	13051	Bachelor of Technology (Electronics & Communication Engineering)	ECE2615	Antenna and Microwave Engineering	2022
1178	13051	Bachelor of Technology (Electronics & Communication Engineering)	ECE2616	Antenna and Microwave Engineering Lab	2022

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1179	13051	Bachelor of Technology (Electronics & Communication Engineering)	ECE2605	VLSI Design Lab	2022
1180	13051	Bachelor of Technology (Electronics & Communication Engineering)	ECE2609	Digital Signal Processing Lab	2022
1181	13051	Bachelor of Technology (Electronics & Communication Engineering)	ECE2637	Minor Project	2022
1182	13051	Bachelor of Technology (Electronics & Communication Engineering)	ECE2607	Advanced Java Programming	2022
1183	13051	Bachelor of Technology (Electronics & Communication Engineering)	ECE2610	Advanced Java Programming Lab	2022
1184	13051	Bachelor of Technology (Electronics & Communication Engineering)	ECE2613	Embedded System	2022
1185	13051	Bachelor of Technology (Electronics & Communication Engineering)	ECE2614	Embedded System Lab	2022
1186	13051	Bachelor of Technology (Electronics & Communication Engineering)	ECE2617	IOT and Wireless Sensor Network	2022
1187	13051	Bachelor of Technology (Electronics & Communication Engineering)	ECE2618	Data Mining	2022
1188	13051	Bachelor of Technology (Electronics & Communication Engineering)	ECE2619	Nanomaterials and Clean Energy Systems #	2022
1189	13051	Bachelor of Technology (Electronics & Communication Engineering)	ECE2719	Radar & Satellite Communication	2022
1190	13051	Bachelor of Technology (Electronics & Communication Engineering)	ECE2720	Advanced Mobile Communication	2022
1191	13051	Bachelor of Technology (Electronics & Communication Engineering)	ECE2721	Embedded System with ARM Processors	2022
1192	13051	Bachelor of Technology (Electronics & Communication Engineering)	ECE2722	Radar & Satellite Communication Lab	2022
1193	13051	Bachelor of Technology (Electronics & Communication Engineering)	ECE2723	Python Lab	2022


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1194	13051	Bachelor of Technology (Electronics & Communication Engineering)	ECE2735	Summer Internship Evaluation-II	2022
1195	13051	Bachelor of Technology (Electronics & Communication Engineering)	ECE2706	Optical Communications	2022
1196	13051	Bachelor of Technology (Electronics & Communication Engineering)	ECE2716	Optical Communications Lab	2022
1197	13051	Bachelor of Technology (Electronics & Communication Engineering)	ECE2712	Digital Image Processing	2022
1198	13051	Bachelor of Technology (Electronics & Communication Engineering)	ECE2713	Digital Image Processing Lab	2022
1199	13051	Bachelor of Technology (Electronics & Communication Engineering)	ECE2724	Robotic Process Automation Design & Development	2022
1200	13051	Bachelor of Technology (Electronics & Communication Engineering)	ECE2727	Nano Electronics #	2022
1201	13051	Bachelor of Technology (Electronics & Communication Engineering)	ECE2718	Independent Study	2022
1202	13051	Bachelor of Technology (Electronics & Communication Engineering)	ECE2731	Term Paper	2022
1203	13051	Bachelor of Technology (Electronics & Communication Engineering)	ECE2732	Project (With Presentation & Evaluation)	2022
1204	13051	Bachelor of Technology (Electronics & Communication Engineering)	ECE2837	Project (Dissertation)	2022
1205	13051	Bachelor of Technology (Electronics & Communication Engineering)	ECE2805	RTOS Programming	2022
1206	13051	Bachelor of Technology (Electronics & Communication Engineering)	ECE2806	Verilog Programming	2022
1207	13051	Bachelor of Technology (Electronics & Communication Engineering)	ECE2813	Verilog Programming Lab	2022
1208	13051	Bachelor of Technology (Electronics & Communication Engineering)	ECE2812	Advanced VLSI Design	2022

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1209	13051	Bachelor of Technology (Electronics & Communication Engineering)	ECE2814	Power Electronics	2022
1210	13051	Bachelor of Technology (Electronics & Communication Engineering)	ECE2815	Information Theory and Coding	2022
1211	13051	Bachelor of Technology (Electronics & Communication Engineering)	ECE2816	Advanced Robotic Process Automation Design & Development	2022
1212	13051	Bachelor of Technology (Electronics & Communication Engineering)	ECE2818	Wireless Communication	2022
1213	13051	Bachelor of Technology (Electronics & Communication Engineering)	ECE2819	Quantum Computation #	2022
1214	13399	Bachelor of Technology (Biomedical Engineering)	BME2112	Engineering Mathematics-I	2022
1215	13399	Bachelor of Technology (Biomedical Engineering)	BME2114	Engineering Chemistry	2022
1216	13399	Bachelor of Technology (Biomedical Engineering)	BME2104	Introduction to Computers & Programming in C	2022
1217	13399	Bachelor of Technology (Biomedical Engineering)	BME2106	Elements of Mechanical Engineering	2022
1218	13399	Bachelor of Technology (Biomedical Engineering)	BME2117	Basics of Electrical & Electronics Engineering	2022
1219	13399	Bachelor of Technology (Biomedical Engineering)	BME2109	Programming in C Lab	2022
1220	13399	Bachelor of Technology (Biomedical Engineering)	BME2111	Elements of Mechanical Engineering Lab	2022
1221	13399	Bachelor of Technology (Biomedical Engineering)	BME2116	Engineering Chemistry Lab	2022
1222	13399	Bachelor of Technology (Biomedical Engineering)	BME2118	Basics of Electrical & Electronics Engineering Lab	2022
1223	13399	Bachelor of Technology (Biomedical Engineering)	BME2210	Engineering Mathematics-II	2022
1224	13399	Bachelor of Technology (Biomedical Engineering)	BME2211	Engineering Physics	2022
1225	13399	Bachelor of Technology (Biomedical Engineering)	BME2203	Engineering Mechanics	2022
1226	13399	Bachelor of Technology (Biomedical Engineering)	BME2204	Biology for Engineers	2022
1227	13399	Bachelor of Technology (Biomedical Engineering)	BME2205	Object Oriented Programming using C++	2022
1228	13399	Bachelor of Technology (Biomedical Engineering)	BME2208	Engineering Graphics Lab	2022

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1229	13399	Bachelor of Technology (Biomedical Engineering)	BME2209	Object Oriented Programming using C++ Lab	2022
1230	13399	Bachelor of Technology (Biomedical Engineering)	BME2212	Engineering Physics Lab	2022
1231	13399	Bachelor of Technology (Biomedical Engineering)	BME2302	Analog Electronics-I	2022
1232	13399	Bachelor of Technology (Biomedical Engineering)	BME2303	Circuits & Systems	2022
1233	13399	Bachelor of Technology (Biomedical Engineering)	BME2310	Engineering Mathematics-III	2022
1234	13399	Bachelor of Technology (Biomedical Engineering)	BME2314	Medical Imaging Techniques-I	2022
1235	13399	Bachelor of Technology (Biomedical Engineering)	BME2351	Human Anatomy and Physiology	2022
1236	13399	Bachelor of Technology (Biomedical Engineering)	BME2306	Analog Electronics Lab-I	2022
1237	13399	Bachelor of Technology (Biomedical Engineering)	BME2315	Computer Aided Graphic Design Lab	2022
1238	13399	Bachelor of Technology (Biomedical Engineering)	BME2316	Measurement & Measuring Instruments	2022
1239	13399	Bachelor of Technology (Biomedical Engineering)	BME2317	Measurement & Measuring Instruments Lab	2022
1240	13399	Bachelor of Technology (Biomedical Engineering)	BME2318	Virtual Instrumentation	2022
1241	13399	Bachelor of Technology (Biomedical Engineering)	BME2319	Virtual Instrumentation Lab	2022
1242	13399	Bachelor of Technology (Biomedical Engineering)	BME2320	Statistics & Probability Concepts	2022
1243	13399	Bachelor of Technology (Biomedical Engineering)	BME2408	Digital Electronics	2022
1244	13399	Bachelor of Technology (Biomedical Engineering)	BME2412	Biomaterials	2022
1245	13399	Bachelor of Technology (Biomedical Engineering)	BME2413	Signals and Systems	2022
1246	13399	Bachelor of Technology (Biomedical Engineering)	BME2451	Bio-Instrumentation	2022
1247	13399	Bachelor of Technology (Biomedical Engineering)	BME2403	Bio-Instrumentation Lab	2022
1248	13399	Bachelor of Technology (Biomedical Engineering)	BME2409	Digital Electronics Lab	2022
1249	13399	Bachelor of Technology (Biomedical Engineering)	BME2414	Signals and Systems Lab	2022
1250	13399	Bachelor of Technology (Biomedical Engineering)	BME2407	Analog Electronics-II	2022

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1251	13399	Bachelor of Technology (Biomedical Engineering)	BME2417	Analog Electronics Lab-II	2022
1252	13399	Bachelor of Technology (Biomedical Engineering)	BME2415	Biochemistry	2022
1253	13399	Bachelor of Technology (Biomedical Engineering)	BME2416	Medical Imaging Techniques-II	2022
1254	13399	Bachelor of Technology (Biomedical Engineering)	BME2418	Artificial Neural Network	2022
1255	13399	Bachelor of Technology (Biomedical Engineering)	BME2419	Artificial Neural Network Lab	2022
1256	13399	Bachelor of Technology (Biomedical Engineering)	BME2501	Microprocessor Systems	2022
1257	13399	Bachelor of Technology (Biomedical Engineering)	BME2513	Medical Image Processing	2022
1258	13399	Bachelor of Technology (Biomedical Engineering)	BME2514	Machine Learning	2022
1259	13399	Bachelor of Technology (Biomedical Engineering)	BME2504	Microprocessor Systems Lab	2022
1260	13399	Bachelor of Technology (Biomedical Engineering)	BME2515	Machine Learning Lab	2022
1261	13399	Bachelor of Technology (Biomedical Engineering)	BME2516	Medical Image Processing Lab	2022
1262	13399	Bachelor of Technology (Biomedical Engineering)	BME2535	Summer Internship Evaluation-I	2022
1263	13399	Bachelor of Technology (Biomedical Engineering)	BME2503	Control Systems	2022
1264	13399	Bachelor of Technology (Biomedical Engineering)	BME2512	Control Systems Lab	2022
1265	13399	Bachelor of Technology (Biomedical Engineering)	BME2507	Digital Circuits and Systems	2022
1266	13399	Bachelor of Technology (Biomedical Engineering)	BME2509	Digital Circuits and Systems Lab	2022
1267	13399	Bachelor of Technology (Biomedical Engineering)	BME2517	Data Structure with C++	2022
1268	13399	Bachelor of Technology (Biomedical Engineering)	BME2518	Data Structure with C++ Lab	2022
1269	13399	Bachelor of Technology (Biomedical Engineering)	BME2519	Fuzzy Logic and Genetic Algorithm	2022
1270	13399	Bachelor of Technology (Biomedical Engineering)	BME2601	Microcontroller and its Biomedical Applications	2022
1271	13399	Bachelor of Technology (Biomedical Engineering)	BME2608	Medical Imaging and Reconstruction Algorithms	2022
1272	13399	Bachelor of Technology (Biomedical Engineering)	BME2651	Biomechanics	2022


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1273	13399	Bachelor of Technology (Biomedical Engineering)	BME2609	Clinical Need Assessment and Mini Project	2022
1274	13399	Bachelor of Technology (Biomedical Engineering)	BME2610	Medical Imaging and Reconstruction Algorithms Lab	2022
1275	13399	Bachelor of Technology (Biomedical Engineering)	BME2607	Hospital Management System	2022
1276	13399	Bachelor of Technology (Biomedical Engineering)	BME2611	Therapeutic and Surgical Equipment	2022
1277	13399	Bachelor of Technology (Biomedical Engineering)	BME2612	Data Mining	2022
1278	13399	Bachelor of Technology (Biomedical Engineering)	BME2710	Embedded System with Recent Technology	2022
1279	13399	Bachelor of Technology (Biomedical Engineering)	BME2711	Artificial Organs and Rehabilitation Engineering	2022
1280	13399	Bachelor of Technology (Biomedical Engineering)	BME2712	Clinical Electrical Safety Hazards	2022
1281	13399	Bachelor of Technology (Biomedical Engineering)	BME2713	Biomechanics Simulation Lab	2022
1282	13399	Bachelor of Technology (Biomedical Engineering)	BME2714	Embedded System with Recent Technology Lab	2022
1283	13399	Bachelor of Technology (Biomedical Engineering)	BME2735	Summer Internship Evaluation-II	2022
1284	13399	Bachelor of Technology (Biomedical Engineering)	BME2737	Project Dissertation-I	2022
1285	13399	Bachelor of Technology (Biomedical Engineering)	BME2715	Clinical Sciences	2022
1286	13399	Bachelor of Technology (Biomedical Engineering)	BME2716	Neural Network and Fuzzy Logic	2022
1287	13399	Bachelor of Technology (Biomedical Engineering)	BME2717	Virtual Reality	2022
1288	13399	Bachelor of Technology (Biomedical Engineering)	BME2718	Robotic Process Automation Design & Development	2022
1289	13399	Bachelor of Technology (Biomedical Engineering)	BME2837	Project Dissertation-II	2022
1290	13399	Bachelor of Technology (Biomedical Engineering)	BME2802	Introduction to Medical Physics	2022
1291	13399	Bachelor of Technology (Biomedical Engineering)	BME2803	Medical Informatics	2022
1292	13399	Bachelor of Technology (Biomedical Engineering)	BME2804	Recent Advancement in Biomedical Modalities	2022
1293	13399	Bachelor of Technology (Biomedical Engineering)	BME2805	Advanced Robotic Process Automation Design & Development	2022
1294	131326	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	AIE6101	Engineering Mathematics-I	2022

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1295	131326	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	AIE6102	Engineering Physics	2022
1296	131326	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	AIE6104	Introduction to Computers & Programming in C	2022
1297	131326	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	AIE6109	Elements of Mechanical Engineering	2022
1298	131326	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	AIE6105	Engineering Physics Lab	2022
1299	131326	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	AIE6106	Programming in C Lab	2022
1300	131326	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	AIE6110	Elements of Mechanical Engineering Lab	2022
1301	131326	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	AIE6201	Engineering Mathematics-II	2022
1302	131326	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	AIE6202	Engineering Chemistry	2022
1303	131326	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	AIE6204	Object Oriented Programming using C++	2022
1304	131326	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	AIE6210	Engineering Mechanics	2022
1305	131326	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	AIE6212	Basics of Electrical & Electronics Engineering	2022
1306	131326	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	AIE6207	Engineering Chemistry Lab	2022
1307	131326	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	AIE6208	Object Oriented Programming using C++ Lab	2022
1308	131326	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	AIE6211	Engineering Graphics Lab	2022
1309	131326	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	AIE6213	Basics of Electrical & Electronics Engineering Lab	2022
1310	131326	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	AIE6302	Database Management Systems	2022
1311	131326	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	AIE6303	Operating Systems	2022
1312	131326	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	AIE6304	Data Structures using C	2022
1313	131326	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	AIE6313	Digital Electronics	2022
1314	131326	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	AIE6305	Data Structures using C Lab	2022
1315	131326	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	AIE6307	Database Management System Lab	2022
1316	131326	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	AIE6308	UNIX Programming Lab	2022

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1317	131326	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	AIE6314	Digital Electronics Lab	2022
1318	131326	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	AIE6310	E-Commerce & ERP	2022
1319	131326	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	AIE6311	Electronic Devices and Circuits	2022
1320	131326	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	AIE6312	Electronic Devices and Circuits Lab	2022
1321	131326	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	AIE6315	Statistics & Probability Concepts	2022
1322	131326	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	AIE6403	Discrete Mathematics	2022
1323	131326	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	AIE6404	Artificial Intelligence	2022
1324	131326	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	AIE6413	Analysis & Design of Algorithm	2022
1325	131326	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	AIE6414	Data Communication & Computer Networks	2022
1326	131326	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	AIE6406	Artificial Intelligence Lab	2022
1327	131326	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	AIE6415	Data Communication & Computer Networks Lab	2022
1328	131326	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	AIE6416	Analysis & Design of Algorithm Lab	2022
1329	131326	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	AIE6407	Communication Systems	2022
1330	131326	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	AIE6408	Communication Systems Lab	2022
1331	131326	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	AIE6411	Artificial Neural Network	2022
1332	131326	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	AIE6412	Artificial Neural Network Lab	2022
1333	131326	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	AIE6417	Web Designing Technologies	2022
1334	131326	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	AIE6418	Web Designing Technologies Lab	2022
1335	131326	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	AIE6502	Computer Architecture	2022
1336	131326	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	AIE6503	Java Programming	2022
1337	131326	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	AIE6504	Advance Data Structures & Algorithm	2022
1338	131326	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	AIE6515	Microprocessor	2022

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1339	131326	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	AIE6516	Theory of Automata & Computation	2022
1340	131326	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	AIE6507	Java Programming Lab	2022
1341	131326	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	AIE6508	Python Programming Lab	2022
1342	131326	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	AIE6509	Advance Data Structures & Algorithm Lab	2022
1343	131326	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	AIE6517	Microprocessor Lab	2022
1344	131326	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	AIE6535	Summer Internship Evaluation-I	2022
1345	131326	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	AIE6511	Fuzzy Logic & Genetic Algorithm	2022
1346	131326	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	AIE6512	VHDL Programming	2022
1347	131326	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	AIE6513	VHDL Programming Lab	2022
1348	131326	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	AIE6518	Advanced Web Designing Technologies	2022
1349	131326	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	AIE6519	Advanced Web Designing Technologies Lab	2022
1350	131326	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	AIE6603	Advanced Java Programming	2022
1351	131326	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	AIE6604	Advance Database Management System	2022
1352	131326	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	AIE6605	Digital Computer Organization	2022
1353	131326	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	AIE6614	Software Engineering	2022
1354	131326	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	AIE6615	Internet of Things & Wireless Sensor Networks	2022
1355	131326	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	AIE6608	Advanced Java Programming Lab	2022
1356	131326	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	AIE6609	Advance Database Management System Lab	2022
1357	131326	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	AIE6616	Software Engineering Lab	2022
1358	131326	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	AIE6637	Minor Project-I	2022
1359	131326	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	AIE6612	VLSI Design	2022
1360	131326	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	AIE6613	VLSI Design Lab	2022

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1361	131326	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	AIE6617	Open Source Technologies	2022
1362	131326	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	AIE6618	Open Source Technologies Lab	2022
1363	131326	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	AIE6619	Data Mining	2022
1364	131326	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	AIE6702	Computer Graphics	2022
1365	131326	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	AIE6704	Advanced Computer Networks	2022
1366	131326	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	AIE6713	Cryptography & Network Security	2022
1367	131326	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	AIE6714	System Programming & Compiler Construction	2022
1368	131326	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	AIE6706	Computer Graphics Lab	2022
1369	131326	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	AIE6707	Advanced Computer Networks Lab	2022
1370	131326	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	AIE6708	MATLAB Programming	2022
1371	131326	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	AIE6715	Network Security Lab	2022
1372	131326	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	AIE6716	System Programming & Compiler Construction Lab	2022
1373	131326	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	AIE6735	Summer Internship Evaluation-II	2022
1374	131326	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	AIE6737	Minor Project-II	2022
1375	131326	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	AIE6710	Mobile Computing	2022
1376	131326	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	AIE6717	Robotic Process Automation Design & Development	2022
1377	131326	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	AIE6718	Responsive Web Design	2022
1378	131326	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	AIE6719	Responsive Web Design Lab	2022
1379	131326	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	AIE6809	Research Methodology & Technical Report Writing	2022
1380	131326	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	AIE6837	Major Project	2022
1381	131326	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	RBE6801	Fundamental of Robotics System & Robot Programming	2022
1382	131326	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	RBE6802	Advanced Control Systems & Drives for Robots	2022

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1383	131326	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	RBE6803	Microprocessor and Interfacing	2022
1384	131326	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	RBE6804	Kinematics & Dynamics of Robots	2022
1385	131326	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	RBE6805	Advanced Applied Mathematics for Engineering	2022
1386	131326	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	RBE6806	Fundamental of Robotics System & Robot Programming Lab	2022
1387	131326	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	RBE6807	Advanced Control Systems & Drives for Robots Lab	2022
1388	131326	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	RBE6808	Microprocessor and Interfacing Lab	2022
1389	131326	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	RBE6809	Digital Image Processing	2022
1390	131326	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	RBE6810	Digital Image Processing Lab	2022
1391	131326	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	RBE6811	Dot Net Programming	2022
1392	131326	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	RBE6812	Dot Net Programming Lab	2022
1393	131326	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	RBE6813	Advance Robotic Process Automation Design & Development	2022
1394	131326	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	MLE6801	Applied Statistical Analysis	2022
1395	131326	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	MLE6802	Data Mining & Predictive Analysis	2022
1396	131326	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	MLE6803	Data Warehousing and Multi-dimensional Modelling	2022
1397	131326	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	MLE6804	Big Data Technologies	2022
1398	131326	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	MLE6805	Applied Statistical Analysis Lab	2022
1399	131326	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	MLE6806	Data Mining & Predictive Analysis Lab	2022
1400	131326	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	MLE6807	Data Warehousing and Multi-dimensional Modelling Lab	2022
1401	131326	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	MLE6808	R-Programming Lab	2022
1402	131326	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	MLE6809	Digital Image Processing	2022
1403	131326	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	MLE6810	Digital Image Processing Lab	2022
1404	131326	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	MLE6811	Dot Net Programming	2022

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1405	131326	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	MLE6812	Dot Net Programming Lab	2022
1406	131326	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	MLE6813	Advance Robotic Process Automation Design & Development	2022
1407	131326	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	AIE6935	Summer Internship Evaluation-III	2022
1408	131326	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	AIE6937	Project-Dissertation-I	2022
1409	131326	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	RBE6901	Automation in Manufacturing Systems	2022
1410	131326	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	RBE6902	Robotic Sensors, Vision and Hardware Implementation	2022
1411	131326	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	RBE6903	Pattern Recognition & Image Processing	2022
1412	131326	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	RBE6904	Robotic Sensors, Vision and Hardware Implementation Lab	2022
1413	131326	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	RBE6905	Pattern Recognition & Image Processing Lab	2022
1414	131326	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	RBE6906	Optimization Techniques	2022
1415	131326	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	RBE6907	CNC Machines & Adaptive Control	2022
1416	131326	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	RBE6908	Neural Network and Fuzzy Logic	2022
1417	131326	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	RBE6909	Neural Network and Fuzzy Logic Lab	2022
1418	131326	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	RBE6910	Decision Making Systems	2022
1419	131326	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	RBE6911	Decision Making Systems Lab	2022
1420	131326	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	MLE6901	Pattern Recognition and Image Processing	2022
1421	131326	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	MLE6902	Neural Network and Fuzzy Logic	2022
1422	131326	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	MLE6903	Natural Language Processing	2022
1423	131326	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	MLE6904	Pattern Recognition and Image Processing Lab	2022
1424	131326	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	MLE6905	Neural Network and Fuzzy Logic Lab	2022
1425	131326	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	MLE6906	Hadoop Lab	2022
1426	131326	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	MLE6907	Descriptive Analysis	2022

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1427	131326	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	MLE6908	Optimization Techniques	2022
1428	131326	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	MLE6909	Social Network Data Analytics	2022
1429	131326	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	MLE6910	Agent Based Intelligent Systems	2022
1430	131326	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	AIE6037	Project-Dissertation-II	2022
1431	131124	B.Tech. + M.Tech. Network & Cyber Security	NCE6101	Engineering Mathematics-I	2022
1432	131124	B.Tech. + M.Tech. Network & Cyber Security	NCE6102	Engineering Physics	2022
1433	131124	B.Tech. + M.Tech. Network & Cyber Security	NCE6104	Introduction to Computers & Programming in C	2022
1434	131124	B.Tech. + M.Tech. Network & Cyber Security	NCE6109	Elements of Mechanical Engineering	2022
1435	131124	B.Tech. + M.Tech. Network & Cyber Security	NCE6105	Engineering Physics Lab	2022
1436	131124	B.Tech. + M.Tech. Network & Cyber Security	NCE6106	Programming in C Lab	2022
1437	131124	B.Tech. + M.Tech. Network & Cyber Security	NCE6110	Elements of Mechanical Engineering Lab	2022
1438	131124	B.Tech. + M.Tech. Network & Cyber Security	NCE6201	Engineering Mathematics-II	2022
1439	131124	B.Tech. + M.Tech. Network & Cyber Security	NCE6202	Engineering Chemistry	2022
1440	131124	B.Tech. + M.Tech. Network & Cyber Security	NCE6204	Object Oriented Programming using C++	2022
1441	131124	B.Tech. + M.Tech. Network & Cyber Security	NCE6210	Engineering Mechanics	2022
1442	131124	B.Tech. + M.Tech. Network & Cyber Security	NCE6212	Basics of Electrical & Electronics Engineering	2022
1443	131124	B.Tech. + M.Tech. Network & Cyber Security	NCE6207	Engineering Chemistry Lab	2022
1444	131124	B.Tech. + M.Tech. Network & Cyber Security	NCE6208	Object Oriented Programming using C++ Lab	2022
1445	131124	B.Tech. + M.Tech. Network & Cyber Security	NCE6211	Engineering Graphics Lab	2022
1446	131124	B.Tech. + M.Tech. Network & Cyber Security	NCE6213	Basics of Electrical & Electronics Engineering Lab	2022
1447	131124	B.Tech. + M.Tech. Network & Cyber Security	NCE6302	Database Management Systems	2022
1448	131124	B.Tech. + M.Tech. Network & Cyber Security	NCE6303	Operating Systems	2022

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1449	131124	B.Tech. + M.Tech. Network & Cyber Security	NCE6304	Data Structures using C	2022
1450	131124	B.Tech. + M.Tech. Network & Cyber Security	NCE6313	Digital Electronics	2022
1451	131124	B.Tech. + M.Tech. Network & Cyber Security	NCE6305	Data Structures using C Lab	2022
1452	131124	B.Tech. + M.Tech. Network & Cyber Security	NCE6307	Database Management System Lab	2022
1453	131124	B.Tech. + M.Tech. Network & Cyber Security	NCE6308	UNIX Programming Lab	2022
1454	131124	B.Tech. + M.Tech. Network & Cyber Security	NCE6314	Digital Electronics Lab	2022
1455	131124	B.Tech. + M.Tech. Network & Cyber Security	NCE6310	E-Commerce & ERP	2022
1456	131124	B.Tech. + M.Tech. Network & Cyber Security	NCE6311	Electronic Devices and Circuits	2022
1457	131124	B.Tech. + M.Tech. Network & Cyber Security	NCE6312	Electronic Devices and Circuits Lab	2022
1458	131124	B.Tech. + M.Tech. Network & Cyber Security	NCE6315	Statistics & Probability Concepts	2022
1459	131124	B.Tech. + M.Tech. Network & Cyber Security	NCE6403	Discrete Mathematics	2022
1460	131124	B.Tech. + M.Tech. Network & Cyber Security	NCE6404	Artificial Intelligence	2022
1461	131124	B.Tech. + M.Tech. Network & Cyber Security	NCE6413	Analysis & Design of Algorithm	2022
1462	131124	B.Tech. + M.Tech. Network & Cyber Security	NCE6414	Data Communication & Computer Networks	2022
1463	131124	B.Tech. + M.Tech. Network & Cyber Security	NCE6406	Artificial Intelligence Lab	2022
1464	131124	B.Tech. + M.Tech. Network & Cyber Security	NCE6415	Data Communication & Computer Networks Lab	2022
1465	131124	B.Tech. + M.Tech. Network & Cyber Security	NCE6416	Analysis & Design of Algorithm Lab	2022
1466	131124	B.Tech. + M.Tech. Network & Cyber Security	NCE6407	Communication Systems	2022
1467	131124	B.Tech. + M.Tech. Network & Cyber Security	NCE6408	Communication Systems Lab	2022
1468	131124	B.Tech. + M.Tech. Network & Cyber Security	NCE6411	Artificial Neural Network	2022
1469	131124	B.Tech. + M.Tech. Network & Cyber Security	NCE6412	Artificial Neural Network Lab	2022
1470	131124	B.Tech. + M.Tech. Network & Cyber Security	NCE6417	Web Designing Technologies	2022

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1471	131124	B.Tech. + M.Tech. Network & Cyber Security	NCE6418	Web Designing Technologies Lab	2022
1472	131124	B.Tech. + M.Tech. Network & Cyber Security	NCE6502	Computer Architecture	2022
1473	131124	B.Tech. + M.Tech. Network & Cyber Security	NCE6503	Java Programming	2022
1474	131124	B.Tech. + M.Tech. Network & Cyber Security	NCE6504	Advance Data Structures & Algorithm	2022
1475	131124	B.Tech. + M.Tech. Network & Cyber Security	NCE6515	Microprocessor	2022
1476	131124	B.Tech. + M.Tech. Network & Cyber Security	NCE6516	Theory of Automata & Computation	2022
1477	131124	B.Tech. + M.Tech. Network & Cyber Security	NCE6507	Java Programming Lab	2022
1478	131124	B.Tech. + M.Tech. Network & Cyber Security	NCE6508	Python Programming Lab	2022
1479	131124	B.Tech. + M.Tech. Network & Cyber Security	NCE6509	Advance Data Structures & Algorithm Lab	2022
1480	131124	B.Tech. + M.Tech. Network & Cyber Security	NCE6517	Microprocessor Lab	2022
1481	131124	B.Tech. + M.Tech. Network & Cyber Security	NCE6535	Summer Internship Evaluation-I	2022
1482	131124	B.Tech. + M.Tech. Network & Cyber Security	NCE6511	Fuzzy Logic & Genetic Algorithm	2022
1483	131124	B.Tech. + M.Tech. Network & Cyber Security	NCE6512	VHDL Programming	2022
1484	131124	B.Tech. + M.Tech. Network & Cyber Security	NCE6513	VHDL Programming Lab	2022
1485	131124	B.Tech. + M.Tech. Network & Cyber Security	NCE6518	Advanced Web Designing Technologies	2022
1486	131124	B.Tech. + M.Tech. Network & Cyber Security	NCE6519	Advanced Web Designing Technologies Lab	2022
1487	131124	B.Tech. + M.Tech. Network & Cyber Security	NCE6603	Advanced Java Programming	2022
1488	131124	B.Tech. + M.Tech. Network & Cyber Security	NCE6604	Advance Database Management System	2022
1489	131124	B.Tech. + M.Tech. Network & Cyber Security	NCE6605	Digital Computer Organization	2022
1490	131124	B.Tech. + M.Tech. Network & Cyber Security	NCE6614	Software Engineering	2022
1491	131124	B.Tech. + M.Tech. Network & Cyber Security	NCE6615	Internet of Things & Wireless Sensor Networks	2022
1492	131124	B.Tech. + M.Tech. Network & Cyber Security	NCE6608	Advanced Java Programming Lab	2022

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1493	131124	B.Tech. + M.Tech. Network & Cyber Security	NCE6609	Advance Database Management System Lab	2022
1494	131124	B.Tech. + M.Tech. Network & Cyber Security	NCE6619	Software Engineering Lab	2022
1495	131124	B.Tech. + M.Tech. Network & Cyber Security	NCE6637	Minor Project-I	2022
1496	131124	B.Tech. + M.Tech. Network & Cyber Security	NCE6612	VLSI Design	2022
1497	131124	B.Tech. + M.Tech. Network & Cyber Security	NCE6613	VLSI Design Lab	2022
1498	131124	B.Tech. + M.Tech. Network & Cyber Security	NCE6616	Open Source Technologies	2022
1499	131124	B.Tech. + M.Tech. Network & Cyber Security	NCE6617	Open Source Technologies Lab	2022
1500	131124	B.Tech. + M.Tech. Network & Cyber Security	NCE6618	Data Mining	2022
1501	131124	B.Tech. + M.Tech. Network & Cyber Security	NCE6702	Computer Graphics	2022
1502	131124	B.Tech. + M.Tech. Network & Cyber Security	NCE6704	Advanced Computer Networks	2022
1503	131124	B.Tech. + M.Tech. Network & Cyber Security	NCE6713	Cryptography & Network Security	2022
1504	131124	B.Tech. + M.Tech. Network & Cyber Security	NCE6714	System Programming & Compiler Construction	2022
1505	131124	B.Tech. + M.Tech. Network & Cyber Security	NCE6706	Computer Graphics Lab	2022
1506	131124	B.Tech. + M.Tech. Network & Cyber Security	NCE6707	Advanced Computer Networks Lab	2022
1507	131124	B.Tech. + M.Tech. Network & Cyber Security	NCE6708	MATLAB Programming	2022
1508	131124	B.Tech. + M.Tech. Network & Cyber Security	NCE6715	System Programming & Compiler Construction Lab	2022
1509	131124	B.Tech. + M.Tech. Network & Cyber Security	NCE6718	Network Security Lab	2022
1510	131124	B.Tech. + M.Tech. Network & Cyber Security	NCE6735	Summer Internship Evaluation-II	2022
1511	131124	B.Tech. + M.Tech. Network & Cyber Security	NCE6737	Minor Project-II	2022
1512	131124	B.Tech. + M.Tech. Network & Cyber Security	NCE6710	Mobile Computing	2022
1513	131124	B.Tech. + M.Tech. Network & Cyber Security	NCE6716	Robotic Process Automation Design & Development	2022
1514	131124	B.Tech. + M.Tech. Network & Cyber Security	NCE6717	Responsive Web Design	2022

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1515	131124	B.Tech. + M.Tech. Network & Cyber Security	NCE6719	Responsive Web Design Lab	2022
1516	131124	B.Tech. + M.Tech. Network & Cyber Security	NCE6801	Mathematical Foundation for Cyber Security	2022
1517	131124	B.Tech. + M.Tech. Network & Cyber Security	NCE6802	Network and Wireless Security	2022
1518	131124	B.Tech. + M.Tech. Network & Cyber Security	NCE6803	Cyber Crime and IT Law	2022
1519	131124	B.Tech. + M.Tech. Network & Cyber Security	NCE6804	Cyber Crime Investigation & Forensics	2022
1520	131124	B.Tech. + M.Tech. Network & Cyber Security	NCE6805	Intrusion Detection & Prevention System	2022
1521	131124	B.Tech. + M.Tech. Network & Cyber Security	NCE6806	Cryptography Foundation Lab	2022
1522	131124	B.Tech. + M.Tech. Network & Cyber Security	NCE6807	Web Security Lab	2022
1523	131124	B.Tech. + M.Tech. Network & Cyber Security	NCE6808	Network & Wireless Security Lab	2022
1524	131124	B.Tech. + M.Tech. Network & Cyber Security	NCE6809	Research Methodology & Technical Report Writing	2022
1525	131124	B.Tech. + M.Tech. Network & Cyber Security	NCE6837	Major Project	2022
1526	131124	B.Tech. + M.Tech. Network & Cyber Security	NCE6812	Digital Image Processing	2022
1527	131124	B.Tech. + M.Tech. Network & Cyber Security	NCE6813	Digital Image Processing Lab	2022
1528	131124	B.Tech. + M.Tech. Network & Cyber Security	NCE6814	Dot Net Programming	2022
1529	131124	B.Tech. + M.Tech. Network & Cyber Security	NCE6815	Dot Net Programming Lab	2022
1530	131124	B.Tech. + M.Tech. Network & Cyber Security	NCE6816	Advance Robotic Process Automation Design & Development	2022
1531	131124	B.Tech. + M.Tech. Network & Cyber Security	NCE6901	Biometric Systems & Biometric Image Processing	2022
1532	131124	B.Tech. + M.Tech. Network & Cyber Security	NCE6902	Software Vulnerability Analysis	2022
1533	131124	B.Tech. + M.Tech. Network & Cyber Security	NCE6903	Applied Cryptography	2022
1534	131124	B.Tech. + M.Tech. Network & Cyber Security	NCE6904	Biometric Image Processing Lab	2022
1535	131124	B.Tech. + M.Tech. Network & Cyber Security	NCE6905	Applied Cryptography Lab	2022
1536	131124	B.Tech. + M.Tech. Network & Cyber Security	NCE6935	Summer Internship Evaluation-III	2022

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1537	131124	B.Tech. + M.Tech. Network & Cyber Security	NCE6937	Project-Dissertation-I	2022
1538	131124	B.Tech. + M.Tech. Network & Cyber Security	NCE6906	Web Application & Penetration Testing	2022
1539	131124	B.Tech. + M.Tech. Network & Cyber Security	NCE6907	Malware Analysis in Network Security	2022
1540	131124	B.Tech. + M.Tech. Network & Cyber Security	NCE6908	Web Security	2022
1541	131124	B.Tech. + M.Tech. Network & Cyber Security	NCE6909	Digital Watermarking & Steganography	2022
1542	131124	B.Tech. + M.Tech. Network & Cyber Security	NCE6037	Project-Dissertation-II	2022
1543	131123	B.Tech. + M.Tech. Data Science	DSE6101	Engineering Mathematics-I	2022
1544	131123	B.Tech. + M.Tech. Data Science	DSE6102	Engineering Physics	2022
1545	131123	B.Tech. + M.Tech. Data Science	DSE6104	Introduction to Computers & Programming in C	2022
1546	131123	B.Tech. + M.Tech. Data Science	DSE6109	Elements of Mechanical Engineering	2022
1547	131123	B.Tech. + M.Tech. Data Science	DSE6105	Engineering Physics Lab	2022
1548	131123	B.Tech. + M.Tech. Data Science	DSE6106	Programming in C Lab	2022
1549	131123	B.Tech. + M.Tech. Data Science	DSE6110	Elements of Mechanical Engineering Lab	2022
1550	131123	B.Tech. + M.Tech. Data Science	DSE6201	Engineering Mathematics-II	2022
1551	131123	B.Tech. + M.Tech. Data Science	DSE6202	Engineering Chemistry	2022
1552	131123	B.Tech. + M.Tech. Data Science	DSE6204	Object Oriented Programming using C++	2022
1553	131123	B.Tech. + M.Tech. Data Science	DSE6210	Engineering Mechanics	2022
1554	131123	B.Tech. + M.Tech. Data Science	DSE6212	Basics of Electrical & Electronics Engineering	2022
1555	131123	B.Tech. + M.Tech. Data Science	DSE6207	Engineering Chemistry Lab	2022
1556	131123	B.Tech. + M.Tech. Data Science	DSE6208	Object Oriented Programming using C++ Lab	2022
1557	131123	B.Tech. + M.Tech. Data Science	DSE6211	Engineering Graphics Lab	2022
1558	131123	B.Tech. + M.Tech. Data Science	DSE6213	Basics of Electrical & Electronics Engineering Lab	2022
1559	131123	B.Tech. + M.Tech. Data Science	DSE6302	Database Management Systems	2022
1560	131123	B.Tech. + M.Tech. Data Science	DSE6303	Operating Systems	2022
1561	131123	B.Tech. + M.Tech. Data Science	DSE6304	Data Structures using C	2022
1562	131123	B.Tech. + M.Tech. Data Science	DSE6313	Digital Electronics	2022
1563	131123	B.Tech. + M.Tech. Data Science	DSE6305	Data Structures using C Lab	2022
1564	131123	B.Tech. + M.Tech. Data Science	DSE6307	Database Management System Lab	2022
1565	131123	B.Tech. + M.Tech. Data Science	DSE6308	UNIX Programming Lab	2022

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1566	131123	B.Tech. + M.Tech. Data Science	DSE6314	Digital Electronics Lab	2022
1567	131123	B.Tech. + M.Tech. Data Science	DSE6310	E-Commerce & ERP	2022
1568	131123	B.Tech. + M.Tech. Data Science	DSE6311	Electronic Devices and Circuits	2022
1569	131123	B.Tech. + M.Tech. Data Science	DSE6312	Electronic Devices and Circuits Lab	2022
1570	131123	B.Tech. + M.Tech. Data Science	DSE6315	Statistics & Probability Concepts	2022
1571	131123	B.Tech. + M.Tech. Data Science	DSE6403	Discrete Mathematics	2022
1572	131123	B.Tech. + M.Tech. Data Science	DSE6404	Artificial Intelligence	2022
1573	131123	B.Tech. + M.Tech. Data Science	DSE6413	Analysis & Design of Algorithm	2022
1574	131123	B.Tech. + M.Tech. Data Science	DSE6414	Data Communication & Computer Networks	2022
1575	131123	B.Tech. + M.Tech. Data Science	DSE6406	Artificial Intelligence Lab	2022
1576	131123	B.Tech. + M.Tech. Data Science	DSE6415	Data Communication & Computer Networks Lab	2022
1577	131123	B.Tech. + M.Tech. Data Science	DSE6416	Analysis & Design of Algorithm Lab	2022
1578	131123	B.Tech. + M.Tech. Data Science	DSE6407	Communication Systems	2022
1579	131123	B.Tech. + M.Tech. Data Science	DSE6408	Communication Systems Lab	2022
1580	131123	B.Tech. + M.Tech. Data Science	DSE6411	Artificial Neural Network	2022
1581	131123	B.Tech. + M.Tech. Data Science	DSE6412	Artificial Neural Network Lab	2022
1582	131123	B.Tech. + M.Tech. Data Science	DSE6417	Web Designing Technologies	2022
1583	131123	B.Tech. + M.Tech. Data Science	DSE6418	Web Designing Technologies Lab	2022
1584	131123	B.Tech. + M.Tech. Data Science	DSE6502	Computer Architecture	2022
1585	131123	B.Tech. + M.Tech. Data Science	DSE6503	Java Programming	2022
1586	131123	B.Tech. + M.Tech. Data Science	DSE6504	Advance Data Structures & Algorithm	2022
1587	131123	B.Tech. + M.Tech. Data Science	DSE6515	Microprocessor	2022
1588	131123	B.Tech. + M.Tech. Data Science	DSE6516	Theory of Automata & Computation	2022
1589	131123	B.Tech. + M.Tech. Data Science	DSE6507	Java Programming Lab	2022
1590	131123	B.Tech. + M.Tech. Data Science	DSE6508	Python Programming Lab	2022
1591	131123	B.Tech. + M.Tech. Data Science	DSE6509	Advance Data Structures & Algorithm Lab	2022
1592	131123	B.Tech. + M.Tech. Data Science	DSE6517	Microprocessor Lab	2022
1593	131123	B.Tech. + M.Tech. Data Science	DSE6535	Summer Internship Evaluation-I	2022
1594	131123	B.Tech. + M.Tech. Data Science	DSE6511	Fuzzy Logic & Genetic Algorithm	2022
1595	131123	B.Tech. + M.Tech. Data Science	DSE6512	VHDL Programming	2022
1596	131123	B.Tech. + M.Tech. Data Science	DSE6513	VHDL Programming Lab	2022
1597	131123	B.Tech. + M.Tech. Data Science	DSE6518	Advanced Web Designing Technologies	2022

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1598	131123	B.Tech. + M.Tech. Data Science	DSE6519	Advanced Web Designing Technologies Lab	2022
1599	131123	B.Tech. + M.Tech. Data Science	DSE6603	Advanced Java Programming	2022
1600	131123	B.Tech. + M.Tech. Data Science	DSE6604	Advance Database Management System	2022
1601	131123	B.Tech. + M.Tech. Data Science	DSE6605	Digital Computer Organization	2022
1602	131123	B.Tech. + M.Tech. Data Science	DSE6614	Software Engineering	2022
1603	131123	B.Tech. + M.Tech. Data Science	DSE6615	Internet of Things & Wireless Sensor Networks	2022
1604	131123	B.Tech. + M.Tech. Data Science	DSE6608	Advanced Java Programming Lab	2022
1605	131123	B.Tech. + M.Tech. Data Science	DSE6609	Advance Database Management System Lab	2022
1606	131123	B.Tech. + M.Tech. Data Science	DSE6616	Software Engineering Lab	2022
1607	131123	B.Tech. + M.Tech. Data Science	DSE6637	Minor Project-I	2022
1608	131123	B.Tech. + M.Tech. Data Science	DSE6612	VLSI Design	2022
1609	131123	B.Tech. + M.Tech. Data Science	DSE6613	VLSI Design Lab	2022
1610	131123	B.Tech. + M.Tech. Data Science	DSE6617	Open Source Technologies	2022
1611	131123	B.Tech. + M.Tech. Data Science	DSE6618	Open Source Technologies Lab	2022
1612	131123	B.Tech. + M.Tech. Data Science	DSE6619	Data Mining	2022
1613	131123	B.Tech. + M.Tech. Data Science	DSE6702	Computer Graphics	2022
1614	131123	B.Tech. + M.Tech. Data Science	DSE6704	Advanced Computer Networks	2022
1615	131123	B.Tech. + M.Tech. Data Science	DSE6713	Cryptography & Network Security	2022
1616	131123	B.Tech. + M.Tech. Data Science	DSE6714	System Programming & Compiler Construction	2022
1617	131123	B.Tech. + M.Tech. Data Science	DSE6706	Computer Graphics Lab	2022
1618	131123	B.Tech. + M.Tech. Data Science	DSE6707	Advanced Computer Networks Lab	2022
1619	131123	B.Tech. + M.Tech. Data Science	DSE6708	MATLAB Programming	2022
1620	131123	B.Tech. + M.Tech. Data Science	DSE6715	Network Security Lab	2022
1621	131123	B.Tech. + M.Tech. Data Science	DSE6716	System Programming & Compiler Construction Lab	2022
1622	131123	B.Tech. + M.Tech. Data Science	DSE6735	Summer Internship Evaluation-II	2022
1623	131123	B.Tech. + M.Tech. Data Science	DSE6737	Minor Project-II	2022
1624	131123	B.Tech. + M.Tech. Data Science	DSE6710	Mobile Computing	2022
1625	131123	B.Tech. + M.Tech. Data Science	DSE6717	Robotic Process Automation Design & Development	2022
1626	131123	B.Tech. + M.Tech. Data Science	DSE6718	Responsive Web Design	2022
1627	131123	B.Tech. + M.Tech. Data Science	DSE6719	Responsive Web Design Lab	2022
1628	131123	B.Tech. + M.Tech. Data Science	DSE6801	Applied Statistical Analysis	2022
1629	131123	B.Tech. + M.Tech. Data Science	DSE6802	Data Mining & Predictive Analytics	2022

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1630	131123	B.Tech. + M.Tech. Data Science	DSE6803	Data Warehousing & Multi-dimensional Modelling	2022
1631	131123	B.Tech. + M.Tech. Data Science	DSE6804	Database & Knowledge Base Systems	2022
1632	131123	B.Tech. + M.Tech. Data Science	DSE6805	Big Data Technologies	2022
1633	131123	B.Tech. + M.Tech. Data Science	DSE6806	Applied Statically Analysis Lab	2022
1634	131123	B.Tech. + M.Tech. Data Science	DSE6807	Data Mining & Predictive Analytics Lab	2022
1635	131123	B.Tech. + M.Tech. Data Science	DSE6808	Data Warehousing & Multi-dimensional Modelling Lab	2022
1636	131123	B.Tech. + M.Tech. Data Science	DSE6809	Research Methodology & Technical Report Writing	2022
1637	131123	B.Tech. + M.Tech. Data Science	DSE6837	Major Project	2022
1638	131123	B.Tech. + M.Tech. Data Science	DSE6812	Digital Image Processing	2022
1639	131123	B.Tech. + M.Tech. Data Science	DSE6813	Digital Image Processing Lab	2022
1640	131123	B.Tech. + M.Tech. Data Science	DSE6814	Dot Net Programming	2022
1641	131123	B.Tech. + M.Tech. Data Science	DSE6815	Dot Net Programming Lab	2022
1642	131123	B.Tech. + M.Tech. Data Science	DSE6816	Advance Robotic Process Automation Design & Development	2022
1643	131123	B.Tech. + M.Tech. Data Science	DSE6901	Descriptive Analysis	2022
1644	131123	B.Tech. + M.Tech. Data Science	DSE6902	Learning & Reasoning with Bayesian Networks	2022
1645	131123	B.Tech. + M.Tech. Data Science	DSE6903	Social Network Data Analytics	2022
1646	131123	B.Tech. + M.Tech. Data Science	DSE6904	R-Programming Lab	2022
1647	131123	B.Tech. + M.Tech. Data Science	DSE6905	Hadoop Lab	2022
1648	131123	B.Tech. + M.Tech. Data Science	DSE6935	Summer Internship Evaluation-III	2022
1649	131123	B.Tech. + M.Tech. Data Science	DSE6937	Project-Dissertation-I	2022
1650	131123	B.Tech. + M.Tech. Data Science	DSE6906	Web Technology	2022
1651	131123	B.Tech. + M.Tech. Data Science	DSE6907	Service Oriented Architecture	2022
1652	131123	B.Tech. + M.Tech. Data Science	DSE6908	Natural Language Processing	2022
1653	131123	B.Tech. + M.Tech. Data Science	DSE6909	Agent Based Intelligent Systems	2022
1654	131123	B.Tech. + M.Tech. Data Science	DSE6037	Project-Dissertation-II	2022
1655	13578	Master of Technology (Civil Engineering) (Specialisation: Structural Engg, Construction Technology & Mgmt., Environmental Engg., Transportation Engg.)	CIV4101	Applied Numerical Methods	2022

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1656	13578	Master of Technology (Civil Engineering) (Specialisation: Structural Engg, Construction Technology & Mgmt., Environmental Engg., Transportation Engg.)	CIV4102	Sustainable Constructions	2022
1657	13578	Master of Technology (Civil Engineering) (Specialisation: Structural Engg, Construction Technology & Mgmt., Environmental Engg., Transportation Engg.)	CIV4103	Disaster Mitigation and Management	2022
1658	13578	Master of Technology (Civil Engineering) (Specialisation: Structural Engg, Construction Technology & Mgmt., Environmental Engg., Transportation Engg.)	CIV4104	Environmental Impact Assessment for Civil Engineers	2022
1659	13578	Master of Technology (Civil Engineering) (Specialisation: Structural Engg, Construction Technology & Mgmt., Environmental Engg., Transportation Engg.)	CIV4105	Optimization and Quantitative Methods in Civil Engineering	2022
1660	13578	Master of Technology (Civil Engineering) (Specialisation: Structural Engg, Construction Technology & Mgmt., Environmental Engg., Transportation Engg.)	CIV4106	Advanced Civil Engineering Lab	2022
1661	13578	Master of Technology (Civil Engineering) (Specialisation: Structural Engg, Construction Technology & Mgmt., Environmental Engg., Transportation Engg.)	CIV4201	Research Methodology and Technical Report Writing	2022
1662	13578	Master of Technology (Civil Engineering) (Specialisation: Structural Engg, Construction Technology & Mgmt., Environmental Engg., Transportation Engg.)	STE4201	Structural Dynamics	2022

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1663	13578	Master of Technology (Civil Engineering) (Specialisation: Structural Engg, Construction Technology & Mgmt., Environmental Engg., Transportation Engg.)	STE4202	Advanced Steel Design	2022
1664	13578	Master of Technology (Civil Engineering) (Specialisation: Structural Engg, Construction Technology & Mgmt., Environmental Engg., Transportation Engg.)	STE4204	Design of Industrial Structures	2022
1665	13578	Master of Technology (Civil Engineering) (Specialisation: Structural Engg, Construction Technology & Mgmt., Environmental Engg., Transportation Engg.)	STE4212	Advanced Structural Analysis	2022
1666	13578	Master of Technology (Civil Engineering) (Specialisation: Structural Engg, Construction Technology & Mgmt., Environmental Engg., Transportation Engg.)	STE4208	Advanced Bridge Design	2022
1667	13578	Master of Technology (Civil Engineering) (Specialisation: Structural Engg, Construction Technology & Mgmt., Environmental Engg., Transportation Engg.)	STE4211	Advanced Concrete Design	2022
1668	13578	Master of Technology (Civil Engineering) (Specialisation: Structural Engg, Construction Technology & Mgmt., Environmental Engg., Transportation Engg.)	STE4213	Finite Element Method	2022
1669	13578	Master of Technology (Civil Engineering) (Specialisation: Structural Engg, Construction Technology & Mgmt., Environmental Engg., Transportation Engg.)	CME4201	Advances in Construction Practices and Machinery	2022

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1670	13578	Master of Technology (Civil Engineering) (Specialisation: Structural Engg, Construction Technology & Mgmt., Environmental Engg., Transportation Engg.)	CME4203	Building Services & Maintenance Management	2022
1671	13578	Master of Technology (Civil Engineering) (Specialisation: Structural Engg, Construction Technology & Mgmt., Environmental Engg., Transportation Engg.)	CME4204	Systems Design and Value Analysis	2022
1672	13578	Master of Technology (Civil Engineering) (Specialisation: Structural Engg, Construction Technology & Mgmt., Environmental Engg., Transportation Engg.)	CME4211	Process Analysis & Theory of Constraints	2022
1673	13578	Master of Technology (Civil Engineering) (Specialisation: Structural Engg, Construction Technology & Mgmt., Environmental Engg., Transportation Engg.)	CME4207	Reliability Analysis in Construction Management	2022
1674	13578	Master of Technology (Civil Engineering) (Specialisation: Structural Engg, Construction Technology & Mgmt., Environmental Engg., Transportation Engg.)	CME4212	Pre-Engineered Construction Technology	2022
1675	13578	Master of Technology (Civil Engineering) (Specialisation: Structural Engg, Construction Technology & Mgmt., Environmental Engg., Transportation Engg.)	CME4213	Construction Planning and Management	2022
1676	13578	Master of Technology (Civil Engineering) (Specialisation: Structural Engg, Construction Technology & Mgmt., Environmental Engg., Transportation Engg.)	TRE4201	Transportation Planning	2022

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1677	13578	Master of Technology (Civil Engineering) (Specialisation: Structural Engg, Construction Technology & Mgmt., Environmental Engg., Transportation Engg.)	TRE4216	Pavement Materials & Construction	2022
1678	13578	Master of Technology (Civil Engineering) (Specialisation: Structural Engg, Construction Technology & Mgmt., Environmental Engg., Transportation Engg.)	TRE4217	Pavement Materials & Construction Lab	2022
1679	13578	Master of Technology (Civil Engineering) (Specialisation: Structural Engg, Construction Technology & Mgmt., Environmental Engg., Transportation Engg.)	TRE4211	Pavement Analysis and Design	2022
1680	13578	Master of Technology (Civil Engineering) (Specialisation: Structural Engg, Construction Technology & Mgmt., Environmental Engg., Transportation Engg.)	TRE4222	Pavement Analysis and Design Lab	2022
1681	13578	Master of Technology (Civil Engineering) (Specialisation: Structural Engg, Construction Technology & Mgmt., Environmental Engg., Transportation Engg.)	TRE4220	Advanced Traffic Engineering and Modeling	2022
1682	13578	Master of Technology (Civil Engineering) (Specialisation: Structural Engg, Construction Technology & Mgmt., Environmental Engg., Transportation Engg.)	TRE4221	Advanced Traffic Engineering and Modeling Lab	2022
1683	13578	Master of Technology (Civil Engineering) (Specialisation: Structural Engg, Construction Technology & Mgmt., Environmental Engg., Transportation Engg.)	TRE4210	Transportation Economics & Finance	2022

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1684	13578	Master of Technology (Civil Engineering) (Specialisation: Structural Engg, Construction Technology & Mgmt., Environmental Engg., Transportation Engg.)	TRE4214	Accidents Analysis & Prevention	2022
1685	13578	Master of Technology (Civil Engineering) (Specialisation: Structural Engg, Construction Technology & Mgmt., Environmental Engg., Transportation Engg.)	TRE4218	Geometric Design of Highways	2022
1686	13578	Master of Technology (Civil Engineering) (Specialisation: Structural Engg, Construction Technology & Mgmt., Environmental Engg., Transportation Engg.)	EVE4201	Environmental Policies and Legislation	2022
1687	13578	Master of Technology (Civil Engineering) (Specialisation: Structural Engg, Construction Technology & Mgmt., Environmental Engg., Transportation Engg.)	EVE4208	Solid and Hazardous Waste Management	2022
1688	13578	Master of Technology (Civil Engineering) (Specialisation: Structural Engg, Construction Technology & Mgmt., Environmental Engg., Transportation Engg.)	EVE4211	Water Treatment Plant Design and Operation	2022
1689	13578	Master of Technology (Civil Engineering) (Specialisation: Structural Engg, Construction Technology & Mgmt., Environmental Engg., Transportation Engg.)	EVE4212	Air Pollution and Control	2022
1690	13578	Master of Technology (Civil Engineering) (Specialisation: Structural Engg, Construction Technology & Mgmt., Environmental Engg., Transportation Engg.)	EVE4205	Optimization of Water Resources System	2022

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1691	13578	Master of Technology (Civil Engineering) (Specialisation: Structural Engg, Construction Technology & Mgmt., Environmental Engg., Transportation Engg.)	EVE4213	Environmental Chemistry	2022
1692	13578	Master of Technology (Civil Engineering) (Specialisation: Structural Engg, Construction Technology & Mgmt., Environmental Engg., Transportation Engg.)	EVE4214	Environmental Engineering Lab	2022
1693	13578	Master of Technology (Civil Engineering) (Specialisation: Structural Engg, Construction Technology & Mgmt., Environmental Engg., Transportation Engg.)	EVE4215	GIS & Remote Sensing for Land and Water Management	2022
1694	13578	Master of Technology (Civil Engineering) (Specialisation: Structural Engg, Construction Technology & Mgmt., Environmental Engg., Transportation Engg.)	HWE4201	Pavement Analysis and Design	2022
1695	13578	Master of Technology (Civil Engineering) (Specialisation: Structural Engg, Construction Technology & Mgmt., Environmental Engg., Transportation Engg.)	HWE4202	Pavement Analysis and Design Lab	2022
1696	13578	Master of Technology (Civil Engineering) (Specialisation: Structural Engg, Construction Technology & Mgmt., Environmental Engg., Transportation Engg.)	HWE4203	Highways Geometric Design	2022
1697	13578	Master of Technology (Civil Engineering) (Specialisation: Structural Engg, Construction Technology & Mgmt., Environmental Engg., Transportation Engg.)	HWE4204	Pavement Materials and Construction	2022

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1698	13578	Master of Technology (Civil Engineering) (Specialisation: Structural Engg, Construction Technology & Mgmt., Environmental Engg., Transportation Engg.)	HWE4205	Pavement Materials and Construction Lab	2022
1699	13578	Master of Technology (Civil Engineering) (Specialisation: Structural Engg, Construction Technology & Mgmt., Environmental Engg., Transportation Engg.)	HWE4206	Construction Project Management and BOT System	2022
1700	13578	Master of Technology (Civil Engineering) (Specialisation: Structural Engg, Construction Technology & Mgmt., Environmental Engg., Transportation Engg.)	HWE4207	Advanced Traffic Engineering and Modelling	2022
1701	13578	Master of Technology (Civil Engineering) (Specialisation: Structural Engg, Construction Technology & Mgmt., Environmental Engg., Transportation Engg.)	HWE4208	Transportation Economics, Planning and Management	2022
1702	13578	Master of Technology (Civil Engineering) (Specialisation: Structural Engg, Construction Technology & Mgmt., Environmental Engg., Transportation Engg.)	HWE4209	Accident Analysis and Prevention	2022
1703	13578	Master of Technology (Civil Engineering) (Specialisation: Structural Engg, Construction Technology & Mgmt., Environmental Engg., Transportation Engg.)	CIV4335	Summer Internship Evaluation	2022
1704	13578	Master of Technology (Civil Engineering) (Specialisation: Structural Engg, Construction Technology & Mgmt., Environmental Engg., Transportation Engg.)	CIV4337	Project-Dissertation-I	2022

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1705	13578	Master of Technology (Civil Engineering) (Specialisation: Structural Engg, Construction Technology & Mgmt., Environmental Engg., Transportation Engg.)	STE4308	Design of Tall Buildings	2022
1706	13578	Master of Technology (Civil Engineering) (Specialisation: Structural Engg, Construction Technology & Mgmt., Environmental Engg., Transportation Engg.)	STE4312	Offshore Structures	2022
1707	13578	Master of Technology (Civil Engineering) (Specialisation: Structural Engg, Construction Technology & Mgmt., Environmental Engg., Transportation Engg.)	STE4314	Pre-stressed Concrete Design	2022
1708	13578	Master of Technology (Civil Engineering) (Specialisation: Structural Engg, Construction Technology & Mgmt., Environmental Engg., Transportation Engg.)	STE4302	Advanced Concrete Technology	2022
1709	13578	Master of Technology (Civil Engineering) (Specialisation: Structural Engg, Construction Technology & Mgmt., Environmental Engg., Transportation Engg.)	STE4307	Soil Structure Interaction	2022
1710	13578	Master of Technology (Civil Engineering) (Specialisation: Structural Engg, Construction Technology & Mgmt., Environmental Engg., Transportation Engg.)	STE4315	Theory of Plates & Shells	2022
1711	13578	Master of Technology (Civil Engineering) (Specialisation: Structural Engg, Construction Technology & Mgmt., Environmental Engg., Transportation Engg.)	STE4304	Advanced Construction Materials	2022

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1712	13578	Master of Technology (Civil Engineering) (Specialisation: Structural Engg, Construction Technology & Mgmt., Environmental Engg., Transportation Engg.)	STE4305	Advanced Construction Materials Lab	2022
1713	13578	Master of Technology (Civil Engineering) (Specialisation: Structural Engg, Construction Technology & Mgmt., Environmental Engg., Transportation Engg.)	STE4309	Advanced Steel and Concrete Composite Structures	2022
1714	13578	Master of Technology (Civil Engineering) (Specialisation: Structural Engg, Construction Technology & Mgmt., Environmental Engg., Transportation Engg.)	STE4310	Advanced Structural Engineering Lab	2022
1715	13578	Master of Technology (Civil Engineering) (Specialisation: Structural Engg, Construction Technology & Mgmt., Environmental Engg., Transportation Engg.)	CME4301	Construction Economics and Finance	2022
1716	13578	Master of Technology (Civil Engineering) (Specialisation: Structural Engg, Construction Technology & Mgmt., Environmental Engg., Transportation Engg.)	CME4307	GIS in Construction Engineering	2022
1717	13578	Master of Technology (Civil Engineering) (Specialisation: Structural Engg, Construction Technology & Mgmt., Environmental Engg., Transportation Engg.)	CME4310	Construction Quality & Safety Management	2022
1718	13578	Master of Technology (Civil Engineering) (Specialisation: Structural Engg, Construction Technology & Mgmt., Environmental Engg., Transportation Engg.)	CME4308	Operations Strategy	2022

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1719	13578	Master of Technology (Civil Engineering) (Specialisation: Structural Engg, Construction Technology & Mgmt., Environmental Engg., Transportation Engg.)	CME4314	Contract Laws & Regulations	2022
1720	13578	Master of Technology (Civil Engineering) (Specialisation: Structural Engg, Construction Technology & Mgmt., Environmental Engg., Transportation Engg.)	CME4315	Advanced Concrete Technology	2022
1721	13578	Master of Technology (Civil Engineering) (Specialisation: Structural Engg, Construction Technology & Mgmt., Environmental Engg., Transportation Engg.)	CME4302	Highway Construction and Maintenance	2022
1722	13578	Master of Technology (Civil Engineering) (Specialisation: Structural Engg, Construction Technology & Mgmt., Environmental Engg., Transportation Engg.)	CME4303	Highway Construction and Maintenance Lab	2022
1723	13578	Master of Technology (Civil Engineering) (Specialisation: Structural Engg, Construction Technology & Mgmt., Environmental Engg., Transportation Engg.)	CME4304	Geotechnics in Construction	2022
1724	13578	Master of Technology (Civil Engineering) (Specialisation: Structural Engg, Construction Technology & Mgmt., Environmental Engg., Transportation Engg.)	CME4305	Geotechnical Lab for Construction Engineers	2022
1725	13578	Master of Technology (Civil Engineering) (Specialisation: Structural Engg, Construction Technology & Mgmt., Environmental Engg., Transportation Engg.)	CME4316	Soft Computing Techniques in Civil Engineering	2022

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1726	13578	Master of Technology (Civil Engineering) (Specialisation: Structural Engg, Construction Technology & Mgmt., Environmental Engg., Transportation Engg.)	CME4317	Soft Computing Techniques in Civil Engineering Lab	2022
1727	13578	Master of Technology (Civil Engineering) (Specialisation: Structural Engg, Construction Technology & Mgmt., Environmental Engg., Transportation Engg.)	TRE4305	Transportation Infrastructure Design	2022
1728	13578	Master of Technology (Civil Engineering) (Specialisation: Structural Engg, Construction Technology & Mgmt., Environmental Engg., Transportation Engg.)	TRE4306	Airport Infrastructure Planning & Design	2022
1729	13578	Master of Technology (Civil Engineering) (Specialisation: Structural Engg, Construction Technology & Mgmt., Environmental Engg., Transportation Engg.)	TRE4312	Road Safety Engineering	2022
1730	13578	Master of Technology (Civil Engineering) (Specialisation: Structural Engg, Construction Technology & Mgmt., Environmental Engg., Transportation Engg.)	TRE4303	Public Transportation System	2022
1731	13578	Master of Technology (Civil Engineering) (Specialisation: Structural Engg, Construction Technology & Mgmt., Environmental Engg., Transportation Engg.)	TRE4307	Intelligent Transportation System	2022
1732	13578	Master of Technology (Civil Engineering) (Specialisation: Structural Engg, Construction Technology & Mgmt., Environmental Engg., Transportation Engg.)	TRE4308	Railway Infrastructure Planning & Design	2022

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1733	13578	Master of Technology (Civil Engineering) (Specialisation: Structural Engg, Construction Technology & Mgmt., Environmental Engg., Transportation Engg.)	TRE4301	GIS & Its Application in Transportation Engineering	2022
1734	13578	Master of Technology (Civil Engineering) (Specialisation: Structural Engg, Construction Technology & Mgmt., Environmental Engg., Transportation Engg.)	TRE4302	GIS & Its Application in Transportation Engineering Lab	2022
1735	13578	Master of Technology (Civil Engineering) (Specialisation: Structural Engg, Construction Technology & Mgmt., Environmental Engg., Transportation Engg.)	TRE4313	Soft Computing Techniques in Civil Engineering	2022
1736	13578	Master of Technology (Civil Engineering) (Specialisation: Structural Engg, Construction Technology & Mgmt., Environmental Engg., Transportation Engg.)	TRE4314	Soft Computing Techniques in Civil Engineering Lab	2022
1737	13578	Master of Technology (Civil Engineering) (Specialisation: Structural Engg, Construction Technology & Mgmt., Environmental Engg., Transportation Engg.)	EVE4302	Industrial Wastewater Treatment and Design	2022
1738	13578	Master of Technology (Civil Engineering) (Specialisation: Structural Engg, Construction Technology & Mgmt., Environmental Engg., Transportation Engg.)	EVE4303	Water Resource Planning and Management	2022
1739	13578	Master of Technology (Civil Engineering) (Specialisation: Structural Engg, Construction Technology & Mgmt., Environmental Engg., Transportation Engg.)	EVE4309	Biological Process of Waste Water Treatment	2022

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1740	13578	Master of Technology (Civil Engineering) (Specialisation: Structural Engg, Construction Technology & Mgmt., Environmental Engg., Transportation Engg.)	EVE4310	Transport Phenomenon of Waste Water	2022
1741	13578	Master of Technology (Civil Engineering) (Specialisation: Structural Engg, Construction Technology & Mgmt., Environmental Engg., Transportation Engg.)	EVE4311	Water Reclamation and Reuse	2022
1742	13578	Master of Technology (Civil Engineering) (Specialisation: Structural Engg, Construction Technology & Mgmt., Environmental Engg., Transportation Engg.)	EVE4312	Air and Water Quality Modelling	2022
1743	13578	Master of Technology (Civil Engineering) (Specialisation: Structural Engg, Construction Technology & Mgmt., Environmental Engg., Transportation Engg.)	EVE4313	Air and Water Quality Modelling Lab	2022
1744	13578	Master of Technology (Civil Engineering) (Specialisation: Structural Engg, Construction Technology & Mgmt., Environmental Engg., Transportation Engg.)	EVE4314	Advanced Wastewater Engineering	2022
1745	13578	Master of Technology (Civil Engineering) (Specialisation: Structural Engg, Construction Technology & Mgmt., Environmental Engg., Transportation Engg.)	EVE4315	Advanced Wastewater Engineering Lab	2022
1746	13578	Master of Technology (Civil Engineering) (Specialisation: Structural Engg, Construction Technology & Mgmt., Environmental Engg., Transportation Engg.)	HWE4301	Road Safety Engineering	2022

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1747	13578	Master of Technology (Civil Engineering) (Specialisation: Structural Engg, Construction Technology & Mgmt., Environmental Engg., Transportation Engg.)	HWE4302	Bridge Engineering	2022
1748	13578	Master of Technology (Civil Engineering) (Specialisation: Structural Engg, Construction Technology & Mgmt., Environmental Engg., Transportation Engg.)	HWE4303	GIS and its Applications in Highway Planning	2022
1749	13578	Master of Technology (Civil Engineering) (Specialisation: Structural Engg, Construction Technology & Mgmt., Environmental Engg., Transportation Engg.)	HWE4304	Pavement Engineering Management	2022
1750	13578	Master of Technology (Civil Engineering) (Specialisation: Structural Engg, Construction Technology & Mgmt., Environmental Engg., Transportation Engg.)	HWE4305	Intelligent Transportation System	2022
1751	13578	Master of Technology (Civil Engineering) (Specialisation: Structural Engg, Construction Technology & Mgmt., Environmental Engg., Transportation Engg.)	HWE4306	Soft Computing Techniques in Civil Engineering	2022
1752	13578	Master of Technology (Civil Engineering) (Specialisation: Structural Engg, Construction Technology & Mgmt., Environmental Engg., Transportation Engg.)	HWE4307	Soft Computing Techniques in Civil Engineering Lab	2022
1753	13578	Master of Technology (Civil Engineering) (Specialisation: Structural Engg, Construction Technology & Mgmt., Environmental Engg., Transportation Engg.)	HWE4308	Construction Methods in Geotechnical Engineering	2022

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1754	13578	Master of Technology (Civil Engineering) (Specialisation: Structural Engg, Construction Technology & Mgmt., Environmental Engg., Transportation Engg.)	HWE4309	Construction Methods in Geotechnical Engineering Lab	2022
1755	13578	Master of Technology (Civil Engineering) (Specialisation: Structural Engg, Construction Technology & Mgmt., Environmental Engg., Transportation Engg.)	HWE4310	Advanced Construction Materials	2022
1756	13578	Master of Technology (Civil Engineering) (Specialisation: Structural Engg, Construction Technology & Mgmt., Environmental Engg., Transportation Engg.)	HWE4311	Advanced Construction Materials Lab	2022
1757	13578	Master of Technology (Civil Engineering) (Specialisation: Structural Engg, Construction Technology & Mgmt., Environmental Engg., Transportation Engg.)	CIV4437	Project-Dissertation-II	2022
1758	13581	Master of Technology (Mechanical Engineering) (Specialisation: Thermal Engg., Machine Design Engg., Industrial & Production Engg.)	MAE4101	Advanced Solid Mechanics	2022
1759	13581	Master of Technology (Mechanical Engineering) (Specialisation: Thermal Engg., Machine Design Engg., Industrial & Production Engg.)	MAE4102	Applied Numerical Methods	2022
1760	13581	Master of Technology (Mechanical Engineering) (Specialisation: Thermal Engg., Machine Design Engg., Industrial & Production Engg.)	MAE4103	Advanced Fluid Mechanics	2022
1761	13581	Master of Technology (Mechanical Engineering) (Specialisation: Thermal Engg., Machine Design Engg., Industrial & Production Engg.)	MAE4104	Advanced Machining Processes	2022

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1762	13581	Master of Technology (Mechanical Engineering) (Specialisation: Thermal Engg., Machine Design Engg., Industrial & Production Engg.)	MAE4105	Computer Integrated Manufacturing	2022
1763	13581	Master of Technology (Mechanical Engineering) (Specialisation: Thermal Engg., Machine Design Engg., Industrial & Production Engg.)	MAE4106	Advanced Fluid Mechanics Lab	2022
1764	13581	Master of Technology (Mechanical Engineering) (Specialisation: Thermal Engg., Machine Design Engg., Industrial & Production Engg.)	MAE4107	Advanced Machining Processes Lab	2022
1765	13581	Master of Technology (Mechanical Engineering) (Specialisation: Thermal Engg., Machine Design Engg., Industrial & Production Engg.)	MAE4108	Computer Integrated Manufacturing Lab	2022
1766	13581	Master of Technology (Mechanical Engineering) (Specialisation: Thermal Engg., Machine Design Engg., Industrial & Production Engg.)	MAE4201	Optimization Techniques	2022
1767	13581	Master of Technology (Mechanical Engineering) (Specialisation: Thermal Engg., Machine Design Engg., Industrial & Production Engg.)	MAE4202	Design of Experiments	2022
1768	13581	Master of Technology (Mechanical Engineering) (Specialisation: Thermal Engg., Machine Design Engg., Industrial & Production Engg.)	MAE4203	Research Methodology & Technical Report Writing	2022
1769	13581	Master of Technology (Mechanical Engineering) (Specialisation: Thermal Engg., Machine Design Engg., Industrial & Production Engg.)	THE4203	Advanced Heat & Mass Transfer	2022
1770	13581	Master of Technology (Mechanical Engineering) (Specialisation: Thermal Engg., Machine Design Engg., Industrial & Production Engg.)	THE4206	Advanced Heat & Mass Transfer Lab	2022


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1771	13581	Master of Technology (Mechanical Engineering) (Specialisation: Thermal Engg., Machine Design Engg., Industrial & Production Engg.)	THE4211	Concept of Combustion	2022
1772	13581	Master of Technology (Mechanical Engineering) (Specialisation: Thermal Engg., Machine Design Engg., Industrial & Production Engg.)	THE4212	Energy Management & Auditing	2022
1773	13581	Master of Technology (Mechanical Engineering) (Specialisation: Thermal Engg., Machine Design Engg., Industrial & Production Engg.)	THE4213	Refrigeration & Air Conditioning	2022
1774	13581	Master of Technology (Mechanical Engineering) (Specialisation: Thermal Engg., Machine Design Engg., Industrial & Production Engg.)	THE4214	Refrigeration & Air Conditioning Lab	2022
1775	13581	Master of Technology (Mechanical Engineering) (Specialisation: Thermal Engg., Machine Design Engg., Industrial & Production Engg.)	MDE4204	Advanced Tribology	2022
1776	13581	Master of Technology (Mechanical Engineering) (Specialisation: Thermal Engg., Machine Design Engg., Industrial & Production Engg.)	MDE4205	Industrial Robotics	2022
1777	13581	Master of Technology (Mechanical Engineering) (Specialisation: Thermal Engg., Machine Design Engg., Industrial & Production Engg.)	MDE4211	Advanced Computer Aided Design	2022
1778	13581	Master of Technology (Mechanical Engineering) (Specialisation: Thermal Engg., Machine Design Engg., Industrial & Production Engg.)	MDE4212	Advanced Computer Aided Design Lab	2022
1779	13581	Master of Technology (Mechanical Engineering) (Specialisation: Thermal Engg., Machine Design Engg., Industrial & Production Engg.)	MDE4213	Experimental Stress Analysis	2022


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1780	13581	Master of Technology (Mechanical Engineering) (Specialisation: Thermal Engg., Machine Design Engg., Industrial & Production Engg.)	IPE4204	Mechatronics	2022
1781	13581	Master of Technology (Mechanical Engineering) (Specialisation: Thermal Engg., Machine Design Engg., Industrial & Production Engg.)	IPE4213	Mechatronics Lab	2022
1782	13581	Master of Technology (Mechanical Engineering) (Specialisation: Thermal Engg., Machine Design Engg., Industrial & Production Engg.)	IPE4205	Welding and Aided Processes	2022
1783	13581	Master of Technology (Mechanical Engineering) (Specialisation: Thermal Engg., Machine Design Engg., Industrial & Production Engg.)	IPE4211	Advanced Computer Aided Manufacturing	2022
1784	13581	Master of Technology (Mechanical Engineering) (Specialisation: Thermal Engg., Machine Design Engg., Industrial & Production Engg.)	IPE4212	Advanced Computer Aided Manufacturing Lab	2022
1785	13581	Master of Technology (Mechanical Engineering) (Specialisation: Thermal Engg., Machine Design Engg., Industrial & Production Engg.)	IPE4214	Quality and Reliability Management	2022
1786	13581	Master of Technology (Mechanical Engineering) (Specialisation: Thermal Engg., Machine Design Engg., Industrial & Production Engg.)	MAE4301	Total Quality Management & Quality Assurance	2022
1787	13581	Master of Technology (Mechanical Engineering) (Specialisation: Thermal Engg., Machine Design Engg., Industrial & Production Engg.)	MAE4335	Summer Internship Evaluation	2022
1788	13581	Master of Technology (Mechanical Engineering) (Specialisation: Thermal Engg., Machine Design Engg., Industrial & Production Engg.)	MAE4337	Project-Dissertation-I	2022


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1789	13581	Master of Technology (Mechanical Engineering) (Specialisation: Thermal Engg., Machine Design Engg., Industrial & Production Engg.)	THE4304	Cryogenics	2022
1790	13581	Master of Technology (Mechanical Engineering) (Specialisation: Thermal Engg., Machine Design Engg., Industrial & Production Engg.)	THE4309	Advanced Computational Fluid Dynamics	2022
1791	13581	Master of Technology (Mechanical Engineering) (Specialisation: Thermal Engg., Machine Design Engg., Industrial & Production Engg.)	THE4310	Advanced Computational Fluid Dynamics Lab	2022
1792	13581	Master of Technology (Mechanical Engineering) (Specialisation: Thermal Engg., Machine Design Engg., Industrial & Production Engg.)	THE4311	Micro Fluidics & Nano Fluidic	2022
1793	13581	Master of Technology (Mechanical Engineering) (Specialisation: Thermal Engg., Machine Design Engg., Industrial & Production Engg.)	THE4312	Turbo Machines	2022
1794	13581	Master of Technology (Mechanical Engineering) (Specialisation: Thermal Engg., Machine Design Engg., Industrial & Production Engg.)	MDE4302	Advanced Mechanical Vibrations	2022
1795	13581	Master of Technology (Mechanical Engineering) (Specialisation: Thermal Engg., Machine Design Engg., Industrial & Production Engg.)	MDE4307	Advanced Mechanical Vibrations Lab	2022
1796	13581	Master of Technology (Mechanical Engineering) (Specialisation: Thermal Engg., Machine Design Engg., Industrial & Production Engg.)	MDE4303	Finite Elements Method	2022
1797	13581	Master of Technology (Mechanical Engineering) (Specialisation: Thermal Engg., Machine Design Engg., Industrial & Production Engg.)	MDE4308	Finite Elements Method Lab	2022


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1798	13581	Master of Technology (Mechanical Engineering) (Specialisation: Thermal Engg., Machine Design Engg., Industrial & Production Engg.)	MDE4309	Product Design & Development	2022
1799	13581	Master of Technology (Mechanical Engineering) (Specialisation: Thermal Engg., Machine Design Engg., Industrial & Production Engg.)	MDE4310	Advanced Mechanical Design	2022
1800	13581	Master of Technology (Mechanical Engineering) (Specialisation: Thermal Engg., Machine Design Engg., Industrial & Production Engg.)	IPE4302	Computer Aided Metrology & Inspection	2022
1801	13581	Master of Technology (Mechanical Engineering) (Specialisation: Thermal Engg., Machine Design Engg., Industrial & Production Engg.)	IPE4307	Computer Aided Metrology & Inspection Lab	2022
1802	13581	Master of Technology (Mechanical Engineering) (Specialisation: Thermal Engg., Machine Design Engg., Industrial & Production Engg.)	IPE4303	Metal Cutting & Tool Design	2022
1803	13581	Master of Technology (Mechanical Engineering) (Specialisation: Thermal Engg., Machine Design Engg., Industrial & Production Engg.)	IPE4308	Metal Cutting & Tool Design Lab	2022
1804	13581	Master of Technology (Mechanical Engineering) (Specialisation: Thermal Engg., Machine Design Engg., Industrial & Production Engg.)	IPE4304	Production Planning & Control	2022
1805	13581	Master of Technology (Mechanical Engineering) (Specialisation: Thermal Engg., Machine Design Engg., Industrial & Production Engg.)	IPE4309	Material Management	2022
1806	13581	Master of Technology (Mechanical Engineering) (Specialisation: Thermal Engg., Machine Design Engg., Industrial & Production Engg.)	MAE4437	Project-Dissertation-II	2022


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1807	13684	Master of Technology (Data Science)	DSE4101	Advanced Data Structure & Algorithms	2022
1808	13684	Master of Technology (Data Science)	DSE4102	Advanced Database Management Systems	2022
1809	13684	Master of Technology (Data Science)	DSE4103	Digital Computer Organization	2022
1810	13684	Master of Technology (Data Science)	DSE4104	Advanced Computer Networks	2022
1811	13684	Master of Technology (Data Science)	DSE4105	Advanced Data Structure & Algorithms Lab	2022
1812	13684	Master of Technology (Data Science)	DSE4106	Advanced Database Management Systems Lab	2022
1813	13684	Master of Technology (Data Science)	DSE4107	Advanced Computer Networks Lab	2022
1814	13684	Master of Technology (Data Science)	DSE4108	MATLAB Programming	2022
1815	13684	Master of Technology (Data Science)	DSE4109	Python Programming Lab	2022
1816	13684	Master of Technology (Data Science)	DSE4201	Applied Statistical Analysis	2022
1817	13684	Master of Technology (Data Science)	DSE4202	Data Mining & Predictive Analytics	2022
1818	13684	Master of Technology (Data Science)	DSE4203	Data Warehousing & Multi-dimensional Modeling	2022
1819	13684	Master of Technology (Data Science)	DSE4204	Database & Knowledge Base Systems	2022
1820	13684	Master of Technology (Data Science)	DSE4205	Big Data Technologies	2022
1821	13684	Master of Technology (Data Science)	DSE4206	Research Methodology & Technical Report Writing	2022
1822	13684	Master of Technology (Data Science)	DSE4207	Applied Statistical Analysis Lab	2022
1823	13684	Master of Technology (Data Science)	DSE4208	Data Mining & Predictive Analytics Lab	2022
1824	13684	Master of Technology (Data Science)	DSE4209	Data Warehousing & Multi-dimensional Modeling Lab	2022
1825	13684	Master of Technology (Data Science)	DSE4210	Information Management System	2022
1826	13684	Master of Technology (Data Science)	DSE4211	Information System Security	2022
1827	13684	Master of Technology (Data Science)	DSE4301	Descriptive Analysis	2022
1828	13684	Master of Technology (Data Science)	DSE4302	Learning and Reasoning with Bayesian Networks	2022

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1829	13684	Master of Technology (Data Science)	DSE4303	Social Network Data Analytics	2022
1830	13684	Master of Technology (Data Science)	DSE4304	R-Programming Lab	2022
1831	13684	Master of Technology (Data Science)	DSE4305	Hadoop Lab	2022
1832	13684	Master of Technology (Data Science)	DSE4335	Summer Internship Evaluation	2022
1833	13684	Master of Technology (Data Science)	DSE4337	Project Dissertation-I	2022
1834	13684	Master of Technology (Data Science)	DSE4306	Web Technology	2022
1835	13684	Master of Technology (Data Science)	DSE4307	Service Oriented Architecture	2022
1836	13684	Master of Technology (Data Science)	DSE4308	Natural Language Processing	2022
1837	13684	Master of Technology (Data Science)	DSE4309	Agent Based Intelligent Systems	2022
1838	13684	Master of Technology (Data Science)	DSE4437	Project Dissertation-II	2022
1839	131448	Master of Technology (Artificial Intelligence) (Specialisation: Robotics / Machine Learning)	AIE4101	Advanced Data Structure & Algorithms	2022
1840	131448	Master of Technology (Artificial Intelligence) (Specialisation: Robotics / Machine Learning)	AIE4102	Advanced Database Management Systems	2022
1841	131448	Master of Technology (Artificial Intelligence) (Specialisation: Robotics / Machine Learning)	AIE4103	Digital Computer Organization	2022
1842	131448	Master of Technology (Artificial Intelligence) (Specialisation: Robotics / Machine Learning)	AIE4104	Advanced Computer Networks	2022
1843	131448	Master of Technology (Artificial Intelligence) (Specialisation: Robotics / Machine Learning)	AIE4105	Advanced Data Structure & Algorithms Lab	2022
1844	131448	Master of Technology (Artificial Intelligence) (Specialisation: Robotics / Machine Learning)	AIE4106	Advanced Database Management Systems Lab	2022
1845	131448	Master of Technology (Artificial Intelligence) (Specialisation: Robotics / Machine Learning)	AIE4107	Advanced Computer Networks Lab	2022
1846	131448	Master of Technology (Artificial Intelligence) (Specialisation: Robotics / Machine Learning)	AIE4108	MATLAB Programming	2022

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1847	131448	Master of Technology (Artificial Intelligence) (Specialisation: Robotics / Machine Learning)	AIE4109	Python Programming Lab	2022
1848	131448	Master of Technology (Artificial Intelligence) (Specialisation: Robotics / Machine Learning)	AIE4206	Research Methodology & Technical Report Writing	2022
1849	131448	Master of Technology (Artificial Intelligence) (Specialisation: Robotics / Machine Learning)	RBE4201	Fundamental of Robotics System & Robot Programming	2022
1850	131448	Master of Technology (Artificial Intelligence) (Specialisation: Robotics / Machine Learning)	RBE4202	Advanced Control Systems and Drives for Robots	2022
1851	131448	Master of Technology (Artificial Intelligence) (Specialisation: Robotics / Machine Learning)	RBE4203	Microprocessor and Interfacing	2022
1852	131448	Master of Technology (Artificial Intelligence) (Specialisation: Robotics / Machine Learning)	RBE4204	Kinematics & Dynamics of Robots	2022
1853	131448	Master of Technology (Artificial Intelligence) (Specialisation: Robotics / Machine Learning)	RBE4205	Advanced Applied Mathematics for Engineering	2022
1854	131448	Master of Technology (Artificial Intelligence) (Specialisation: Robotics / Machine Learning)	RBE4206	Fundamental of Robotics System & Robot Programming Lab	2022
1855	131448	Master of Technology (Artificial Intelligence) (Specialisation: Robotics / Machine Learning)	RBE4207	Advanced Control Systems & Drives for Robots Lab	2022
1856	131448	Master of Technology (Artificial Intelligence) (Specialisation: Robotics / Machine Learning)	RBE4208	Microprocessor and Interfacing Lab	2022
1857	131448	Master of Technology (Artificial Intelligence) (Specialisation: Robotics / Machine Learning)	RBE4209	Fundamentals of Artificial Intelligence for Robotics	2022
1858	131448	Master of Technology (Artificial Intelligence) (Specialisation: Robotics / Machine Learning)	RBE4210	Robotic Simulation & Simultaneous Localization Mapping	2022
1859	131448	Master of Technology (Artificial Intelligence) (Specialisation: Robotics / Machine Learning)	MLE4201	Applied Statistical Analysis	2022
1860	131448	Master of Technology (Artificial Intelligence) (Specialisation: Robotics / Machine Learning)	MLE4202	Data Mining and Predictive Analysis	2022
1861	131448	Master of Technology (Artificial Intelligence) (Specialisation: Robotics / Machine Learning)	MLE4203	Data Warehousing and Multi-dimensional Modeling	2022

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1862	131448	Master of Technology (Artificial Intelligence) (Specialisation: Robotics / Machine Learning)	MLE4204	Big Data Technologies	2022
1863	131448	Master of Technology (Artificial Intelligence) (Specialisation: Robotics / Machine Learning)	MLE4205	Applied Statistical Analysis Lab	2022
1864	131448	Master of Technology (Artificial Intelligence) (Specialisation: Robotics / Machine Learning)	MLE4206	Data Mining and Predictive Analysis Lab	2022
1865	131448	Master of Technology (Artificial Intelligence) (Specialisation: Robotics / Machine Learning)	MLE4207	Data Warehousing and Multi-dimensional Modeling Lab	2022
1866	131448	Master of Technology (Artificial Intelligence) (Specialisation: Robotics / Machine Learning)	MLE4208	R-Programming Lab	2022
1867	131448	Master of Technology (Artificial Intelligence) (Specialisation: Robotics / Machine Learning)	MLE4209	Database and Knowledge Base Systems	2022
1868	131448	Master of Technology (Artificial Intelligence) (Specialisation: Robotics / Machine Learning)	MLE4210	Information Management System	2022
1869	131448	Master of Technology (Artificial Intelligence) (Specialisation: Robotics / Machine Learning)	MLE4211	Fundamental of Artificial Intelligence	2022
1870	131448	Master of Technology (Artificial Intelligence) (Specialisation: Robotics / Machine Learning)	AIE4335	Summer Internship Evaluation	2022
1871	131448	Master of Technology (Artificial Intelligence) (Specialisation: Robotics / Machine Learning)	AIE4337	Project Dissertation-I	2022
1872	131448	Master of Technology (Artificial Intelligence) (Specialisation: Robotics / Machine Learning)	RBE4301	Automation in Manufacturing Systems	2022
1873	131448	Master of Technology (Artificial Intelligence) (Specialisation: Robotics / Machine Learning)	RBE4302	Robotic Sensors, Vision and Hardware Implementation	2022
1874	131448	Master of Technology (Artificial Intelligence) (Specialisation: Robotics / Machine Learning)	RBE4303	Pattern Recognition & Image Processing	2022
1875	131448	Master of Technology (Artificial Intelligence) (Specialisation: Robotics / Machine Learning)	RBE4304	Robotic Sensors, Vision and Hardware Implementation Lab	2022
1876	131448	Master of Technology (Artificial Intelligence) (Specialisation: Robotics / Machine Learning)	RBE4305	Pattern Recognition & Image Processing Lab	2022

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1877	131448	Master of Technology (Artificial Intelligence) (Specialisation: Robotics / Machine Learning)	RBE4306	Optimization Techniques	2022
1878	131448	Master of Technology (Artificial Intelligence) (Specialisation: Robotics / Machine Learning)	RBE4307	CNC Machines & Adaptive Control	2022
1879	131448	Master of Technology (Artificial Intelligence) (Specialisation: Robotics / Machine Learning)	RBE4308	Neural Network and Fuzzy Logic	2022
1880	131448	Master of Technology (Artificial Intelligence) (Specialisation: Robotics / Machine Learning)	RBE4309	Neural Network and Fuzzy Logic Lab	2022
1881	131448	Master of Technology (Artificial Intelligence) (Specialisation: Robotics / Machine Learning)	RBE4310	Decision Making Systems	2022
1882	131448	Master of Technology (Artificial Intelligence) (Specialisation: Robotics / Machine Learning)	RBE4311	Decision Making Systems Lab	2022
1883	131448	Master of Technology (Artificial Intelligence) (Specialisation: Robotics / Machine Learning)	MLE4301	Pattern Recognition and Image Processing	2022
1884	131448	Master of Technology (Artificial Intelligence) (Specialisation: Robotics / Machine Learning)	MLE4302	Neural Network and Fuzzy Logic	2022
1885	131448	Master of Technology (Artificial Intelligence) (Specialisation: Robotics / Machine Learning)	MLE4303	Natural Language Processing	2022
1886	131448	Master of Technology (Artificial Intelligence) (Specialisation: Robotics / Machine Learning)	MLE4304	Pattern Recognition and Image Processing Lab	2022
1887	131448	Master of Technology (Artificial Intelligence) (Specialisation: Robotics / Machine Learning)	MLE4305	Neural Network and Fuzzy Logic Lab	2022
1888	131448	Master of Technology (Artificial Intelligence) (Specialisation: Robotics / Machine Learning)	MLE4306	Hadoop Lab	2022
1889	131448	Master of Technology (Artificial Intelligence) (Specialisation: Robotics / Machine Learning)	MLE4307	Descriptive Analysis	2022
1890	131448	Master of Technology (Artificial Intelligence) (Specialisation: Robotics / Machine Learning)	MLE4308	Optimization Techniques	2022
1891	131448	Master of Technology (Artificial Intelligence) (Specialisation: Robotics / Machine Learning)	MLE4309	Social Network Data Analytics	2022

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1892	131448	Master of Technology (Artificial Intelligence) (Specialisation: Robotics / Machine Learning)	MLE4310	Agent Based Intelligent Systems	2022
1893	131448	Master of Technology (Artificial Intelligence) (Specialisation: Robotics / Machine Learning)	AIE4437	Project Dissertation-II	2022
1894	131128	Master of Technology (Network & Cyber Security)	NCE4101	Advanced Data Structure & Algorithms	2022
1895	131128	Master of Technology (Network & Cyber Security)	NCE4102	Advanced Database Management Systems	2022
1896	131128	Master of Technology (Network & Cyber Security)	NCE4103	Digital Computer Organization	2022
1897	131128	Master of Technology (Network & Cyber Security)	NCE4104	Advanced Computer Networks	2022
1898	131128	Master of Technology (Network & Cyber Security)	NCE4105	Advanced Data Structure & Algorithms Lab	2022
1899	131128	Master of Technology (Network & Cyber Security)	NCE4106	Advanced Database Management Systems Lab	2022
1900	131128	Master of Technology (Network & Cyber Security)	NCE4107	Advanced Computer Networks Lab	2022
1901	131128	Master of Technology (Network & Cyber Security)	NCE4108	MATLAB Programming	2022
1902	131128	Master of Technology (Network & Cyber Security)	NCE4109	Python Programming Lab	2022
1903	131128	Master of Technology (Network & Cyber Security)	NCE4201	Mathematical Foundation for Cyber Security	2022
1904	131128	Master of Technology (Network & Cyber Security)	NCE4202	Network and Wireless Security	2022
1905	131128	Master of Technology (Network & Cyber Security)	NCE4203	Cyber Crime and IT Law	2022
1906	131128	Master of Technology (Network & Cyber Security)	NCE4204	Cyber Crime Investigation & Forensics	2022
1907	131128	Master of Technology (Network & Cyber Security)	NCE4205	Intrusion Detection & Prevention System	2022
1908	131128	Master of Technology (Network & Cyber Security)	NCE4206	Research Methodology & Technical Report Writing	2022
1909	131128	Master of Technology (Network & Cyber Security)	NCE4207	Cryptography Foundation Lab	2022
1910	131128	Master of Technology (Network & Cyber Security)	NCE4208	Web Security Lab	2022
1911	131128	Master of Technology (Network & Cyber Security)	NCE4209	Network Security Lab	2022
1912	131128	Master of Technology (Network & Cyber Security)	NCE4210	Big Data Systems	2022

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1913	131128	Master of Technology (Network & Cyber Security)	NCE4211	Distributed System Security	2022
1914	131128	Master of Technology (Network & Cyber Security)	NCE4212	Block Chain Technology	2022
1915	131128	Master of Technology (Network & Cyber Security)	NCE4301	Biometric Systems & Biometric Image Processing	2022
1916	131128	Master of Technology (Network & Cyber Security)	NCE4302	Software Vulnerability Analysis	2022
1917	131128	Master of Technology (Network & Cyber Security)	NCE4303	Applied Cryptography	2022
1918	131128	Master of Technology (Network & Cyber Security)	NCE4304	Biometric Image Processing Lab	2022
1919	131128	Master of Technology (Network & Cyber Security)	NCE4305	Applied Cryptography Lab	2022
1920	131128	Master of Technology (Network & Cyber Security)	NCE4335	Summer Internship Evaluation	2022
1921	131128	Master of Technology (Network & Cyber Security)	NCE4337	Project Dissertation-I	2022
1922	131128	Master of Technology (Network & Cyber Security)	NCE4306	Web Application & Penetration Testing	2022
1923	131128	Master of Technology (Network & Cyber Security)	NCE4307	Malware Analysis in Network Security	2022
1924	131128	Master of Technology (Network & Cyber Security)	NCE4308	Web Security	2022
1925	131128	Master of Technology (Network & Cyber Security)	NCE4309	Digital Watermarking & Stagenography	2022
1926	131128	Master of Technology (Network & Cyber Security)	NCE4437	Project Dissertation-II	2022
1927	13049	Bachelor of Science (Information Technology)	IFT2109	Mathematics	2022
1928	13049	Bachelor of Science (Information Technology)	IFT2112	Digital Electronics	2022
1929	13049	Bachelor of Science (Information Technology)	IFT2114	Computer Fundamentals & Tools	2022
1930	13049	Bachelor of Science (Information Technology)	IFT2115	Computer Fundamentals & Tools Lab	2022
1931	13049	Bachelor of Science (Information Technology)	IFT2116	Computer Programming with C Language	2022
1932	13049	Bachelor of Science (Information Technology)	IFT2118	Computer Programming with C Language Lab	2022
1933	13049	Bachelor of Science (Information Technology)	IFT2202	Introduction to Database Management System	2022
1934	13049	Bachelor of Science (Information Technology)	IFT2211	Data Structure Through C Language	2022

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Sl. No.	Programme Code	Name of Programme	Course Code	Course Name	Year
1935	13049	Bachelor of Science (Information Technology)	IFT2216	Data Structures Using C++ Language Lab	2022
1936	13049	Bachelor of Science (Information Technology)	IFT2217	Web Technologies	2022
1937	13049	Bachelor of Science (Information Technology)	IFT2219	Computer Organization & Architecture	2022
1938	13049	Bachelor of Science (Information Technology)	IFT2220	Web Technologies Lab	2022
1939	13049	Bachelor of Science (Information Technology)	IFT2222	Discrete Mathematics Structures with Application to CS	2022
1940	13049	Bachelor of Science (Information Technology)	IFT2223	Introduction to Database Management System Lab	2022
1941	13049	Bachelor of Science (Information Technology)	IFT2312	Introduction to Object Oriented Programming with C++	2022
1942	13049	Bachelor of Science (Information Technology)	IFT2314	Operating System	2022
1943	13049	Bachelor of Science (Information Technology)	IFT2315	Object Oriented Programming with C++ Lab	2022
1944	13049	Bachelor of Science (Information Technology)	IFT2319	Software Engineering	2022
1945	13049	Bachelor of Science (Information Technology)	IFT2320	Operating System Lab	2022
1946	13049	Bachelor of Science (Information Technology)	IFT2321	Fuzzy Logic	2022
1947	13049	Bachelor of Science (Information Technology)	IFT2323	Accounting & Financial Management	2022
1948	13049	Bachelor of Science (Information Technology)	IFT2335	Summer Internship Evaluation-I	2022
1949	13049	Bachelor of Science (Information Technology)	IFT2413	Design & Analysis of Algorithm	2022
1950	13049	Bachelor of Science (Information Technology)	IFT2418	Data Communication & Computer Networks	2022
1951	13049	Bachelor of Science (Information Technology)	IFT2420	Data Communication & Computer Networks Lab	2022
1952	13049	Bachelor of Science (Information Technology)	IFT2421	Design & Analysis of Algorithm Lab	2022
1953	13049	Bachelor of Science (Information Technology)	IFT2422	Computer Graphics	2022
1954	13049	Bachelor of Science (Information Technology)	IFT2423	Computer Graphics Lab	2022
1955	13049	Bachelor of Science (Information Technology)	IFT2424	Multimedia & Its Applications	2022
1956	13049	Bachelor of Science (Information Technology)	IFT2510	Java Programming	2022


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1957	13049	Bachelor of Science (Information Technology)	IFT2511	Java Programming Lab	2022
1958	13049	Bachelor of Science (Information Technology)	IFT2517	Computer Oriented Numerical Methods	2022
1959	13049	Bachelor of Science (Information Technology)	IFT2522	Linux	2022
1960	13049	Bachelor of Science (Information Technology)	IFT2523	Linux Lab	2022
1961	13049	Bachelor of Science (Information Technology)	IFT2525	Basics of Cloud Computing	2022
1962	13049	Bachelor of Science (Information Technology)	IFT2535	Summer Internship Evaluation-II	2022
1963	13049	Bachelor of Science (Information Technology)	IFT2616	Computer Oriented Statistical & Optimization Methods	2022
1964	13049	Bachelor of Science (Information Technology)	IFT2618	Introduction to Open Source Technologies (PHP, MySQL)	2022
1965	13049	Bachelor of Science (Information Technology)	IFT2620	Introduction to Open Source Technologies (PHP, MySQL) Lab	2022
1966	13049	Bachelor of Science (Information Technology)	IFT2622	Internet of Things	2022
1967	13049	Bachelor of Science (Information Technology)	IFT2637	Major Project / Dissertation	2022
1968	13049	Bachelor of Science (Information Technology)	IFT2604	Data Warehousing & Data Mining	2022
1969	13049	Bachelor of Science (Information Technology)	IFT2611	Mobile Computing	2022
1970	13049	Bachelor of Science (Information Technology)	IFT2619	E-Commerce	2022
1971	13049	Bachelor of Science (Information Technology)	IFT2621	Cryptography & Network Security	2022
1972	13048	Bachelor of Computer Application	IFT2109	Mathematics-I	2022
1973	13048	Bachelor of Computer Application	IFT2111	Computer Fundamentals	2022
1974	13048	Bachelor of Computer Application	IFT2112	Digital Electronics	2022
1975	13048	Bachelor of Computer Application	IFT2116	Computer Programming with C Language	2022
1976	13048	Bachelor of Computer Application	IFT2117	Computer Fundamentals Lab	2022
1977	13048	Bachelor of Computer Application	IFT2118	Computer Programming with C Language Lab	2022
1978	13048	Bachelor of Computer Application	IFT2210	Mathematics-II	2022
1979	13048	Bachelor of Computer Application	IFT2211	Data & File Structure using C	2022
1980	13048	Bachelor of Computer Application	IFT2216	Data & File Structures using C Lab	2022
1981	13048	Bachelor of Computer Application	IFT2217	Web Technologies	2022
1982	13048	Bachelor of Computer Application	IFT2218	Database Management System	2022

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1983	13048	Bachelor of Computer Application	IFT2219	Computer Organization & Architecture	2022
1984	13048	Bachelor of Computer Application	IFT2220	Web Technologies Lab	2022
1985	13048	Bachelor of Computer Application	IFT2221	Database Management System Lab	2022
1986	13048	Bachelor of Computer Application	IFT2312	Object Oriented Programming with C++	2022
1987	13048	Bachelor of Computer Application	IFT2314	Operating System	2022
1988	13048	Bachelor of Computer Application	IFT2315	Object Oriented Programming with C++ Lab	2022
1989	13048	Bachelor of Computer Application	IFT2317	Discrete Mathematical Structure with Applications to CS	2022
1990	13048	Bachelor of Computer Application	IFT2318	Management Information System	2022
1991	13048	Bachelor of Computer Application	IFT2319	Fundamentals of Software Engineering	2022
1992	13048	Bachelor of Computer Application	IFT2320	Operating System Lab	2022
1993	13048	Bachelor of Computer Application	IFT2335	Summer Internship Evaluation-I	2022
1994	13048	Bachelor of Computer Application	IFT2413	Basics of Algorithm	2022
1995	13048	Bachelor of Computer Application	IFT2418	Computer Networks	2022
1996	13048	Bachelor of Computer Application	IFT2419	Principles of Management	2022
1997	13048	Bachelor of Computer Application	IFT2420	Computer Networks Lab	2022
1998	13048	Bachelor of Computer Application	IFT2421	Basics of Algorithm Lab	2022
1999	13048	Bachelor of Computer Application	IFT2424	Multimedia & Its Applications	2022
2000	13048	Bachelor of Computer Application	IFT2510	Core Java Programming	2022
2001	13048	Bachelor of Computer Application	IFT2511	Core Java Programming Lab	2022
2002	13048	Bachelor of Computer Application	IFT2518	Accounting & Financial Management	2022
2003	13048	Bachelor of Computer Application	IFT2519	Basics of Computer Graphics	2022
2004	13048	Bachelor of Computer Application	IFT2520	Basics of Computer Graphics Lab	2022
2005	13048	Bachelor of Computer Application	IFT2524	Statistics and Probability Theory	2022
2006	13048	Bachelor of Computer Application	IFT2535	Summer Internship Evaluation-II	2022
2007	13048	Bachelor of Computer Application	IFT2616	Computer Oriented Statistical & Optimization Methods	2022
2008	13048	Bachelor of Computer Application	IFT2618	Introduction to Open Source Technologies (PHP, MySQL)	2022
2009	13048	Bachelor of Computer Application	IFT2620	Introduction to Open Source Technologies Lab	2022
2010	13048	Bachelor of Computer Application	IFT2622	Internet of Things	2022
2011	13048	Bachelor of Computer Application	IFT2637	Major Project / Dissertation	2022
2012	13048	Bachelor of Computer Application	IFT2604	Data Warehousing & Data Mining	2022
2013	13048	Bachelor of Computer Application	IFT2611	Mobile Computing	2022
2014	13048	Bachelor of Computer Application	IFT2619	E-Commerce	2022

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2015	13048	Bachelor of Computer Application	IFT2621	Cryptography & Network Security	2022
2016	131450	Master of Computer Application	IFT4101	Data Communication and Computer Networks	2022
2017	131450	Master of Computer Application	IFT4102	Design and Analysis of Algorithm	2022
2018	131450	Master of Computer Application	IFT4103	Software Engineering	2022
2019	131450	Master of Computer Application	IFT4104	Computer Graphics and Multimedia Systems	2022
2020	131450	Master of Computer Application	IFT4105	Data Communication and Computer Networks Lab	2022
2021	131450	Master of Computer Application	IFT4106	Design and Analysis of Algorithm Lab	2022
2022	131450	Master of Computer Application	IFT4107	Computer Graphics and Multimedia Systems Lab	2022
2023	131450	Master of Computer Application	IFT4201	Mobile Computing	2022
2024	131450	Master of Computer Application	IFT4202	Programming with Java	2022
2025	131450	Master of Computer Application	IFT4203	Software Project Management	2022
2026	131450	Master of Computer Application	IFT4204	Artificial Intelligence	2022
2027	131450	Master of Computer Application	IFT4205	Programming with Java Lab	2022
2028	131450	Master of Computer Application	IFT4206	Software Project Management Lab	2022
2029	131450	Master of Computer Application	IFT4207	Artificial Intelligence Lab	2022
2030	131450	Master of Computer Application	IFT4238	Seminar	2022
2031	131450	Master of Computer Application	IFT4301	Data Warehousing & Data Mining	2022
2032	131450	Master of Computer Application	IFT4302	Programming with dot NET Framework	2022
2033	131450	Master of Computer Application	IFT4303	Network Security & Cryptography	2022
2034	131450	Master of Computer Application	IFT4304	Soft Computing	2022
2035	131450	Master of Computer Application	IFT4305	Data Warehousing & Data Mining Lab	2022
2036	131450	Master of Computer Application	IFT4306	Programming with dot NET Framework Lab	2022
2037	131450	Master of Computer Application	IFT4307	Soft Computing Lab	2022
2038	131450	Master of Computer Application	IFT4331	Term Paper	2022
2039	131450	Master of Computer Application	IFT4335	Summer Internship Evaluation	2022
2040	131450	Master of Computer Application	IFT4308	Android Programming	2022
2041	131450	Master of Computer Application	IFT4309	Android Programming Lab	2022
2042	131450	Master of Computer Application	IFT4310	Digital Image Processing	2022
2043	131450	Master of Computer Application	IFT4311	Digital Image Processing Lab	2022
2044	131450	Master of Computer Application	IFT4312	Big Data	2022
2045	131450	Master of Computer Application	IFT4313	Big Data Lab	2022
2046	131450	Master of Computer Application	IFT4401	Machine Learning using Python	2022

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2047	131450	Master of Computer Application	IFT4402	Cloud Computing	2022
2048	131450	Master of Computer Application	IFT4403	Machine Learning using Python Lab	2022
2049	131450	Master of Computer Application	IFT4437	Major Project / Dissertation	2022
2050	131037	Master of Science (Renewable Energy)	RWE4101	Renewable Energy Conversion Systems	2022
2051	131037	Master of Science (Renewable Energy)	RWE4102	Introduction to Solar Photovoltaics	2022
2052	131037	Master of Science (Renewable Energy)	RWE4103	Introduction to Solar Thermal Technology	2022
2053	131037	Master of Science (Renewable Energy)	RWE4104	Biomass	2022
2054	131037	Master of Science (Renewable Energy)	RWE4106	Field Work-I / Seminar-I	2022
2055	131037	Master of Science (Renewable Energy)	RWE4107	Solar Radiation Measurement & Analysis Lab	2022
2056	131037	Master of Science (Renewable Energy)	RWE4201	Solar Thermal Systems	2022
2057	131037	Master of Science (Renewable Energy)	RWE4202	Fabrication of Solar Cells: Material & Designing Aspects	2022
2058	131037	Master of Science (Renewable Energy)	RWE4211	Instrumental Techniques and Characterization	2022
2059	131037	Master of Science (Renewable Energy)	RWE4204	Energy Storage	2022
2060	131037	Master of Science (Renewable Energy)	RWE4206	Solar PV & Thermal Lab	2022
2061	131037	Master of Science (Renewable Energy)	RWE4205	Financial Evaluation of Renewable Energy Systems	2022
2062	131037	Master of Science (Renewable Energy)	RWE4207	Energy Access and Planning	2022
2063	131037	Master of Science (Renewable Energy)	RWE4208	Wind Energy	2022
2064	131037	Master of Science (Renewable Energy)	RWE4209	Risk Management in Renewable Energy Projects	2022
2065	131037	Master of Science (Renewable Energy)	RWE4210	Fundamentals of Nuclear Power Generation-I	2022
2066	131037	Master of Science (Renewable Energy)	RWE4301	Modelling and Simulation of Solar Thermal Systems	2022
2067	131037	Master of Science (Renewable Energy)	RWE4302	Designing of Solar Rooftop Grid/Off-grid PV System	2022
2068	131037	Master of Science (Renewable Energy)	RWE4304	Solar and Wind Energy Meteorology	2022
2069	131037	Master of Science (Renewable Energy)	RWE4305	Solar Power Generation Lab	2022

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2070	131037	Master of Science (Renewable Energy)	RWE4309	Large Scale Grid Integration of Renewable Energy Sources	2022
2071	131037	Master of Science (Renewable Energy)	RWE4306	Field Work-II/ Seminar-II	2022
2072	131037	Master of Science (Renewable Energy)	RWE4335	Summer Internship Evaluation	2022
2073	131037	Master of Science (Renewable Energy)	RWE4303	Biofuels and Biomethanation	2022
2074	131037	Master of Science (Renewable Energy)	RWE4307	Designing of Solar Projects	2022
2075	131037	Master of Science (Renewable Energy)	RWE4308	Thermoelectric Systems and Devices	2022
2076	131037	Master of Science (Renewable Energy)	RWE4310	Smart Grids and Renewables	2022
2077	131037	Master of Science (Renewable Energy)	RWE4311	Wind Energy: Energy Conversion and Design of Turbines	2022
2078	131037	Master of Science (Renewable Energy)	RWE4312	Fundamentals of Nuclear Power Generation-II	2022
2079	131037	Master of Science (Renewable Energy)	RWE4401	Energy Management	2022
2080	131037	Master of Science (Renewable Energy)	RWE4402	Energy Policy	2022
2081	131037	Master of Science (Renewable Energy)	RWE4403	Green Buildings	2022
2082	131037	Master of Science (Renewable Energy)	RWE4437	Dissertation/ Seminar & Progress Report/ Comprehensive Viva	2022
2083	131038	Master of Science (Renewable Energy) Part-Time	RWP4101	Renewable Energy Conversion Systems	2022
2084	131038	Master of Science (Renewable Energy) Part-Time	RWP4102	Introduction to Solar Photovoltaics	2022
2085	131038	Master of Science (Renewable Energy) Part-Time	RWP4103	Introduction to Solar Thermal Technology	2022
2086	131038	Master of Science (Renewable Energy) Part-Time	RWP4104	Solar Radiation Measurement & Analysis Lab	2022
2087	131038	Master of Science (Renewable Energy) Part-Time	RWP4105	Field Work-I/ Seminar-I	2022
2088	131038	Master of Science (Renewable Energy) Part-Time	RWP4201	Solar Thermal Systems	2022
2089	131038	Master of Science (Renewable Energy) Part-Time	RWP4202	Fabrication of Solar Cells: Material & Designing Aspects	2022
2090	131038	Master of Science (Renewable Energy) Part-Time	RWP4209	Instrumental Techniques and characterization	2022
2091	131038	Master of Science (Renewable Energy) Part-Time	RWP4204	Energy Storage	2022

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2092	131038	Master of Science (Renewable Energy) Part-Time	RWP4205	Solar Photovoltaic & Thermal Lab	2022
2093	131038	Master of Science (Renewable Energy) Part-Time	RWP4206	Risk Management in Renewable Energy Projects	2022
2094	131038	Master of Science (Renewable Energy) Part-Time	RWP4207	Wind Energy	2022
2095	131038	Master of Science (Renewable Energy) Part-Time	RWP4208	Fundamentals of Nuclear Power Generation-I	2022
2096	131038	Master of Science (Renewable Energy) Part-Time	RWP4301	Modelling and Simulation of Solar Thermal Systems	2022
2097	131038	Master of Science (Renewable Energy) Part-Time	RWP4302	Designing of Solar Rooftop PV System	2022
2098	131038	Master of Science (Renewable Energy) Part-Time	RWP4303	Biomass	2022
2099	131038	Master of Science (Renewable Energy) Part-Time	RWP4305	Designing of Solar Projects	2022
2100	131038	Master of Science (Renewable Energy) Part-Time	RWP4306	Large Scale Grid Integration of Renewable Energy Sources	2022
2101	131038	Master of Science (Renewable Energy) Part-Time	RWP4307	Wind Energy: Energy Conversion and Design of Turbines	2022
2102	131038	Master of Science (Renewable Energy) Part-Time	RWP4308	Fundamentals of Nuclear Power Generation-II	2022
2103	131038	Master of Science (Renewable Energy) Part-Time	RWP4402	Energy Management	2022
2104	131038	Master of Science (Renewable Energy) Part-Time	RWP4403	Green Buildings	2022
2105	131038	Master of Science (Renewable Energy) Part-Time	RWP4404	Field Work-II/ Minor Project/ Seminar-II	2022
2106	131038	Master of Science (Renewable Energy) Part-Time	RWP4401	Financial Evaluation of Renewable Energy Systems	2022
2107	131038	Master of Science (Renewable Energy) Part-Time	RWP4405	Energy Access and Planning	2022
2108	131038	Master of Science (Renewable Energy) Part-Time	RWP4406	Thermoelectric Systems and Devices	2022
2109	131038	Master of Science (Renewable Energy) Part-Time	RWP4501	Solar and Wind Energy Meteorology	2022
2110	131038	Master of Science (Renewable Energy) Part-Time	RWP4502	Biofuels and Biomethanation	2022
2111	131038	Master of Science (Renewable Energy) Part-Time	RWP4503	Solar Power Generation Lab	2022
2112	131038	Master of Science (Renewable Energy) Part-Time	RWP4504	Smart Grids and Renewables	2022
2113	131038	Master of Science (Renewable Energy) Part-Time	RWP4601	Energy Policy	2022

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2114	131038	Master of Science (Renewable Energy) Part-Time	RWP4637	Dissertation / Seminar & Progress Report / Comprehensive Viva	2022
2115	13558	Bachelor of Science (Hons.) (Chemistry)	CHY2101	Inorganic Chemistry-I	2022
2116	13558	Bachelor of Science (Hons.) (Chemistry)	CHY2102	Organic Chemistry-I	2022
2117	13558	Bachelor of Science (Hons.) (Chemistry)	CHY2105	Applied Mathematics-I	2022
2118	13558	Bachelor of Science (Hons.) (Chemistry)	CHY2106	Physics-I	2022
2119	13558	Bachelor of Science (Hons.) (Chemistry)	CHY2103	Inorganic Chemistry Lab-I	2022
2120	13558	Bachelor of Science (Hons.) (Chemistry)	CHY2104	Organic Chemistry Lab-I	2022
2121	13558	Bachelor of Science (Hons.) (Chemistry)	CHY2107	Physics Lab-I	2022
2122	13558	Bachelor of Science (Hons.) (Chemistry)	CHY2201	Physical Chemistry-I	2022
2123	13558	Bachelor of Science (Hons.) (Chemistry)	CHY2202	Analytical Chemistry	2022
2124	13558	Bachelor of Science (Hons.) (Chemistry)	CHY2205	Applied Mathematics-II	2022
2125	13558	Bachelor of Science (Hons.) (Chemistry)	CHY2206	Physics-II	2022
2126	13558	Bachelor of Science (Hons.) (Chemistry)	CHY2203	Physical Chemistry Lab-I	2022
2127	13558	Bachelor of Science (Hons.) (Chemistry)	CHY2204	Analytical Chemistry Lab	2022
2128	13558	Bachelor of Science (Hons.) (Chemistry)	CHY2207	Physics Lab-II	2022
2129	13558	Bachelor of Science (Hons.) (Chemistry)	CHY2301	Inorganic Chemistry-II	2022
2130	13558	Bachelor of Science (Hons.) (Chemistry)	CHY2302	Organic Chemistry-II	2022
2131	13558	Bachelor of Science (Hons.) (Chemistry)	CHY2303	Physical Chemistry-II	2022
2132	13558	Bachelor of Science (Hons.) (Chemistry)	CHY2304	Biochemistry	2022
2133	13558	Bachelor of Science (Hons.) (Chemistry)	CHY2305	Inorganic Chemistry Lab-II	2022
2134	13558	Bachelor of Science (Hons.) (Chemistry)	CHY2306	Organic Chemistry Lab-II	2022
2135	13558	Bachelor of Science (Hons.) (Chemistry)	CHY2307	Physical Chemistry Lab-II	2022

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2136	13558	Bachelor of Science (Hons.) (Chemistry)	CHY2308	Industrial Chemistry	2022
2137	13558	Bachelor of Science (Hons.) (Chemistry)	CHY2309	Bioinorganic Chemistry	2022
2138	13558	Bachelor of Science (Hons.) (Chemistry)	CHY2401	Inorganic Chemistry-III	2022
2139	13558	Bachelor of Science (Hons.) (Chemistry)	CHY2402	Organic Chemistry-III	2022
2140	13558	Bachelor of Science (Hons.) (Chemistry)	CHY2403	Physical Chemistry-III	2022
2141	13558	Bachelor of Science (Hons.) (Chemistry)	CHY2404	Polymer Chemistry	2022
2142	13558	Bachelor of Science (Hons.) (Chemistry)	CHY2405	Inorganic Chemistry Lab-III	2022
2143	13558	Bachelor of Science (Hons.) (Chemistry)	CHY2406	Organic Chemistry Lab-III	2022
2144	13558	Bachelor of Science (Hons.) (Chemistry)	CHY2407	Physical Chemistry Lab-III	2022
2145	13558	Bachelor of Science (Hons.) (Chemistry)	CHY2408	Green Chemistry	2022
2146	13558	Bachelor of Science (Hons.) (Chemistry)	CHY2409	Agricultural Chemistry	2022
2147	13558	Bachelor of Science (Hons.) (Chemistry)	CHY2431	Term Paper & Workshop	2022
2148	13558	Bachelor of Science (Hons.) (Chemistry)	CHY2432	Project (with Presentation & Evaluation)	2022
2149	13558	Bachelor of Science (Hons.) (Chemistry)	CHY2501	Inorganic Chemistry-IV	2022
2150	13558	Bachelor of Science (Hons.) (Chemistry)	CHY2502	Organic Chemistry-IV	2022
2151	13558	Bachelor of Science (Hons.) (Chemistry)	CHY2503	Physical Chemistry-IV	2022
2152	13558	Bachelor of Science (Hons.) (Chemistry)	CHY2504	Inorganic Chemistry Lab-IV	2022
2153	13558	Bachelor of Science (Hons.) (Chemistry)	CHY2505	Organic Chemistry Lab-IV	2022
2154	13558	Bachelor of Science (Hons.) (Chemistry)	CHY2506	Physical Chemistry Lab-IV	2022
2155	13558	Bachelor of Science (Hons.) (Chemistry)	CHY2535	Summer Project Evaluation/ Study Abroad Programme	2022
2156	13558	Bachelor of Science (Hons.) (Chemistry)	CHY2507	Food & Nutrition Chemistry	2022
2157	13558	Bachelor of Science (Hons.) (Chemistry)	CHY2508	Quantum Chemistry	2022


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2158	13558	Bachelor of Science (Hons.) (Chemistry)	CHY2509	Technical Writing in Science-I& Workshop	2022
2159	13558	Bachelor of Science (Hons.) (Chemistry)	CHY2531	Term Paper& Workshop	2022
2160	13558	Bachelor of Science (Hons.) (Chemistry)	CHY2601	Inorganic Chemistry-V	2022
2161	13558	Bachelor of Science (Hons.) (Chemistry)	CHY2602	Organic Chemistry-V	2022
2162	13558	Bachelor of Science (Hons.) (Chemistry)	CHY2603	Physical Chemistry-V	2022
2163	13558	Bachelor of Science (Hons.) (Chemistry)	CHY2604	Spectroscopy	2022
2164	13558	Bachelor of Science (Hons.) (Chemistry)	CHY2605	Basics of Computer Programming in C and its Application in Chemistry	2022
2165	13558	Bachelor of Science (Hons.) (Chemistry)	CHY2606	Inorganic Chemistry Lab-V	2022
2166	13558	Bachelor of Science (Hons.) (Chemistry)	CHY2607	Organic Chemistry Lab-V	2022
2167	13558	Bachelor of Science (Hons.) (Chemistry)	CHY2608	Physical Chemistry Lab-V	2022
2168	13558	Bachelor of Science (Hons.) (Chemistry)	CHY2609	Programming in C Lab	2022
2169	13558	Bachelor of Science (Hons.) (Chemistry)	CHY2610	Material Chemistry	2022
2170	13558	Bachelor of Science (Hons.) (Chemistry)	CHY2611	Nanochemistry	2022
2171	13558	Bachelor of Science (Hons.) (Chemistry)	CHY2612	Technical Writing in Science-II& Workshop	2022
2172	13558	Bachelor of Science (Hons.) (Chemistry)	CHY2631	Term Paper& Workshop	2022
2173	13558	Bachelor of Science (Hons.) (Chemistry)	CHY2632	Project (with Presentation & Evaluation)	2022
2174	13556	Bachelor of Science (Hons.) (Mathematics)	MTH2101	Differential Calculus	2022
2175	13556	Bachelor of Science (Hons.) (Mathematics)	MTH2107	Classical Algebra	2022
2176	13556	Bachelor of Science (Hons.) (Mathematics)	MTH2108	Integral Calculus	2022
2177	13556	Bachelor of Science (Hons.) (Mathematics)	MTH2110	Physics	2022
2178	13556	Bachelor of Science (Hons.) (Mathematics)	MTH2205	Ordinary Differential Equations	2022
2179	13556	Bachelor of Science (Hons.) (Mathematics)	MTH2209	Groups & Ring Theory	2022

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2180	13556	Bachelor of Science (Hons.) (Mathematics)	MTH2212	Vector Calculus	2022
2181	13556	Bachelor of Science (Hons.) (Mathematics)	MTH2213	Chemistry	2022
2182	13556	Bachelor of Science (Hons.) (Mathematics)	MTH2214	Computer Fundamentals	2022
2183	13556	Bachelor of Science (Hons.) (Mathematics)	MTH2303	Partial Differential Equations	2022
2184	13556	Bachelor of Science (Hons.) (Mathematics)	MTH2318	Introduction to C Programming	2022
2185	13556	Bachelor of Science (Hons.) (Mathematics)	MTH2319	C Programming Lab	2022
2186	13556	Bachelor of Science (Hons.) (Mathematics)	MTH2320	Analytical Geometry	2022
2187	13556	Bachelor of Science (Hons.) (Mathematics)	MTH2321	Statistics	2022
2188	13556	Bachelor of Science (Hons.) (Mathematics)	MTH2322	Real Analysis-I	2022
2189	13556	Bachelor of Science (Hons.) (Mathematics)	MTH2413	Numerical Methods	2022
2190	13556	Bachelor of Science (Hons.) (Mathematics)	MTH2414	Numerical Methods Lab	2022
2191	13556	Bachelor of Science (Hons.) (Mathematics)	MTH2415	Linear Algebra	2022
2192	13556	Bachelor of Science (Hons.) (Mathematics)	MTH2420	Complex Analysis	2022
2193	13556	Bachelor of Science (Hons.) (Mathematics)	MTH2421	Real Analysis-II	2022
2194	13556	Bachelor of Science (Hons.) (Mathematics)	MTH2503	Mechanics	2022
2195	13556	Bachelor of Science (Hons.) (Mathematics)	MTH2504	Operations Research	2022
2196	13556	Bachelor of Science (Hons.) (Mathematics)	MTH2520	Scientific Computing	2022
2197	13556	Bachelor of Science (Hons.) (Mathematics)	MTH2535	Summer Workshop/ Study Abroad Programme	2022
2198	13556	Bachelor of Science (Hons.) (Mathematics)	MTH2515	Mathematical Modeling	2022
2199	13556	Bachelor of Science (Hons.) (Mathematics)	MTH2518	Fuzzy Sets and Fuzzy Logic	2022
2200	13556	Bachelor of Science (Hons.) (Mathematics)	MTH2519	R Programming and SAS	2022
2201	13556	Bachelor of Science (Hons.) (Mathematics)	MTH2521	Digital Electronics	2022

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2202	13556	Bachelor of Science (Hons.) (Mathematics)	MTH2615	Special Functions & Integral Transforms	2022
2203	13556	Bachelor of Science (Hons.) (Mathematics)	MTH2620	Discrete Mathematics	2022
2204	13556	Bachelor of Science (Hons.) (Mathematics)	MTH2621	Metric Spaces	2022
2205	13556	Bachelor of Science (Hons.) (Mathematics)	MTH2622	Technical Writing by using LaTeX	2022
2206	13556	Bachelor of Science (Hons.) (Mathematics)	MTH2603	Financial Mathematics	2022
2207	13556	Bachelor of Science (Hons.) (Mathematics)	MTH2611	Number Theory	2022
2208	13556	Bachelor of Science (Hons.) (Mathematics)	MTH2618	Functional Analysis	2022
2209	13556	Bachelor of Science (Hons.) (Mathematics)	MTH2619	Introduction to Statistical Inference	2022
2210	13557	Bachelor of Science (Hons.) (Physics)	PHY2101	Mechanics	2022
2211	13557	Bachelor of Science (Hons.) (Physics)	PHY2102	Waves & Oscillations	2022
2212	13557	Bachelor of Science (Hons.) (Physics)	PHY2104	Physics Lab-I	2022
2213	13557	Bachelor of Science (Hons.) (Physics)	PHY2105	Applied Mathematics-I	2022
2214	13557	Bachelor of Science (Hons.) (Physics)	PHY2106	Applied Chemistry-I	2022
2215	13557	Bachelor of Science (Hons.) (Physics)	PHY2107	Applied Chemistry Lab-I	2022
2216	13557	Bachelor of Science (Hons.) (Physics)	PHY2108	Properties of Matter	2022
2217	13557	Bachelor of Science (Hons.) (Physics)	PHY2201	Thermodynamics	2022
2218	13557	Bachelor of Science (Hons.) (Physics)	PHY2202	Optics	2022
2219	13557	Bachelor of Science (Hons.) (Physics)	PHY2203	Mathematical Physics-I	2022
2220	13557	Bachelor of Science (Hons.) (Physics)	PHY2204	Physics Lab-II	2022
2221	13557	Bachelor of Science (Hons.) (Physics)	PHY2205	Applied Mathematics-II	2022
2222	13557	Bachelor of Science (Hons.) (Physics)	PHY2206	Applied Chemistry-II	2022
2223	13557	Bachelor of Science (Hons.) (Physics)	PHY2207	Applied Chemistry Lab-II	2022


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2224	13557	Bachelor of Science (Hons.) (Physics)	PHY2301	Electricity & Magnetism	2022
2225	13557	Bachelor of Science (Hons.) (Physics)	PHY2303	Analog Electronics	2022
2226	13557	Bachelor of Science (Hons.) (Physics)	PHY2304	Physics Lab-III	2022
2227	13557	Bachelor of Science (Hons.) (Physics)	PHY2308	Mathematical Physics-II	2022
2228	13557	Bachelor of Science (Hons.) (Physics)	PHY2309	Classical Mechanics	2022
2229	13557	Bachelor of Science (Hons.) (Physics)	PHY2306	Computer programming in C	2022
2230	13557	Bachelor of Science (Hons.) (Physics)	PHY2331	Term Paper & Workshop	2022
2231	13557	Bachelor of Science (Hons.) (Physics)	PHY2404	Physics Lab-IV	2022
2232	13557	Bachelor of Science (Hons.) (Physics)	PHY2407	Electrodynamics	2022
2233	13557	Bachelor of Science (Hons.) (Physics)	PHY2408	Statistical Mechanics	2022
2234	13557	Bachelor of Science (Hons.) (Physics)	PHY2410	Quantum Mechanics	2022
2235	13557	Bachelor of Science (Hons.) (Physics)	PHY2411	Digital Electronics	2022
2236	13557	Bachelor of Science (Hons.) (Physics)	PHY2406	Laser Physics	2022
2237	13557	Bachelor of Science (Hons.) (Physics)	PHY2412	Special Theory of Relativity	2022
2238	13557	Bachelor of Science (Hons.) (Physics)	PHY2431	Term Paper & Workshop	2022
2239	13557	Bachelor of Science (Hons.) (Physics)	PHY2503	Nuclear & Particle Physics	2022
2240	13557	Bachelor of Science (Hons.) (Physics)	PHY2504	Physics Lab-V	2022
2241	13557	Bachelor of Science (Hons.) (Physics)	PHY2506	Solid State Physics	2022
2242	13557	Bachelor of Science (Hons.) (Physics)	PHY2508	Applied Mathematics-III	2022
2243	13557	Bachelor of Science (Hons.) (Physics)	PHY2509	Applied Mathematics-III Lab	2022
2244	13557	Bachelor of Science (Hons.) (Physics)	PHY2510	Atomic & Molecular Physics	2022
2245	13557	Bachelor of Science (Hons.) (Physics)	PHY2535	Summer Project Evaluation/ Study Abroad Programme	2022


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2246	13557	Bachelor of Science (Hons.) (Physics)	PHY2512	Introduction to MATLAB	2022
2247	13557	Bachelor of Science (Hons.) (Physics)	PHY2513	Semiconductor Physics	2022
2248	13557	Bachelor of Science (Hons.) (Physics)	PHY2531	Term Paper& Workshop	2022
2249	13557	Bachelor of Science (Hons.) (Physics)	PHY2606	Introduction to Nanotechnology	2022
2250	13557	Bachelor of Science (Hons.) (Physics)	PHY2607	Accelerators and Detectors	2022
2251	13557	Bachelor of Science (Hons.) (Physics)	PHY2609	Mathematical Physics-III	2022
2252	13557	Bachelor of Science (Hons.) (Physics)	PHY2610	Instrumentation Techniques	2022
2253	13557	Bachelor of Science (Hons.) (Physics)	PHY2605	Low Temperature Physics and Superconductivity	2022
2254	13557	Bachelor of Science (Hons.) (Physics)	PHY2611	Introduction to Astronomy	2022
2255	13557	Bachelor of Science (Hons.) (Physics)	PHY2631	Term Paper& Workshop	2022
2256	13557	Bachelor of Science (Hons.) (Physics)	PHY2634	Study Abroad	2022
2257	13059	Bachelor of Science (Hons.) (Forensic Science)	FCH2102	Introduction to Forensic Science	2022
2258	13059	Bachelor of Science (Hons.) (Forensic Science)	FCH2103	Fundamentals of Crime Scene Investigation	2022
2259	13059	Bachelor of Science (Hons.) (Forensic Science)	FCH2104	Biology	2022
2260	13059	Bachelor of Science (Hons.) (Forensic Science)	FCH2105	Applied Mathematics	2022
2261	13059	Bachelor of Science (Hons.) (Forensic Science)	FCH2107	Human Anatomy and Physiology	2022
2262	13059	Bachelor of Science (Hons.) (Forensic Science)	FCH2108	Crime Scene Investigation Lab	2022
2263	13059	Bachelor of Science (Hons.) (Forensic Science)	FCH2109	Chemistry-I (Basic)	2022
2264	13059	Bachelor of Science (Hons.) (Forensic Science)	FCH2201	Physical Evidence in Forensic Science	2022
2265	13059	Bachelor of Science (Hons.) (Forensic Science)	FCH2202	Fingerprint Science	2022
2266	13059	Bachelor of Science (Hons.) (Forensic Science)	FCH2203	Metric System & Physical Properties of Evidences	2022
2267	13059	Bachelor of Science (Hons.) (Forensic Science)	FCH2207	Fingerprinting Lab	2022

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2268	13059	Bachelor of Science (Hons.) (Forensic Science)	FCH2208	Metric System Lab	2022
2269	13059	Bachelor of Science (Hons.) (Forensic Science)	FCH2209	Chemistry-II (Inorganic)	2022
2270	13059	Bachelor of Science (Hons.) (Forensic Science)	FCH2210	Physics-I	2022
2271	13059	Bachelor of Science (Hons.) (Forensic Science)	FCH2302	Forensic Serology	2022
2272	13059	Bachelor of Science (Hons.) (Forensic Science)	FCH2311	Forensic Serology Lab	2022
2273	13059	Bachelor of Science (Hons.) (Forensic Science)	FCH2312	Questioned Documents-I	2022
2274	13059	Bachelor of Science (Hons.) (Forensic Science)	FCH2313	Research Methodology and Statistics	2022
2275	13059	Bachelor of Science (Hons.) (Forensic Science)	FCH2314	Chemistry-III (Physical)	2022
2276	13059	Bachelor of Science (Hons.) (Forensic Science)	FCH2308	Crime Scenario in India	2022
2277	13059	Bachelor of Science (Hons.) (Forensic Science)	FCH2315	Cyber Forensics	2022
2278	13059	Bachelor of Science (Hons.) (Forensic Science)	FCH2402	Fundamentals of Forensic Photography	2022
2279	13059	Bachelor of Science (Hons.) (Forensic Science)	FCH2403	Forensic Anthropology	2022
2280	13059	Bachelor of Science (Hons.) (Forensic Science)	FCH2410	Forensic Anthropology Lab	2022
2281	13059	Bachelor of Science (Hons.) (Forensic Science)	FCH2412	Questioned Documents-II	2022
2282	13059	Bachelor of Science (Hons.) (Forensic Science)	FCH2413	Chemistry-IV (Organic)	2022
2283	13059	Bachelor of Science (Hons.) (Forensic Science)	FCH2414	Questioned Documents Lab	2022
2284	13059	Bachelor of Science (Hons.) (Forensic Science)	FCH2415	Wildlife Forensics	2022
2285	13059	Bachelor of Science (Hons.) (Forensic Science)	FCH2416	Physics-II	2022
2286	13059	Bachelor of Science (Hons.) (Forensic Science)	FCH2431	Term Paper	2022
2287	13059	Bachelor of Science (Hons.) (Forensic Science)	FCH2432	Project (with Presentation & Evaluation)	2022
2288	13059	Bachelor of Science (Hons.) (Forensic Science)	FCH2433	Workshop / Certification (Discipline Specific) (1credit per workshop)	2022
2289	13059	Bachelor of Science (Hons.) (Forensic Science)	FCH2502	DNA Fingerprinting	2022

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2290	13059	Bachelor of Science (Hons.) (Forensic Science)	FCH2505	Instrumentation- Biological	2022
2291	13059	Bachelor of Science (Hons.) (Forensic Science)	FCH2511	DNA Fingerprinting Lab	2022
2292	13059	Bachelor of Science (Hons.) (Forensic Science)	FCH2514	Chemistry-V (Toxicology)	2022
2293	13059	Bachelor of Science (Hons.) (Forensic Science)	FCH2515	Forensic Toxicology Lab	2022
2294	13059	Bachelor of Science (Hons.) (Forensic Science)	FCH2535	Summer Internship Evaluation/ Study Abroad Programme	2022
2295	13059	Bachelor of Science (Hons.) (Forensic Science)	FCH2509	Technical Writing in Science-I	2022
2296	13059	Bachelor of Science (Hons.) (Forensic Science)	FCH2516	Arson and Explosive	2022
2297	13059	Bachelor of Science (Hons.) (Forensic Science)	FCH2517	Quality Management and Ethics	2022
2298	13059	Bachelor of Science (Hons.) (Forensic Science)	FCH2531	Term Paper	2022
2299	13059	Bachelor of Science (Hons.) (Forensic Science)	FCH2533	Workshop / Certification (Discipline Specific) (1credit per workshop)	2022
2300	13059	Bachelor of Science (Hons.) (Forensic Science)	FCH2613	Criminology, Criminal Law & Police Administration	2022
2301	13059	Bachelor of Science (Hons.) (Forensic Science)	FCH2616	Forensic Medicine	2022
2302	13059	Bachelor of Science (Hons.) (Forensic Science)	FCH2617	Ballistics	2022
2303	13059	Bachelor of Science (Hons.) (Forensic Science)	FCH2618	Chemistry-VI (Physical and Chemical)	2022
2304	13059	Bachelor of Science (Hons.) (Forensic Science)	FCH2619	Ballistics Lab	2022
2305	13059	Bachelor of Science (Hons.) (Forensic Science)	FCH2610	Forensic Psychology	2022
2306	13059	Bachelor of Science (Hons.) (Forensic Science)	FCH2620	Physics-III	2022
2307	13059	Bachelor of Science (Hons.) (Forensic Science)	FCH2612	Technical Writing in Science-II & Workshop	2022
2308	13059	Bachelor of Science (Hons.) (Forensic Science)	FCH2614	Seminar	2022
2309	13059	Bachelor of Science (Hons.) (Forensic Science)	FCH2631	Term Paper & Workshop	2022
2310	13059	Bachelor of Science (Hons.) (Forensic Science)	FCH2632	Minor Project (with Presentation & Evaluation)	2022
2311	13509	Master of Science (Chemistry)	CHY4101	Physical Chemistry	2022

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2312	13509	Master of Science (Chemistry)	CHY4102	Organic Chemistry	2022
2313	13509	Master of Science (Chemistry)	CHY4105	Physical Chemistry Lab	2022
2314	13509	Master of Science (Chemistry)	CHY4106	Organic Chemistry Lab	2022
2315	13509	Master of Science (Chemistry)	CHY4109	Inorganic Chemistry	2022
2316	13509	Master of Science (Chemistry)	CHY4110	Cheminformatics & Bioinformatics	2022
2317	13509	Master of Science (Chemistry)	CHY4111	Foundations of Biochemistry	2022
2318	13509	Master of Science (Chemistry)	CHY4112	Cheminformatics & Bioinformatics Lab	2022
2319	13509	Master of Science (Chemistry)	CHY4108	Research Seminar	2022
2320	13509	Master of Science (Chemistry)	CHY4201	Analytical Chemistry	2022
2321	13509	Master of Science (Chemistry)	CHY4202	Industrial Chemistry	2022
2322	13509	Master of Science (Chemistry)	CHY4211	Organometallic Chemistry	2022
2323	13509	Master of Science (Chemistry)	CHY4212	Introduction to Laboratory Safety	2022
2324	13509	Master of Science (Chemistry)	CHY4213	Spectroscopy	2022
2325	13509	Master of Science (Chemistry)	CHY4206	Analytical Chemistry Lab	2022
2326	13509	Master of Science (Chemistry)	CHY4207	Industrial Chemistry Lab	2022
2327	13509	Master of Science (Chemistry)	CHY4231	Term Paper	2022
2328	13509	Master of Science (Chemistry)	CHY4301	Instrumental Methods of Analysis	2022
2329	13509	Master of Science (Chemistry)	CHY4318	Advanced Organic Chemistry	2022
2330	13509	Master of Science (Chemistry)	CHY4319	Advanced Physical Chemistry	2022
2331	13509	Master of Science (Chemistry)	CHY4323	Advanced Inorganic Chemistry	2022
2332	13509	Master of Science (Chemistry)	CHY4324	Inorganic Chemistry Lab	2022
2333	13509	Master of Science (Chemistry)	CHY4325	Natural Products & Heterocyclic Chemistry	2022
2334	13509	Master of Science (Chemistry)	CHY4335	Summer Internship Evaluation/ Study Abroad Programme	2022
2335	13509	Master of Science (Chemistry)	CHY4304	Drugs and Dyes	2022
2336	13509	Master of Science (Chemistry)	CHY4305	Advanced Natural Products Chemistry	2022
2337	13509	Master of Science (Chemistry)	CHY4308	Advanced Nanochemistry	2022
2338	13509	Master of Science (Chemistry)	CHY4310	Medicinal Chemistry	2022
2339	13509	Master of Science (Chemistry)	CHY4311	Polymer Technology	2022
2340	13509	Master of Science (Chemistry)	CHY4312	Non-Conventional Energy Sources	2022
2341	13509	Master of Science (Chemistry)	CHY4313	Industrial Waste and Water Treatment	2022
2342	13509	Master of Science (Chemistry)	CHY4314	Nuclear Chemistry	2022
2343	13509	Master of Science (Chemistry)	CHY4315	Food Technology	2022
2344	13509	Master of Science (Chemistry)	CHY4321	Environmental Chemistry	2022
2345	13509	Master of Science (Chemistry)	CHY4322	Renewable Energy Conversion Systems	2022

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2346	13509	Master of Science (Chemistry)	CHY4405	Introduction to Polymeric Materials	2022
2347	13509	Master of Science (Chemistry)	CHY4407	Chemistry of Nanomaterials	2022
2348	13509	Master of Science (Chemistry)	CHY4408	Good Laboratory Practices Seminar	2022
2349	13509	Master of Science (Chemistry)	CHY4437	Major Project	2022
2350	13510	Master of Science (Mathematics)	MTH4101	Complex Analysis	2022
2351	13510	Master of Science (Mathematics)	MTH4102	Real Analysis	2022
2352	13510	Master of Science (Mathematics)	MTH4105	Computing and C Programming	2022
2353	13510	Master of Science (Mathematics)	MTH4106	C Programming Lab	2022
2354	13510	Master of Science (Mathematics)	MTH4109	Ordinary Differential Equations	2022
2355	13510	Master of Science (Mathematics)	MTH4110	Linear Algebra	2022
2356	13510	Master of Science (Mathematics)	MTH4205	Topology	2022
2357	13510	Master of Science (Mathematics)	MTH4206	Statistics Based Lab-I	2022
2358	13510	Master of Science (Mathematics)	MTH4213	Partial Differential Equations	2022
2359	13510	Master of Science (Mathematics)	MTH4215	Introduction to MATLAB	2022
2360	13510	Master of Science (Mathematics)	MTH4216	MATLAB Programming Lab	2022
2361	13510	Master of Science (Mathematics)	MTH4217	Operations Research	2022
2362	13510	Master of Science (Mathematics)	MTH4219	Mathematical Statistics	2022
2363	13510	Master of Science (Mathematics)	MTH4325	Numerical Analysis	2022
2364	13510	Master of Science (Mathematics)	MTH4326	Abstract Algebra	2022
2365	13510	Master of Science (Mathematics)	MTH4327	Numerical Analysis Lab	2022
2366	13510	Master of Science (Mathematics)	MTH4343	Probability and Sampling Methods	2022
2367	13510	Master of Science (Mathematics)	MTH4344	Statistics Based Lab-II	2022
2368	13510	Master of Science (Mathematics)	MTH4335	Summer Workshop/ Study Abroad Programme	2022
2369	13510	Master of Science (Mathematics)	MTH4303	Discrete Mathematical Structures	2022
2370	13510	Master of Science (Mathematics)	MTH4305	Fuzzy Sets and their Applications	2022
2371	13510	Master of Science (Mathematics)	MTH4329	Number Theory & Cryptography	2022
2372	13510	Master of Science (Mathematics)	MTH4340	Tensors and Differential Geometry	2022
2373	13510	Master of Science (Mathematics)	MTH4345	Fractional Calculus	2022
2374	13510	Master of Science (Mathematics)	MTH4409	Fluid Dynamics	2022
2375	13510	Master of Science (Mathematics)	MTH4417	Mathematical Methods	2022
2376	13510	Master of Science (Mathematics)	MTH4433	Workshop	2022
2377	13510	Master of Science (Mathematics)	MTH4437	Project	2022
2378	13510	Master of Science (Mathematics)	MTH4402	Functional Analysis	2022
2379	13510	Master of Science (Mathematics)	MTH4410	Classical Mechanics	2022
2380	13510	Master of Science (Mathematics)	MTH4411	Mathematical Modeling	2022
2381	13510	Master of Science (Mathematics)	MTH4412	Biomechanics	2022
2382	13510	Master of Science (Mathematics)	MTH4413	Coding Theory	2022

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2383	13510	Master of Science (Mathematics)	MTH4414	Stochastic Processes	2022
2384	13510	Master of Science (Mathematics)	MTH4415	Statistical Inference	2022
2385	13510	Master of Science (Mathematics)	MTH4416	Numerical Solutions to ODE and PDEs	2022
2386	13500	Master of Science (Physics)	PHY4101	Mathematical Physics	2022
2387	13500	Master of Science (Physics)	PHY4102	Classical Mechanics	2022
2388	13500	Master of Science (Physics)	PHY4103	Electronics	2022
2389	13500	Master of Science (Physics)	PHY4109	Quantum Mechanics-I	2022
2390	13500	Master of Science (Physics)	PHY4110	Computational Physics	2022
2391	13500	Master of Science (Physics)	PHY4111	Integrated Physics Lab-I	2022
2392	13500	Master of Science (Physics)	PHY4202	Statistical Mechanics	2022
2393	13500	Master of Science (Physics)	PHY4208	Quantum Mechanics-II	2022
2394	13500	Master of Science (Physics)	PHY4209	Condensed Matter Physics-I	2022
2395	13500	Master of Science (Physics)	PHY4215	Electrodynamics	2022
2396	13500	Master of Science (Physics)	PHY4216	Atomic and Molecular Physics	2022
2397	13500	Master of Science (Physics)	PHY4212	Integrated Physics Lab-II	2022
2398	13500	Master of Science (Physics)	PHY4307	Material Science	2022
2399	13500	Master of Science (Physics)	PHY4315	Condensed Matter Physics-II	2022
2400	13500	Master of Science (Physics)	PHY4321	Nuclear & Particle Physics	2022
2401	13500	Master of Science (Physics)	PHY4316	Integrated Physics Lab-III	2022
2402	13500	Master of Science (Physics)	PHY4335	Summer Internship Evaluation/ Study Abroad Programme	2022
2403	13500	Master of Science (Physics)	PHY4306	Digital Electronics & Microprocessors	2022
2404	13500	Master of Science (Physics)	PHY4317	Renewable Energy Resources	2022
2405	13500	Master of Science (Physics)	PHY4318	Introduction to Astrophysics	2022
2406	13500	Master of Science (Physics)	PHY4319	Non-linear Dynamics	2022
2407	13500	Master of Science (Physics)	PHY4322	Laser Physics	2022
2408	13500	Master of Science (Physics)	PHY4323	Plasma Physics-I	2022
2409	13500	Master of Science (Physics)	PHY4410	Experimental Techniques	2022
2410	13500	Master of Science (Physics)	PHY4437	Major Project	2022
2411	13500	Master of Science (Physics)	PHY4404	Nano-Science & Technology	2022
2412	13500	Master of Science (Physics)	PHY4405	Atmospheric Physics	2022
2413	13500	Master of Science (Physics)	PHY4406	General Relativity & Cosmology	2022
2414	13500	Master of Science (Physics)	PHY4407	Optical Fibers & Communications	2022
2415	13500	Master of Science (Physics)	PHY4408	Physics of Solar Photovoltaics	2022
2416	13500	Master of Science (Physics)	PHY4409	Biophysics	2022
2417	13500	Master of Science (Physics)	PHY4411	Radiation Physics	2022
2418	13500	Master of Science (Physics)	PHY4412	Plasma Physics-II	2022

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2419	13500	Master of Science (Physics)	PHY4413	High Energy Physics	2022
2420	13011	Master of Science (Forensic Science)	FCH4101	Criminology, Criminal Law, Police Administration	2022
2421	13011	Master of Science (Forensic Science)	FCH4103	Forensic Physics	2022
2422	13011	Master of Science (Forensic Science)	FCH4106	Forensic Ballistics	2022
2423	13011	Master of Science (Forensic Science)	FCH4107	Forensic Physics Lab	2022
2424	13011	Master of Science (Forensic Science)	FCH4108	Crime Scene Investigation (CSI) Lab	2022
2425	13011	Master of Science (Forensic Science)	FCH4111	Forensic and Criminal Investigation	2022
2426	13011	Master of Science (Forensic Science)	FCH4112	Instrumentation (Chemical)	2022
2427	13011	Master of Science (Forensic Science)	FCH4110	Research Seminar	2022
2428	13011	Master of Science (Forensic Science)	FCH4201	Forensic Photography	2022
2429	13011	Master of Science (Forensic Science)	FCH4202	Elements of Forensic Medicine and Odontology	2022
2430	13011	Master of Science (Forensic Science)	FCH4205	Questioned Documents	2022
2431	13011	Master of Science (Forensic Science)	FCH4206	Forensic Medicine & Odontology Lab	2022
2432	13011	Master of Science (Forensic Science)	FCH4208	Questioned Documents & Fingerprints Lab	2022
2433	13011	Master of Science (Forensic Science)	FCH4209	Instrumentation (Biological)	2022
2434	13011	Master of Science (Forensic Science)	FCH4210	Fingerprint Science	2022
2435	13011	Master of Science (Forensic Science)	FCH4211	Arson & Explosives	2022
2436	13011	Master of Science (Forensic Science)	FCH4231	Term Paper	2022
2437	13011	Master of Science (Forensic Science)	FCH4301	Forensic Chemistry, Toxicology & Pharmacology	2022
2438	13011	Master of Science (Forensic Science)	FCH4302	Forensic Biology & Serology	2022
2439	13011	Master of Science (Forensic Science)	FCH4304	Forensic Biology and Serology Lab	2022
2440	13011	Master of Science (Forensic Science)	FCH4305	Forensic Chemistry & Toxicology Lab	2022

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2441	13011	Master of Science (Forensic Science)	FCH4315	Statistics & Research Methodology	2022
2442	13011	Master of Science (Forensic Science)	FCH4316	Instrumentation (Physical)	2022
2443	13011	Master of Science (Forensic Science)	FCH4318	Instrumentation Workshop	2022
2444	13011	Master of Science (Forensic Science)	FCH4335	Summer Internship Evaluation/ Study Abroad Program	2022
2445	13011	Master of Science (Forensic Science)	FCH4306	Advanced Forensic Biology & Anthropology	2022
2446	13011	Master of Science (Forensic Science)	FCH4317	Cyber Forensic & Computer Application	2022
2447	13011	Master of Science (Forensic Science)	FCH4319	Forensic Genetics	2022
2448	13011	Master of Science (Forensic Science)	FCH4310	Advanced Questioned Documents & Fingerprint Examination	2022
2449	13011	Master of Science (Forensic Science)	FCH4320	Advanced Forensic Chemistry and Toxicology	2022
2450	13011	Master of Science (Forensic Science)	FCH4321	Forensic Wildlife and Entomology	2022
2451	13011	Master of Science (Forensic Science)	FCH4405	Quality Management & Accreditation in Forensic Science Laboratories	2022
2452	13011	Master of Science (Forensic Science)	FCH4408	Forensic Psychology	2022
2453	13011	Master of Science (Forensic Science)	FCH4409	Good Laboratory Practices Seminar	2022
2454	13011	Master of Science (Forensic Science)	FCH4437	Major Project	2022
2455	13690	Master of Science (Biochemistry)	BCH4101	Basic Biochemistry	2022
2456	13690	Master of Science (Biochemistry)	BCH4102	Biostatistics	2022
2457	13690	Master of Science (Biochemistry)	BCH4104	Biochemical Engineering	2022
2458	13690	Master of Science (Biochemistry)	BCH4105	Biochemistry Lab	2022
2459	13690	Master of Science (Biochemistry)	BCH4106	Instrumentation Techniques	2022
2460	13690	Master of Science (Biochemistry)	BCH4107	Biochemical Engineering Lab	2022
2461	13690	Master of Science (Biochemistry)	BCH4108	Research Seminar	2022
2462	13690	Master of Science (Biochemistry)	BCH4109	Biochemistry of Proteins and Enzymes	2022
2463	13690	Master of Science (Biochemistry)	BCH4110	Cell Biology and Signaling	2022
2464	13690	Master of Science (Biochemistry)	BCH4111	Bioinformatics Lab	2022
2465	13690	Master of Science (Biochemistry)	BCH4201	Advanced Biochemistry	2022
2466	13690	Master of Science (Biochemistry)	BCH4202	Structural Biology	2022
2467	13690	Master of Science (Biochemistry)	BCH4203	Genetics	2022

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2468	13690	Master of Science (Biochemistry)	BCH4204	Clinical Biochemistry	2022
2469	13690	Master of Science (Biochemistry)	BCH4206	Advanced Biochemistry Lab	2022
2470	13690	Master of Science (Biochemistry)	BCH4207	Cell Biology and Genetics Lab	2022
2471	13690	Master of Science (Biochemistry)	BCH4208	Clinical Biochemistry Lab	2022
2472	13690	Master of Science (Biochemistry)	BCH4209	Immunology	2022
2473	13690	Master of Science (Biochemistry)	BCH4231	Term Paper	2022
2474	13690	Master of Science (Biochemistry)	BCH4301	Recombinant DNA Technology	2022
2475	13690	Master of Science (Biochemistry)	BCH4302	Advanced Genetics	2022
2476	13690	Master of Science (Biochemistry)	BCH4303	Molecular Biology	2022
2477	13690	Master of Science (Biochemistry)	BCH4306	Molecular Biology & Microbiology Lab	2022
2478	13690	Master of Science (Biochemistry)	BCH4307	Instrumentation and Genetic Engineering Lab	2022
2479	13690	Master of Science (Biochemistry)	BCH4335	Summer Internship Evaluation plus Project Formulation	2022
2480	13690	Master of Science (Biochemistry)	BCH4308	Microbiology	2022
2481	13690	Master of Science (Biochemistry)	BCH4310	Ecology and Evolution	2022
2482	13690	Master of Science (Biochemistry)	BCH4311	Microbiology Lab	2022
2483	13690	Master of Science (Biochemistry)	BCH4313	Ecology and Evolution Lab	2022
2484	13690	Master of Science (Biochemistry)	BCH4408	Developmental Biology and Neurological Disorders	2022
2485	13690	Master of Science (Biochemistry)	BCH4409	Methodologies in Biochemistry	2022
2486	13690	Master of Science (Biochemistry)	BCH4407	Good Laboratory Practices Seminar	2022
2487	13690	Master of Science (Biochemistry)	BCH4437	Major Project	2022
2488	13751	Bachelor of Science (Hons.) (Earth Science)	ESC2101	Basics of Earth System Sciences	2022
2489	13751	Bachelor of Science (Hons.) (Earth Science)	ESC2102	Earth Surface Features & Processes	2022
2490	13751	Bachelor of Science (Hons.) (Earth Science)	ESC2105	Mathematics-I	2022
2491	13751	Bachelor of Science (Hons.) (Earth Science)	ESC2109	Physics-I	2022
2492	13751	Bachelor of Science (Hons.) (Earth Science)	ESC2110	Chemistry-I	2022
2493	13751	Bachelor of Science (Hons.) (Earth Science)	ESC2111	Biology	2022
2494	13751	Bachelor of Science (Hons.) (Earth Science)	ESC2107	Chemistry Laboratory	2022
2495	13751	Bachelor of Science (Hons.) (Earth Science)	ESC2108	Field Survey-I	2022
2496	13751	Bachelor of Science (Hons.) (Earth Science)	ESC2201	Crystallography & Mineralogy	2022

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2497	13751	Bachelor of Science (Hons.) (Earth Science)	ESC2206	Mathematics-II	2022
2498	13751	Bachelor of Science (Hons.) (Earth Science)	ESC2210	Structural Geology	2022
2499	13751	Bachelor of Science (Hons.) (Earth Science)	ESC2211	Physics-II	2022
2500	13751	Bachelor of Science (Hons.) (Earth Science)	ESC2212	Chemistry-II	2022
2501	13751	Bachelor of Science (Hons.) (Earth Science)	ESC2208	Earth Science Laboratory-I	2022
2502	13751	Bachelor of Science (Hons.) (Earth Science)	ESC2209	Field Survey-II	2022
2503	13751	Bachelor of Science (Hons.) (Earth Science)	ESC2301	Igneous Petrology	2022
2504	13751	Bachelor of Science (Hons.) (Earth Science)	ESC2302	Sedimentology	2022
2505	13751	Bachelor of Science (Hons.) (Earth Science)	ESC2303	Metamorphic Petrology	2022
2506	13751	Bachelor of Science (Hons.) (Earth Science)	ESC2304	Atmospheric Science	2022
2507	13751	Bachelor of Science (Hons.) (Earth Science)	ESC2309	Marine Science	2022
2508	13751	Bachelor of Science (Hons.) (Earth Science)	ESC2307	Earth Science Laboratory-II	2022
2509	13751	Bachelor of Science (Hons.) (Earth Science)	ESC2308	Field Survey-III	2022
2510	13751	Bachelor of Science (Hons.) (Earth Science)	ESC2335	Summer Project Evaluation-I	2022
2511	13751	Bachelor of Science (Hons.) (Earth Science)	ESC2405	Economic Geology	2022
2512	13751	Bachelor of Science (Hons.) (Earth Science)	ESC2406	Geochemistry	2022
2513	13751	Bachelor of Science (Hons.) (Earth Science)	ESC2410	Remote Sensing & GIS	2022
2514	13751	Bachelor of Science (Hons.) (Earth Science)	ESC2412	Geophysics	2022
2515	13751	Bachelor of Science (Hons.) (Earth Science)	ESC2413	Paleontology	2022
2516	13751	Bachelor of Science (Hons.) (Earth Science)	ESC2408	Earth Science Laboratory-III	2022
2517	13751	Bachelor of Science (Hons.) (Earth Science)	ESC2409	Field Survey-IV	2022
2518	13751	Bachelor of Science (Hons.) (Earth Science)	ESC2503	Exploration Geology	2022

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2519	13751	Bachelor of Science (Hons.) (Earth Science)	ESC2509	Stratigraphy of India	2022
2520	13751	Bachelor of Science (Hons.) (Earth Science)	ESC2510	Engineering Geology	2022
2521	13751	Bachelor of Science (Hons.) (Earth Science)	ESC2511	Hydrogeology	2022
2522	13751	Bachelor of Science (Hons.) (Earth Science)	ESC2507	Earth Science Laboratory-IV	2022
2523	13751	Bachelor of Science (Hons.) (Earth Science)	ESC2508	Field Survey-V	2022
2524	13751	Bachelor of Science (Hons.) (Earth Science)	ESC2535	Summer Project Evaluation-II	2022
2525	13751	Bachelor of Science (Hons.) (Earth Science)	ESC2603	Coal and Petroleum Geology	2022
2526	13751	Bachelor of Science (Hons.) (Earth Science)	ESC2604	Hazard Assessment & Risk Management	2022
2527	13751	Bachelor of Science (Hons.) (Earth Science)	ESC2633	Workshop / Seminar / Conference/ Symposium	2022
2528	13751	Bachelor of Science (Hons.) (Earth Science)	ESC2637	Dissertation	2022
2529	13619	Master of Science (Environmental Science & Management)	ENV4101	Ecology and Ecosystem Dynamics	2022
2530	13619	Master of Science (Environmental Science & Management)	ENV4102	Earth System Sciences	2022
2531	13619	Master of Science (Environmental Science & Management)	ENV4103	Environmental Biology	2022
2532	13619	Master of Science (Environmental Science & Management)	ENV4109	Chemistry of Environment	2022
2533	13619	Master of Science (Environmental Science & Management)	ENV4110	Environmental Physics & Energy	2022
2534	13619	Master of Science (Environmental Science & Management)	ENV4111	Basic Mathematics	2022
2535	13619	Master of Science (Environmental Science & Management)	ENV4107	Analytical Laboratory-I	2022
2536	13619	Master of Science (Environmental Science & Management)	ENV4131	Term Paper/Seminar	2022
2537	13619	Master of Science (Environmental Science & Management)	ENV4201	Pollution Control and Management	2022
2538	13619	Master of Science (Environmental Science & Management)	ENV4204	Environmental Analysis: Tools and Techniques	2022
2539	13619	Master of Science (Environmental Science & Management)	ENV4209	Atmospheric Science & Climate Change	2022
2540	13619	Master of Science (Environmental Science & Management)	ENV4210	Geoinformatics for Environmental Management	2022

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2541	13619	Master of Science (Environmental Science & Management)	ENV4211	Statistical Tools and Research Methodology	2022
2542	13619	Master of Science (Environmental Science & Management)	ENV4212	Analytical Laboratory-II	2022
2543	13619	Master of Science (Environmental Science & Management)	ENV4231	Term Paper/Seminar	2022
2544	13619	Master of Science (Environmental Science & Management)	ENV4232	Project (Field Survey)	2022
2545	13619	Master of Science (Environmental Science & Management)	ENV4301	Environmental Conservation and Sustainable Development	2022
2546	13619	Master of Science (Environmental Science & Management)	ENV4313	Water Resources Management	2022
2547	13619	Master of Science (Environmental Science & Management)	ENV4314	Eco-toxicology, Health and Safety	2022
2548	13619	Master of Science (Environmental Science & Management)	ENV4315	Waste Management & Valorization	2022
2549	13619	Master of Science (Environmental Science & Management)	ENV4316	Analytical Laboratory -III	2022
2550	13619	Master of Science (Environmental Science & Management)	ENV4317	Environmental Economics	2022
2551	13619	Master of Science (Environmental Science & Management)	ENV4331	Term Paper/Seminar/ Workshop/ Conference/ Training	2022
2552	13619	Master of Science (Environmental Science & Management)	ENV4335	Summer Internship Evaluation + Project Formulation	2022
2553	13619	Master of Science (Environmental Science & Management)	ENV4309	Environmental Biotechnology	2022
2554	13619	Master of Science (Environmental Science & Management)	ENV4310	Environmental Geology	2022
2555	13619	Master of Science (Environmental Science & Management)	ENV4311	Green Energy	2022
2556	13619	Master of Science (Environmental Science & Management)	ENV4312	Waste Water Treatment	2022
2557	13619	Master of Science (Environmental Science & Management)	ENV4401	Environmental Law and Environmental Impact Assessment	2022
2558	13619	Master of Science (Environmental Science & Management)	ENV4402	Urban Ecosystem and Industrial Ecology	2022
2559	13619	Master of Science (Environmental Science & Management)	ENV4403	Natural Hazards and Disaster Management	2022
2560	13619	Master of Science (Environmental Science & Management)	ENV4431	Term Paper/Seminar (Research Article)	2022
2561	13619	Master of Science (Environmental Science & Management)	ENV4437	Research based Project Work	2022
2562	13044	Bachelor of Science (Hons.) (Biotechnology)	BTH2101	Plant Sciences-I	2022

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2563	13044	Bachelor of Science (Hons.) (Biotechnology)	BTH2103	Computers Applications	2022
2564	13044	Bachelor of Science (Hons.) (Biotechnology)	BTH2110	Animal Diversity	2022
2565	13044	Bachelor of Science (Hons.) (Biotechnology)	BTH2104	Plant Sciences-I Lab	2022
2566	13044	Bachelor of Science (Hons.) (Biotechnology)	BTH2105	Animal Sciences Lab	2022
2567	13044	Bachelor of Science (Hons.) (Biotechnology)	BTH2106	Computers Applications Lab	2022
2568	13044	Bachelor of Science (Hons.) (Biotechnology)	BTH2107	Microbial Biotechnology	2022
2569	13044	Bachelor of Science (Hons.) (Biotechnology)	BTH2108	Food Biotechnology	2022
2570	13044	Bachelor of Science (Hons.) (Biotechnology)	BTH2109	Agriculture Biotechnology	2022
2571	13044	Bachelor of Science (Hons.) (Biotechnology)	BTH2131	Term Paper	2022
2572	13044	Bachelor of Science (Hons.) (Biotechnology)	BTH2132	Project (with Presentation & Evaluation)	2022
2573	13044	Bachelor of Science (Hons.) (Biotechnology)	BTH2133	Workshop / Certification (Discipline Specific) (1 credit per workshop)	2022
2574	13044	Bachelor of Science (Hons.) (Biotechnology)	BTH2201	Plant Sciences-II	2022
2575	13044	Bachelor of Science (Hons.) (Biotechnology)	BTH2203	Animal Physiology	2022
2576	13044	Bachelor of Science (Hons.) (Biotechnology)	BTH2204	Plant Physiology	2022
2577	13044	Bachelor of Science (Hons.) (Biotechnology)	BTH2212	Introduction to Data Sciences	2022
2578	13044	Bachelor of Science (Hons.) (Biotechnology)	BTH2205	Plant sciences-II Lab	2022
2579	13044	Bachelor of Science (Hons.) (Biotechnology)	BTH2207	Plant Physiology Lab	2022
2580	13044	Bachelor of Science (Hons.) (Biotechnology)	BTH2208	Animal Physiology Lab	2022
2581	13044	Bachelor of Science (Hons.) (Biotechnology)	BTH2209	Molecular Modeling	2022
2582	13044	Bachelor of Science (Hons.) (Biotechnology)	BTH2210	Bio-safety and Bioethics	2022
2583	13044	Bachelor of Science (Hons.) (Biotechnology)	BTH2211	Bioinformatics	2022
2584	13044	Bachelor of Science (Hons.) (Biotechnology)	BTH2231	Term Paper	2022

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2585	13044	Bachelor of Science (Hons.) (Biotechnology)	BTH2232	Project(with Presentation &Evaluation)	2022
2586	13044	Bachelor of Science (Hons.) (Biotechnology)	BTH2233	Workshop/ Certification (Discipline Specific) (1credit per workshop)	2022
2587	13044	Bachelor of Science (Hons.) (Biotechnology)	BTH2234	Study Abroad	2022
2588	13044	Bachelor of Science (Hons.) (Biotechnology)	BTH2301	Biochemistry	2022
2589	13044	Bachelor of Science (Hons.) (Biotechnology)	BTH2302	Microbiology	2022
2590	13044	Bachelor of Science (Hons.) (Biotechnology)	BTH2303	Enzymology	2022
2591	13044	Bachelor of Science (Hons.) (Biotechnology)	BTH2304	Genetics & Cell Biology	2022
2592	13044	Bachelor of Science (Hons.) (Biotechnology)	BTH2305	Biochemistry Lab	2022
2593	13044	Bachelor of Science (Hons.) (Biotechnology)	BTH2306	Microbiology Lab	2022
2594	13044	Bachelor of Science (Hons.) (Biotechnology)	BTH2307	Enzymology Lab	2022
2595	13044	Bachelor of Science (Hons.) (Biotechnology)	BTH2308	Genetics & Cell Biology Lab	2022
2596	13044	Bachelor of Science (Hons.) (Biotechnology)	BTH2309	Intellectual property rights	2022
2597	13044	Bachelor of Science (Hons.) (Biotechnology)	BTH2310	Pharmaceutical Biotechnology	2022
2598	13044	Bachelor of Science (Hons.) (Biotechnology)	BTH2311	Clinical Biotechnology	2022
2599	13044	Bachelor of Science (Hons.) (Biotechnology)	BTH2331	Term Paper	2022
2600	13044	Bachelor of Science (Hons.) (Biotechnology)	BTH2332	Project(with Presentation &Evaluation)	2022
2601	13044	Bachelor of Science (Hons.) (Biotechnology)	BTH2333	Workshop/ Certification (Discipline Specific) (1credit per workshop)	2022
2602	13044	Bachelor of Science (Hons.) (Biotechnology)	BTH2334	Study Abroad	2022
2603	13044	Bachelor of Science (Hons.) (Biotechnology)	BTH2401	Molecular Biology	2022
2604	13044	Bachelor of Science (Hons.) (Biotechnology)	BTH2402	Introductory Immunology	2022
2605	13044	Bachelor of Science (Hons.) (Biotechnology)	BTH2403	Instrumentation & Bioanalytical techniques	2022
2606	13044	Bachelor of Science (Hons.) (Biotechnology)	BTH2404	Research Methodology	2022

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2607	13044	Bachelor of Science (Hons.) (Biotechnology)	BTH2405	In Silico analysis of Biomolecules	2022
2608	13044	Bachelor of Science (Hons.) (Biotechnology)	BTH2406	Molecular Biology Lab	2022
2609	13044	Bachelor of Science (Hons.) (Biotechnology)	BTH2407	Introductory Immunology Lab	2022
2610	13044	Bachelor of Science (Hons.) (Biotechnology)	BTH2408	In Silico analysis of Biomolecules Lab	2022
2611	13044	Bachelor of Science (Hons.) (Biotechnology)	BTH2409	Nano Biotechnology	2022
2612	13044	Bachelor of Science (Hons.) (Biotechnology)	BTH2410	Forensic Biotechnology	2022
2613	13044	Bachelor of Science (Hons.) (Biotechnology)	BTH2411	Genetically Modified Organism (Crops/Animals)	2022
2614	13044	Bachelor of Science (Hons.) (Biotechnology)	BTH2431	Term Paper	2022
2615	13044	Bachelor of Science (Hons.) (Biotechnology)	BTH2432	Project (with Presentation & Evaluation)	2022
2616	13044	Bachelor of Science (Hons.) (Biotechnology)	BTH2433	Workshop / Certification (Discipline Specific) (1 credit per workshop)	2022
2617	13044	Bachelor of Science (Hons.) (Biotechnology)	BTH2434	Study Abroad	2022
2618	13044	Bachelor of Science (Hons.) (Biotechnology)	BTH2501	Animal Biotechnology	2022
2619	13044	Bachelor of Science (Hons.) (Biotechnology)	BTH2502	Plant Biotechnology	2022
2620	13044	Bachelor of Science (Hons.) (Biotechnology)	BTH2503	Stem Cell & Gene Therapy	2022
2621	13044	Bachelor of Science (Hons.) (Biotechnology)	BTH2504	Marine Biotechnology	2022
2622	13044	Bachelor of Science (Hons.) (Biotechnology)	BTH2505	Biosensors	2022
2623	13044	Bachelor of Science (Hons.) (Biotechnology)	BTH2509	Animal Biotechnology Lab	2022
2624	13044	Bachelor of Science (Hons.) (Biotechnology)	BTH2510	Plant Biotechnology Lab	2022
2625	13044	Bachelor of Science (Hons.) (Biotechnology)	BTH2506	Modern Killer diseases	2022
2626	13044	Bachelor of Science (Hons.) (Biotechnology)	BTH2507	Biofuels and Green Biotechnology	2022
2627	13044	Bachelor of Science (Hons.) (Biotechnology)	BTH2508	Artificial Neural Network	2022
2628	13044	Bachelor of Science (Hons.) (Biotechnology)	BTH2511	Introductory Nanobiotechnology	2022

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2629	13044	Bachelor of Science (Hons.) (Biotechnology)	BTH2512	Integrated Biomaterials	2022
2630	13044	Bachelor of Science (Hons.) (Biotechnology)	BTH2531	Term Paper	2022
2631	13044	Bachelor of Science (Hons.) (Biotechnology)	BTH2532	Project (with Presentation & Evaluation)	2022
2632	13044	Bachelor of Science (Hons.) (Biotechnology)	BTH2533	Workshop / Certification (Discipline Specific) (1 credit per workshop)	2022
2633	13044	Bachelor of Science (Hons.) (Biotechnology)	BTH2534	Study Abroad	2022
2634	13044	Bachelor of Science (Hons.) (Biotechnology)	BTH2601	Recombinant DNA Technology	2022
2635	13044	Bachelor of Science (Hons.) (Biotechnology)	BTH2602	Genomics & Proteomics	2022
2636	13044	Bachelor of Science (Hons.) (Biotechnology)	BTH2603	Industrial Biotechnology	2022
2637	13044	Bachelor of Science (Hons.) (Biotechnology)	BTH2604	Stress Biology	2022
2638	13044	Bachelor of Science (Hons.) (Biotechnology)	BTH2605	Recombinant DNA Technology Lab	2022
2639	13044	Bachelor of Science (Hons.) (Biotechnology)	BTH2609	Genomics & Proteomics Lab	2022
2640	13044	Bachelor of Science (Hons.) (Biotechnology)	BTH2606	Biosafety Management	2022
2641	13044	Bachelor of Science (Hons.) (Biotechnology)	BTH2607	Drug Design and Development	2022
2642	13044	Bachelor of Science (Hons.) (Biotechnology)	BTH2608	Bioprocess Technology	2022
2643	13044	Bachelor of Science (Hons.) (Biotechnology)	BTH2631	Term Paper	2022
2644	13044	Bachelor of Science (Hons.) (Biotechnology)	BTH2632	Project (with Presentation & Evaluation)	2022
2645	13044	Bachelor of Science (Hons.) (Biotechnology)	BTH2633	Workshop / Certification (Discipline Specific) (1 credit per workshop)	2022
2646	13044	Bachelor of Science (Hons.) (Biotechnology)	BTH2634	Study Abroad	2022
2647	13692	Bachelor of Science (Hons.) (Biological Science)	BLS2101	Plant Diversity-I	2022
2648	13692	Bachelor of Science (Hons.) (Biological Science)	BLS2102	Animal Diversity	2022
2649	13692	Bachelor of Science (Hons.) (Biological Science)	BLS2103	Chemistry-I	2022

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2650	13692	Bachelor of Science (Hons.) (Biological Science)	BLS2104	Physics-I	2022
2651	13692	Bachelor of Science (Hons.) (Biological Science)	BLS2105	Mathematics-I	2022
2652	13692	Bachelor of Science (Hons.) (Biological Science)	BLS2106	Plant & Animal Diversity Lab	2022
2653	13692	Bachelor of Science (Hons.) (Biological Science)	BLS2107	Chemistry Lab-I	2022
2654	13692	Bachelor of Science (Hons.) (Biological Science)	BLS2108	Physics Lab-I	2022
2655	13692	Bachelor of Science (Hons.) (Biological Science)	BLS2201	Plant Diversity II	2022
2656	13692	Bachelor of Science (Hons.) (Biological Science)	BLS2203	Chemistry II	2022
2657	13692	Bachelor of Science (Hons.) (Biological Science)	BLS2204	Physics II	2022
2658	13692	Bachelor of Science (Hons.) (Biological Science)	BLS2205	Mathematics II	2022
2659	13692	Bachelor of Science (Hons.) (Biological Science)	BLS2206	Plant Diversity Lab	2022
2660	13692	Bachelor of Science (Hons.) (Biological Science)	BLS2207	Chemistry Lab II	2022
2661	13692	Bachelor of Science (Hons.) (Biological Science)	BLS2208	Physics Lab II	2022
2662	13692	Bachelor of Science (Hons.) (Biological Science)	BLS2209	Molecular Modeling	2022
2663	13692	Bachelor of Science (Hons.) (Biological Science)	BLS2210	Bio-safety and Bioethics	2022
2664	13692	Bachelor of Science (Hons.) (Biological Science)	BLS2211	Bioinformatics	2022
2665	13692	Bachelor of Science (Hons.) (Biological Science)	BLS2301	Plant Anatomy	2022
2666	13692	Bachelor of Science (Hons.) (Biological Science)	BLS2302	Animal Anatomy	2022
2667	13692	Bachelor of Science (Hons.) (Biological Science)	BLS2303	Cell Biology	2022
2668	13692	Bachelor of Science (Hons.) (Biological Science)	BLS2304	Genetics	2022
2669	13692	Bachelor of Science (Hons.) (Biological Science)	BLS2305	Plant & Animal Anatomy Lab	2022
2670	13692	Bachelor of Science (Hons.) (Biological Science)	BLS2306	Cell biology & Genetics Lab	2022
2671	13692	Bachelor of Science (Hons.) (Biological Science)	BLS2332	Project (with Presentation & Evaluation)	2022

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2672	13692	Bachelor of Science (Hons.) (Biological Science)	BLS2401	Plant Physiology	2022
2673	13692	Bachelor of Science (Hons.) (Biological Science)	BLS2402	Animal Physiology	2022
2674	13692	Bachelor of Science (Hons.) (Biological Science)	BLS2403	Microbiology	2022
2675	13692	Bachelor of Science (Hons.) (Biological Science)	BLS2404	Biostats & Bioinformatics	2022
2676	13692	Bachelor of Science (Hons.) (Biological Science)	BLS2405	Ecology & Evolution	2022
2677	13692	Bachelor of Science (Hons.) (Biological Science)	BLS2406	Plant & Animal Physiology Lab	2022
2678	13692	Bachelor of Science (Hons.) (Biological Science)	BLS2407	Microbiology Lab	2022
2679	13692	Bachelor of Science (Hons.) (Biological Science)	BLS2501	Molecular Biology	2022
2680	13692	Bachelor of Science (Hons.) (Biological Science)	BLS2502	Biochemistry	2022
2681	13692	Bachelor of Science (Hons.) (Biological Science)	BLS2503	Immunology	2022
2682	13692	Bachelor of Science (Hons.) (Biological Science)	BLS2504	Bio-analytical & Biophysical Techniques	2022
2683	13692	Bachelor of Science (Hons.) (Biological Science)	BLS2505	Biomaterials	2022
2684	13692	Bachelor of Science (Hons.) (Biological Science)	BLS2506	Molecular Biology Lab	2022
2685	13692	Bachelor of Science (Hons.) (Biological Science)	BLS2507	Immunology Lab	2022
2686	13692	Bachelor of Science (Hons.) (Biological Science)	BLS2508	Biochemistry & Bio-analytical Lab	2022
2687	13692	Bachelor of Science (Hons.) (Biological Science)	BLS2535	Summer Internship Project (Evaluation)	2022
2688	13692	Bachelor of Science (Hons.) (Biological Science)	BLS2601	Recombinant DNA Technology	2022
2689	13692	Bachelor of Science (Hons.) (Biological Science)	BLS2602	Genomics & proteomics	2022
2690	13692	Bachelor of Science (Hons.) (Biological Science)	BLS2603	IPR, Biosafety & Bioethics	2022
2691	13692	Bachelor of Science (Hons.) (Biological Science)	BLS2604	Applied Biology	2022
2692	13692	Bachelor of Science (Hons.) (Biological Science)	BLS2605	Recombinant DNA Technology Lab	2022
2693	13692	Bachelor of Science (Hons.) (Biological Science)	BLS2606	Applied Biology Lab	2022

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2694	13041	Bachelor of Technology (Biotechnology)	BTE2104	Introduction to Computers & Programming in 'C'	2022
2695	13041	Bachelor of Technology (Biotechnology)	BTE2106	Electrical Science	2022
2696	13041	Bachelor of Technology (Biotechnology)	BTE2108	Programming in C Lab	2022
2697	13041	Bachelor of Technology (Biotechnology)	BTE2110	Electrical Science Lab	2022
2698	13041	Bachelor of Technology (Biotechnology)	BTE2111	Engineering Mathematics-I	2022
2699	13041	Bachelor of Technology (Biotechnology)	BTE2112	Engineering Chemistry	2022
2700	13041	Bachelor of Technology (Biotechnology)	BTE2113	Engineering Chemistry Lab	2022
2701	13041	Bachelor of Technology (Biotechnology)	BTE2203	Object Oriented Programming in C++	2022
2702	13041	Bachelor of Technology (Biotechnology)	BTE2205	Object Oriented Programming in C++ Lab	2022
2703	13041	Bachelor of Technology (Biotechnology)	BTE2206	Engineering Graphics Lab	2022
2704	13041	Bachelor of Technology (Biotechnology)	BTE2207	Engineering Mathematics-II	2022
2705	13041	Bachelor of Technology (Biotechnology)	BTE2208	Engineering Physics	2022
2706	13041	Bachelor of Technology (Biotechnology)	BTE2209	Engineering Physics Lab	2022
2707	13041	Bachelor of Technology (Biotechnology)	BTE2210	Life Sciences	2022
2708	13041	Bachelor of Technology (Biotechnology)	BTE2301	Cell Biology & Genetics	2022
2709	13041	Bachelor of Technology (Biotechnology)	BTE2302	Biochemistry	2022
2710	13041	Bachelor of Technology (Biotechnology)	BTE2303	Biostatistics	2022
2711	13041	Bachelor of Technology (Biotechnology)	BTE2304	Database Management System	2022
2712	13041	Bachelor of Technology (Biotechnology)	BTE2305	Chemical Biology	2022
2713	13041	Bachelor of Technology (Biotechnology)	BTE2306	Biochemistry Lab	2022
2714	13041	Bachelor of Technology (Biotechnology)	BTE2307	Cell Biology & Genetics Lab	2022
2715	13041	Bachelor of Technology (Biotechnology)	BTE2308	Database Management System Lab	2022


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2716	13041	Bachelor of Technology (Biotechnology)	BTE2309	Industrial Biotechnology	2022
2717	13041	Bachelor of Technology (Biotechnology)	BTE2310	Fermentation technology	2022
2718	13041	Bachelor of Technology (Biotechnology)	BTE2311	Drug Design and Development	2022
2719	13041	Bachelor of Technology (Biotechnology)	BTE2312	Recombinant DNA Technology	2022
2720	13041	Bachelor of Technology (Biotechnology)	BTE2331	Term Paper	2022
2721	13041	Bachelor of Technology (Biotechnology)	BTE2332	Project (with Presentation & Evaluation)	2022
2722	13041	Bachelor of Technology (Biotechnology)	BTE2333	Workshop / Certification (Discipline Specific)	2022
2723	13041	Bachelor of Technology (Biotechnology)	BTE2334	Study Abroad	2022
2724	13041	Bachelor of Technology (Biotechnology)	BTE2401	Microbiology	2022
2725	13041	Bachelor of Technology (Biotechnology)	BTE2402	Data Structure & Algorithms	2022
2726	13041	Bachelor of Technology (Biotechnology)	BTE2403	Enzymology & Enzyme Technology	2022
2727	13041	Bachelor of Technology (Biotechnology)	BTE2404	Chemical Engineering Principles	2022
2728	13041	Bachelor of Technology (Biotechnology)	BTE2405	Methods and Instrumentation in Biotechnology	2022
2729	13041	Bachelor of Technology (Biotechnology)	BTE2406	Microbiology Lab	2022
2730	13041	Bachelor of Technology (Biotechnology)	BTE2407	Data Structure & Algorithms Lab	2022
2731	13041	Bachelor of Technology (Biotechnology)	BTE2408	Enzymology & Enzyme Technology Lab	2022
2732	13041	Bachelor of Technology (Biotechnology)	BTE2409	Methods and Instrumentation in Biotechnology Lab	2022
2733	13041	Bachelor of Technology (Biotechnology)	BTE2410	Marine Biotechnology	2022
2734	13041	Bachelor of Technology (Biotechnology)	BTE2411	Vaccine Development	2022
2735	13041	Bachelor of Technology (Biotechnology)	BTE2412	Agricultural Biotechnology	2022
2736	13041	Bachelor of Technology (Biotechnology)	BTE2413	Natural products and medicinal chemistry	2022
2737	13041	Bachelor of Technology (Biotechnology)	BTE2414	Stem cell Technology	2022

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2738	13041	Bachelor of Technology (Biotechnology)	BTE2431	Term Paper	2022
2739	13041	Bachelor of Technology (Biotechnology)	BTE2432	Project (with Presentation & Evaluation)	2022
2740	13041	Bachelor of Technology (Biotechnology)	BTE2433	Workshop / Certification (Discipline Specific)	2022
2741	13041	Bachelor of Technology (Biotechnology)	BTE2434	Study Abroad	2022
2742	13041	Bachelor of Technology (Biotechnology)	BTE2501	Molecular Biology	2022
2743	13041	Bachelor of Technology (Biotechnology)	BTE2502	Animal Biotechnology	2022
2744	13041	Bachelor of Technology (Biotechnology)	BTE2503	Plant Biotechnology	2022
2745	13041	Bachelor of Technology (Biotechnology)	BTE2504	Bioinformatics	2022
2746	13041	Bachelor of Technology (Biotechnology)	BTE2505	Molecular Biology Lab	2022
2747	13041	Bachelor of Technology (Biotechnology)	BTE2506	Animal Biotechnology Lab	2022
2748	13041	Bachelor of Technology (Biotechnology)	BTE2507	Plant Biotechnology Lab	2022
2749	13041	Bachelor of Technology (Biotechnology)	BTE2508	Bioinformatics Lab	2022
2750	13041	Bachelor of Technology (Biotechnology)	BTE2535	Summer Internship Evaluation-I	2022
2751	13041	Bachelor of Technology (Biotechnology)	BTE2509	Biofuels & Green Technology	2022
2752	13041	Bachelor of Technology (Biotechnology)	BTE2510	Stem Cells and Tissue Engineering	2022
2753	13041	Bachelor of Technology (Biotechnology)	BTE2511	Java-I	2022
2754	13041	Bachelor of Technology (Biotechnology)	BTE2531	Term Paper	2022
2755	13041	Bachelor of Technology (Biotechnology)	BTE2532	Project (with Presentation & Evaluation)	2022
2756	13041	Bachelor of Technology (Biotechnology)	BTE2533	Workshop / Certification (Discipline Specific)	2022
2757	13041	Bachelor of Technology (Biotechnology)	BTE2534	Study Abroad	2022
2758	13041	Bachelor of Technology (Biotechnology)	BTE2601	Recombinant DNA Technology	2022
2759	13041	Bachelor of Technology (Biotechnology)	BTE2602	Bioprocess Technology	2022


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2760	13041	Bachelor of Technology (Biotechnology)	BTE2603	Immunology & Immunotechnology	2022
2761	13041	Bachelor of Technology (Biotechnology)	BTE2604	Fundamentals of Biochemical Engineering	2022
2762	13041	Bachelor of Technology (Biotechnology)	BTE2605	Recombinant DNA Technology Lab	2022
2763	13041	Bachelor of Technology (Biotechnology)	BTE2606	Bioprocess Technology Lab	2022
2764	13041	Bachelor of Technology (Biotechnology)	BTE2607	Immunology & Immunotechnology Lab	2022
2765	13041	Bachelor of Technology (Biotechnology)	BTE2608	Pharmaceutical Biotechnology	2022
2766	13041	Bachelor of Technology (Biotechnology)	BTE2609	Molecular modeling	2022
2767	13041	Bachelor of Technology (Biotechnology)	BTE2611	JAVA –II	2022
2768	13041	Bachelor of Technology (Biotechnology)	BTE2612	RNA Biology	2022
2769	13041	Bachelor of Technology (Biotechnology)	BTE2613	Introduction to Neuroscience and Information Processing	2022
2770	13041	Bachelor of Technology (Biotechnology)	BTE2631	Term Paper	2022
2771	13041	Bachelor of Technology (Biotechnology)	BTE2632	Project (with Presentation & Evaluation)	2022
2772	13041	Bachelor of Technology (Biotechnology)	BTE2633	Workshop / Certification (Discipline Specific)	2022
2773	13041	Bachelor of Technology (Biotechnology)	BTE2634	Study Abroad	2022
2774	13041	Bachelor of Technology (Biotechnology)	BTE2701	Genomics & Proteomics	2022
2775	13041	Bachelor of Technology (Biotechnology)	BTE2702	IPR, Biosafety & Bioethics	2022
2776	13041	Bachelor of Technology (Biotechnology)	BTE2703	Research Methodology & Report Writing	2022
2777	13041	Bachelor of Technology (Biotechnology)	BTE2704	Genomics & Proteomics Lab	2022
2778	13041	Bachelor of Technology (Biotechnology)	BTE2735	Summer Internship Evaluation-II	2022
2779	13041	Bachelor of Technology (Biotechnology)	BTE2705	Bioprocess Plant Designing	2022
2780	13041	Bachelor of Technology (Biotechnology)	BTE2706	Molecular Medicine & Diagnosis	2022
2781	13041	Bachelor of Technology (Biotechnology)	BTE2707	Applications of Plant Biotechnology	2022


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2782	13041	Bachelor of Technology (Biotechnology)	BTE2708	Bioenergy Engineering	2022
2783	13041	Bachelor of Technology (Biotechnology)	BTE2709	Advanced Nanobiotechnology	2022
2784	13041	Bachelor of Technology (Biotechnology)	BTE2731	Term Paper	2022
2785	13041	Bachelor of Technology (Biotechnology)	BTE2732	Project (with Presentation & Evaluation)	2022
2786	13041	Bachelor of Technology (Biotechnology)	BTE2733	Workshop/ Certification (Discipline Specific)	2022
2787	13041	Bachelor of Technology (Biotechnology)	BTE2734	Study Abroad	2022
2788	13041	Bachelor of Technology (Biotechnology)	BTE2837	Dissertation / Project Report Presentation / Viva Voce	2022
2789	13002	Master of Science (Biotechnology)	BTH4101	Biochemistry	2022
2790	13002	Master of Science (Biotechnology)	BTH4103	Microbiology	2022
2791	13002	Master of Science (Biotechnology)	BTH4104	Genetics	2022
2792	13002	Master of Science (Biotechnology)	BTH4111	Cell and Molecular Biology	2022
2793	13002	Master of Science (Biotechnology)	BTH4112	Plant and Animal Biotechnology	2022
2794	13002	Master of Science (Biotechnology)	BTH4113	Basics of Mathematics & Statistics	2022
2795	13002	Master of Science (Biotechnology)	BTH4114	Basics of Chemistry & Physics	2022
2796	13002	Master of Science (Biotechnology)	BTH4109	Microbiology Lab	2022
2797	13002	Master of Science (Biotechnology)	BTH4115	Biochemistry and Analytical Techniques Lab	2022
2798	13002	Master of Science (Biotechnology)	BTH4116	Plant & Animal Biotechnology Lab	2022
2799	13002	Master of Science (Biotechnology)	BTH4203	Immunology	2022
2800	13002	Master of Science (Biotechnology)	BTH4210	Genetic Engineering	2022
2801	13002	Master of Science (Biotechnology)	BTH4211	Bioinformatics	2022
2802	13002	Master of Science (Biotechnology)	BTH4212	Genomics and Proteomics	2022
2803	13002	Master of Science (Biotechnology)	BTH4213	Molecular Diagnostics	2022
2804	13002	Master of Science (Biotechnology)	BTH4214	Research Methodology & Scientific Communication Skills	2022
2805	13002	Master of Science (Biotechnology)	BTH4209	Immunology Lab	2022
2806	13002	Master of Science (Biotechnology)	BTH4215	Molecular Biology and Genetic Engineering Lab	2022
2807	13002	Master of Science (Biotechnology)	BTH4238	Seminar	2022
2808	13002	Master of Science (Biotechnology)	BTH4204	Environmental Biotechnology	2022
2809	13002	Master of Science (Biotechnology)	BTH4216	Biological Imaging	2022
2810	13002	Master of Science (Biotechnology)	BTH4217	Computational Biology	2022
2811	13002	Master of Science (Biotechnology)	BTH4218	Drug Discovery & Development	2022
2812	13002	Master of Science (Biotechnology)	BTH4219	RNA Biology	2022

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2813	13002	Master of Science (Biotechnology)	BTH4320	Bioprocess Engineering & Technology	2022
2814	13002	Master of Science (Biotechnology)	BTH4321	Emerging Technologies	2022
2815	13002	Master of Science (Biotechnology)	BTH4322	Critical Analysis of Classical Papers	2022
2816	13002	Master of Science (Biotechnology)	BTH4306	Bioentrepreneurship, IPR, Biosafety & Bioethics	2022
2817	13002	Master of Science (Biotechnology)	BTH4323	Bioprocess Engineering & Technology Lab	2022
2818	13002	Master of Science (Biotechnology)	BTH4324	Bioinformatics Lab	2022
2819	13002	Master of Science (Biotechnology)	BTH4332	Project Proposal Preparation & Presentation	2022
2820	13002	Master of Science (Biotechnology)	BTH4338	Seminar	2022
2821	13002	Master of Science (Biotechnology)	BTH4335	Summer Internship Evaluation	2022
2822	13002	Master of Science (Biotechnology)	BTH4314	Nanobiotechnology	2022
2823	13002	Master of Science (Biotechnology)	BTH4319	Advances in Plant Genomics	2022
2824	13002	Master of Science (Biotechnology)	BTH4325	Microbial Technology	2022
2825	13002	Master of Science (Biotechnology)	BTH4326	Protein Engineering	2022
2826	13002	Master of Science (Biotechnology)	BTH4327	Vaccines	2022
2827	13002	Master of Science (Biotechnology)	BTH4328	Cancer Biology	2022
2828	13002	Master of Science (Biotechnology)	BTH4437	Dissertation	2022
2829	131177	Master of Science (Data Science)	DSC4101	Introduction to Data Science	2022
2830	131177	Master of Science (Data Science)	DSC4102	Machine Learning-I	2022
2831	131177	Master of Science (Data Science)	DSC4103	Statistics & Exploratory Data Analysis	2022
2832	131177	Master of Science (Data Science)	DSC4104	Database Management System-I	2022
2833	131177	Master of Science (Data Science)	DSC4105	Programming Toolbox I-R	2022
2834	131177	Master of Science (Data Science)	DSC4106	Programming ToolBox II- Python	2022
2835	131177	Master of Science (Data Science)	DSC4107	Big Data Tools & Technologies-I	2022
2836	131177	Master of Science (Data Science)	DSC4108	Introduction to Linux	2022
2837	131177	Master of Science (Data Science)	DSC4109	Machine Learning-I Lab	2022
2838	131177	Master of Science (Data Science)	DSC4110	Statistics & Exploratory Data Analysis Lab	2022
2839	131177	Master of Science (Data Science)	DSC4201	Machine Learning-II	2022
2840	131177	Master of Science (Data Science)	DSC4202	Regression Theory & Analysis	2022
2841	131177	Master of Science (Data Science)	DSC4203	Data Structure & Algorithm Design	2022
2842	131177	Master of Science (Data Science)	DSC4204	Database Management System-II	2022
2843	131177	Master of Science (Data Science)	DSC4205	Spark	2022
2844	131177	Master of Science (Data Science)	DSC4206	Data Visualization	2022
2845	131177	Master of Science (Data Science)	DSC4207	Big Data Tools & Technologies-II	2022

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2846	131177	Master of Science (Data Science)	DSC4208	Machine Learning-II Lab	2022
2847	131177	Master of Science (Data Science)	DSC4209	Regression Theory & Analysis Lab	2022
2848	131177	Master of Science (Data Science)	DSC4210	Data Structure & Algorithm Design Lab	2022
2849	131177	Master of Science (Data Science)	DSC4211	Pattern Recognition	2022
2850	131177	Master of Science (Data Science)	DSC4212	Next Generation Sequencing Analysis	2022
2851	131177	Master of Science (Data Science)	DSC4213	Association Rule Mining	2022
2852	131177	Master of Science (Data Science)	DSC4301	Generalized & Linear Modeling	2022
2853	131177	Master of Science (Data Science)	DSC4302	Deep Learning & Neural Networks	2022
2854	131177	Master of Science (Data Science)	DSC4303	Time Series	2022
2855	131177	Master of Science (Data Science)	DSC4304	Graph & Social Network Analysis	2022
2856	131177	Master of Science (Data Science)	DSC4305	Natural Language Processing	2022
2857	131177	Master of Science (Data Science)	DSC4306	Graph & Social Network Analysis Lab	2022
2858	131177	Master of Science (Data Science)	DSC4307	Big Data Tools & Technologies-III	2022
2859	131177	Master of Science (Data Science)	DSC4308	Generalized & Linear Modeling Lab	2022
2860	131177	Master of Science (Data Science)	DSC4309	Time Series Lab	2022
2861	131177	Master of Science (Data Science)	DSC4310	Deep Learning & Neural Networks Lab	2022
2862	131177	Master of Science (Data Science)	DSC4335	Summer Internship Evaluation	2022
2863	131177	Master of Science (Data Science)	DSC4311	Weather Prediction	2022
2864	131177	Master of Science (Data Science)	DSC4312	Disease Classification	2022
2865	131177	Master of Science (Data Science)	DSC4313	Customer Behaviour Analysis	2022
2866	131177	Master of Science (Data Science)	DSC4437	Dissertation / Project Report Presentation / Viva Voce	2022
2867	13798	Bachelor of Arts (Journalism & Mass Communication)	JRN2151	Print Media – Reporting & Editing	2022
2868	13798	Bachelor of Arts (Journalism & Mass Communication)	JRN2107	Advertising Principles & Planning	2022
2869	13798	Bachelor of Arts (Journalism & Mass Communication)	JRN2108	Computer Graphics & Animation	2022
2870	13798	Bachelor of Arts (Journalism & Mass Communication)	JRN2109	Understanding Mass Communication	2022
2871	13798	Bachelor of Arts (Journalism & Mass Communication)	JRN2104	Introduction to Visual Communication	2022
2872	13798	Bachelor of Arts (Journalism & Mass Communication)	JRN2105	Introduction to Culture & Society	2022
2873	13798	Bachelor of Arts (Journalism & Mass Communication)	JRN2110	News and Contemporary Issues	2022
2874	13798	Bachelor of Arts (Journalism & Mass Communication)	JRN2251	Basic Photography	2022

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2875	13798	Bachelor of Arts (Journalism & Mass Communication)	JRN2202	Print Media – Specialized Reporting & Feature Writing	2022
2876	13798	Bachelor of Arts (Journalism & Mass Communication)	JRN2207	Electronic Communication: Radio & TV	2022
2877	13798	Bachelor of Arts (Journalism & Mass Communication)	JRN2208	Media Planning & Buying	2022
2878	13798	Bachelor of Arts (Journalism & Mass Communication)	JRN2230	Readings in Media	2022
2879	13798	Bachelor of Arts (Journalism & Mass Communication)	JRN2232	Project (with Presentation & Evaluation)	2022
2880	13798	Bachelor of Arts (Journalism & Mass Communication)	JRN2236	Media Production Portfolio	2022
2881	13798	Bachelor of Arts (Journalism & Mass Communication)	JRN2351	TV Journalism	2022
2882	13798	Bachelor of Arts (Journalism & Mass Communication)	JRN2303	Digital Photography	2022
2883	13798	Bachelor of Arts (Journalism & Mass Communication)	JRN2304	Public Relations	2022
2884	13798	Bachelor of Arts (Journalism & Mass Communication)	JRN2307	Development Communication	2022
2885	13798	Bachelor of Arts (Journalism & Mass Communication)	JRN2308	Mass Communication Research-I	2022
2886	13798	Bachelor of Arts (Journalism & Mass Communication)	JRN2330	Readings in Media	2022
2887	13798	Bachelor of Arts (Journalism & Mass Communication)	JRN2332	Project (with Presentation & Evaluation)	2022
2888	13798	Bachelor of Arts (Journalism & Mass Communication)	JRN2336	Media Production Portfolio	2022
2889	13798	Bachelor of Arts (Journalism & Mass Communication)	JRN2451	TV Production and Presentation	2022
2890	13798	Bachelor of Arts (Journalism & Mass Communication)	JRN2401	Film Theory & Practice-I	2022
2891	13798	Bachelor of Arts (Journalism & Mass Communication)	JRN2402	Corporate Communication	2022
2892	13798	Bachelor of Arts (Journalism & Mass Communication)	JRN2408	Media Laws & Management	2022
2893	13798	Bachelor of Arts (Journalism & Mass Communication)	JRN2432	Project (with presentation & evaluation)	2022
2894	13798	Bachelor of Arts (Journalism & Mass Communication)	JRN2404	Web Designing	2022
2895	13798	Bachelor of Arts (Journalism & Mass Communication)	JRN2406	Advertising Design	2022
2896	13798	Bachelor of Arts (Journalism & Mass Communication)	JRN2407	Brand Management	2022

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2897	13798	Bachelor of Arts (Journalism & Mass Communication)	JRN2409	Digital Marketing	2022
2898	13798	Bachelor of Arts (Journalism & Mass Communication)	JRN2551	New Media	2022
2899	13798	Bachelor of Arts (Journalism & Mass Communication)	JRN2501	Film Theory and Practice - II	2022
2900	13798	Bachelor of Arts (Journalism & Mass Communication)	JRN2506	Data Journalism	2022
2901	13798	Bachelor of Arts (Journalism & Mass Communication)	JRN2507	Mass Communication Research-II	2022
2902	13798	Bachelor of Arts (Journalism & Mass Communication)	JRN2535	Summer Internship Evaluation	2022
2903	13798	Bachelor of Arts (Journalism & Mass Communication)	JRN2502	National and International Issues & Affairs	2022
2904	13798	Bachelor of Arts (Journalism & Mass Communication)	JRN2503	Event Management	2022
2905	13798	Bachelor of Arts (Journalism & Mass Communication)	JRN2504	Multimedia Journalism	2022
2906	13798	Bachelor of Arts (Journalism & Mass Communication)	JRN2602	Media Analysis	2022
2907	13798	Bachelor of Arts (Journalism & Mass Communication)	JRN2635	Internship	2022
2908	13798	Bachelor of Arts (Journalism & Mass Communication)	JRN2637	Professional Project OR Dissertation	2022
2909	13493	Bachelor of Science (Animation & Visual Graphics)	ANI2152	Introduction to Multimedia and its Application	2022
2910	13493	Bachelor of Science (Animation & Visual Graphics)	ANI2106	Design Software	2022
2911	13493	Bachelor of Science (Animation & Visual Graphics)	ANI2107	Stop Motion	2022
2912	13493	Bachelor of Science (Animation & Visual Graphics)	ANI2108	Basics of Art History and Sketching & Drawing	2022
2913	13493	Bachelor of Science (Animation & Visual Graphics)	ANI2101	Typography	2022
2914	13493	Bachelor of Science (Animation & Visual Graphics)	ANI2105	Introduction to Visual Communication	2022
2915	13493	Bachelor of Science (Animation & Visual Graphics)	ANI2133	Workshop / Certification (Discipline Specific) (1 credit per workshop)	2022
2916	13493	Bachelor of Science (Animation & Visual Graphics)	ANI2134	Study Abroad	2022
2917	13493	Bachelor of Science (Animation & Visual Graphics)	ANI2252	Creating 2D Animation	2022
2918	13493	Bachelor of Science (Animation & Visual Graphics)	ANI2202	Web Design & Development	2022

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2919	13493	Bachelor of Science (Animation & Visual Graphics)	ANI2209	UI and UX Design	2022
2920	13493	Bachelor of Science (Animation & Visual Graphics)	ANI2210	Production Pipeline	2022
2921	13493	Bachelor of Science (Animation & Visual Graphics)	ANI2211	Fundamentals of Classical Animation	2022
2922	13493	Bachelor of Science (Animation & Visual Graphics)	ANI2201	Digital Photography	2022
2923	13493	Bachelor of Science (Animation & Visual Graphics)	ANI2212	Online Certification (Minimum 30 Hours)	2022
2924	13493	Bachelor of Science (Animation & Visual Graphics)	ANI2233	Workshop / Certification (Discipline Specific) (1 credit per workshop)	2022
2925	13493	Bachelor of Science (Animation & Visual Graphics)	ANI2234	Study Abroad	2022
2926	13493	Bachelor of Science (Animation & Visual Graphics)	ANI2352	3D Modeling & Texturing	2022
2927	13493	Bachelor of Science (Animation & Visual Graphics)	ANI2301	Lighting and Rendering	2022
2928	13493	Bachelor of Science (Animation & Visual Graphics)	ANI2302	Rigging and Animation	2022
2929	13493	Bachelor of Science (Animation & Visual Graphics)	ANI2305	Audio & Video Post Production	2022
2930	13493	Bachelor of Science (Animation & Visual Graphics)	ANI2335	Summer Project Evaluation-I	2022
2931	13493	Bachelor of Science (Animation & Visual Graphics)	ANI2307	Design Thinking	2022
2932	13493	Bachelor of Science (Animation & Visual Graphics)	ANI2308	Online Certification (Minimum 30 Hours)	2022
2933	13493	Bachelor of Science (Animation & Visual Graphics)	ANI2333	Workshop / Certification (Discipline Specific) (1 credit per workshop)	2022
2934	13493	Bachelor of Science (Animation & Visual Graphics)	ANI2334	Study Abroad	2022
2935	13493	Bachelor of Science (Animation & Visual Graphics)	ANI2452	Maya Modeling & Texturing	2022
2936	13493	Bachelor of Science (Animation & Visual Graphics)	ANI2401	Lighting and Rendering in Maya	2022
2937	13493	Bachelor of Science (Animation & Visual Graphics)	ANI2405	Digital Compositing	2022
2938	13493	Bachelor of Science (Animation & Visual Graphics)	ANI2406	Introduction to Game Development	2022
2939	13493	Bachelor of Science (Animation & Visual Graphics)	ANI2407	Motion Graphics	2022

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2940	13493	Bachelor of Science (Animation & Visual Graphics)	ANI2408	Online Certification (Minimum 30 Hours)	2022
2941	13493	Bachelor of Science (Animation & Visual Graphics)	ANI2433	Workshop / Certification (Discipline Specific) (1 credit per workshop)	2022
2942	13493	Bachelor of Science (Animation & Visual Graphics)	ANI2434	Study Abroad	2022
2943	13493	Bachelor of Science (Animation & Visual Graphics)	ANI2505	Maya Rigging & Animation	2022
2944	13493	Bachelor of Science (Animation & Visual Graphics)	ANI2506	Game Development with AR VR	2022
2945	13493	Bachelor of Science (Animation & Visual Graphics)	ANI2507	Maya Particle & Dynamics	2022
2946	13493	Bachelor of Science (Animation & Visual Graphics)	ANI2535	Summer Project Evaluation-II	2022
2947	13493	Bachelor of Science (Animation & Visual Graphics)	ANI2552	Scripting & Storyboarding	2022
2948	13493	Bachelor of Science (Animation & Visual Graphics)	ANI2508	Online Certification (Minimum 30 Hours)	2022
2949	13493	Bachelor of Science (Animation & Visual Graphics)	ANI2533	Workshop / Certification (Discipline Specific) (1 credit per workshop)	2022
2950	13493	Bachelor of Science (Animation & Visual Graphics)	ANI2534	Study Abroad	2022
2951	13493	Bachelor of Science (Animation & Visual Graphics)	ANI2652	VFX	2022
2952	13493	Bachelor of Science (Animation & Visual Graphics)	ANI2635	Internship	2022
2953	13493	Bachelor of Science (Animation & Visual Graphics)	ANI2637	Professional Project	2022
2954	13800	Master of Arts (Journalism & Mass Communication)	JRN4101	Introduction to Mass Communication	2022
2955	13800	Master of Arts (Journalism & Mass Communication)	JRN4102	Print Journalism - Reporting & Editing	2022
2956	13800	Master of Arts (Journalism & Mass Communication)	JRN4103	Media Arts - I: Radio & TV	2022
2957	13800	Master of Arts (Journalism & Mass Communication)	JRN4104	Advertising : Concepts & Principles	2022
2958	13800	Master of Arts (Journalism & Mass Communication)	JRN4105	Introduction to Photography	2022
2959	13800	Master of Arts (Journalism & Mass Communication)	JRN4106	Design Software	2022
2960	13800	Master of Arts (Journalism & Mass Communication)	JRN4107	History, Culture & Society	2022

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2961	13800	Master of Arts (Journalism & Mass Communication)	JRN4201	Advertising Planning & Strategy	2022
2962	13800	Master of Arts (Journalism & Mass Communication)	JRN4202	Print Design & Visualization	2022
2963	13800	Master of Arts (Journalism & Mass Communication)	JRN4203	Specialized Reporting & Feature Writing	2022
2964	13800	Master of Arts (Journalism & Mass Communication)	JRN4204	Media Arts - II: Radio & TV	2022
2965	13800	Master of Arts (Journalism & Mass Communication)	JRN4206	Public Relations & Corporate Communication	2022
2966	13800	Master of Arts (Journalism & Mass Communication)	JRN4207	Advanced Photography	2022
2967	13800	Master of Arts (Journalism & Mass Communication)	JRN4209	Media Planning & Brand Management	2022
2968	13800	Master of Arts (Journalism & Mass Communication)	JRN4210	Media Trends & Technology	2022
2969	13800	Master of Arts (Journalism & Mass Communication)	JRN4301	Media Arts-III: Film	2022
2970	13800	Master of Arts (Journalism & Mass Communication)	JRN4304	Media Laws & Ethics	2022
2971	13800	Master of Arts (Journalism & Mass Communication)	JRN4305	Development Communication	2022
2972	13800	Master of Arts (Journalism & Mass Communication)	JRN4306	Digital Media Production	2022
2973	13800	Master of Arts (Journalism & Mass Communication)	JRN4307	Mass Media & Industry	2022
2974	13800	Master of Arts (Journalism & Mass Communication)	JRN4308	Communication Research	2022
2975	13800	Master of Arts (Journalism & Mass Communication)	JRN4335	Summer Internship Evaluation	2022
2976	13800	Master of Arts (Journalism & Mass Communication)	JRN4402	Media Arts - IV: Cyber Media	2022
2977	13800	Master of Arts (Journalism & Mass Communication)	JRN4403	Media Analysis	2022
2978	13800	Master of Arts (Journalism & Mass Communication)	JRN4435	Internship	2022
2979	13800	Master of Arts (Journalism & Mass Communication)	JRN4437	Dissertation OR Professional Project	2022
2980	13347	Post Graduate Diploma (Journalism & Mass Communication)	JRN3101	Introduction to Mass Communication	2022
2981	13347	Post Graduate Diploma (Journalism & Mass Communication)	JRN3102	Print Journalism - Reporting & Editing	2022

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Sl. No.	Programme Code	Name of Programme	Course Code	Course Name	Year
2982	13347	Post Graduate Diploma (Journalilsm & Mass Communication)	JRN3103	Media Arts - I: Radio & TV	2022
2983	13347	Post Graduate Diploma (Journalilsm & Mass Communication)	JRN3104	Advertising : Concepts & Principles	2022
2984	13347	Post Graduate Diploma (Journalilsm & Mass Communication)	JRN3105	Introduction to Photography	2022
2985	13347	Post Graduate Diploma (Journalilsm & Mass Communication)	JRN3106	Design Software	2022
2986	13347	Post Graduate Diploma (Journalilsm & Mass Communication)	JRN3107	History, Culture & Society	2022
2987	13347	Post Graduate Diploma (Journalilsm & Mass Communication)	JRN3201	Advertising Planning & Strategy	2022
2988	13347	Post Graduate Diploma (Journalilsm & Mass Communication)	JRN3202	Print Design & Visualization	2022
2989	13347	Post Graduate Diploma (Journalilsm & Mass Communication)	JRN3203	Specialized Reporting & Feature Writing	2022
2990	13347	Post Graduate Diploma (Journalilsm & Mass Communication)	JRN3204	Media Arts - II: Radio & TV	2022
2991	13347	Post Graduate Diploma (Journalilsm & Mass Communication)	JRN3206	Public Relations & Corporate Communication	2022
2992	13347	Post Graduate Diploma (Journalilsm & Mass Communication)	JRN3207	Advanced Photography	2022
2993	13347	Post Graduate Diploma (Journalilsm & Mass Communication)	JRN3209	Media Planning & Brand Management	2022
2994	13347	Post Graduate Diploma (Journalilsm & Mass Communication)	JRN3210	Media Trends & Technology	2022
2995	13347	Post Graduate Diploma (Journalilsm & Mass Communication)	JRN3232	Project	2022
2996	13573	Bachelor of Arts (Hons.) (History)	HIS2104	Social Formations & Cultural Patterns of the Ancient World	2022

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2997	13573	Bachelor of Arts (Hons.) (History)	HIS2105	History of Early India-I	2022
2998	13573	Bachelor of Arts (Hons.) (History)	HIS2106	Social Formations & Cultural Patterns of the Medieval World	2022
2999	13573	Bachelor of Arts (Hons.) (History)	HIS2205	History of Early India-II	2022
3000	13573	Bachelor of Arts (Hons.) (History)	HIS2206	Indo-Islamic Polity and Culture in Medieval India-I	2022
3001	13573	Bachelor of Arts (Hons.) (History)	HIS2207	Rise of Modern West-I	2022
3002	13573	Bachelor of Arts (Hons.) (History)	HIS2208	History of Africa	2022
3003	13573	Bachelor of Arts (Hons.) (History)	HIS2231	Term Paper	2022
3004	13573	Bachelor of Arts (Hons.) (History)	HIS2232	Project with Presentation and Evaluation	2022
3005	13573	Bachelor of Arts (Hons.) (History)	HIS2305	Indo-Islamic Polity and Culture in Medieval India-II	2022
3006	13573	Bachelor of Arts (Hons.) (History)	HIS2306	Rise of Modern West-II	2022
3007	13573	Bachelor of Arts (Hons.) (History)	HIS2307	History of British Rule in India-I	2022
3008	13573	Bachelor of Arts (Hons.) (History)	HIS2335	Summer Project Evaluation	2022
3009	13573	Bachelor of Arts (Hons.) (History)	HIS2308	History of South East Asia	2022
3010	13573	Bachelor of Arts (Hons.) (History)	HIS2331	Term Paper	2022
3011	13573	Bachelor of Arts (Hons.) (History)	HIS2332	Project Studies	2022
3012	13573	Bachelor of Arts (Hons.) (History)	HIS2405	History of British Rule in India-II	2022
3013	13573	Bachelor of Arts (Hons.) (History)	HIS2406	History of USA	2022
3014	13573	Bachelor of Arts (Hons.) (History)	HIS2407	History of China and Japan	2022
3015	13573	Bachelor of Arts (Hons.) (History)	HIS2408	Historical Research Method	2022
3016	13573	Bachelor of Arts (Hons.) (History)	HIS2431	Term Paper	2022
3017	13573	Bachelor of Arts (Hons.) (History)	HIS2432	Project with Presentation & Evaluation	2022
3018	13573	Bachelor of Arts (Hons.) (History)	HIS2504	History of USSR	2022
3019	13573	Bachelor of Arts (Hons.) (History)	HIS2505	History of West Asia	2022
3020	13573	Bachelor of Arts (Hons.) (History)	HIS2506	History of World Wars	2022
3021	13573	Bachelor of Arts (Hons.) (History)	HIS2507	History of Latin America	2022
3022	13573	Bachelor of Arts (Hons.) (History)	HIS2531	Term Paper	2022
3023	13573	Bachelor of Arts (Hons.) (History)	HIS2532	Project Studies	2022
3024	13573	Bachelor of Arts (Hons.) (History)	HIS2604	Gender and History	2022
3025	13573	Bachelor of Arts (Hons.) (History)	HIS2605	History of Contemporary India	2022
3026	13573	Bachelor of Arts (Hons.) (History)	HIS2637	Dissertation/ Project Studies	2022
3027	13573	Bachelor of Arts (Hons.) (History)	HIS2606	Environmental History- Global Perspectives	2022
3028	13573	Bachelor of Arts (Hons.) (History)	HIS2631	Term Paper	2022
3029	13573	Bachelor of Arts (Hons.) (History)	HIS2632	Project with Presentation and Evaluation	2022

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3030	13574	Bachelor of Arts (Hons.) (Political Science)	POL2101	Indian Nationalism	2022
3031	13574	Bachelor of Arts (Hons.) (Political Science)	POL2102	British Colonialism in India	2022
3032	13574	Bachelor of Arts (Hons.) (Political Science)	POL2103	Political Philosophy-I	2022
3033	13574	Bachelor of Arts (Hons.) (Political Science)	POL2201	Indian State and Politics after Independence	2022
3034	13574	Bachelor of Arts (Hons.) (Political Science)	POL2202	Political Philosophy-II	2022
3035	13574	Bachelor of Arts (Hons.) (Political Science)	POL2203	Global Themes in Development and Politics	2022
3036	13574	Bachelor of Arts (Hons.) (Political Science)	POL2204	Current Themes in Indian Politics	2022
3037	13574	Bachelor of Arts (Hons.) (Political Science)	POL2205	Plato's Political Philosophy	2022
3038	13574	Bachelor of Arts (Hons.) (Political Science)	POL2206	Elections and Electoral Politics	2022
3039	13574	Bachelor of Arts (Hons.) (Political Science)	POL2230	Review of Contemporary Literature-I	2022
3040	13574	Bachelor of Arts (Hons.) (Political Science)	POL2231	Term Paper (Political Philosophy/Political Studies)	2022
3041	13574	Bachelor of Arts (Hons.) (Political Science)	POL2232	Project with Presentation and Evaluation	2022
3042	13574	Bachelor of Arts (Hons.) (Political Science)	POL2301	Indian Political Thought-I	2022
3043	13574	Bachelor of Arts (Hons.) (Political Science)	POL2302	State Politics in India	2022
3044	13574	Bachelor of Arts (Hons.) (Political Science)	POL2303	Politics of Post-Colonial States	2022
3045	13574	Bachelor of Arts (Hons.) (Political Science)	POL2335	Summer Project Evaluation	2022
3046	13574	Bachelor of Arts (Hons.) (Political Science)	POL2304	Politics and media	2022
3047	13574	Bachelor of Arts (Hons.) (Political Science)	POL2305	South Asia in Perspective	2022
3048	13574	Bachelor of Arts (Hons.) (Political Science)	POL2330	Review of Contemporary Literature-II	2022
3049	13574	Bachelor of Arts (Hons.) (Political Science)	POL2331	Term Paper (Political Philosophy/Political Studies)	2022
3050	13574	Bachelor of Arts (Hons.) (Political Science)	POL2332	Project with Presentation and Evaluation	2022
3051	13574	Bachelor of Arts (Hons.) (Political Science)	POL2401	Indian Political Thought-II	2022

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3052	13574	Bachelor of Arts (Hons.) (Political Science)	POL2402	Public Administration-I	2022
3053	13574	Bachelor of Arts (Hons.) (Political Science)	POL2403	Social Movements in India	2022
3054	13574	Bachelor of Arts (Hons.) (Political Science)	POL2404	Religion and Politics in India	2022
3055	13574	Bachelor of Arts (Hons.) (Political Science)	POL2405	Cinema and Politics in India	2022
3056	13574	Bachelor of Arts (Hons.) (Political Science)	POL2430	Review of Contemporary Literature-III	2022
3057	13574	Bachelor of Arts (Hons.) (Political Science)	POL2431	Term Paper (Political Philosophy/Political Studies)	2022
3058	13574	Bachelor of Arts (Hons.) (Political Science)	POL2432	Project with presentation and evaluation	2022
3059	13574	Bachelor of Arts (Hons.) (Political Science)	POL2433	Workshop on Contemporary Politics	2022
3060	13574	Bachelor of Arts (Hons.) (Political Science)	POL2501	Public Administration-II	2022
3061	13574	Bachelor of Arts (Hons.) (Political Science)	POL2502	International Relations	2022
3062	13574	Bachelor of Arts (Hons.) (Political Science)	POL2503	India's Foreign Policy	2022
3063	13574	Bachelor of Arts (Hons.) (Political Science)	POL2504	Reading Karl Marx	2022
3064	13574	Bachelor of Arts (Hons.) (Political Science)	POL2505	Civil Society in India	2022
3065	13574	Bachelor of Arts (Hons.) (Political Science)	POL2506	Post-Cold War World Politics	2022
3066	13574	Bachelor of Arts (Hons.) (Political Science)	POL2507	Theories of Punishment	2022
3067	13574	Bachelor of Arts (Hons.) (Political Science)	POL2530	Review of Contemporary Literature-IV	2022
3068	13574	Bachelor of Arts (Hons.) (Political Science)	POL2531	Term Paper (Political Philosophy/Political Studies)	2022
3069	13574	Bachelor of Arts (Hons.) (Political Science)	POL2532	Project with Presentation and Evaluation	2022
3070	13574	Bachelor of Arts (Hons.) (Political Science)	POL2601	Comparative Government and Politics	2022
3071	13574	Bachelor of Arts (Hons.) (Political Science)	POL2602	Reading Gandhi	2022
3072	13574	Bachelor of Arts (Hons.) (Political Science)	POL2637	Dissertation	2022
3073	13574	Bachelor of Arts (Hons.) (Political Science)	POL2603	Reading Vivekananda	2022

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Sl. No.	Programme Code	Name of Programme	Course Code	Course Name	Year
3074	13574	Bachelor of Arts (Hons.) (Political Science)	POL2604	Reading Ambedkar	2022
3075	13574	Bachelor of Arts (Hons.) (Political Science)	POL2605	Modern Themes in Gender	2022
3076	13574	Bachelor of Arts (Hons.) (Political Science)	POL2606	Political violence: concepts and trends	2022
3077	13574	Bachelor of Arts (Hons.) (Political Science)	POL2630	Review of Contemporary Literature-V	2022
3078	13574	Bachelor of Arts (Hons.) (Political Science)	POL2631	Term Paper (Political Philosophy/Political Studies)	2022
3079	13574	Bachelor of Arts (Hons.) (Political Science)	POL2632	Project with Presentation and Evaluation	2022
3080	13061	Bachelor of Arts (Hons.) (English)	ENG2101	History of English Literature	2022
3081	13061	Bachelor of Arts (Hons.) (English)	ENG2102	English Poetry from Chaucer to Blake	2022
3082	13061	Bachelor of Arts (Hons.) (English)	ENG2103	Drama from Elizabethan to Restoration Age	2022
3083	13061	Bachelor of Arts (Hons.) (English)	ENG2202	English Poetry from Wordsworth to Tennyson	2022
3084	13061	Bachelor of Arts (Hons.) (English)	ENG2203	Modern Drama	2022
3085	13061	Bachelor of Arts (Hons.) (English)	ENG2204	Introduction to Linguistics	2022
3086	13061	Bachelor of Arts (Hons.) (English)	ENG2205	Research Methodology-I	2022
3087	13061	Bachelor of Arts (Hons.) (English)	ENG2301	20 th Century Indian English Poetry	2022
3088	13061	Bachelor of Arts (Hons.) (English)	ENG2302	English Novel	2022
3089	13061	Bachelor of Arts (Hons.) (English)	ENG2303	Literary Criticism	2022
3090	13061	Bachelor of Arts (Hons.) (English)	ENG2304	Research Methodology-II	2022
3091	13061	Bachelor of Arts (Hons.) (English)	ENG2335	Summer Project Evaluation	2022
3092	13061	Bachelor of Arts (Hons.) (English)	ENG2401	20 th Century Indian English Novel	2022
3093	13061	Bachelor of Arts (Hons.) (English)	ENG2402	Prose Down the Ages	2022
3094	13061	Bachelor of Arts (Hons.) (English)	ENG2403	Literary Theory	2022
3095	13061	Bachelor of Arts (Hons.) (English)	ENG2410	Research Methodology-III	2022
3096	13061	Bachelor of Arts (Hons.) (English)	ENG2406	Post-Colonial Literature	2022
3097	13061	Bachelor of Arts (Hons.) (English)	ENG2408	Feminist Writings	2022
3098	13061	Bachelor of Arts (Hons.) (English)	ENG2409	Literature and Society	2022
3099	13061	Bachelor of Arts (Hons.) (English)	ENG2501	Modern English Poetry	2022
3100	13061	Bachelor of Arts (Hons.) (English)	ENG2502	Contemporary Literature	2022
3101	13061	Bachelor of Arts (Hons.) (English)	ENG2503	Popular Fiction	2022
3102	13061	Bachelor of Arts (Hons.) (English)	ENG2505	Modern European Drama	2022
3103	13061	Bachelor of Arts (Hons.) (English)	ENG2506	Indian Women Writing	2022
3104	13061	Bachelor of Arts (Hons.) (English)	ENG2507	New Literature in English	2022

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3105	13061	Bachelor of Arts (Hons.) (English)	ENG2601	Modern English Novel	2022
3106	13061	Bachelor of Arts (Hons.) (English)	ENG2602	American Literature	2022
3107	13061	Bachelor of Arts (Hons.) (English)	ENG2637	Dissertation	2022
3108	13061	Bachelor of Arts (Hons.) (English)	ENG2605	Literature & Gender	2022
3109	13061	Bachelor of Arts (Hons.) (English)	ENG2606	Literary Forms and Practical Criticism	2022
3110	13061	Bachelor of Arts (Hons.) (English)	ENG2607	Dalit Literature	2022
3111	13103	Master of Arts (English)	ENG4102	English Literature from Medieval Period to 17 th Century	2022
3112	13103	Master of Arts (English)	ENG4103	Drama from Shakespeare to Ben Jonson	2022
3113	13103	Master of Arts (English)	ENG4104	Restoration and Augustan Prose and Poetry	2022
3114	13103	Master of Arts (English)	ENG4105	18 th and 19 th Century Novels	2022
3115	13103	Master of Arts (English)	ENG4201	Restoration and Augustan Drama	2022
3116	13103	Master of Arts (English)	ENG4203	English Romantic Poetry	2022
3117	13103	Master of Arts (English)	ENG4204	Victorian Poetry and Prose	2022
3118	13103	Master of Arts (English)	ENG4205	Theoretical Linguistics	2022
3119	13103	Master of Arts (English)	ENG4206	Research Methodology-I	2022
3120	13103	Master of Arts (English)	ENG4301	20 th Century Poetry	2022
3121	13103	Master of Arts (English)	ENG4302	20 th Century Drama	2022
3122	13103	Master of Arts (English)	ENG4303	Literary Criticism	2022
3123	13103	Master of Arts (English)	ENG4304	20 th Century Novel	2022
3124	13103	Master of Arts (English)	ENG4305	Research Methodology-II	2022
3125	13103	Master of Arts (English)	ENG4335	Summer Project Evaluation	2022
3126	13103	Master of Arts (English)	ENG4401	Literary Theory	2022
3127	13103	Master of Arts (English)	ENG4437	Dissertation	2022
3128	13103	Master of Arts (English)	ENG4402	American Literature	2022
3129	13103	Master of Arts (English)	ENG4403	European Comedy	2022
3130	13103	Master of Arts (English)	ENG4407	Ancient Greek & Latin Literature	2022
3131	13103	Master of Arts (English)	ENG4404	20 th Century Indian English Literature	2022
3132	13103	Master of Arts (English)	ENG4405	Indian Literature in Translation	2022
3133	13103	Master of Arts (English)	ENG4406	Linguistics and English Language Teaching	2022
3134	13062	Bachelor of Arts (Hons.) (French)	FRE2101	Written Expression-I	2022
3135	13062	Bachelor of Arts (Hons.) (French)	FRE2102	Oral Expression-I	2022
3136	13062	Bachelor of Arts (Hons.) (French)	FRE2104	Practical Phonetics-I	2022

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3137	13062	Bachelor of Arts (Hons.) (French)	FRE2105	Life in France and Francophone Countries-I	2022
3138	13062	Bachelor of Arts (Hons.) (French)	FRE2201	Written Expression-II	2022
3139	13062	Bachelor of Arts (Hons.) (French)	FRE2202	Oral Expression-II	2022
3140	13062	Bachelor of Arts (Hons.) (French)	FRE2204	Practical Phonetics-II	2022
3141	13062	Bachelor of Arts (Hons.) (French)	FRE2205	Life in France and Francophone Countries-II	2022
3142	13062	Bachelor of Arts (Hons.) (French)	FRE2301	Written Expression-III	2022
3143	13062	Bachelor of Arts (Hons.) (French)	FRE2302	Oral Expression-III	2022
3144	13062	Bachelor of Arts (Hons.) (French)	FRE2304	Understanding French Texts-I	2022
3145	13062	Bachelor of Arts (Hons.) (French)	FRE2305	Introduction to French and Francophone Civilization & Culture-I	2022
3146	13062	Bachelor of Arts (Hons.) (French)	FRE2401	Written Expression-IV	2022
3147	13062	Bachelor of Arts (Hons.) (French)	FRE2402	Oral Expression-IV	2022
3148	13062	Bachelor of Arts (Hons.) (French)	FRE2406	Understanding French Texts-II	2022
3149	13062	Bachelor of Arts (Hons.) (French)	FRE2407	Introduction to French and Francophone Civilization & Culture-II	2022
3150	13062	Bachelor of Arts (Hons.) (French)	FRE2405	French through activities	2022
3151	13062	Bachelor of Arts (Hons.) (French)	FRE2408	FOS: French for hotel and restaurant	2022
3152	13062	Bachelor of Arts (Hons.) (French)	FRE2501	Written Expression-V	2022
3153	13062	Bachelor of Arts (Hons.) (French)	FRE2502	Oral Expression-V	2022
3154	13062	Bachelor of Arts (Hons.) (French)	FRE2506	Introduction to French Literature-I	2022
3155	13062	Bachelor of Arts (Hons.) (French)	FRE2507	Initiation to Translation	2022
3156	13062	Bachelor of Arts (Hons.) (French)	FRE2505	Introduction to French Linguistics	2022
3157	13062	Bachelor of Arts (Hons.) (French)	FRE2508	FOS: French for Tourism	2022
3158	13062	Bachelor of Arts (Hons.) (French)	FRE2601	Written Expression-VI	2022
3159	13062	Bachelor of Arts (Hons.) (French)	FRE2602	Oral Expression-VI	2022
3160	13062	Bachelor of Arts (Hons.) (French)	FRE2603	Introduction to French Literature-II	2022
3161	13062	Bachelor of Arts (Hons.) (French)	FRE2606	FOS: Professional & Business French	2022
3162	13062	Bachelor of Arts (Hons.) (French)	FRE2637	Project Report	2022
3163	13062	Bachelor of Arts (Hons.) (French)	FRE2607	Detailed study of a French Novel	2022
3164	13062	Bachelor of Arts (Hons.) (French)	FRE2608	Literature of France: from Origin to 16 th century	2022
3165	13089	Bachelor of Arts (Hons.) (German)	GER2101	Written Expression-I	2022
3166	13089	Bachelor of Arts (Hons.) (German)	GER2102	Oral Expression-I	2022

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3167	13089	Bachelor of Arts (Hons.) (German)	GER2103	Introduction to German History and Culture (Eng)	2022
3168	13089	Bachelor of Arts (Hons.) (German)	GER2201	Written Expression-II	2022
3169	13089	Bachelor of Arts (Hons.) (German)	GER2202	Oral Expression-II	2022
3170	13089	Bachelor of Arts (Hons.) (German)	GER2203	German through Activities	2022
3171	13089	Bachelor of Arts (Hons.) (German)	GER2301	Written Expression-III	2022
3172	13089	Bachelor of Arts (Hons.) (German)	GER2302	Oral Expression-III	2022
3173	13089	Bachelor of Arts (Hons.) (German)	GER2303	German History and Culture (Landeskunde) I	2022
3174	13089	Bachelor of Arts (Hons.) (German)	GER2401	Written Expression-IV	2022
3175	13089	Bachelor of Arts (Hons.) (German)	GER2402	Oral Expression-IV	2022
3176	13089	Bachelor of Arts (Hons.) (German)	GER2403	German through Literary Texts	2022
3177	13089	Bachelor of Arts (Hons.) (German)	GER2404	Enhancing language proficiency	2022
3178	13089	Bachelor of Arts (Hons.) (German)	GER2405	German Culture and Civilization (Landeskunde) II	2022
3179	13089	Bachelor of Arts (Hons.) (German)	GER2501	Written Expression-V	2022
3180	13089	Bachelor of Arts (Hons.) (German)	GER2502	Oral Expression-V	2022
3181	13089	Bachelor of Arts (Hons.) (German)	GER2503	Introduction to German Literature	2022
3182	13089	Bachelor of Arts (Hons.) (German)	GER2535	Summer Project Evaluation	2022
3183	13089	Bachelor of Arts (Hons.) (German)	GER2504	Introduction to Linguistics	2022
3184	13089	Bachelor of Arts (Hons.) (German)	GER2505	Business German-I	2022
3185	13089	Bachelor of Arts (Hons.) (German)	GER2601	Written Expression-VI	2022
3186	13089	Bachelor of Arts (Hons.) (German)	GER2602	Oral Expression-VI	2022
3187	13089	Bachelor of Arts (Hons.) (German)	GER2603	Introduction to Translation	2022
3188	13089	Bachelor of Arts (Hons.) (German)	GER2637	Dissertation	2022
3189	13089	Bachelor of Arts (Hons.) (German)	GER2604	Detailed Study of selected Author/Literary work`	2022
3190	13089	Bachelor of Arts (Hons.) (German)	GER2605	Business German-II	2022
3191	13063	Bachelor of Arts (Hons.) (Spanish)	SPA2101	Written Expression-I	2022
3192	13063	Bachelor of Arts (Hons.) (Spanish)	SPA2102	Oral Expression-I	2022
3193	13063	Bachelor of Arts (Hons.) (Spanish)	SPA2103	Grammar and Communicative Spanish-I	2022
3194	13063	Bachelor of Arts (Hons.) (Spanish)	SPA2201	Written Expression-II	2022
3195	13063	Bachelor of Arts (Hons.) (Spanish)	SPA2202	Oral Expression-II	2022
3196	13063	Bachelor of Arts (Hons.) (Spanish)	SPA2203	Grammar and Communicative Spanish-II	2022
3197	13063	Bachelor of Arts (Hons.) (Spanish)	SPA2301	Written Expression-III	2022
3198	13063	Bachelor of Arts (Hons.) (Spanish)	SPA2302	Oral Expression-III	2022
3199	13063	Bachelor of Arts (Hons.) (Spanish)	SPA2303	Introduction to Spanish culture and civilization (Spanish)	2022

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3200	13063	Bachelor of Arts (Hons.) (Spanish)	SPA2401	Written Expression-IV	2022
3201	13063	Bachelor of Arts (Hons.) (Spanish)	SPA2402	Oral Expression-IV	2022
3202	13063	Bachelor of Arts (Hons.) (Spanish)	SPA2403	Business Spanish	2022
3203	13063	Bachelor of Arts (Hons.) (Spanish)	SPA2404	Spanish through literary texts	2022
3204	13063	Bachelor of Arts (Hons.) (Spanish)	SPA2405	Spanish through activities	2022
3205	13063	Bachelor of Arts (Hons.) (Spanish)	SPA2501	Written Expression-V	2022
3206	13063	Bachelor of Arts (Hons.) (Spanish)	SPA2502	Oral Expression-V	2022
3207	13063	Bachelor of Arts (Hons.) (Spanish)	SPA2503	Introduction to Translation	2022
3208	13063	Bachelor of Arts (Hons.) (Spanish)	SPA2535	Summer Project Evaluation	2022
3209	13063	Bachelor of Arts (Hons.) (Spanish)	SPA2504	Introduction to Linguistics	2022
3210	13063	Bachelor of Arts (Hons.) (Spanish)	SPA2505	Introduction to Culture and Civilization of Latin American countries	2022
3211	13063	Bachelor of Arts (Hons.) (Spanish)	SPA2601	Written Expression-VI	2022
3212	13063	Bachelor of Arts (Hons.) (Spanish)	SPA2602	Oral Expression-VI	2022
3213	13063	Bachelor of Arts (Hons.) (Spanish)	SPA2603	Introduction to Spanish Literature	2022
3214	13063	Bachelor of Arts (Hons.) (Spanish)	SPA2637	Dissertation	2022
3215	13063	Bachelor of Arts (Hons.) (Spanish)	SPA2604	Applied Spanish Grammar and Introduction to linguistics	2022
3216	13063	Bachelor of Arts (Hons.) (Spanish)	SPA2605	Detail study of literary texts	2022
3217	13817	Bachelor of Design in Fashion Design	FST2101	Pattern Making & Drafting-I	2022
3218	13817	Bachelor of Design in Fashion Design	FST2102	Introduction to Apparel Manufacturing Technique	2022
3219	13817	Bachelor of Design in Fashion Design	FST2103	Computer Applications	2022
3220	13817	Bachelor of Design in Fashion Design	FST2104	Design & Colour Concept	2022
3221	13817	Bachelor of Design in Fashion Design	FST2105	Fundamentals of Textiles	2022
3222	13817	Bachelor of Design in Fashion Design	FST2106	Basics of Fashion	2022
3223	13817	Bachelor of Design in Fashion Design	FST2107	Social and Psychological Aspects of Clothing	2022
3224	13817	Bachelor of Design in Fashion Design	FST2108	Fashion Art Illustration & Model Drawing-I	2022
3225	13817	Bachelor of Design in Fashion Design	FST2201	Fashion Art Illustration & Model Drawing-II	2022
3226	13817	Bachelor of Design in Fashion Design	FST2202	Pattern Making & Drafting-II	2022
3227	13817	Bachelor of Design in Fashion Design	FST2203	Garment Construction-I	2022

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3228	13817	Bachelor of Design in Fashion Design	FST2204	Computer Aided Design-I	2022
3229	13817	Bachelor of Design in Fashion Design	FST2205	Fabric Artistry & Embroidery	2022
3230	13817	Bachelor of Design in Fashion Design	FST2206	Design Process & Application of Colour Theory	2022
3231	13817	Bachelor of Design in Fashion Design	FST2207	Technology of Textiles Manufacturing	2022
3232	13817	Bachelor of Design in Fashion Design	FST2208	Fashion-Business Laws, Ethics & Communication	2022
3233	13817	Bachelor of Design in Fashion Design	FST2209	Fashion Theory	2022
3234	13817	Bachelor of Design in Fashion Design	FST2301	Fashion Art Illustration & Model Drawing-III	2022
3235	13817	Bachelor of Design in Fashion Design	FST2302	Advance Pattern Making-I	2022
3236	13817	Bachelor of Design in Fashion Design	FST2303	Garment Construction-II	2022
3237	13817	Bachelor of Design in Fashion Design	FST2304	History of Indian Costumes	2022
3238	13817	Bachelor of Design in Fashion Design	FST2305	Technology of Processing & Care Renovation of Textiles	2022
3239	13817	Bachelor of Design in Fashion Design	FST2306	Apparel Production	2022
3240	13817	Bachelor of Design in Fashion Design	FST2307	Basics of Management	2022
3241	13817	Bachelor of Design in Fashion Design	FST2308	Introduction to Fashion Research & Product Development Process	2022
3242	13817	Bachelor of Design in Fashion Design	FST2309	Computer Aided Manufacturing	2022
3243	13817	Bachelor of Design in Fashion Design	FST2332	Project Presentation	2022
3244	13817	Bachelor of Design in Fashion Design	FST2401	Fashion Art Illustration & Model Drawing-IV	2022
3245	13817	Bachelor of Design in Fashion Design	FST2402	Advance Pattern Making-II	2022
3246	13817	Bachelor of Design in Fashion Design	FST2403	Garment Construction-III	2022
3247	13817	Bachelor of Design in Fashion Design	FST2404	Computer Aided Design-III	2022
3248	13817	Bachelor of Design in Fashion Design	FST2405	Fashion Merchandizing-I	2022
3249	13817	Bachelor of Design in Fashion Design	FST2406	Quality Control & Production Management-I	2022

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3250	13817	Bachelor of Design in Fashion Design	FST2407	History of Western Costumes	2022
3251	13817	Bachelor of Design in Fashion Design	FST2408	Visual Merchandising	2022
3252	13817	Bachelor of Design in Fashion Design	FST2409	Fashion Marketing Management	2022
3253	13817	Bachelor of Design in Fashion Design	FST2410	Traditional Indian Textiles Documentation	2022
3254	13817	Bachelor of Design in Fashion Design	FST2411	Study on Traditional Dresses of India	2022
3255	13817	Bachelor of Design in Fashion Design	FST2431	Term Paper	2022
3256	13817	Bachelor of Design in Fashion Design	FST2433	Workshops / Certification (Discipline specific)	2022
3257	13817	Bachelor of Design in Fashion Design	FST2501	Fashion Art Illustration and Model Drawing-V	2022
3258	13817	Bachelor of Design in Fashion Design	FST2502	Garment Construction-IV	2022
3259	13817	Bachelor of Design in Fashion Design	FST2503	Computer Aided Design-IV	2022
3260	13817	Bachelor of Design in Fashion Design	FST2504	Pattern Draping	2022
3261	13817	Bachelor of Design in Fashion Design	FST2505	Pattern Grading	2022
3262	13817	Bachelor of Design in Fashion Design	FST2506	Fashion Merchandizing-II	2022
3263	13817	Bachelor of Design in Fashion Design	FST2507	Quality Control & Production Management-II	2022
3264	13817	Bachelor of Design in Fashion Design	FST2508	Fashion Forecasting	2022
3265	13817	Bachelor of Design in Fashion Design	FST2535	Craft Documentation (Market Visit, Field Trip, Documentation & Presentation, Scope & Final Presentation)	2022
3266	13817	Bachelor of Design in Fashion Design	FST2509	Manufacturing process in Apparel Industry & Export Management	2022
3267	13817	Bachelor of Design in Fashion Design	FST2510	Quality Assurance in Apparel Industry	2022
3268	13817	Bachelor of Design in Fashion Design	FST2511	Fashion Retailing & Visual Merchandising	2022
3269	13817	Bachelor of Design in Fashion Design	FST2512	Fashion Promotion	2022
3270	13817	Bachelor of Design in Fashion Design	FST2513	The Business of Luxury Fashion	2022


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3271	13817	Bachelor of Design in Fashion Design	FST2514	Couture Design	2022
3272	13817	Bachelor of Design in Fashion Design	FST2601	Retail Merchandising and Management	2022
3273	13817	Bachelor of Design in Fashion Design	FST2602	Fashion study applicable to home furnishing	2022
3274	13817	Bachelor of Design in Fashion Design	FST2603	Leather Science Applicable to Fashion Art	2022
3275	13817	Bachelor of Design in Fashion Design	FST2604	Entrepreneurship	2022
3276	13817	Bachelor of Design in Fashion Design	FST2605	Nonwovens in Fashion Apparel Applications	2022
3277	13817	Bachelor of Design in Fashion Design	FST2606	Designing and Development of Fashion Accessories	2022
3278	13817	Bachelor of Design in Fashion Design	FST2610	Advance Pattern Making-III	2022
3279	13817	Bachelor of Design in Fashion Design	FST2611	Garment Construction-V	2022
3280	13817	Bachelor of Design in Fashion Design	FST2607	Sportswear Design & Development	2022
3281	13817	Bachelor of Design in Fashion Design	FST2608	Costume Design Pertaining to Performing Arts	2022
3282	13817	Bachelor of Design in Fashion Design	FST2609	Functions of Indian Buying Houses / Agents - A Study	2022
3283	13817	Bachelor of Design in Fashion Design	FST2701	Fabric Manufacturing Technology : Crochet & Non-woven	2022
3284	13817	Bachelor of Design in Fashion Design	FST2702	Field Trip / Visit Documentation Evaluation	2022
3285	13817	Bachelor of Design in Fashion Design	FST2703	Computer Aided Design-V	2022
3286	13817	Bachelor of Design in Fashion Design	FST2704	Graduate Design Collection	2022
3287	13817	Bachelor of Design in Fashion Design	FST2837	Graduation Project	2022
3288	13803	Bachelor of Interior Design	IND2101	Language of Design #	2022
3289	13803	Bachelor of Interior Design	IND2102	Design Fundamentals & Illustration Techniques-I	2022
3290	13803	Bachelor of Interior Design	IND2103	Design Elements & Principles	2022
3291	13803	Bachelor of Interior Design	IND2104	Design Studio-I (Basic Graphics)	2022
3292	13803	Bachelor of Interior Design	IND2105	Colour Concept & Applications	2022
3293	13803	Bachelor of Interior Design	IND2106	Introduction to Craft & Model Making	2022
3294	13803	Bachelor of Interior Design	IND2107	History of Design & Culture	2022
3295	13803	Bachelor of Interior Design	IND2108	Calligraphy Exploration	2022

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3296	13803	Bachelor of Interior Design	IND2109	Fundamentals of Form Studies	2022
3297	13803	Bachelor of Interior Design	IND2201	Introduction to Design Theory #	2022
3298	13803	Bachelor of Interior Design	IND2202	Technical Drawing & Illustrations	2022
3299	13803	Bachelor of Interior Design	IND2203	Design Fundamentals & Illustration Techniques-II	2022
3300	13803	Bachelor of Interior Design	IND2204	Design Studio-II (Photography & Videography)	2022
3301	13803	Bachelor of Interior Design	IND2205	Application of Color Theory	2022
3302	13803	Bachelor of Interior Design	IND2206	Fundamentals of Applied Ergonomics	2022
3303	13803	Bachelor of Interior Design	IND2207	Typography Exploration	2022
3304	13803	Bachelor of Interior Design	IND2208	Introduction to Prototyping Techniques	2022
3305	13803	Bachelor of Interior Design	IND2233	Seminar or Guest Lecture or Workshop for Skill Development	2022
3306	13803	Bachelor of Interior Design	IND2301	Introduction to Spatial Design #	2022
3307	13803	Bachelor of Interior Design	IND2302	Interior Design Materials & Applications	2022
3308	13803	Bachelor of Interior Design	IND2303	Elements of Interior Space Planning & Scaling	2022
3309	13803	Bachelor of Interior Design	IND2304	Psychology of Living Environments	2022
3310	13803	Bachelor of Interior Design	IND2311	Fundamental of Structures	2022
3311	13803	Bachelor of Interior Design	IND2306	History of Interior Design & Study on Popular Styles	2022
3312	13803	Bachelor of Interior Design	IND2307	Lighting & Colour in Interiors	2022
3313	13803	Bachelor of Interior Design	IND2308	Perspective Drawing Techniques & Technical Specs-I	2022
3314	13803	Bachelor of Interior Design	IND2309	Interior Design Studio-I	2022
3315	13803	Bachelor of Interior Design	IND2310	Interior Workshop Practice-I	2022
3316	13803	Bachelor of Interior Design	IND2401	Sustainable Design #	2022
3317	13803	Bachelor of Interior Design	IND2402	Advanced Interior Design Materials & Applications	2022
3318	13803	Bachelor of Interior Design	IND2403	Interior Services	2022
3319	13803	Bachelor of Interior Design	IND2404	Estimation, Costing & Project Management	2022
3320	13803	Bachelor of Interior Design	IND2405	Perspective Drawing Techniques & Technical Specs-II	2022
3321	13803	Bachelor of Interior Design	IND2406	Interior Design Studio-II	2022
3322	13803	Bachelor of Interior Design	IND2407	Interior Workshop Practice-II	2022
3323	13803	Bachelor of Interior Design	IND2433	Seminar or Guest Lecture or Workshop for Skill Development	2022

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3324	13803	Bachelor of Interior Design	IND2501	Design Thinking & Creative Problem Solving #	2022
3325	13803	Bachelor of Interior Design	IND2502	Revitalization of Arts & Crafts	2022
3326	13803	Bachelor of Interior Design	IND2503	Interior Safety Systems & Building Management	2022
3327	13803	Bachelor of Interior Design	IND2504	Textile in Interiors	2022
3328	13803	Bachelor of Interior Design	IND2505	Interior Landscape Design	2022
3329	13803	Bachelor of Interior Design	IND2506	Interior Design Studio-III	2022
3330	13803	Bachelor of Interior Design	IND2507	Computer Aided Interior Design & Drafting	2022
3331	13803	Bachelor of Interior Design	IND2508	Interior Space Modeling Workshop-I	2022
3332	13803	Bachelor of Interior Design	IND2532	Integrated Project Work	2022
3333	13803	Bachelor of Interior Design	IND2601	Introduction to Design Management #	2022
3334	13803	Bachelor of Interior Design	IND2602	Marketing & Entrepreneurship Development	2022
3335	13803	Bachelor of Interior Design	IND2603	Professional Practice & Office Management	2022
3336	13803	Bachelor of Interior Design	IND2604	Interior Design Studio-IV	2022
3337	13803	Bachelor of Interior Design	IND2605	Computer Aided Interior Design & Visualization	2022
3338	13803	Bachelor of Interior Design	IND2606	Interior Space Modeling Workshop-II	2022
3339	13803	Bachelor of Interior Design	IND2633	Seminar or Guest Lecture or Workshop for Skill Development	2022
3340	13803	Bachelor of Interior Design	IND2607	Furniture Ergonomics & Design	2022
3341	13803	Bachelor of Interior Design	IND2608	History of Furniture Design	2022
3342	13803	Bachelor of Interior Design	IND2609	Furniture Construction and Detailing	2022
3343	13803	Bachelor of Interior Design	IND2610	Sustainable Interior Design& Materials	2022
3344	13803	Bachelor of Interior Design	IND2611	Sustainable Interior Renovation	2022
3345	13803	Bachelor of Interior Design	IND2612	Adaptive Reuse & Retrofit	2022
3346	13803	Bachelor of Interior Design	IND2613	Performance Space Design	2022
3347	13803	Bachelor of Interior Design	IND2614	Public Art	2022
3348	13803	Bachelor of Interior Design	IND2615	Public Space Design-Contextual Studies	2022
3349	13803	Bachelor of Interior Design	IND2701	Advanced Interior Design Studio	2022
3350	13803	Bachelor of Interior Design	IND2702	Design Research Methods & Presentation Techniques	2022
3351	13803	Bachelor of Interior Design	IND2733	Seminar	2022

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3352	13803	Bachelor of Interior Design	IND2736	Interior Design Portfolio Development	2022
3353	13803	Bachelor of Interior Design	IND2737	Interior Design Dissertation	2022
3354	13803	Bachelor of Interior Design	IND2837	Training & Onsite Learning	2022
3355	13057	Bachelor of Fine Arts	FNA2101	Drawing-I	2022
3356	13057	Bachelor of Fine Arts	FNA2102	Geometrical Drawing & Perspective-I	2022
3357	13057	Bachelor of Fine Arts	FNA2103	Design-I	2022
3358	13057	Bachelor of Fine Arts	FNA2104	Painting-I	2022
3359	13057	Bachelor of Fine Arts	FNA2105	Sculpture-I	2022
3360	13057	Bachelor of Fine Arts	FNA2106	Print Making-I	2022
3361	13057	Bachelor of Fine Arts	FNA2107	History of Art-I	2022
3362	13057	Bachelor of Fine Arts	FNA2108	Visual Graphics-I	2022
3363	13057	Bachelor of Fine Arts	FNA2109	Photography-I	2022
3364	13057	Bachelor of Fine Arts	FNA2201	Drawing-II	2022
3365	13057	Bachelor of Fine Arts	FNA2202	Geometrical Drawing & Perspective-II	2022
3366	13057	Bachelor of Fine Arts	FNA2203	Design-II	2022
3367	13057	Bachelor of Fine Arts	FNA2204	Painting-II	2022
3368	13057	Bachelor of Fine Arts	FNA2205	Sculpture-II	2022
3369	13057	Bachelor of Fine Arts	FNA2206	Print Making-II	2022
3370	13057	Bachelor of Fine Arts	FNA2207	History of Art-II	2022
3371	13057	Bachelor of Fine Arts	FNA2208	Visual Graphics-II	2022
3372	13057	Bachelor of Fine Arts	FNA2209	Photography-II	2022
3373	13057	Bachelor of Fine Arts	FNA2301	History of Art-III	2022
3374	13057	Bachelor of Fine Arts	FNA2302	Aesthetics-I	2022
3375	13057	Bachelor of Fine Arts	FNA2335	Summer Project Evaluation-I	2022
3376	13057	Bachelor of Fine Arts	FNA2303	Study from Life-I	2022
3377	13057	Bachelor of Fine Arts	FNA2304	Composition -I	2022
3378	13057	Bachelor of Fine Arts	FNA2305	Carving-I	2022
3379	13057	Bachelor of Fine Arts	FNA2306	Mural-I	2022
3380	13057	Bachelor of Fine Arts	FNA2307	Photography-I	2022
3381	13057	Bachelor of Fine Arts	FNA2308	Ceramics-I	2022
3382	13057	Bachelor of Fine Arts	FNA2309	Assemblage-I	2022
3383	13057	Bachelor of Fine Arts	FNA2310	Sculpture Methods & Materials - I	2022
3384	13057	Bachelor of Fine Arts	FNA2311	Drawing & Illustration-I	2022
3385	13057	Bachelor of Fine Arts	FNA2312	Design-III	2022
3386	13057	Bachelor of Fine Arts	FNA2313	Lettering & Typography-I	2022
3387	13057	Bachelor of Fine Arts	FNA2314	Photography-III	2022

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3388	13057	Bachelor of Fine Arts	FNA2315	Printing Techniques-I	2022
3389	13057	Bachelor of Fine Arts	FNA2316	Computer Graphic-I	2022
3390	13057	Bachelor of Fine Arts	FNA2317	Advertising Theory-I	2022
3391	13057	Bachelor of Fine Arts	FNA2318	Drawing-III	2022
3392	13057	Bachelor of Fine Arts	FNA2319	Painting-III	2022
3393	13057	Bachelor of Fine Arts	FNA2320	Composition-I	2022
3394	13057	Bachelor of Fine Arts	FNA2321	Photography-III	2022
3395	13057	Bachelor of Fine Arts	FNA2322	Print Making-III	2022
3396	13057	Bachelor of Fine Arts	FNA2323	Computer Graphic-I	2022
3397	13057	Bachelor of Fine Arts	FNA2324	Painting Methods & Materials-I	2022
3398	13057	Bachelor of Fine Arts	FNA2401	History of Art - IV	2022
3399	13057	Bachelor of Fine Arts	FNA2402	Aesthetics - II	2022
3400	13057	Bachelor of Fine Arts	FNA2403	Study from Life- II	2022
3401	13057	Bachelor of Fine Arts	FNA2404	Composition- II	2022
3402	13057	Bachelor of Fine Arts	FNA2405	Carving- II	2022
3403	13057	Bachelor of Fine Arts	FNA2406	Mural - II	2022
3404	13057	Bachelor of Fine Arts	FNA2407	Photography - II	2022
3405	13057	Bachelor of Fine Arts	FNA2408	Ceramics - II	2022
3406	13057	Bachelor of Fine Arts	FNA2409	Assemblage - II	2022
3407	13057	Bachelor of Fine Arts	FNA2410	Sculpture Methods & Materials - II	2022
3408	13057	Bachelor of Fine Arts	FNA2411	Drawing & Illustration - II	2022
3409	13057	Bachelor of Fine Arts	FNA2412	Design - IV	2022
3410	13057	Bachelor of Fine Arts	FNA2413	Lettering & Typography - II	2022
3411	13057	Bachelor of Fine Arts	FNA2414	Computer Graphics - II	2022
3412	13057	Bachelor of Fine Arts	FNA2415	Printing Techniques - II	2022
3413	13057	Bachelor of Fine Arts	FNA2416	Advertising Theory - II	2022
3414	13057	Bachelor of Fine Arts	FNA2417	Drawing - IV	2022
3415	13057	Bachelor of Fine Arts	FNA2418	Painting - IV	2022
3416	13057	Bachelor of Fine Arts	FNA2419	Composition - II	2022
3417	13057	Bachelor of Fine Arts	FNA2420	Mural - I	2022
3418	13057	Bachelor of Fine Arts	FNA2421	Print Making - II	2022
3419	13057	Bachelor of Fine Arts	FNA2422	Painting Methods & Materials - II	2022
3420	13057	Bachelor of Fine Arts	FNA2501	History of Art - V	2022
3421	13057	Bachelor of Fine Arts	FNA2502	Aesthetics - III	2022
3422	13057	Bachelor of Fine Arts	FNA2535	Practical Training - I (Evaluation)	2022
3423	13057	Bachelor of Fine Arts	FNA2503	Study from Life - III	2022
3424	13057	Bachelor of Fine Arts	FNA2504	Composition - III	2022
3425	13057	Bachelor of Fine Arts	FNA2505	Metal Casting - I	2022

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3426	13057	Bachelor of Fine Arts	FNA2506	Mural - III	2022
3427	13057	Bachelor of Fine Arts	FNA2507	Photography - III	2022
3428	13057	Bachelor of Fine Arts	FNA2508	Ceramics - III	2022
3429	13057	Bachelor of Fine Arts	FNA2509	Assemblage - III	2022
3430	13057	Bachelor of Fine Arts	FNA2510	Sculpture Methods & Materials - III	2022
3431	13057	Bachelor of Fine Arts	FNA2511	Drawing & Illustration - III	2022
3432	13057	Bachelor of Fine Arts	FNA2512	Design - V	2022
3433	13057	Bachelor of Fine Arts	FNA2513	Packaging - I	2022
3434	13057	Bachelor of Fine Arts	FNA2514	Computer Graphics - III	2022
3435	13057	Bachelor of Fine Arts	FNA2515	Printing Techniques - III	2022
3436	13057	Bachelor of Fine Arts	FNA2516	Textile Design - I	2022
3437	13057	Bachelor of Fine Arts	FNA2517	Advertising Theory - III	2022
3438	13057	Bachelor of Fine Arts	FNA2518	Drawing - V	2022
3439	13057	Bachelor of Fine Arts	FNA2519	Painting - V	2022
3440	13057	Bachelor of Fine Arts	FNA2520	Composition - III	2022
3441	13057	Bachelor of Fine Arts	FNA2521	Photography - III	2022
3442	13057	Bachelor of Fine Arts	FNA2522	Print Making - III	2022
3443	13057	Bachelor of Fine Arts	FNA2523	Traditional Painting - I	2022
3444	13057	Bachelor of Fine Arts	FNA2524	Painting Methods & Materials - III	2022
3445	13057	Bachelor of Fine Arts	FNA2534	Study Abroad	2022
3446	13057	Bachelor of Fine Arts	FNA2532	Project - I	2022
3447	13057	Bachelor of Fine Arts	FNA2601	History of Art - VI	2022
3448	13057	Bachelor of Fine Arts	FNA2602	Aesthetics - IV	2022
3449	13057	Bachelor of Fine Arts	FNA2637	Dissertation-I	2022
3450	13057	Bachelor of Fine Arts	FNA2603	Study from Life - IV	2022
3451	13057	Bachelor of Fine Arts	FNA2604	Composition - IV	2022
3452	13057	Bachelor of Fine Arts	FNA2605	Metal Casting - II	2022
3453	13057	Bachelor of Fine Arts	FNA2606	Mural - IV	2022
3454	13057	Bachelor of Fine Arts	FNA2607	Photography - IV	2022
3455	13057	Bachelor of Fine Arts	FNA2608	Ceramics - IV	2022
3456	13057	Bachelor of Fine Arts	FNA2609	Assemblage - IV	2022
3457	13057	Bachelor of Fine Arts	FNA2610	Sculpture Methods & Materials - IV	2022
3458	13057	Bachelor of Fine Arts	FNA2611	Drawing & Illustration - IV	2022
3459	13057	Bachelor of Fine Arts	FNA2612	Design-VI	2022
3460	13057	Bachelor of Fine Arts	FNA2613	Packaging-II	2022
3461	13057	Bachelor of Fine Arts	FNA2614	Printing Techniques-IV	2022

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3462	13057	Bachelor of Fine Arts	FNA2615	Computer Graphics - IV	2022
3463	13057	Bachelor of Fine Arts	FNA2616	Textile Design - II	2022
3464	13057	Bachelor of Fine Arts	FNA2617	Advertising Theory - IV	2022
3465	13057	Bachelor of Fine Arts	FNA2618	Drawing - VI	2022
3466	13057	Bachelor of Fine Arts	FNA2619	Painting - VI	2022
3467	13057	Bachelor of Fine Arts	FNA2620	Composition - IV	2022
3468	13057	Bachelor of Fine Arts	FNA2621	Mural - II	2022
3469	13057	Bachelor of Fine Arts	FNA2622	Print Making - II	2022
3470	13057	Bachelor of Fine Arts	FNA2623	Painting Methods & Materials - IV	2022
3471	13057	Bachelor of Fine Arts	FNA2634	Study Abroad	2022
3472	13057	Bachelor of Fine Arts	FNA2630	Traditional Artwork	2022
3473	13057	Bachelor of Fine Arts	FNA2701	History of Modern Art - I	2022
3474	13057	Bachelor of Fine Arts	FNA2735	Practical Training Evaluation-II	2022
3475	13057	Bachelor of Fine Arts	FNA2702	Study from Life - V	2022
3476	13057	Bachelor of Fine Arts	FNA2703	Composition - V	2022
3477	13057	Bachelor of Fine Arts	FNA2704	Metal Casting - III	2022
3478	13057	Bachelor of Fine Arts	FNA2705	Mural - V	2022
3479	13057	Bachelor of Fine Arts	FNA2706	Photography - V	2022
3480	13057	Bachelor of Fine Arts	FNA2707	Ceramics - V	2022
3481	13057	Bachelor of Fine Arts	FNA2708	Assemblage - V	2022
3482	13057	Bachelor of Fine Arts	FNA2709	Sculpture Methods & Materials - V	2022
3483	13057	Bachelor of Fine Arts	FNA2710	Design - VII	2022
3484	13057	Bachelor of Fine Arts	FNA2711	Packaging - III	2022
3485	13057	Bachelor of Fine Arts	FNA2712	Drawing & Illustration - V	2022
3486	13057	Bachelor of Fine Arts	FNA2713	Computer Graphics - V	2022
3487	13057	Bachelor of Fine Arts	FNA2714	Photography - V	2022
3488	13057	Bachelor of Fine Arts	FNA2715	History of Design - I	2022
3489	13057	Bachelor of Fine Arts	FNA2716	Drawing - VII	2022
3490	13057	Bachelor of Fine Arts	FNA2717	Painting & Composition - I	2022
3491	13057	Bachelor of Fine Arts	FNA2718	Mural - III	2022
3492	13057	Bachelor of Fine Arts	FNA2719	Print Making - III	2022
3493	13057	Bachelor of Fine Arts	FNA2720	Painting Methods & Materials - V	2022
3494	13057	Bachelor of Fine Arts	FNA2732	Project- II	2022
3495	13057	Bachelor of Fine Arts	FNA2733	Workshops/ Certification/ Exhibition (Discipline specific)	2022
3496	13057	Bachelor of Fine Arts	FNA2801	History of Art - VIII	2022
3497	13057	Bachelor of Fine Arts	FNA2837	Portfolio Development & Presentation With Exhibitions	2022

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3498	13057	Bachelor of Fine Arts	FNA2802	Study from Life - VI	2022
3499	13057	Bachelor of Fine Arts	FNA2803	Composition - VI	2022
3500	13057	Bachelor of Fine Arts	FNA2804	Metal Casting - IV	2022
3501	13057	Bachelor of Fine Arts	FNA2805	Mural - IV	2022
3502	13057	Bachelor of Fine Arts	FNA2806	Photography - IV	2022
3503	13057	Bachelor of Fine Arts	FNA2807	Ceramics - IV	2022
3504	13057	Bachelor of Fine Arts	FNA2808	Assemblage - IV	2022
3505	13057	Bachelor of Fine Arts	FNA2809	Sculpture Methods & Materials - IV	2022
3506	13057	Bachelor of Fine Arts	FNA2810	Design - VIII	2022
3507	13057	Bachelor of Fine Arts	FNA2811	Packaging - IV	2022
3508	13057	Bachelor of Fine Arts	FNA2812	Drawing & Illustration - VI	2022
3509	13057	Bachelor of Fine Arts	FNA2813	Computer Graphics - VI	2022
3510	13057	Bachelor of Fine Arts	FNA2814	Photography - VI	2022
3511	13057	Bachelor of Fine Arts	FNA2815	History of Design - II	2022
3512	13057	Bachelor of Fine Arts	FNA2816	Drawing - VIII	2022
3513	13057	Bachelor of Fine Arts	FNA2817	Painting & Composition - II	2022
3514	13057	Bachelor of Fine Arts	FNA2818	Mural - IV	2022
3515	13057	Bachelor of Fine Arts	FNA2819	Print Making - IV	2022
3516	13057	Bachelor of Fine Arts	FNA2820	Painting Methods & Materials - VI	2022
3517	13010	Master of Fine Arts	FNA4101	Visualization - I	2022
3518	13010	Master of Fine Arts	FNA4102	Graphic Designing - I	2022
3519	13010	Master of Fine Arts	FNA4103	TV Graphics - I	2022
3520	13010	Master of Fine Arts	FNA4104	Illustration - I	2022
3521	13010	Master of Fine Arts	FNA4105	Advertising & Marketing Research - I	2022
3522	13010	Master of Fine Arts	FNA4106	Drawing - I	2022
3523	13010	Master of Fine Arts	FNA4107	Creative Painting - I	2022
3524	13010	Master of Fine Arts	FNA4108	Mural (Painting) - I	2022
3525	13010	Master of Fine Arts	FNA4109	Portraiture - I	2022
3526	13010	Master of Fine Arts	FNA4110	History of Art (20 th Century) - I	2022
3527	13010	Master of Fine Arts	FNA4111	Creative Drawing - I	2022
3528	13010	Master of Fine Arts	FNA4112	History of Art - 20th Century Art (Sculpture) - I	2022
3529	13010	Master of Fine Arts	FNA4113	Portraiture Sculpture- I	2022
3530	13010	Master of Fine Arts	FNA4114	Mural (Sculpture)- I	2022
3531	13010	Master of Fine Arts	FNA4115	Creative Sculpture-I	2022
3532	13010	Master of Fine Arts	FNA4237	Report & Viva (Specialization Specific)	2022

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3533	13010	Master of Fine Arts	FNA4201	Visualization - II	2022
3534	13010	Master of Fine Arts	FNA4202	Graphic Designing - II	2022
3535	13010	Master of Fine Arts	FNA4203	TV Graphics - II	2022
3536	13010	Master of Fine Arts	FNA4204	Illustration - II	2022
3537	13010	Master of Fine Arts	FNA4205	Advertising & Marketing Research - II	2022
3538	13010	Master of Fine Arts	FNA4206	Drawing -II	2022
3539	13010	Master of Fine Arts	FNA4207	Creative Painting - II	2022
3540	13010	Master of Fine Arts	FNA4208	Mural (Painting) - II	2022
3541	13010	Master of Fine Arts	FNA4209	Portraiture - II	2022
3542	13010	Master of Fine Arts	FNA4210	History of Art (20 th Century) - II	2022
3543	13010	Master of Fine Arts	FNA4211	Creative Drawing -II	2022
3544	13010	Master of Fine Arts	FNA4212	Portraiture Sculpture- II	2022
3545	13010	Master of Fine Arts	FNA4213	Mural (Sculpture) - II	2022
3546	13010	Master of Fine Arts	FNA4214	Creative Sculpture- II	2022
3547	13010	Master of Fine Arts	FNA4215	History of Art - (20 th Century) - II	2022
3548	13010	Master of Fine Arts	FNA4337	Dissertation & Viva (Specialization Specific)-I	2022
3549	13010	Master of Fine Arts	FNA4301	Visualization - III	2022
3550	13010	Master of Fine Arts	FNA4302	Graphic Designing-III	2022
3551	13010	Master of Fine Arts	FNA4303	TV Graphics - III	2022
3552	13010	Master of Fine Arts	FNA4304	Illustration - III	2022
3553	13010	Master of Fine Arts	FNA4305	Advertising & Business Organization-I	2022
3554	13010	Master of Fine Arts	FNA4306	Drawing – III	2022
3555	13010	Master of Fine Arts	FNA4307	Creative Painting - III	2022
3556	13010	Master of Fine Arts	FNA4308	Mural Painting - III	2022
3557	13010	Master of Fine Arts	FNA4309	Portraiture - III	2022
3558	13010	Master of Fine Arts	FNA4310	Art Criticism (Painting) - I	2022
3559	13010	Master of Fine Arts	FNA4311	Creative Sculpture - III	2022
3560	13010	Master of Fine Arts	FNA4312	Portraiture Sculpture - III	2022
3561	13010	Master of Fine Arts	FNA4313	Mural (Sculpture) - III	2022
3562	13010	Master of Fine Arts	FNA4315	Art Criticism (Sculpture) - I	2022
3563	13010	Master of Fine Arts	FNA4437	Dissertation & Viva (Specialization Specific) - II	2022
3564	13010	Master of Fine Arts	FNA4401	Visualization - IV	2022
3565	13010	Master of Fine Arts	FNA4402	Graphic Designing - IV	2022
3566	13010	Master of Fine Arts	FNA4403	TV Graphics - IV	2022
3567	13010	Master of Fine Arts	FNA4404	Illustration - IV	2022

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3568	13010	Master of Fine Arts	FNA4405	Advertising & Business Organization - II	2022
3569	13010	Master of Fine Arts	FNA4406	Drawing - IV	2022
3570	13010	Master of Fine Arts	FNA4407	Creative Painting - IV	2022
3571	13010	Master of Fine Arts	FNA4408	Mural (Painting) - IV	2022
3572	13010	Master of Fine Arts	FNA4409	Portraiture - IV	2022
3573	13010	Master of Fine Arts	FNA4410	Art Criticism (Painting) - II	2022
3574	13010	Master of Fine Arts	FNA4411	Creative Drawing - IV	2022
3575	13010	Master of Fine Arts	FNA4412	Portraiture Sculpture - IV	2022
3576	13010	Master of Fine Arts	FNA4413	Mural (Sculpture) - IV	2022
3577	13010	Master of Fine Arts	FNA4414	Creative Sculpture - II	2022
3578	13010	Master of Fine Arts	FNA4415	Art Criticism (Sculpture) - II	2022
3579	13111	B.A., LLB (Hons.)	LAW2101	History-I	2022
3580	13111	B.A., LLB (Hons.)	LAW2102	Political Science-I	2022
3581	13111	B.A., LLB (Hons.)	LAW2103	English-I	2022
3582	13111	B.A., LLB (Hons.)	LAW2104	Legal Method	2022
3583	13111	B.A., LLB (Hons.)	LAW2105	Law of Contract-I	2022
3584	13111	B.A., LLB (Hons.)	LAW2106	Micro Economics-I	2022
3585	13111	B.A., LLB (Hons.)	LAW2201	History-II	2022
3586	13111	B.A., LLB (Hons.)	LAW2202	Political Science-II	2022
3587	13111	B.A., LLB (Hons.)	LAW2203	English-II	2022
3588	13111	B.A., LLB (Hons.)	LAW2204	Law of Contract-II	2022
3589	13111	B.A., LLB (Hons.)	LAW2205	Micro Economics-II	2022
3590	13111	B.A., LLB (Hons.)	LAW2301	Sociology-I	2022
3591	13111	B.A., LLB (Hons.)	LAW2302	Macro Economics-I	2022
3592	13111	B.A., LLB (Hons.)	LAW2303	Constitutional Law-I	2022
3593	13111	B.A., LLB (Hons.)	LAW2304	Law of Crimes-I (Indian Penal Code Section-1 to 120B)	2022
3594	13111	B.A., LLB (Hons.)	LAW2305	Family Law-I	2022
3595	13111	B.A., LLB (Hons.)	LAW2311	Code of Criminal Procedure	2022
3596	13111	B.A., LLB (Hons.)	LAW2335	Summer Internship Evaluation-I	2022
3597	13111	B.A., LLB (Hons.)	LAW2401	Sociology-II	2022
3598	13111	B.A., LLB (Hons.)	LAW2402	Macro Economics-II	2022
3599	13111	B.A., LLB (Hons.)	LAW2403	Constitutional Law-II	2022
3600	13111	B.A., LLB (Hons.)	LAW2404	Administrative Law	2022
3601	13111	B.A., LLB (Hons.)	LAW2405	Family Law-II	2022
3602	13111	B.A., LLB (Hons.)	LAW2406	Law of Crimes-II (Indian Penal Code Section 121-511)	2022
3603	13111	B.A., LLB (Hons.)	LAW2501	Sociology-III	2022

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List of courses 2022-23

Sl. No.	Programme Code	Name of Programme	Course Code	Course Name	Year
3604	13111	B.A., LLB (Hons.)	LAW2502	Law of Evidence	2022
3605	13111	B.A., LLB (Hons.)	LAW2503	Code of Civil Procedure	2022
3606	13111	B.A., LLB (Hons.)	LAW2504	Labour Law-I	2022
3607	13111	B.A., LLB (Hons.)	LAW2505	Property Law	2022
3608	13111	B.A., LLB (Hons.)	LAW2535	Summer Internship Evaluation-II	2022
3609	13111	B.A., LLB (Hons.)	LAW2601	History - III	2022
3610	13111	B.A., LLB (Hons.)	LAW2602	Political Science - III	2022
3611	13111	B.A., LLB (Hons.)	LAW2603	Company Law	2022
3612	13111	B.A., LLB (Hons.)	LAW2604	Law of Torts (Motor Vehicles Act & Consumer Protection Act, 2019)	2022
3613	13111	B.A., LLB (Hons.)	LAW2605	Labour Law - II	2022
3614	13111	B.A., LLB (Hons.)	LAW2606	Cyber Laws	2022
3615	13111	B.A., LLB (Hons.)	LAW2702	Environmental Law	2022
3616	13111	B.A., LLB (Hons.)	LAW2703	Jurisprudence	2022
3617	13111	B.A., LLB (Hons.)	LAW2704	Public International Law	2022
3618	13111	B.A., LLB (Hons.)	LAW2705	Arbitration & Alternate Dispute Resolution	2022
3619	13111	B.A., LLB (Hons.)	LAW2735	Summer Internship Evaluation-III	2022
3620	13111	B.A., LLB (Hons.)	LAW2701	Human Rights Law	2022
3621	13111	B.A., LLB (Hons.)	LAW2706	Indian Federalism	2022
3622	13111	B.A., LLB (Hons.)	LAW2707	Forensic Science-I	2022
3623	13111	B.A., LLB (Hons.)	LAW2708	Offences against Child & Juvenile Offence Human Rights Law	2022
3624	13111	B.A., LLB (Hons.)	LAW2709	Law and Medicine-I	2022
3625	13111	B.A., LLB (Hons.)	LAW2710	Military Law	2022
3626	13111	B.A., LLB (Hons.)	LAW2802	Taxation Law	2022
3627	13111	B.A., LLB (Hons.)	LAW2803	Interpretation of Statutes	2022
3628	13111	B.A., LLB (Hons.)	LAW2804	International Trade Law	2022
3629	13111	B.A., LLB (Hons.)	LAW2805	Land Laws	2022
3630	13111	B.A., LLB (Hons.)	LAW2801	Investment & Competition Law	2022
3631	13111	B.A., LLB (Hons.)	LAW2806	Women & Criminal Law	2022
3632	13111	B.A., LLB (Hons.)	LAW2807	Probation & Parole	2022
3633	13111	B.A., LLB (Hons.)	LAW2808	Forensic Science-II	2022
3634	13111	B.A., LLB (Hons.)	LAW2809	Law and Medicine-II	2022
3635	13111	B.A., LLB (Hons.)	LAW2810	Medical Jurisprudence	2022
3636	13111	B.A., LLB (Hons.)	LAW2901	Drafting, Pleading & Convincing	2022
3637	13111	B.A., LLB (Hons.)	LAW2902	Intellectual Property Rights	2022
3638	13111	B.A., LLB (Hons.)	LAW2903	Law Poverty & Development	2022
3639	13111	B.A., LLB (Hons.)	LAW2904	Professional Ethics	2022

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List of courses 2022-23

Sl. No.	Programme Code	Name of Programme	Course Code	Course Name	Year
3640	13111	B.A., LLB (Hons.)	LAW2935	Summer Internship Evaluation-IV	2022
3641	13111	B.A., LLB (Hons.)	LAW2905	Private International Law	2022
3642	13111	B.A., LLB (Hons.)	LAW2906	Election Law	2022
3643	13111	B.A., LLB (Hons.)	LAW2907	Banking & Insurance Laws	2022
3644	13111	B.A., LLB (Hons.)	LAW2908	International Humanitarian & Refugee Law	2022
3645	13111	B.A., LLB (Hons.)	LAW2909	Criminology & Victimology	2022
3646	13111	B.A., LLB (Hons.)	LAW2910	Media Laws	2022
3647	13111	B.A., LLB (Hons.)	LAW2911	Corruption Laws	2022
3648	13111	B.A., LLB (Hons.)	LAW2003	Moot Court / Internship	2022
3649	13111	B.A., LLB (Hons.)	LAW2037	Dissertation	2022
3650	13216	B.Com, LLB (Hons.)	LAW2103	English-I	2022
3651	13216	B.Com, LLB (Hons.)	LAW2104	Legal Method	2022
3652	13216	B.Com, LLB (Hons.)	LAW2105	Law of Contract-I	2022
3653	13216	B.Com, LLB (Hons.)	LAW2107	Financial Accounting-I	2022
3654	13216	B.Com, LLB (Hons.)	LAW2108	Business Organization & Management	2022
3655	13216	B.Com, LLB (Hons.)	ECO2104	Economic System and Society	2022
3656	13216	B.Com, LLB (Hons.)	MGT2130	Readings in Management	2022
3657	13216	B.Com, LLB (Hons.)	COM2131	Term Paper	2022
3658	13216	B.Com, LLB (Hons.)	COM2132	Project (with Presentation & Evaluation)	2022
3659	13216	B.Com, LLB (Hons.)	COM2133	Workshop/ Certification (Discipline Specific) (1credit per workshop)	2022
3660	13216	B.Com, LLB (Hons.)	COM2134	Study Abroad	2022
3661	13216	B.Com, LLB (Hons.)	LAW2203	English-II	2022
3662	13216	B.Com, LLB (Hons.)	LAW2204	Law of Contract-II	2022
3663	13216	B.Com, LLB (Hons.)	LAW2206	Financial Accounting-II	2022
3664	13216	B.Com, LLB (Hons.)	LAW2207	Business Mathematics	2022
3665	13216	B.Com, LLB (Hons.)	COM2204	Computer Applications in Business	2022
3666	13216	B.Com, LLB (Hons.)	MGT2204	Analysis & Design of Business System	2022
3667	13216	B.Com, LLB (Hons.)	MGT2205	Innovation & Creativity Management	2022
3668	13216	B.Com, LLB (Hons.)	MGT2206	Human Values & Professional Ethics	2022
3669	13216	B.Com, LLB (Hons.)	MGT2230	Readings in Management	2022
3670	13216	B.Com, LLB (Hons.)	COM2231	Term Paper	2022
3671	13216	B.Com, LLB (Hons.)	COM2232	Project(with Presentation &Evaluation)	2022

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Sl. No.	Programme Code	Name of Programme	Course Code	Course Name	Year
3672	13216	B.Com, LLB (Hons.)	COM2233	Workshop/ Certification (Discipline Specific) (1credit per workshop)	2022
3673	13216	B.Com, LLB (Hons.)	COM2234	Study Abroad	2022
3674	13216	B.Com, LLB (Hons.)	LAW2303	Constitutional Law-I	2022
3675	13216	B.Com, LLB (Hons.)	LAW2304	Law of Crimes-I (Indian Penal Code Section-1 to 120B)	2022
3676	13216	B.Com, LLB (Hons.)	LAW2305	Family Law-I	2022
3677	13216	B.Com, LLB (Hons.)	LAW2307	Corporate Accounting	2022
3678	13216	B.Com, LLB (Hons.)	LAW2308	Statistical Methods in Research-I	2022
3679	13216	B.Com, LLB (Hons.)	LAW2311	Code of Criminal Procedure	2022
3680	13216	B.Com, LLB (Hons.)	LAW2335	Summer Internship Evaluation-I	2022
3681	13216	B.Com, LLB (Hons.)	LAW2403	Constitutional Law-II	2022
3682	13216	B.Com, LLB (Hons.)	LAW2404	Administrative Law	2022
3683	13216	B.Com, LLB (Hons.)	LAW2405	Family Law-II	2022
3684	13216	B.Com, LLB (Hons.)	LAW2406	Law of Crimes-II (Indian Penal Code Section 121-511)	2022
3685	13216	B.Com, LLB (Hons.)	LAW2407	Financial Management	2022
3686	13216	B.Com, LLB (Hons.)	LAW2408	Statistical Methods in Research-II	2022
3687	13216	B.Com, LLB (Hons.)	LAW2502	Law of Evidence	2022
3688	13216	B.Com, LLB (Hons.)	LAW2503	Code of Civil Procedure	2022
3689	13216	B.Com, LLB (Hons.)	LAW2504	Labour Law-I	2022
3690	13216	B.Com, LLB (Hons.)	LAW2505	Property Law	2022
3691	13216	B.Com, LLB (Hons.)	LAW2507	Cost Accounting	2022
3692	13216	B.Com, LLB (Hons.)	LAW2508	Macro Economics	2022
3693	13216	B.Com, LLB (Hons.)	LAW2535	Summer Internship Evaluation-II	2022
3694	13216	B.Com, LLB (Hons.)	COM2502	Accounting Theory	2022
3695	13216	B.Com, LLB (Hons.)	COM2503	Advanced Corporate Accounting	2022
3696	13216	B.Com, LLB (Hons.)	COM2504	Corporate Tax Law and Practice	2022
3697	13216	B.Com, LLB (Hons.)	COM2505	Business Taxation	2022
3698	13216	B.Com, LLB (Hons.)	LAW2603	Company Law	2022
3699	13216	B.Com, LLB (Hons.)	LAW2604	Law of Torts (Motor Vehicles Act & Consumer Protection Act, 2019)	2022
3700	13216	B.Com, LLB (Hons.)	LAW2605	Labour Law-II	2022
3701	13216	B.Com, LLB (Hons.)	LAW2606	Cyber Laws	2022
3702	13216	B.Com, LLB (Hons.)	LAW2607	Management Accounting	2022
3703	13216	B.Com, LLB (Hons.)	LAW2608	Financial Markets, Institutions & Financial Services	2022
3704	13216	B.Com, LLB (Hons.)	COM2602	Advanced Accounts	2022
3705	13216	B.Com, LLB (Hons.)	COM2603	Advanced Cost Accounting	2022

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Sl. No.	Programme Code	Name of Programme	Course Code	Course Name	Year
3706	13216	B.Com, LLB (Hons.)	COM2604	Indirect Taxes including GST	2022
3707	13216	B.Com, LLB (Hons.)	COM2605	Public Finance and Tax Practices	2022
3708	13216	B.Com, LLB (Hons.)	LAW2702	Environmental Law	2022
3709	13216	B.Com, LLB (Hons.)	LAW2703	Jurisprudence	2022
3710	13216	B.Com, LLB (Hons.)	LAW2704	Public International Law	2022
3711	13216	B.Com, LLB (Hons.)	LAW2705	Arbitration & Alternate Dispute Resolution	2022
3712	13216	B.Com, LLB (Hons.)	LAW2735	Summer Internship Evaluation-III	2022
3713	13216	B.Com, LLB (Hons.)	LAW2701	Human Rights Law	2022
3714	13216	B.Com, LLB (Hons.)	LAW2706	Indian Federalism	2022
3715	13216	B.Com, LLB (Hons.)	LAW2707	Forensic Science-I	2022
3716	13216	B.Com, LLB (Hons.)	LAW2708	Offences against Child & Juvenile Offence Human Rights Law	2022
3717	13216	B.Com, LLB (Hons.)	LAW2709	Law and Medicine-I	2022
3718	13216	B.Com, LLB (Hons.)	LAW2710	Military Law	2022
3719	13216	B.Com, LLB (Hons.)	LAW2802	Taxation Law	2022
3720	13216	B.Com, LLB (Hons.)	LAW2803	Interpretation of Statutes	2022
3721	13216	B.Com, LLB (Hons.)	LAW2804	International Trade Law	2022
3722	13216	B.Com, LLB (Hons.)	LAW2805	Land Laws	2022
3723	13216	B.Com, LLB (Hons.)	LAW2801	Investment & Competition Law	2022
3724	13216	B.Com, LLB (Hons.)	LAW2806	Women & Criminal Law	2022
3725	13216	B.Com, LLB (Hons.)	LAW2807	Probation & Parole	2022
3726	13216	B.Com, LLB (Hons.)	LAW2808	Forensic Science-II	2022
3727	13216	B.Com, LLB (Hons.)	LAW2809	Law and Medicine-II	2022
3728	13216	B.Com, LLB (Hons.)	LAW2810	Medical Jurisprudence	2022
3729	13216	B.Com, LLB (Hons.)	LAW2901	Drafting, Pleading & Convincing	2022
3730	13216	B.Com, LLB (Hons.)	LAW2902	Intellectual Property Rights	2022
3731	13216	B.Com, LLB (Hons.)	LAW2903	Law Poverty & Development	2022
3732	13216	B.Com, LLB (Hons.)	LAW2904	Professional Ethics	2022
3733	13216	B.Com, LLB (Hons.)	LAW2935	Summer Internship Evaluation-IV	2022
3734	13216	B.Com, LLB (Hons.)	LAW2905	Private International Law	2022
3735	13216	B.Com, LLB (Hons.)	LAW2906	Election Law	2022
3736	13216	B.Com, LLB (Hons.)	LAW2907	Banking & Insurance Laws	2022
3737	13216	B.Com, LLB (Hons.)	LAW2908	International Humanitarian & Refugee Law	2022
3738	13216	B.Com, LLB (Hons.)	LAW2909	Criminology & Victimology	2022
3739	13216	B.Com, LLB (Hons.)	LAW2910	Media Laws	2022
3740	13216	B.Com, LLB (Hons.)	LAW2911	Corruption Laws	2022
3741	13216	B.Com, LLB (Hons.)	LAW2003	Moot Court / Internship	2022

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3742	13216	B.Com, LLB (Hons.)	LAW2037	Dissertation	2022
3743	13215	BBA, LLB (Hons.)	LAW2103	English-I	2022
3744	13215	BBA, LLB (Hons.)	LAW2104	Legal Methods	2022
3745	13215	BBA, LLB (Hons.)	LAW2105	Law of Contract-I	2022
3746	13215	BBA, LLB (Hons.)	LAW2108	Business Organization & Management	2022
3747	13215	BBA, LLB (Hons.)	LAW2110	Financial Accounting	2022
3748	13215	BBA, LLB (Hons.)	COM2103	E-Commerce	2022
3749	13215	BBA, LLB (Hons.)	MGT2104	Business Mathematics	2022
3750	13215	BBA, LLB (Hons.)	ECO2104	Economic System and Society	2022
3751	13215	BBA, LLB (Hons.)	MGT2130	Readings in Management	2022
3752	13215	BBA, LLB (Hons.)	MGT 2131	Term Paper	2022
3753	13215	BBA, LLB (Hons.)	MGT 2132	Project (with Presentation & Evaluation)	2022
3754	13215	BBA, LLB (Hons.)	MGT 2133	Workshop / Certification (Discipline Specific) (1credit per workshop)	2022
3755	13215	BBA, LLB (Hons.)	MGT 2134	Study Abroad	2022
3756	13215	BBA, LLB (Hons.)	LAW2203	English-II	2022
3757	13215	BBA, LLB (Hons.)	LAW2204	Law of Contract-II	2022
3758	13215	BBA, LLB (Hons.)	LAW2208	Marketing Management	2022
3759	13215	BBA, LLB (Hons.)	LAW2209	Human Resource Management	2022
3760	13215	BBA, LLB (Hons.)	MGT2204	Analysis & Design of Business System	2022
3761	13215	BBA, LLB (Hons.)	MGT2205	Innovation & Creativity Management	2022
3762	13215	BBA, LLB (Hons.)	MGT2206	Human Values & Professional Ethics	2022
3763	13215	BBA, LLB (Hons.)	MGT2230	Readings in Management	2022
3764	13215	BBA, LLB (Hons.)	MGT2231	Term Paper	2022
3765	13215	BBA, LLB (Hons.)	MGT2232	Project (with Presentation & Evaluation)	2022
3766	13215	BBA, LLB (Hons.)	MGT2233	Workshop / Certification (Discipline Specific) (1credit per workshop)	2022
3767	13215	BBA, LLB (Hons.)	MGT2234	Study Abroad	2022
3768	13215	BBA, LLB (Hons.)	LAW2303	Constitutional Law-I	2022
3769	13215	BBA, LLB (Hons.)	LAW2304	Law of Crimes - I (Indian Penal Code Section-1 to 120B)	2022
3770	13215	BBA, LLB (Hons.)	LAW2305	Family Law-I	2022
3771	13215	BBA, LLB (Hons.)	LAW2309	Organizational Behaviour	2022

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3772	13215	BBA, LLB (Hons.)	LAW2310	Financial Management	2022
3773	13215	BBA, LLB (Hons.)	LAW2311	Code of Criminal Procedure	2022
3774	13215	BBA, LLB (Hons.)	LAW2335	Summer Internship Evaluation-I	2022
3775	13215	BBA, LLB (Hons.)	ECO2304	Mergers & Acquisitions	2022
3776	13215	BBA, LLB (Hons.)	MGT2305	Industrial Psychology	2022
3777	13215	BBA, LLB (Hons.)	MGT2331	Term Paper	2022
3778	13215	BBA, LLB (Hons.)	MGT2332	Project (with Presentation & Evaluation)	2022
3779	13215	BBA, LLB (Hons.)	MGT2333	Workshop / Certification (Discipline Specific) (1 credit per workshop)	2022
3780	13215	BBA, LLB (Hons.)	MGT2334	Study Abroad	2022
3781	13215	BBA, LLB (Hons.)	LAW2403	Constitutional Law – II	2022
3782	13215	BBA, LLB (Hons.)	LAW2404	Administrative Law	2022
3783	13215	BBA, LLB (Hons.)	LAW2405	Family Law - II	2022
3784	13215	BBA, LLB (Hons.)	LAW2406	Law of Crimes - II (Indian Penal Code Section 121-511)	2022
3785	13215	BBA, LLB (Hons.)	LAW2409	Business Environment	2022
3786	13215	BBA, LLB (Hons.)	LAW2410	Research Methodology & Report Preparation	2022
3787	13215	BBA, LLB (Hons.)	MGT2404	Business Information & Database System	2022
3788	13215	BBA, LLB (Hons.)	MGT2405	Personal Financial Planning	2022
3789	13215	BBA, LLB (Hons.)	MGT2406	Sales & Distribution Management	2022
3790	13215	BBA, LLB (Hons.)	MGT2431	Term Paper	2022
3791	13215	BBA, LLB (Hons.)	MGT2432	Project (with Presentation & Evaluation)	2022
3792	13215	BBA, LLB (Hons.)	MGT2433	Workshop / Certification (Discipline Specific) (1 credit per workshop)	2022
3793	13215	BBA, LLB (Hons.)	MGT2434	Study Abroad	2022
3794	13215	BBA, LLB (Hons.)	LAW2502	Law of Evidence	2022
3795	13215	BBA, LLB (Hons.)	LAW2503	Code of Civil Procedure	2022
3796	13215	BBA, LLB (Hons.)	LAW2504	Labour Law - I	2022
3797	13215	BBA, LLB (Hons.)	LAW2505	Property Law	2022
3798	13215	BBA, LLB (Hons.)	LAW2535	Summer Internship Evaluation-II	2022
3799	13215	BBA, LLB (Hons.)	MGT2503	Consumer Behaviour	2022
3800	13215	BBA, LLB (Hons.)	MGT2504	Service Marketing	2022
3801	13215	BBA, LLB (Hons.)	MGT2505	International Marketing	2022
3802	13215	BBA, LLB (Hons.)	MGT2531	Term Paper	2022

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3803	13215	BBA, LLB (Hons.)	MGT2532	Project (with Presentation & Evaluation)	2022
3804	13215	BBA, LLB (Hons.)	MGT2533	Workshop / Certification (Discipline Specific) (1 credit per workshop)	2022
3805	13215	BBA, LLB (Hons.)	MGT2534	Study Abroad	2022
3806	13215	BBA, LLB (Hons.)	MGT2506	Financial Services	2022
3807	13215	BBA, LLB (Hons.)	MGT2507	Principles of Investment Management	2022
3808	13215	BBA, LLB (Hons.)	MGT2508	Financial Derivatives	2022
3809	13215	BBA, LLB (Hons.)	MGT2531	Term Paper	2022
3810	13215	BBA, LLB (Hons.)	MGT2532	Project (with Presentation & Evaluation)	2022
3811	13215	BBA, LLB (Hons.)	MGT2533	Workshop / Certification (Discipline Specific) (1 credit per workshop)	2022
3812	13215	BBA, LLB (Hons.)	MGT2534	Study Abroad	2022
3813	13215	BBA, LLB (Hons.)	MGT2509	Organizational Development & Change	2022
3814	13215	BBA, LLB (Hons.)	MGT2510	Training & Development	2022
3815	13215	BBA, LLB (Hons.)	MGT2511	International Human Resource Management	2022
3816	13215	BBA, LLB (Hons.)	MGT2531	Term Paper	2022
3817	13215	BBA, LLB (Hons.)	MGT2532	Project (with Presentation & Evaluation)	2022
3818	13215	BBA, LLB (Hons.)	MGT2533	Workshop / Certification (Discipline Specific) (1 credit per workshop)	2022
3819	13215	BBA, LLB (Hons.)	MGT2534	Study Abroad	2022
3820	13215	BBA, LLB (Hons.)	LAW2603	Company Law	2022
3821	13215	BBA, LLB (Hons.)	LAW2604	Law of Torts (Motor Vehicles Act & Consumer Protection Act, 2019)	2022
3822	13215	BBA, LLB (Hons.)	LAW2605	Labour Law -II	2022
3823	13215	BBA, LLB (Hons.)	LAW2606	Cyber Laws	2022
3824	13215	BBA, LLB (Hons.)	MGT2602	Brand Management	2022
3825	13215	BBA, LLB (Hons.)	MGT2603	Advertising & Sales Promotion	2022
3826	13215	BBA, LLB (Hons.)	MGT2604	Retail Management	2022
3827	13215	BBA, LLB (Hons.)	MGT2631	Term Paper	2022
3828	13215	BBA, LLB (Hons.)	MGT2632	Project (with Presentation & Evaluation)	2022

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3829	13215	BBA, LLB (Hons.)	MGT2633	Workshop / Certification (Discipline Specific) (1 credit per workshop)	2022
3830	13215	BBA, LLB (Hons.)	MGT2605	Corporate Tax Planning	2022
3831	13215	BBA, LLB (Hons.)	MGT2606	Banking & Financial Institutions	2022
3832	13215	BBA, LLB (Hons.)	MGT2607	Advanced Corporate Finance	2022
3833	13215	BBA, LLB (Hons.)	MGT2631	Term Paper	2022
3834	13215	BBA, LLB (Hons.)	MGT2632	Project (with Presentation & Evaluation)	2022
3835	13215	BBA, LLB (Hons.)	MGT2633	Workshop / Certification (Discipline Specific) (1 credit per workshop)	2022
3836	13215	BBA, LLB (Hons.)	MGT2608	Industrial Relations & Labour Law	2022
3837	13215	BBA, LLB (Hons.)	MGT2609	Performance Management System	2022
3838	13215	BBA, LLB (Hons.)	MGT2610	Compensation & Reward Management	2022
3839	13215	BBA, LLB (Hons.)	MGT2631	Term Paper	2022
3840	13215	BBA, LLB (Hons.)	MGT2632	Project (with Presentation & Evaluation)	2022
3841	13215	BBA, LLB (Hons.)	MGT2633	Workshop / Certification (Discipline Specific) (1 credit per workshop)	2022
3842	13215	BBA, LLB (Hons.)	LAW2702	Environmental Law	2022
3843	13215	BBA, LLB (Hons.)	LAW2703	Jurisprudence	2022
3844	13215	BBA, LLB (Hons.)	LAW2704	Public International Law	2022
3845	13215	BBA, LLB (Hons.)	LAW2705	Arbitration & Alternate Dispute Resolution	2022
3846	13215	BBA, LLB (Hons.)	LAW2735	Summer Internship Evaluation-III	2022
3847	13215	BBA, LLB (Hons.)	LAW2701	Human Rights Law	2022
3848	13215	BBA, LLB (Hons.)	LAW2706	Indian Federalism	2022
3849	13215	BBA, LLB (Hons.)	LAW2707	Forensic Science-I	2022
3850	13215	BBA, LLB (Hons.)	LAW2708	Offences against Child & Juvenile Offence Human Rights Law	2022
3851	13215	BBA, LLB (Hons.)	LAW2709	Law and Medicine-I	2022
3852	13215	BBA, LLB (Hons.)	LAW2710	Military Law	2022
3853	13215	BBA, LLB (Hons.)	LAW2802	Taxation Law	2022
3854	13215	BBA, LLB (Hons.)	LAW2803	Interpretation of Statutes	2022
3855	13215	BBA, LLB (Hons.)	LAW2804	International Trade Law	2022
3856	13215	BBA, LLB (Hons.)	LAW2805	Land Laws	2022
3857	13215	BBA, LLB (Hons.)	LAW2801	Investment & Competition Law	2022
3858	13215	BBA, LLB (Hons.)	LAW2806	Women & Criminal Law	2022

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3859	13215	BBA, LLB (Hons.)	LAW2807	Probation & Parole	2022
3860	13215	BBA, LLB (Hons.)	LAW2808	Forensic Science-II	2022
3861	13215	BBA, LLB (Hons.)	LAW2809	Law and Medicine-II	2022
3862	13215	BBA, LLB (Hons.)	LAW2810	Medical Jurisprudence	2022
3863	13215	BBA, LLB (Hons.)	LAW2901	Drafting, Pleading & Convincing	2022
3864	13215	BBA, LLB (Hons.)	LAW2902	Intellectual Property Rights	2022
3865	13215	BBA, LLB (Hons.)	LAW2903	Law Poverty & Development	2022
3866	13215	BBA, LLB (Hons.)	LAW2904	Professional Ethics	2022
3867	13215	BBA, LLB (Hons.)	LAW2935	Summer Internship Evaluation-IV	2022
3868	13215	BBA, LLB (Hons.)	LAW2905	Private International Law	2022
3869	13215	BBA, LLB (Hons.)	LAW2906	Election Law	2022
3870	13215	BBA, LLB (Hons.)	LAW2907	Banking & Insurance Law	2022
3871	13215	BBA, LLB (Hons.)	LAW2908	International Humanitarian & Refugee Law	2022
3872	13215	BBA, LLB (Hons.)	LAW2909	Criminology & Victimology	2022
3873	13215	BBA, LLB (Hons.)	LAW2910	Media Laws	2022
3874	13215	BBA, LLB (Hons.)	LAW2911	Corruption Laws	2022
3875	13215	BBA, LLB (Hons.)	LAW2003	Moot Court / Internship	2022
3876	13215	BBA, LLB (Hons.)	LAW2037	Dissertation	2022
3877	13018	Master of Law (LLM)	LAW4101	Research Method & Legal Writing	2022
3878	13018	Master of Law (LLM)	LAW4102	Comparative Public Law/ System of Governance	2022
3879	13018	Master of Law (LLM)	LAW4103	Laws on Securities and Financial Markets	2022
3880	13018	Master of Law (LLM)	LAW4104	Corporate Governance	2022
3881	13018	Master of Law (LLM)	LAW4105	Intellectual Property Law	2022
3882	13018	Master of Law (LLM)	LAW4106	Fundamental Rights & Directive Principles	2022
3883	13018	Master of Law (LLM)	LAW4107	Center State Relation & Constitutional Governance	2022
3884	13018	Master of Law (LLM)	LAW4108	Police and Security Administration	2022
3885	13018	Master of Law (LLM)	LAW4109	Criminology and Criminal Justice Administration	2022
3886	13018	Master of Law (LLM)	LAW4110	Victimology	2022
3887	13018	Master of Law (LLM)	LAW4111	Criminal Justice and Human Rights	2022
3888	13018	Master of Law (LLM)	LAW4112	Theorising Child Rights and Legal Order	2022
3889	13018	Master of Law (LLM)	LAW4113	International and Regional Instruments on Child Protection	2022
3890	13018	Master of Law (LLM)	LAW4114	National and State Policies for Child Protection and Development	2022

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3891	13018	Master of Law (LLM)	LAW4201	Law and Justice in a Globalizing World	2022
3892	13018	Master of Law (LLM)	LAW4237	Dissertation	2022
3893	13018	Master of Law (LLM)	LAW4202	Competition Law	2022
3894	13018	Master of Law (LLM)	LAW4203	International Trade Law	2022
3895	13018	Master of Law (LLM)	LAW4205	Banking & Insurance Law	2022
3896	13018	Master of Law (LLM)	LAW4206	Administrative Law	2022
3897	13018	Master of Law (LLM)	LAW4207	Religion Diversity & Law	2022
3898	13018	Master of Law (LLM)	LAW4208	Media Law	2022
3899	13018	Master of Law (LLM)	LAW4209	International Criminal Law	2022
3900	13018	Master of Law (LLM)	LAW4210	Police Law and Administration	2022
3901	13018	Master of Law (LLM)	LAW4211	Corporate Crimes/ White Collar Crimes	2022
3902	13018	Master of Law (LLM)	LAW4212	Civil Laws for Child Rights	2022
3903	13018	Master of Law (LLM)	LAW4213	Crimes against Children	2022
3904	13018	Master of Law (LLM)	LAW4214	Juvenile Justice System and Administration	2022
3905	13393	Bachelor of Science (Dietetics & Applied Nutrition)	DAN2151	Principles of Nutrition	2022
3906	13393	Bachelor of Science (Dietetics & Applied Nutrition)	DAN2101	Food Science-I	2022
3907	13393	Bachelor of Science (Dietetics & Applied Nutrition)	DAN2102	Nutritional Biochemistry	2022
3908	13393	Bachelor of Science (Dietetics & Applied Nutrition)	DAN2103	Food Science- I Lab	2022
3909	13393	Bachelor of Science (Dietetics & Applied Nutrition)	DAN2104	Nutritional Biochemistry Lab	2022
3910	13393	Bachelor of Science (Dietetics & Applied Nutrition)	DAN2251	Family Meal Management	2022
3911	13393	Bachelor of Science (Dietetics & Applied Nutrition)	DAN2201	Food Science-II	2022
3912	13393	Bachelor of Science (Dietetics & Applied Nutrition)	DAN2202	Food Microbiology	2022
3913	13393	Bachelor of Science (Dietetics & Applied Nutrition)	DAN2203	Food Science II Lab	2022
3914	13393	Bachelor of Science (Dietetics & Applied Nutrition)	DAN2204	Food Microbiology Lab	2022
3915	13393	Bachelor of Science (Dietetics & Applied Nutrition)	DAN2351	Basic Dietetics	2022
3916	13393	Bachelor of Science (Dietetics & Applied Nutrition)	DAN2301	Quantity Food Services	2022
3917	13393	Bachelor of Science (Dietetics & Applied Nutrition)	DAN2302	Human Physiology	2022

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3918	13393	Bachelor of Science (Dietetics & Applied Nutrition)	DAN2303	Human Physiology Lab	2022
3919	13393	Bachelor of Science (Dietetics & Applied Nutrition)	DAN2331	Research Paper Writing	2022
3920	13393	Bachelor of Science (Dietetics & Applied Nutrition)	DAN2332	Project (with Presentation & Evaluation)	2022
3921	13393	Bachelor of Science (Dietetics & Applied Nutrition)	DAN2333	Workshop (1 credit per workshop)	2022
3922	13393	Bachelor of Science (Dietetics & Applied Nutrition)	DAN2304	Food Processing	2022
3923	13393	Bachelor of Science (Dietetics & Applied Nutrition)	DAN2451	Advanced Dietetics	2022
3924	13393	Bachelor of Science (Dietetics & Applied Nutrition)	DAN2401	Food Service Management	2022
3925	13393	Bachelor of Science (Dietetics & Applied Nutrition)	DAN2402	Quantity Food Production	2022
3926	13393	Bachelor of Science (Dietetics & Applied Nutrition)	DAN2403	Clinical Nutrition	2022
3927	13393	Bachelor of Science (Dietetics & Applied Nutrition)	DAN2404	Food Service Management Lab	2022
3928	13393	Bachelor of Science (Dietetics & Applied Nutrition)	DAN2431	Paper Writing	2022
3929	13393	Bachelor of Science (Dietetics & Applied Nutrition)	DAN2432	Project (with Presentation & Evaluation)	2022
3930	13393	Bachelor of Science (Dietetics & Applied Nutrition)	DAN2433	Workshop (1 credit per workshop)	2022
3931	13393	Bachelor of Science (Dietetics & Applied Nutrition)	DAN2405	Foundation of Food Nutrition	2022
3932	13393	Bachelor of Science (Dietetics & Applied Nutrition)	DAN2551	Community Nutrition	2022
3933	13393	Bachelor of Science (Dietetics & Applied Nutrition)	DAN2501	Nutrition for Health & Fitness	2022
3934	13393	Bachelor of Science (Dietetics & Applied Nutrition)	DAN2502	Bakery	2022
3935	13393	Bachelor of Science (Dietetics & Applied Nutrition)	DAN2503	Food Quality Control	2022
3936	13393	Bachelor of Science (Dietetics & Applied Nutrition)	DAN2504	Bakery Lab	2022
3937	13393	Bachelor of Science (Dietetics & Applied Nutrition)	DAN2505	Food Quality Lab	2022
3938	13393	Bachelor of Science (Dietetics & Applied Nutrition)	DAN2535	Summer Internship Evaluation	2022
3939	13393	Bachelor of Science (Dietetics & Applied Nutrition)	DAN2601	Food Preservation	2022

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3940	13393	Bachelor of Science (Dietetics & Applied Nutrition)	DAN2602	Clinical & Therapeutic Nutrition	2022
3941	13393	Bachelor of Science (Dietetics & Applied Nutrition)	DAN2603	Food Preservation Lab	2022
3942	13393	Bachelor of Science (Dietetics & Applied Nutrition)	DAN2604	Clinical & Therapeutic Nutrition Lab	2022
3943	13393	Bachelor of Science (Dietetics & Applied Nutrition)	DAN2637	Internship	2022
3944	13165	Bachelor of Science (Medical Lab Technology)	MLT2107	Anatomy and Physiology-I	2022
3945	13165	Bachelor of Science (Medical Lab Technology)	MLT2108	Haematology-I	2022
3946	13165	Bachelor of Science (Medical Lab Technology)	MLT2109	General Microbiology	2022
3947	13165	Bachelor of Science (Medical Lab Technology)	MLT2103	General Biochemistry-I	2022
3948	13165	Bachelor of Science (Medical Lab Technology)	MLT2110	Anatomy and Physiology Lab-I	2022
3949	13165	Bachelor of Science (Medical Lab Technology)	MLT2111	Haematology Lab-I	2022
3950	13165	Bachelor of Science (Medical Lab Technology)	MLT2112	Clinical Training-I	2022
3951	13165	Bachelor of Science (Medical Lab Technology)	MLT2207	Anatomy and Physiology-II	2022
3952	13165	Bachelor of Science (Medical Lab Technology)	MLT2208	Haematology-II	2022
3953	13165	Bachelor of Science (Medical Lab Technology)	MLT2209	Clinical Bacteriology	2022
3954	13165	Bachelor of Science (Medical Lab Technology)	MLT2210	General Biochemistry-II	2022
3955	13165	Bachelor of Science (Medical Lab Technology)	MLT2211	Haematology Lab-II	2022
3956	13165	Bachelor of Science (Medical Lab Technology)	MLT2212	Clinical Training-II	2022
3957	13165	Bachelor of Science (Medical Lab Technology)	MLT2205	Nutrition	2022
3958	13165	Bachelor of Science (Medical Lab Technology)	MLT2206	Medical Terminology	2022
3959	13165	Bachelor of Science (Medical Lab Technology)	MLT2234	Study Abroad	2022
3960	13165	Bachelor of Science (Medical Lab Technology)	MLT2307	Immunology and Serology	2022
3961	13165	Bachelor of Science (Medical Lab Technology)	MLT2308	Haematology-III	2022

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3962	13165	Bachelor of Science (Medical Lab Technology)	MLT2309	Clinical Parasitology	2022
3963	13165	Bachelor of Science (Medical Lab Technology)	MLT2310	Metabolic Biochemistry	2022
3964	13165	Bachelor of Science (Medical Lab Technology)	MLT2311	Haematology Lab-III	2022
3965	13165	Bachelor of Science (Medical Lab Technology)	MLT2312	Clinical Biochemistry Lab	2022
3966	13165	Bachelor of Science (Medical Lab Technology)	MLT2313	Clinical Training-III	2022
3967	13165	Bachelor of Science (Medical Lab Technology)	MLT2305	Hospital Administration	2022
3968	13165	Bachelor of Science (Medical Lab Technology)	MLT2306	Lab Management & Safety Process	2022
3969	13165	Bachelor of Science (Medical Lab Technology)	MLT2334	Study Abroad	2022
3970	13165	Bachelor of Science (Medical Lab Technology)	MLT2405	Clinical Pathology and Cytology	2022
3971	13165	Bachelor of Science (Medical Lab Technology)	MLT2406	Clinical Virology and Mycology	2022
3972	13165	Bachelor of Science (Medical Lab Technology)	MLT2407	Diagnostic Biochemistry-I	2022
3973	13165	Bachelor of Science (Medical Lab Technology)	MLT2408	Diagnostic Biochemistry Lab-I	2022
3974	13165	Bachelor of Science (Medical Lab Technology)	MLT2409	Clinical Training-IV	2022
3975	13165	Bachelor of Science (Medical Lab Technology)	MLT2410	Basics in Computers & PC Package	2022
3976	13165	Bachelor of Science (Medical Lab Technology)	MLT2411	Mathematics and Biostatistics	2022
3977	13165	Bachelor of Science (Medical Lab Technology)	MLT2434	Study Abroad	2022
3978	13165	Bachelor of Science (Medical Lab Technology)	MLT2507	Histopathology	2022
3979	13165	Bachelor of Science (Medical Lab Technology)	MLT2508	Immunohematology and Blood Transfusion	2022
3980	13165	Bachelor of Science (Medical Lab Technology)	MLT2509	Biostatistics and Quality Assurance	2022
3981	13165	Bachelor of Science (Medical Lab Technology)	MLT2510	Diagnostic Biochemistry-II	2022
3982	13165	Bachelor of Science (Medical Lab Technology)	MLT2511	Diagnostic Biochemistry Lab-II	2022
3983	13165	Bachelor of Science (Medical Lab Technology)	MLT2512	Clinical Training-V	2022

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3984	13165	Bachelor of Science (Medical Lab Technology)	MLT2535	Summer Internship Evaluation	2022
3985	13165	Bachelor of Science (Medical Lab Technology)	MLT2505	Preventive & Social Medicine	2022
3986	13165	Bachelor of Science (Medical Lab Technology)	MLT2532	Project (with presentation & evaluation)	2022
3987	13165	Bachelor of Science (Medical Lab Technology)	MLT2534	Study Abroad	2022
3988	13165	Bachelor of Science (Medical Lab Technology)	MLT2637	Internship Evaluation	2022
3989	131127	Bachelor of Optometry	OPT2101	General Anatomy	2022
3990	131127	Bachelor of Optometry	OPT2102	General Physiology	2022
3991	131127	Bachelor of Optometry	OPT2103	Basic Biochemistry-I	2022
3992	131127	Bachelor of Optometry	OPT2104	Physical Optics	2022
3993	131127	Bachelor of Optometry	OPT2105	Geometrical Optics-I	2022
3994	131127	Bachelor of Optometry	OPT2106	Optometric Procedures-I	2022
3995	131127	Bachelor of Optometry	OPT2107	Basics in Computers and PC package	2022
3996	131127	Bachelor of Optometry	OPT2108	Mathematics and Biostatistics	2022
3997	131127	Bachelor of Optometry	OPT2201	Basic Biochemistry-II	2022
3998	131127	Bachelor of Optometry	OPT2202	Ocular Anatomy	2022
3999	131127	Bachelor of Optometry	OPT2203	Ocular Physiology	2022
4000	131127	Bachelor of Optometry	OPT2204	Geometrical Optics-II	2022
4001	131127	Bachelor of Optometry	OPT2205	Optometric Procedures-II	2022
4002	131127	Bachelor of Optometry	OPT2206	Clinics-I	2022
4003	131127	Bachelor of Optometry	OPT2207	Nutrition	2022
4004	131127	Bachelor of Optometry	OPT2209	Medical Psychology	2022
4005	131127	Bachelor of Optometry	OPT2232	Project (with Presentation & Evaluation)	2022
4006	131127	Bachelor of Optometry	OPT2301	Ocular Microbiology	2022
4007	131127	Bachelor of Optometry	OPT2302	Applied Optics-I (Optometric Optics)	2022
4008	131127	Bachelor of Optometry	OPT2303	Visual Optics-I (Visual Perception & Neurophysiology)	2022
4009	131127	Bachelor of Optometry	OPT2304	Pathology	2022
4010	131127	Bachelor of Optometry	OPT2305	Ocular Diseases-I	2022
4011	131127	Bachelor of Optometry	OPT2306	Clinical Optometric Procedures	2022
4012	131127	Bachelor of Optometry	OPT2307	Clinics-II	2022
4013	131127	Bachelor of Optometry	OPT2331	Term Paper	2022
4014	131127	Bachelor of Optometry	OPT2332	Project (with Presentation & Evaluation)	2022

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4015	131127	Bachelor of Optometry	OPT2333	Workshop / Certification (1credit per workshop)	2022
4016	131127	Bachelor of Optometry	OPT2308	Hospital Administration	2022
4017	131127	Bachelor of Optometry	OPT2309	Basic Accountancy	2022
4018	131127	Bachelor of Optometry	OPT2310	Medical Law and Ethics	2022
4019	131127	Bachelor of Optometry	OPT2401	Applied Optics-II (Dispensing Optics)	2022
4020	131127	Bachelor of Optometry	OPT2402	Visual Optics-II	2022
4021	131127	Bachelor of Optometry	OPT2403	Ocular Diseases-II	2022
4022	131127	Bachelor of Optometry	OPT2404	Basic Pharmacology	2022
4023	131127	Bachelor of Optometry	OPT2405	Optometric Instruments	2022
4024	131127	Bachelor of Optometry	OPT2406	Clinics-III	2022
4025	131127	Bachelor of Optometry	OPT2407	Ophthalmic imaging	2022
4026	131127	Bachelor of Optometry	OPT2408	Ophthalmic Electrodiagnostic Procedures	2022
4027	131127	Bachelor of Optometry	OPT2409	Perimetry	2022
4028	131127	Bachelor of Optometry	OPT2431	Term Paper	2022
4029	131127	Bachelor of Optometry	OPT2432	Project (with Presentation & Evaluation)	2022
4030	131127	Bachelor of Optometry	OPT2433	Workshop / Certification (1credit per workshop)	2022
4031	131127	Bachelor of Optometry	OPT2501	Contact Lens-I	2022
4032	131127	Bachelor of Optometry	OPT2502	Low Vision Care	2022
4033	131127	Bachelor of Optometry	OPT2503	Public Health, Community Optometry	2022
4034	131127	Bachelor of Optometry	OPT2504	Binocular Vision-I	2022
4035	131127	Bachelor of Optometry	OPT2505	Diseases of the Eye and Clinical Medicine	2022
4036	131127	Bachelor of Optometry	OPT2506	Occupational Optometry	2022
4037	131127	Bachelor of Optometry	OPT2507	Clinics-IV	2022
4038	131127	Bachelor of Optometry	OPT2535	Summer Internship Evaluation-I	2022
4039	131127	Bachelor of Optometry	OPT2508	Ocular Prosthesis	2022
4040	131127	Bachelor of Optometry	OPT2509	Refractive Surgery	2022
4041	131127	Bachelor of Optometry	OPT2510	Research Methodology	2022
4042	131127	Bachelor of Optometry	OPT2531	Term Paper	2022
4043	131127	Bachelor of Optometry	OPT2532	Project (with Presentation & Evaluation)	2022
4044	131127	Bachelor of Optometry	OPT2533	Workshop / Certification (1credit per workshop)	2022
4045	131127	Bachelor of Optometry	OPT2601	Contact Lens-II	2022
4046	131127	Bachelor of Optometry	OPT2602	Binocular Vision-II	2022

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Sl. No.	Programme Code	Name of Programme	Course Code	Course Name	Year
4047	131127	Bachelor of Optometry	OPT2603	Geriatric Optometry	2022
4048	131127	Bachelor of Optometry	OPT2604	Pediatric Optometry	2022
4049	131127	Bachelor of Optometry	OPT2605	Clinic-V	2022
4050	131127	Bachelor of Optometry	OPT2606	Visual Rehabilitation	2022
4051	131127	Bachelor of Optometry	OPT2607	Vision Therapy and Learning Disabilities	2022
4052	131127	Bachelor of Optometry	OPT2608	Eye Banking	2022
4053	131127	Bachelor of Optometry	OPT2609	Introduction to Biostatistics	2022
4054	131127	Bachelor of Optometry	OPT2632	Project (with Presentation & Evaluation)	2022
4055	131127	Bachelor of Optometry	OPT2701	(Clinics-VI A.) Retina, Glaucoma, Low Vision	2022
4056	131127	Bachelor of Optometry	OPT2702	(Clinics-VI B.) Pediatric & Binocular Vision	2022
4057	131127	Bachelor of Optometry	OPT2703	(Clinics-VI C.) Cornea and Contact Lenses	2022
4058	131127	Bachelor of Optometry	OPT2704	(Clinics-VI D.) Primary Eye Care	2022
4059	131127	Bachelor of Optometry	OPT2735	Summer Internship Evaluation-II	2022
4060	131127	Bachelor of Optometry	OPT2737	Research Project (Mid-Term Evaluation)	2022
4061	131127	Bachelor of Optometry	OPT2801	Clinics VII (Comprehensive Eye Care and Refraction)	2022
4062	131127	Bachelor of Optometry	OPT2802	Clinics VIII (Optometric Procedures and Instruments)	2022
4063	131127	Bachelor of Optometry	OPT2837	Project - Dissertation	2022
4064	13389	Bachelor of Audiology & Speech Language Pathology	ASL2106	Communication Sciences	2022
4065	13389	Bachelor of Audiology & Speech Language Pathology	ASL2107	Anatomy and Physiology of Speech & Hearing	2022
4066	13389	Bachelor of Audiology & Speech Language Pathology	ASL2108	Clinical Psychology	2022
4067	13389	Bachelor of Audiology & Speech Language Pathology	ASL2109	Linguistics and Phonetics	2022
4068	13389	Bachelor of Audiology & Speech Language Pathology	ASL2110	Electronics and Acoustics	2022
4069	13389	Bachelor of Audiology & Speech Language Pathology	ASL2111	Research Methods and Statistics	2022
4070	13389	Bachelor of Audiology & Speech Language Pathology	ASL2105	Clinical Practicum	2022
4071	13389	Bachelor of Audiology & Speech Language Pathology	ASL2206	Neurology	2022
4072	13389	Bachelor of Audiology & Speech Language Pathology	ASL2207	Otolaryngology	2022

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4073	13389	Bachelor of Audiology & Speech Language Pathology	ASL2208	Speech Language Pathology	2022
4074	13389	Bachelor of Audiology & Speech Language Pathology	ASL2209	Audiology	2022
4075	13389	Bachelor of Audiology & Speech Language Pathology	ASL2210	Practicals in Speech Language Pathology	2022
4076	13389	Bachelor of Audiology & Speech Language Pathology	ASL2211	Practicals in Audiology	2022
4077	13389	Bachelor of Audiology & Speech Language Pathology	ASL2307	Voice and its Disorders	2022
4078	13389	Bachelor of Audiology & Speech Language Pathology	ASL2308	Speech Sound Disorders	2022
4079	13389	Bachelor of Audiology & Speech Language Pathology	ASL2309	Diagnostic Audiology Behavioral Test	2022
4080	13389	Bachelor of Audiology & Speech Language Pathology	ASL2310	Amplification Devices	2022
4081	13389	Bachelor of Audiology & Speech Language Pathology	ASL2311	Clinicals in Speech Language Pathology-I	2022
4082	13389	Bachelor of Audiology & Speech Language Pathology	ASL2312	Clinicals in Audiology-I	2022
4083	13389	Bachelor of Audiology & Speech Language Pathology	ASL2335	Summer Internship Evaluation-I (Community Outreach Programs)	2022
4084	13389	Bachelor of Audiology & Speech Language Pathology	ASL2402	Motor Speech Disorders in Children	2022
4085	13389	Bachelor of Audiology & Speech Language Pathology	ASL2406	Child Language Disorders	2022
4086	13389	Bachelor of Audiology & Speech Language Pathology	ASL2407	Diagnostic Audiology – Physiological Tests	2022
4087	13389	Bachelor of Audiology & Speech Language Pathology	ASL2408	Implantable Hearing Devices	2022
4088	13389	Bachelor of Audiology & Speech Language Pathology	ASL2409	Clinicals in Speech Language Pathology-II	2022
4089	13389	Bachelor of Audiology & Speech Language Pathology	ASL2410	Clinicals in Audiology-II	2022
4090	13389	Bachelor of Audiology & Speech Language Pathology	ASL2501	Fluency and its Disorders	2022
4091	13389	Bachelor of Audiology & Speech Language Pathology	ASL2507	Structural Anomalies & Speech Disorders	2022
4092	13389	Bachelor of Audiology & Speech Language Pathology	ASL2508	Pediatric Audiology	2022
4093	13389	Bachelor of Audiology & Speech Language Pathology	ASL2509	Aural Rehabilitation in Children	2022
4094	13389	Bachelor of Audiology & Speech Language Pathology	ASL2510	Clinicals in Speech Language Pathology-III	2022

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4095	13389	Bachelor of Audiology & Speech Language Pathology	ASL2511	Clinicals in Audiology-III	2022
4096	13389	Bachelor of Audiology & Speech Language Pathology	ASL2535	Summer Internship Evaluation-II (Outreach Program)	2022
4097	13389	Bachelor of Audiology & Speech Language Pathology	ASL2606	Motor Speech Disorders in Adults	2022
4098	13389	Bachelor of Audiology & Speech Language Pathology	ASL2607	Language Disorders in Adults	2022
4099	13389	Bachelor of Audiology & Speech Language Pathology	ASL2608	Aural Rehabilitation in Adults	2022
4100	13389	Bachelor of Audiology & Speech Language Pathology	ASL2609	Audiology in Practice	2022
4101	13389	Bachelor of Audiology & Speech Language Pathology	ASL2610	Clinicals in Speech Language Pathology-IV	2022
4102	13389	Bachelor of Audiology & Speech Language Pathology	ASL2611	Clinicals in Audiology-IV	2022
4103	13389	Bachelor of Audiology & Speech Language Pathology	ASL2701	Clinicals in Speech Language Pathology and Audiology-I	2022
4104	13389	Bachelor of Audiology & Speech Language Pathology	ASL2801	Clinicals in Speech Language Pathology and Audiology-II	2022
4105	13402	Master of Science (Clinical Research)	CLR4101	Fundamentals of Clinical Operations	2022
4106	13402	Master of Science (Clinical Research)	CLR4103	Statistics for Clinical Research	2022
4107	13402	Master of Science (Clinical Research)	CLR4104	Basics of Pharmacy, Drug discovery & Development	2022
4108	13402	Master of Science (Clinical Research)	CLR4105	Fundamentals of Anatomy and Physiology	2022
4109	13402	Master of Science (Clinical Research)	CLR4201	Pre Clinical Studies and Safety	2022
4110	13402	Master of Science (Clinical Research)	CLR4202	IPR & Data Exclusivity, Bioethics in Clinical Research	2022
4111	13402	Master of Science (Clinical Research)	CLR4204	Regulatory Affairs	2022
4112	13402	Master of Science (Clinical Research)	CLR4206	Audit & Inspection	2022
4113	13402	Master of Science (Clinical Research)	CLR4303	Reporting and Medical Writing	2022
4114	13402	Master of Science (Clinical Research)	CLR4304	Pharmacogenomics	2022
4115	13402	Master of Science (Clinical Research)	CLR4306	Project Management and Pharmacovigilance	2022
4116	13402	Master of Science (Clinical Research)	CLR4307	Diagnostics in Clinical Research	2022

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4117	13402	Master of Science (Clinical Research)	CLR4308	Pathophysiology and Therapeutics	2022
4118	13402	Master of Science (Clinical Research)	CLR4335	Summer Internship Evaluation	2022
4119	13402	Master of Science (Clinical Research)	CLR4437	Dissertation	2022
4120	13394	Master of Science (Dietetics & Applied Nutrition)	DAN4101	Advanced Nutrition-I	2022
4121	13394	Master of Science (Dietetics & Applied Nutrition)	DAN4102	Nutritional Biochemistry-I	2022
4122	13394	Master of Science (Dietetics & Applied Nutrition)	DAN4103	Human Physiology	2022
4123	13394	Master of Science (Dietetics & Applied Nutrition)	DAN4104	Food Science-I	2022
4124	13394	Master of Science (Dietetics & Applied Nutrition)	DAN4105	Therapeutic Nutrition-I	2022
4125	13394	Master of Science (Dietetics & Applied Nutrition)	DAN4106	Nutritional Biochemistry Lab-I	2022
4126	13394	Master of Science (Dietetics & Applied Nutrition)	DAN4107	Food Science Lab-I	2022
4127	13394	Master of Science (Dietetics & Applied Nutrition)	DAN4108	Therapeutic Nutrition Lab-I	2022
4128	13394	Master of Science (Dietetics & Applied Nutrition)	DAN4201	Advanced Nutrition-II	2022
4129	13394	Master of Science (Dietetics & Applied Nutrition)	DAN4202	Nutritional Biochemistry-II	2022
4130	13394	Master of Science (Dietetics & Applied Nutrition)	DAN4203	Research Methodology	2022
4131	13394	Master of Science (Dietetics & Applied Nutrition)	DAN4204	Therapeutic Nutrition-II	2022
4132	13394	Master of Science (Dietetics & Applied Nutrition)	DAN4205	Dietetic Technique and Patient Counseling	2022
4133	13394	Master of Science (Dietetics & Applied Nutrition)	DAN4206	Nutritional Biochemistry Lab-II	2022
4134	13394	Master of Science (Dietetics & Applied Nutrition)	DAN4207	Advanced Nutrition Lab-II	2022
4135	13394	Master of Science (Dietetics & Applied Nutrition)	DAN4208	Therapeutic Nutrition Lab-II	2022
4136	13394	Master of Science (Dietetics & Applied Nutrition)	DAN4301	Community Nutrition-I	2022
4137	13394	Master of Science (Dietetics & Applied Nutrition)	DAN4302	Institutional Food Administration	2022
4138	13394	Master of Science (Dietetics & Applied Nutrition)	DAN4303	Food Science-II	2022

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4139	13394	Master of Science (Dietetics & Applied Nutrition)	DAN4304	Food Microbiology	2022
4140	13394	Master of Science (Dietetics & Applied Nutrition)	DAN4305	Community Nutrition Lab-I	2022
4141	13394	Master of Science (Dietetics & Applied Nutrition)	DAN4306	Food Science Lab-II	2022
4142	13394	Master of Science (Dietetics & Applied Nutrition)	DAN4307	Food Microbiology Lab	2022
4143	13394	Master of Science (Dietetics & Applied Nutrition)	DAN4335	Summer Internship Evaluation	2022
4144	13394	Master of Science (Dietetics & Applied Nutrition)	DAN4401	Community Nutrition-II	2022
4145	13394	Master of Science (Dietetics & Applied Nutrition)	DAN4402	Food Processing & Technology	2022
4146	13394	Master of Science (Dietetics & Applied Nutrition)	DAN4403	Nutrition for Health and Fitness	2022
4147	13394	Master of Science (Dietetics & Applied Nutrition)	DAN4404	Community Nutrition Lab-II	2022
4148	13394	Master of Science (Dietetics & Applied Nutrition)	DAN4405	Food Processing & Technology Lab	2022
4149	13394	Master of Science (Dietetics & Applied Nutrition)	DAN4437	Dissertation	2022
4150	131133	Master of Optometry	OPT4101	Epidemiology Public Health & Community Optometry	2022
4151	131133	Master of Optometry	OPT4102	Binocular Vision & Pediatric Optometry-I	2022
4152	131133	Master of Optometry	OPT4105	Clinic-I (General)	2022
4153	131133	Master of Optometry	OPT4106	Research Methodology & Biostatistics-I	2022
4154	131133	Master of Optometry	OPT4109	Low Vision, Rehabilitation & Geriatric Optometry	2022
4155	131133	Master of Optometry	OPT4110	Applied Optics	2022
4156	131133	Master of Optometry	OPT4203	Binocular Vision-II & Vision Therapy	2022
4157	131133	Master of Optometry	OPT4204	Advanced Contact Lens-I	2022
4158	131133	Master of Optometry	OPT4205	Clinics-II (Specialty)	2022
4159	131133	Master of Optometry	OPT4211	Ocular Diseases & Diagnostics-I	2022
4160	131133	Master of Optometry	OPT4212	Research Methodology & Biostatistics-II	2022
4161	131133	Master of Optometry	OPT4232	Project (Research)	2022
4162	131133	Master of Optometry	OPT4303	Advanced Contact Lens-II	2022
4163	131133	Master of Optometry	OPT4305	Clinics-III (Specialty)	2022
4164	131133	Master of Optometry	OPT4306	Environmental Optometry	2022

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4165	131133	Master of Optometry	OPT4307	Teaching Methodology	2022
4166	131133	Master of Optometry	OPT4308	Ocular Diseases & Diagnostics-II	2022
4167	131133	Master of Optometry	OPT4332	Project	2022
4168	131133	Master of Optometry	OPT4401	Clinical Optometry (General)	2022
4169	131133	Master of Optometry	OPT4437	Clinical Internship-Dissertation	2022
4170	131133	Master of Optometry	OPT4407	Advance Clinical Retina and Glaucoma	2022
4171	131133	Master of Optometry	OPT4408	Advance Pediatric, Binocular Vision & Vision Therapy	2022
4172	131133	Master of Optometry	OPT4409	Advance Applied Optics	2022
4173	131133	Master of Optometry	OPT4410	Advance Cornea & Contact Lens	2022
4174	131134	Master of Optometry (Practitioner)	OPP4101	Epidemiology Public Health & Community Optometry	2022
4175	131134	Master of Optometry (Practitioner)	OPP4102	Binocular Vision & Pediatric Optometry-I	2022
4176	131134	Master of Optometry (Practitioner)	OPP4105	Clinic-I	2022
4177	131134	Master of Optometry (Practitioner)	OPP4106	Research Methodology & Biostatistics	2022
4178	131134	Master of Optometry (Practitioner)	OPP4109	Low Vision Care and Geriatric Optometry	2022
4179	131134	Master of Optometry (Practitioner)	OPP4110	Applied Optics (Dispensing)	2022
4180	131134	Master of Optometry (Practitioner)	OPP4132	Project (with Presentation & Evaluation)	2022
4181	131134	Master of Optometry (Practitioner)	OPP4203	Binocular Vision-II & Vision Therapy	2022
4182	131134	Master of Optometry (Practitioner)	OPP4204	Advanced Contact Lens-I	2022
4183	131134	Master of Optometry (Practitioner)	OPP4205	Clinics-II (Specialty)	2022
4184	131134	Master of Optometry (Practitioner)	OPP4211	Ocular Disease and Diagnostics-I	2022
4185	131134	Master of Optometry (Practitioner)	OPP4212	Low Vision Care and Rehabilitation	2022
4186	131134	Master of Optometry (Practitioner)	OPP4232	Project	2022
4187	131134	Master of Optometry (Practitioner)	OPP4303	Advanced Contact Lens-II	2022
4188	131134	Master of Optometry (Practitioner)	OPP4305	Clinics-III (Specialty)	2022
4189	131134	Master of Optometry (Practitioner)	OPP4306	Environmental Optometry	2022
4190	131134	Master of Optometry (Practitioner)	OPP4307	Teaching Methodology	2022
4191	131134	Master of Optometry (Practitioner)	OPP4308	Ocular Diseases and Diagnostics-II	2022
4192	131134	Master of Optometry (Practitioner)	OPP4332	Project	2022
4193	131134	Master of Optometry (Practitioner)	OPP4401	Clinical Optometry (General)	2022
4194	131134	Master of Optometry (Practitioner)	OPP4437	Clinical Dissertation	2022
4195	131134	Master of Optometry (Practitioner)	OPP4407	Advance Clinical Retina	2022
4196	131134	Master of Optometry (Practitioner)	OPP4408	Advance Clinical Glaucoma	2022

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4197	131134	Master of Optometry (Practitioner)	OPP4409	Advance Clinical Pediatric, Binocular Vision and Vision Therapy	2022
4198	131134	Master of Optometry (Practitioner)	OPP4410	Advance Applied Optics	2022
4199	131134	Master of Optometry (Practitioner)	OPP4411	Advance Cornea & Contact Lens	2022
4200	13396	Master of Public Health	PUH4101	Demography	2022
4201	13396	Master of Public Health	PUH4102	Basic Epidemiology	2022
4202	13396	Master of Public Health	PUH4103	Social & Behavioral Aspects of Health	2022
4203	13396	Master of Public Health	PUH4104	Healthcare Delivery System & Policies	2022
4204	13396	Master of Public Health	PUH4106	Biostatistics	2022
4205	13396	Master of Public Health	PUH4109	Human Resource Management	2022
4206	13396	Master of Public Health	PUH4201	Applied Epidemiology	2022
4207	13396	Master of Public Health	PUH4203	Communicable & Non-Communicable Diseases	2022
4208	13396	Master of Public Health	PUH4204	Environmental Health Sanitation	2022
4209	13396	Master of Public Health	PUH4205	Research Methodology	2022
4210	13396	Master of Public Health	PUH4206	National Health Programmes	2022
4211	13396	Master of Public Health	PUH4208	Health Economics	2022
4212	13396	Master of Public Health	PUH4231	Term Paper	2022
4213	13396	Master of Public Health	PUH4301	Operations Research	2022
4214	13396	Master of Public Health	PUH4302	Quality in Healthcare	2022
4215	13396	Master of Public Health	PUH4303	Nutrition	2022
4216	13396	Master of Public Health	PUH4304	Women & Child Health	2022
4217	13396	Master of Public Health	PUH4305	Health Programme Management	2022
4218	13396	Master of Public Health	PUH4306	Health Promotion & Behaviour Change Communication	2022
4219	13396	Master of Public Health	PUH4335	Summer Internship Evaluation	2022
4220	13396	Master of Public Health	PUH4401	Health Information System	2022
4221	13396	Master of Public Health	PUH4402	Health Insurance	2022
4222	13396	Master of Public Health	PUH4403	Disaster Management	2022
4223	13396	Master of Public Health	PUH4404	Occupational Health	2022
4224	13396	Master of Public Health	PUH4437	Dissertation	2022
4225	13340	Master of Hospital Administration	MHA4101	Hospital Organization and Management Processes	2022
4226	13340	Master of Hospital Administration	MHA4102	Demography	2022
4227	13340	Master of Hospital Administration	MHA4104	Marketing Management	2022
4228	13340	Master of Hospital Administration	MHA4105	Biostatistics	2022

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4229	13340	Master of Hospital Administration	MHA4106	Information Technology for Managers	2022
4230	13340	Master of Hospital Administration	MHA4107	Essentials of Healthcare System	2022
4231	13340	Master of Hospital Administration	MHA4108	Human Resource Management	2022
4232	13340	Master of Hospital Administration	MHA4201	Financial Management	2022
4233	13340	Master of Hospital Administration	MHA4203	Hospital Planning	2022
4234	13340	Master of Hospital Administration	MHA4204	Health Economics	2022
4235	13340	Master of Hospital Administration	MHA4205	Research Methodology	2022
4236	13340	Master of Hospital Administration	MHA4206	Hospital Materials Management	2022
4237	13340	Master of Hospital Administration	MHA4207	Epidemiology	2022
4238	13340	Master of Hospital Administration	MHA4231	Term Paper	2022
4239	13340	Master of Hospital Administration	MHA4301	Strategic Management	2022
4240	13340	Master of Hospital Administration	MHA4302	Operations Research	2022
4241	13340	Master of Hospital Administration	MHA4303	Quality Management	2022
4242	13340	Master of Hospital Administration	MHA4304	Medical & Health Laws	2022
4243	13340	Master of Hospital Administration	MHA4305	Management of Clinical Services	2022
4244	13340	Master of Hospital Administration	MHA4306	Management of Support & Utility Services	2022
4245	13340	Master of Hospital Administration	MHA4335	Summer Internship Evaluation	2022
4246	13340	Master of Hospital Administration	MHA4401	Hospital Management Information System	2022
4247	13340	Master of Hospital Administration	MHA4402	Health Insurance and Medical Tourism	2022
4248	13340	Master of Hospital Administration	MHA4403	Disaster Management	2022
4249	13340	Master of Hospital Administration	MHA4437	Dissertation	2022
4250	13163	Master of Science (Medical Lab Technology)	MLT4108	Laboratory Management & Quality Control	2022
4251	13163	Master of Science (Medical Lab Technology)	MLT4110	Anatomy	2022
4252	13163	Master of Science (Medical Lab Technology)	MLT4111	Physiology	2022
4253	13163	Master of Science (Medical Lab Technology)	MLT4113	Clinical Immunology	2022
4254	13163	Master of Science (Medical Lab Technology)	MLT4114	Advanced Laboratory Technique	2022
4255	13163	Master of Science (Medical Lab Technology)	MLT4105	Lab Course	2022
4256	13163	Master of Science (Medical Lab Technology)	MLT4112	Clinical Training	2022
4257	13163	Master of Science (Medical Lab Technology)	MLT4208	Molecular Diagnostics	2022

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4258	13163	Master of Science (Medical Lab Technology)	MLT4211	Research Methodology & Biostatistics	2022
4259	13163	Master of Science (Medical Lab Technology)	MLT4210	Metabolic Biochemistry	2022
4260	13163	Master of Science (Medical Lab Technology)	MLT4213	Clinical Nutrition	2022
4261	13163	Master of Science (Medical Lab Technology)	MLT4214	Principles of Biochemistry	2022
4262	13163	Master of Science (Medical Lab Technology)	MLT4215	Clinical Biochemistry Lab Course-I	2022
4263	13163	Master of Science (Medical Lab Technology)	MLT4216	Clinical Biochemistry Clinical Training-I	2022
4264	13163	Master of Science (Medical Lab Technology)	MLT4217	General Microbiology	2022
4265	13163	Master of Science (Medical Lab Technology)	MLT4218	Diagnostic Microbiology-I	2022
4266	13163	Master of Science (Medical Lab Technology)	MLT4219	Clinical Bacteriology	2022
4267	13163	Master of Science (Medical Lab Technology)	MLT4220	Clinical Microbiology Lab Course-I	2022
4268	13163	Master of Science (Medical Lab Technology)	MLT4221	Clinical Microbiology Clinical Training-I	2022
4269	13163	Master of Science (Medical Lab Technology)	MLT4335	Summer Project Evaluation	2022
4270	13163	Master of Science (Medical Lab Technology)	MLT4307	Clinical Endocrinology	2022
4271	13163	Master of Science (Medical Lab Technology)	MLT4308	Clinical Enzymology	2022
4272	13163	Master of Science (Medical Lab Technology)	MLT4309	Advances in Intermediary Metabolism	2022
4273	13163	Master of Science (Medical Lab Technology)	MLT4310	Diagnostic Biochemistry	2022
4274	13163	Master of Science (Medical Lab Technology)	MLT4313	Advanced Chemical Pathology	2022
4275	13163	Master of Science (Medical Lab Technology)	MLT4314	Clinical Biochemistry Lab Course-II	2022
4276	13163	Master of Science (Medical Lab Technology)	MLT4315	Clinical Biochemistry Clinical Training-II	2022
4277	13163	Master of Science (Medical Lab Technology)	MLT4316	Diagnostic Microbiology-II	2022
4278	13163	Master of Science (Medical Lab Technology)	MLT4317	Clinical Virology	2022
4279	13163	Master of Science (Medical Lab Technology)	MLT4318	Clinical Mycology	2022

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4280	13163	Master of Science (Medical Lab Technology)	MLT4319	Clinical Parasitology	2022
4281	13163	Master of Science (Medical Lab Technology)	MLT4320	Pharmaceutical Microbiology	2022
4282	13163	Master of Science (Medical Lab Technology)	MLT4321	Clinical Microbiology Lab Course-II	2022
4283	13163	Master of Science (Medical Lab Technology)	MLT4322	Clinical Microbiology Clinical Training-II	2022
4284	13163	Master of Science (Medical Lab Technology)	MLT4401	On Job Training	2022
4285	13163	Master of Science (Medical Lab Technology)	MLT4437	Dissertation-Clinical Research	2022
4286	131703	Master of Science (Speech Language Pathology)	SLP4101	Research Methods, Epidemiology and Statistics	2022
4287	131703	Master of Science (Speech Language Pathology)	SLP4102	Speech Science and Speech Production	2022
4288	131703	Master of Science (Speech Language Pathology)	SLP4103	Augmentative and Alternative Communication	2022
4289	131703	Master of Science (Speech Language Pathology)	SLP4104	Neurobiology of Speech- Language and Cognition	2022
4290	131703	Master of Science (Speech Language Pathology)	SLP4105	Clinical Linguistics and Multilingual Issues	2022
4291	131703	Master of Science (Speech Language Pathology)	SLP4106	Clinical (Internal)	2022
4292	131703	Master of Science (Speech Language Pathology)	SLP4201	Advanced in Speech Sound Disorder	2022
4293	131703	Master of Science (Speech Language Pathology)	SLP4202	Voice Science and Disorder	2022
4294	131703	Master of Science (Speech Language Pathology)	SLP4203	Disorder of Fluency	2022
4295	131703	Master of Science (Speech Language Pathology)	SLP4204	Language Disorder in Children	2022
4296	131703	Master of Science (Speech Language Pathology)	SLP4205	Clinical (External)	2022
4297	131703	Master of Science (Speech Language Pathology)	SLP4301	Neurogenic Speech Disorder	2022
4298	131703	Master of Science (Speech Language Pathology)	SLP4302	Dysphagia	2022
4299	131703	Master of Science (Speech Language Pathology)	SLP4303	Aphasia	2022
4300	131703	Master of Science (Speech Language Pathology)	SLP4304	Language and Literacy Disorder	2022
4301	131703	Master of Science (Speech Language Pathology)	SLP4305	Cognitive Communication Disorder	2022

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4302	131703	Master of Science (Speech Language Pathology)	SLP4306	Clinical (Internal)	2022
4303	131703	Master of Science (Speech Language Pathology)	SLP4401	Practices in Speech-Language Pathology	2022
4304	131703	Master of Science (Speech Language Pathology)	SLP4437	Dissertation	2022
4305	131703	Master of Science (Speech Language Pathology)	SLP4403	Clinical (External)	2022
4306	131311	Bachelor of Science (Molecular Medicine & Stem Cell Technologies)	SCT2101	Cell Biology & Genetics	2022
4307	131311	Bachelor of Science (Molecular Medicine & Stem Cell Technologies)	SCT2102	Microbiology & Virology	2022
4308	131311	Bachelor of Science (Molecular Medicine & Stem Cell Technologies)	SCT2103	Biochemistry	2022
4309	131311	Bachelor of Science (Molecular Medicine & Stem Cell Technologies)	SCT2104	Stem Cell Technology Basics	2022
4310	131311	Bachelor of Science (Molecular Medicine & Stem Cell Technologies)	SCT2105	Biotechniques & Instrumentation	2022
4311	131311	Bachelor of Science (Molecular Medicine & Stem Cell Technologies)	SCT2106	Bioinformatics-I	2022
4312	131311	Bachelor of Science (Molecular Medicine & Stem Cell Technologies)	SCT2107	Cell & Molecular Biology Lab	2022
4313	131311	Bachelor of Science (Molecular Medicine & Stem Cell Technologies)	SCT2108	Biochemistry Lab	2022
4314	131311	Bachelor of Science (Molecular Medicine & Stem Cell Technologies)	SCT2109	Biotechniques & Instrumentation Lab	2022
4315	131311	Bachelor of Science (Molecular Medicine & Stem Cell Technologies)	SCT2110	Research Presentation	2022
4316	131311	Bachelor of Science (Molecular Medicine & Stem Cell Technologies)	SCT2131	Term Paper	2022
4317	131311	Bachelor of Science (Molecular Medicine & Stem Cell Technologies)	SCT2201	Molecular Biology	2022

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4318	131311	Bachelor of Science (Molecular Medicine & Stem Cell Technologies)	SCT2202	Immunology-I	2022
4319	131311	Bachelor of Science (Molecular Medicine & Stem Cell Technologies)	SCT2203	Human Developmental Biology	2022
4320	131311	Bachelor of Science (Molecular Medicine & Stem Cell Technologies)	SCT2204	Bioinformatics-II	2022
4321	131311	Bachelor of Science (Molecular Medicine & Stem Cell Technologies)	SCT2205	Biostatistics	2022
4322	131311	Bachelor of Science (Molecular Medicine & Stem Cell Technologies)	SCT2206	Enzymology & Enzyme Technology	2022
4323	131311	Bachelor of Science (Molecular Medicine & Stem Cell Technologies)	SCT2207	Molecular Biology Lab	2022
4324	131311	Bachelor of Science (Molecular Medicine & Stem Cell Technologies)	SCT2208	Microbiology & Virology Lab	2022
4325	131311	Bachelor of Science (Molecular Medicine & Stem Cell Technologies)	SCT2209	Immunology-I Lab	2022
4326	131311	Bachelor of Science (Molecular Medicine & Stem Cell Technologies)	SCT2210	Bioinformatics-II Lab	2022
4327	131311	Bachelor of Science (Molecular Medicine & Stem Cell Technologies)	SCT2211	Scientific Communication Skill Development (Seminar/ Workshop)	2022
4328	131311	Bachelor of Science (Molecular Medicine & Stem Cell Technologies)	SCT2301	Stem Cell Biology, Anatomy and Physiology	2022
4329	131311	Bachelor of Science (Molecular Medicine & Stem Cell Technologies)	SCT2302	Molecular Medicine	2022
4330	131311	Bachelor of Science (Molecular Medicine & Stem Cell Technologies)	SCT2303	Immunology-II	2022
4331	131311	Bachelor of Science (Molecular Medicine & Stem Cell Technologies)	SCT2304	Recombinant DNA Technology	2022
4332	131311	Bachelor of Science (Molecular Medicine & Stem Cell Technologies)	SCT2305	Nano-Biotechnology and Nano-Medicine	2022


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4333	131311	Bachelor of Science (Molecular Medicine & Stem Cell Technologies)	SCT2306	Genomics & Proteomic Algorithms	2022
4334	131311	Bachelor of Science (Molecular Medicine & Stem Cell Technologies)	SCT2307	Immunology-II Lab	2022
4335	131311	Bachelor of Science (Molecular Medicine & Stem Cell Technologies)	SCT2308	Recombinant DNA Technology Lab	2022
4336	131311	Bachelor of Science (Molecular Medicine & Stem Cell Technologies)	SCT2309	Genomics & Proteomic Algorithms Lab	2022
4337	131311	Bachelor of Science (Molecular Medicine & Stem Cell Technologies)	SCT2310	Nano-Biotechnology and Nano-Medicine Lab	2022
4338	131311	Bachelor of Science (Molecular Medicine & Stem Cell Technologies)	SCT2311	Scientific Communication Skill Development (Seminar/ Workshop)	2022
4339	131311	Bachelor of Science (Molecular Medicine & Stem Cell Technologies)	SCT2312	Fermentation Technology	2022
4340	131311	Bachelor of Science (Molecular Medicine & Stem Cell Technologies)	SCT2331	Term Paper	2022
4341	131311	Bachelor of Science (Molecular Medicine & Stem Cell Technologies)	SCT2401	Human Pluripotent Stem Cell Culture & Differentiation Methods	2022
4342	131311	Bachelor of Science (Molecular Medicine & Stem Cell Technologies)	SCT2402	Cancer Biology & Cancer Therapeutics	2022
4343	131311	Bachelor of Science (Molecular Medicine & Stem Cell Technologies)	SCT2403	Preclinical Animal Models	2022
4344	131311	Bachelor of Science (Molecular Medicine & Stem Cell Technologies)	SCT2404	Molecular Modeling & Drug Development	2022
4345	131311	Bachelor of Science (Molecular Medicine & Stem Cell Technologies)	SCT2405	Plant Biotechnology and Its Applications in Molecular Medicine	2022
4346	131311	Bachelor of Science (Molecular Medicine & Stem Cell Technologies)	SCT2406	Molecular Immunology Lab	2022
4347	131311	Bachelor of Science (Molecular Medicine & Stem Cell Technologies)	SCT2407	Molecular Modeling & Drug Development Lab	2022

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Sl. No.	Programme Code	Name of Programme	Course Code	Course Name	Year
4348	131311	Bachelor of Science (Molecular Medicine & Stem Cell Technologies)	SCT2408	Scientific Communication Skill Development (Seminar/ Workshop)	2022
4349	131311	Bachelor of Science (Molecular Medicine & Stem Cell Technologies)	SCT2501	Human Pluripotent Stem Cells Based Therapeutics	2022
4350	131311	Bachelor of Science (Molecular Medicine & Stem Cell Technologies)	SCT2502	Systems Biology	2022
4351	131311	Bachelor of Science (Molecular Medicine & Stem Cell Technologies)	SCT2503	Ethics of Biomedical Research, Intellectual Property (IP), IP rights (IPR)	2022
4352	131311	Bachelor of Science (Molecular Medicine & Stem Cell Technologies)	SCT2504	Clinical Trial Design	2022
4353	131311	Bachelor of Science (Molecular Medicine & Stem Cell Technologies)	SCT2505	Stem Cells and Regenerative Medicine Lab	2022
4354	131311	Bachelor of Science (Molecular Medicine & Stem Cell Technologies)	SCT2531	Term Paper	2022
4355	131311	Bachelor of Science (Molecular Medicine & Stem Cell Technologies)	SCT2506	Scientific Communication Skill Development (Seminar/ Workshop)	2022
4356	131311	Bachelor of Science (Molecular Medicine & Stem Cell Technologies)	SCT2507	Medical Writing (Online Resources)	2022
4357	131311	Bachelor of Science (Molecular Medicine & Stem Cell Technologies)	SCT2535	Summer Internship Evaluation	2022
4358	131311	Bachelor of Science (Molecular Medicine & Stem Cell Technologies)	SCT2601	Analysis of Business of Science & Alternative Careers in Molecular Medicine and Regenerative Medicine (Online Resources)	2022
4359	131311	Bachelor of Science (Molecular Medicine & Stem Cell Technologies)	SCT2602	Industry Trends and Campus Recruitment Events and Career Counseling (Online Resources)	2022
4360	131311	Bachelor of Science (Molecular Medicine & Stem Cell Technologies)	SCT2637	Dissertation/ Project Report Presentation/ Viva-Voce	2022
4361	131312	Master of Science (Molecular Medicine & Stem Cell Technologies)	SCT4101	Cell Biology & Genetics	2022

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4362	131312	Master of Science (Molecular Medicine & Stem Cell Technologies)	SCT4102	Microbiology & Virology	2022
4363	131312	Master of Science (Molecular Medicine & Stem Cell Technologies)	SCT4103	Molecular Biology & rDNA Technology	2022
4364	131312	Master of Science (Molecular Medicine & Stem Cell Technologies)	SCT4104	Human Anatomy and Physiology	2022
4365	131312	Master of Science (Molecular Medicine & Stem Cell Technologies)	SCT4105	Bioanalytical Technologies & Instrumentation	2022
4366	131312	Master of Science (Molecular Medicine & Stem Cell Technologies)	SCT4106	Biostatistics	2022
4367	131312	Master of Science (Molecular Medicine & Stem Cell Technologies)	SCT4107	Biological Programming-I (Bioinformatics)	2022
4368	131312	Master of Science (Molecular Medicine & Stem Cell Technologies)	SCT4108	Cell & Molecular Biology Lab	2022
4369	131312	Master of Science (Molecular Medicine & Stem Cell Technologies)	SCT4109	Molecular Biology & rDNA Technology Lab	2022
4370	131312	Master of Science (Molecular Medicine & Stem Cell Technologies)	SCT4110	Bioanalytical Technologies & Instrumentation Lab	2022
4371	131312	Master of Science (Molecular Medicine & Stem Cell Technologies)	SCT4111	Research Seminar/ Research Presentation/ Lit. Review & Presentation: Molecular Medicine	2022
4372	131312	Master of Science (Molecular Medicine & Stem Cell Technologies)	SCT4131	Term Paper	2022
4373	131312	Master of Science (Molecular Medicine & Stem Cell Technologies)	SCT4201	Stem Cell Technology	2022
4374	131312	Master of Science (Molecular Medicine & Stem Cell Technologies)	SCT4202	Fundamental Immunology-I	2022
4375	131312	Master of Science (Molecular Medicine & Stem Cell Technologies)	SCT4203	Human Embryology and Developmental Biology	2022
4376	131312	Master of Science (Molecular Medicine & Stem Cell Technologies)	SCT4204	Biological Programming-II (Bioinformatics)	2022

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4377	131312	Master of Science (Molecular Medicine & Stem Cell Technologies)	SCT4205	Molecular Medicine: Principles & Application	2022
4378	131312	Master of Science (Molecular Medicine & Stem Cell Technologies)	SCT4206	Nano-medicines and Technologies	2022
4379	131312	Master of Science (Molecular Medicine & Stem Cell Technologies)	SCT4207	Fermentation Technology & Its Applications in Molecular Medicine	2022
4380	131312	Master of Science (Molecular Medicine & Stem Cell Technologies)	SCT4208	Stem Cell Technology Lab	2022
4381	131312	Master of Science (Molecular Medicine & Stem Cell Technologies)	SCT4209	Nano-medicines and Technologies Lab	2022
4382	131312	Master of Science (Molecular Medicine & Stem Cell Technologies)	SCT4210	Fundamental Immunology-I Lab	2022
4383	131312	Master of Science (Molecular Medicine & Stem Cell Technologies)	SCT4211	Biological Programming (Bioinformatics)-II Lab	2022
4384	131312	Master of Science (Molecular Medicine & Stem Cell Technologies)	SCT4301	Cancer Biology & Cancer Therapeutics (T cell & Antibody-based Therapeutics)	2022
4385	131312	Master of Science (Molecular Medicine & Stem Cell Technologies)	SCT4302	Human Stem Cell Culture & Differentiation Methods	2022
4386	131312	Master of Science (Molecular Medicine & Stem Cell Technologies)	SCT4303	Vaccines and Preclinical Animal Models	2022
4387	131312	Master of Science (Molecular Medicine & Stem Cell Technologies)	SCT4304	Fundamental Immunology-II	2022
4388	131312	Master of Science (Molecular Medicine & Stem Cell Technologies)	SCT4305	Genomics & Proteomics	2022
4389	131312	Master of Science (Molecular Medicine & Stem Cell Technologies)	SCT4306	Ethics of Biomedical Research Intellectual Property (IP), IP rights (IPR)	2022
4390	131312	Master of Science (Molecular Medicine & Stem Cell Technologies)	SCT4307	Plant Biotechnology and Its Applications in Molecular Medicine	2022
4391	131312	Master of Science (Molecular Medicine & Stem Cell Technologies)	SCT4308	Fundamental Immunology-II Lab	2022

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4392	131312	Master of Science (Molecular Medicine & Stem Cell Technologies)	SCT4309	Genomics & Proteomics Lab	2022
4393	131312	Master of Science (Molecular Medicine & Stem Cell Technologies)	SCT4310	Stem Cell Culture Lab	2022
4394	131312	Master of Science (Molecular Medicine & Stem Cell Technologies)	SCT4311	Scientific Communication Skill Development (Seminar/ Workshop)	2022
4395	131312	Master of Science (Molecular Medicine & Stem Cell Technologies)	SCT4335	Summer Internship Evaluation	2022
4396	131312	Master of Science (Molecular Medicine & Stem Cell Technologies)	SCT4312	Systems Biology	2022
4397	131312	Master of Science (Molecular Medicine & Stem Cell Technologies)	SCT4331	Term Paper	2022
4398	131312	Master of Science (Molecular Medicine & Stem Cell Technologies)	SCT4401	Analysis of Business of Science & Alternative Careers in Molecular Medicine & Regenerative Medicine (Online Resources)	2022
4399	131312	Master of Science (Molecular Medicine & Stem Cell Technologies)	SCT4402	Industry Trends & Campus Recruitment Events & Career Counseling (Online Resources)	2022
4400	131312	Master of Science (Molecular Medicine & Stem Cell Technologies)	SCT4437	Dissertation / Project Report Presentation / Viva Voce	2022
4401	13184	Bachelor of Science (Nursing)	ENGL101	Communicative English	2022
4402	13184	Bachelor of Science (Nursing)	ANAT105 & PHYS110	Applied Anatomy and Applied Physiology	2022
4403	13184	Bachelor of Science (Nursing)	SOCI115 & PSYC120	Applied Sociology and Applied Psychology	2022
4404	13184	Bachelor of Science (Nursing)	N-NF(I) 125	Nursing Foundation-I including First Aid module	2022
4405	13184	Bachelor of Science (Nursing)	SSCC(I) 130	Self-study/ Co-curricular including First Aid module	2022
4406	13184	Bachelor of Science (Nursing)	BIOC135 & NUTR140	Applied Biochemistry and Applied Nutrition & Dietetics	2022
4407	13184	Bachelor of Science (Nursing)	N-NF(II) 125	Nursing Foundation-(I&II) including Health Assessment module	2022
4408	13184	Bachelor of Science (Nursing)	N-NF(II)P 125	Nursing Foundation-(I&II) Practical	2022

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4409	13184	Bachelor of Science (Nursing)	HNIT145	Health/ Nursing Informatics & Technology	2022
4410	13184	Bachelor of Science (Nursing)	SSCC(II) 130	Self-study/ Co-curricular	2022
4411	13184	Bachelor of Science (Nursing)	MICR201	Applied Microbiology and Infection Control including Safety	2022
4412	13184	Bachelor of Science (Nursing)	PHAR(I) 205 & PATH(I) 210	Pharmacology-I and Pathology-I	2022
4413	13184	Bachelor of Science (Nursing)	N-AHN(I) 215	Adult Health Nursing-I with integrated pathophysiology including BCLS module	2022
4414	13184	Bachelor of Science (Nursing)	N-AHN (I)P 215	Adult Health Nursing-I Practical	2022
4415	13184	Bachelor of Science (Nursing)	SSCC(I) 220	Self-study/ Co-curricular	2022
4416	13184	Bachelor of Science (Nursing)	ELEC301	Human Values	2022
4417	13184	Bachelor of Science (Nursing)	ELEC302	Diabetes Care	2022
4418	13184	Bachelor of Science (Nursing)	ELEC303	Soft Skills	2022
4419	13184	Bachelor of Science (Nursing)	PHAR(II) 205 & PATH(II) 210	Pharmacology-(I&II) including Fundamentals of prescribing Module and Pathology- (I&II) & Genetics	2022
4420	13184	Bachelor of Science (Nursing)	N-AHN (II) 225	Adult Health Nursing-II with integrated pathophysiology including Geriatric Nursing + Palliative care module	2022
4421	13184	Bachelor of Science (Nursing)	N-AHN (II)P 225	Adult Health Nursing-II Practical	2022
4422	13184	Bachelor of Science (Nursing)	PROF230	Professionalism, Professional Values and Ethics including Bioethics	2022
4423	13184	Bachelor of Science (Nursing)	SSCC(II) 220	Self-study/ Co-curricular	2022
4424	13184	Bachelor of Science (Nursing)	N-CHN(I) 301	Child Health Nursing-I including Essential Newborn Care (ENBC), FBNC, IMNCI and PLS, modules	2022
4425	13184	Bachelor of Science (Nursing)	N-MHN (I)305	Mental Health Nursing-I	2022
4426	13184	Bachelor of Science (Nursing)	N-COMH (I)310	Community Health Nursing-I including Environmental Science & Epidemiology	2022
4427	13184	Bachelor of Science (Nursing)	N-COMH (I)P 310	Community Health Nursing-I Practical	2022
4428	13184	Bachelor of Science (Nursing)	EDUC315	Educational Technology/ Nursing Education	2022
4429	13184	Bachelor of Science (Nursing)	N-FORN 320	Introduction to Forensic Nursing and Indian Laws	2022
4430	13184	Bachelor of Science (Nursing)	SSCC(I) 325	Self-study/ Co-curricular	2022

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4431	13184	Bachelor of Science (Nursing)	ELEC501	CBT	2022
4432	13184	Bachelor of Science (Nursing)	ELEC502	Personality Development	2022
4433	13184	Bachelor of Science (Nursing)	ELEC503	Addiction Psychiatry	2022
4434	13184	Bachelor of Science (Nursing)	ELEC504	Adolescent Health	2022
4435	13184	Bachelor of Science (Nursing)	ELEC505	Sports Health	2022
4436	13184	Bachelor of Science (Nursing)	ELEC506	Accreditation & Practice Standards	2022
4437	13184	Bachelor of Science (Nursing)	ELEC507	Developmental Psychology	2022
4438	13184	Bachelor of Science (Nursing)	ELEC508	Menopausal Health	2022
4439	13184	Bachelor of Science (Nursing)	ELEC509	Health Economics	2022
4440	13184	Bachelor of Science (Nursing)	N-CHN (II)301	Child Health Nursing-(I&II)	2022
4441	13184	Bachelor of Science (Nursing)	N-MHN (II)305	Mental Health Nursing-(I&II)	2022
4442	13184	Bachelor of Science (Nursing)	NMLE 330	Nursing Management & Leadership	2022
4443	13184	Bachelor of Science (Nursing)	N-MIDW (I)/ OBGN 335	Midwifery/ Obstetrics and Gynaecology (OBG) Nursing-I including SBA module	2022
4444	13184	Bachelor of Science (Nursing)	N-CHN (II)P 301	Child Health Nursing-(I&II) Practical	2022
4445	13184	Bachelor of Science (Nursing)	N-MHN (II)P 305	Mental Health Nursing-(I&II) Practical	2022
4446	13184	Bachelor of Science (Nursing)	N-COMH (II)401	Community Health Nursing-II	2022
4447	13184	Bachelor of Science (Nursing)	NRST405	Nursing Research & Statistics	2022
4448	13184	Bachelor of Science (Nursing)	N-MIDW (II)/ OBGN 410	Midwifery/ Obstetrics and Gynaecology (OBG) Nursing –II including safe delivery app module	2022
4449	13184	Bachelor of Science (Nursing)	N-COMH (II)P 401	Community Health Nursing-II Practical	2022
4450	13184	Bachelor of Science (Nursing)	N-MIDW (II)P / OBGN 410	Midwifery/ Obstetrics and Gynaecology (OBG) Nursing –(I&II) Practical	2022
4451	13184	Bachelor of Science (Nursing)	ELEC701	Scientific Writing Skills	2022
4452	13184	Bachelor of Science (Nursing)	ELEC702	Lactation Management	2022
4453	13184	Bachelor of Science (Nursing)	ELEC703	Sexuality & Health	2022
4454	13184	Bachelor of Science (Nursing)	ELEC704	Stress Management	2022
4455	13184	Bachelor of Science (Nursing)	ELEC705	Job Readiness & Employability in Health Care Setting	2022
4456	13184	Bachelor of Science (Nursing)	INTE440	Internship (Intensive Practicum/ Residency Posting)	2022
4457	13560	Post Basic Bachelor of Science (Nursing)	NUR2105	Nursing Foundation	2022

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4458	13560	Post Basic Bachelor of Science (Nursing)	NUR2106	Nutrition and Dietetics	2022
4459	13560	Post Basic Bachelor of Science (Nursing)	NUR2107	Biochemistry and Biophysics	2022
4460	13560	Post Basic Bachelor of Science (Nursing)	NUR2108	Medical Surgical Nursing	2022
4461	13560	Post Basic Bachelor of Science (Nursing)	NUR2109	English	2022
4462	13560	Post Basic Bachelor of Science (Nursing)	NUR2110	Medical Surgical Nursing (Practical)	2022
4463	13560	Post Basic Bachelor of Science (Nursing)	NUR2207	Psychology	2022
4464	13560	Post Basic Bachelor of Science (Nursing)	NUR2208	Maternal Nursing	2022
4465	13560	Post Basic Bachelor of Science (Nursing)	NUR2209	Pediatric Nursing	2022
4466	13560	Post Basic Bachelor of Science (Nursing)	NUR2210	Microbiology	2022
4467	13560	Post Basic Bachelor of Science (Nursing)	NUR2211	Maternal Nursing (Practical)	2022
4468	13560	Post Basic Bachelor of Science (Nursing)	NUR2212	Pediatric Nursing (Practical)	2022
4469	13560	Post Basic Bachelor of Science (Nursing)	NUR2305	Sociology	2022
4470	13560	Post Basic Bachelor of Science (Nursing)	NUR2306	Community Health Nursing	2022
4471	13560	Post Basic Bachelor of Science (Nursing)	NUR2307	Introduction to Nursing Administration	2022
4472	13560	Post Basic Bachelor of Science (Nursing)	NUR2308	Community Health Nursing (Practical)	2022
4473	13560	Post Basic Bachelor of Science (Nursing)	NUR2405	Psychiatric Nursing	2022
4474	13560	Post Basic Bachelor of Science (Nursing)	NUR2406	Introduction to Nursing Education	2022
4475	13560	Post Basic Bachelor of Science (Nursing)	NUR2407	Introduction to Nursing Research and Statistics	2022
4476	13560	Post Basic Bachelor of Science (Nursing)	NUR2408	Psychiatric Nursing (Practical)	2022
4477	13560	Post Basic Bachelor of Science (Nursing)	NUR2437	Dissertation (Nursing Research)	2022

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Sl. No.	Programme Code	Name of Programme	Course Code	Course Name	Year
4478	131449	Master of Science (Nursing) (With Specialisation in (1) Medical Surgical Nursing (2) Community Health Nursing (3) Psychiatric Nursing (4) Obstetrical & Gynaecological Nursing and (5) Paediatric Nursing)	NUR4101	Nursing Education	2022
4479	131449	Master of Science (Nursing) (With Specialisation in (1) Medical Surgical Nursing (2) Community Health Nursing (3) Psychiatric Nursing (4) Obstetrical & Gynaecological Nursing and (5) Paediatric Nursing)	NUR4102	Nursing Education Practical	2022
4480	131449	Master of Science (Nursing) (With Specialisation in (1) Medical Surgical Nursing (2) Community Health Nursing (3) Psychiatric Nursing (4) Obstetrical & Gynaecological Nursing and (5) Paediatric Nursing)	MSN4103	Medical Surgical Nursing-I	2022
4481	131449	Master of Science (Nursing) (With Specialisation in (1) Medical Surgical Nursing (2) Community Health Nursing (3) Psychiatric Nursing (4) Obstetrical & Gynaecological Nursing and (5) Paediatric Nursing)	CHN4103	Community Health Nursing-I	2022
4482	131449	Master of Science (Nursing) (With Specialisation in (1) Medical Surgical Nursing (2) Community Health Nursing (3) Psychiatric Nursing (4) Obstetrical & Gynaecological Nursing and (5) Paediatric Nursing)	PSN4103	Psychiatric Nursing-I	2022
4483	131449	Master of Science (Nursing) (With Specialisation in (1) Medical Surgical Nursing (2) Community Health Nursing (3) Psychiatric Nursing (4) Obstetrical & Gynaecological Nursing and (5) Paediatric Nursing)	OGN4103	Obstetric & Gynaecological Nursing-I	2022

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4484	131449	Master of Science (Nursing) (With Specialisation in (1) Medical Surgical Nursing (2) Community Health Nursing (3) Psychiatric Nursing (4) Obstetrical & Gynaecological Nursing and (5) Paediatric Nursing)	PDN4103	Child Health Nursing-I	2022
4485	131449	Master of Science (Nursing) (With Specialisation in (1) Medical Surgical Nursing (2) Community Health Nursing (3) Psychiatric Nursing (4) Obstetrical & Gynaecological Nursing and (5) Paediatric Nursing)	NUR4201	Advance Nursing Practice	2022
4486	131449	Master of Science (Nursing) (With Specialisation in (1) Medical Surgical Nursing (2) Community Health Nursing (3) Psychiatric Nursing (4) Obstetrical & Gynaecological Nursing and (5) Paediatric Nursing)	NUR4202	Nursing Research & Statistics	2022
4487	131449	Master of Science (Nursing) (With Specialisation in (1) Medical Surgical Nursing (2) Community Health Nursing (3) Psychiatric Nursing (4) Obstetrical & Gynaecological Nursing and (5) Paediatric Nursing)	MSN4203	Medical Surgical Nursing CS-I & II Practical	2022
4488	131449	Master of Science (Nursing) (With Specialisation in (1) Medical Surgical Nursing (2) Community Health Nursing (3) Psychiatric Nursing (4) Obstetrical & Gynaecological Nursing and (5) Paediatric Nursing)	CHN4203	Community Health Nursing CS-I & II Practical	2022
4489	131449	Master of Science (Nursing) (With Specialisation in (1) Medical Surgical Nursing (2) Community Health Nursing (3) Psychiatric Nursing (4) Obstetrical & Gynaecological Nursing and (5) Paediatric Nursing)	PSN4203	Psychiatric Nursing CS-I & II Practical	2022

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4490	131449	Master of Science (Nursing) (With Specialisation in (1) Medical Surgical Nursing (2) Community Health Nursing (3) Psychiatric Nursing (4) Obstetrical & Gynaecological Nursing and (5) Paediatric Nursing)	OGN4203	Obstetric & Gynaecological Nursing CS-I & II Practical	2022
4491	131449	Master of Science (Nursing) (With Specialisation in (1) Medical Surgical Nursing (2) Community Health Nursing (3) Psychiatric Nursing (4) Obstetrical & Gynaecological Nursing and (5) Paediatric Nursing)	PDN4203	Child Health Nursing CS-I & II Practical	2022
4492	131449	Master of Science (Nursing) (With Specialisation in (1) Medical Surgical Nursing (2) Community Health Nursing (3) Psychiatric Nursing (4) Obstetrical & Gynaecological Nursing and (5) Paediatric Nursing)	NUR4337	Nursing Research Project	2022
4493	131449	Master of Science (Nursing) (With Specialisation in (1) Medical Surgical Nursing (2) Community Health Nursing (3) Psychiatric Nursing (4) Obstetrical & Gynaecological Nursing and (5) Paediatric Nursing)	MSN4301	Cardiothoracic & Vascular Nursing	2022
4494	131449	Master of Science (Nursing) (With Specialisation in (1) Medical Surgical Nursing (2) Community Health Nursing (3) Psychiatric Nursing (4) Obstetrical & Gynaecological Nursing and (5) Paediatric Nursing)	MSN4302	Critical Care Nursing	2022
4495	131449	Master of Science (Nursing) (With Specialisation in (1) Medical Surgical Nursing (2) Community Health Nursing (3) Psychiatric Nursing (4) Obstetrical & Gynaecological Nursing and (5) Paediatric Nursing)	MSN4303	Oncology Nursing	2022

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4496	131449	Master of Science (Nursing) (With Specialisation in (1) Medical Surgical Nursing (2) Community Health Nursing (3) Psychiatric Nursing (4) Obstetrical & Gynaecological Nursing and (5) Paediatric Nursing)	MSN4304	Neurosciences Nursing	2022
4497	131449	Master of Science (Nursing) (With Specialisation in (1) Medical Surgical Nursing (2) Community Health Nursing (3) Psychiatric Nursing (4) Obstetrical & Gynaecological Nursing and (5) Paediatric Nursing)	MSN4305	Nephro Urology Nursing	2022
4498	131449	Master of Science (Nursing) (With Specialisation in (1) Medical Surgical Nursing (2) Community Health Nursing (3) Psychiatric Nursing (4) Obstetrical & Gynaecological Nursing and (5) Paediatric Nursing)	MSN4306	Orthopedic Nursing	2022
4499	131449	Master of Science (Nursing) (With Specialisation in (1) Medical Surgical Nursing (2) Community Health Nursing (3) Psychiatric Nursing (4) Obstetrical & Gynaecological Nursing and (5) Paediatric Nursing)	MSN4307	Gastro Enterology Nursing	2022
4500	131449	Master of Science (Nursing) (With Specialisation in (1) Medical Surgical Nursing (2) Community Health Nursing (3) Psychiatric Nursing (4) Obstetrical & Gynaecological Nursing and (5) Paediatric Nursing)	CHN4301	Community Health Nursing	2022
4501	131449	Master of Science (Nursing) (With Specialisation in (1) Medical Surgical Nursing (2) Community Health Nursing (3) Psychiatric Nursing (4) Obstetrical & Gynaecological Nursing and (5) Paediatric Nursing)	PSN4301	Psychiatric Nursing	2022

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4502	131449	Master of Science (Nursing) (With Specialisation in (1) Medical Surgical Nursing (2) Community Health Nursing (3) Psychiatric Nursing (4) Obstetrical & Gynaecological Nursing and (5) Paediatric Nursing)	OGN4301	Obstetric & Gynaecological Nursing	2022
4503	131449	Master of Science (Nursing) (With Specialisation in (1) Medical Surgical Nursing (2) Community Health Nursing (3) Psychiatric Nursing (4) Obstetrical & Gynaecological Nursing and (5) Paediatric Nursing)	PDN4301	Child Health Nursing	2022
4504	131449	Master of Science (Nursing) (With Specialisation in (1) Medical Surgical Nursing (2) Community Health Nursing (3) Psychiatric Nursing (4) Obstetrical & Gynaecological Nursing and (5) Paediatric Nursing)	NUR4401	Nursing Management	2022
4505	131449	Master of Science (Nursing) (With Specialisation in (1) Medical Surgical Nursing (2) Community Health Nursing (3) Psychiatric Nursing (4) Obstetrical & Gynaecological Nursing and (5) Paediatric Nursing)	NUR4437	Nursing Research Dissertation	2022
4506	131449	Master of Science (Nursing) (With Specialisation in (1) Medical Surgical Nursing (2) Community Health Nursing (3) Psychiatric Nursing (4) Obstetrical & Gynaecological Nursing and (5) Paediatric Nursing)	MSN4402	Cardiothoracic & Vascular Nursing CS-III & IV Practical	2022
4507	131449	Master of Science (Nursing) (With Specialisation in (1) Medical Surgical Nursing (2) Community Health Nursing (3) Psychiatric Nursing (4) Obstetrical & Gynaecological Nursing and (5) Paediatric Nursing)	MSN4403	Critical Care Nursing CS-III & IV Practical	2022

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4508	131449	Master of Science (Nursing) (With Specialisation in (1) Medical Surgical Nursing (2) Community Health Nursing (3) Psychiatric Nursing (4) Obstetrical & Gynaecological Nursing and (5) Paediatric Nursing)	MSN4404	Oncology Nursing CS-III & IV Practical	2022
4509	131449	Master of Science (Nursing) (With Specialisation in (1) Medical Surgical Nursing (2) Community Health Nursing (3) Psychiatric Nursing (4) Obstetrical & Gynaecological Nursing and (5) Paediatric Nursing)	MSN4405	Neurosciences Nursing CS-III & IV Practical	2022
4510	131449	Master of Science (Nursing) (With Specialisation in (1) Medical Surgical Nursing (2) Community Health Nursing (3) Psychiatric Nursing (4) Obstetrical & Gynaecological Nursing and (5) Paediatric Nursing)	MSN4406	Nephro-Urology Nursing CS-III & IV Practical	2022
4511	131449	Master of Science (Nursing) (With Specialisation in (1) Medical Surgical Nursing (2) Community Health Nursing (3) Psychiatric Nursing (4) Obstetrical & Gynaecological Nursing and (5) Paediatric Nursing)	MSN4407	Orthopedic Nursing CS-III & IV Practical	2022
4512	131449	Master of Science (Nursing) (With Specialisation in (1) Medical Surgical Nursing (2) Community Health Nursing (3) Psychiatric Nursing (4) Obstetrical & Gynaecological Nursing and (5) Paediatric Nursing)	MSN4408	Gastro Enterology Nursing CS-III & IV Practical	2022
4513	131449	Master of Science (Nursing) (With Specialisation in (1) Medical Surgical Nursing (2) Community Health Nursing (3) Psychiatric Nursing (4) Obstetrical & Gynaecological Nursing and (5) Paediatric Nursing)	CHN4402	Community Health Nursing CS-III & IV Practical	2022

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4514	131449	Master of Science (Nursing) (With Specialisation in (1) Medical Surgical Nursing (2) Community Health Nursing (3) Psychiatric Nursing (4) Obstetrical & Gynaecological Nursing and (5) Paediatric Nursing)	PSN4402	Psychiatric Nursing CS-III & IV Practical	2022
4515	131449	Master of Science (Nursing) (With Specialisation in (1) Medical Surgical Nursing (2) Community Health Nursing (3) Psychiatric Nursing (4) Obstetrical & Gynaecological Nursing and (5) Paediatric Nursing)	OGN4402	Obstetric & Gynaecological Nursing CS-III & IV Practical	2022
4516	131449	Master of Science (Nursing) (With Specialisation in (1) Medical Surgical Nursing (2) Community Health Nursing (3) Psychiatric Nursing (4) Obstetrical & Gynaecological Nursing and (5) Paediatric Nursing)	PDN4402	Child Health Nursing CS-III & IV Practical	2022
4517	13133	Bachelor of Pharmacy	BP101T	Human Anatomy and Physiology-I	2022
4518	13133	Bachelor of Pharmacy	BP102T	Pharmaceutical Analysis	2022
4519	13133	Bachelor of Pharmacy	BP103T	Pharmaceutics-I	2022
4520	13133	Bachelor of Pharmacy	BP104T	Pharmaceutical Inorganic Chemistry	2022
4521	13133	Bachelor of Pharmacy	BP105T	Communication Skills	2022
4522	13133	Bachelor of Pharmacy	BP107P	Human Anatomy and Physiology Practical-I	2022
4523	13133	Bachelor of Pharmacy	BP108P	Pharmaceutical Analysis Practical	2022
4524	13133	Bachelor of Pharmacy	BP109P	Pharmaceutics-I Practical	2022
4525	13133	Bachelor of Pharmacy	BP110P	Pharmaceutical Inorganic Chemistry Practical	2022
4526	13133	Bachelor of Pharmacy	BP111P	Communication Skills Practical	2022
4527	13133	Bachelor of Pharmacy	BP106RMT	Remedial Mathematics	2022
4528	13133	Bachelor of Pharmacy	BP106RBT	Remedial Biology	2022
4529	13133	Bachelor of Pharmacy	BP112RBP	Remedial Biology Practical	2022
4530	13133	Bachelor of Pharmacy	BP201T	Human Anatomy and Physiology-II	2022
4531	13133	Bachelor of Pharmacy	BP202T	Pharmaceutical Organic Chemistry-I	2022
4532	13133	Bachelor of Pharmacy	BP203T	Biochemistry	2022
4533	13133	Bachelor of Pharmacy	BP204T	Pathophysiology	2022

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4534	13133	Bachelor of Pharmacy	BP205T	Computer Applications in Pharmacy	2022
4535	13133	Bachelor of Pharmacy	BP206T	Environmental Sciences	2022
4536	13133	Bachelor of Pharmacy	BP207P	Human Anatomy and Physiology Practical-II	2022
4537	13133	Bachelor of Pharmacy	BP208P	Pharmaceutical Organic Chemistry Practical-I	2022
4538	13133	Bachelor of Pharmacy	BP209P	Biochemistry Practical	2022
4539	13133	Bachelor of Pharmacy	BP210P	Computer Applications in Pharmacy Practical	2022
4540	13133	Bachelor of Pharmacy	BP301T	Pharmaceutical Organic Chemistry-II	2022
4541	13133	Bachelor of Pharmacy	BP302T	Physical Pharmaceutics-I	2022
4542	13133	Bachelor of Pharmacy	BP303T	Pharmaceutical Microbiology	2022
4543	13133	Bachelor of Pharmacy	BP304T	Pharmaceutical Engineering	2022
4544	13133	Bachelor of Pharmacy	BP305P	Pharmaceutical Organic Chemistry Practical-II	2022
4545	13133	Bachelor of Pharmacy	BP306P	Physical Pharmaceutics Practical-I	2022
4546	13133	Bachelor of Pharmacy	BP307P	Pharmaceutical Microbiology Practical	2022
4547	13133	Bachelor of Pharmacy	BP308P	Pharmaceutical Engineering Practical	2022
4548	13133	Bachelor of Pharmacy	BP401T	Pharmaceutical Organic Chemistry-III	2022
4549	13133	Bachelor of Pharmacy	BP402T	Medicinal Chemistry-I	2022
4550	13133	Bachelor of Pharmacy	BP403T	Physical Pharmaceutics-II	2022
4551	13133	Bachelor of Pharmacy	BP404T	Pharmacology-I	2022
4552	13133	Bachelor of Pharmacy	BP405T	Pharmacognosy and Phytochemistry-I	2022
4553	13133	Bachelor of Pharmacy	BP406P	Medicinal Chemistry Practical-I	2022
4554	13133	Bachelor of Pharmacy	BP407P	Physical Pharmaceutics Practical-II	2022
4555	13133	Bachelor of Pharmacy	BP408P	Pharmacology Practical-I	2022
4556	13133	Bachelor of Pharmacy	BP409P	Pharmacognosy and Phytochemistry Practical-I	2022
4557	13133	Bachelor of Pharmacy	BP501T	Medicinal Chemistry-II	2022
4558	13133	Bachelor of Pharmacy	BP502T	Industrial Pharmacy-I	2022
4559	13133	Bachelor of Pharmacy	BP503T	Pharmacology-II	2022
4560	13133	Bachelor of Pharmacy	BP504T	Pharmacognosy and Phytochemistry-II	2022
4561	13133	Bachelor of Pharmacy	BP505T	Pharmaceutical Jurisprudence	2022
4562	13133	Bachelor of Pharmacy	BP506P	Industrial Pharmacy Practical-I	2022


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4563	13133	Bachelor of Pharmacy	BP507P	Pharmacology Practical-II	2022
4564	13133	Bachelor of Pharmacy	BP508P	Pharmacognosy and Phytochemistry Practical-II	2022
4565	13133	Bachelor of Pharmacy	BP601T	Medicinal Chemistry-III	2022
4566	13133	Bachelor of Pharmacy	BP602T	Pharmacology-III	2022
4567	13133	Bachelor of Pharmacy	BP603T	Herbal Drug Technology	2022
4568	13133	Bachelor of Pharmacy	BP604T	Biopharmaceutics and Pharmacokinetics	2022
4569	13133	Bachelor of Pharmacy	BP605T	Pharmaceutical Biotechnology	2022
4570	13133	Bachelor of Pharmacy	BP606T	Quality Assurance	2022
4571	13133	Bachelor of Pharmacy	BP607P	Medicinal Chemistry Practical-III	2022
4572	13133	Bachelor of Pharmacy	BP608P	Pharmacology Practical-III	2022
4573	13133	Bachelor of Pharmacy	BP609P	Herbal Drug Technology Practical	2022
4574	13133	Bachelor of Pharmacy	BP701T	Instrumental Methods of Analysis	2022
4575	13133	Bachelor of Pharmacy	BP702T	Industrial Pharmacy-II	2022
4576	13133	Bachelor of Pharmacy	BP703T	Pharmacy Practice	2022
4577	13133	Bachelor of Pharmacy	BP704T	Novel Drug Delivery System	2022
4578	13133	Bachelor of Pharmacy	BP705P	Instrumental Methods of Analysis Practical	2022
4579	13133	Bachelor of Pharmacy	BP706PS	Practice School	2022
4580	13133	Bachelor of Pharmacy	BP801T	Biostatistics and Research Methodology	2022
4581	13133	Bachelor of Pharmacy	BP802T	Social and Preventive Pharmacy	2022
4582	13133	Bachelor of Pharmacy	BP813PW	Project Work	2022
4583	13133	Bachelor of Pharmacy	BP803ET	Pharma Marketing Management	2022
4584	13133	Bachelor of Pharmacy	BP804ET	Pharmaceutical Regulatory Science	2022
4585	13133	Bachelor of Pharmacy	BP805ET	Pharmacovigilance	2022
4586	13133	Bachelor of Pharmacy	BP806ET	Quality Control and Standardization of Herbals	2022
4587	13133	Bachelor of Pharmacy	BP807ET	Computer Aided Drug Design	2022
4588	13133	Bachelor of Pharmacy	BP808ET	Cell and Molecular Biology	2022
4589	13133	Bachelor of Pharmacy	BP809ET	Cosmetic Science	2022
4590	13133	Bachelor of Pharmacy	BP810ET	Experimental Pharmacology	2022
4591	13133	Bachelor of Pharmacy	BP811ET	Advanced Instrumentation Techniques	2022
4592	13133	Bachelor of Pharmacy	BP812ET	Dietary Supplements and Nutraceuticals	2022
4593	13040	Bachelor of Architecture	ARC2101	Architectural Design-I	2022
4594	13040	Bachelor of Architecture	ARC2102	Building Materials & Construction Technology-I	2022

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4595	13040	Bachelor of Architecture	ARC2104	Architectural Graphics Skills-I	2022
4596	13040	Bachelor of Architecture	ARC2105	Visual Arts-I	2022
4597	13040	Bachelor of Architecture	ARC2106	History of Architecture-I	2022
4598	13040	Bachelor of Architecture	ARC2109	Structure-I	2022
4599	13040	Bachelor of Architecture	ARC2111	Model Making	2022
4600	13040	Bachelor of Architecture	ARC2201	Architectural Design-II	2022
4601	13040	Bachelor of Architecture	ARC2202	Building Materials & Construction Technology-II	2022
4602	13040	Bachelor of Architecture	ARC2204	Architectural Graphics Skills-II	2022
4603	13040	Bachelor of Architecture	ARC2205	Visual Arts-II	2022
4604	13040	Bachelor of Architecture	ARC2206	History of Architecture-II	2022
4605	13040	Bachelor of Architecture	ARC2209	Structure-II	2022
4606	13040	Bachelor of Architecture	ARC2213	Architectural Climatology	2022
4607	13040	Bachelor of Architecture	ARC2301	Architectural Design-III	2022
4608	13040	Bachelor of Architecture	ARC2302	Building Materials & Construction Technology-III	2022
4609	13040	Bachelor of Architecture	ARC2304	Architectural Graphics Skills-III	2022
4610	13040	Bachelor of Architecture	ARC2305	Visual Arts-III	2022
4611	13040	Bachelor of Architecture	ARC2307	History of Architecture-III	2022
4612	13040	Bachelor of Architecture	ARC2308	Structure-III	2022
4613	13040	Bachelor of Architecture	ARC2312	Building Services-I	2022
4614	13040	Bachelor of Architecture	ARC2313	Surveying & Leveling	2022
4615	13040	Bachelor of Architecture	ARC2401	Architectural Design-IV	2022
4616	13040	Bachelor of Architecture	ARC2402	Building Materials & Construction Technology-IV	2022
4617	13040	Bachelor of Architecture	ARC2409	Structure-IV	2022
4618	13040	Bachelor of Architecture	ARC2413	Computer Applications-I	2022
4619	13040	Bachelor of Architecture	ARC2414	Visual Arts-IV	2022
4620	13040	Bachelor of Architecture	ARC2415	History of Architecture-IV	2022
4621	13040	Bachelor of Architecture	ARC2416	Building Services-II	2022
4622	13040	Bachelor of Architecture	ARC2501	Architectural Design-V	2022
4623	13040	Bachelor of Architecture	ARC2502	Building Materials & Construction Technology-V	2022
4624	13040	Bachelor of Architecture	ARC2509	Structure-V	2022
4625	13040	Bachelor of Architecture	ARC2513	Computer Applications-II	2022
4626	13040	Bachelor of Architecture	ARC2517	Theory of Architecture-I	2022
4627	13040	Bachelor of Architecture	ARC2518	Building Services-III	2022
4628	13040	Bachelor of Architecture	ARC2519	People Culture & Built Environment-I	2022

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4629	13040	Bachelor of Architecture	ARC2520	Ecology, Environment & Sustainable Development-I	2022
4630	13040	Bachelor of Architecture	ARC2521	Computer Applications & Advance Technologies-I (Smart Buildings)	2022
4631	13040	Bachelor of Architecture	ARC2522	Aesthetics & Creativity: Graphic Design	2022
4632	13040	Bachelor of Architecture	ARC2523	Road Safety & Civic Sense	2022
4633	13040	Bachelor of Architecture	ARC2601	Architectural Design-VI	2022
4634	13040	Bachelor of Architecture	ARC2602	Building Materials & Construction Technology-VI	2022
4635	13040	Bachelor of Architecture	ARC2609	Structure-VI	2022
4636	13040	Bachelor of Architecture	ARC2617	Site Planning & Landscape	2022
4637	13040	Bachelor of Architecture	ARC2618	Theory of Architecture-II	2022
4638	13040	Bachelor of Architecture	ARC2619	Building Services-IV	2022
4639	13040	Bachelor of Architecture	ARC2638	Seminar	2022
4640	13040	Bachelor of Architecture	ARC2620	People Culture & Built Environment-II	2022
4641	13040	Bachelor of Architecture	ARC2621	Ecology, Environment & Sustainable Development-II	2022
4642	13040	Bachelor of Architecture	ARC2622	Computer Applications & Advance Technologies-II (ARVR Architecture)	2022
4643	13040	Bachelor of Architecture	ARC2623	Aesthetics & Creativity- Photography	2022
4644	13040	Bachelor of Architecture	ARC2701	Architectural Design-VII	2022
4645	13040	Bachelor of Architecture	ARC2702	Building Materials & Construction Technology-VII	2022
4646	13040	Bachelor of Architecture	ARC2703	Structure-VII	2022
4647	13040	Bachelor of Architecture	ARC2705	Research Methodology	2022
4648	13040	Bachelor of Architecture	ARC2717	LEED Lab-I	2022
4649	13040	Bachelor of Architecture	ARC2718	Interior Design	2022
4650	13040	Bachelor of Architecture	ARC2720	Specification, Estimation & Valuation	2022
4651	13040	Bachelor of Architecture	ARC2721	People Culture & Built Environment-III	2022
4652	13040	Bachelor of Architecture	ARC2722	Ecology, Environment & Sustainable Development-III	2022
4653	13040	Bachelor of Architecture	ARC2723	Computer Applications & Advance Technologies-III (BIM)	2022
4654	13040	Bachelor of Architecture	ARC2724	Aesthetics & Creativity- Video and Film Making	2022
4655	13040	Bachelor of Architecture	ARC2801	Building Materials & Construction Technology-VIII	2022

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4656	13040	Bachelor of Architecture	ARC2809	Architectural Design-VIII	2022
4657	13040	Bachelor of Architecture	ARC2815	Structure-VIII	2022
4658	13040	Bachelor of Architecture	ARC2816	Town Planning	2022
4659	13040	Bachelor of Architecture	ARC2817	LEED Lab-II	2022
4660	13040	Bachelor of Architecture	ARC2837	Dissertation	2022
4661	13040	Bachelor of Architecture	ARC2818	People Culture & Built Environment-IV	2022
4662	13040	Bachelor of Architecture	ARC2819	Ecology, Environment & Sustainable Development-IV	2022
4663	13040	Bachelor of Architecture	ARC2820	Computer Applications & Advance Technologies-IV (Software)	2022
4664	13040	Bachelor of Architecture	ARC2821	Aesthetics & Creativity- Theatre & Set Design	2022
4665	13040	Bachelor of Architecture	ARC2937	Practical Training	2022
4666	13040	Bachelor of Architecture	ARC2037	Architectural Thesis	2022
4667	13040	Bachelor of Architecture	ARC2001	Professional Practice	2022
4668	13040	Bachelor of Architecture	ARC2002	Career Development	2022
4669	13040	Bachelor of Architecture	ARC2003	Understanding Cultural Landscapes for Urban Renewal & Conservation	2022
4670	13040	Bachelor of Architecture	ARC2004	Smart Cities and Smart Technologies	2022
4671	13040	Bachelor of Architecture	ARC2005	Transit Oriented Development	2022
4672	13349	Bachelor of Planning	PLN2101	Fundamentals of Urban and Regional Planning	2022
4673	13349	Bachelor of Planning	PLN2104	Statistical and Quantitative Methods in Planning	2022
4674	13349	Bachelor of Planning	PLN2109	Techniques of Planning-I	2022
4675	13349	Bachelor of Planning	PLN2110	Basic Computer Applications	2022
4676	13349	Bachelor of Planning	PLN2111	Technical Report Writing	2022
4677	13349	Bachelor of Planning	PLN2107	Planning and Design Lab-I (Area Appreciation and Space Perceptions)	2022
4678	13349	Bachelor of Planning	PLN2210	Cities in History	2022
4679	13349	Bachelor of Planning	PLN2211	Geo Informatics for Planning-I	2022
4680	13349	Bachelor of Planning	PLN2212	Planning Communication	2022
4681	13349	Bachelor of Planning	PLN2213	Site and Land Development	2022
4682	13349	Bachelor of Planning	PLN2214	Introduction to Social Sciences	2022
4683	13349	Bachelor of Planning	PLN2208	Planning and Design Lab-II (Site Planning and Urban Neighbourhood Planning)	2022

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4684	13349	Bachelor of Planning	PLN2301	Planning Theory-I	2022
4685	13349	Bachelor of Planning	PLN2303	Techniques of Planning-II	2022
4686	13349	Bachelor of Planning	PLN2305	Demography and Urbanization	2022
4687	13349	Bachelor of Planning	PLN2306	Traffic and Transportation Planning-I	2022
4688	13349	Bachelor of Planning	PLN2309	Elements of Economics	2022
4689	13349	Bachelor of Planning	PLN2307	Planning and Design Lab-III (Village Planning)	2022
4690	13349	Bachelor of Planning	PLN2401	Planning Theory-II	2022
4691	13349	Bachelor of Planning	PLN2402	Planning Practice-I	2022
4692	13349	Bachelor of Planning	PLN2403	Traffic and Transportation Planning-II	2022
4693	13349	Bachelor of Planning	PLN2408	Geo-Informatics for Planning-II	2022
4694	13349	Bachelor of Planning	PLN2407	Planning and Design Lab-IV (Land use and Transport Planning)	2022
4695	13349	Bachelor of Planning	PLN2411	Real Estate Development and Management	2022
4696	13349	Bachelor of Planning	PLN2412	Urban Governance and Management	2022
4697	13349	Bachelor of Planning	PLN2413	Reading and Comprehending Spaces	2022
4698	13349	Bachelor of Planning	PLN2502	Planning and Management of Utilities and Services	2022
4699	13349	Bachelor of Planning	PLN2503	Planning Legislation-I	2022
4700	13349	Bachelor of Planning	PLN2510	Housing and Community Planning	2022
4701	13349	Bachelor of Planning	PLN2511	Ecology, Environment and Resource Development & Management	2022
4702	13349	Bachelor of Planning	PLN2507	Planning and Design Lab-V (Sub-City Plan)	2022
4703	13349	Bachelor of Planning	PLN2508	Professional Training-I	2022
4704	13349	Bachelor of Planning	PLN2509	Disaster Risk Management and Climate Change Adaptations	2022
4705	13349	Bachelor of Planning	PLN2513	Infographic and Storytelling Techniques	2022
4706	13349	Bachelor of Planning	PLN2514	Eco-Tourism	2022
4707	13349	Bachelor of Planning	PLN2605	Planning and Management of Informal Sectors	2022
4708	13349	Bachelor of Planning	PLN2608	Metropolitan Planning, Development and Management	2022
4709	13349	Bachelor of Planning	PLN2609	Regional Planning & Management	2022
4710	13349	Bachelor of Planning	PLN2613	Environment Planning	2022

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4711	13349	Bachelor of Planning	PLN2607	Planning and Design Lab-VI (Master Development Plan)	2022
4712	13349	Bachelor of Planning	PLN2610	Special Area Planning	2022
4713	13349	Bachelor of Planning	PLN2612	Urban Design, Renewal, and Conservation	2022
4714	13349	Bachelor of Planning	PLN2614	Big Data and Data Analysis	2022
4715	13349	Bachelor of Planning	PLN2703	Urban Finance	2022
4716	13349	Bachelor of Planning	PLN2711	Project Formulation, Appraisal and Management	2022
4717	13349	Bachelor of Planning	PLN2716	Land Economics and Location Theory	2022
4718	13349	Bachelor of Planning	PLN2706	Planning and Design Lab-VII (Regional Plan)	2022
4719	13349	Bachelor of Planning	PLN2707	Professional Training-II	2022
4720	13349	Bachelor of Planning	PLN2737	Dissertation	2022
4721	13349	Bachelor of Planning	PLN2714	Smart Cities and Advanced Technologies for Emerging Planning Issues	2022
4722	13349	Bachelor of Planning	PLN2717	Participatory Integrated Urban Development	2022
4723	13349	Bachelor of Planning	PLN2718	Sustainable Cities and Regions	2022
4724	13349	Bachelor of Planning	PLN2802	Planning Practice – II	2022
4725	13349	Bachelor of Planning	PLN2803	Human Values in Planning	2022
4726	13349	Bachelor of Planning	PLN2804	Rural Development & Management	2022
4727	13349	Bachelor of Planning	PLN2805	Planning Legislation-II	2022
4728	13349	Bachelor of Planning	PLN2837	Planning Thesis	2022
4729	131469	Master of Planning (Urban & Regional)	PLN4101	Planning History and Theory	2022
4730	131469	Master of Planning (Urban & Regional)	PLN4102	Socio-Economic Dimensions in Planning	2022
4731	131469	Master of Planning (Urban & Regional)	PLN4103	Planning Techniques and Computer Applications	2022
4732	131469	Master of Planning (Urban & Regional)	PLN4104	Infrastructure Planning and Management	2022
4733	131469	Master of Planning (Urban & Regional)	PLN4105	Housing and Environmental Planning	2022
4734	131469	Master of Planning (Urban & Regional)	PLN4108	Planning Studio-I (i) Area Planning (ii) Village Development Plan	2022
4735	131469	Master of Planning (Urban & Regional)	PLN4110	Infographic and Storytelling Techniques	2022
4736	131469	Master of Planning (Urban & Regional)	PLN4111	Eco-Tourism	2022

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4737	131469	Master of Planning (Urban & Regional)	PLN4112	Metropolitan Regional Planning	2022
4738	131469	Master of Planning (Urban & Regional)	PLN4208	Application of Geoinformatics	2022
4739	131469	Master of Planning (Urban & Regional)	PLN4209	Regional Planning and Development	2022
4740	131469	Master of Planning (Urban & Regional)	PLN4210	Land Management and Real Estate	2022
4741	131469	Master of Planning (Urban & Regional)	PLN4211	Transportation Planning and Management	2022
4742	131469	Master of Planning (Urban & Regional)	PLN4212	Demography and Quantitative Analysis	2022
4743	131469	Master of Planning (Urban & Regional)	PLN4206	Planning Studio-II Urban Planning	2022
4744	131469	Master of Planning (Urban & Regional)	PLN4213	Special Area Planning	2022
4745	131469	Master of Planning (Urban & Regional)	PLN4215	Urban Design Renewal and Conservation	2022
4746	131469	Master of Planning (Urban & Regional)	PLN4216	Big Data and Data Analytics	2022
4747	131469	Master of Planning (Urban & Regional)	PLN4302	Project Planning and Finance Management	2022
4748	131469	Master of Planning (Urban & Regional)	PLN4304	Public Policy and Politics in Planning	2022
4749	131469	Master of Planning (Urban & Regional)	PLN4308	Resilience and Planning	2022
4750	131469	Master of Planning (Urban & Regional)	PLN4309	Urban and Regional Governance	2022
4751	131469	Master of Planning (Urban & Regional)	PLN4310	Research Methodology and Thesis Planning	2022
4752	131469	Master of Planning (Urban & Regional)	PLN4307	Planning Studio-III Regional Planning	2022
4753	131469	Master of Planning (Urban & Regional)	PLN4312	Smart Cities and Advanced Technologies for Emerging Planning Issues	2022
4754	131469	Master of Planning (Urban & Regional)	PLN4314	Participatory and Integrated Urban Development	2022
4755	131469	Master of Planning (Urban & Regional)	PLN4315	Sustainable Cities and Regions	2022
4756	131469	Master of Planning (Urban & Regional)	PLN4403	Planning Legislation and Professional Practice	2022
4757	131469	Master of Planning (Urban & Regional)	PLN4437	Planning Thesis	2022
4758	OE	Behavioural Science (OE)	BEH2151	Understanding Self for Effectiveness	2022

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4759	OE	Behavioural Science (OE)	BEH2251	Problem Solving and Creative Thinking	2022
4760	OE	Behavioural Science (OE)	BEH2351	Group Dynamics and Team Building	2022
4761	OE	Behavioural Science (OE)	BEH2451	Stress and Coping Strategies	2022
4762	OE	Behavioural Science (OE)	BEH2551	Individual, Society and Nations	2022
4763	OE	Behavioural Science (OE)	BEH2651	Interpersonal Communication and Relationship Management	2022
4764	OE	Behavioural Science (OE)	BEH2552	Personality, Nationalism and Human Values	2022
4765	OE	Behavioural Science (OE)	BEH2652	Interpersonal Communication	2022
4766	OE	Behavioural Science (OE)	BEH2751	Relationship Management	2022
4767	OE	Behavioural Science (OE)	BEH2851	Personal & Professional Excellence	2022
4768	OE	Behavioural Science (OE)	BEH4151	Self-Development and Interpersonal Skills	2022
4769	OE	Behavioural Science (OE)	BEH4251	Behavioural Communication and Relationship Management	2022
4770	OE	Behavioural Science (OE)	BEH4351	Leading Through Teams	2022
4771	OE	Behavioural Science (OE)	BEH4451	Professional Excellence	2022
4772	OE	Communication Skills (OE)	CSS2151	Effective Listening	2022
4773	OE	Communication Skills (OE)	CSS2251	Presentation Skills	2022
4774	OE	Communication Skills (OE)	CSS2351	Reading and Comprehension	2022
4775	OE	Communication Skills (OE)	CSS2451	Corporate Communication	2022
4776	OE	Communication Skills (OE)	CSS2551	Employability Skills	2022
4777	OE	Communication Skills (OE)	CSS2651	Workplace Communication	2022
4778	OE	Communication Skills (OE)	CSS2152	English-I	2022
4779	OE	Communication Skills (OE)	CSS2252	English-II	2022
4780	OE	Communication Skills (OE)	CSS4151	Basics of Communication	2022
4781	OE	Communication Skills (OE)	CSS4251	Corporate Communication	2022
4782	OE	Communication Skills (OE)	CSS4351	Interpersonal Communication	2022
4783	OE	Communication Skills (OE)	CSS4451	Cross Cultural Communication	2022
4784	OE	Communication Skills (OE)	CSS4152	Managerial Communication	2022
4785	OE	Environmental Studies (OE)	ENV2151	Environmental Studies-I	2022
4786	OE	Environmental Studies (OE)	ENV2251	Environmental Studies-II	2022
4787	OE	Environmental Studies (OE)	ENV2152/ ENV2252	Environmental Studies	2022
4788	OE	French (OE)	LAN2151	French-I	2022
4789	OE	French (OE)	LAN2251	French-II	2022
4790	OE	French (OE)	LAN2351	French-III	2022
4791	OE	French (OE)	LAN2451	French-IV	2022

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4792	OE	French (OE)	LAN2551	French-V	2022
4793	OE	French (OE)	LAN2651	French-VI	2022
4794	OE	French (OE)	LAN2751	French-VII	2022
4795	OE	French (OE)	LAN2851	French-VIII	2022
4796	OE	French (OE)	LAN2951	French-IX	2022
4797	OE	French (OE)	LAN2170	French for Technology-I	2022
4798	OE	French (OE)	LAN2270	French for Technology-II	2022
4799	OE	French (OE)	LAN2370	French for Technology-III	2022
4800	OE	French (OE)	LAN2470	French for Technology-IV	2022
4801	OE	French (OE)	LAN2570	French for Technology-V	2022
4802	OE	French (OE)	LAN2670	French for Technology-VI	2022
4803	OE	French (OE)	LAN2770	French for Technology-VII	2022
4804	OE	French (OE)	LAN4151	French-I	2022
4805	OE	French (OE)	LAN4251	French-II	2022
4806	OE	French (OE)	LAN4351	French-III	2022
4807	OE	French (OE)	LAN4451	French-IV	2022
4808	OE	French (OE)	LAN4551	French-V	2022
4809	OE	German (OE)	LAN2152	German-I	2022
4810	OE	German (OE)	LAN2252	German-II	2022
4811	OE	German (OE)	LAN2352	German-III	2022
4812	OE	German (OE)	LAN2452	German-IV	2022
4813	OE	German (OE)	LAN2552	German-V	2022
4814	OE	German (OE)	LAN2652	German-VI	2022
4815	OE	German (OE)	LAN2752	German-VII	2022
4816	OE	German (OE)	LAN2852	German-VIII	2022
4817	OE	German (OE)	LAN2952	German-IX	2022
4818	OE	German (OE)	LAN4152	German-I	2022
4819	OE	German (OE)	LAN4252	German-II	2022
4820	OE	German (OE)	LAN4352	German-III	2022
4821	OE	German (OE)	LAN4452	German-IV	2022
4822	OE	German (OE)	LAN4552	German-V	2022
4823	OE	Spanish (OE)	LAN2153	Spanish-I	2022
4824	OE	Spanish (OE)	LAN2253	Spanish-II	2022
4825	OE	Spanish (OE)	LAN2353	Spanish-III	2022
4826	OE	Spanish (OE)	LAN2453	Spanish-IV	2022
4827	OE	Spanish (OE)	LAN2553	Spanish-V	2022
4828	OE	Spanish (OE)	LAN2653	Spanish-VI	2022
4829	OE	Spanish (OE)	LAN2753	Spanish-VII	2022

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4830	OE	Spanish (OE)	LAN2853	Spanish-VIII	2022
4831	OE	Spanish (OE)	LAN2953	Spanish-IX	2022
4832	OE	Spanish (OE)	LAN4153	Spanish-I	2022
4833	OE	Spanish (OE)	LAN4253	Spanish-II	2022
4834	OE	Spanish (OE)	LAN4353	Spanish-III	2022
4835	OE	Spanish (OE)	LAN4453	Spanish-IV	2022
4836	OE	Spanish (OE)	LAN4553	Spanish-V	2022
4837	OE	Russian (OE)	LAN2154	Russian-I	2022
4838	OE	Russian (OE)	LAN2254	Russian-II	2022
4839	OE	Russian (OE)	LAN2354	Russian-III	2022
4840	OE	Russian (OE)	LAN2454	Russian-IV	2022
4841	OE	Russian (OE)	LAN2554	Russian-V	2022
4842	OE	Russian (OE)	LAN2654	Russian-VI	2022
4843	OE	Russian (OE)	LAN2754	Russian-VII	2022
4844	OE	Russian (OE)	LAN2854	Russian-VIII	2022
4845	OE	Russian (OE)	LAN2954	Russian-IX	2022
4846	OE	Russian (OE)	LAN4154	Russian-I	2022
4847	OE	Russian (OE)	LAN4254	Russian-II	2022
4848	OE	Russian (OE)	LAN4354	Russian-III	2022
4849	OE	Russian (OE)	LAN4454	Russian-IV	2022
4850	OE	Russian (OE)	LAN4554	Russian-V	2022
4851	OE	Chinese (OE)	LAN2155	Chinese-I	2022
4852	OE	Chinese (OE)	LAN2255	Chinese-II	2022
4853	OE	Chinese (OE)	LAN2355	Chinese-III	2022
4854	OE	Chinese (OE)	LAN2455	Chinese-IV	2022
4855	OE	Chinese (OE)	LAN2555	Chinese-V	2022
4856	OE	Chinese (OE)	LAN2655	Chinese-VI	2022
4857	OE	Chinese (OE)	LAN2755	Chinese-VII	2022
4858	OE	Chinese (OE)	LAN2855	Chinese-VIII	2022
4859	OE	Chinese (OE)	LAN2955	Chinese-IX	2022
4860	OE	Chinese (OE)	LAN4155	Chinese-I	2022
4861	OE	Chinese (OE)	LAN4255	Chinese-II	2022
4862	OE	Chinese (OE)	LAN4355	Chinese-III	2022
4863	OE	Chinese (OE)	LAN4455	Chinese-IV	2022
4864	OE	Chinese (OE)	LAN4555	Chinese-V	2022
4865	OE	Korean (OE)	LAN2157	Korean-I	2022
4866	OE	Korean (OE)	LAN2257	Korean-II	2022
4867	OE	Korean (OE)	LAN2357	Korean-III	2022

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4868	OE	Korean (OE)	LAN2457	Korean-IV	2022
4869	OE	Korean (OE)	LAN2557	Korean-V	2022
4870	OE	Korean (OE)	LAN2657	Korean-VI	2022
4871	OE	Korean (OE)	LAN2757	Korean-VII	2022
4872	OE	Korean (OE)	LAN2857	Korean-VIII	2022
4873	OE	Korean (OE)	LAN2957	Korean-IX	2022
4874	OE	Korean (OE)	LAN4157	Korean-I	2022
4875	OE	Korean (OE)	LAN4257	Korean-II	2022
4876	OE	Korean (OE)	LAN4357	Korean-III	2022
4877	OE	Korean (OE)	LAN4457	Korean-IV	2022
4878	OE	Korean (OE)	LAN4557	Korean-V	2022
4879	OE	Japanese (OE)	LAN2158	Japanese-I	2022
4880	OE	Japanese (OE)	LAN2258	Japanese-II	2022
4881	OE	Japanese (OE)	LAN2358	Japanese-III	2022
4882	OE	Japanese (OE)	LAN2458	Japanese-IV	2022
4883	OE	Japanese (OE)	LAN2558	Japanese-V	2022
4884	OE	Japanese (OE)	LAN2658	Japanese-VI	2022
4885	OE	Japanese (OE)	LAN2758	Japanese-VII	2022
4886	OE	Japanese (OE)	LAN2858	Japanese-VIII	2022
4887	OE	Japanese (OE)	LAN2958	Japanese-IX	2022
4888	OE	Japanese (OE)	LAN4158	Japanese-I	2022
4889	OE	Japanese (OE)	LAN4258	Japanese-II	2022
4890	OE	Japanese (OE)	LAN4358	Japanese-III	2022
4891	OE	Japanese (OE)	LAN4458	Japanese-IV	2022
4892	OE	Japanese (OE)	LAN4558	Japanese-V	2022
4893	OE	Hindi (OE)	LAN2159	Hindi-I	2022
4894	OE	Hindi (OE)	LAN2259	Hindi-II	2022
4895	OE	Hindi (OE)	LAN2359	Hindi-III	2022
4896	OE	Hindi (OE)	LAN2459	Hindi-IV	2022
4897	OE	Hindi (OE)	LAN2559	Hindi-V	2022
4898	OE	Hindi (OE)	LAN2659	Hindi-VI	2022
4899	OE	Hindi (OE)	LAN2759	Hindi-VII	2022
4900	OE	Hindi (OE)	LAN2859	Hindi-VIII	2022
4901	OE	Hindi (OE)	LAN2959	Hindi-IX	2022
4902	OE	Hindi (OE)	LAN4159	Hindi-I	2022
4903	OE	Hindi (OE)	LAN4259	Hindi-II	2022
4904	OE	Hindi (OE)	LAN4359	Hindi-III	2022
4905	OE	Hindi (OE)	LAN4459	Hindi-IV	2022

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4906	OE	Hindi (OE)	LAN4559	Hindi-V	2022
4907	OE	Accounting (OE)	COM2151	Financial Accounting-I	2022
4908	OE	Accounting (OE)	COM2251	Financial Accounting-II	2022
4909	OE	Accounting (OE)	COM2351	Corporate Accounting	2022
4910	OE	Accounting (OE)	COM2451	Financial Management	2022
4911	OE	Accounting (OE)	COM2551	Cost Accounting	2022
4912	OE	Accounting (OE)	COM2651	Management Accounting	2022
4913	OE	Aerospace Engineering (OE)	ASE2153	Elements of Aeronautics	2022
4914	OE	Aerospace Engineering (OE)	ASE2253	Elements of Astronautics	2022
4915	OE	Aerospace Engineering (OE)	ASE2353	Theory of Flight	2022
4916	OE	Aerospace Engineering (OE)	ASE2453	Principles of Stability & Control	2022
4917	OE	Aerospace Engineering (OE)	ASE2553	Introduction to Flight Vehicle Design	2022
4918	OE	Aerospace Engineering (OE)	ASE2653	Principles of Aerospace Propulsion	2022
4919	OE	Animation (OE)	ANI2152	Introduction to Multimedia and its Application	2022
4920	OE	Animation (OE)	ANI2252	Creating 2D Animation	2022
4921	OE	Animation (OE)	ANI2352	3D Modeling & Texturing	2022
4922	OE	Animation (OE)	ANI2452	Maya Modeling & Texturing	2022
4923	OE	Animation (OE)	ANI2552	Scripting & Storyboarding	2022
4924	OE	Animation (OE)	ANI2652	VFX	2022
4925	OE	Artificial Intelligence (OE)	CSE2351	Basics of Artificial Intelligence	2022
4926	OE	Artificial Intelligence (OE)	CSE2451	Artificial Neural Networks	2022
4927	OE	Artificial Intelligence (OE)	CSE2551	Fuzzy Logic	2022
4928	OE	Artificial Intelligence (OE)	CSE2651	Introduction to Genetic Algorithm	2022
4929	OE	Artificial Intelligence (OE)	CSE2751	Soft Computing	2022
4930	OE	Artificial Intelligence (OE)	CSE2851	Project (Artificial Intelligence)	2022
4931	OE	Biomedical (OE)	BME2351	Human Anatomy and Physiology-I	2022
4932	OE	Biomedical (OE)	BME2451	Bioinstrumentation	2022
4933	OE	Biomedical (OE)	BME2551	Tissue Engineering	2022
4934	OE	Biomedical (OE)	BME2651	Biomechanic	2022
4935	OE	Biomedical (OE)	BME2751	Medical Image Processing	2022
4936	OE	Biomedical (OE)	BME2851	Seminar-Biomedical Engineering	2022
4937	OE	Climate Science (OE)	AST2151	Basics of Climate Science	2022
4938	OE	Climate Science (OE)	AST2251	Introduction to Earth System Science	2022
4939	OE	Climate Science (OE)	AST2351	Cloud Microphysics and Chemistry	2022
4940	OE	Climate Science (OE)	AST2451	Climate Change: Impact, Vulnerability and Adaption	2022

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4941	OE	Climate Science (OE)	AST2551	Primer of Oceanography	2022
4942	OE	Climate Science (OE)	AST2651	Fundamentals of Climate Variability and Modeling	2022
4943	OE	Cloud Computing (OE)	CSE2353	Computer Networks	2022
4944	OE	Cloud Computing (OE)	CSE2453	Distributed System	2022
4945	OE	Cloud Computing (OE)	CSE2553	High Performance Computing	2022
4946	OE	Cloud Computing (OE)	CSE2653	Information Storage Management	2022
4947	OE	Cloud Computing (OE)	CSE2753	Interfacing with Virtualization	2022
4948	OE	Cloud Computing (OE)	CSE2853	Cloud Computing Tools & Techniques	2022
4949	OE	Computer Forensics & Cyber Security (OE)	FCH2151	Computer Forensics	2022
4950	OE	Computer Forensics & Cyber Security (OE)	FCH2251	Ethics, Policies and the IT Act	2022
4951	OE	Computer Forensics & Cyber Security (OE)	FCH2352	Biometric Technology	2022
4952	OE	Computer Forensics & Cyber Security (OE)	FCH2451	Implementation Practical on MATLAB	2022
4953	OE	Computer Forensics & Cyber Security (OE)	FCH2551	Cyber Security	2022
4954	OE	Computer Forensics & Cyber Security (OE)	FCH2651	Incident Response Management	2022
4955	OE	Data Analytics (OE)	MTH2151	Optimization Techniques	2022
4956	OE	Data Analytics (OE)	MTH2251	Statistics	2022
4957	OE	Data Analytics (OE)	MTH2351	Data Mining	2022
4958	OE	Data Analytics (OE)	MTH2451	Database Management System	2022
4959	OE	Data Analytics (OE)	MTH2551	Introduction to Financial Modeling	2022
4960	OE	Data Analytics (OE)	MTH2651	Statistical Quality Control	2022
4961	OE	Dietetics & Nutrition (OE)	DAN2151	Principles of Nutrition	2022
4962	OE	Dietetics & Nutrition (OE)	DAN2251	Family Meal Management	2022
4963	OE	Dietetics & Nutrition (OE)	DAN2351	Basics Dietetics	2022
4964	OE	Dietetics & Nutrition (OE)	DAN2451	Advanced Dietetics	2022
4965	OE	Dietetics & Nutrition (OE)	DAN2551	Community Nutrition	2022
4966	OE	Dietetics & Nutrition (OE)	DAN2651	Food Chemistry	2022
4967	OE	Disaster Management & Sustainable Built Environment (OE)	DSM2151	Introduction to Disaster Management	2022
4968	OE	Disaster Management & Sustainable Built Environment (OE)	DSM2251	Resilience Building for Built Environment	2022
4969	OE	Disaster Management & Sustainable Built Environment (OE)	DSM2351	Emergency Management	2022

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4970	OE	Disaster Management & Sustainable Built Environment (OE)	DSM2451	Rehabilitation Reconstruction and Recovery	2022
4971	OE	Disaster Management & Sustainable Built Environment (OE)	DSM2551	Climate Change Adaptations and Sustainable Development	2022
4972	OE	Disaster Management & Sustainable Built Environment (OE)	DSM2651	Geoinformatics in Disaster Management	2022
4973	OE	Economics (OE)	ECO2151	Micro Economics-I	2022
4974	OE	Economics (OE)	ECO2251	Indian Economy	2022
4975	OE	Economics (OE)	ECO2351	Macro Economics –I	2022
4976	OE	Economics (OE)	ECO2451	Public Finance	2022
4977	OE	Economics (OE)	ECO2552	Statistical Methods in Economics	2022
4978	OE	Economics (OE)	ECO2651	Money, Banking & Financial Markets	2022
4979	OE	Embedded System (OE)	ECE2352	Introduction to Microprocessor System	2022
4980	OE	Embedded System (OE)	ECE2452	Microcontroller	2022
4981	OE	Embedded System (OE)	ECE2552	PCB Fabrication	2022
4982	OE	Embedded System (OE)	ECE2652	Robotics and Automation	2022
4983	OE	Embedded System (OE)	ECE2752	Simulation and Modeling	2022
4984	OE	Embedded System (OE)	ECE2852	Project (Embedded System)	2022
4985	OE	English Literature (OE)	ENG2151	Shakespearean Comedy	2022
4986	OE	English Literature (OE)	ENG2251	Romantic Poetry	2022
4987	OE	English Literature (OE)	ENG2351	The Novels of England	2022
4988	OE	English Literature (OE)	ENG2451	The English Novels of India	2022
4989	OE	English Literature (OE)	ENG2551	Genre Fiction	2022
4990	OE	English Literature (OE)	ENG2651	Contemporary Literature	2022
4991	OE	Environmental Management (OE)	ENV2351	Environmental Pollution and Waste Management	2022
4992	OE	Environmental Management (OE)	ENV2451	Environmental Management and Industrial Safety	2022
4993	OE	Environmental Management (OE)	ENV2551	Environmental Economics and Globalization	2022
4994	OE	Environmental Management (OE)	ENV2651	Sustainable Development Practices	2022
4995	OE	Entrepreneurship (OE)	MGT2152	Orientation Programme in Entrepreneurship	2022
4996	OE	Entrepreneurship (OE)	MGT2252	Exploring Business Opportunity	2022
4997	OE	Entrepreneurship (OE)	MGT2352	Developing a Business Model	2022
4998	OE	Entrepreneurship (OE)	MGT2452	Translating Business Model into Startup	2022
4999	OE	Entrepreneurship (OE)	MGT2552	Advanced Programme in Entrepreneurship: Growth	2022

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5000	OE	Entrepreneurship (OE)	MGT2652	Advanced Programme in Entrepreneurship: Expansion	2022
5001	OE	Environmental Health & Climate (OE)	AST2152	Linkages between Environment and Health	2022
5002	OE	Environmental Health & Climate (OE)	AST2252	Climate Change and Implications on Public Health	2022
5003	OE	Environmental Health & Climate (OE)	AST2352	Diseases in Contemporary Society	2022
5004	OE	Environmental Health & Climate (OE)	AST2452	Air, Water and Soil Pollution, Environmental Health Professions	2022
5005	OE	Environmental Health & Climate (OE)	AST2552	Ground-based and Satellite Remote Sensing	2022
5006	OE	Environmental Health & Climate (OE)	AST2652	Instrumentation Lab	2022
5007	OE	Fashion Management (OE)	FDT2151	Fashion Art Illustration and Model Drawing	2022
5008	OE	Fashion Management (OE)	FDT2251	Fashion Theory	2022
5009	OE	Fashion Management (OE)	FDT2351	Computer Aided Manufacturing	2022
5010	OE	Fashion Management (OE)	FDT2451	Fashion Management	2022
5011	OE	Fashion Management (OE)	FDT2551	Fashion Forecasting	2022
5012	OE	Fashion Management (OE)	FDT2651	Fashion Retailing & Visual Merchandising	2022
5013	OE	French Studies (OE)	LAN2161	Professional French for Business-1	2022
5014	OE	French Studies (OE)	LAN2261	Professional French for Business-2	2022
5015	OE	French Studies (OE)	LAN2361	Professional French for Business-3	2022
5016	OE	French Studies (OE)	LAN2461	Professional French for Business-4	2022
5017	OE	French Studies (OE)	LAN2561	Introduction to French Literature & select socio-cultural aspects of France	2022
5018	OE	French Studies (OE)	LAN2661	French through activities	2022
5019	OE	Geotechnical Engineering (OE)	CIV2351	Engineering Geology	2022
5020	OE	Geotechnical Engineering (OE)	CIV2451	Geo informatics	2022
5021	OE	Geotechnical Engineering (OE)	CIV2551	Geotechnical Engineering-I	2022
5022	OE	Geotechnical Engineering (OE)	CIV2651	Geotechnical Engineering-II	2022
5023	OE	Geotechnical Engineering (OE)	CIV2751	Project (Geotechnical Engineering)	2022
5024	OE	Geotechnical Engineering (OE)	CIV2851	Seminar-Geotechnical Engineering	2022
5025	OE	German Studies (OE)	LAN2162	Professional German for Business-1	2022
5026	OE	German Studies (OE)	LAN2262	Professional German for Business-2	2022
5027	OE	German Studies (OE)	LAN2362	Professional German for Business-3	2022
5028	OE	German Studies (OE)	LAN2462	Professional German for Business-4	2022

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5029	OE	German Studies (OE)	LAN2562	Introduction to German Literature & select socio-cultural aspects of Germany	2022
5030	OE	German Studies (OE)	LAN2662	German through activities	2022
5031	OE	History (OE)	HIS2151	History of Ancient India	2022
5032	OE	History (OE)	HIS2251	History of Medieval India	2022
5033	OE	History (OE)	HIS2351	History of Modern India	2022
5034	OE	History (OE)	HIS2451	The Ancient World	2022
5035	OE	History (OE)	HIS2551	Rise of the Modern West	2022
5036	OE	History (OE)	HIS2651	History of the World from Mid 20 th Century to the 21 st Century	2022
5037	OE	Human Rights (OE)	LAW2152	Concept and Theoretical Understanding of Human Rights	2022
5038	OE	Human Rights (OE)	LAW2252	Systems, Organizations and Instruments of Human Rights	2022
5039	OE	Human Rights (OE)	LAW2352	Contemporary Human Rights Situations and Issues	2022
5040	OE	Human Rights (OE)	LAW2452	Specific Themes in Human Rights	2022
5041	OE	Human Rights (OE)	LAW2552	Legislation Themes in Human Rights	2022
5042	OE	Human Rights (OE)	LAW2652	Report Writing and Thesis Preparation (Human Rights)	2022
5043	OE	Instrumentation Engineering (OE)	ECE2351	Basic Instrumentation	2022
5044	OE	Instrumentation Engineering (OE)	ECE2451	Virtual Instrumentation	2022
5045	OE	Instrumentation Engineering (OE)	ECE2551	Biomedical Instrumentation	2022
5046	OE	Instrumentation Engineering (OE)	ECE2651	Analytical Instrumentation	2022
5047	OE	Instrumentation Engineering (OE)	ECE2751	Industrial Process Control	2022
5048	OE	Instrumentation Engineering (OE)	ECE2851	Project (Instrumentation Engineering)	2022
5049	OE	Intellectual Property Rights (OE)	LAW2151	Principles of IPR	2022
5050	OE	Intellectual Property Rights (OE)	LAW2251	Patent Law and Practices	2022
5051	OE	Intellectual Property Rights (OE)	LAW2351	Copyright Law and Practices	2022
5052	OE	Intellectual Property Rights (OE)	LAW2451	Trademark Law and Practices	2022
5053	OE	Intellectual Property Rights (OE)	LAW2551	Emerging Legal Issues and Challenges	2022
5054	OE	Intellectual Property Rights (OE)	LAW2651	Future Aspects of Intellectual Property Rights	2022
5055	OE	Journalism (OE)	JRN2151	Print Media: Reporting & Editing	2022
5056	OE	Journalism (OE)	JRN2251	Basic Photography	2022
5057	OE	Journalism (OE)	JRN2351	TV Journalism	2022
5058	OE	Journalism (OE)	JRN2451	TV Production & Presentation	2022

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5059	OE	Journalism (OE)	JRN2551	New Media	2022
5060	OE	Journalism (OE)	JRN2651	Media Analysis	2022
5061	OE	Korean Studies (OE)	LAN2165	Introduction to Korean History & Geography	2022
5062	OE	Korean Studies (OE)	LAN2265	Korean Cultural Perspectives	2022
5063	OE	Korean Studies (OE)	LAN2365	Modern History of Korea & Introduction to Korean Language	2022
5064	OE	Korean Studies (OE)	LAN2465	Contemporary Korea	2022
5065	OE	Korean Studies (OE)	LAN2565	Polity & Economy of Korea	2022
5066	OE	Korean Studies (OE)	LAN2665	Themes in Korean Literature	2022
5067	OE	Laser System (OE)	LOE2351	Basics of Lasers	2022
5068	OE	Laser System (OE)	LOE2451	Laser Technology & Applications	2022
5069	OE	Laser System (OE)	LOE2551	Laser Systems & Devices	2022
5070	OE	Laser System (OE)	LOE2651	Lasers in Defense Applications	2022
5071	OE	Laser System (OE)	LOE2751	Lasers in Industrial Applications	2022
5072	OE	Laser System (OE)	LOE2851	Lasers in Atmospheric Studies	2022
5073	OE	Management (OE)	MGT2151	Management Foundations	2022
5074	OE	Management (OE)	MGT2251	Marketing Management	2022
5075	OE	Management (OE)	MGT2351	Organizational Behaviour	2022
5076	OE	Management (OE)	MGT2451	Business Environment	2022
5077	OE	Management (OE)	MGT2551	Operations Research	2022
5078	OE	Management (OE)	MGT2651	Business Law	2022
5079	OE	Mechanical Engineering (OE)	MAE2352	Thermodynamics	2022
5080	OE	Mechanical Engineering (OE)	MAE2452	Fluid Power Systems	2022
5081	OE	Mechanical Engineering (OE)	MAE2552	KOM	2022
5082	OE	Mechanical Engineering (OE)	MAE2652	DOM	2022
5083	OE	Mechanical Engineering (OE)	MAE2752	Meteorology	2022
5084	OE	Mechanical Engineering (OE)	MAE2852	Project (Mechanical Engineering)	2022
5085	OE	Materials Science & Technology (OE)	PHY2151	Fundamentals of Materials Science	2022
5086	OE	Materials Science & Technology (OE)	PHY2251	Classification & Selection of Materials	2022
5087	OE	Materials Science & Technology (OE)	PHY2351	Properties of Materials	2022
5088	OE	Materials Science & Technology (OE)	PHY2451	Manufacturing Processes for Materials	2022
5089	OE	Materials Science & Technology (OE)	PHY2551	Materials Testing & Characterization	2022
5090	OE	Materials Science & Technology (OE)	PHY2651	Materials at Nanoscale	2022

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5091	OE	Nanotechnology (OE)	NAT2152	Basics of Nanoscience	2022
5092	OE	Nanotechnology (OE)	NAT2251	Properties of Nanomaterials	2022
5093	OE	Nanotechnology (OE)	NAT2353	Synthesis of Nanomaterials	2022
5094	OE	Nanotechnology (OE)	NAT2453	Characterization Techniques	2022
5095	OE	Nanotechnology (OE)	NAT2553	Vacuum Science & Clean Room Technology	2022
5096	OE	Nanotechnology (OE)	NAT2652	Industrial Applications of Nanomaterials	2022
5097	OE	Painting Arts (OE)	FNA2151	Basics of Drawing and Asian Landscape	2022
5098	OE	Painting Arts (OE)	FNA2251	Basics of Drawing and Monochrome Folk Composition	2022
5099	OE	Painting Arts (OE)	FNA2351	Advanced Drawing and Illustration of Indian Temple Sculpture	2022
5100	OE	Painting Arts (OE)	FNA2451	Advanced Drawing with Ink with brush Illustration	2022
5101	OE	Painting Arts (OE)	FNA2551	Advanced Drawing and Illustration with Mural Art	2022
5102	OE	Painting Arts (OE)	FNA2651	Advanced Drawing and Illustration with Visual Design	2022
5103	OE	Pharmaceuticals (OE)	CHY2152	Cosmetic Formulation	2022
5104	OE	Pharmaceuticals (OE)	CHY2252	Industrial Management and Safety Process	2022
5105	OE	Pharmaceuticals (OE)	CHY2352	Drug Design	2022
5106	OE	Pharmaceuticals (OE)	CHY2452	Application of Nanotechnology in Medicine	2022
5107	OE	Pharmaceuticals (OE)	CHY2552	Intellectual Property Rights and Quality Assurance	2022
5108	OE	Pharmaceuticals (OE)	CHY2652	Pharmaceutical and Cosmetics Sciences Lab	2022
5109	OE	Physical Education and Sports Management (OE)	PED2151	Health Education and Sports	2022
5110	OE	Physical Education and Sports Management (OE)	PED2251	Human Anatomy and Exercise	2022
5111	OE	Physical Education and Sports Management (OE)	PED2351	Sports Training and Conditioning	2022
5112	OE	Physical Education and Sports Management (OE)	PED2451	Basics of Sports Management	2022
5113	OE	Physical Education and Sports Management (OE)	PED2551	Sports Psychology	2022
5114	OE	Physical Education and Sports Management (OE)	PED2651	Sports Medicine	2022
5115	OE	Political Studies (OE)	POL2151	Indian National Movement	2022

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5116	OE	Political Studies (OE)	POL2251	Indian State and Politics after Independence	2022
5117	OE	Political Studies (OE)	POL2351	State Politics in India	2022
5118	OE	Political Studies (OE)	POL2451	Politics and Media	2022
5119	OE	Political Studies (OE)	POL2551	South Asia: Political Perspectives	2022
5120	OE	Political Studies (OE)	POL2651	Post-Cold War World Politics	2022
5121	OE	Psychology (OE)	PSY2151	Introductory Psychology	2022
5122	OE	Psychology (OE)	PSY2251	Abnormal Psychology	2022
5123	OE	Psychology (OE)	PSY2351	Basic Cognitive Psychology	2022
5124	OE	Psychology (OE)	PSY2451	Life Span Development	2022
5125	OE	Psychology (OE)	PSY2551	Psychometric Testing	2022
5126	OE	Psychology (OE)	PSY2651	Counselling Psychology	2022
5127	OE	Positive Psychology (OE)	PSY2152	The Science of Happiness	2022
5128	OE	Positive Psychology (OE)	PSY2252	Optimism and Success	2022
5129	OE	Positive Psychology (OE)	PSY2352	Resilience and Well Being	2022
5130	OE	Positive Psychology (OE)	PSY2452	Positive Psychology & Work Life	2022
5131	OE	Positive Psychology (OE)	PSY2552	Creativity & Problem Solving	2022
5132	OE	Positive Psychology (OE)	PSY2652	Positive Leadership & Competency Development	2022
5133	OE	Performing Arts (OE)	PAR2151	Introduction to Performing Arts	2022
5134	OE	Performing Arts (OE)	PAR2251	Dynamics of Dance, Music & Theatre	2022
5135	OE	Performing Arts (OE)	PAR2351	Social relevance of Dance, Music & Drama in Contemporary Indian Scene	2022
5136	OE	Performing Arts (OE)	PAR2451	Indian Folk Arts	2022
5137	OE	Performing Arts (OE)	PAR2551	Modern Indian Performing Arts	2022
5138	OE	Performing Arts (OE)	PAR2651	Arts, Aesthetic & Society	2022
5139	OE	Polymer Technology (OE)	PTE2151	Polymerization	2022
5140	OE	Polymer Technology (OE)	PTE2251	Waste Plastic Recycling	2022
5141	OE	Polymer Technology (OE)	PTE2351	Polymer Technology	2022
5142	OE	Polymer Technology (OE)	PTE2451	Rubber & Tyre Technology	2022
5143	OE	Polymer Technology (OE)	PTE2551	Polymeric Nano Composites	2022
5144	OE	Polymer Technology (OE)	PTE2651	Bio-Medical Plastics	2022
5145	OE	Quebec Studies (OE)	LAN2164	Introduction to the French North America- a short history of Quebec	2022
5146	OE	Quebec Studies (OE)	LAN2264	Quebec Society Culture & Language	2022
5147	OE	Quebec Studies (OE)	LAN2364	Quebec in the World Affairs	2022
5148	OE	Quebec Studies (OE)	LAN2464	Political Economy of Quebec	2022

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5149	OE	Quebec Studies (OE)	LAN2564	Introduction to Major Literary Movements in Quebec-I	2022
5150	OE	Quebec Studies (OE)	LAN2664	Introduction to Major Literary Movements in Quebec-II	2022
5151	OE	Renewable Energy (OE)	SAE2152	Fundamental of Solar Photovoltaic, Battery & Inverter	2022
5152	OE	Renewable Energy (OE)	SAE2252	Solar PV Installation	2022
5153	OE	Renewable Energy (OE)	SAE2352	Solar PV Design	2022
5154	OE	Renewable Energy (OE)	SAE2452	Solid Waste Management and Power Generation	2022
5155	OE	Renewable Energy (OE)	SAE2552	Solar Thermal Systems	2022
5156	OE	Renewable Energy (OE)	SAE2651	Energy Audit and Energy Management	2022
5157	OE	Spanish Studies (OE)	LAN2163	EFE Professional Spanish for Business-I	2022
5158	OE	Spanish Studies (OE)	LAN2263	EFE Professional Spanish for Business-II	2022
5159	OE	Spanish Studies (OE)	LAN2363	EFE Professional Spanish for Business-III	2022
5160	OE	Spanish Studies (OE)	LAN2463	EFE Professional Spanish for Business-IV	2022
5161	OE	Spanish Studies (OE)	LAN2563	Introduction to Spanish Literature & select socio-cultural aspects of Spain	2022
5162	OE	Spanish Studies (OE)	LAN2663	Spanish through activities	2022
5163	OE	Stem Cell Technology (OE)	SCT2151	Introduction to Stem Cell Technology	2022
5164	OE	Stem Cell Technology (OE)	SCT2251	Fundamental Human Embryology & Developmental Biology	2022
5165	OE	Stem Cell Technology (OE)	SCT2351	Fundamental Cell Biology Human Anatomy & Physiology	2022
5166	OE	Stem Cell Technology (OE)	SCT2451	Human Pluripotent Stem Cell Culture & Differentiation Methods	2022
5167	OE	Stem Cell Technology (OE)	SCT2551	Therapeutic Applications of Human Pluripotent Stem Cells	2022
5168	OE	Stem Cell Technology (OE)	SCT2651	Project & Paper Presentation	2022
5169	OE	Sanskrit (OE)	SKT2151	Introduction to Sanskrit Language	2022
5170	OE	Sanskrit (OE)	SKT2251	General Introduction to Vedic Literature & Conversational Sanskrit	2022
5171	OE	Sanskrit (OE)	SKT2351	General Introduction to Sanskrit Literature & Sanskrit Conversation	2022
5172	OE	Sanskrit (OE)	SKT2451	Sanskrit Language & Indian Culture	2022

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5173	OE	Sanskrit (OE)	SKT2551	Introduction to Sanskrit Linguistics	2022
5174	OE	Sanskrit (OE)	SKT2651	General Introduction to Indian Philosophy & Sanskrit Grammar	2022
5175	OE	Tagore Studies (OE)	ENG2152	Rabindranath Tagore in the 21 st Century	2022
5176	OE	Tagore Studies (OE)	ENG2252	Tagore- Autobiographies & Biographical Sketches	2022
5177	OE	Tagore Studies (OE)	ENG2352	Tagore as a Cultural Icon – Tagore as a Painter & Performer	2022
5178	OE	Tagore Studies (OE)	ENG2452	Tagore as a Poet	2022
5179	OE	Tagore Studies (OE)	ENG2552	Tagore as a Fiction Writer	2022
5180	OE	Tagore Studies (OE)	ENG2652	Tagore and Mass Media	2022
5181	OE	Unmanned Aerial Vehicles (OE)	ASE2352	Introduction to UAVs and Applications	2022
5182	OE	Unmanned Aerial Vehicles (OE)	ASE2452	Principles of UAV's Flight	2022
5183	OE	Unmanned Aerial Vehicles (OE)	ASE2552	Aerial Imagery: Hardware & Software	2022
5184	OE	Unmanned Aerial Vehicles (OE)	ASE2652	Embedded Systems for UAVs	2022
5185	OE	Unmanned Aerial Vehicles (OE)	ASE2752	Research Project-I Drone Development	2022
5186	OE	Unmanned Aerial Vehicles (OE)	ASE2852	Research Project-II Drone Troubleshooting, Testing & Deployment	2022
5187	OE	Military Training Foundation (OE)	GEN2051	Military Training Foundation	2022
5188	OE	Apparel Merchandising (OE)	VFD2151	Introduction to Apparel Merchandising	2022
5189	OE	Apparel Merchandising (OE)	VFD2251	Apparel Market Research & Product Analysis	2022
5190	OE	Apparel Merchandising (OE)	VFD2351	Vendor Management & Product Evaluation	2022
5191	OE	Apparel Merchandising (OE)	VFD2451	Prototype Preparation & Merchandise Plan	2022
5192	OE	Apparel Merchandising (OE)	VFD2551	Pre-Production Management	2022
5193	OE	Apparel Merchandising (OE)	VFD2651	Shipment & Documentation Management	2022
5194	OE	Fashion Design (OE)	VFD2152	Design Eco-System	2022
5195	OE	Fashion Design (OE)	VFD2252	Fashion Design Research	2022
5196	OE	Fashion Design (OE)	VFD2352	Design Preparatory Process	2022
5197	OE	Fashion Design (OE)	VFD2452	Prototype Garment Development	2022
5198	OE	Fashion Design (OE)	VFD2552	Design Development	2022
5199	OE	Fashion Design (OE)	VFD2652	Health & Safety Equilibrium	2022
5200	OE	Food & Beverage Service (OE)	VHM2152	Basics of Food Service	2022

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List of courses 2022-23

Sl. No.	Programme Code	Name of Programme	Course Code	Course Name	Year
5201	OE	Food & Beverage Service (OE)	VHM2252	Advanced Food Service	2022
5202	OE	Food & Beverage Service (OE)	VHM2352	Beverage Studies- Basic	2022
5203	OE	Food & Beverage Service (OE)	VHM2452	Beverage Studies-Advanced	2022
5204	OE	Food & Beverage Service (OE)	VHM2552	F&B Service Supervisory Skills	2022
5205	OE	Food & Beverage Service (OE)	VHM2652	F&B Management Skills	2022
5206	OE	Food Production Techniques (OE)	VHM2151	Basics of Food Production	2022
5207	OE	Food Production Techniques (OE)	VHM2251	Food Production Skills	2022
5208	OE	Food Production Techniques (OE)	VHM2351	Food Production Operations	2022
5209	OE	Food Production Techniques (OE)	VHM2451	Advanced Food Production	2022
5210	OE	Food Production Techniques (OE)	VHM2551	Food Production Supervisory Skills	2022
5211	OE	Food Production Techniques (OE)	VHM2651	Food Production Management	2022
5212	OE	Front Office Operations (OE)	VHM2153	Fundamentals of Front Office Operations	2022
5213	OE	Front Office Operations (OE)	VHM2253	Handling Reception	2022
5214	OE	Front Office Operations (OE)	VHM2353	Check-in & Check-out Process	2022
5215	OE	Front Office Operations (OE)	VHM2453	Front Office Supervisory Skills	2022
5216	OE	Front Office Operations (OE)	VHM2553	Front Office Yield Management	2022
5217	OE	Front Office Operations (OE)	VHM2653	Managing Front Office	2022
5218	OE	Housekeeping Functions (OE)	VHM2154	Basics of Housekeeping	2022
5219	OE	Housekeeping Functions (OE)	VHM2254	Rules for Cleaning	2022
5220	OE	Housekeeping Functions (OE)	VHM2354	Laundry Operations	2022
5221	OE	Housekeeping Functions (OE)	VHM2454	Maintaining Guest Room	2022
5222	OE	Housekeeping Functions (OE)	VHM2554	Housekeeping Supervisory Skills	2022
5223	OE	Housekeeping Functions (OE)	VHM2654	Housekeeping Management Skills	2022
5224	OE	Tourism Operations (OE)	VTM2151	Fundamentals of Tourism	2022
5225	OE	Tourism Operations (OE)	VTM2251	Tour Operations & Tourist Guidance	2022
5226	OE	Tourism Operations (OE)	VTM2351	Handling Travel Agency	2022
5227	OE	Tourism Operations (OE)	VTM2451	Coordinating Tour Transportations	2022
5228	OE	Tourism Operations (OE)	VTM2551	Tourism Management	2022
5229	OE	Tourism Operations (OE)	VTM2651	Event Planning	2022

OE- Open Electives


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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
1	Computers in Management	MGT2101	Bachelor of Business Administration	Quiz, Group Discussion, Report Writing	2010
2	Financial Accounting	MGT2102	Bachelor of Business Administration	Quiz, Group Discussion	2010
3	E-Commerce	COM2103	Bachelor of Business Administration	Quiz, Presentation, Group Discussion	2010
4	Readings in Management	MGT2130	Bachelor of Business Administration	Quiz, Group Discussion, Report Writing	2010
5	Term Paper	MGT2131	Bachelor of Business Administration	Academic writing, Presentation	2010
6	Project (with Presentation & Evaluation)	MGT2132	Bachelor of Business Administration	Project writing, Presentation	2010
7	Workshop / Certification (Discipline Specific) (1credit per workshop)	MGT2133	Bachelor of Business Administration	Quiz, Written Test	2010
8	Study Abroad	MGT2134	Bachelor of Business Administration	Written test, Country Report	2010
9	Business Statistics	MGT2202	Bachelor of Business Administration	Quiz, Group Discussion, Report Writing	2010
10	Corporate Accounting	MGT2203	Bachelor of Business Administration	Quiz, Group Discussion	2010
11	Analysis & Design of Business System	MGT2204	Bachelor of Business Administration	Quiz, Presentation, Group Discussion	2010
12	Innovation & Creativity Management	MGT2205	Bachelor of Business Administration	Quiz, Group Discussion, Report Writing	2010
13	Human Values & Professional Ethics	MGT2206	Bachelor of Business Administration	Quiz, Presentation, Group Discussion	2010
14	Readings in Management	MGT2230	Bachelor of Business Administration	Quiz, Group Discussion, Report Writing	2010
15	Term Paper	MGT2231	Bachelor of Business Administration	Academic writing, Presentation	2010
16	Project (with Presentation & Evaluation)	MGT2232	Bachelor of Business Administration	Project writing, Presentation	2010
17	Workshop / Certification (Discipline Specific) (1credit per workshop)	MGT2233	Bachelor of Business Administration	Quiz, Written Test	2010
18	Study Abroad	MGT2234	Bachelor of Business Administration	Written test, Country Report	2010
19	Cost Accounting	MGT2303	Bachelor of Business Administration	Quiz, Presentation, Group Discussion, Viva-Voce	2010
20	Analytical Decision Making	MGT2304	Bachelor of Business Administration	Quiz, Presentation, Group Discussion, Viva-Voce	2010
21	Term Paper	MGT2331	Bachelor of Business Administration	Academic writing, Presentation	2010
22	Project (with Presentation & Evaluation)	MGT2332	Bachelor of Business Administration	Project writing, Presentation	2010
23	Workshop / Certification (Discipline Specific) (1credit per workshop)	MGT2333	Bachelor of Business Administration	Quiz, Written Test	2010
24	Study Abroad	MGT2334	Bachelor of Business Administration	Written test, Country Report	2010
25	Research Methodology & Report Preparation	MGT2402	Bachelor of Business Administration	Presentation, Quiz, Group Discussion	2010

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
26	Management Accounting	MGT2403	Bachelor of Business Administration	Quiz, Presentation, Group Discussion, Viva-Voce	2010
27	Business Information & Data Base System	MGT2404	Bachelor of Business Administration	Quiz, Presentation, Group Discussion, Viva-Voce	2010
28	Term Paper	MGT2431	Bachelor of Business Administration	Academic writing, Presentation	2010
29	Project (with Presentation & Evaluation)	MGT2432	Bachelor of Business Administration	Project writing, Presentation	2010
30	Workshop / Certification (Discipline Specific) (1credit per workshop)	MGT2433	Bachelor of Business Administration	Quiz, Written Test	2010
31	Study Abroad	MGT2434	Bachelor of Business Administration	Written test, Country Report	2010
32	Operations Research	MGT2551	Bachelor of Business Administration	Quiz, Presentation, Group Discussion, Viva-Voce	2010
33	Entrepreneurship Development	MGT2502	Bachelor of Business Administration	Quiz, Presentation, Group Discussion, Viva-Voce	2010
34	Summer Internship Evaluation	MGT2535	Bachelor of Business Administration	Project writing, Presentation	2010
35	Term Paper	MGT2531	Bachelor of Business Administration	Academic writing, Presentation	2010
36	Project (with Presentation & Evaluation)	MGT2532	Bachelor of Business Administration	Project writing, Presentation	2010
37	Workshop / Certification (Discipline Specific) (1credit per workshop)	MGT2533	Bachelor of Business Administration	Quiz, Written Test	2010
38	Training & Development	MGT2510	Bachelor of Business Administration	Quiz, Presentation, Group Discussion, Viva-Voce	2010
39	Relational Database Management System	MGT2512	Bachelor of Business Administration	Quiz, Presentation, Group Discussion, Viva-Voce	2010
40	Programming with Microsoft Visual Basic	MGT2514	Bachelor of Business Administration	Quiz, Presentation, Group Discussion, Viva-Voce	2010
41	Dissertation	MGT2637	Bachelor of Business Administration	Project writing, Presentation	2010
42	Brand Management	MGT2602	Bachelor of Business Administration	Quiz, Presentation, Group Discussion, Viva-Voce	2010
43	Advertising & Sales Promotion	MGT2603	Bachelor of Business Administration	Quiz, Presentation, Group Discussion, Viva-Voce	2010
44	Term Paper	MGT2631	Bachelor of Business Administration	Academic writing, Presentation	2010
45	Project (with Presentation & Evaluation)	MGT2632	Bachelor of Business Administration	Project writing, Presentation	2010
46	Workshop / Certification (Discipline Specific) (1credit per workshop)	MGT2633	Bachelor of Business Administration	Quiz, Written Test	2010
47	Corporate Tax Planning	MGT2605	Bachelor of Business Administration	Quiz, Presentation, Group Discussion, Viva-Voce	2010
48	Term Paper	MGT2631	Bachelor of Business Administration	Academic writing, Presentation	2010
49	Project (with Presentation & Evaluation)	MGT2632	Bachelor of Business Administration	Project writing, Presentation	2010
50	Workshop / Certification (Discipline Specific) (1credit per workshop)	MGT2633	Bachelor of Business Administration	Quiz, Written Test	2010

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
51	Compensation & Reward Management	MGT2610	Bachelor of Business Administration	Quiz, Presentation, Group Discussion, Viva-Voce	2010
52	Object Oriented Programming with Java	MGT2611	Bachelor of Business Administration	Quiz, Presentation, Group Discussion, Viva-Voce	2010
53	Web Database Programming with ASP	MGT2613	Bachelor of Business Administration	Quiz, Presentation, Group Discussion, Viva-Voce	2010
54	Intellectual Property Rights	MGT2614	Bachelor of Business Administration	Quiz, Presentation, Group Discussion, Viva-Voce	2010
55	Human Rights	MGT2615	Bachelor of Business Administration	Quiz, Presentation, Group Discussion, Viva-Voce	2010
56	Study Abroad	MGT2634	Bachelor of Business Administration	Written test, Country Report	2010
57	Financial Accounting	MBF2103	Bachelor of Business Administration (Banking & Finance)	Quiz, Presentation, Group Discussion, Viva-Voce	2013
58	Marketing Management	MBF2201	Bachelor of Business Administration (Banking & Finance)	Quiz, Presentation, Group Discussion, Viva-Voce	2013
59	Business Statistics	MBF2203	Bachelor of Business Administration (Banking & Finance)	Quiz, Presentation, Group Discussion, Viva-Voce	2013
60	Corporate Accounting	MBF2204	Bachelor of Business Administration (Banking & Finance)	Quiz, Presentation, Group Discussion, Viva-Voce	2013
61	Financial Management	MBF2302	Bachelor of Business Administration (Banking & Finance)	Quiz, Presentation, Group Discussion, Viva-Voce	2013
62	Computers and Management Information Systems	MBF2303	Bachelor of Business Administration (Banking & Finance)	Quiz, Presentation, Group Discussion, Viva-Voce	2013
63	Cost Accounting	MBF2304	Bachelor of Business Administration (Banking & Finance)	Quiz, Presentation, Group Discussion, Viva-Voce	2013
64	Corporate Tax Planning	MBF2306	Bachelor of Business Administration (Banking & Finance)	Quiz, Presentation, Group Discussion, Viva-Voce	2013
65	Management Accounting	MBF2401	Bachelor of Business Administration (Banking & Finance)	Quiz, Presentation, Group Discussion, Viva-Voce	2013
66	Research Methodology & Report Preparation	MBF2403	Bachelor of Business Administration (Banking & Finance)	Presentation, Quiz, Group Discussion	2013
67	Entrepreneurship Development	MBF2503	Bachelor of Business Administration (Banking & Finance)	Quiz, Presentation, Group Discussion, Viva-Voce	2013
68	Summer Internship	MBF2535	Bachelor of Business Administration (Banking & Finance)	Report Writing, Presentation	2013
69	Advanced Corporate Finance	MBF2604	Bachelor of Business Administration (Banking & Finance)	Quiz, Presentation, Group Discussion, Viva-Voce	2013

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
70	Project Work/ Dissertation	MBF2637	Bachelor of Business Administration (Banking & Finance)	Project writing, Presentation	2013
71	Accounting for Management	MGT4102	Master of Business Administration	Industry Guest Talk, Class Test, Presentation, Report Writing	2010
72	Quantitative Techniques in Management	MGT4106	Master of Business Administration	Industry Guest Talk, Class Test, Presentation, Report Writing	2010
73	Information Technology & E-Commerce	MGT4109	Master of Business Administration	Industry Guest Talk, Class Test, Presentation, Report Writing	2010
74	Business Research Methods	MGT4203	Master of Business Administration	Industry Guest Talk, Class Test, Presentation, Report Writing	2010
75	Management Science	MGT4207	Master of Business Administration	Industry Guest Talk, Class Test, Presentation, Report Writing	2010
76	Business Analytics	MGT4210	Master of Business Administration	Industry Guest Talk, Class Test, Presentation, Report Writing	2010
77	Excel for Managers	MGT4211	Master of Business Administration	Industry Guest Talk, Class Test, Presentation, Report Writing	2010
78	Corporate Financial Reporting & Analysis	FIN4201	Master of Business Administration	Industry Guest Talk, Class Test, Presentation, Report Writing	2010
79	Financial Statement Analysis	FIN4203	Master of Business Administration	Industry Guest Talk, Class Test, Presentation, Report Writing	2010
80	Web Design using HTML	ITM4204	Master of Business Administration	Industry Guest Talk, Class Test, Presentation, Report Writing	2010
81	Marketing Research	MKT4201	Master of Business Administration	Industry Guest Talk, Class Test, Presentation, Report Writing	2010
82	Web Design using HTML	ECM4204	Master of Business Administration	Industry Guest Talk, Class Test, Presentation, Report Writing	2010
83	Summer Internship Evaluation	MGT4335	Master of Business Administration	Report Writing, Presentation	2010
84	Business Valuation	FIN4302	Master of Business Administration	Industry Guest Talk, Class Test, Presentation, Report Writing	2010
85	Financial Modeling with MS-Excel	FIN4306	Master of Business Administration	Industry Guest Talk, Class Test, Presentation, Report Writing	2010
86	Training & Development	HRM4305	Master of Business Administration	Industry Guest Talk, Class Test, Presentation, Report Writing	2010
87	Database Management Systems	ITM4302	Master of Business Administration	Industry Guest Talk, Class Test, Presentation, Report Writing	2010
88	Digital Marketing	ITM4303	Master of Business Administration	Industry Guest Talk, Class Test, Presentation, Report Writing	2010
89	Introduction to Cloud Computing	ITM4304	Master of Business Administration	Industry Guest Talk, Class Test, Presentation, Report Writing	2010
90	System Analysis & Design	ITM4305	Master of Business Administration	Industry Guest Talk, Class Test, Presentation, Report Writing	2010
91	Dynamic Web Design & Development	ITM4306	Master of Business Administration	Industry Guest Talk, Class Test, Presentation, Report Writing	2010
92	Advertising & Sales Promotion	MKT4301	Master of Business Administration	Industry Guest Talk, Class Test, Presentation, Report Writing	2010
93	Digital Marketing	MKT4303	Master of Business Administration	Industry Guest Talk, Class Test, Presentation, Report Writing	2010
94	Direct Marketing	MKT4305	Master of Business Administration	Industry Guest Talk, Class Test, Presentation, Report Writing	2010

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
95	Retail Management	MKT4306	Master of Business Administration	Industry Guest Talk, Class Test, Presentation, Report Writing	2010
96	Sales Management	MKT4307	Master of Business Administration	Industry Guest Talk, Class Test, Presentation, Report Writing	2010
97	Consumer Behaviour	MKT4308	Master of Business Administration	Industry Guest Talk, Class Test, Presentation, Report Writing	2010
98	Digital Marketing	ECM4301	Master of Business Administration	Industry Guest Talk, Class Test, Presentation, Report Writing	2010
99	Database Management Systems	ECM4302	Master of Business Administration	Industry Guest Talk, Class Test, Presentation, Report Writing	2010
100	Dynamic Web Design & Development	ECM4307	Master of Business Administration	Industry Guest Talk, Class Test, Presentation, Report Writing	2010
101	Entrepreneurship Development	MGT4429	Master of Business Administration	Industry Guest Talk, Class Test, Presentation, Report Writing	2010
102	Dissertation	MGT4437	Master of Business Administration	Report Writing, Presentation, Viva-Voce	2010
103	Private Equity and Entrepreneurial Finance	FIN4405	Master of Business Administration	Industry Guest Talk, Class Test, Presentation, Report Writing	2010
104	Compensation & Reward Management	HRM4401	Master of Business Administration	Industry Guest Talk, Class Test, Presentation, Report Writing	2010
105	Psychological Testing	HRM4402	Master of Business Administration	Industry Guest Talk, Class Test, Presentation, Report Writing	2010
106	Managerial Counselling	HRM4406	Master of Business Administration	Industry Guest Talk, Class Test, Presentation, Report Writing	2010
107	International Trade Procedures & Documentation	IBM4407	Master of Business Administration	Industry Guest Talk, Class Test, Presentation, Report Writing	2010
108	Data Warehousing & Data Mining	ITM4401	Master of Business Administration	Industry Guest Talk, Class Test, Presentation, Report Writing	2010
109	Search Engine Optimization	ITM4405	Master of Business Administration	Industry Guest Talk, Class Test, Presentation, Report Writing	2010
110	Tools for Business Intelligence	ITM4406	Master of Business Administration	Industry Guest Talk, Class Test, Presentation, Report Writing	2010
111	Social Media Analytics	ECM4401	Master of Business Administration	Industry Guest Talk, Class Test, Presentation, Report Writing	2010
112	Tools for Business Intelligence	ECM4404	Master of Business Administration	Industry Guest Talk, Class Test, Presentation, Report Writing	2010
113	Search Engine Optimization	ECM4406	Master of Business Administration	Industry Guest Talk, Class Test, Presentation, Report Writing	2010
114	Accounting for Management	MBF4102	Master of Business Administration (Banking & Finance)	Industry Guest Talk, Class Test, Presentation, Report Writing	2012
115	Quantitative Techniques in Management	MBF4106	Master of Business Administration (Banking & Finance)	Industry Guest Talk, Class Test, Presentation, Report Writing	2012
116	Information Technology & E-Commerce	MBF4109	Master of Business Administration (Banking & Finance)	Industry Guest Talk, Class Test, Presentation, Report Writing	2012
117	Business Research Methods	MBF4203	Master of Business Administration (Banking & Finance)	Industry Guest Talk, Class Test, Presentation, Report Writing	2012

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
118	Business Analytics	MBF4210	Master of Business Administration (Banking & Finance)	Industry Guest Talk, Class Test, Presentation, Report Writing	2012
119	Excel for Managers	MBF4211	Master of Business Administration (Banking & Finance)	Industry Guest Talk, Class Test, Presentation, Report Writing	2012
120	Summer Internship Evaluation	MBF4335	Master of Business Administration (Banking & Finance)	Report Writing, Presentation, Viva-Voce	2012
121	Security Analysis & Portfolio Management	MBF4308	Master of Business Administration (Banking & Finance)	Industry Guest Talk, Class Test, Presentation, Report Writing	2012
122	Business Valuation	MBF4311	Master of Business Administration (Banking & Finance)	Industry Guest Talk, Class Test, Presentation, Report Writing	2012
123	Financial Modeling using MS-Excel	MBF4313	Master of Business Administration (Banking & Finance)	Industry Guest Talk, Class Test, Presentation, Report Writing	2012
124	Financial Risk Management	MBF4314	Master of Business Administration (Banking & Finance)	Industry Guest Talk, Class Test, Presentation, Report Writing	2012
125	Fixed Income Securities Analysis	MBF4315	Master of Business Administration (Banking & Finance)	Industry Guest Talk, Class Test, Presentation, Report Writing	2012
126	Entrepreneurship Development	MBF4413	Master of Business Administration (Banking & Finance)	Industry Guest Talk, Class Test, Presentation, Report Writing	2012
127	Dissertation	MBF4437	Master of Business Administration (Banking & Finance)	Report Writing, Presentation, Viva-Voce	2012
128	Corporate Tax Planning	MBF4408	Master of Business Administration (Banking & Finance)	Industry Guest Talk, Class Test, Presentation, Report Writing	2012
129	Private Equity & Entrepreneurial Finance	MBF4412	Master of Business Administration (Banking & Finance)	Industry Guest Talk, Class Test, Presentation, Report Writing	2012
130	Business Statistics	MWP4106	Master of Business Administration (Executive for Working Professionals)	Industry Guest Talk, Class Test, Presentation, Report Writing	2014
131	Information Technology for Managers	MWP4109	Master of Business Administration (Executive for Working Professionals)	Industry Guest Talk, Class Test, Presentation, Report Writing	2014
132	Workshop	MWP4133	Master of Business Administration (Executive for Working Professionals)	Report Writing, Presentation, Viva-Voce	2014
133	Research Methodology & Report Preparation	MWP4204	Master of Business Administration (Executive for Working Professionals)	Class Test, Presentation, Report Writing	2014
134	Fundamentals of Data Analytics	MWP4205	Master of Business Administration (Executive for Working Professionals)	Industry Guest Talk, Class Test, Presentation, Report Writing	2014

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
135	Term Paper	MWP4231	Master of Business Administration (Executive for Working Professionals)	Academic writing, Presentation	2014
136	Workshop	MWP4233	Master of Business Administration (Executive for Working Professionals)	Report Writing, Presentation, Viva-Voce	2014
137	MOOC Course	MWP4209	Master of Business Administration (Executive for Working Professionals)	Industry Guest Talk, Class Test, Presentation, Report Writing	2014
138	Innovation and Entrepreneurship	MWP4311	Master of Business Administration (Executive for Working Professionals)	Industry Guest Talk, Class Test, Presentation, Report Writing	2014
139	Project-I	MWP4337	Master of Business Administration (Executive for Working Professionals)	Report Writing, Presentation, Viva-Voce	2014
140	Database Management System for Business	MWP4322	Master of Business Administration (Executive for Working Professionals)	Industry Guest Talk, Class Test, Presentation, Report Writing	2014
141	E-Commerce Fundamentals	MWP4323	Master of Business Administration (Executive for Working Professionals)	Industry Guest Talk, Class Test, Presentation, Report Writing	2014
142	Programming for Analytics using R	MWP4326	Master of Business Administration (Executive for Working Professionals)	Industry Guest Talk, Class Test, Presentation, Report Writing	2014
143	Programming for Analytics using Python	MWP4327	Master of Business Administration (Executive for Working Professionals)	Industry Guest Talk, Class Test, Presentation, Report Writing	2014
144	Visual Analytics Tableau/ Power BI	MWP4328	Master of Business Administration (Executive for Working Professionals)	Industry Guest Talk, Class Test, Presentation, Report Writing	2014
145	Environmental Governance and Sustainability	MWP4411	Master of Business Administration (Executive for Working Professionals)	Industry Guest Talk, Class Test, Presentation, Report Writing	2014
146	E-Business Essentials	MWP4412	Master of Business Administration (Executive for Working Professionals)	Industry Guest Talk, Class Test, Presentation, Report Writing	2014
147	Project-II	MWP4437	Master of Business Administration (Executive for Working Professionals)	Report Writing, Presentation, Viva-Voce	2014
148	ERP for Businesses	MWP4425	Master of Business Administration (Executive for Working Professionals)	Industry Guest Talk, Class Test, Presentation, Report Writing	2014
149	Digital Marketing	MWP4426	Master of Business Administration (Executive for Working Professionals)	Industry Guest Talk, Class Test, Presentation, Report Writing	2014
150	Predictive Analytics-I Machine Learning using R	MWP4428	Master of Business Administration (Executive for Working Professionals)	Industry Guest Talk, Class Test, Presentation, Report Writing	2014
151	Predictive Analytics-II Machine Learning using Python	MWP4429	Master of Business Administration (Executive for Working Professionals)	Industry Guest Talk, Class Test, Presentation, Report Writing	2014

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
152	Accounting for Management	HHM4102	Master of Business Administration (Hospital & Healthcare Management)	Industry Guest Talk, Class Test, Presentation, Report Writing	2011
153	Biostatistics	HHM4104	Master of Business Administration (Hospital & Healthcare Management)	Industry Guest Talk, Class Test, Presentation, Report Writing	2011
154	Information Technology and E-Commerce	HHM4109	Master of Business Administration (Hospital & Healthcare Management)	Industry Guest Talk, Class Test, Presentation, Report Writing	2011
155	Research Methodology	HHM4203	Master of Business Administration (Hospital & Healthcare Management)	Class Test, Presentation, Report Writing	2011
156	Hospital Planning	HHM4205	Master of Business Administration (Hospital & Healthcare Management)	Industry Guest Talk, Class Test, Presentation, Report Writing	2011
157	Hospital Materials Management	HHM4206	Master of Business Administration (Hospital & Healthcare Management)	Industry Guest Talk, Class Test, Presentation, Report Writing	2011
158	Excel for Managers	HHM4209	Master of Business Administration (Hospital & Healthcare Management)	Industry Guest Talk, Class Test, Presentation, Report Writing	2011
159	Term Paper	HHM4231	Master of Business Administration (Hospital & Healthcare Management)	Academic writing, Presentation	2011
160	Management of Clinical Services	HHM4303	Master of Business Administration (Hospital & Healthcare Management)	Industry Guest Talk, Class Test, Presentation, Report Writing	2011
161	Operations Research	HHM4305	Master of Business Administration (Hospital & Healthcare Management)	Industry Guest Talk, Class Test, Presentation, Report Writing	2011
162	Management of Support & Utility Services	HHM4308	Master of Business Administration (Hospital & Healthcare Management)	Industry Guest Talk, Class Test, Presentation, Report Writing	2011
163	Summer Internship Evaluation	HHM4335	Master of Business Administration (Hospital & Healthcare Management)	Report Writing, Presentation, Viva-Voce	2011
164	Hospital Management Information System	HHM4401	Master of Business Administration (Hospital & Healthcare Management)	Industry Guest Talk, Class Test, Presentation, Report Writing	2011
165	Entrepreneurship and Consultancy in Healthcare	HHM4406	Master of Business Administration (Hospital & Healthcare Management)	Industry Guest Talk, Class Test, Presentation, Report Writing	2011
166	Disaster Management	HHM4408	Master of Business Administration (Hospital & Healthcare Management)	Industry Guest Talk, Class Test, Presentation, Report Writing	2011
167	Dissertation	HHM4437	Master of Business Administration (Hospital & Healthcare Management)	Report Writing, Presentation, Viva-Voce	2011
168	Accounting for Management	BUA4102	Master of Business Administration (Business Analytics)	Industry Guest Talk, Class Test, Presentation, Report Writing	2019

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1.1.3 Total number of courses having focus on employability/ entrepreneurship / skill development offered during the year (2022)

Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
169	Statistical Techniques	BUA4104	Master of Business Administration (Business Analytics)	Industry Guest Talk, Class Test, Presentation, Report Writing	2019
170	Excel for Decision Making	BUA4105	Master of Business Administration (Business Analytics)	Industry Guest Talk, Class Test, Presentation, Report Writing	2019
171	Optimization Techniques	BUA4106	Master of Business Administration (Business Analytics)	Industry Guest Talk, Class Test, Presentation, Report Writing	2019
172	Database Management System	BUA4107	Master of Business Administration (Business Analytics)	Industry Guest Talk, Class Test, Presentation, Report Writing	2019
173	Business Research Methods	BUA4204	Master of Business Administration (Business Analytics)	Industry Guest Talk, Class Test, Presentation, Report Writing	2019
174	Programming for Analytics using R	BUA4206	Master of Business Administration (Business Analytics)	Industry Guest Talk, Class Test, Presentation, Report Writing	2019
175	Programming for Analytics using Python	BUA4207	Master of Business Administration (Business Analytics)	Industry Guest Talk, Class Test, Presentation, Report Writing	2019
176	Datamining	BUA4302	Master of Business Administration (Business Analytics)	Industry Guest Talk, Class Test, Presentation, Report Writing	2019
177	Predictive Analytics-I Machine Learning using R	BUA4303	Master of Business Administration (Business Analytics)	Industry Guest Talk, Class Test, Presentation, Report Writing	2019
178	Predictive Analytics-II Machine Learning using Python	BUA4304	Master of Business Administration (Business Analytics)	Industry Guest Talk, Class Test, Presentation, Report Writing	2019
179	Big Data Analytics- Hadoop	BUA4305	Master of Business Administration (Business Analytics)	Industry Guest Talk, Class Test, Presentation, Report Writing	2019
180	Financial Decision Analysis	BUA4306	Master of Business Administration (Business Analytics)	Industry Guest Talk, Class Test, Presentation, Report Writing	2019
181	Visual Analytics- Tablue/ Power BI	BUA4307	Master of Business Administration (Business Analytics)	Industry Guest Talk, Class Test, Presentation, Report Writing	2019
182	Summer Internship Evaluation	BUA4335	Master of Business Administration (Business Analytics)	Report Writing, Presentation, Viva-Voce	2019
183	Financial Analytics	BUA4402	Master of Business Administration (Business Analytics)	Industry Guest Talk, Class Test, Presentation, Report Writing	2019
184	Supply Chain Analytics	BUA4403	Master of Business Administration (Business Analytics)	Industry Guest Talk, Class Test, Presentation, Report Writing	2019
185	HR Analytics	BUA4404	Master of Business Administration (Business Analytics)	Industry Guest Talk, Class Test, Presentation, Report Writing	2019

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1.1.3 Total number of courses having focus on employability/ entrepreneurship / skill development offered during the year (2022)

Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
186	Marketing Analytics	BUA4405	Master of Business Administration (Business Analytics)	Industry Guest Talk, Class Test, Presentation, Report Writing	2019
187	Data Privacy and Data Security Laws	BUA4406	Master of Business Administration (Business Analytics)	Industry Guest Talk, Class Test, Presentation, Report Writing	2019
188	Dissertation (Analytics Project)	BUA4437	Master of Business Administration (Business Analytics)	Report Writing, Presentation, Viva-Voce	2019
189	Computers in Management	MGT2101	Bachelor of Arts (Hons.) (Economics)	Quiz, Case Discussion, Report Writing, Class Performance	2010
190	E Commerce	COM2103	Bachelor of Arts (Hons.) (Economics)	Quiz, Case Discussion, Report Writing, Class Performance	2010
191	Term Paper	ECO2131	Bachelor of Arts (Hons.) (Economics)	Academic writing, Presentation	2010
192	Project (with Presentation & Evaluation)	ECO2132	Bachelor of Arts (Hons.) (Economics)	Project writing, Presentation, Viva-Voce	2010
193	Workshop / Certification (Discipline Specific) (1credit per workshop)	ECO2133	Bachelor of Arts (Hons.) (Economics)	Quiz, Written Test	2010
194	Study Abroad	ECO2134	Bachelor of Arts (Hons.) (Economics)	Written test, Country Report	2010
195	Statistical Methods in Economics-I	ECO2202	Bachelor of Arts (Hons.) (Economics)	Quiz, Case Discussion, Report Writing, Class Performance	2010
196	Innovation & Creativity Management	MGT2205	Bachelor of Arts (Hons.) (Economics)	Quiz, Case Discussion, Report Writing, Class Performance	2010
197	Human Values & Professional Ethics	MGT2206	Bachelor of Arts (Hons.) (Economics)	Quiz, Case Discussion, Report Writing, Class Performance	2010
198	Readings in Economics	ECO2230	Bachelor of Arts (Hons.) (Economics)	Quiz, Case Discussion, Report Writing, Class Performance	2010
199	Term Paper	ECO2231	Bachelor of Arts (Hons.) (Economics)	Academic writing, Presentation	2010
200	Project (With Presentation & Evaluation)	ECO2232	Bachelor of Arts (Hons.) (Economics)	Project writing, Presentation, Viva-Voce	2010
201	Workshop / Certification (Discipline Specific) (1credit per workshop)	ECO2233	Bachelor of Arts (Hons.) (Economics)	Quiz, Written Test	2010
202	Study Abroad	ECO2234	Bachelor of Arts (Hons.) (Economics)	Written test, Country Report	2010
203	Statistical Methods in Economics-II	ECO2302	Bachelor of Arts (Hons.) (Economics)	Quiz, Case Discussion, Report Writing, Class Performance	2010
204	Economics of Entrepreneurship	ECO2303	Bachelor of Arts (Hons.) (Economics)	Quiz, Case Discussion, Report Writing, Class Performance	2010
205	Agricultural Economics	ECO2305	Bachelor of Arts (Hons.) (Economics)	Quiz, Case Discussion, Report Writing, Class Performance	2010
206	Industrial Psychology	MGT2305	Bachelor of Arts (Hons.) (Economics)	Quiz, Case Discussion, Report Writing, Class Performance	2010
207	Term paper	ECO2331	Bachelor of Arts (Hons.) (Economics)	Academic writing, Presentation	2010
208	Project (With Presentation & Evaluation)	ECO2332	Bachelor of Arts (Hons.) (Economics)	Project writing, Presentation, Viva-Voce	2010

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1.1.3 Total number of courses having focus on employability/ entrepreneurship / skill development offered during the year (2022)

Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
209	Workshop / Certification (Discipline Specific) (1credit per workshop)	ECO2333	Bachelor of Arts (Hons.) (Economics)	Quiz, Written Test	2010
210	Study Abroad	ECO2334	Bachelor of Arts (Hons.) (Economics)	Written test, Country Report	2010
211	Research Methodology	ECO2403	Bachelor of Arts (Hons.) (Economics)	Quiz, Case Discussion, Report Writing, Class Performance	2010
212	Business Information & Data Base System	MGT2404	Bachelor of Arts (Hons.) (Economics)	Quiz, Case Discussion, Report Writing, Class Performance	2010
213	Term paper	ECO2431	Bachelor of Arts (Hons.) (Economics)	Academic writing, Presentation	2010
214	Project(With Presentation & Evaluation)	ECO2432	Bachelor of Arts (Hons.) (Economics)	Project writing, Presentation, Viva-Voce	2010
215	Workshop / Certification (Discipline Specific) * (1credit per workshop)	ECO2433	Bachelor of Arts (Hons.) (Economics)	Quiz, Written Test	2010
216	Study Abroad	ECO2434	Bachelor of Arts (Hons.) (Economics)	Written test, Country Report	2010
217	Econometrics- Basic Theory & Application	ECO2551	Bachelor of Arts (Hons.) (Economics)	Quiz, Case Discussion, Report Writing, Class Performance	2010
218	Summer Internship Evaluation	ECO2535	Bachelor of Arts (Hons.) (Economics)	Report Writing, Presentation, Viva-Voce	2010
219	Relational Database Management System	MGT2512	Bachelor of Arts (Hons.) (Economics)	Quiz, Case Discussion, Report Writing, Class Performance	2010
220	Term paper	ECO2531	Bachelor of Arts (Hons.) (Economics)	Academic writing, Presentation	2010
221	Project(With Presentation & Evaluation)	ECO2532	Bachelor of Arts (Hons.) (Economics)	Project writing, Presentation, Viva-Voce	2010
222	Workshop / Certification (Discipline Specific) (1credit per workshop)	ECO2533	Bachelor of Arts (Hons.) (Economics)	Quiz, Written Test	2010
223	Study Abroad	ECO2534	Bachelor of Arts (Hons.) (Economics)	Written test, Country Report	2010
224	Banking & Financial Institutions	ECO2603	Bachelor of Arts (Hons.) (Economics)	Quiz, Case Discussion, Report Writing, Class Performance	2010
225	Dissertation	ECO2637	Bachelor of Arts (Hons.) (Economics)	Report Writing, Presentation, Viva-Voce	2010
226	Term paper	ECO2631	Bachelor of Arts (Hons.) (Economics)	Academic writing, Presentation	2010
227	Workshop / Certification (Discipline Specific) (1credit per workshop)	ECO 2633	Bachelor of Arts (Hons.) (Economics)	Quiz, Written Test	2010
228	Study Abroad	ECO2634	Bachelor of Arts (Hons.) (Economics)	Written test, Country Report	2010
229	Computer Application in Economic Analysis	ECO4103	Master of Arts (Economics)	Quiz, Case Discussion, Report Writing, Class Performance	2012
230	Indian Economy-Issues & Policy	ECO4105	Master of Arts (Economics)	Quiz, Case Discussion, Report Writing, Class Performance	2012
231	Term Paper/Review of Dissertation-I	ECO4231	Master of Arts (Economics)	Academic writing, Presentation, Viva-Voce	2012

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1.1.3 Total number of courses having focus on employability/ entrepreneurship / skill development offered during the year (2022)

Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
232	Fundamentals of Econometrics	ECO4301	Master of Arts (Economics)	Quiz, Case Discussion, Report Writing, Class Performance	2012
233	Research Methods in Economics	ECO4303	Master of Arts (Economics)	Quiz, Case Discussion, Report Writing, Class Performance	2012
234	Term Paper/Review of Dissertation-II	ECO4331	Master of Arts (Economics)	Academic writing, Presentation, Viva-Voce	2012
235	Summer Internship Evaluation	ECO4335	Master of Arts (Economics)	Report Writing, Presentation, Viva-Voce	2012
236	Environmental Economics	ECO4309	Master of Arts (Economics)	Quiz, Case Discussion, Report Writing, Class Performance	2012
237	Dissertation	ECO4437	Master of Arts (Economics)	Report Writing, Presentation, Viva-Voce	2012
238	Entrepreneurship & Small Scale Business	ECO4404	Master of Arts (Economics)	Quiz, Case Discussion, Report Writing, Class Performance	2012
239	Management Foundations	MGT2151	Management (OE)	Quiz, Presentation, Group Discussion	2013
240	Marketing Management	MGT2251	Management (OE)	Quiz, Presentation, Group Discussion	2013
241	Organizational Behaviour	MGT2351	Management (OE)	Quiz, Presentation, Group Discussion	2013
242	Business Environment	MGT2451	Management (OE)	Quiz, Presentation, Group Discussion	2013
243	Operations Research	MGT2551	Management (OE)	Quiz, Presentation, Group Discussion	2013
244	Business Law	MGT2651	Management (OE)	Quiz, Presentation, Group Discussion	2013
245	Orientation Programme in Entrepreneurship	MGT2152	Entrepreneurship (OE)	Quiz, Presentation, Group Discussion	2018
246	Exploring Business Opportunity	MGT2252	Entrepreneurship (OE)	Quiz, Presentation, Group Discussion	2018
247	Developing a Business Model	MGT2352	Entrepreneurship (OE)	Quiz, Presentation, Group Discussion	2018
248	Translating Business Model into Startup	MGT2452	Entrepreneurship (OE)	Quiz, Presentation, Group Discussion	2018
249	Advanced Programme in Entrepreneurship: Growth	MGT2552	Entrepreneurship (OE)	Quiz, Presentation, Group Discussion	2018
250	Advanced Programme in Entrepreneurship: Expansion	MGT2652	Entrepreneurship (OE)	Quiz, Presentation, Group Discussion	2018
251	Micro Economics-I	ECO2151	Economics (OE)	Quiz, Case Discussion, Report Writing, Class Performance	2013
252	Indian Economy	ECO2251	Economics (OE)	Quiz, Case Discussion, Report Writing, Class Performance	2013
253	Macro Economics –I	ECO2351	Economics (OE)	Quiz, Case Discussion, Report Writing, Class Performance	2013
254	Public Finance	ECO2451	Economics (OE)	Quiz, Case Discussion, Report Writing, Class Performance	2013
255	Statistical Methods in Economics	ECO2552	Economics (OE)	Quiz, Case Discussion, Report Writing, Class Performance	2013
256	Money, Banking & Financial Markets	ECO2651	Economics (OE)	Quiz, Case Discussion, Report Writing, Class Performance	2016

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1.1.3 Total number of courses having focus on employability/ entrepreneurship / skill development offered during the year (2022)

Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
257	Military Training Foundation	GEN2051	Military Training Foundation (OE)	Quiz, Group Discussion, Group Presentation, Viva-Voce	2015
258	Financial Accounting-I	COM2151	Bachelor of Commerce (Hons.)	Quiz, Case Discussion, Report Writing, Class Performance	2010
259	E-commerce	COM2103	Bachelor of Commerce (Hons.)	Quiz, Case Discussion, Report Writing, Class Performance	2010
260	Readings in Management	COM2130	Bachelor of Commerce (Hons.)	Quiz, Case Discussion, Report Writing, Class Performance	2010
261	Term Paper	COM2131	Bachelor of Commerce (Hons.)	Academic writing, Presentation	2010
262	Project (with Presentation & Evaluation)	COM2132	Bachelor of Commerce (Hons.)	Report Writing, Presentation	2010
263	Workshop / Certification (Discipline Specific) (1credit per workshop)	COM2133	Bachelor of Commerce (Hons.)	Quiz, Written Test	2010
264	Study Abroad	COM2134	Bachelor of Commerce (Hons.)	Written test, Country Report	2010
265	Financial Accounting-II	COM2251	Bachelor of Commerce (Hons.)	Quiz, Group Discussion, Presentation, Viva Voce	2010
266	Advertising Management	COM2205	Bachelor of Commerce (Hons.)	Quiz, Group Discussion, Presentation, Viva Voce	2010
267	Computer Applications in Business	COM2204	Bachelor of Commerce (Hons.)	Quiz, Group Discussion, Presentation, Viva Voce	2010
268	Innovation & Creativity Management	COM2207	Bachelor of Commerce (Hons.)	Quiz, Group Discussion, Presentation, Viva Voce	2010
269	Human Values & Professional Ethics	COM2208	Bachelor of Commerce (Hons.)	Quiz, Group Discussion, Presentation, Viva Voce	2010
270	Readings in Management	COM2230	Bachelor of Commerce (Hons.)	Quiz, Group Discussion, Presentation, Viva Voce	2010
271	Term Paper	COM2231	Bachelor of Commerce (Hons.)	Academic Writing, Presentation	2010
272	Project(with Presentation &Evaluation)	COM2232	Bachelor of Commerce (Hons.)	Report Writing, Presentation, Viva-Voce	2010
273	Workshop/ Certification (Discipline Specific) (1credit per workshop)	COM2233	Bachelor of Commerce (Hons.)	Quiz, Written Test	2010
274	Study Abroad	COM2234	Bachelor of Commerce (Hons.)	Written test, Country Report	2010
275	Corporate Accounting	COM2351	Bachelor of Commerce (Hons.)	Quiz, Group Discussion, Presentation, Viva Voce	2010
276	Statistical Methods in Research – I	COM2301	Bachelor of Commerce (Hons.)	Quiz, Group Discussion, Presentation, Viva Voce	2010
277	Corporate Law	COM2302	Bachelor of Commerce (Hons.)	Quiz, Group Discussion, Presentation, Viva Voce	2010
278	Mergers & Acquisitions	COM2305	Bachelor of Commerce (Hons.)	Quiz, Group Discussion, Presentation, Viva Voce	2010
279	Term Paper(Evaluation)	COM2331	Bachelor of Commerce (Hons.)	Academic Writing, Presentation	2010
280	Project (with Presentation & Evaluation)	COM2332	Bachelor of Commerce (Hons.)	Report Writing, Presentation, Viva-Voce	2010
281	Workshop / Certification (Discipline Specific) (1credit per workshop)	COM2333	Bachelor of Commerce (Hons.)	Quiz, Written Test	2010
282	Study Abroad	COM2334	Bachelor of Commerce (Hons.)	Written test, Country Report	2010

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1.1.3 Total number of courses having focus on employability/ entrepreneurship / skill development offered during the year (2022)

Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
283	Financial Management	COM2451	Bachelor of Commerce (Hons.)	Quiz, Group Discussion, Presentation, Viva Voce	2010
284	Auditing	COM2401	Bachelor of Commerce (Hons.)	Quiz, Group Discussion, Presentation, Viva Voce	2010
285	Statistical Methods in Research – II	COM2402	Bachelor of Commerce (Hons.)	Quiz, Group Discussion, Presentation, Viva Voce	2010
286	Income Tax Law & Practice	COM2403	Bachelor of Commerce (Hons.)	Quiz, Group Discussion, Presentation, Viva Voce	2010
287	Business Information & Data Base System	COM2404	Bachelor of Commerce (Hons.)	Quiz, Group Discussion, Presentation, Viva Voce	2010
288	Term Paper	COM2431	Bachelor of Commerce (Hons.)	Academic Writing, Presentation	2010
289	Project (with Presentation & Evaluation)	COM2432	Bachelor of Commerce (Hons.)	Report Writing, Presentation, Viva-Voce	2010
290	Workshop / Certification (Discipline Specific) (1credit per workshop)	COM2433	Bachelor of Commerce (Hons.)	Quiz, Written Test	2010
291	Study Abroad	COM2434	Bachelor of Commerce (Hons.)	Written test, Country Report	2010
292	Cost Accounting	COM2551	Bachelor of Commerce (Hons.)	Quiz, Group Discussion, Presentation, Viva Voce	2010
293	Summer Internship Evaluation	COM2535	Bachelor of Commerce (Hons.)	Report Writing, Presentation, Viva-Voce	2010
294	Advanced Corporate Accounting	COM2503	Bachelor of Commerce (Hons.)	Quiz, Group Discussion, Presentation, Viva Voce	2010
295	Corporate Tax Law and Practice	COM2504	Bachelor of Commerce (Hons.)	Quiz, Group Discussion, Presentation, Viva Voce	2010
296	Business Taxation	COM2505	Bachelor of Commerce (Hons.)	Quiz, Group Discussion, Presentation, Viva Voce	2010
297	Management Accounting	COM2651	Bachelor of Commerce (Hons.)	Quiz, Group Discussion, Presentation, Viva Voce	2010
298	Dissertation	COM2637	Bachelor of Commerce (Hons.)	Report Writing, Presentation, Viva-Voce	2010
299	Advanced Accounts	COM2602	Bachelor of Commerce (Hons.)	Quiz, Group Discussion, Presentation, Viva Voce	2010
300	Advanced Cost Accounting	COM2603	Bachelor of Commerce (Hons.)	Quiz, Group Discussion, Presentation, Viva Voce	2010
301	Indirect Taxes including GST	COM2604	Bachelor of Commerce (Hons.)	Quiz, Group Discussion, Presentation, Viva Voce	2010
302	Quantitative Techniques for Business Decisions	COM4102	Master of Commerce	Quiz, Group Discussion, Presentation, Viva Voce	2013
303	Auditing	COM4105	Master of Commerce	Quiz, Group Discussion, Presentation, Viva Voce	2013
304	Computer Applications in Business	COM4106	Master of Commerce	Quiz, Group Discussion, Presentation, Viva Voce	2013
305	Managerial Accounting	COM4201	Master of Commerce	Quiz, Group Discussion, Presentation, Viva Voce	2013
306	Corporate Accounting	COM4203	Master of Commerce	Quiz, Group Discussion, Presentation, Viva Voce	2013
307	E-Commerce	COM4205	Master of Commerce	Quiz, Group Discussion, Presentation, Viva Voce	2013

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1.1.3 Total number of courses having focus on employability/ entrepreneurship / skill development offered during the year (2022)

Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
308	Corporate Law	COM4301	Master of Commerce	Quiz, Group Discussion, Presentation, Viva Voce	2013
309	Cost Accounting	COM4302	Master of Commerce	Quiz, Group Discussion, Presentation, Viva Voce	2013
310	Advance Business Statistics & Research Methodology	COM4303	Master of Commerce	Quiz, Group Discussion, Presentation, Viva Voce	2013
311	Income Tax Law & Practice	COM4304	Master of Commerce	Quiz, Group Discussion, Presentation, Viva Voce	2013
312	Summer Internship Evaluation	COM4335	Master of Commerce	Report Writing, Presentation, Viva-Voce	2013
313	Tax Planning & Tax Management	COM4305	Master of Commerce	Quiz, Group Discussion, Presentation, Viva Voce	2013
314	Advertising and Sales Management	COM4310	Master of Commerce	Quiz, Group Discussion, Presentation, Viva Voce	2013
315	Corporate Tax Planning	COM4402	Master of Commerce	Quiz, Group Discussion, Presentation, Viva Voce	2013
316	Industrial Law	COM4404	Master of Commerce	Quiz, Group Discussion, Presentation, Viva Voce	2013
317	Dissertation	COM4437	Master of Commerce	Report Writing, Presentation, Viva-Voce	2013
318	International Accounting	COM4405	Master of Commerce	Quiz, Group Discussion, Presentation, Viva Voce	2013
319	Principles & Practice of Taxation & Indian Tax System	COM4406	Master of Commerce	Quiz, Group Discussion, Presentation, Viva Voce	2013
320	International Financial Management	COM4408	Master of Commerce	Quiz, Group Discussion, Presentation, Viva Voce	2013
321	Marketing Research	COM4409	Master of Commerce	Quiz, Group Discussion, Presentation, Viva Voce	2013
322	Financial Accounting-I	COM2151	Accounting (OE)	Quiz, Group Discussion, Presentation, Viva Voce	2013
323	Financial Accounting-II	COM2251	Accounting (OE)	Quiz, Group Discussion, Presentation, Viva Voce	2013
324	Corporate Accounting	COM2351	Accounting (OE)	Quiz, Group Discussion, Presentation, Viva Voce	2013
325	Financial Management	COM2451	Accounting (OE)	Quiz, Group Discussion, Presentation, Viva Voce	2013
326	Cost Accounting	COM2551	Accounting (OE)	Quiz, Group Discussion, Presentation, Viva Voce	2013
327	Management Accounting	COM2651	Accounting (OE)	Quiz, Group Discussion, Presentation, Viva Voce	2013
328	Food Production Foundation-I	HMC2101	Bachelor of Hotel Management	Practical Classes, Field work, ODC, Industrial Training	2015
329	Food & Beverage Service Foundation-I	HMC2102	Bachelor of Hotel Management	Practical Classes, Field work, ODC, Industrial Training	2015
330	Front Office Foundation	HMC2103	Bachelor of Hotel Management	Practical Classes, Field work, ODC, Industrial Training	2015
331	Housekeeping Foundation	HMC2104	Bachelor of Hotel Management	Practical Classes, Field work, ODC, Industrial Training	2015
332	Application of Computers	HMC2105	Bachelor of Hotel Management	Practical Classes, Field work, ODC, Industrial Training	2015

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
333	Food Production Foundation Lab-I	HMC2106	Bachelor of Hotel Management	Practical Classes, Field work, ODC, Industrial Training	2015
334	Food & Beverage Service Foundation Lab-I	HMC2107	Bachelor of Hotel Management	Practical Classes, Field work, ODC, Industrial Training	2015
335	Front Office Foundation Lab	HMC2108	Bachelor of Hotel Management	Practical Classes, Field work, ODC, Industrial Training	2015
336	Housekeeping Foundation Lab	HMC2109	Bachelor of Hotel Management	Practical Classes, Field work, ODC, Industrial Training	2015
337	Application of Computers Lab	HMC2110	Bachelor of Hotel Management	Practical Classes, Field work, ODC, Industrial Training	2015
338	Field Work Project-I	HMC2111	Bachelor of Hotel Management	Field work, Report writing, Presentation	2015
339	Food Production Foundation-II	HMC2201	Bachelor of Hotel Management	Practical Classes, Field work, ODC, Industrial Training	2015
340	Food & Beverage Service Foundation-II	HMC2202	Bachelor of Hotel Management	Practical Classes, Field work, ODC, Industrial Training	2015
341	Front Office Operation-I	HMC2203	Bachelor of Hotel Management	Practical Classes, Field work, ODC, Industrial Training	2015
342	Housekeeping Operation-I	HMC2204	Bachelor of Hotel Management	Practical Classes, Field work, ODC, Industrial Training	2015
343	Food Science & Nutrition	HMC2205	Bachelor of Hotel Management	Practical Classes, Field work, ODC, Industrial Training	2015
344	Fundamentals of Accounting-I	HMC2206	Bachelor of Hotel Management	Practical Classes, Field work, ODC, Industrial Training	2015
345	Food Production Foundation Lab-II	HMC2207	Bachelor of Hotel Management	Practical Classes, Field work, ODC, Industrial Training	2015
346	Food & Beverage Service Foundation Lab-II	HMC2208	Bachelor of Hotel Management	Practical Classes, Field work, ODC, Industrial Training	2015
347	Front Office Operation Lab-I	HMC2209	Bachelor of Hotel Management	Practical Classes, Field work, ODC, Industrial Training	2015
348	Housekeeping Operation Lab-I	HMC2210	Bachelor of Hotel Management	Practical Classes, Field work, ODC, Industrial Training	2015
349	Field Work Project-II	HMC2211	Bachelor of Hotel Management	Field work, Report writing, Presentation	2015
350	Food Production Operations-I	HMC2301	Bachelor of Hotel Management	Practical Classes, Field work, ODC, Industrial Training	2015
351	Food & Beverage Service Operations-I	HMC2302	Bachelor of Hotel Management	Practical Classes, Field work, ODC, Industrial Training	2015
352	Front Office Operation-II	HMC2303	Bachelor of Hotel Management	Practical Classes, Field work, ODC, Industrial Training	2015
353	Housekeeping Operation-II	HMC2304	Bachelor of Hotel Management	Practical Classes, Field work, ODC, Industrial Training	2015
354	Food Production Operations Lab-I	HMC2308	Bachelor of Hotel Management	Practical Classes, Field work, ODC, Industrial Training	2015
355	Food & Beverage Service Operations Lab-I	HMC2309	Bachelor of Hotel Management	Practical Classes, Field work, ODC, Industrial Training	2015
356	Front Office Operation Lab-II	HMC2310	Bachelor of Hotel Management	Practical Classes, Field work, ODC, Industrial Training	2015
357	Housekeeping Operation Lab-II	HMC2311	Bachelor of Hotel Management	Practical Classes, Field work, ODC, Industrial Training	2015

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1.1.3 Total number of courses having focus on employability/ entrepreneurship / skill development offered during the year (2022)

Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
358	Food Production Operations-II	HMC2401	Bachelor of Hotel Management	Practical Classes, Field work, ODC, Industrial Training	2015
359	Food & Beverage Service Operations-II	HMC2402	Bachelor of Hotel Management	Practical Classes, Field work, ODC, Industrial Training	2015
360	Front Office Management-I	HMC2403	Bachelor of Hotel Management	Practical Classes, Field work, ODC, Industrial Training	2015
361	Housekeeping Management-I	HMC2404	Bachelor of Hotel Management	Practical Classes, Field work, ODC, Industrial Training	2015
362	Food Production Operations Lab-II	HMC2408	Bachelor of Hotel Management	Practical Classes, Field work, ODC, Industrial Training	2015
363	Food & Beverage Service Operations Lab-II	HMC2409	Bachelor of Hotel Management	Practical Classes, Field work, ODC, Industrial Training	2015
364	Front Office Management Lab	HMC2410	Bachelor of Hotel Management	Practical Classes, Field work, ODC, Industrial Training	2015
365	Housekeeping Management Lab	HMC2411	Bachelor of Hotel Management	Practical Classes, Field work, ODC, Industrial Training	2015
366	Food Production Training Report	HMC2501	Bachelor of Hotel Management	Field work, Industrial Training, Report Writing, Presentation	2015
367	Food & Beverage Service Training Report	HMC2502	Bachelor of Hotel Management	Practical Classes, Field work, ODC, Industrial Training	2015
368	Front Office Management Training Report	HMC2503	Bachelor of Hotel Management	Practical Classes, Field work, ODC, Industrial Training	2015
369	Housekeeping Management Training Report	HMC2504	Bachelor of Hotel Management	Practical Classes, Field work, ODC, Industrial Training	2015
370	Advanced Food Production Operations-I	HMC2601	Bachelor of Hotel Management	Practical Classes, Field work, ODC, Industrial Training	2015
371	Advanced Food & Beverage Service Operations-I	HMC2602	Bachelor of Hotel Management	Practical Classes, Field work, ODC, Industrial Training	2015
372	Front Office Management-II	HMC2603	Bachelor of Hotel Management	Practical Classes, Field work, ODC, Industrial Training	2015
373	Housekeeping Management-II	HMC2604	Bachelor of Hotel Management	Practical Classes, Field work, ODC, Industrial Training	2015
374	Advanced Food Production Operations Lab-I	HMC2608	Bachelor of Hotel Management	Practical Classes, Field work, ODC, Industrial Training	2015
375	Advanced Food & Beverage Service Operations Lab-I	HMC2609	Bachelor of Hotel Management	Practical Classes, Field work, ODC, Industrial Training	2015
376	Front Office Management Lab-II	HMC2610	Bachelor of Hotel Management	Practical Classes, Field work, ODC, Industrial Training	2015
377	Housekeeping Management Lab-II	HMC2611	Bachelor of Hotel Management	Practical Classes, Field work, ODC, Industrial Training	2015
378	Advanced Food Production-II	HMC2701	Bachelor of Hotel Management	Practical Classes, Field work, ODC, Industrial Training	2015
379	Advanced Food & Beverage Service -II	HMC2702	Bachelor of Hotel Management	Practical Classes, Field work, ODC, Industrial Training	2015
380	Advanced Front Office Management	HMC2703	Bachelor of Hotel Management	Practical Classes, Field work, ODC, Industrial Training	2015
381	Accommodation Management	HMC2704	Bachelor of Hotel Management	Practical Classes, Field work, ODC, Industrial Training	2015
382	Facility Management, Planning & Design	HMC2705	Bachelor of Hotel Management	Practical Classes, Field work, ODC, Industrial Training	2015

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1.1.3 Total number of courses having focus on employability/ entrepreneurship / skill development offered during the year (2022)

Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
383	Entrepreneurship Development	HMC2708	Bachelor of Hotel Management	Practical Classes, Field work, ODC, Industrial Training	2015
384	Event Management	HMC2709	Bachelor of Hotel Management	Practical Classes, Field work, ODC, Industrial Training	2015
385	Advanced Food Production Operations Lab-II	HMC2710	Bachelor of Hotel Management	Practical Classes, Field work, ODC, Industrial Training	2015
386	Advanced Food & Beverage Service Operations Lab-II	HMC2711	Bachelor of Hotel Management	Practical Classes, Field work, ODC, Industrial Training	2015
387	Research Methodology	HMC2803	Bachelor of Hotel Management	Practical Classes, Field work, ODC, Industrial Training	2015
388	Specialization Course Lab	HMC2804	Bachelor of Hotel Management	Practical Classes, Field work, ODC, Industrial Training	2015
389	GDPI Sessions	HMC2805	Bachelor of Hotel Management	Group Discussion, Quiz, Presentation	2015
390	Research Project	HMC2837	Bachelor of Hotel Management	Report Writing, Presentation, Viva-Voce	2015
391	Basics of Food Service	VHM2152	Food & Beverage Service (OE)	Practical Classes, Field work, ODC, Industrial Training	2016
392	Advanced Food Service	VHM2252	Food & Beverage Service (OE)	Practical Classes, Field work, ODC, Industrial Training	2016
393	Beverage Studies- Basic	VHM2352	Food & Beverage Service (OE)	Practical Classes, Field work, ODC, Industrial Training	2016
394	Beverage Studies-Advanced	VHM2452	Food & Beverage Service (OE)	Practical Classes, Field work, ODC, Industrial Training	2016
395	F&B Service Supervisory Skills	VHM2552	Food & Beverage Service (OE)	Practical Classes, Field work, ODC, Industrial Training	2016
396	F&B Management Skills	VHM2652	Food & Beverage Service (OE)	Practical Classes, Field work, ODC, Industrial Training	2016
397	Basics of Food Production	VHM2151	Food Production Techniques (OE)	Practical Classes, Field work, ODC, Industrial Training	2016
398	Food Production Skills	VHM2251	Food Production Techniques (OE)	Practical Classes, Field work, ODC, Industrial Training	2016
399	Food Production Operations	VHM2351	Food Production Techniques (OE)	Practical Classes, Field work, ODC, Industrial Training	2016
400	Advanced Food Production	VHM2451	Food Production Techniques (OE)	Practical Classes, Field work, ODC, Industrial Training	2016
401	Food Production Supervisory Skills	VHM2551	Food Production Techniques (OE)	Practical Classes, Field work, ODC, Industrial Training	2016
402	Food Production Management	VHM2651	Food Production Techniques (OE)	Practical Classes, Field work, ODC, Industrial Training	2016
403	Fundamentals of Front Office Operations	VHM2153	Front Office Operations (OE)	Practical Classes, Field work, ODC, Industrial Training	2016
404	Handling Reception	VHM2253	Front Office Operations (OE)	Practical Classes, Field work, ODC, Industrial Training	2016
405	Check-in & Check-out Process	VHM2353	Front Office Operations (OE)	Practical Classes, Field work, ODC, Industrial Training	2016
406	Front Office Supervisory Skills	VHM2453	Front Office Operations (OE)	Practical Classes, Field work, ODC, Industrial Training	2016
407	Front Office Yield Management	VHM2553	Front Office Operations (OE)	Practical Classes, Field work, ODC, Industrial Training	2016

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1.1.3 Total number of courses having focus on employability/ entrepreneurship / skill development offered during the year (2022)

Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
408	Managing Front Office	VHM2653	Front Office Operations (OE)	Practical Classes, Field work, ODC, Industrial Training	2016
409	Basics of Housekeeping	VHM2154	Housekeeping Functions (OE)	Practical Classes, Field work, ODC, Industrial Training	2016
410	Rules for Cleaning	VHM2254	Housekeeping Functions (OE)	Practical Classes, Field work, ODC, Industrial Training	2016
411	Laundry Operations	VHM2354	Housekeeping Functions (OE)	Practical Classes, Field work, ODC, Industrial Training	2016
412	Maintaining Guest Room	VHM2454	Housekeeping Functions (OE)	Practical Classes, Field work, ODC, Industrial Training	2016
413	Housekeeping Supervisory Skills	VHM2554	Housekeeping Functions (OE)	Practical Classes, Field work, ODC, Industrial Training	2016
414	Housekeeping Management Skills	VHM2654	Housekeeping Functions (OE)	Practical Classes, Field work, ODC, Industrial Training	2016
415	Fundamentals of Tourism	VTM2151	Tourism Operations (OE)	Practical Classes, Field work, ODC, Industrial Training	2016
416	Tour Operations & Tourist Guidance	VTM2251	Tourism Operations (OE)	Practical Classes, Field work, ODC, Industrial Training	2016
417	Handling Travel Agency	VTM2351	Tourism Operations (OE)	Practical Classes, Field work, ODC, Industrial Training	2016
418	Coordinating Tour Transportations	VTM2451	Tourism Operations (OE)	Practical Classes, Field work, ODC, Industrial Training	2016
419	Tourism Management	VTM2551	Tourism Operations (OE)	Practical Classes, Field work, ODC, Industrial Training	2016
420	Event Planning	VTM2651	Tourism Operations (OE)	Practical Classes, Field work, ODC, Industrial Training	2016
421	Elementary Statistics	PSY2101	Bachelor of Science (Clinical Psychology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2011
422	Psychological Practical-I	PSY2103	Bachelor of Science (Clinical Psychology)	Practical, Presentation, Class Performance, Lab Report,	2011
423	Human Rights, Values and Ethics	PSY2105	Bachelor of Science (Clinical Psychology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2011
424	Reading in Psychology	PSY2130	Bachelor of Science (Clinical Psychology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2011
425	Project (with Presentation & Evaluation)	PSY2132	Bachelor of Science (Clinical Psychology)	Project writing, Presentation, Viva-Voce	2011
426	Article/ Feature Writing	PSY2136	Bachelor of Science (Clinical Psychology)	Academic Writing, Presentation, Quiz	2011
427	Abnormal Psychology	PSY2251	Bachelor of Science (Clinical Psychology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2011
428	Advance Statistics	PSY2201	Bachelor of Science (Clinical Psychology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2011
429	Psychological Practical-II	PSY2203	Bachelor of Science (Clinical Psychology)	Practical, Presentation, Class Performance, Lab Report,	2011

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1.1.3 Total number of courses having focus on employability/ entrepreneurship / skill development offered during the year (2022)

Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
430	Readings in Psychology	PSY2230	Bachelor of Science (Clinical Psychology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2011
431	Project (with Presentation & Evaluation)	PSY2232	Bachelor of Science (Clinical Psychology)	Project writing, Presentation, Viva-Voce	2011
432	Article/ Feature Writing	PSY2236	Bachelor of Science (Clinical Psychology)	Academic Writing, Presentation, Quiz	2011
433	Psychological Practical-III	PSY2302	Bachelor of Science (Clinical Psychology)	Practical, Presentation, Class Performance, Lab Report,	2011
434	Summer Project Evaluation-I	PSY2335	Bachelor of Science (Clinical Psychology)	Report Writing, Presentation, Viva-Voce	2011
435	Sports Psychology	PSY2304	Bachelor of Science (Clinical Psychology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2011
436	Readings in Psychology	PSY2330	Bachelor of Science (Clinical Psychology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2011
437	Term paper	PSY2331	Bachelor of Science (Clinical Psychology)	Academic Writing, Presentation, Quiz	2011
438	Project (with Presentation & Evaluation)	PSY2332	Bachelor of Science (Clinical Psychology)	Project writing, Presentation, Viva-Voce	2011
439	Workshop / Certification (Discipline Specific) (1 Credit per workshop)	PSY2333	Bachelor of Science (Clinical Psychology)	Quiz, Written Test	2011
440	Article/ Feature Writing	PSY2336	Bachelor of Science (Clinical Psychology)	Academic Writing, Presentation, Quiz	2011
441	Psychological Practical-IV	PSY2402	Bachelor of Science (Clinical Psychology)	Practical, Presentation, Class Performance, Lab Report,	2011
442	Applied Social Psychology	PSY2406	Bachelor of Science (Clinical Psychology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2011
443	Readings in Psychology	PSY2430	Bachelor of Science (Clinical Psychology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2011
444	Term paper	PSY2431	Bachelor of Science (Clinical Psychology)	Academic Writing, Presentation, Quiz	2011
445	Project (with Presentation & Evaluation)	PSY2432	Bachelor of Science (Clinical Psychology)	Project writing, Presentation, Viva-Voce	2011
446	Workshop / Certification (Discipline Specific) (1 Credit per workshop)	PSY2433	Bachelor of Science (Clinical Psychology)	Quiz, Written Test	2011
447	Article/ Feature Writing	PSY2436	Bachelor of Science (Clinical Psychology)	Academic Writing, Presentation, Quiz	2011
448	Psychometric Testing	PSY2551	Bachelor of Science (Clinical Psychology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2011
449	Psychological Practical-V	PSY2501	Bachelor of Science (Clinical Psychology)	Practical, Presentation, Class Performance, Lab Report,	2011
450	Clinical Psychology	PSY2502	Bachelor of Science (Clinical Psychology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2011

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1.1.3 Total number of courses having focus on employability/ entrepreneurship / skill development offered during the year (2022)

Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
451	Summer Project Evaluation-II	PSY2535	Bachelor of Science (Clinical Psychology)	Report Writing, Presentation, Viva-Voce	2011
452	Scientific Research Paper-I	PSY2505	Bachelor of Science (Clinical Psychology)	Report Writing, Presentation, Viva-Voce	2011
453	Project (with Presentation & Evaluation)	PSY2532	Bachelor of Science (Clinical Psychology)	Project writing, Presentation, Viva-Voce	2011
454	Counselling Psychology	PSY2651	Bachelor of Science (Clinical Psychology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2011
455	School Counseling	PSY2601	Bachelor of Science (Clinical Psychology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2011
456	Psychological Practical-VI	PSY2602	Bachelor of Science (Clinical Psychology)	Practical, Presentation, Class Performance, Lab Report,	2011
457	Dissertation	PSY2637	Bachelor of Science (Clinical Psychology)	Report Writing, Presentation, Viva-Voce	2011
458	Psychology of Children with Special Needs	PSY2603	Bachelor of Science (Clinical Psychology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2011
459	Psychology of Exceptional and gifted Children	PSY2604	Bachelor of Science (Clinical Psychology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2011
460	Scientific Research Paper-II	PSY2605	Bachelor of Science (Clinical Psychology)	Report Writing, Presentation, Viva-Voce	2011
461	Project (with Presentation & Evaluation)	PSY2632	Bachelor of Science (Clinical Psychology)	Project writing, Presentation, Viva-Voce	2011
462	Elementary Statistics	PSY2101	Bachelor of Arts (Hons.) (Applied Psychology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2013
463	Psychological Practical-I	PSY2103	Bachelor of Arts (Hons.) (Applied Psychology)	Practical, Presentation, Class Performance, Lab Report,	2013
464	Human Rights, Values and Ethics	PSY2105	Bachelor of Arts (Hons.) (Applied Psychology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2013
465	Readings in Psychology	PSY2130	Bachelor of Arts (Hons.) (Applied Psychology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2013
466	Project (with Presentation & Evaluation)	PSY2132	Bachelor of Arts (Hons.) (Applied Psychology)	Project writing, Presentation, Viva-Voce	2013
467	Article/ Feature Writing	PSY2136	Bachelor of Arts (Hons.) (Applied Psychology)	Academic Writing, Presentation, Quiz	2013
468	Abnormal Psychology	PSY2251	Bachelor of Arts (Hons.) (Applied Psychology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2013
469	Advance Statistics	PSY2201	Bachelor of Arts (Hons.) (Applied Psychology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2013
470	Psychological Practical-II	PSY2203	Bachelor of Arts (Hons.) (Applied Psychology)	Practical, Presentation, Class Performance, Lab Report,	2013

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1.1.3 Total number of courses having focus on employability/ entrepreneurship / skill development offered during the year (2022)

Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
471	Organizational Behaviour	PSY2205	Bachelor of Arts (Hons.) (Applied Psychology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2013
472	Readings in Psychology	PSY2230	Bachelor of Arts (Hons.) (Applied Psychology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2013
473	Project (with Presentation & Evaluation)	PSY2232	Bachelor of Arts (Hons.) (Applied Psychology)	Project writing, Presentation, Viva-Voce	2013
474	Article/ Feature Writing	PSY2236	Bachelor of Arts (Hons.) (Applied Psychology)	Academic Writing, Presentation, Quiz	2013
475	Psychological Practical-III	PSY2302	Bachelor of Arts (Hons.) (Applied Psychology)	Practical, Presentation, Class Performance, Lab Report	2013
476	Summer Project Evaluation-I	PSY2335	Bachelor of Arts (Hons.) (Applied Psychology)	Report Writing, Presentation, Viva-Voce	2013
477	Readings in Psychology	PSY2330	Bachelor of Arts (Hons.) (Applied Psychology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2013
478	Term paper	PSY2331	Bachelor of Arts (Hons.) (Applied Psychology)	Academic Writing, Presentation, Quiz	2013
479	Project (with Presentation & Evaluation)	PSY2332	Bachelor of Arts (Hons.) (Applied Psychology)	Project writing, Presentation, Viva-Voce	2013
480	Workshop / Certification (Discipline Specific) 1 Credit per workshop)	PSY2333	Bachelor of Arts (Hons.) (Applied Psychology)	Quiz, Written Test	2013
481	Article/ Feature Writing	PSY2336	Bachelor of Arts (Hons.) (Applied Psychology)	Academic Writing, Presentation, Quiz	2013
482	Psychological Practical-IV	PSY2402	Bachelor of Arts (Hons.) (Applied Psychology)	Practical, Presentation, Class Performance, Lab Report,	2013
483	Applied Social Psychology	PSY2406	Bachelor of Arts (Hons.) (Applied Psychology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2013
484	Readings in Psychology	PSY2430	Bachelor of Arts (Hons.) (Applied Psychology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2013
485	Term paper	PSY2431	Bachelor of Arts (Hons.) (Applied Psychology)	Academic Writing, Presentation, Quiz	2013
486	Project (with Presentation & Evaluation)	PSY2432	Bachelor of Arts (Hons.) (Applied Psychology)	Project writing, Presentation, Viva-Voce	2013
487	Workshop / Certification (Discipline Specific) 1 Credit per workshop)	PSY2433	Bachelor of Arts (Hons.) (Applied Psychology)	Quiz, Written Test	2013
488	Article/ Feature Writing	PSY2436	Bachelor of Arts (Hons.) (Applied Psychology)	Academic Writing, Presentation, Quiz	2013
489	Psychometric Testing	PSY2551	Bachelor of Arts (Hons.) (Applied Psychology)	Practical, Presentation, Class Performance, Lab Report,	2013
490	Psychological Practical-V	PSY2501	Bachelor of Arts (Hons.) (Applied Psychology)	Practical, Presentation, Class Performance, Lab Report,	2013
491	Summer Project Evaluation-II	PSY2535	Bachelor of Arts (Hons.) (Applied Psychology)	Report Writing, Presentation, Viva-Voce	2013

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1.1.3 Total number of courses having focus on employability/ entrepreneurship / skill development offered during the year (2022)

Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
492	Clinical Psychology	PSY2502	Bachelor of Arts (Hons.) (Applied Psychology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2013
493	Scientific Research Paper-I	PSY2505	Bachelor of Arts (Hons.) (Applied Psychology)	Report Writing, Presentation, Viva-Voce	2013
494	Project (with Presentation & Evaluation)	PSY2532	Bachelor of Arts (Hons.) (Applied Psychology)	Project writing, Presentation, Viva-Voce	2013
495	Counseling Psychology	PSY2651	Bachelor of Arts (Hons.) (Applied Psychology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2013
496	School Counseling	PSY2601	Bachelor of Arts (Hons.) (Applied Psychology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2013
497	Psychological Practical-VI	PSY2602	Bachelor of Arts (Hons.) (Applied Psychology)	Practical, Presentation, Class Performance, Lab Report,	2013
498	Dissertation (based on Applied Psychology)	PSY2637	Bachelor of Arts (Hons.) (Applied Psychology)	Report Writing, Presentation, Viva-Voce	2013
499	Scientific Research Paper-II	PSY2605	Bachelor of Arts (Hons.) (Applied Psychology)	Report Writing, Presentation, Viva-Voce	2013
500	Positive Psychology	PSY2606	Bachelor of Arts (Hons.) (Applied Psychology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2013
501	Project (with Presentation & Evaluation)	PSY2632	Bachelor of Arts (Hons.) (Applied Psychology)	Project writing, Presentation, Viva-Voce	2013
502	Cognitive Psychology	PSY4102	Master of Arts (Counselling Psychology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2012
503	Parametric Statistical Method	PSY4105	Master of Arts (Counselling Psychology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2012
504	Practicum - I	PSY4106	Master of Arts (Counselling Psychology)	Practical, Presentation, Class Performance, Lab Report,	2012
505	Field Practice-I	PSY4107	Master of Arts (Counselling Psychology)	Practical, Presentation, Class Performance, Lab Report,	2012
506	Psychopathology	PSY4201	Master of Arts (Counselling Psychology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2012
507	Psychological Assessment and Diagnosis	PSY4202	Master of Arts (Counselling Psychology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2012
508	Non-Parametric Statistical Method	PSY4204	Master of Arts (Counselling Psychology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2012
509	Positive Psychology	PSY4206	Master of Arts (Counselling Psychology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2012
510	Practicum - II	PSY4207	Master of Arts (Counselling Psychology)	Practical, Presentation, Class Performance, Lab Report,	2012
511	Field Practice-II	PSY4208	Master of Arts (Counselling Psychology)	Practical, Presentation, Class Performance, Lab Report,	2012

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1.1.3 Total number of courses having focus on employability/ entrepreneurship / skill development offered during the year (2022)

Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
512	Scientific Research Paper	PSY4209	Master of Arts (Counselling Psychology)	Report Writing, Presentation, Viva-Voce	2012
513	Research Methods: Experimental Design	PSY4301	Master of Arts (Counselling Psychology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2012
514	Psychotherapy	PSY4302	Master of Arts (Counselling Psychology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2012
515	Counseling Psychology	PSY4304	Master of Arts (Counselling Psychology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2012
516	Practicum-III	PSY4308	Master of Arts (Counselling Psychology)	Practical, Presentation, Class Performance, Lab Report,	2012
517	Field Practice-III	PSY4309	Master of Arts (Counselling Psychology)	Practical, Presentation, Class Performance, Lab Report,	2012
518	Summer Internship Evaluation	PSY4335	Master of Arts (Counselling Psychology)	Report Writing, Presentation, Viva-Voce	2012
519	Clinical Psychology	PSY4303	Master of Arts (Counselling Psychology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2012
520	Developmental Psychology	PSY4305	Master of Arts (Counselling Psychology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2012
521	Research Methods: Non-Experimental Design	PSY4401	Master of Arts (Counselling Psychology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2012
522	Advance and Applied Counselling Skills	PSY4403	Master of Arts (Counselling Psychology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2012
523	Practicum-IV	PSY4412	Master of Arts (Counselling Psychology)	Practical, Presentation, Class Performance, Lab Report,	2012
524	Field Practice-IV	PSY4413	Master of Arts (Counselling Psychology)	Practical, Presentation, Class Performance, Lab Report,	2012
525	Dissertation	PSY4437	Master of Arts (Counselling Psychology)	Report Writing, Presentation, Viva-Voce	2012
526	Mental Retardation	PSY4402	Master of Arts (Counselling Psychology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2012
527	Childhood Pathology and Exceptional Children	PSY4405	Master of Arts (Counselling Psychology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2012
528	Employee Counselling and Empowerment	PSY4409	Master of Arts (Counselling Psychology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2012
529	Organizational Behaviour and Industrial Relations	PSY4410	Master of Arts (Counselling Psychology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2012
530	Psychological Practices in Personnel & Human Resource Management	PSY4411	Master of Arts (Counselling Psychology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2012

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1.1.3 Total number of courses having focus on employability/ entrepreneurship / skill development offered during the year (2022)

Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
531	Parametric Statistical Method	PSY4105	Master of Arts (Applied Psychology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2016
532	Practicum-I	PSY4106	Master of Arts (Applied Psychology)	Practical, Presentation, Class Performance, Lab Report,	2016
533	Field Practice-I	PSY4107	Master of Arts (Applied Psychology)	Practical, Presentation, Class Performance, Lab Report,	2016
534	Psychopathology	PSY4201	Master of Arts (Applied Psychology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2016
535	Psychological Assessment & Diagnosis	PSY4202	Master of Arts (Applied Psychology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2016
536	Non-Parametric Statistical Methods	PSY4204	Master of Arts (Applied Psychology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2016
537	Practicum-II	PSY4207	Master of Arts (Applied Psychology)	Practical, Presentation, Class Performance, Lab Report,	2016
538	Field Practice-II	PSY4208	Master of Arts (Applied Psychology)	Practical, Presentation, Class Performance, Lab Report,	2016
539	Scientific Research Paper	PSY4209	Master of Arts (Applied Psychology)	Report Writing, Presentation, Viva-Voce	2016
540	Applied Psychotherapy	PSY4310	Master of Arts (Applied Psychology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2016
541	Research Methods in Applied Psychology	PSY4311	Master of Arts (Applied Psychology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2016
542	Interviewing & Counselling Skills	PSY4312	Master of Arts (Applied Psychology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2016
543	Practicum-III	PSY4308	Master of Arts (Applied Psychology)	Practical, Presentation, Class Performance, Lab Report,	2016
544	Field Practice-III	PSY4309	Master of Arts (Applied Psychology)	Practical, Presentation, Class Performance, Lab Report,	2016
545	Summer Internship Evaluation	PSY4335	Master of Arts (Applied Psychology)	Report Writing, Presentation, Viva-Voce	2016
546	Applied Psychophysiology & Biofeedback	PSY4313	Master of Arts (Applied Psychology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2016
547	Human Factors Psychology & Ergonomics	PSY4314	Master of Arts (Applied Psychology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2016
548	Forensic & Legal Psychology	PSY4315	Master of Arts (Applied Psychology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2016
549	Community Psychology	PSY4316	Master of Arts (Applied Psychology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2016

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
550	Psychological Practices in Personnel & Human Resource Management	PSY4317	Master of Arts (Applied Psychology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2016
551	Rehabilitation Psychology	PSY4404	Master of Arts (Applied Psychology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2016
552	Psychometrics	PSY4415	Master of Arts (Applied Psychology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2016
553	Practicum-IV	PSY4412	Master of Arts (Applied Psychology)	Practical, Presentation, Class Performance, Lab Report,	2016
554	Field Practice-IV	PSY4413	Master of Arts (Applied Psychology)	Practical, Presentation, Class Performance, Lab Report,	2016
555	Dissertation	PSY4437	Master of Arts (Applied Psychology)	Report Writing, Presentation, Viva-Voce	2016
556	Employee Counselling & Empowerment	PSY4409	Master of Arts (Applied Psychology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2016
557	Psychology of Selling, Marketing & Advertising	PSY4416	Master of Arts (Applied Psychology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2016
558	Psychology of Criminal Behaviour & Criminal Profiling	PSY4417	Master of Arts (Applied Psychology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2016
559	Guidance & Counselling	PSY4419	Master of Arts (Applied Psychology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2016
560	Parametric Statistical Method	PSY4105	Master of Science (Clinical Psychology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2011
561	Practicum-I	PSY4106	Master of Science (Clinical Psychology)	Practical, Presentation, Class Performance, Lab Report,	2011
562	Field Practice-I	PSY4107	Master of Science (Clinical Psychology)	Practical, Presentation, Class Performance, Lab Report,	2011
563	Psychopathology	PSY4201	Master of Science (Clinical Psychology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2011
564	Psychological Assessment and Diagnosis	PSY4202	Master of Science (Clinical Psychology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2011
565	Non-Parametric Statistical Method	PSY4204	Master of Science (Clinical Psychology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2011
566	Health Psychology	PSY4205	Master of Science (Clinical Psychology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2011
567	Practicum-II	PSY4207	Master of Science (Clinical Psychology)	Practical, Presentation, Class Performance, Lab Report,	2011
568	Field Practice-II	PSY4208	Master of Science (Clinical Psychology)	Practical, Presentation, Class Performance, Lab Report,	2011

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
569	Scientific Research Paper	PSY4209	Master of Science (Clinical Psychology)	Report Writing, Presentation, Viva-Voce	2011
570	Research Methods: Experimental Design	PSY4301	Master of Science (Clinical Psychology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2011
571	Psychotherapy	PSY4302	Master of Science (Clinical Psychology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2011
572	Clinical Psychology	PSY4303	Master of Science (Clinical Psychology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2011
573	Practicum – III	PSY4308	Master of Science (Clinical Psychology)	Practical, Presentation, Class Performance, Lab Report,	2011
574	Field Practice-III	PSY4309	Master of Science (Clinical Psychology)	Practical, Presentation, Class Performance, Lab Report,	2011
575	Summer Internship Evaluation	PSY4335	Master of Science (Clinical Psychology)	Report Writing, Presentation, Viva-Voce	2011
576	Counselling Psychology	PSY4304	Master of Science (Clinical Psychology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2011
577	Neuro Psychology	PSY4306	Master of Science (Clinical Psychology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2011
578	Research Methods: Non-Experimental Design	PSY4401	Master of Science (Clinical Psychology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2011
579	Mental Retardation	PSY4402	Master of Science (Clinical Psychology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2011
580	Practicum-IV	PSY4412	Master of Science (Clinical Psychology)	Practical, Presentation, Class Performance, Lab Report,	2011
581	Field Practice-IV	PSY4413	Master of Science (Clinical Psychology)	Practical, Presentation, Class Performance, Lab Report,	2011
582	Dissertation	PSY4437	Master of Science (Clinical Psychology)	Report Writing, Presentation, Viva-Voce	2011
583	Rehabilitation Psychology	PSY4404	Master of Science (Clinical Psychology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2011
584	Childhood Pathology and Exceptional Children	PSY4405	Master of Science (Clinical Psychology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2011
585	Psychotherapeutic Intervention in Clinical setting	PSY4406	Master of Science (Clinical Psychology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2011
586	Differential Diagnostic Techniques	PSY4407	Master of Science (Clinical Psychology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2011
587	Community Psychology and Intervention	PSY4408	Master of Science (Clinical Psychology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2011

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
588	Basics of Social Work	SCW4102	Master of Social Work	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2016
589	Work with Individuals & Families: Social Case Work	SCW4103	Master of Social Work	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2016
590	Working with Groups: Social Group Work	SCW4104	Master of Social Work	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2016
591	Research Methods in Social Work: Quantitative Approach	SCW4105	Master of Social Work	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2016
592	Field Work Practicum-I	SCW4107	Master of Social Work	Practical, Presentation, Class Performance, Lab Report,	2016
593	Social Policy & Social Welfare Administration	SCW4201	Master of Social Work	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2016
594	Social Work with Communities	SCW4202	Master of Social Work	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2016
595	Community Organization & Social Action	SCW4204	Master of Social Work	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2016
596	Research Methods in Social Work: Qualitative Approach	SCW4205	Master of Social Work	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2016
597	Skill Based Project	SCW4206	Master of Social Work	Report Writing, Presentation, Viva-Voce	2016
598	Field Work Practicum-II	SCW4207	Master of Social Work	Practical, Presentation, Class Performance, Lab Report,	2016
599	Social Justice & Empowerment	SCW4302	Master of Social Work	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2016
600	Communication & Counselling	SCW4303	Master of Social Work	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2016
601	Field Work Practicum-III	SCW4304	Master of Social Work	Practical, Presentation, Class Performance, Lab Report,	2016
602	Summer Internship Evaluation	SCW4335	Master of Social Work	Report Writing, Presentation, Viva-Voce	2016
603	Human Resource Development & Employee Wellness	SCW4305	Master of Social Work	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2016
604	Mental Health & Psychiatric Social Work	SCW4306	Master of Social Work	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2016
605	Social Work with Families & Children	SCW4307	Master of Social Work	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2016

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
606	Correctional Administration & Services	SCW4308	Master of Social Work	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2016
607	Management of Development & Welfare Services	SCW4310	Master of Social Work	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2016
608	Human Rights & Social Work Practice	SCW4401	Master of Social Work	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2016
609	Social Work with Urban, Rural & Tribal Communities	SCW4403	Master of Social Work	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2016
610	Field Work Practicum-IV	SCW4404	Master of Social Work	Practical, Presentation, Class Performance, Lab Report,	2016
611	Dissertation	SCW4437	Master of Social Work	Report Writing, Presentation, Viva-Voce	2016
612	Social Work with PWD	SCW4407	Master of Social Work	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2016
613	Social Work with HIV/AIDS	SCW4408	Master of Social Work	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2016
614	Disaster Management	SCW4410	Master of Social Work	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2016
615	Psychosocial Foundation of Behaviour & Psychopathology	PSY5101	M.Phil (Clinical Psychology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2016
616	Psychiatry	PSY5103	M.Phil (Clinical Psychology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2016
617	Practical: Psychological Assessment including Viva-Voce	PSY5104	M.Phil (Clinical Psychology)	Practical, Presentation, Class Performance, Lab Report,	2016
618	Statistics & Research Methodology	PSY5106	M.Phil (Clinical Psychology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2016
619	Submission of Psychodiagnostic Records	PSY5105	M.Phil (Clinical Psychology)	Report Writing, Presentation, Viva-Voce	2016
620	Psychotherapy & Counselling	PSY5301	M.Phil (Clinical Psychology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2016
621	Behavioural Medicine	PSY5302	M.Phil (Clinical Psychology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2016
622	Practical: Psychological Therapies including Viva-Voce	PSY5304	M.Phil (Clinical Psychology)	Practical, Presentation, Class Performance, Lab Report,	2016
623	Biological Foundation of Behaviour	PSY5306	M.Phil (Clinical Psychology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2016
624	Submission of Psychotherapy Records	PSY5305	M.Phil (Clinical Psychology)	Report Writing, Presentation, Viva-Voce	2016

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
625	Dissertation	PSY5337	M.Phil (Clinical Psychology)	Report Writing, Presentation, Viva-Voce	2016
626	Psychosocial Perspectives of Mental Disorders	PCP3101	Professional Diploma in Clinical Psychology	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2022
627	Counseling and Therapy	PCP3102	Professional Diploma in Clinical Psychology	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2022
628	Psychiatry	PCP3103	Professional Diploma in Clinical Psychology	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2022
629	Practical-I: Psychological Assessment including Viva-Voce	PCP3104	Professional Diploma in Clinical Psychology	Practical, Presentation, Class Performance, Lab Report,	2022
630	Practical-II: Psychological Interventions including Viva-Voce	PCP3105	Professional Diploma in Clinical Psychology	Practical, Presentation, Class Performance, Lab Report,	2022
631	Submission-I: Psychodiagnostic Records	PCP3106	Professional Diploma in Clinical Psychology	Report Writing, Presentation, Viva-Voce	2022
632	Submission-II: Psychotherapy Records	PCP3107	Professional Diploma in Clinical Psychology	Report Writing, Presentation, Viva-Voce	2022
633	Understanding Self for Effectiveness	BEH2151	Behavioural Science (OE)	Social Awareness Programme (SAP), Journal for Success, Quiz, Presentation	2010
634	Problem Solving and Creative Thinking	BEH2251	Behavioural Science (OE)	Social Awareness Programme (SAP), Journal for Success, Quiz, Presentation	2010
635	Group Dynamics and Team Building	BEH2351	Behavioural Science (OE)	Social Awareness Programme (SAP), Journal for Success, Quiz, Presentation	2010
636	Stress and Coping Strategies	BEH2451	Behavioural Science (OE)	Social Awareness Programme (SAP), Journal for Success, Quiz, Presentation	2010
637	Individual, Society and Nations	BEH2551	Behavioural Science (OE)	Social Awareness Programme (SAP), Journal for Success, Quiz, Presentation	2010
638	Interpersonal Communication and Relationship Management	BEH2651	Behavioural Science (OE)	Social Awareness Programme (SAP), Journal for Success, Quiz, Presentation	2010
639	Personality, Nationalism and Human Values	BEH2552	Behavioural Science (OE)	Social Awareness Programme (SAP), Journal for Success, Quiz, Presentation	2010
640	Interpersonal Communication	BEH2652	Behavioural Science (OE)	Social Awareness Programme (SAP), Journal for Success, Quiz, Presentation	2010
641	Relationship Management	BEH2751	Behavioural Science (OE)	Social Awareness Programme (SAP), Journal for Success, Quiz, Presentation	2010
642	Personal & Professional Excellence	BEH2851	Behavioural Science (OE)	Social Awareness Programme (SAP), Journal for Success, Quiz, Presentation	2010

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
643	Self-Development and Interpersonal Skills	BEH4151	Behavioural Science (OE)	Social Awareness Programme (SAP), Journal for Success, Quiz, Presentation	2010
644	Behavioural Communication and Relationship Management	BEH4251	Behavioural Science (OE)	Social Awareness Programme (SAP), Journal for Success, Quiz, Presentation	2010
645	Leading Through Teams	BEH4351	Behavioural Science (OE)	Social Awareness Programme (SAP), Journal for Success, Quiz, Presentation	2010
646	Professional Excellence	BEH4451	Behavioural Science (OE)	Social Awareness Programme (SAP), Journal for Success, Quiz, Presentation	2010
647	Introductory Psychology	PSY2151	Psychology (OE)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2013
648	Abnormal Psychology	PSY2251	Psychology (OE)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2013
649	Basic Cognitive Psychology	PSY2351	Psychology (OE)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2013
650	Life Span Development	PSY2451	Psychology (OE)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2013
651	Psychometric Testing	PSY2551	Psychology (OE)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2013
652	Counselling Psychology	PSY2651	Psychology (OE)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2013
653	The Science of Happiness	PSY2152	Positive Psychology (OE)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2017
654	Optimism and Success	PSY2252	Positive Psychology (OE)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2017
655	Resilience and Well Being	PSY2352	Positive Psychology (OE)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2017
656	Positive Psychology & Work Life	PSY2452	Positive Psychology (OE)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2017
657	Creativity & Problem Solving	PSY2552	Positive Psychology (OE)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2017
658	Positive Leadership & Competency Development	PSY2652	Positive Psychology (OE)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2017
659	Introduction to Computers & Programming in C	ASE2105	Bachelor of Technology (Aerospace Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2011

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660	Programming in C Lab	ASE2110	Bachelor of Technology (Aerospace Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2011
661	Workshop Technology	ASE2215	Bachelor of Technology (Aerospace Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2011
662	Engineering Graphics Lab	ASE2212	Bachelor of Technology (Aerospace Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2011
663	Engineering Mechanics Lab	ASE2218	Bachelor of Technology (Aerospace Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2011
664	Strength of Materials	ASE2315	Bachelor of Technology (Aerospace Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2011
665	Fluid Mechanics and Dynamics	ASE2322	Bachelor of Technology (Aerospace Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2011
666	Strength of Materials Lab	ASE2317	Bachelor of Technology (Aerospace Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2011
667	Fluid Mechanics and Dynamics Lab	ASE2323	Bachelor of Technology (Aerospace Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2011
668	Aircraft Manufacturing Processes	ASE2324	Bachelor of Technology (Aerospace Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2011
669	Numerical Analysis and Programming	ASE2412	Bachelor of Technology (Aerospace Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2011
670	Aircraft Propulsion	ASE2416	Bachelor of Technology (Aerospace Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2011
671	Aerospace Structures-I	ASE2417	Bachelor of Technology (Aerospace Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2011
672	Low Speed Aerodynamics Lab	ASE2419	Bachelor of Technology (Aerospace Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2011
673	Aircraft Propulsion Lab	ASE2420	Bachelor of Technology (Aerospace Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2011
674	Numerical Analysis and Programming Lab using MATLAB	ASE2421	Bachelor of Technology (Aerospace Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2011
675	Fuels & Combustion	ASE2422	Bachelor of Technology (Aerospace Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2011
676	Control Systems	ASE2423	Bachelor of Technology (Aerospace Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2011
677	Mechatronics	ASE2424	Bachelor of Technology (Aerospace Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2011
678	Turbomachinery	ASE2510	Bachelor of Technology (Aerospace Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2011
679	High Speed Aerodynamics	ASE2511	Bachelor of Technology (Aerospace Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2011
680	Aerospace Structures-II	ASE2512	Bachelor of Technology (Aerospace Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2011
681	Flight Mechanics	ASE2513	Bachelor of Technology (Aerospace Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2011
682	Computer Aided Drafting Lab	ASE2514	Bachelor of Technology (Aerospace Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2011
683	Structural Analysis Lab	ASE2515	Bachelor of Technology (Aerospace Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2011
684	Summer Internship Evaluation-I	ASE2535	Bachelor of Technology (Aerospace Engineering)	Report Writing, Presentation, Viva-Voce	2011

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685	Aircraft Systems and Instrumentation	ASE2517	Bachelor of Technology (Aerospace Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2011
686	Aircraft Maintenance & Quality Assurance	ASE2609	Bachelor of Technology (Aerospace Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2011
687	Computational Fluid Dynamics	ASE2613	Bachelor of Technology (Aerospace Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2011
688	Aerospace Materials	ASE2614	Bachelor of Technology (Aerospace Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2011
689	Aircraft Stability & Control	ASE2651	Bachelor of Technology (Aerospace Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2011
690	Computational Fluid Dynamics Lab	ASE2612	Bachelor of Technology (Aerospace Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2011
691	Aeromodelling Lab	ASE2615	Bachelor of Technology (Aerospace Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2011
692	Minor Project	ASE2637	Bachelor of Technology (Aerospace Engineering)	Project writing, Presentation, Viva-Voce	2011
693	Finite Element Method	ASE2618	Bachelor of Technology (Aerospace Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2011
694	Flight Dynamics	ASE2702	Bachelor of Technology (Aerospace Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2011
695	Aircraft Design	ASE2709	Bachelor of Technology (Aerospace Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2011
696	Vibration Engineering	ASE2713	Bachelor of Technology (Aerospace Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2011
697	Vibration Engineering Lab	ASE2714	Bachelor of Technology (Aerospace Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2011
698	Summer Internship Evaluation-II	ASE2735	Bachelor of Technology (Aerospace Engineering)	Report Writing, Presentation, Viva-Voce	2011
699	Major Project	ASE2737	Bachelor of Technology (Aerospace Engineering)	Report Writing, Presentation, Viva-Voce	2011
700	Aerospace Navigation, Guidance and Control	ASE2812	Bachelor of Technology (Aerospace Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2011
701	Project-Dissertation	ASE2837	Bachelor of Technology (Aerospace Engineering)	Report Writing, Presentation, Viva-Voce	2011
702	Aeroelasticity	ASE2813	Bachelor of Technology (Aerospace Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2011
703	Aerospace Industrial Management	ASE2814	Bachelor of Technology (Aerospace Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2011
704	Introduction to Computers & Programming in C	CSE2104	Bachelor of Technology (Computer Science & Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
705	Programming in C Lab	CSE2107	Bachelor of Technology (Computer Science & Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2010
706	Object Oriented Programming using C++	CSE2204	Bachelor of Technology (Computer Science & Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
707	Object Oriented Programming using C++ Lab	CSE2208	Bachelor of Technology (Computer Science & Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2010

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708	Basics of Electrical & Electronics Engineering Lab	CSE2218	Bachelor of Technology (Computer Science & Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2010
709	Engineering Graphics Lab	CSE2219	Bachelor of Technology (Computer Science & Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2010
710	Database Management Systems	CSE2302	Bachelor of Technology (Computer Science & Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
711	Operating Systems	CSE2303	Bachelor of Technology (Computer Science & Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
712	Data Structures using C	CSE2304	Bachelor of Technology (Computer Science & Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
713	Digital Electronics	CSE2314	Bachelor of Technology (Computer Science & Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
714	Data Structures Using C Lab	CSE2305	Bachelor of Technology (Computer Science & Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2010
715	Database Management Systems Lab	CSE2307	Bachelor of Technology (Computer Science & Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2010
716	UNIX Programming Lab	CSE2308	Bachelor of Technology (Computer Science & Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2010
717	Digital Electronics Lab	CSE2315	Bachelor of Technology (Computer Science & Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2010
718	Electronic Devices & Circuits	CSE2310	Bachelor of Technology (Computer Science & Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
719	Electronic Devices & Circuits Lab	CSE2311	Bachelor of Technology (Computer Science & Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2010
720	E-Commerce & ERP	CSE2312	Bachelor of Technology (Computer Science & Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
721	Artificial Intelligence	CSE2412	Bachelor of Technology (Computer Science & Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
722	Artificial Intelligence Lab	CSE2413	Bachelor of Technology (Computer Science & Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2010
723	Data Communication & Computer Networks Lab	CSE2420	Bachelor of Technology (Computer Science & Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2010
724	Artificial Neural Network	CSE2410	Bachelor of Technology (Computer Science & Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010

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725	Artificial Neural Network Lab	CSE2411	Bachelor of Technology (Computer Science & Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2010
726	Communication Systems	CSE2414	Bachelor of Technology (Computer Science & Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
727	Communication Systems Lab	CSE2415	Bachelor of Technology (Computer Science & Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2010
728	Web Designing Technologies	CSE2422	Bachelor of Technology (Computer Science & Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
729	Web Designing Technologies Lab	CSE2423	Bachelor of Technology (Computer Science & Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2010
730	Computer Architecture	CSE2502	Bachelor of Technology (Computer Science & Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
731	Java Programming	CSE2503	Bachelor of Technology (Computer Science & Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
732	Microprocessor	CSE2515	Bachelor of Technology (Computer Science & Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
733	Java Programming Lab	CSE2505	Bachelor of Technology (Computer Science & Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2010
734	Microprocessor Lab	CSE2517	Bachelor of Technology (Computer Science & Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2010
735	Summer Internship Evaluation-I	CSE2535	Bachelor of Technology (Computer Science & Engineering)	Report Writing, Presentation, Viva-Voce	2010
736	VHDL Programming	CSE2506	Bachelor of Technology (Computer Science & Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
737	VHDL Programming Lab	CSE2507	Bachelor of Technology (Computer Science & Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2010
738	Advanced Web Designing Technologies	CSE2518	Bachelor of Technology (Computer Science & Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
739	Advanced Web Designing Technologies Lab	CSE2519	Bachelor of Technology (Computer Science & Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2010
740	Advanced Java Programming	CSE2604	Bachelor of Technology (Computer Science & Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
741	Software Engineering	CSE2613	Bachelor of Technology (Computer Science & Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010

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742	Internet of Things & Wireless Sensor Networks	CSE2614	Bachelor of Technology (Computer Science & Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
743	Advanced Java Programming Lab	CSE2608	Bachelor of Technology (Computer Science & Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2010
744	Software Engineering Lab	CSE2615	Bachelor of Technology (Computer Science & Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2010
745	Minor Project-I	CSE2637	Bachelor of Technology (Computer Science & Engineering)	Report Writing, Presentation, Viva-Voce	2010
746	VLSI Design	CSE2610	Bachelor of Technology (Computer Science & Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
747	VLSI Design Lab	CSE2611	Bachelor of Technology (Computer Science & Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2010
748	Open Source Technologies	CSE2616	Bachelor of Technology (Computer Science & Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
749	Open Source Technologies Lab	CSE2617	Bachelor of Technology (Computer Science & Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2010
750	Data Mining	CSE2618	Bachelor of Technology (Computer Science & Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
751	Computer Graphics	CSE2710	Bachelor of Technology (Computer Science & Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
752	Cryptography & Network Security	CSE2713	Bachelor of Technology (Computer Science & Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
753	System Programming & Compiler Construction	CSE2714	Bachelor of Technology (Computer Science & Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
754	Computer Graphics Lab	CSE2712	Bachelor of Technology (Computer Science & Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2010
755	Network Security Lab	CSE2715	Bachelor of Technology (Computer Science & Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2010
756	System Programming & Compiler Lab	CSE2716	Bachelor of Technology (Computer Science & Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2010
757	Summer Internship Evaluation-II	CSE2735	Bachelor of Technology (Computer Science & Engineering)	Report Writing, Presentation, Viva-Voce	2010
758	Minor Project-II	CSE2737	Bachelor of Technology (Computer Science & Engineering)	Report Writing, Presentation, Viva-Voce	2010

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759	Mobile Computing	CSE2707	Bachelor of Technology (Computer Science & Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
760	Robotic Process Automation Design & Development	CSE2717	Bachelor of Technology (Computer Science & Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
761	Responsive Web Design	CSE2718	Bachelor of Technology (Computer Science & Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
762	Responsive Web Design Lab	CSE2719	Bachelor of Technology (Computer Science & Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2010
763	Project-Dissertation	CSE2837	Bachelor of Technology (Computer Science & Engineering)	Report Writing, Presentation, Viva-Voce	2010
764	Digital Image Processing	CSE2803	Bachelor of Technology (Computer Science & Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
765	Digital Image Processing Lab	CSE2805	Bachelor of Technology (Computer Science & Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2010
766	Dot Net Programming	CSE2804	Bachelor of Technology (Computer Science & Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
767	Dot Net Programming Lab	CSE2806	Bachelor of Technology (Computer Science & Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2010
768	Advance Robotic Process Automation Design & Development	CSE2812	Bachelor of Technology (Computer Science & Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
769	Introduction to Computers & Programming in C	ECE2105	Bachelor of Technology (Electronics & Communication Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
770	Elements of Mechanical Engineering Lab	ECE2109	Bachelor of Technology (Electronics & Communication Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2010
771	Programming in C Lab	ECE2110	Bachelor of Technology (Electronics & Communication Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2010
772	Basics of Electrical & Electronics Engineering Lab	ECE2118	Bachelor of Technology (Electronics & Communication Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2010
773	Object Oriented Programming using C++	ECE2203	Bachelor of Technology (Electronics & Communication Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
774	Object Oriented Programming using C++ Lab	ECE2206	Bachelor of Technology (Electronics & Communication Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2010
775	Engineering Graphics Lab	ECE2208	Bachelor of Technology (Electronics & Communication Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2010

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776	Analog Electronics-I	ECE2302	Bachelor of Technology (Electronics & Communication Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
777	Circuits & Systems	ECE2303	Bachelor of Technology (Electronics & Communication Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
778	Data Structure using C	ECE2311	Bachelor of Technology (Electronics & Communication Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
779	Analog Electronics- I Lab	ECE2305	Bachelor of Technology (Electronics & Communication Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2010
780	Circuits & Systems Lab	ECE2306	Bachelor of Technology (Electronics & Communication Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2010
781	Data Structure using C Lab	ECE2312	Bachelor of Technology (Electronics & Communication Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2010
782	Virtual Instrumentation	ECE2313	Bachelor of Technology (Electronics & Communication Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
783	Virtual Instrumentation Lab	ECE2314	Bachelor of Technology (Electronics & Communication Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2010
784	Measurement & Measuring Instruments	ECE2315	Bachelor of Technology (Electronics & Communication Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
785	Measurement & Measuring Instruments Lab	ECE2316	Bachelor of Technology (Electronics & Communication Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2010
786	Communication Systems	ECE2402	Bachelor of Technology (Electronics & Communication Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
787	Analog Electronics-II	ECE2403	Bachelor of Technology (Electronics & Communication Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
788	Electromagnetic Field Theory	ECE2404	Bachelor of Technology (Electronics & Communication Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
789	Digital Electronics	ECE2411	Bachelor of Technology (Electronics & Communication Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
790	Signals & Systems	ECE2417	Bachelor of Technology (Electronics & Communication Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
791	Communication Systems Lab	ECE2406	Bachelor of Technology (Electronics & Communication Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2010
792	Analog Electronics- II Lab	ECE2407	Bachelor of Technology (Electronics & Communication Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2010

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
793	Digital Electronics Lab	ECE2412	Bachelor of Technology (Electronics & Communication Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2010
794	PCB Fabrications	ECE2414	Bachelor of Technology (Electronics & Communication Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
795	Electronic Workshop & PCB Lab	ECE2418	Bachelor of Technology (Electronics & Communication Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2010
796	Database Management Systems	ECE2415	Bachelor of Technology (Electronics & Communication Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
797	Database Management Systems Lab	ECE2416	Bachelor of Technology (Electronics & Communication Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2010
798	Java Programming	ECE2419	Bachelor of Technology (Electronics & Communication Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
799	Java Programming Lab	ECE2420	Bachelor of Technology (Electronics & Communication Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2010
800	Artificial Neural Network	ECE2421	Bachelor of Technology (Electronics & Communication Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
801	Artificial Neural Network Lab	ECE2422	Bachelor of Technology (Electronics & Communication Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2010
802	Digital Circuits & Systems	ECE2501	Bachelor of Technology (Electronics & Communication Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
803	Digital Communications	ECE2502	Bachelor of Technology (Electronics & Communication Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
804	Control Systems	ECE2503	Bachelor of Technology (Electronics & Communication Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
805	Microprocessor Systems	ECE2509	Bachelor of Technology (Electronics & Communication Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
806	Digital Circuits & Systems Lab	ECE2504	Bachelor of Technology (Electronics & Communication Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2010
807	Microprocessor Systems Lab	ECE2505	Bachelor of Technology (Electronics & Communication Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2010
808	Control Systems Lab	ECE2506	Bachelor of Technology (Electronics & Communication Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2010
809	Summer Internship Evaluation-I	ECE2535	Bachelor of Technology (Electronics & Communication Engineering)	Report Writing, Presentation, Viva-Voce	2010

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810	Operating System	ECE2507	Bachelor of Technology (Electronics & Communication Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
811	Computer Architecture	ECE2508	Bachelor of Technology (Electronics & Communication Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
812	Computer Networks	ECE2513	Bachelor of Technology (Electronics & Communication Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
813	VLSI Design	ECE2601	Bachelor of Technology (Electronics & Communication Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
814	Digital Signal Processing	ECE2602	Bachelor of Technology (Electronics & Communication Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
815	Antenna and Microwave Engineering	ECE2615	Bachelor of Technology (Electronics & Communication Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
816	Antenna and Microwave Engineering Lab	ECE2616	Bachelor of Technology (Electronics & Communication Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2010
817	VLSI Design Lab	ECE2605	Bachelor of Technology (Electronics & Communication Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2010
818	Digital Signal Processing Lab	ECE2609	Bachelor of Technology (Electronics & Communication Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2010
819	Minor Project	ECE2637	Bachelor of Technology (Electronics & Communication Engineering)	Report Writing, Presentation, Viva-Voce	2010
820	Advanced Java Programming	ECE2607	Bachelor of Technology (Electronics & Communication Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
821	Advanced Java Programming Lab	ECE2610	Bachelor of Technology (Electronics & Communication Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2010
822	Embedded System	ECE2613	Bachelor of Technology (Electronics & Communication Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
823	Embedded System Lab	ECE2614	Bachelor of Technology (Electronics & Communication Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2010
824	IOT and Wireless Sensor Network	ECE2617	Bachelor of Technology (Electronics & Communication Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
825	Data Mining	ECE2618	Bachelor of Technology (Electronics & Communication Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
826	Radar & Satellite Communication	ECE2719	Bachelor of Technology (Electronics & Communication Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010

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827	Advanced Mobile Communication	ECE2720	Bachelor of Technology (Electronics & Communication Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
828	Embedded System with ARM Processors	ECE2721	Bachelor of Technology (Electronics & Communication Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
829	Radar & Satellite Communication Lab	ECE2722	Bachelor of Technology (Electronics & Communication Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2010
830	Python Lab	ECE2723	Bachelor of Technology (Electronics & Communication Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2010
831	Summer Internship Evaluation-II	ECE2735	Bachelor of Technology (Electronics & Communication Engineering)	Report Writing, Presentation, Viva-Voce	2010
832	Optical Communications	ECE2706	Bachelor of Technology (Electronics & Communication Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
833	Optical Communications Lab	ECE2716	Bachelor of Technology (Electronics & Communication Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2010
834	Digital Image Processing	ECE2712	Bachelor of Technology (Electronics & Communication Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
835	Digital Image Processing Lab	ECE2713	Bachelor of Technology (Electronics & Communication Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2010
836	Robotic Process Automation Design & Development	ECE2724	Bachelor of Technology (Electronics & Communication Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
837	Independent Study	ECE2718	Bachelor of Technology (Electronics & Communication Engineering)	Quiz, Written Test	2010
838	Term Paper	ECE2731	Bachelor of Technology (Electronics & Communication Engineering)	Academic Writing, Presentation	2010
839	Project (With Presentation & Evaluation)	ECE2732	Bachelor of Technology (Electronics & Communication Engineering)	Project writing, Presentation, Viva-Voce	2010
840	Project (Dissertation)	ECE2837	Bachelor of Technology (Electronics & Communication Engineering)	Report Writing, Presentation, Viva-Voce	2010
841	RTOS Programming	ECE2805	Bachelor of Technology (Electronics & Communication Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
842	Verilog Programming	ECE2806	Bachelor of Technology (Electronics & Communication Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
843	Verilog Programming Lab	ECE2813	Bachelor of Technology (Electronics & Communication Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2010

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844	Advanced VLSI Design	ECE2812	Bachelor of Technology (Electronics & Communication Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
845	Power Electronics	ECE2814	Bachelor of Technology (Electronics & Communication Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
846	Information Theory and Coding	ECE2815	Bachelor of Technology (Electronics & Communication Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
847	Advanced Robotic Process Automation Design & Development	ECE2816	Bachelor of Technology (Electronics & Communication Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
848	Wireless Communication	ECE2818	Bachelor of Technology (Electronics & Communication Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
849	Introduction to Computers & Programming in C	BME2104	Bachelor of Technology (Biomedical Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2011
850	Programming in C Lab	BME2109	Bachelor of Technology (Biomedical Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2011
851	Elements of Mechanical Engineering Lab	BME2111	Bachelor of Technology (Biomedical Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2011
852	Object Oriented Programming using C++	BME2205	Bachelor of Technology (Biomedical Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2011
853	Engineering Graphics Lab	BME2208	Bachelor of Technology (Biomedical Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2011
854	Object Oriented Programming using C++ Lab	BME2209	Bachelor of Technology (Biomedical Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2011
855	Analog Electronics-I	BME2302	Bachelor of Technology (Biomedical Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2011
856	Circuits & Systems	BME2303	Bachelor of Technology (Biomedical Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2011
857	Medical Imaging Techniques-I	BME2314	Bachelor of Technology (Biomedical Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2011
858	Human Anatomy and Physiology	BME2351	Bachelor of Technology (Biomedical Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2011
859	Analog Electronics Lab-I	BME2306	Bachelor of Technology (Biomedical Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2011
860	Computer Aided Graphic Design Lab	BME2315	Bachelor of Technology (Biomedical Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2011
861	Measurement & Measuring Instruments	BME2316	Bachelor of Technology (Biomedical Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2011
862	Measurement & Measuring Instruments Lab	BME2317	Bachelor of Technology (Biomedical Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2011
863	Virtual Instrumentation	BME2318	Bachelor of Technology (Biomedical Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2011
864	Virtual Instrumentation Lab	BME2319	Bachelor of Technology (Biomedical Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2011
865	Digital Electronics	BME2408	Bachelor of Technology (Biomedical Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2011
866	Biomaterials	BME2412	Bachelor of Technology (Biomedical Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2011

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
867	Signals and Systems	BME2413	Bachelor of Technology (Biomedical Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2011
868	Bio-Instrumentation	BME2451	Bachelor of Technology (Biomedical Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2011
869	Bio-Instrumentation Lab	BME2403	Bachelor of Technology (Biomedical Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2011
870	Digital Electronics Lab	BME2409	Bachelor of Technology (Biomedical Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2011
871	Signals and Systems Lab	BME2414	Bachelor of Technology (Biomedical Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2011
872	Analog Electronics-II	BME2407	Bachelor of Technology (Biomedical Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2011
873	Analog Electronics Lab-II	BME2417	Bachelor of Technology (Biomedical Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2011
874	Medical Imaging Techniques-II	BME2416	Bachelor of Technology (Biomedical Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2011
875	Artificial Neural Network	BME2418	Bachelor of Technology (Biomedical Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2011
876	Artificial Neural Network Lab	BME2419	Bachelor of Technology (Biomedical Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2011
877	Microprocessor Systems	BME2501	Bachelor of Technology (Biomedical Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2011
878	Medical Image Processing	BME2513	Bachelor of Technology (Biomedical Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2011
879	Machine Learning	BME2514	Bachelor of Technology (Biomedical Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2011
880	Microprocessor Systems Lab	BME2504	Bachelor of Technology (Biomedical Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2011
881	Machine Learning Lab	BME2515	Bachelor of Technology (Biomedical Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2011
882	Medical Image Processing Lab	BME2516	Bachelor of Technology (Biomedical Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2011
883	Summer Internship Evaluation-I	BME2535	Bachelor of Technology (Biomedical Engineering)	Report Writing, Presentation, Viva-Voce	2011
884	Control Systems	BME2503	Bachelor of Technology (Biomedical Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2011
885	Control Systems Lab	BME2512	Bachelor of Technology (Biomedical Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2011
886	Digital Circuits and Systems	BME2507	Bachelor of Technology (Biomedical Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2011
887	Digital Circuits and Systems Lab	BME2509	Bachelor of Technology (Biomedical Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2011
888	Data Structure with C++	BME2517	Bachelor of Technology (Biomedical Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2011
889	Data Structure with C++ Lab	BME2518	Bachelor of Technology (Biomedical Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2011
890	Fuzzy Logic and Genetic Algorithm	BME2519	Bachelor of Technology (Biomedical Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2011
891	Microcontroller and its Biomedical Applications	BME2601	Bachelor of Technology (Biomedical Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2011

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892	Biomechanics	BME2651	Bachelor of Technology (Biomedical Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2011
893	Clinical Need Assessment and Mini Project	BME2609	Bachelor of Technology (Biomedical Engineering)	Quiz, Viva-Voce, Project writing, Lab Records	2011
894	Medical Imaging and Reconstruction Algorithms Lab	BME2610	Bachelor of Technology (Biomedical Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2011
895	Hospital Management System	BME2607	Bachelor of Technology (Biomedical Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2011
896	Therapeutic and Surgical Equipment	BME2611	Bachelor of Technology (Biomedical Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2011
897	Data Mining	BME2612	Bachelor of Technology (Biomedical Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2011
898	Embedded System with Recent Technology	BME2710	Bachelor of Technology (Biomedical Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2011
899	Artificial Organs and Rehabilitation Engineering	BME2711	Bachelor of Technology (Biomedical Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2011
900	Clinical Electrical Safety Hazards	BME2712	Bachelor of Technology (Biomedical Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2011
901	Biomechanics Simulation Lab	BME2713	Bachelor of Technology (Biomedical Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2011
902	Embedded System with Recent Technology Lab	BME2714	Bachelor of Technology (Biomedical Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2011
903	Summer Internship Evaluation-II	BME2735	Bachelor of Technology (Biomedical Engineering)	Report Writing, Presentation, Viva-Voce	2011
904	Project Dissertation-I	BME2737	Bachelor of Technology (Biomedical Engineering)	Report Writing, Presentation, Viva-Voce	2011
905	Clinical Sciences	BME2715	Bachelor of Technology (Biomedical Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2011
906	Neural Network and Fuzzy Logic	BME2716	Bachelor of Technology (Biomedical Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2011
907	Virtual Reality	BME2717	Bachelor of Technology (Biomedical Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2011
908	Robotic Process Automation Design & Development	BME2718	Bachelor of Technology (Biomedical Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2011
909	Project Dissertation-II	BME2837	Bachelor of Technology (Biomedical Engineering)	Report Writing, Presentation, Viva-Voce	2011
910	Medical Informatics	BME2803	Bachelor of Technology (Biomedical Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2011
911	Recent Advancement in Biomedical Modalities	BME2804	Bachelor of Technology (Biomedical Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2011
912	Advanced Robotic Process Automation Design & Development	BME2805	Bachelor of Technology (Biomedical Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2011
913	Introduction to Computers & Programming in C	AIE6104	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
914	Programming in C Lab	AIE6106	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Practical, Lab Records	2017

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
915	Object Oriented Programming using C++	AIE6204	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
916	Object Oriented Programming using C++ Lab	AIE6208	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Practical, Lab Records	2017
917	Engineering Graphics Lab	AIE6211	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Practical, Lab Records	2017
918	Basics of Electrical & Electronics Engineering Lab	AIE6213	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Practical, Lab Records	2017
919	Database Management Systems	AIE6302	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
920	Operating Systems	AIE6303	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
921	Data Structures using C	AIE6304	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
922	Digital Electronics	AIE6313	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
923	Data Structures using C Lab	AIE6305	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Practical, Lab Records	2017
924	Database Management System Lab	AIE6307	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Practical, Lab Records	2017
925	UNIX Programming Lab	AIE6308	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Practical, Lab Records	2017
926	Digital Electronics Lab	AIE6314	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Practical, Lab Records	2017
927	E-Commerce & ERP	AIE6310	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
928	Electronic Devices and Circuits	AIE6311	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
929	Electronic Devices and Circuits Lab	AIE6312	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Practical, Lab Records	2017
930	Artificial Intelligence	AIE6404	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
931	Data Communication & Computer Networks	AIE6414	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017

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932	Artificial Intelligence Lab	AIE6406	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Practical, Lab Records	2017
933	Data Communication & Computer Networks Lab	AIE6415	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Practical, Lab Records	2017
934	Communication Systems	AIE6407	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
935	Communication Systems Lab	AIE6408	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Practical, Lab Records	2017
936	Artificial Neural Network	AIE6411	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
937	Artificial Neural Network Lab	AIE6412	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Practical, Lab Records	2017
938	Web Designing Technologies	AIE6417	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
939	Web Designing Technologies Lab	AIE6418	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Practical, Lab Records	2017
940	Computer Architecture	AIE6502	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
941	Java Programming	AIE6503	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
942	Microprocessor	AIE6515	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
943	Java Programming Lab	AIE6507	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Practical, Lab Records	2017
944	Python Programming Lab	AIE6508	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Practical, Lab Records	2017
945	Advance Data Structures & Algorithm Lab	AIE6509	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Practical, Lab Records	2017
946	Microprocessor Lab	AIE6517	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Practical, Lab Records	2017
947	Summer Internship Evaluation-I	AIE6535	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Report Writing, Presentation, Viva-Voce	2017
948	VHDL Programming	AIE6512	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017

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949	VHDL Programming Lab	AIE6513	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Practical, Lab Records	2017
950	Advanced Web Designing Technologies	AIE6518	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
951	Advanced Web Designing Technologies Lab	AIE6519	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Practical, Lab Records	2017
952	Advanced Java Programming	AIE6603	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
953	Advance Database Management System	AIE6604	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
954	Digital Computer Organization	AIE6605	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
955	Software Engineering	AIE6614	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
956	Internet of Things & Wireless Sensor Networks	AIE6615	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
957	Advanced Java Programming Lab	AIE6608	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Practical, Lab Records	2017
958	Advance Database Management System Lab	AIE6609	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Practical, Lab Records	2017
959	Software Engineering Lab	AIE6616	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Practical, Lab Records	2017
960	Minor Project-I	AIE6637	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Report Writing, Presentation, Viva-Voce	2017
961	VLSI Design	AIE6612	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
962	VLSI Design Lab	AIE6613	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Practical, Lab Records	2017
963	Open Source Technologies	AIE6617	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
964	Open Source Technologies Lab	AIE6618	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Practical, Lab Records	2017
965	Data Mining	AIE6619	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017

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966	Computer Graphics	AIE6702	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
967	Advanced Computer Networks	AIE6704	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
968	Cryptography & Network Security	AIE6713	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
969	System Programming & Compiler Construction	AIE6714	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
970	Computer Graphics Lab	AIE6706	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Practical, Lab Records	2017
971	Advanced Computer Networks Lab	AIE6707	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Practical, Lab Records	2017
972	MATLAB Programming	AIE6708	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
973	Network Security Lab	AIE6715	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Practical, Lab Records	2017
974	System Programming & Compiler Construction Lab	AIE6716	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Practical, Lab Records	2017
975	Summer Internship Evaluation-II	AIE6735	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Report Writing, Presentation, Viva-Voce	2017
976	Minor Project-II	AIE6737	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Report Writing, Presentation, Viva-Voce	2017
977	Mobile Computing	AIE6710	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
978	Robotic Process Automation Design & Development	AIE6717	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
979	Responsive Web Design	AIE6718	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
980	Responsive Web Design Lab	AIE6719	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Practical, Lab Records	2017
981	Research Methodology & Technical Report Writing	AIE6809	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Presentation, Report Writing	2017
982	Major Project	AIE6837	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Report Writing, Presentation, Viva-Voce	2017

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983	Fundamental of Robotics System & Robot Programming	RBE6801	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
984	Advanced Control Systems & Drives for Robots	RBE6802	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
985	Microprocessor and Interfacing	RBE6803	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
986	Kinematics & Dynamics of Robots	RBE6804	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
987	Fundamental of Robotics System & Robot Programming Lab	RBE6806	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Practical, Lab Records	2017
988	Advanced Control Systems & Drives for Robots Lab	RBE6807	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Practical, Lab Records	2017
989	Microprocessor and Interfacing Lab	RBE6808	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Practical, Lab Records	2017
990	Digital Image Processing	RBE6809	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
991	Digital Image Processing Lab	RBE6810	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Practical, Lab Records	2017
992	Dot Net Programming	RBE6811	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
993	Dot Net Programming Lab	RBE6812	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Practical, Lab Records	2017
994	Advance Robotic Process Automation Design & Development	RBE6813	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
995	Data Mining & Predictive Analysis	MLE6802	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
996	Data Warehousing and Multi-dimensional Modelling	MLE6803	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
997	Big Data Technologies	MLE6804	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
998	Data Mining & Predictive Analysis Lab	MLE6806	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Practical, Lab Records	2017
999	Data Warehousing and Multi-dimensional Modelling Lab	MLE6807	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Practical, Lab Records	2017

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1000	R-Programming Lab	MLE6808	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Practical, Lab Records	2017
1001	Digital Image Processing	MLE6809	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1002	Digital Image Processing Lab	MLE6810	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Practical, Lab Records	2017
1003	Dot Net Programming	MLE6811	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1004	Dot Net Programming Lab	MLE6812	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Practical, Lab Records	2017
1005	Advance Robotic Process Automation Design & Development	MLE6813	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1006	Summer Internship Evaluation-III	AIE6935	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Report Writing, Presentation, Viva-Voce	2017
1007	Project-Dissertation-I	AIE6937	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Report Writing, Presentation, Viva-Voce	2017
1008	Automation in Manufacturing Systems	RBE6901	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1009	Robotic Sensors, Vision and Hardware Implementation	RBE6902	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1010	Pattern Recognition & Image Processing	RBE6903	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1011	Robotic Sensors, Vision and Hardware Implementation Lab	RBE6904	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Practical, Lab Records	2017
1012	Pattern Recognition & Image Processing Lab	RBE6905	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Practical, Lab Records	2017
1013	Optimization Techniques	RBE6906	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1014	CNC Machines & Adaptive Control	RBE6907	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1015	Neural Network and Fuzzy Logic	RBE6908	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1016	Neural Network and Fuzzy Logic Lab	RBE6909	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Practical, Lab Records	2017

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1.1.3 Total number of courses having focus on employability/ entrepreneurship / skill development offered during the year (2022)

Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
1017	Decision Making Systems	RBE6910	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1018	Decision Making Systems Lab	RBE6911	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Practical, Lab Records	2017
1019	Pattern Recognition and Image Processing	MLE6901	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1020	Neural Network and Fuzzy Logic	MLE6902	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1021	Natural Language Processing	MLE6903	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1022	Pattern Recognition and Image Processing Lab	MLE6904	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Practical, Lab Records	2017
1023	Neural Network and Fuzzy Logic Lab	MLE6905	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Practical, Lab Records	2017
1024	Hadoop Lab	MLE6906	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Practical, Lab Records	2017
1025	Descriptive Analysis	MLE6907	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1026	Optimization Techniques	MLE6908	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1027	Social Network Data Analytics	MLE6909	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1028	Agent Based Intelligent Systems	MLE6910	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1029	Project-Dissertation-II	AIE6037	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Report Writing, Presentation, Viva-Voce	2017
1030	Introduction to Computers & Programming in C	NCE6104	B.Tech. + M.Tech. Network & Cyber Security	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1031	Programming in C Lab	NCE6106	B.Tech. + M.Tech. Network & Cyber Security	Quiz, Viva-Voce, Practical, Lab Records	2017
1032	Object Oriented Programming using C++	NCE6204	B.Tech. + M.Tech. Network & Cyber Security	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1033	Object Oriented Programming using C++ Lab	NCE6208	B.Tech. + M.Tech. Network & Cyber Security	Quiz, Viva-Voce, Practical, Lab Records	2017
1034	Engineering Graphics Lab	NCE6211	B.Tech. + M.Tech. Network & Cyber Security	Quiz, Viva-Voce, Practical, Lab Records	2017
1035	Basics of Electrical & Electronics Engineering Lab	NCE6213	B.Tech. + M.Tech. Network & Cyber Security	Quiz, Viva-Voce, Practical, Lab Records	2017

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1.1.3 Total number of courses having focus on employability/ entrepreneurship / skill development offered during the year (2022)

Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
1036	Database Management Systems	NCE6302	B.Tech. + M.Tech. Network & Cyber Security	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1037	Operating Systems	NCE6303	B.Tech. + M.Tech. Network & Cyber Security	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1038	Data Structures using C	NCE6304	B.Tech. + M.Tech. Network & Cyber Security	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1039	Digital Electronics	NCE6313	B.Tech. + M.Tech. Network & Cyber Security	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1040	Data Structures using C Lab	NCE6305	B.Tech. + M.Tech. Network & Cyber Security	Quiz, Viva-Voce, Practical, Lab Records	2017
1041	Database Management System Lab	NCE6307	B.Tech. + M.Tech. Network & Cyber Security	Quiz, Viva-Voce, Practical, Lab Records	2017
1042	UNIX Programming Lab	NCE6308	B.Tech. + M.Tech. Network & Cyber Security	Quiz, Viva-Voce, Practical, Lab Records	2017
1043	Digital Electronics Lab	NCE6314	B.Tech. + M.Tech. Network & Cyber Security	Quiz, Viva-Voce, Practical, Lab Records	2017
1044	E-Commerce & ERP	NCE6310	B.Tech. + M.Tech. Network & Cyber Security	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1045	Electronic Devices and Circuits	NCE6311	B.Tech. + M.Tech. Network & Cyber Security	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1046	Electronic Devices and Circuits Lab	NCE6312	B.Tech. + M.Tech. Network & Cyber Security	Quiz, Viva-Voce, Practical, Lab Records	2017
1047	Artificial Intelligence	NCE6404	B.Tech. + M.Tech. Network & Cyber Security	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1048	Data Communication & Computer Networks	NCE6414	B.Tech. + M.Tech. Network & Cyber Security	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1049	Artificial Intelligence Lab	NCE6406	B.Tech. + M.Tech. Network & Cyber Security	Quiz, Viva-Voce, Practical, Lab Records	2017
1050	Data Communication & Computer Networks Lab	NCE6415	B.Tech. + M.Tech. Network & Cyber Security	Quiz, Viva-Voce, Practical, Lab Records	2017
1051	Communication Systems	NCE6407	B.Tech. + M.Tech. Network & Cyber Security	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1052	Communication Systems Lab	NCE6408	B.Tech. + M.Tech. Network & Cyber Security	Quiz, Viva-Voce, Practical, Lab Records	2017
1053	Artificial Neural Network	NCE6411	B.Tech. + M.Tech. Network & Cyber Security	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1054	Artificial Neural Network Lab	NCE6412	B.Tech. + M.Tech. Network & Cyber Security	Quiz, Viva-Voce, Practical, Lab Records	2017
1055	Web Designing Technologies	NCE6417	B.Tech. + M.Tech. Network & Cyber Security	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1056	Web Designing Technologies Lab	NCE6418	B.Tech. + M.Tech. Network & Cyber Security	Quiz, Viva-Voce, Practical, Lab Records	2017
1057	Computer Architecture	NCE6502	B.Tech. + M.Tech. Network & Cyber Security	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1058	Java Programming	NCE6503	B.Tech. + M.Tech. Network & Cyber Security	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1059	Microprocessor	NCE6515	B.Tech. + M.Tech. Network & Cyber Security	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1060	Java Programming Lab	NCE6507	B.Tech. + M.Tech. Network & Cyber Security	Quiz, Viva-Voce, Practical, Lab Records	2017

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
1061	Python Programming Lab	NCE6508	B.Tech. + M.Tech. Network & Cyber Security	Quiz, Viva-Voce, Practical, Lab Records	2017
1062	Microprocessor Lab	NCE6517	B.Tech. + M.Tech. Network & Cyber Security	Quiz, Viva-Voce, Practical, Lab Records	2017
1063	Summer Internship Evaluation-I	NCE6535	B.Tech. + M.Tech. Network & Cyber Security	Report Writing, Presentation, Viva-Voce	2017
1064	VHDL Programming	NCE6512	B.Tech. + M.Tech. Network & Cyber Security	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1065	VHDL Programming Lab	NCE6513	B.Tech. + M.Tech. Network & Cyber Security	Quiz, Viva-Voce, Practical, Lab Records	2017
1066	Advanced Web Designing Technologies	NCE6518	B.Tech. + M.Tech. Network & Cyber Security	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1067	Advanced Web Designing Technologies Lab	NCE6519	B.Tech. + M.Tech. Network & Cyber Security	Quiz, Viva-Voce, Practical, Lab Records	2017
1068	Advanced Java Programming	NCE6603	B.Tech. + M.Tech. Network & Cyber Security	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1069	Advance Database Management System	NCE6604	B.Tech. + M.Tech. Network & Cyber Security	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1070	Digital Computer Organization	NCE6605	B.Tech. + M.Tech. Network & Cyber Security	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1071	Software Engineering	NCE6614	B.Tech. + M.Tech. Network & Cyber Security	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1072	Internet of Things & Wireless Sensor Networks	NCE6615	B.Tech. + M.Tech. Network & Cyber Security	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1073	Advanced Java Programming Lab	NCE6608	B.Tech. + M.Tech. Network & Cyber Security	Quiz, Viva-Voce, Practical, Lab Records	2017
1074	Advance Database Management System Lab	NCE6609	B.Tech. + M.Tech. Network & Cyber Security	Quiz, Viva-Voce, Practical, Lab Records	2017
1075	Software Engineering Lab	NCE6619	B.Tech. + M.Tech. Network & Cyber Security	Quiz, Viva-Voce, Practical, Lab Records	2017
1076	Minor Project-I	NCE6637	B.Tech. + M.Tech. Network & Cyber Security	Report Writing, Presentation, Viva-Voce	2017
1077	VLSI Design	NCE6612	B.Tech. + M.Tech. Network & Cyber Security	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1078	VLSI Design Lab	NCE6613	B.Tech. + M.Tech. Network & Cyber Security	Quiz, Viva-Voce, Practical, Lab Records	2017
1079	Open Source Technologies	NCE6616	B.Tech. + M.Tech. Network & Cyber Security	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1080	Open Source Technologies Lab	NCE6617	B.Tech. + M.Tech. Network & Cyber Security	Quiz, Viva-Voce, Practical, Lab Records	2017
1081	Data Mining	NCE6618	B.Tech. + M.Tech. Network & Cyber Security	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1082	Computer Graphics	NCE6702	B.Tech. + M.Tech. Network & Cyber Security	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1083	Advanced Computer Networks	NCE6704	B.Tech. + M.Tech. Network & Cyber Security	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1084	Cryptography & Network Security	NCE6713	B.Tech. + M.Tech. Network & Cyber Security	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1085	System Programming & Compiler Construction	NCE6714	B.Tech. + M.Tech. Network & Cyber Security	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
1086	Computer Graphics Lab	NCE6706	B.Tech. + M.Tech. Network & Cyber Security	Quiz, Viva-Voce, Practical, Lab Records	2017
1087	Advanced Computer Networks Lab	NCE6707	B.Tech. + M.Tech. Network & Cyber Security	Quiz, Viva-Voce, Practical, Lab Records	2017
1088	MATLAB Programming	NCE6708	B.Tech. + M.Tech. Network & Cyber Security	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1089	System Programming & Compiler Construction Lab	NCE6715	B.Tech. + M.Tech. Network & Cyber Security	Quiz, Viva-Voce, Practical, Lab Records	2017
1090	Network Security Lab	NCE6718	B.Tech. + M.Tech. Network & Cyber Security	Quiz, Viva-Voce, Practical, Lab Records	2017
1091	Summer Internship Evaluation-II	NCE6735	B.Tech. + M.Tech. Network & Cyber Security	Report Writing, Presentation, Viva-Voce	2017
1092	Minor Project-II	NCE6737	B.Tech. + M.Tech. Network & Cyber Security	Report Writing, Presentation, Viva-Voce	2017
1093	Mobile Computing	NCE6710	B.Tech. + M.Tech. Network & Cyber Security	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1094	Robotic Process Automation Design & Development	NCE6716	B.Tech. + M.Tech. Network & Cyber Security	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1095	Responsive Web Design	NCE6717	B.Tech. + M.Tech. Network & Cyber Security	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1096	Responsive Web Design Lab	NCE6719	B.Tech. + M.Tech. Network & Cyber Security	Quiz, Viva-Voce, Practical, Lab Records	2017
1097	Network and Wireless Security	NCE6802	B.Tech. + M.Tech. Network & Cyber Security	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1098	Cyber Crime and IT Law	NCE6803	B.Tech. + M.Tech. Network & Cyber Security	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1099	Cyber Crime Investigation & Forensics	NCE6804	B.Tech. + M.Tech. Network & Cyber Security	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1100	Intrusion Detection & Prevention System	NCE6805	B.Tech. + M.Tech. Network & Cyber Security	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1101	Cryptography Foundation Lab	NCE6806	B.Tech. + M.Tech. Network & Cyber Security	Quiz, Viva-Voce, Practical, Lab Records	2017
1102	Web Security Lab	NCE6807	B.Tech. + M.Tech. Network & Cyber Security	Quiz, Viva-Voce, Practical, Lab Records	2017
1103	Network & Wireless Security Lab	NCE6808	B.Tech. + M.Tech. Network & Cyber Security	Quiz, Viva-Voce, Practical, Lab Records	2017
1104	Research Methodology & Technical Report Writing	NCE6809	B.Tech. + M.Tech. Network & Cyber Security	Quiz, Viva-Voce, Presentation, Report Writing	2017
1105	Major Project	NCE6837	B.Tech. + M.Tech. Network & Cyber Security	Report Writing, Presentation, Viva-Voce	2017
1106	Digital Image Processing	NCE6812	B.Tech. + M.Tech. Network & Cyber Security	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1107	Digital Image Processing Lab	NCE6813	B.Tech. + M.Tech. Network & Cyber Security	Quiz, Viva-Voce, Practical, Lab Records	2017
1108	Dot Net Programming	NCE6814	B.Tech. + M.Tech. Network & Cyber Security	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1109	Dot Net Programming Lab	NCE6815	B.Tech. + M.Tech. Network & Cyber Security	Quiz, Viva-Voce, Practical, Lab Records	2017
1110	Advance Robotic Process Automation Design & Development	NCE6816	B.Tech. + M.Tech. Network & Cyber Security	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
1111	Biometric Systems & Biometric Image Processing	NCE6901	B.Tech. + M.Tech. Network & Cyber Security	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1112	Software Vulnerability Analysis	NCE6902	B.Tech. + M.Tech. Network & Cyber Security	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1113	Applied Cryptography	NCE6903	B.Tech. + M.Tech. Network & Cyber Security	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1114	Biometric Image Processing Lab	NCE6904	B.Tech. + M.Tech. Network & Cyber Security	Quiz, Viva-Voce, Practical, Lab Records	2017
1115	Applied Cryptography Lab	NCE6905	B.Tech. + M.Tech. Network & Cyber Security	Quiz, Viva-Voce, Practical, Lab Records	2017
1116	Summer Internship Evaluation-III	NCE6935	B.Tech. + M.Tech. Network & Cyber Security	Report Writing, Presentation, Viva-Voce	2017
1117	Project-Dissertation-I	NCE6937	B.Tech. + M.Tech. Network & Cyber Security	Report Writing, Presentation, Viva-Voce	2017
1118	Web Application & Penetration Testing	NCE6906	B.Tech. + M.Tech. Network & Cyber Security	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1119	Malware Analysis in Network Security	NCE6907	B.Tech. + M.Tech. Network & Cyber Security	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1120	Web Security	NCE6908	B.Tech. + M.Tech. Network & Cyber Security	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1121	Digital Watermarking & Steganography	NCE6909	B.Tech. + M.Tech. Network & Cyber Security	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1122	Project-Dissertation-II	NCE6037	B.Tech. + M.Tech. Network & Cyber Security	Report Writing, Presentation, Viva-Voce	2017
1123	Introduction to Computers & Programming in C	DSE6104	B.Tech. + M.Tech. Data Science	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1124	Programming in C Lab	DSE6106	B.Tech. + M.Tech. Data Science	Quiz, Viva-Voce, Practical, Lab Records	2017
1125	Object Oriented Programming using C++	DSE6204	B.Tech. + M.Tech. Data Science	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1126	Object Oriented Programming using C++ Lab	DSE6208	B.Tech. + M.Tech. Data Science	Quiz, Viva-Voce, Practical, Lab Records	2017
1127	Engineering Graphics Lab	DSE6211	B.Tech. + M.Tech. Data Science	Quiz, Viva-Voce, Practical, Lab Records	2017
1128	Basics of Electrical & Electronics Engineering Lab	DSE6213	B.Tech. + M.Tech. Data Science	Quiz, Viva-Voce, Practical, Lab Records	2017
1129	Database Management Systems	DSE6302	B.Tech. + M.Tech. Data Science	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1130	Operating Systems	DSE6303	B.Tech. + M.Tech. Data Science	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1131	Data Structures using C	DSE6304	B.Tech. + M.Tech. Data Science	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1132	Digital Electronics	DSE6313	B.Tech. + M.Tech. Data Science	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1133	Data Structures using C Lab	DSE6305	B.Tech. + M.Tech. Data Science	Quiz, Viva-Voce, Practical, Lab Records	2017
1134	Database Management System Lab	DSE6307	B.Tech. + M.Tech. Data Science	Quiz, Viva-Voce, Practical, Lab Records	2017
1135	UNIX Programming Lab	DSE6308	B.Tech. + M.Tech. Data Science	Quiz, Viva-Voce, Practical, Lab Records	2017

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1136	Digital Electronics Lab	DSE6314	B.Tech. + M.Tech. Data Science	Quiz, Viva-Voce, Practical, Lab Records	2017
1137	E-Commerce & ERP	DSE6310	B.Tech. + M.Tech. Data Science	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1138	Electronic Devices and Circuits	DSE6311	B.Tech. + M.Tech. Data Science	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1139	Artificial Intelligence	DSE6404	B.Tech. + M.Tech. Data Science	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1140	Data Communication & Computer Networks	DSE6414	B.Tech. + M.Tech. Data Science	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1141	Artificial Intelligence Lab	DSE6406	B.Tech. + M.Tech. Data Science	Quiz, Viva-Voce, Practical, Lab Records	2017
1142	Data Communication & Computer Networks Lab	DSE6415	B.Tech. + M.Tech. Data Science	Quiz, Viva-Voce, Practical, Lab Records	2017
1143	Communication Systems	DSE6407	B.Tech. + M.Tech. Data Science	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1144	Communication Systems Lab	DSE6408	B.Tech. + M.Tech. Data Science	Quiz, Viva-Voce, Practical, Lab Records	2017
1145	Artificial Neural Network	DSE6411	B.Tech. + M.Tech. Data Science	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1146	Artificial Neural Network Lab	DSE6412	B.Tech. + M.Tech. Data Science	Quiz, Viva-Voce, Practical, Lab Records	2017
1147	Web Designing Technologies	DSE6417	B.Tech. + M.Tech. Data Science	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1148	Web Designing Technologies Lab	DSE6418	B.Tech. + M.Tech. Data Science	Quiz, Viva-Voce, Practical, Lab Records	2017
1149	Computer Architecture	DSE6502	B.Tech. + M.Tech. Data Science	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1150	Java Programming	DSE6503	B.Tech. + M.Tech. Data Science	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1151	Microprocessor	DSE6515	B.Tech. + M.Tech. Data Science	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1152	Java Programming Lab	DSE6507	B.Tech. + M.Tech. Data Science	Quiz, Viva-Voce, Practical, Lab Records	2017
1153	Python Programming Lab	DSE6508	B.Tech. + M.Tech. Data Science	Quiz, Viva-Voce, Practical, Lab Records	2017
1154	Advance Data Structures & Algorithm Lab	DSE6509	B.Tech. + M.Tech. Data Science	Quiz, Viva-Voce, Practical, Lab Records	2017
1155	Microprocessor Lab	DSE6517	B.Tech. + M.Tech. Data Science	Quiz, Viva-Voce, Practical, Lab Records	2017
1156	Summer Internship Evaluation-I	DSE6535	B.Tech. + M.Tech. Data Science	Report Writing, Presentation, Viva-Voce	2017
1157	VHDL Programming	DSE6512	B.Tech. + M.Tech. Data Science	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1158	VHDL Programming Lab	DSE6513	B.Tech. + M.Tech. Data Science	Quiz, Viva-Voce, Practical, Lab Records	2017
1159	Advanced Web Designing Technologies	DSE6518	B.Tech. + M.Tech. Data Science	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1160	Advanced Web Designing Technologies Lab	DSE6519	B.Tech. + M.Tech. Data Science	Quiz, Viva-Voce, Practical, Lab Records	2017

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
1161	Advanced Java Programming	DSE6603	B.Tech. + M.Tech. Data Science	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1162	Advance Database Management System	DSE6604	B.Tech. + M.Tech. Data Science	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1163	Digital Computer Organization	DSE6605	B.Tech. + M.Tech. Data Science	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1164	Software Engineering	DSE6614	B.Tech. + M.Tech. Data Science	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1165	Internet of Things & Wireless Sensor Networks	DSE6615	B.Tech. + M.Tech. Data Science	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1166	Advanced Java Programming Lab	DSE6608	B.Tech. + M.Tech. Data Science	Quiz, Viva-Voce, Practical, Lab Records	2017
1167	Advance Database Management System Lab	DSE6609	B.Tech. + M.Tech. Data Science	Quiz, Viva-Voce, Practical, Lab Records	2017
1168	Software Engineering Lab	DSE6616	B.Tech. + M.Tech. Data Science	Quiz, Viva-Voce, Practical, Lab Records	2017
1169	Minor Project-I	DSE6637	B.Tech. + M.Tech. Data Science	Report Writing, Presentation, Viva-Voce	2017
1170	VLSI Design	DSE6612	B.Tech. + M.Tech. Data Science	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1171	VLSI Design Lab	DSE6613	B.Tech. + M.Tech. Data Science	Quiz, Viva-Voce, Practical, Lab Records	2017
1172	Open Source Technologies	DSE6617	B.Tech. + M.Tech. Data Science	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1173	Open Source Technologies Lab	DSE6618	B.Tech. + M.Tech. Data Science	Quiz, Viva-Voce, Practical, Lab Records	2017
1174	Data Mining	DSE6619	B.Tech. + M.Tech. Data Science	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1175	Computer Graphics	DSE6702	B.Tech. + M.Tech. Data Science	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1176	Advanced Computer Networks	DSE6704	B.Tech. + M.Tech. Data Science	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1177	Cryptography & Network Security	DSE6713	B.Tech. + M.Tech. Data Science	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1178	System Programming & Compiler Construction	DSE6714	B.Tech. + M.Tech. Data Science	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1179	Computer Graphics Lab	DSE6706	B.Tech. + M.Tech. Data Science	Quiz, Viva-Voce, Practical, Lab Records	2017
1180	Advanced Computer Networks Lab	DSE6707	B.Tech. + M.Tech. Data Science	Quiz, Viva-Voce, Practical, Lab Records	2017
1181	MATLAB Programming	DSE6708	B.Tech. + M.Tech. Data Science	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1182	Network Security Lab	DSE6715	B.Tech. + M.Tech. Data Science	Quiz, Viva-Voce, Practical, Lab Records	2017
1183	System Programming & Compiler Construction Lab	DSE6716	B.Tech. + M.Tech. Data Science	Quiz, Viva-Voce, Practical, Lab Records	2017
1184	Summer Internship Evaluation-II	DSE6735	B.Tech. + M.Tech. Data Science	Report Writing, Presentation, Viva-Voce	2017
1185	Minor Project-II	DSE6737	B.Tech. + M.Tech. Data Science	Report Writing, Presentation, Viva-Voce	2017

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
1186	Mobile Computing	DSE6710	B.Tech. + M.Tech. Data Science	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1187	Robotic Process Automation Design & Development	DSE6717	B.Tech. + M.Tech. Data Science	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1188	Responsive Web Design	DSE6718	B.Tech. + M.Tech. Data Science	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1189	Responsive Web Design Lab	DSE6719	B.Tech. + M.Tech. Data Science	Quiz, Viva-Voce, Practical, Lab Records	2017
1190	Data Mining & Predictive Analytics	DSE6802	B.Tech. + M.Tech. Data Science	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1191	Data Warehousing & Multi-dimensional Modelling	DSE6803	B.Tech. + M.Tech. Data Science	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1192	Database & Knowledge Base Systems	DSE6804	B.Tech. + M.Tech. Data Science	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1193	Big Data Technologies	DSE6805	B.Tech. + M.Tech. Data Science	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1194	Applied Statically Analysis Lab	DSE6806	B.Tech. + M.Tech. Data Science	Quiz, Viva-Voce, Practical, Lab Records	2017
1195	Data Mining & Predictive Analytics Lab	DSE6807	B.Tech. + M.Tech. Data Science	Quiz, Viva-Voce, Practical, Lab Records	2017
1196	Data Warehousing & Multi-dimensional Modelling Lab	DSE6808	B.Tech. + M.Tech. Data Science	Quiz, Viva-Voce, Practical, Lab Records	2017
1197	Research Methodology & Technical Report Writing	DSE6809	B.Tech. + M.Tech. Data Science	Quiz, Viva-Voce, Presentation, Report Writing	2017
1198	Major Project	DSE6837	B.Tech. + M.Tech. Data Science	Report Writing, Presentation, Viva-Voce	2017
1199	Digital Image Processing	DSE6812	B.Tech. + M.Tech. Data Science	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1200	Dot Net Programming	DSE6814	B.Tech. + M.Tech. Data Science	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1201	Dot Net Programming Lab	DSE6815	B.Tech. + M.Tech. Data Science	Quiz, Viva-Voce, Practical, Lab Records	2017
1202	Advance Robotic Process Automation Design & Development	DSE6816	B.Tech. + M.Tech. Data Science	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1203	Descriptive Analysis	DSE6901	B.Tech. + M.Tech. Data Science	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1204	Learning & Reasoning with Bayesian Networks	DSE6902	B.Tech. + M.Tech. Data Science	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1205	Social Network Data Analytics	DSE6903	B.Tech. + M.Tech. Data Science	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1206	R-Programming Lab	DSE6904	B.Tech. + M.Tech. Data Science	Quiz, Viva-Voce, Practical, Lab Records	2017
1207	Hadoop Lab	DSE6905	B.Tech. + M.Tech. Data Science	Quiz, Viva-Voce, Practical, Lab Records	2017
1208	Summer Internship Evaluation-III	DSE6935	B.Tech. + M.Tech. Data Science	Report Writing, Presentation, Viva-Voce	2017
1209	Project-Dissertation-I	DSE6937	B.Tech. + M.Tech. Data Science	Report Writing, Presentation, Viva-Voce	2017
1210	Web Technology	DSE6906	B.Tech. + M.Tech. Data Science	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017

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1211	Service Oriented Architecture	DSE6907	B.Tech. + M.Tech. Data Science	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1212	Natural Language Processing	DSE6908	B.Tech. + M.Tech. Data Science	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1213	Agent Based Intelligent Systems	DSE6909	B.Tech. + M.Tech. Data Science	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1214	Project-Dissertation-II	DSE6037	B.Tech. + M.Tech. Data Science	Report Writing, Presentation, Viva-Voce	2017
1215	Applied Numerical Methods	CIV4101	Master of Technology (Civil Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1216	Sustainable Constructions	CIV4102	Master of Technology (Civil Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1217	Disaster Mitigation and Management	CIV4103	Master of Technology (Civil Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1218	Environmental Impact Assessment for Civil Engineers	CIV4104	Master of Technology (Civil Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1219	Optimization and Quantitative Methods in Civil Engineering	CIV4105	Master of Technology (Civil Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1220	Advanced Civil Engineering Lab	CIV4106	Master of Technology (Civil Engineering)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2013
1221	Research Methodology and Technical Report Writing	CIV4201	Master of Technology (Civil Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1222	Structural Dynamics	STE4201	Master of Technology (Civil Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1223	Advanced Steel Design	STE4202	Master of Technology (Civil Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1224	Design of Industrial Structures	STE4204	Master of Technology (Civil Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1225	Advanced Structural Analysis	STE4212	Master of Technology (Civil Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1226	Advanced Bridge Design	STE4208	Master of Technology (Civil Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1227	Advanced Concrete Design	STE4211	Master of Technology (Civil Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1228	Finite Element Method	STE4213	Master of Technology (Civil Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
1229	Advances in Construction Practices and Machinery	CME4201	Master of Technology (Civil Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1230	Building Services & Maintenance Management	CME4203	Master of Technology (Civil Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1231	Systems Design and Value Analysis	CME4204	Master of Technology (Civil Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1232	Reliability Analysis in Construction Management	CME4207	Master of Technology (Civil Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1233	Pre-Engineered Construction Technology	CME4212	Master of Technology (Civil Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1234	Construction Planning and Management	CME4213	Master of Technology (Civil Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1235	Transportation Planning	TRE4201	Master of Technology (Civil Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1236	Accidents Analysis & Prevention	TRE4214	Master of Technology (Civil Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1237	Pavement Materials & Construction	TRE4216	Master of Technology (Civil Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1238	Pavement Materials & Construction Lab	TRE4217	Master of Technology (Civil Engineering)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2013
1239	Geometric Design of Highways	TRE4218	Master of Technology (Civil Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1240	Pavement Analysis and Design	TRE4211	Master of Technology (Civil Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1241	Environmental Policies and Legislation	EVE4201	Master of Technology (Civil Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1242	Solid and Hazardous Waste Management	EVE4208	Master of Technology (Civil Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1243	Water Treatment Plant Design and Operation	EVE4211	Master of Technology (Civil Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1244	Air Pollution and Control	EVE4212	Master of Technology (Civil Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1245	Optimization of Water Resources System	EVE4205	Master of Technology (Civil Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
1246	Environmental Chemistry	EVE4213	Master of Technology (Civil Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1247	Environmental Engineering Lab	EVE4214	Master of Technology (Civil Engineering)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2013
1248	GIS & Remote Sensing for Land and Water Management	EVE4215	Master of Technology (Civil Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1249	Summer Internship Evaluation	CIV4335	Master of Technology (Civil Engineering)	Report Writing, Presentation, Viva-Voce	2013
1250	Project-Dissertation-I	CIV4337	Master of Technology (Civil Engineering)	Report Writing, Presentation, Viva-Voce	2013
1251	Design of Tall Buildings	STE4308	Master of Technology (Civil Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1252	Offshore Structures	STE4312	Master of Technology (Civil Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1253	Pre-stressed Concrete Design	STE4314	Master of Technology (Civil Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1254	Advanced Concrete Technology	STE4302	Master of Technology (Civil Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1255	Soil Structure Interaction	STE4307	Master of Technology (Civil Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1256	Advanced Construction Materials	STE4304	Master of Technology (Civil Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1257	Advanced Construction Materials Lab	STE4305	Master of Technology (Civil Engineering)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2013
1258	Advanced Steel and Concrete Composite Structures	STE4309	Master of Technology (Civil Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1259	Advanced Structural Engineering Lab	STE4310	Master of Technology (Civil Engineering)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2013
1260	GIS in Construction Engineering	CME4307	Master of Technology (Civil Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1261	Construction Quality & Safety Management	CME4310	Master of Technology (Civil Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1262	Operations Strategy	CME4308	Master of Technology (Civil Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1263	Advanced Concrete Technology	CME4315	Master of Technology (Civil Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
1264	Highway Construction and Maintenance	CME4302	Master of Technology (Civil Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1265	Highway Construction and Maintenance Lab	CME4303	Master of Technology (Civil Engineering)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2013
1266	Geotechnics in Construction	CME4304	Master of Technology (Civil Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1267	Geotechnical Lab for Construction Engineers	CME4305	Master of Technology (Civil Engineering)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2013
1268	Soft Computing Techniques in Civil Engineering	CME4316	Master of Technology (Civil Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1269	Soft Computing Techniques in Civil Engineering Lab	CME4317	Master of Technology (Civil Engineering)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2013
1270	Transportation Infrastructure Design	TRE4305	Master of Technology (Civil Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1271	Airport Infrastructure Planning & Design	TRE4306	Master of Technology (Civil Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1272	Public Transportation System	TRE4303	Master of Technology (Civil Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1273	Intelligent Transportation System	TRE4307	Master of Technology (Civil Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1274	Railway Infrastructure Planning & Design	TRE4308	Master of Technology (Civil Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1275	GIS & Its Application in Transportation Engineering	TRE4301	Master of Technology (Civil Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1276	GIS & Its Application in Transportation Engineering Lab	TRE4302	Master of Technology (Civil Engineering)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2013
1277	Industrial Wastewater Treatment and Design	EVE4302	Master of Technology (Civil Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1278	Water Resource Planning and Management	EVE4303	Master of Technology (Civil Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1279	Biological Process of Waste Water Treatment	EVE4309	Master of Technology (Civil Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1280	Transport Phenomenon of Waste Water	EVE4310	Master of Technology (Civil Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1281	Water Reclamation and Reuse	EVE4311	Master of Technology (Civil Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013

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1282	Air and Water Quality Modelling	EVE4312	Master of Technology (Civil Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1283	Air and Water Quality Modelling Lab	EVE4313	Master of Technology (Civil Engineering)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2013
1284	Advanced Wastewater Engineering	EVE4314	Master of Technology (Civil Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1285	Advanced Wastewater Engineering Lab	EVE4315	Master of Technology (Civil Engineering)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2013
1286	Project-Dissertation-II	CIV4437	Master of Technology (Civil Engineering)	Report Writing, Presentation, Viva-Voce	2013
1287	Advanced Solid Mechanics	MAE4101	Master of Technology (Mechanical Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1288	Advanced Machining Processes	MAE4104	Master of Technology (Mechanical Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1289	Computer Integrated Manufacturing	MAE4105	Master of Technology (Mechanical Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1290	Advanced Machining Processes Lab	MAE4107	Master of Technology (Mechanical Engineering)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2013
1291	Computer Integrated Manufacturing Lab	MAE4108	Master of Technology (Mechanical Engineering)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2013
1292	Optimization Techniques	MAE4201	Master of Technology (Mechanical Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1293	Design of Experiments	MAE4202	Master of Technology (Mechanical Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1294	Research Methodology & Technical Report Writing	MAE4203	Master of Technology (Mechanical Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1295	Concept of Combustion	THE4211	Master of Technology (Mechanical Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1296	Energy Management & Auditing	THE4212	Master of Technology (Mechanical Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1297	Refrigeration & Air Conditioning	THE4213	Master of Technology (Mechanical Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1298	Refrigeration & Air Conditioning Lab	THE4214	Master of Technology (Mechanical Engineering)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2013
1299	Advanced Tribology	MDE4204	Master of Technology (Mechanical Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1300	Industrial Robotics	MDE4205	Master of Technology (Mechanical Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
1301	Advanced Computer Aided Design	MDE4211	Master of Technology (Mechanical Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1302	Advanced Computer Aided Design Lab	MDE4212	Master of Technology (Mechanical Engineering)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2013
1303	Experimental Stress Analysis	MDE4213	Master of Technology (Mechanical Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1304	Mechatronics	IPE4204	Master of Technology (Mechanical Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1305	Mechatronics Lab	IPE4213	Master of Technology (Mechanical Engineering)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2013
1306	Welding and Aided Processes	IPE4205	Master of Technology (Mechanical Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1307	Advanced Computer Aided Manufacturing	IPE4211	Master of Technology (Mechanical Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1308	Advanced Computer Aided Manufacturing Lab	IPE4212	Master of Technology (Mechanical Engineering)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2013
1309	Quality and Reliability Management	IPE4214	Master of Technology (Mechanical Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1310	Total Quality Management & Quality Assurance	MAE4301	Master of Technology (Mechanical Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1311	Summer InternshipEvaluation	MAE4335	Master of Technology (Mechanical Engineering)	Report Writing, Presentation, Viva-Voce	2013
1312	Project-Dissertation-I	MAE4337	Master of Technology (Mechanical Engineering)	Report Writing, Presentation, Viva-Voce	2013
1313	Cryogenics	THE4304	Master of Technology (Mechanical Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1314	Advanced Computational Fluid Dynamics	THE4309	Master of Technology (Mechanical Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1315	Advanced Computational Fluid Dynamics Lab	THE4310	Master of Technology (Mechanical Engineering)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2013
1316	Microfluidics & Nanofluidic	THE4311	Master of Technology (Mechanical Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1317	Turbo Machines	THE4312	Master of Technology (Mechanical Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1318	Advanced Mechanical Vibrations	MDE4302	Master of Technology (Mechanical Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1319	Advanced Mechanical Vibrations Lab	MDE4307	Master of Technology (Mechanical Engineering)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2013

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1320	Finite Elements Method	MDE4303	Master of Technology (Mechanical Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1321	Finite Elements Method Lab	MDE4308	Master of Technology (Mechanical Engineering)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2013
1322	Product Design & Development	MDE4309	Master of Technology (Mechanical Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1323	Advanced Mechanical Design	MDE4310	Master of Technology (Mechanical Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1324	Computer Aided Metrology & Inspection	IPE4302	Master of Technology (Mechanical Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1325	Computer Aided Metrology & Inspection Lab	IPE4307	Master of Technology (Mechanical Engineering)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2013
1326	Metal Cutting & Tool Design	IPE4303	Master of Technology (Mechanical Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1327	Metal Cutting & Tool Design Lab	IPE4308	Master of Technology (Mechanical Engineering)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2013
1328	Production Planning & Control	IPE4304	Master of Technology (Mechanical Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1329	Material Management	IPE4309	Master of Technology (Mechanical Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1330	Project-Dissertation-II	MAE4437	Master of Technology (Mechanical Engineering)	Report Writing, Presentation, Viva-Voce	2013
1331	Advanced Database Management Systems	DSE4102	Master of Technology (Data Science)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2017
1332	Digital Computer Organization	DSE4103	Master of Technology (Data Science)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2017
1333	Advanced Computer Networks	DSE4104	Master of Technology (Data Science)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2017
1334	Advanced Database Management Systems Lab	DSE4106	Master of Technology (Data Science)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2017
1335	Advanced Computer Networks Lab	DSE4107	Master of Technology (Data Science)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2017
1336	MATLAB Programming	DSE4108	Master of Technology (Data Science)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2017
1337	Python Programming Lab	DSE4109	Master of Technology (Data Science)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2017
1338	Data Mining & Predictive Analytics	DSE4202	Master of Technology (Data Science)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2017

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
1339	Data Warehousing & Multi-dimensional Modeling	DSE4203	Master of Technology (Data Science)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2017
1340	Database & Knowledge Base Systems	DSE4204	Master of Technology (Data Science)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2017
1341	Big Data Technologies	DSE4205	Master of Technology (Data Science)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2017
1342	Research Methodology & Technical Report Writing	DSE4206	Master of Technology (Data Science)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2017
1343	Data Mining & Predictive Analytics Lab	DSE4208	Master of Technology (Data Science)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2017
1344	Data Warehousing & Multi-dimensional Modeling Lab	DSE4209	Master of Technology (Data Science)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2017
1345	Information Management System	DSE4210	Master of Technology (Data Science)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2017
1346	Information System Security	DSE4211	Master of Technology (Data Science)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2017
1347	Descriptive Analysis	DSE4301	Master of Technology (Data Science)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2017
1348	Learning and Reasoning with Bayesian Networks	DSE4302	Master of Technology (Data Science)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2017
1349	Social Network Data Analytics	DSE4303	Master of Technology (Data Science)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2017
1350	R-Programming Lab	DSE4304	Master of Technology (Data Science)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2017
1351	Hadoop Lab	DSE4305	Master of Technology (Data Science)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2017
1352	Summer Internship Evaluation	DSE4335	Master of Technology (Data Science)	Report Writing, Presentation, Viva-Voce	2017
1353	Project Dissertation-I	DSE4337	Master of Technology (Data Science)	Report Writing, Presentation, Viva-Voce	2017
1354	Web Technology	DSE4306	Master of Technology (Data Science)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2017
1355	Service Oriented Architecture	DSE4307	Master of Technology (Data Science)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2017
1356	Natural Language Processing	DSE4308	Master of Technology (Data Science)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2017
1357	Agent Based Intelligent Systems	DSE4309	Master of Technology (Data Science)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2017

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1358	Project Dissertation-II	DSE4437	Master of Technology (Data Science)	Report Writing, Presentation, Viva-Voce	2017
1359	Advanced Database Management Systems	AIE4102	Master of Technology (Artificial Intelligence) (Specialisation: Robotics / Machine Learning)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2017
1360	Digital Computer Organization	AIE4103	Master of Technology (Artificial Intelligence) (Specialisation: Robotics / Machine Learning)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2017
1361	Advanced Computer Networks	AIE4104	Master of Technology (Artificial Intelligence) (Specialisation: Robotics / Machine Learning)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2017
1362	Advanced Database Management Systems Lab	AIE4106	Master of Technology (Artificial Intelligence) (Specialisation: Robotics / Machine Learning)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2017
1363	Advanced Computer Networks Lab	AIE4107	Master of Technology (Artificial Intelligence) (Specialisation: Robotics / Machine Learning)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2017
1364	MATLAB Programming	AIE4108	Master of Technology (Artificial Intelligence) (Specialisation: Robotics / Machine Learning)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2017
1365	Python Programming Lab	AIE4109	Master of Technology (Artificial Intelligence) (Specialisation: Robotics / Machine Learning)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2017
1366	Research Methodology & Technical Report Writing	AIE4206	Master of Technology (Artificial Intelligence) (Specialisation: Robotics / Machine Learning)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2017
1367	Fundamental of Robotics System & Robot Programming	RBE4201	Master of Technology (Artificial Intelligence) (Specialisation: Robotics / Machine Learning)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2017
1368	Advanced Control Systems and Drives for Robots	RBE4202	Master of Technology (Artificial Intelligence) (Specialisation: Robotics / Machine Learning)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2017
1369	Microprocessor and Interfacing	RBE4203	Master of Technology (Artificial Intelligence) (Specialisation: Robotics / Machine Learning)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2017
1370	Kinematics & Dynamics of Robots	RBE4204	Master of Technology (Artificial Intelligence) (Specialisation: Robotics / Machine Learning)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2017

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
1371	Fundamental of Robotics System & Robot Programming Lab	RBE4206	Master of Technology (Artificial Intelligence) (Specialisation: Robotics / Machine Learning)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2017
1372	Advanced Control Systems & Drives for Robots Lab	RBE4207	Master of Technology (Artificial Intelligence) (Specialisation: Robotics / Machine Learning)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2017
1373	Microprocessor and Interfacing Lab	RBE4208	Master of Technology (Artificial Intelligence) (Specialisation: Robotics / Machine Learning)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2017
1374	Fundamentals of Artificial Intelligence for Robotics	RBE4209	Master of Technology (Artificial Intelligence) (Specialisation: Robotics / Machine Learning)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2017
1375	Robotic Simulation & Simultaneous Localization Mapping	RBE4210	Master of Technology (Artificial Intelligence) (Specialisation: Robotics / Machine Learning)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2017
1376	Data Mining and Predictive Analysis	MLE4202	Master of Technology (Artificial Intelligence) (Specialisation: Robotics / Machine Learning)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2017
1377	Data Warehousing and Multi-dimensional Modeling	MLE4203	Master of Technology (Artificial Intelligence) (Specialisation: Robotics / Machine Learning)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2017
1378	Big Data Technologies	MLE4204	Master of Technology (Artificial Intelligence) (Specialisation: Robotics / Machine Learning)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2017
1379	Data Mining and Predictive Analysis Lab	MLE4206	Master of Technology (Artificial Intelligence) (Specialisation: Robotics / Machine Learning)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2017
1380	Data Warehousing and Multi-dimensional Modeling Lab	MLE4207	Master of Technology (Artificial Intelligence) (Specialisation: Robotics / Machine Learning)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2017
1381	R-Programming Lab	MLE4208	Master of Technology (Artificial Intelligence) (Specialisation: Robotics / Machine Learning)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2017
1382	Database and Knowledge Base Systems	MLE4209	Master of Technology (Artificial Intelligence) (Specialisation: Robotics / Machine Learning)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2017

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
1383	Information Management System	MLE4210	Master of Technology (Artificial Intelligence) (Specialisation: Robotics / Machine Learning)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2017
1384	Fundamental of Artificial Intelligence	MLE4211	Master of Technology (Artificial Intelligence) (Specialisation: Robotics / Machine Learning)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2017
1385	Summer Internship Evaluation	AIE4335	Master of Technology (Artificial Intelligence) (Specialisation: Robotics / Machine Learning)	Report Writing, Presentation, Viva-Voce	2017
1386	Project Dissertation-I	AIE4337	Master of Technology (Artificial Intelligence) (Specialisation: Robotics / Machine Learning)	Report Writing, Presentation, Viva-Voce	2017
1387	Automation in Manufacturing Systems	RBE4301	Master of Technology (Artificial Intelligence) (Specialisation: Robotics / Machine Learning)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2017
1388	Robotic Sensors, Vision and Hardware Implementation	RBE4302	Master of Technology (Artificial Intelligence) (Specialisation: Robotics / Machine Learning)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2017
1389	Pattern Recognition & Image Processing	RBE4303	Master of Technology (Artificial Intelligence) (Specialisation: Robotics / Machine Learning)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2017
1390	Robotic Sensors, Vision and Hardware Implementation Lab	RBE4304	Master of Technology (Artificial Intelligence) (Specialisation: Robotics / Machine Learning)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2017
1391	Pattern Recognition & Image Processing Lab	RBE4305	Master of Technology (Artificial Intelligence) (Specialisation: Robotics / Machine Learning)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2017
1392	Optimization Techniques	RBE4306	Master of Technology (Artificial Intelligence) (Specialisation: Robotics / Machine Learning)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2017
1393	CNC Machines & Adaptive Control	RBE4307	Master of Technology (Artificial Intelligence) (Specialisation: Robotics / Machine Learning)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2017
1394	Neural Network and Fuzzy Logic	RBE4308	Master of Technology (Artificial Intelligence) (Specialisation: Robotics / Machine Learning)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2017

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
1395	Neural Network and Fuzzy Logic Lab	RBE4309	Master of Technology (Artificial Intelligence) (Specialisation: Robotics / Machine Learning)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2017
1396	Decision Making Systems	RBE4310	Master of Technology (Artificial Intelligence) (Specialisation: Robotics / Machine Learning)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2017
1397	Decision Making Systems Lab	RBE4311	Master of Technology (Artificial Intelligence) (Specialisation: Robotics / Machine Learning)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2017
1398	Pattern Recognition and Image Processing	MLE4301	Master of Technology (Artificial Intelligence) (Specialisation: Robotics / Machine Learning)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2017
1399	Neural Network and Fuzzy Logic	MLE4302	Master of Technology (Artificial Intelligence) (Specialisation: Robotics / Machine Learning)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2017
1400	Pattern Recognition and Image Processing Lab	MLE4304	Master of Technology (Artificial Intelligence) (Specialisation: Robotics / Machine Learning)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2017
1401	Neural Network and Fuzzy Logic Lab	MLE4305	Master of Technology (Artificial Intelligence) (Specialisation: Robotics / Machine Learning)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2017
1402	Hadoop Lab	MLE4306	Master of Technology (Artificial Intelligence) (Specialisation: Robotics / Machine Learning)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2017
1403	Optimization Techniques	MLE4308	Master of Technology (Artificial Intelligence) (Specialisation: Robotics / Machine Learning)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2017
1404	Social Network Data Analytics	MLE4309	Master of Technology (Artificial Intelligence) (Specialisation: Robotics / Machine Learning)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2017
1405	Agent Based Intelligent Systems	MLE4310	Master of Technology (Artificial Intelligence) (Specialisation: Robotics / Machine Learning)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2017
1406	Project Dissertation-II	AIE4437	Master of Technology (Artificial Intelligence) (Specialisation: Robotics / Machine Learning)	Report Writing, Presentation, Viva-Voce	2017
1407	Advanced Database Management Systems	NCE4102	Master of Technology (Network & Cyber Security)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2017

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
1408	Digital Computer Organization	NCE4103	Master of Technology (Network & Cyber Security)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2017
1409	Advanced Computer Networks	NCE4104	Master of Technology (Network & Cyber Security)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2017
1410	Advanced Database Management Systems Lab	NCE4106	Master of Technology (Network & Cyber Security)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2017
1411	Advanced Computer Networks Lab	NCE4107	Master of Technology (Network & Cyber Security)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2017
1412	MATLAB Programming	NCE4108	Master of Technology (Network & Cyber Security)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2017
1413	Python Programming Lab	NCE4109	Master of Technology (Network & Cyber Security)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2017
1414	Network and Wireless Security	NCE4202	Master of Technology (Network & Cyber Security)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2017
1415	Cyber Crime and IT Law	NCE4203	Master of Technology (Network & Cyber Security)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2017
1416	Cyber Crime Investigation & Forensics	NCE4204	Master of Technology (Network & Cyber Security)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2017
1417	Intrusion Detection & Prevention System	NCE4205	Master of Technology (Network & Cyber Security)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2017
1418	Research Methodology & Technical Report Writing	NCE4206	Master of Technology (Network & Cyber Security)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2017
1419	Cryptography Foundation Lab	NCE4207	Master of Technology (Network & Cyber Security)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2017
1420	Web Security Lab	NCE4208	Master of Technology (Network & Cyber Security)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2017
1421	Network Security Lab	NCE4209	Master of Technology (Network & Cyber Security)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2017
1422	Big Data Systems	NCE4210	Master of Technology (Network & Cyber Security)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2017
1423	Distributed System Security	NCE4211	Master of Technology (Network & Cyber Security)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2017
1424	Block Chain Technology	NCE4212	Master of Technology (Network & Cyber Security)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2017
1425	Biometric Systems & Biometric Image Processing	NCE4301	Master of Technology (Network & Cyber Security)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2017
1426	Software Vulnerability Analysis	NCE4302	Master of Technology (Network & Cyber Security)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2017

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1427	Applied Cryptography	NCE4303	Master of Technology (Network & Cyber Security)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2017
1428	Biometric Image Processing Lab	NCE4304	Master of Technology (Network & Cyber Security)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2017
1429	Applied Cryptography Lab	NCE4305	Master of Technology (Network & Cyber Security)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2017
1430	Summer Internship Evaluation	NCE4335	Master of Technology (Network & Cyber Security)	Report Writing, Presentation, Viva-Voce	2017
1431	Project Dissertation-I	NCE4337	Master of Technology (Network & Cyber Security)	Report Writing, Presentation, Viva-Voce	2017
1432	Web Application & Penetration Testing	NCE4306	Master of Technology (Network & Cyber Security)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2017
1433	Malware Analysis in Network Security	NCE4307	Master of Technology (Network & Cyber Security)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2017
1434	Web Security	NCE4308	Master of Technology (Network & Cyber Security)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2017
1435	Digital Watermarking & Stagenography	NCE4309	Master of Technology (Network & Cyber Security)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2017
1436	Project Dissertation-II	NCE4437	Master of Technology (Network & Cyber Security)	Report Writing, Presentation, Viva-Voce	2017
1437	Digital Electronics	IFT2112	Bachelor of Science (Information Technology)	Quiz, Class Performance, Group Discussion, Viva-Voce	2011
1438	Computer Fundamentals & Tools	IFT2114	Bachelor of Science (Information Technology)	Quiz, Class Performance, Group Discussion, Viva-Voce	2011
1439	Computer Fundamentals & Tools Lab	IFT2115	Bachelor of Science (Information Technology)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2011
1440	Computer Programming with C Language	IFT2116	Bachelor of Science (Information Technology)	Quiz, Class Performance, Group Discussion, Viva-Voce	2011
1441	Computer Programming with C Language Lab	IFT2118	Bachelor of Science (Information Technology)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2011
1442	Introduction to Database Management System	IFT2202	Bachelor of Science (Information Technology)	Quiz, Class Performance, Group Discussion, Viva-Voce	2011
1443	Data Structure Through C Language	IFT2211	Bachelor of Science (Information Technology)	Quiz, Class Performance, Group Discussion, Viva-Voce	2011
1444	Data Structures Using C++ Language Lab	IFT2216	Bachelor of Science (Information Technology)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2011
1445	Web Technologies	IFT2217	Bachelor of Science (Information Technology)	Quiz, Class Performance, Group Discussion, Viva-Voce	2011
1446	Computer Organization & Architecture	IFT2219	Bachelor of Science (Information Technology)	Quiz, Class Performance, Group Discussion, Viva-Voce	2011
1447	Web Technologies Lab	IFT2220	Bachelor of Science (Information Technology)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2011
1448	Discrete Mathematics Structures with Application to CS	IFT2222	Bachelor of Science (Information Technology)	Quiz, Class Performance, Group Discussion, Viva-Voce	2011
1449	Introduction to Database Management System Lab	IFT2223	Bachelor of Science (Information Technology)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2011

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
1450	Introduction to Object Oriented Programming with C++	IFT2312	Bachelor of Science (Information Technology)	Quiz, Class Performance, Group Discussion, Viva-Voce	2011
1451	Operating System	IFT2314	Bachelor of Science (Information Technology)	Quiz, Class Performance, Group Discussion, Viva-Voce	2011
1452	Object Oriented Programming with C++ Lab	IFT2315	Bachelor of Science (Information Technology)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2011
1453	Software Engineering	IFT2319	Bachelor of Science (Information Technology)	Quiz, Class Performance, Group Discussion, Viva-Voce	2011
1454	Operating System Lab	IFT2320	Bachelor of Science (Information Technology)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2011
1455	Fuzzy Logic	IFT2321	Bachelor of Science (Information Technology)	Quiz, Class Performance, Group Discussion, Viva-Voce	2011
1456	Accounting & Financial Management	IFT2323	Bachelor of Science (Information Technology)	Quiz, Class Performance, Group Discussion, Viva-Voce	2011
1457	Summer Internship Evaluation-I	IFT2335	Bachelor of Science (Information Technology)	Report Writing, Presentation, Viva-Voce	2011
1458	Design & Analysis of Algorithm	IFT2413	Bachelor of Science (Information Technology)	Quiz, Class Performance, Group Discussion, Viva-Voce	2011
1459	Data Communication & Computer Networks	IFT2418	Bachelor of Science (Information Technology)	Quiz, Class Performance, Group Discussion, Viva-Voce	2011
1460	Data Communication & Computer Networks Lab	IFT2420	Bachelor of Science (Information Technology)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2011
1461	Design & Analysis of Algorithm Lab	IFT2421	Bachelor of Science (Information Technology)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2011
1462	Computer Graphics	IFT2422	Bachelor of Science (Information Technology)	Quiz, Class Performance, Group Discussion, Viva-Voce	2011
1463	Computer Graphics Lab	IFT2423	Bachelor of Science (Information Technology)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2011
1464	Multimedia & Its Applications	IFT2424	Bachelor of Science (Information Technology)	Quiz, Class Performance, Group Discussion, Viva-Voce	2011
1465	Java Programming	IFT2510	Bachelor of Science (Information Technology)	Quiz, Class Performance, Group Discussion, Viva-Voce	2011
1466	Java Programming Lab	IFT2511	Bachelor of Science (Information Technology)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2011
1467	Computer Oriented Numerical Methods	IFT2517	Bachelor of Science (Information Technology)	Quiz, Class Performance, Group Discussion, Viva-Voce	2011
1468	Linux	IFT2522	Bachelor of Science (Information Technology)	Quiz, Class Performance, Group Discussion, Viva-Voce	2011
1469	Linux Lab	IFT2523	Bachelor of Science (Information Technology)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2011
1470	Basics of Cloud Computing	IFT2525	Bachelor of Science (Information Technology)	Quiz, Class Performance, Group Discussion, Viva-Voce	2011
1471	Summer Internship Evaluation-II	IFT2535	Bachelor of Science (Information Technology)	Report Writing, Presentation, Viva-Voce	2011
1472	Computer Oriented Statistical & Optimization Methods	IFT2616	Bachelor of Science (Information Technology)	Quiz, Class Performance, Group Discussion, Viva-Voce	2011
1473	Introduction to Open Source Technologies (PHP, MySQL)	IFT2618	Bachelor of Science (Information Technology)	Quiz, Class Performance, Group Discussion, Viva-Voce	2011
1474	Introduction to Open Source Technologies (PHP, MySQL) Lab	IFT2620	Bachelor of Science (Information Technology)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2011

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1.1.3 Total number of courses having focus on employability/ entrepreneurship / skill development offered during the year (2022)

Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
1475	Internet of Things	IFT2622	Bachelor of Science (Information Technology)	Quiz, Class Performance, Group Discussion, Viva-Voce	2011
1476	Major Project / Dissertation	IFT2637	Bachelor of Science (Information Technology)	Report Writing, Presentation, Viva-Voce	2011
1477	Data Warehousing & Data Mining	IFT2604	Bachelor of Science (Information Technology)	Quiz, Class Performance, Group Discussion, Viva-Voce	2011
1478	Mobile Computing	IFT2611	Bachelor of Science (Information Technology)	Quiz, Class Performance, Group Discussion, Viva-Voce	2011
1479	E-Commerce	IFT2619	Bachelor of Science (Information Technology)	Quiz, Class Performance, Group Discussion, Viva-Voce	2011
1480	Cryptography & Network Security	IFT2621	Bachelor of Science (Information Technology)	Quiz, Class Performance, Group Discussion, Viva-Voce	2011
1481	Computer Fundamentals	IFT2111	Bachelor of Computer Application	Quiz, Class Performance, Group Discussion, Viva-Voce	2010
1482	Digital Electronics	IFT2112	Bachelor of Computer Application	Quiz, Class Performance, Group Discussion, Viva-Voce	2010
1483	Computer Programming with C Language	IFT2116	Bachelor of Computer Application	Quiz, Class Performance, Group Discussion, Viva-Voce	2010
1484	Computer Fundamentals Lab	IFT2117	Bachelor of Computer Application	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2010
1485	Computer Programming with C Language Lab	IFT2118	Bachelor of Computer Application	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2010
1486	Data & File Structure using C	IFT2211	Bachelor of Computer Application	Quiz, Class Performance, Group Discussion, Viva-Voce	2010
1487	Data & File Structures using C Lab	IFT2216	Bachelor of Computer Application	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2010
1488	Web Technologies	IFT2217	Bachelor of Computer Application	Quiz, Class Performance, Group Discussion, Viva-Voce	2010
1489	Database Management System	IFT2218	Bachelor of Computer Application	Quiz, Class Performance, Group Discussion, Viva-Voce	2010
1490	Computer Organization & Architecture	IFT2219	Bachelor of Computer Application	Quiz, Class Performance, Group Discussion, Viva-Voce	2010
1491	Web Technologies Lab	IFT2220	Bachelor of Computer Application	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2010
1492	Database Management System Lab	IFT2221	Bachelor of Computer Application	Quiz, Class Performance, Group Discussion, Viva-Voce	2010
1493	Object Oriented Programming with C++	IFT2312	Bachelor of Computer Application	Quiz, Class Performance, Group Discussion, Viva-Voce	2010
1494	Operating System	IFT2314	Bachelor of Computer Application	Quiz, Class Performance, Group Discussion, Viva-Voce	2010
1495	Object Oriented Programming with C++ Lab	IFT2315	Bachelor of Computer Application	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2010
1496	Discrete Mathematical Structure with Applications to CS	IFT2317	Bachelor of Computer Application	Quiz, Class Performance, Group Discussion, Viva-Voce	2010
1497	Management Information System	IFT2318	Bachelor of Computer Application	Quiz, Class Performance, Group Discussion, Viva-Voce	2010
1498	Fundamentals of Software Engineering	IFT2319	Bachelor of Computer Application	Quiz, Class Performance, Group Discussion, Viva-Voce	2010
1499	Operating System Lab	IFT2320	Bachelor of Computer Application	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2010

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1.1.3 Total number of courses having focus on employability/ entrepreneurship / skill development offered during the year (2022)

Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
1500	Summer Internship Evaluation-I	IFT2335	Bachelor of Computer Application	Report Writing, Presentation, Viva-Voce	2010
1501	Computer Networks	IFT2418	Bachelor of Computer Application	Quiz, Class Performance, Group Discussion, Viva-Voce	2010
1502	Principles of Management	IFT2419	Bachelor of Computer Application	Quiz, Class Performance, Group Discussion, Viva-Voce	2010
1503	Computer Networks Lab	IFT2420	Bachelor of Computer Application	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2010
1504	Multimedia & Its Applications	IFT2424	Bachelor of Computer Application	Quiz, Class Performance, Group Discussion, Viva-Voce	2010
1505	Core Java Programming	IFT2510	Bachelor of Computer Application	Quiz, Class Performance, Group Discussion, Viva-Voce	2010
1506	Core Java Programming Lab	IFT2511	Bachelor of Computer Application	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2010
1507	Accounting & Financial Management	IFT2518	Bachelor of Computer Application	Quiz, Class Performance, Group Discussion, Viva-Voce	2010
1508	Basics of Computer Graphics	IFT2519	Bachelor of Computer Application	Quiz, Class Performance, Group Discussion, Viva-Voce	2010
1509	Basics of Computer Graphics Lab	IFT2520	Bachelor of Computer Application	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2010
1510	Summer Internship Evaluation-II	IFT2535	Bachelor of Computer Application	Report Writing, Presentation, Viva-Voce	2010
1511	Computer Oriented Statistical & Optimization Methods	IFT2616	Bachelor of Computer Application	Quiz, Class Performance, Group Discussion, Viva-Voce	2010
1512	Introduction to Open Source Technologies (PHP, MySQL)	IFT2618	Bachelor of Computer Application	Quiz, Class Performance, Group Discussion, Viva-Voce	2010
1513	Introduction to Open Source Technologies Lab	IFT2620	Bachelor of Computer Application	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2010
1514	Internet of Things	IFT2622	Bachelor of Computer Application	Quiz, Class Performance, Group Discussion, Viva-Voce	2010
1515	Major Project / Dissertation	IFT2637	Bachelor of Computer Application	Report Writing, Presentation, Viva-Voce	2010
1516	Data Warehousing & Data Mining	IFT2604	Bachelor of Computer Application	Quiz, Class Performance, Group Discussion, Viva-Voce	2010
1517	Mobile Computing	IFT2611	Bachelor of Computer Application	Quiz, Class Performance, Group Discussion, Viva-Voce	2010
1518	E-Commerce	IFT2619	Bachelor of Computer Application	Quiz, Class Performance, Group Discussion, Viva-Voce	2010
1519	Cryptography & Network Security	IFT2621	Bachelor of Computer Application	Quiz, Class Performance, Group Discussion, Viva-Voce	2010
1520	Data Communication and Computer Networks	IFT4101	Master of Computer Application	Quiz, Class Performance, Group Discussion, Viva-Voce	2010
1521	Software Engineering	IFT4103	Master of Computer Application	Quiz, Class Performance, Group Discussion, Viva-Voce	2010
1522	Computer Graphics and Multimedia Systems	IFT4104	Master of Computer Application	Quiz, Class Performance, Group Discussion, Viva-Voce	2010
1523	Data Communication and Computer Networks Lab	IFT4105	Master of Computer Application	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2010
1524	Computer Graphics and Multimedia Systems Lab	IFT4107	Master of Computer Application	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2010

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
1525	Mobile Computing	IFT4201	Master of Computer Application	Quiz, Class Performance, Group Discussion, Viva-Voce	2010
1526	Programming with Java	IFT4202	Master of Computer Application	Quiz, Class Performance, Group Discussion, Viva-Voce	2010
1527	Software Project Management	IFT4203	Master of Computer Application	Quiz, Class Performance, Group Discussion, Viva-Voce	2010
1528	Artificial Intelligence	IFT4204	Master of Computer Application	Quiz, Class Performance, Group Discussion, Viva-Voce	2010
1529	Programming with Java Lab	IFT4205	Master of Computer Application	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2010
1530	Software Project Management Lab	IFT4206	Master of Computer Application	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2010
1531	Artificial Intelligence Lab	IFT4207	Master of Computer Application	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2010
1532	Seminar	IFT4238	Master of Computer Application	Quiz, Written Test	2010
1533	Data Warehousing & Data Mining	IFT4301	Master of Computer Application	Quiz, Class Performance, Group Discussion, Viva-Voce	2010
1534	Programming with dot NET Framework	IFT4302	Master of Computer Application	Quiz, Class Performance, Group Discussion, Viva-Voce	2010
1535	Network Security & Cryptography	IFT4303	Master of Computer Application	Quiz, Class Performance, Group Discussion, Viva-Voce	2010
1536	Soft Computing	IFT4304	Master of Computer Application	Quiz, Class Performance, Group Discussion, Viva-Voce	2010
1537	Data Warehousing & Data Mining Lab	IFT4305	Master of Computer Application	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2010
1538	Programming with dot NET Framework Lab	IFT4306	Master of Computer Application	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2010
1539	Soft Computing Lab	IFT4307	Master of Computer Application	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2010
1540	Term Paper	IFT4331	Master of Computer Application	Academic writing, Presentation	2010
1541	Summer Internship Evaluation	IFT4335	Master of Computer Application	Report Writing, Presentation, Viva-Voce	2010
1542	Android Programming	IFT4308	Master of Computer Application	Quiz, Class Performance, Group Discussion, Viva-Voce	2010
1543	Android Programming Lab	IFT4309	Master of Computer Application	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2010
1544	Digital Image Processing	IFT4310	Master of Computer Application	Quiz, Class Performance, Group Discussion, Viva-Voce	2010
1545	Digital Image Processing Lab	IFT4311	Master of Computer Application	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2010
1546	Big Data	IFT4312	Master of Computer Application	Quiz, Class Performance, Group Discussion, Viva-Voce	2010
1547	Big Data Lab	IFT4313	Master of Computer Application	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2010
1548	Machine Learning using Python	IFT4401	Master of Computer Application	Quiz, Class Performance, Group Discussion, Viva-Voce	2010
1549	Cloud Computing	IFT4402	Master of Computer Application	Quiz, Class Performance, Group Discussion, Viva-Voce	2010

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
1550	Machine Learning using Python Lab	IFT4403	Master of Computer Application	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2010
1551	Major Project / Dissertation	IFT4437	Master of Computer Application	Report Writing, Presentation, Viva-Voce	2010
1552	Renewable Energy Conversion Systems	RWE4101	Master of Science (Renewable Energy)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2016
1553	Introduction to Solar Photovoltaics	RWE4102	Master of Science (Renewable Energy)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2016
1554	Introduction to Solar Thermal Technology	RWE4103	Master of Science (Renewable Energy)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2016
1555	Biomass	RWE4104	Master of Science (Renewable Energy)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2016
1556	Field Work-I / Seminar-I	RWE4106	Master of Science (Renewable Energy)	Report Writing, Presentation, Viva-Voce	2016
1557	Solar Radiation Measurement & Analysis Lab	RWE4107	Master of Science (Renewable Energy)	Practical Lab, Report Writing, Presentation, Viva-Voce	2016
1558	Solar PV & Thermal Lab	RWE4206	Master of Science (Renewable Energy)	Practical Lab, Report Writing, Presentation, Viva-Voce	2016
1559	Financial Evaluation of Renewable Energy Systems	RWE4205	Master of Science (Renewable Energy)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2016
1560	Energy Access and Planning	RWE4207	Master of Science (Renewable Energy)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2016
1561	Wind Energy	RWE4208	Master of Science (Renewable Energy)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2016
1562	Risk Management in Renewable Energy Projects	RWE4209	Master of Science (Renewable Energy)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2016
1563	Solar Power Generation Lab	RWE4305	Master of Science (Renewable Energy)	Practical Lab, Report Writing, Presentation, Viva-Voce	2016
1564	Field Work-II/ Seminar-II	RWE4306	Master of Science (Renewable Energy)	Report Writing, Presentation, Viva-Voce	2016
1565	Summer Internship Evaluation	RWE4335	Master of Science (Renewable Energy)	Report Writing, Presentation, Viva-Voce	2016
1566	Biofuels and Biomethanation	RWE4303	Master of Science (Renewable Energy)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2016
1567	Designing of Solar Projects	RWE4307	Master of Science (Renewable Energy)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2016
1568	Thermoelectric Systems and Devices	RWE4308	Master of Science (Renewable Energy)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2016

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
1569	Smart Grids and Renewables	RWE4310	Master of Science (Renewable Energy)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2016
1570	Green Buildings	RWE4403	Master of Science (Renewable Energy)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2016
1571	Dissertation/ Seminar & Progress Report/ Comprehensive Viva	RWE4437	Master of Science (Renewable Energy)	Report Writing, Presentation, Viva-Voce	2016
1572	Renewable Energy Conversion Systems	RWP4101	Master of Science (Renewable Energy) Part-Time	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2016
1573	Introduction to Solar Photovoltaics	RWP4102	Master of Science (Renewable Energy) Part-Time	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2016
1574	Introduction to Solar Thermal Technology	RWP4103	Master of Science (Renewable Energy) Part-Time	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2016
1575	Field Work-I/ Seminar-I	RWP4105	Master of Science (Renewable Energy) Part-Time	Report Writing, Presentation, Viva-Voce	2016
1576	Energy Storage	RWP4204	Master of Science (Renewable Energy) Part-Time	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2016
1577	Solar Photovoltaic & Thermal Lab	RWP4205	Master of Science (Renewable Energy) Part-Time	Practical Lab, Report Writing, Presentation, Viva-Voce	2016
1578	Risk Management in Renewable Energy Projects	RWP4206	Master of Science (Renewable Energy) Part-Time	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2016
1579	Biomass	RWP4303	Master of Science (Renewable Energy) Part-Time	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2016
1580	Designing of Solar Projects	RWP4305	Master of Science (Renewable Energy) Part-Time	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2016
1581	Large Scale Grid Integration of Renewable Energy Sources	RWP4306	Master of Science (Renewable Energy) Part-Time	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2016
1582	Green Buildings	RWP4403	Master of Science (Renewable Energy) Part-Time	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2016
1583	Field Work-II/ Minor Project/ Seminar-II	RWP4404	Master of Science (Renewable Energy) Part-Time	Report Writing, Presentation, Viva-Voce	2016
1584	Thermoelectric Systems and Devices	RWP4406	Master of Science (Renewable Energy) Part-Time	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2016
1585	Solar Power Generation Lab	RWP4503	Master of Science (Renewable Energy) Part-Time	Practical Lab, Report Writing, Presentation, Viva-Voce	2016
1586	Dissertation / Seminar & Progress Report / Comprehensive Viva	RWP4637	Master of Science (Renewable Energy) Part-Time	Report Writing, Presentation, Viva-Voce	2016
1587	Elements of Aeronautics	ASE2153	Aerospace Engineering (OE)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2013

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
1588	Elements of Astronautics	ASE2253	Aerospace Engineering (OE)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2013
1589	Theory of Flight	ASE2353	Aerospace Engineering (OE)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2013
1590	Principles of Stability & Control	ASE2453	Aerospace Engineering (OE)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2013
1591	Introduction to Flight Vehicle Design	ASE2553	Aerospace Engineering (OE)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2013
1592	Principles of Aerospace Propulsion	ASE2653	Aerospace Engineering (OE)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2013
1593	Basics of Artificial Intelligence	CSE2351	Artificial Intelligence (OE)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2013
1594	Artificial Neural Networks	CSE2451	Artificial Intelligence (OE)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2013
1595	Fuzzy Logic	CSE2551	Artificial Intelligence (OE)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2013
1596	Introduction to Genetic Algorithm	CSE2651	Artificial Intelligence (OE)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2013
1597	Soft Computing	CSE2751	Artificial Intelligence (OE)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2013
1598	Project (Artificial Intelligence)	CSE2851	Artificial Intelligence (OE)	Report Writing, Viva-Voce, Presentation	2013
1599	Human Anatomy and Physiology-I	BME2351	Biomedical (OE)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2013
1600	Bioinstrumentation	BME2451	Biomedical (OE)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2013
1601	Tissue Engineering	BME2551	Biomedical (OE)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2013
1602	Biomechanic	BME2651	Biomedical (OE)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2013
1603	Medical Image Processing	BME2751	Biomedical (OE)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2013
1604	Seminar-Biomedical Engineering	BME2851	Biomedical (OE)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2013
1605	Computer Networks	CSE2353	Cloud Computing (OE)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2013
1606	Distributed System	CSE2453	Cloud Computing (OE)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2013
1607	High Performance Computing	CSE2553	Cloud Computing (OE)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2013
1608	Information Storage Management	CSE2653	Cloud Computing (OE)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2013
1609	Interfacing with Virtualization	CSE2753	Cloud Computing (OE)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2013
1610	Cloud Computing Tools & Techniques	CSE2853	Cloud Computing (OE)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2013
1611	Introduction to Microprocessor System	ECE2352	Embedded System (OE)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2013
1612	Microcontroller	ECE2452	Embedded System (OE)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2013

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1613	PCB Fabrication	ECE2552	Embedded System (OE)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2013
1614	Robotics and Automation	ECE2652	Embedded System (OE)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2013
1615	Simulation and Modeling	ECE2752	Embedded System (OE)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2013
1616	Project (Embedded System)	ECE2852	Embedded System (OE)	Report Writing, Viva-Voce, Presentation	2013
1617	Engineering Geology	CIV2351	Geotechnical Engineering (OE)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2013
1618	Geo informatics	CIV2451	Geotechnical Engineering (OE)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2013
1619	Geotechnical Engineering-I	CIV2551	Geotechnical Engineering (OE)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2013
1620	Geotechnical Engineering-II	CIV2651	Geotechnical Engineering (OE)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2013
1621	Project (Geotechnical Engineering)	CIV2751	Geotechnical Engineering (OE)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2013
1622	Seminar-Geotechnical Engineering	CIV2851	Geotechnical Engineering (OE)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2013
1623	Basic Instrumentation	ECE2351	Instrumentation Engineering (OE)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2013
1624	Virtual Instrumentation	ECE2451	Instrumentation Engineering (OE)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2013
1625	Biomedical Instrumentation	ECE2551	Instrumentation Engineering (OE)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2013
1626	Analytical Instrumentation	ECE2651	Instrumentation Engineering (OE)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2013
1627	Industrial Process Control	ECE2751	Instrumentation Engineering (OE)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2013
1628	Project (Instrumentation Engineering)	ECE2851	Instrumentation Engineering (OE)	Report Writing, Viva-Voce, Presentation	2013
1629	Basics of Lasers	LOE2351	Laser System (OE)	Quiz, Viva-Voce, Presentation, Case-Discussion	2013
1630	Laser Technology & Applications	LOE2451	Laser System (OE)	Quiz, Viva-Voce, Presentation, Case-Discussion	2013
1631	Laser Systems & Devices	LOE2551	Laser System (OE)	Quiz, Viva-Voce, Presentation, Case-Discussion	2013
1632	Lasers in Defense Applications	LOE2651	Laser System (OE)	Quiz, Viva-Voce, Presentation, Case-Discussion	2013
1633	Lasers in Industrial Applications	LOE2751	Laser System (OE)	Quiz, Viva-Voce, Presentation, Case-Discussion	2013
1634	Lasers in Atmospheric Studies	LOE2851	Laser System (OE)	Quiz, Viva-Voce, Presentation, Case-Discussion	2013
1635	Thermodynamics	MAE2352	Mechanical Engineering (OE)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2013
1636	Fluid Power Systems	MAE2452	Mechanical Engineering (OE)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2013
1637	KOM	MAE2552	Mechanical Engineering (OE)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2013

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1638	DOM	MAE2652	Mechanical Engineering (OE)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2013
1639	Meteorology	MAE2752	Mechanical Engineering (OE)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2013
1640	Project (Mechanical Engineering)	MAE2852	Mechanical Engineering (OE)	Report Writing, Viva-Voce, Presentation	2013
1641	Basics of Nanoscience	NAT2152	Nanotechnology (OE)	Quiz, Viva-Voce, Presentation, Case-Discussion	2013
1642	Properties of Nanomaterials	NAT2251	Nanotechnology (OE)	Quiz, Viva-Voce, Presentation, Case-Discussion	2013
1643	Synthesis of Nanomaterials	NAT2353	Nanotechnology (OE)	Quiz, Viva-Voce, Presentation, Case-Discussion	2013
1644	Characterization Techniques	NAT2453	Nanotechnology (OE)	Quiz, Viva-Voce, Presentation, Case-Discussion	2013
1645	Vacuum Science & Clean Room Technology	NAT2553	Nanotechnology (OE)	Quiz, Viva-Voce, Presentation, Case-Discussion	2013
1646	Industrial Applications of Nanomaterials	NAT2652	Nanotechnology (OE)	Quiz, Viva-Voce, Presentation, Case-Discussion	2013
1647	Fundamental of Solar Photovoltaic, Battery & Inverter	SAE2152	Renewable Energy (OE)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2015
1648	Solar PV Installation	SAE2252	Renewable Energy (OE)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2015
1649	Solar PV Design	SAE2352	Renewable Energy (OE)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2015
1650	Solid Waste Management and Power Generation	SAE2452	Renewable Energy (OE)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2015
1651	Solar Thermal Systems	SAE2552	Renewable Energy (OE)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2015
1652	Energy Audit and Energy Management	SAE2651	Renewable Energy (OE)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2015
1653	Introduction to UAVs and Applications	ASE2352	Unmanned Aerial Vehicles (OE)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2021
1654	Principles of UAV's Flight	ASE2452	Unmanned Aerial Vehicles (OE)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2021
1655	Aerial Imagery: Hardware & Software	ASE2552	Unmanned Aerial Vehicles (OE)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2021
1656	Embedded Systems for UAVs	ASE2652	Unmanned Aerial Vehicles (OE)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2021
1657	Research Project-I Drone Development	ASE2752	Unmanned Aerial Vehicles (OE)	Report Writing, Viva-Voce, Presentation	2021
1658	Research Project-II Drone Troubleshooting, Testing & Deployment	ASE2852	Unmanned Aerial Vehicles (OE)	Report Writing, Viva-Voce, Presentation	2021
1659	Inorganic Chemistry Lab-I	CHY2103	Bachelor of Science (Hons.) (Chemistry)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2014

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1.1.3 Total number of courses having focus on employability/ entrepreneurship / skill development offered during the year (2022)

Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
1660	Organic Chemistry Lab-I	CHY2104	Bachelor of Science (Hons.) (Chemistry)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2014
1661	Physics Lab-I	CHY2107	Bachelor of Science (Hons.) (Chemistry)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2014
1662	Physical Chemistry-I	CHY2201	Bachelor of Science (Hons.) (Chemistry)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2014
1663	Physical Chemistry Lab-I	CHY2203	Bachelor of Science (Hons.) (Chemistry)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2014
1664	Analytical Chemistry Lab	CHY2204	Bachelor of Science (Hons.) (Chemistry)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2014
1665	Physics Lab-II	CHY2207	Bachelor of Science (Hons.) (Chemistry)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2014
1666	Inorganic Chemistry Lab-II	CHY2305	Bachelor of Science (Hons.) (Chemistry)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2014
1667	Organic Chemistry Lab-II	CHY2306	Bachelor of Science (Hons.) (Chemistry)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2014
1668	Physical Chemistry Lab-II	CHY2307	Bachelor of Science (Hons.) (Chemistry)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2014
1669	Industrial Chemistry	CHY2308	Bachelor of Science (Hons.) (Chemistry)	Quiz, Class Performance, Group Discussion, Viva-Voce	2014
1670	Bioinorganic Chemistry	CHY2309	Bachelor of Science (Hons.) (Chemistry)	Quiz, Class Performance, Group Discussion, Viva-Voce	2014
1671	Polymer Chemistry	CHY2404	Bachelor of Science (Hons.) (Chemistry)	Quiz, Class Performance, Group Discussion, Viva-Voce	2014
1672	Inorganic Chemistry Lab-III	CHY2405	Bachelor of Science (Hons.) (Chemistry)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2014
1673	Organic Chemistry Lab-III	CHY2406	Bachelor of Science (Hons.) (Chemistry)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2014
1674	Physical Chemistry Lab-III	CHY2407	Bachelor of Science (Hons.) (Chemistry)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2014
1675	Green Chemistry	CHY2408	Bachelor of Science (Hons.) (Chemistry)	Quiz, Class Performance, Group Discussion, Viva-Voce	2014
1676	Agricultural Chemistry	CHY2409	Bachelor of Science (Hons.) (Chemistry)	Quiz, Class Performance, Group Discussion, Viva-Voce	2014
1677	Term Paper & Workshop	CHY2431	Bachelor of Science (Hons.) (Chemistry)	Academic Writing, Presentation	2014
1678	Project (with Presentation & Evaluation)	CHY2432	Bachelor of Science (Hons.) (Chemistry)	Project writing, Presentation, Viva-Voce	2014
1679	Inorganic Chemistry Lab-IV	CHY2504	Bachelor of Science (Hons.) (Chemistry)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2014
1680	Organic Chemistry Lab-IV	CHY2505	Bachelor of Science (Hons.) (Chemistry)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2014
1681	Physical Chemistry Lab-IV	CHY2506	Bachelor of Science (Hons.) (Chemistry)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2014
1682	Summer Project Evaluation/ Study Abroad Programme	CHY2535	Bachelor of Science (Hons.) (Chemistry)	Report Writing, Presentation, Viva-Voce	2014
1683	Food & Nutrition Chemistry	CHY2507	Bachelor of Science (Hons.) (Chemistry)	Quiz, Class Performance, Group Discussion, Viva-Voce	2014
1684	Quantum Chemistry	CHY2508	Bachelor of Science (Hons.) (Chemistry)	Quiz, Class Performance, Group Discussion, Viva-Voce	2014

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1685	Technical Writing in Science-I & Workshop	CHY2509	Bachelor of Science (Hons.) (Chemistry)	Quiz, Class Performance, Group Discussion, Viva-Voce	2014
1686	Term Paper & Workshop	CHY2531	Bachelor of Science (Hons.) (Chemistry)	Academic Writing, Presentation	2014
1687	Spectroscopy	CHY2604	Bachelor of Science (Hons.) (Chemistry)	Quiz, Class Performance, Group Discussion, Viva-Voce	2014
1688	Basics of Computer Programming in C and its Application in Chemistry	CHY2605	Bachelor of Science (Hons.) (Chemistry)	Quiz, Class Performance, Group Discussion, Viva-Voce	2014
1689	Inorganic Chemistry Lab-V	CHY2606	Bachelor of Science (Hons.) (Chemistry)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2014
1690	Organic Chemistry Lab-V	CHY2607	Bachelor of Science (Hons.) (Chemistry)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2014
1691	Physical Chemistry Lab-V	CHY2608	Bachelor of Science (Hons.) (Chemistry)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2014
1692	Programming in C Lab	CHY2609	Bachelor of Science (Hons.) (Chemistry)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2014
1693	Material Chemistry	CHY2610	Bachelor of Science (Hons.) (Chemistry)	Quiz, Class Performance, Group Discussion, Viva-Voce	2014
1694	Nanochemistry	CHY2611	Bachelor of Science (Hons.) (Chemistry)	Quiz, Class Performance, Group Discussion, Viva-Voce	2014
1695	Technical Writing in Science-II & Workshop	CHY2612	Bachelor of Science (Hons.) (Chemistry)	Quiz, Class Performance, Group Discussion, Viva-Voce	2014
1696	Term Paper & Workshop	CHY2631	Bachelor of Science (Hons.) (Chemistry)	Academic Writing, Presentation	2014
1697	Project (with Presentation & Evaluation)	CHY2632	Bachelor of Science (Hons.) (Chemistry)	Project writing, Presentation, Viva-Voce	2014
1698	Computer Fundamentals	MTH2214	Bachelor of Science (Hons.) (Mathematics)	Quiz, Class Performance, Group Discussion, Viva-Voce	2014
1699	Introduction to C Programming	MTH2318	Bachelor of Science (Hons.) (Mathematics)	Quiz, Class Performance, Group Discussion, Viva-Voce	2014
1700	C Programming Lab	MTH2319	Bachelor of Science (Hons.) (Mathematics)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2014
1701	Mechanics	MTH2503	Bachelor of Science (Hons.) (Mathematics)	Quiz, Class Performance, Group Discussion, Viva-Voce	2014
1702	Operations Research	MTH2504	Bachelor of Science (Hons.) (Mathematics)	Quiz, Class Performance, Group Discussion, Viva-Voce	2014
1703	Scientific Computing	MTH2520	Bachelor of Science (Hons.) (Mathematics)	Quiz, Class Performance, Group Discussion, Viva-Voce	2014
1704	Summer Workshop/ Study Abroad Programme	MTH2535	Bachelor of Science (Hons.) (Mathematics)	Report Writing, Presentation, Viva-Voce	2014
1705	Fuzzy Sets and Fuzzy Logic	MTH2518	Bachelor of Science (Hons.) (Mathematics)	Quiz, Class Performance, Group Discussion, Viva-Voce	2014
1706	R Programming and SAS	MTH2519	Bachelor of Science (Hons.) (Mathematics)	Quiz, Class Performance, Group Discussion, Viva-Voce	2014
1707	Digital Electronics	MTH2521	Bachelor of Science (Hons.) (Mathematics)	Quiz, Class Performance, Group Discussion, Viva-Voce	2014
1708	Special Functions & Integral Transforms	MTH2615	Bachelor of Science (Hons.) (Mathematics)	Quiz, Class Performance, Group Discussion, Viva-Voce	2014
1709	Mechanics	PHY2101	Bachelor of Science (Hons.) (Physics)	Quiz, Class Performance, Group Discussion, Viva-Voce	2014

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1710	Waves & Oscillations	PHY2102	Bachelor of Science (Hons.) (Physics)	Quiz, Class Performance, Group Discussion, Viva-Voce	2014
1711	Physics Lab-I	PHY2104	Bachelor of Science (Hons.) (Physics)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2014
1712	Applied Chemistry Lab-I	PHY2107	Bachelor of Science (Hons.) (Physics)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2014
1713	Optics	PHY2202	Bachelor of Science (Hons.) (Physics)	Quiz, Class Performance, Group Discussion, Viva-Voce	2014
1714	Physics Lab-II	PHY2204	Bachelor of Science (Hons.) (Physics)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2014
1715	Applied Chemistry Lab-II	PHY2207	Bachelor of Science (Hons.) (Physics)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2014
1716	Electricity & Magnetism	PHY2301	Bachelor of Science (Hons.) (Physics)	Quiz, Class Performance, Group Discussion, Viva-Voce	2014
1717	Analog Electronics	PHY2303	Bachelor of Science (Hons.) (Physics)	Quiz, Class Performance, Group Discussion, Viva-Voce	2014
1718	Physics Lab-III	PHY2304	Bachelor of Science (Hons.) (Physics)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2014
1719	Classical Mechanics	PHY2309	Bachelor of Science (Hons.) (Physics)	Quiz, Class Performance, Group Discussion, Viva-Voce	2014
1720	Computer programming in C	PHY2306	Bachelor of Science (Hons.) (Physics)	Quiz, Class Performance, Group Discussion, Viva-Voce	2014
1721	Term Paper & Workshop	PHY2331	Bachelor of Science (Hons.) (Physics)	Academic Writing, Presentation, Quiz	2014
1722	Physics Lab-IV	PHY2404	Bachelor of Science (Hons.) (Physics)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2014
1723	Quantum Mechanics	PHY2410	Bachelor of Science (Hons.) (Physics)	Quiz, Class Performance, Group Discussion, Viva-Voce	2014
1724	Digital Electronics	PHY2411	Bachelor of Science (Hons.) (Physics)	Quiz, Class Performance, Group Discussion, Viva-Voce	2014
1725	Laser Physics	PHY2406	Bachelor of Science (Hons.) (Physics)	Quiz, Class Performance, Group Discussion, Viva-Voce	2014
1726	Term Paper & Workshop	PHY2431	Bachelor of Science (Hons.) (Physics)	Academic Writing, Presentation, Quiz	2014
1727	Nuclear & Particle Physics	PHY2503	Bachelor of Science (Hons.) (Physics)	Quiz, Class Performance, Group Discussion, Viva-Voce	2014
1728	Physics Lab-V	PHY2504	Bachelor of Science (Hons.) (Physics)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2014
1729	Solid State Physics	PHY2506	Bachelor of Science (Hons.) (Physics)	Quiz, Class Performance, Group Discussion, Viva-Voce	2014
1730	Atomic & Molecular Physics	PHY2510	Bachelor of Science (Hons.) (Physics)	Quiz, Class Performance, Group Discussion, Viva-Voce	2014
1731	Summer Project Evaluation/ Study Abroad Programme	PHY2535	Bachelor of Science (Hons.) (Physics)	Report Writing, Presentation, Viva-Voce	2014
1732	Introduction to MATLAB	PHY2512	Bachelor of Science (Hons.) (Physics)	Quiz, Class Performance, Group Discussion, Viva-Voce	2014
1733	Semiconductor Physics	PHY2513	Bachelor of Science (Hons.) (Physics)	Quiz, Class Performance, Group Discussion, Viva-Voce	2014
1734	Term Paper & Workshop	PHY2531	Bachelor of Science (Hons.) (Physics)	Academic Writing, Presentation, Quiz	2014

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
1735	Introduction to Nanotechnology	PHY2606	Bachelor of Science (Hons.) (Physics)	Quiz, Class Performance, Group Discussion, Viva-Voce	2014
1736	Instrumentation Techniques	PHY2610	Bachelor of Science (Hons.) (Physics)	Quiz, Class Performance, Group Discussion, Viva-Voce	2014
1737	Low Temperature Physics and Superconductivity	PHY2605	Bachelor of Science (Hons.) (Physics)	Quiz, Class Performance, Group Discussion, Viva-Voce	2014
1738	Introduction to Astronomy	PHY2611	Bachelor of Science (Hons.) (Physics)	Quiz, Class Performance, Group Discussion, Viva-Voce	2014
1739	Term Paper & Workshop	PHY2631	Bachelor of Science (Hons.) (Physics)	Academic Writing, Presentation, Quiz	2014
1740	Study Abroad	PHY2634	Bachelor of Science (Hons.) (Physics)	Written Test, Country Report	2014
1741	Introduction to Forensic Science	FCH2102	Bachelor of Science (Hons.) (Forensic Science)	Quiz, Class Performance, Group Discussion, Viva-Voce	2014
1742	Fundamentals of Crime Scene Investigation	FCH2103	Bachelor of Science (Hons.) (Forensic Science)	Quiz, Class Performance, Group Discussion, Viva-Voce	2014
1743	Human Anatomy and Physiology	FCH2107	Bachelor of Science (Hons.) (Forensic Science)	Quiz, Class Performance, Group Discussion, Viva-Voce	2014
1744	Crime Scene Investigation Lab	FCH2108	Bachelor of Science (Hons.) (Forensic Science)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2014
1745	Physical Evidence in Forensic Science	FCH2201	Bachelor of Science (Hons.) (Forensic Science)	Quiz, Class Performance, Group Discussion, Viva-Voce	2014
1746	Fingerprint Science	FCH2202	Bachelor of Science (Hons.) (Forensic Science)	Quiz, Class Performance, Group Discussion, Viva-Voce	2014
1747	Metric System & Physical Properties of Evidences	FCH2203	Bachelor of Science (Hons.) (Forensic Science)	Quiz, Class Performance, Group Discussion, Viva-Voce	2014
1748	Fingerprinting Lab	FCH2207	Bachelor of Science (Hons.) (Forensic Science)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2014
1749	Metric System Lab	FCH2208	Bachelor of Science (Hons.) (Forensic Science)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2014
1750	Forensic Serology	FCH2302	Bachelor of Science (Hons.) (Forensic Science)	Quiz, Class Performance, Group Discussion, Viva-Voce	2014
1751	Forensic Serology Lab	FCH2311	Bachelor of Science (Hons.) (Forensic Science)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2014
1752	Questioned Documents-I	FCH2312	Bachelor of Science (Hons.) (Forensic Science)	Quiz, Class Performance, Group Discussion, Viva-Voce	2014
1753	Research Methodology and Statistics	FCH2313	Bachelor of Science (Hons.) (Forensic Science)	Quiz, Class Performance, Group Discussion, Viva-Voce	2014
1754	Cyber Forensics	FCH2315	Bachelor of Science (Hons.) (Forensic Science)	Quiz, Class Performance, Group Discussion, Viva-Voce	2014
1755	Fundamentals of Forensic Photography	FCH2402	Bachelor of Science (Hons.) (Forensic Science)	Quiz, Class Performance, Group Discussion, Viva-Voce	2014
1756	Forensic Anthropology	FCH2403	Bachelor of Science (Hons.) (Forensic Science)	Quiz, Class Performance, Group Discussion, Viva-Voce	2014
1757	Forensic Anthropology Lab	FCH2410	Bachelor of Science (Hons.) (Forensic Science)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2014
1758	Questioned Documents-II	FCH2412	Bachelor of Science (Hons.) (Forensic Science)	Quiz, Class Performance, Group Discussion, Viva-Voce	2014
1759	Questioned Documents Lab	FCH2414	Bachelor of Science (Hons.) (Forensic Science)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2014

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1760	Wildlife Forensics	FCH2415	Bachelor of Science (Hons.) (Forensic Science)	Quiz, Class Performance, Group Discussion, Viva-Voce	2014
1761	Term Paper	FCH2431	Bachelor of Science (Hons.) (Forensic Science)	Academic Writing, Presentation	2014
1762	Project (with Presentation & Evaluation)	FCH2432	Bachelor of Science (Hons.) (Forensic Science)	Project writing, Presentation, Viva-Voce	2014
1763	Workshop / Certification (Discipline Specific) (1credit per workshop)	FCH2433	Bachelor of Science (Hons.) (Forensic Science)	Quiz, Written Test	2014
1764	DNA Fingerprinting	FCH2502	Bachelor of Science (Hons.) (Forensic Science)	Quiz, Class Performance, Group Discussion, Viva-Voce	2014
1765	Instrumentation- Biological	FCH2505	Bachelor of Science (Hons.) (Forensic Science)	Quiz, Class Performance, Group Discussion, Viva-Voce	2014
1766	DNA Fingerprinting Lab	FCH2511	Bachelor of Science (Hons.) (Forensic Science)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2014
1767	Forensic Toxicology Lab	FCH2515	Bachelor of Science (Hons.) (Forensic Science)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2014
1768	Summer Internship Evaluation/ Study Abroad Programme	FCH2535	Bachelor of Science (Hons.) (Forensic Science)	Report Writing, Presentation, Viva-Voce	2014
1769	Technical Writing in Science-I	FCH2509	Bachelor of Science (Hons.) (Forensic Science)	Quiz, Class Performance, Group Discussion, Viva-Voce	2014
1770	Arson and Explosive	FCH2516	Bachelor of Science (Hons.) (Forensic Science)	Quiz, Class Performance, Group Discussion, Viva-Voce	2014
1771	Quality Management and Ethics	FCH2517	Bachelor of Science (Hons.) (Forensic Science)	Quiz, Class Performance, Group Discussion, Viva-Voce	2014
1772	Term Paper	FCH2531	Bachelor of Science (Hons.) (Forensic Science)	Academic Writing, Presentation	2014
1773	Workshop / Certification (Discipline Specific) (1credit per workshop)	FCH2533	Bachelor of Science (Hons.) (Forensic Science)	Quiz, Written Test	2014
1774	Forensic Medicine	FCH2616	Bachelor of Science (Hons.) (Forensic Science)	Quiz, Class Performance, Group Discussion, Viva-Voce	2014
1775	Ballistics	FCH2617	Bachelor of Science (Hons.) (Forensic Science)	Quiz, Class Performance, Group Discussion, Viva-Voce	2014
1776	Ballistics Lab	FCH2619	Bachelor of Science (Hons.) (Forensic Science)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2014
1777	Forensic Psychology	FCH2610	Bachelor of Science (Hons.) (Forensic Science)	Quiz, Class Performance, Group Discussion, Viva-Voce	2014
1778	Technical Writing in Science-II & Workshop	FCH2612	Bachelor of Science (Hons.) (Forensic Science)	Quiz, Class Performance, Group Discussion, Viva-Voce	2014
1779	Seminar	FCH2614	Bachelor of Science (Hons.) (Forensic Science)	Quiz, Written Test	2014
1780	Term Paper & Workshop	FCH2631	Bachelor of Science (Hons.) (Forensic Science)	Academic Writing, Presentation, Quiz	2014
1781	Minor Project (with Presentation & Evaluation)	FCH2632	Bachelor of Science (Hons.) (Forensic Science)	Project writing, Presentation, Viva-Voce	2014
1782	Physical Chemistry Lab	CHY4105	Master of Science (Chemistry)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2013
1783	Organic Chemistry Lab	CHY4106	Master of Science (Chemistry)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2013

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1784	Cheminformatics & Biochemistry Lab	CHY4112	Master of Science (Chemistry)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2013
1785	Research Seminar	CHY4108	Master of Science (Chemistry)	Quiz, Written Test	2013
1786	Analytical Chemistry	CHY4201	Master of Science (Chemistry)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1787	Industrial Chemistry	CHY4202	Master of Science (Chemistry)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1788	Organometallic Chemistry	CHY4211	Master of Science (Chemistry)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1789	Introduction to Laboratory Safety	CHY4212	Master of Science (Chemistry)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1790	Spectroscopy	CHY4213	Master of Science (Chemistry)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1791	Analytical Chemistry Lab	CHY4206	Master of Science (Chemistry)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2013
1792	Industrial Chemistry Lab	CHY4207	Master of Science (Chemistry)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2013
1793	Term Paper	CHY4231	Master of Science (Chemistry)	Academic Writing, Presentation, Quiz	2013
1794	Inorganic Chemistry Lab	CHY4324	Master of Science (Chemistry)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2013
1795	Natural Products & Heterocyclic Chemistry	CHY4325	Master of Science (Chemistry)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1796	Summer Internship Evaluation/ Study Abroad Programme	CHY4335	Master of Science (Chemistry)	Report Writing, Presentation, Viva-Voce	2013
1797	Drugs and Dyes	CHY4304	Master of Science (Chemistry)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1798	Advanced Natural Products Chemistry	CHY4305	Master of Science (Chemistry)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1799	Advanced Nanochemistry	CHY4308	Master of Science (Chemistry)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1800	Medicinal Chemistry	CHY4310	Master of Science (Chemistry)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1801	Polymer Technology	CHY4311	Master of Science (Chemistry)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1802	Non-Conventional Energy Sources	CHY4312	Master of Science (Chemistry)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013

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1803	Industrial Waste and Water Treatment	CHY4313	Master of Science (Chemistry)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1804	Nuclear Chemistry	CHY4314	Master of Science (Chemistry)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1805	Food Technology	CHY4315	Master of Science (Chemistry)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1806	Environmental Chemistry	CHY4321	Master of Science (Chemistry)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1807	Renewable Energy Conversion Systems	CHY4322	Master of Science (Chemistry)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1808	Introduction to Polymeric Materials	CHY4405	Master of Science (Chemistry)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1809	Chemistry of Nanomaterials	CHY4407	Master of Science (Chemistry)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1810	Good Laboratory Practices Seminar	CHY4408	Master of Science (Chemistry)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2013
1811	Major Project	CHY4437	Master of Science (Chemistry)	Report Writing, Presentation, Viva-Voce	2013
1812	Computing and C Programming	MTH4105	Master of Science (Mathematics)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1813	C Programming Lab	MTH4106	Master of Science (Mathematics)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2013
1814	Topology	MTH4205	Master of Science (Mathematics)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1815	Statistics Based Lab-I	MTH4206	Master of Science (Mathematics)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2013
1816	Introduction to MATLAB	MTH4215	Master of Science (Mathematics)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1817	MATLAB Programming Lab	MTH4216	Master of Science (Mathematics)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2013
1818	Operations Research	MTH4217	Master of Science (Mathematics)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1819	Numerical Analysis	MTH4325	Master of Science (Mathematics)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1820	Numerical Analysis Lab	MTH4327	Master of Science (Mathematics)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2013
1821	Summer Workshop/ Study Abroad Programme	MTH4335	Master of Science (Mathematics)	Report Writing, Presentation, Viva-Voce	2013

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
1822	Number Theory & Cryptography	MTH4329	Master of Science (Mathematics)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1823	Fluid Dynamics	MTH4409	Master of Science (Mathematics)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1824	Workshop	MTH4433	Master of Science (Mathematics)	Quiz, Written Test	2013
1825	Project	MTH4437	Master of Science (Mathematics)	Project Writing, Presentation, Viva-Voce	2013
1826	Classical Mechanics	MTH4410	Master of Science (Mathematics)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1827	Biomechanics	MTH4412	Master of Science (Mathematics)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1828	Stochastic Processes	MTH4414	Master of Science (Mathematics)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1829	Statistical Inference	MTH4415	Master of Science (Mathematics)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1830	Numerical Solutions to ODE and PDEs	MTH4416	Master of Science (Mathematics)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1831	Classical Mechanics	PHY4102	Master of Science (Physics)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2012
1832	Electronics	PHY4103	Master of Science (Physics)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2012
1833	Quantum Mechanics-I	PHY4109	Master of Science (Physics)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2012
1834	Computational Physics	PHY4110	Master of Science (Physics)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2012
1835	Integrated Physics Lab-I	PHY4111	Master of Science (Physics)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2012
1836	Statistical Mechanics	PHY4202	Master of Science (Physics)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2012
1837	Quantum Mechanics-II	PHY4208	Master of Science (Physics)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2012
1838	Electrodynamics	PHY4215	Master of Science (Physics)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2012
1839	Atomic and Molecular Physics	PHY4216	Master of Science (Physics)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2012

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
1840	Integrated Physics Lab-II	PHY4212	Master of Science (Physics)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2012
1841	Nuclear & Particle Physics	PHY4321	Master of Science (Physics)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2012
1842	Laser Physics	PHY4322	Master of Science (Physics)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2012
1843	Integrated Physics Lab-III	PHY4316	Master of Science (Physics)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2012
1844	Summer Internship Evaluation/ Study Abroad Programme	PHY4335	Master of Science (Physics)	Report Writing, Presentation, Viva-Voce	2012
1845	Digital Electronics & Microprocessors	PHY4306	Master of Science (Physics)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2012
1846	Renewable Energy Resources	PHY4317	Master of Science (Physics)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2012
1847	Introduction to Astrophysics	PHY4318	Master of Science (Physics)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2012
1848	Experimental Techniques	PHY4410	Master of Science (Physics)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2012
1849	Nano-Science & Technology	PHY4404	Master of Science (Physics)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2012
1850	Atmospheric Physics	PHY4405	Master of Science (Physics)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2012
1851	General Relativity & Cosmology	PHY4406	Master of Science (Physics)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2012
1852	Optical Fibers & Communications	PHY4407	Master of Science (Physics)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2012
1853	Physics of Solar Photovoltaics	PHY4408	Master of Science (Physics)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2012
1854	Biophysics	PHY4409	Master of Science (Physics)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2012
1855	Radiation Physics	PHY4411	Master of Science (Physics)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2012
1856	High Energy Physics	PHY4413	Master of Science (Physics)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2012
1857	Forensic Physics	FCH4103	Master of Science (Forensic Science)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2014

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
1858	Forensic Ballistics	FCH4106	Master of Science (Forensic Science)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2014
1859	Forensic Physics Lab	FCH4107	Master of Science (Forensic Science)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2014
1860	Crime Scene Investigation (CSI) Lab	FCH4108	Master of Science (Forensic Science)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2014
1861	Forensic and Criminal Investigation	FCH4111	Master of Science (Forensic Science)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2014
1862	Instrumentation (Chemical)	FCH4112	Master of Science (Forensic Science)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2014
1863	Research Seminar	FCH4110	Master of Science (Forensic Science)	Academic Writing, Presentation, Quiz	2014
1864	Forensic Photography	FCH4201	Master of Science (Forensic Science)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2014
1865	Elements of Forensic Medicine and Odontology	FCH4202	Master of Science (Forensic Science)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2014
1866	Questioned Documents	FCH4205	Master of Science (Forensic Science)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2014
1867	Forensic Medicine & Odontology Lab	FCH4206	Master of Science (Forensic Science)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2014
1868	Questioned Documents & Fingerprints Lab	FCH4208	Master of Science (Forensic Science)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2014
1869	Instrumentation (Biological)	FCH4209	Master of Science (Forensic Science)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2014
1870	Fingerprint Science	FCH4210	Master of Science (Forensic Science)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2014
1871	Term Paper	FCH4231	Master of Science (Forensic Science)	Academic Writing, Presentation, Quiz	2014
1872	Forensic Chemistry, Toxicology & Pharmacology	FCH4301	Master of Science (Forensic Science)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2014
1873	Forensic Biology & Serology	FCH4302	Master of Science (Forensic Science)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2014
1874	Forensic Biology and Serology Lab	FCH4304	Master of Science (Forensic Science)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2014
1875	Forensic Chemistry & Toxicology Lab	FCH4305	Master of Science (Forensic Science)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2014
1876	Statistics & Research Methodology	FCH4315	Master of Science (Forensic Science)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2014

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
1877	Instrumentation (Physical)	FCH4316	Master of Science (Forensic Science)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2014
1878	Instrumentation Workshop	FCH4318	Master of Science (Forensic Science)	Academic Writing, Presentation, Quiz	2014
1879	Summer Internship Evaluation/ Study Abroad Programme	FCH4335	Master of Science (Forensic Science)	Report Writing, Presentation, Viva-Voce	2014
1880	Advanced Forensic Biology & Anthropology	FCH4306	Master of Science (Forensic Science)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2014
1881	Cyber Forensic & Computer Application	FCH4317	Master of Science (Forensic Science)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2014
1882	Forensic Genetics	FCH4319	Master of Science (Forensic Science)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2014
1883	Advanced Questioned Documents & Fingerprint Examination	FCH4310	Master of Science (Forensic Science)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2014
1884	Advanced Forensic Chemistry and Toxicology	FCH4320	Master of Science (Forensic Science)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2014
1885	Forensic Wildlife and Entomology	FCH4321	Master of Science (Forensic Science)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2014
1886	Quality Management & Accreditation in Forensic Science Laboratories	FCH4405	Master of Science (Forensic Science)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2014
1887	Forensic Psychology	FCH4408	Master of Science (Forensic Science)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2014
1888	Good Laboratory Practices Seminar	FCH4409	Master of Science (Forensic Science)	Academic Writing, Presentation, Quiz	2014
1889	Major Project	FCH4437	Master of Science (Forensic Science)	Report Writing, Presentation, Viva-Voce	2014
1890	Biostatistics	BCH4102	Master of Science (Biochemistry)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2014
1891	Biochemistry Lab	BCH4105	Master of Science (Biochemistry)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2014
1892	Instrumentation Techniques	BCH4106	Master of Science (Biochemistry)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2014
1893	Biochemical Engineering Lab	BCH4107	Master of Science (Biochemistry)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2014
1894	Research Seminar	BCH4108	Master of Science (Biochemistry)	Report Writing, Presentation, Viva-Voce	2014
1895	Biochemistry of Proteins and Enzymes	BCH4109	Master of Science (Biochemistry)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2014

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
1896	Bioinformatics Lab	BCH4111	Master of Science (Biochemistry)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2014
1897	Advanced Biochemistry Lab	BCH4206	Master of Science (Biochemistry)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2014
1898	Cell Biology and Genetics Lab	BCH4207	Master of Science (Biochemistry)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2014
1899	Clinical Biochemistry Lab	BCH4208	Master of Science (Biochemistry)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2014
1900	Immunology	BCH4209	Master of Science (Biochemistry)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2014
1901	Term Paper	BCH4231	Master of Science (Biochemistry)	Academic Writing, Presentation, Viva-Voce	2014
1902	Recombinant DNA Technology	BCH4301	Master of Science (Biochemistry)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2014
1903	Molecular Biology	BCH4303	Master of Science (Biochemistry)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2014
1904	Molecular Biology & Microbiology Lab	BCH4306	Master of Science (Biochemistry)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2014
1905	Instrumentation and Genetic Engineering Lab	BCH4307	Master of Science (Biochemistry)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2014
1906	Summer Internship Evaluation/ Study Abroad Programme	BCH4335	Master of Science (Biochemistry)	Report Writing, Presentation, Viva-Voce	2014
1907	Microbiology	BCH4308	Master of Science (Biochemistry)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2014
1908	Ecology and Evolution	BCH4310	Master of Science (Biochemistry)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2014
1909	Microbiology Lab	BCH4311	Master of Science (Biochemistry)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2014
1910	Ecology and Evolution Lab	BCH4313	Master of Science (Biochemistry)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2014
1911	Methodologies of Biochemistry	BCH4409	Master of Science (Biochemistry)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2014
1912	Good Laboratory Practices Seminar	BCH4407	Master of Science (Biochemistry)	Academic Writing, Presentation, Viva-Voce	2014
1913	Major Project	BCH4437	Master of Science (Biochemistry)	Report Writing, Presentation, Viva-Voce	2014
1914	Computer Forensics	FCH2151	Computer Forensics & Cyber Security (OE)	Quiz, Class Performance, Group Discussion, Viva-Voce	2015
1915	Ethics, Policies and the IT Act	FCH2251	Computer Forensics & Cyber Security (OE)	Quiz, Class Performance, Group Discussion, Viva-Voce	2015
1916	Biometric Technology	FCH2352	Computer Forensics & Cyber Security (OE)	Quiz, Class Performance, Group Discussion, Viva-Voce	2015
1917	Implementation Practical on MATLAB	FCH2451	Computer Forensics & Cyber Security (OE)	Lab Record, Quiz, Class Performance, Group Discussion, Viva-Voce	2015

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1918	Cyber Security	FCH2551	Computer Forensics & Cyber Security (OE)	Quiz, Class Performance, Group Discussion, Viva-Voce	2015
1919	Incident Response Management	FCH2651	Computer Forensics & Cyber Security (OE)	Quiz, Class Performance, Group Discussion, Viva-Voce	2015
1920	Optimization Techniques	MTH2151	Data Analytics (OE)	Quiz, Class Performance, Group Discussion, Viva-Voce	2013
1921	Statistics	MTH2251	Data Analytics (OE)	Quiz, Class Performance, Group Discussion, Viva-Voce	2013
1922	Data Mining	MTH2351	Data Analytics (OE)	Quiz, Class Performance, Group Discussion, Viva-Voce	2013
1923	Database Management System	MTH2451	Data Analytics (OE)	Quiz, Class Performance, Group Discussion, Viva-Voce	2013
1924	Introduction to Financial Modeling	MTH2551	Data Analytics (OE)	Quiz, Class Performance, Group Discussion, Viva-Voce	2013
1925	Statistical Quality Control	MTH2651	Data Analytics (OE)	Quiz, Class Performance, Group Discussion, Viva-Voce	2013
1926	Fundamentals of Materials Science	PHY2151	Materials Science & Technology (OE)	Quiz, Class Performance, Group Discussion, Viva-Voce	2019
1927	Classification & Selection of Materials	PHY2251	Materials Science & Technology (OE)	Quiz, Class Performance, Group Discussion, Viva-Voce	2019
1928	Properties of Materials	PHY2351	Materials Science & Technology (OE)	Quiz, Class Performance, Group Discussion, Viva-Voce	2019
1929	Manufacturing Processes for Materials	PHY2451	Materials Science & Technology (OE)	Quiz, Class Performance, Group Discussion, Viva-Voce	2019
1930	Materials Testing & Characterization	PHY2551	Materials Science & Technology (OE)	Quiz, Class Performance, Group Discussion, Viva-Voce	2019
1931	Materials at Nanoscale	PHY2651	Materials Science & Technology (OE)	Quiz, Class Performance, Group Discussion, Viva-Voce	2019
1932	Cosmetic Formulation	CHY2152	Pharmaceuticals (OE)	Quiz, Class Performance, Group Discussion, Viva-Voce	2013
1933	Industrial Management and Safety Process	CHY2252	Pharmaceuticals (OE)	Quiz, Class Performance, Group Discussion, Viva-Voce	2013
1934	Drug Design	CHY2352	Pharmaceuticals (OE)	Quiz, Class Performance, Group Discussion, Viva-Voce	2013
1935	Application of Nanotechnology in Medicine	CHY2452	Pharmaceuticals (OE)	Quiz, Class Performance, Group Discussion, Viva-Voce	2013
1936	Intellectual Property Rights and Quality Assurance	CHY2552	Pharmaceuticals (OE)	Quiz, Class Performance, Group Discussion, Viva-Voce	2013
1937	Pharmaceutical and Cosmetics Sciences Lab	CHY2652	Pharmaceuticals (OE)	Lab Record, Quiz, Group Discussion, Viva-Voce	2013
1938	Polymerization	PTE2151	Polymer Technology (OE)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2019
1939	Waste Plastic Recycling	PTE2251	Polymer Technology (OE)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2019
1940	Polymer Technology	PTE2351	Polymer Technology (OE)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2019

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1941	Rubber & Tyre Technology	PTE2451	Polymer Technology (OE)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2019
1942	Polymeric Nano Composites	PTE2551	Polymer Technology (OE)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2019
1943	Bio-Medical Plastics	PTE2651	Polymer Technology (OE)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2019
1944	Earth Surface Features & Processes	ESC2102	Bachelor of Science (Hons.) (Earth Science)	Hands on Training, Institute & Industry visit, Laboratory Training	2014
1945	Chemistry Laboratory	ESC2107	Bachelor of Science (Hons.) (Earth Science)	Hands on Training, Institute & Industry visit, Laboratory Training	2014
1946	Field Survey-I	ESC2108	Bachelor of Science (Hons.) (Earth Science)	On site validation, Hands on Training, Institute & Industry visit, Laboratory Training	2014
1947	Crystallography & Mineralogy	ESC2201	Bachelor of Science (Hons.) (Earth Science)	Hands on Training, Institute & Industry visit, Laboratory Training	2014
1948	Structural Geology	ESC2210	Bachelor of Science (Hons.) (Earth Science)	Hands on Training, Institute & Industry visit, Laboratory Training	2014
1949	Earth Science Laboratory-I	ESC2208	Bachelor of Science (Hons.) (Earth Science)	Hands on Training, Institute & Industry visit, Laboratory Training	2014
1950	Field Survey-II	ESC2209	Bachelor of Science (Hons.) (Earth Science)	On site validation, Hands on Training, Institute & Industry visit, Laboratory Training	2014
1951	Igneous Petrology	ESC2301	Bachelor of Science (Hons.) (Earth Science)	Hands on Training, Institute & Industry visit, Laboratory Training	2014
1952	Sedimentology	ESC2302	Bachelor of Science (Hons.) (Earth Science)	Hands on Training, Institute & Industry visit, Laboratory Training	2014
1953	Metamorphic Petrology	ESC2303	Bachelor of Science (Hons.) (Earth Science)	Hands on Training, Institute & Industry visit, Laboratory Training	2014
1954	Atmospheric Science	ESC2304	Bachelor of Science (Hons.) (Earth Science)	Hands on Training, Institute & Industry visit, Laboratory Training	2014
1955	Marine Science	ESC2309	Bachelor of Science (Hons.) (Earth Science)	Hands on Training, Institute & Industry visit, Laboratory Training	2014
1956	Earth Science Laboratory-II	ESC2307	Bachelor of Science (Hons.) (Earth Science)	Hands on Training, Institute & Industry visit, Laboratory Training	2014
1957	Field Survey-III	ESC2308	Bachelor of Science (Hons.) (Earth Science)	On site validation, Hands on Training, Institute & Industry visit, Laboratory Training	2014

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1958	Summer Project Evaluation-I	ESC2335	Bachelor of Science (Hons.) (Earth Science)	Report Writing, Presentation, Viva-Voce	2014
1959	Economic Geology	ESC2405	Bachelor of Science (Hons.) (Earth Science)	Hands on Training, Institute & Industry visit, Laboratory Training	2014
1960	Remote Sensing & GIS	ESC2410	Bachelor of Science (Hons.) (Earth Science)	Hands on Training, Institute & Industry visit, Laboratory Training	2014
1961	Geophysics	ESC2412	Bachelor of Science (Hons.) (Earth Science)	Hands on Training, Institute & Industry visit, Laboratory Training	2014
1962	Paleontology	ESC2413	Bachelor of Science (Hons.) (Earth Science)	Hands on Training, Institute & Industry visit, Laboratory Training	2014
1963	Earth Science Laboratory-III	ESC2408	Bachelor of Science (Hons.) (Earth Science)	Hands on Training, Institute & Industry visit, Laboratory Training	2014
1964	Field Survey-IV	ESC2409	Bachelor of Science (Hons.) (Earth Science)	On site validation, Hands on Training, Institute & Industry visit, Laboratory Training	2014
1965	Exploration Geology	ESC2503	Bachelor of Science (Hons.) (Earth Science)	Hands on Training, Institute & Industry visit, Laboratory Training	2014
1966	Stratigraphy of India	ESC2509	Bachelor of Science (Hons.) (Earth Science)	Hands on Training, Institute & Industry visit, Laboratory Training	2014
1967	Engineering Geology	ESC2510	Bachelor of Science (Hons.) (Earth Science)	Hands on Training, Institute & Industry visit, Laboratory Training	2014
1968	Hydrogeology	ESC2511	Bachelor of Science (Hons.) (Earth Science)	Hands on Training, Institute & Industry visit, Laboratory Training	2014
1969	Earth Science Laboratory-IV	ESC2507	Bachelor of Science (Hons.) (Earth Science)	Hands on Training, Institute & Industry visit, Laboratory Training	2014
1970	Field Survey-V	ESC2508	Bachelor of Science (Hons.) (Earth Science)	On site validation, Hands on Training, Institute & Industry visit, Laboratory Training	2014
1971	Summer Project Evaluation-II	ESC2535	Bachelor of Science (Hons.) (Earth Science)	Report Writing, Presentation, Viva-Voce	2014
1972	Coal and Petroleum Geology	ESC2603	Bachelor of Science (Hons.) (Earth Science)	Hands on Training, Institute & Industry visit, Laboratory Training	2014
1973	Workshop / Seminar / Conference/ Symposium	ESC2633	Bachelor of Science (Hons.) (Earth Science)	Academic Writing, Presentation, Quiz	2014
1974	Dissertation	ESC2637	Bachelor of Science (Hons.) (Earth Science)	Report Writing, Presentation, Viva-Voce	2014
1975	Ecology and Ecosystem Dynamics	ENV4101	Master of Science (Environmental Science & Management)	Hands on Training, Institute & Industry visit, Laboratory Training	2014

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1.1.3 Total number of courses having focus on employability/ entrepreneurship / skill development offered during the year (2022)

Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
1976	Earth System Sciences	ENV4102	Master of Science (Environmental Science & Management)	Hands on Training, Institute & Industry visit, Laboratory Training	2014
1977	Environmental Biology	ENV4103	Master of Science (Environmental Science & Management)	Hands on Training, Institute & Industry visit, Laboratory Training	2014
1978	Chemistry of Environment	ENV4109	Master of Science (Environmental Science & Management)	Hands on Training, Institute & Industry visit, Laboratory Training	2014
1979	Environmental Physics & Energy	ENV4110	Master of Science (Environmental Science & Management)	Hands on Training, Institute & Industry visit, Laboratory Training	2014
1980	Analytical Laboratory-I	ENV4107	Master of Science (Environmental Science & Management)	Hands on Training, Institute & Industry visit, Laboratory Training	2014
1981	Term Paper/Seminar	ENV4131	Master of Science (Environmental Science & Management)	Academic Writing, Presentation, Quiz	2014
1982	Pollution Control and Management	ENV4201	Master of Science (Environmental Science & Management)	Hands on Training, Institute & Industry visit, Laboratory Training	2014
1983	Environmental Analysis: Tools and Techniques	ENV4204	Master of Science (Environmental Science & Management)	Hands on Training, Institute & Industry visit, Laboratory Training	2014
1984	Atmospheric Science & Climate Change	ENV4209	Master of Science (Environmental Science & Management)	Hands on Training, Institute & Industry visit, Laboratory Training	2014
1985	Geoinformatics for Environmental Management	ENV4210	Master of Science (Environmental Science & Management)	Hands on Training, Institute & Industry visit, Laboratory Training	2014
1986	Statistical Tools and Research Methodology	ENV4211	Master of Science (Environmental Science & Management)	Hands on Training, Institute & Industry visit, Laboratory Training	2014
1987	Analytical Laboratory-II	ENV4212	Master of Science (Environmental Science & Management)	Hands on Training, Institute & Industry visit, Laboratory Training	2014
1988	Term Paper/Seminar	ENV4231	Master of Science (Environmental Science & Management)	Academic Writing, Presentation, Quiz	2014
1989	Project (Field Survey)	ENV4232	Master of Science (Environmental Science & Management)	On site validation, Hands on Training, Institute & Industry visit, Laboratory Training	2014
1990	Environmental Conservation and Sustainable Development	ENV4301	Master of Science (Environmental Science & Management)	Hands on Training, Institute & Industry visit, Laboratory Training	2014
1991	Water Resources Management	ENV4313	Master of Science (Environmental Science & Management)	Hands on Training, Institute & Industry visit, Laboratory Training	2014
1992	Eco-toxicology, Health and Safety	ENV4314	Master of Science (Environmental Science & Management)	Hands on Training, Institute & Industry visit, Laboratory Training	2014

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1993	Waste Management & Valorization	ENV4315	Master of Science (Environmental Science & Management)	Hands on Training, Institute & Industry visit, Laboratory Training	2014
1994	Analytical Laboratory -III	ENV4316	Master of Science (Environmental Science & Management)	Hands on Training, Institute & Industry visit, Laboratory Training	2014
1995	Term Paper/Seminar/ Workshop/ Conference/ Training	ENV4331	Master of Science (Environmental Science & Management)	Academic Writing, Presentation, Quiz	2014
1996	Summer Internship Evaluation + Project Formulation	ENV4335	Master of Science (Environmental Science & Management)	Report Writing, Presentation, Viva-Voce	2014
1997	Environmental Biotechnology	ENV4309	Master of Science (Environmental Science & Management)	Hands on Training, Institute & Industry visit, Laboratory Training	2014
1998	Environmental Geology	ENV4310	Master of Science (Environmental Science & Management)	Hands on Training, Institute & Industry visit, Laboratory Training	2014
1999	Green Energy	ENV4311	Master of Science (Environmental Science & Management)	Hands on Training, Institute & Industry visit, Laboratory Training	2014
2000	Waste Water Treatment	ENV4312	Master of Science (Environmental Science & Management)	Hands on Training, Institute & Industry visit, Laboratory Training	2014
2001	Environmental Law and Environmental Impact Assessment	ENV4401	Master of Science (Environmental Science & Management)	Hands on Training, Institute & Industry visit, Laboratory Training	2014
2002	Urban Ecosystem and Industrial Ecology	ENV4402	Master of Science (Environmental Science & Management)	Hands on Training, Institute & Industry visit, Laboratory Training	2014
2003	Natural Hazards and Disaster Management	ENV4403	Master of Science (Environmental Science & Management)	Hands on Training, Institute & Industry visit, Laboratory Training	2014
2004	Term Paper/Seminar (Research Article)	ENV4431	Master of Science (Environmental Science & Management)	Academic Writing, Presentation, Quiz	2014
2005	Research based Project work	ENV4437	Master of Science (Environmental Science & Management)	Report Writing, Presentation, Viva-Voce	2014
2006	Environmental Studies-I	ENV2151	Environmental Studies (OE)	Quiz, Viva-Voce, Presentation, Project Report	2013
2007	Environmental Studies-II	ENV2251	Environmental Studies (OE)	Quiz, Viva-Voce, Presentation, Project Report	2013
2008	Environmental Studies	ENV2152/ ENV2252	Environmental Studies (OE)	Quiz, Viva-Voce, Presentation, Project Report	2013
2009	Basics of Climate Science	AST2151	Climate Science (OE)	Hands on Training, Institute & Industry visit, Laboratory Training	2014
2010	Introduction to Earth System Science	AST2251	Climate Science (OE)	Hands on Training, Institute & Industry visit, Laboratory Training	2014

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
2011	Cloud Microphysics and Chemistry	AST2351	Climate Science (OE)	Hands on Training, Institute & Industry visit, Laboratory Training	2014
2012	Climate Change: Impact, Vulnerability and Adaption	AST2451	Climate Science (OE)	Hands on Training, Institute & Industry visit, Laboratory Training	2014
2013	Primer of Oceanography	AST2551	Climate Science (OE)	Hands on Training, Institute & Industry visit, Laboratory Training	2014
2014	Fundamentals of Climate Variability and Modeling	AST2651	Climate Science (OE)	Hands on Training, Institute & Industry visit, Laboratory Training	2014
2015	Environmental Pollution and Waste Management	ENV2351	Environmental Management (OE)	Quiz, Viva-Voce, Presentation, Project Report	2013
2016	Environmental Management and Industrial Safety	ENV2451	Environmental Management (OE)	Quiz, Viva-Voce, Presentation, Project Report	2013
2017	Environmental Economics and Globalization	ENV2551	Environmental Management (OE)	Quiz, Viva-Voce, Presentation, Project Report	2013
2018	Sustainable Development Practices	ENV2651	Environmental Management (OE)	Quiz, Viva-Voce, Presentation, Project Report	2013
2019	Linkages between Environment and Health	AST2152	Environmental Health & Climate (OE)	Hands on Training, Institute & Industry visit, Laboratory Training	2021
2020	Climate Change and Implications on Public Health	AST2252	Environmental Health & Climate (OE)	Hands on Training, Institute & Industry visit, Laboratory Training	2021
2021	Diseases in Contemporary Society	AST2352	Environmental Health & Climate (OE)	Hands on Training, Institute & Industry visit, Laboratory Training	2021
2022	Air, Water and Soil Pollution, Environmental Health Professions	AST2452	Environmental Health & Climate (OE)	Hands on Training, Institute & Industry visit, Laboratory Training	2021
2023	Ground-based and Satellite Remote Sensing	AST2552	Environmental Health & Climate (OE)	Hands on Training, Institute & Industry visit, Laboratory Training	2021
2024	Instrumentation Lab	AST2652	Environmental Health & Climate (OE)	Hands on Training, Institute & Industry visit, Laboratory Training	2021
2025	Computers Applications	BTH2103	Bachelor of Science (Hons.) (Biotechnology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2010
2026	Plant Sciences-I Lab	BTH2104	Bachelor of Science (Hons.) (Biotechnology)	Practical, Lab Visit, Lab Record, Class Performance	2010
2027	Animal Sciences-I Lab	BTH2105	Bachelor of Science (Hons.) (Biotechnology)	Practical, Lab Visit, Lab Record, Class Performance	2010
2028	Computers Applications Lab	BTH2106	Bachelor of Science (Hons.) (Biotechnology)	Practical, Lab Visit, Lab Record, Class Performance	2010
2029	Microbial Biotechnology	BTH2107	Bachelor of Science (Hons.) (Biotechnology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2010

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
2030	Food Biotechnology	BTH2108	Bachelor of Science (Hons.) (Biotechnology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2010
2031	Agriculture Biotechnology	BTH2109	Bachelor of Science (Hons.) (Biotechnology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2010
2032	Term Paper	BTH2131	Bachelor of Science (Hons.) (Biotechnology)	Academic Writing, Presentation, Quiz	2010
2033	Project (with Presentation & Evaluation)	BTH2132	Bachelor of Science (Hons.) (Biotechnology)	Project writing, Presentation, Viva-Voce	2010
2034	Workshop / Certification (Discipline Specific) (1credit per workshop)	BTH2133	Bachelor of Science (Hons.) (Biotechnology)	Quiz, Written Test	2010
2035	Study Abroad	BTH2134	Bachelor of Science (Hons.) (Biotechnology)	Written Test, Country Report	2010
2036	Plant sciences-II Lab	BTH2205	Bachelor of Science (Hons.) (Biotechnology)	Practical, Lab Visit, Lab Record, Class Performance	2010
2037	Plant Physiology Lab	BTH2207	Bachelor of Science (Hons.) (Biotechnology)	Practical, Lab Visit, Lab Record, Class Performance	2010
2038	Animal Physiology Lab	BTH2208	Bachelor of Science (Hons.) (Biotechnology)	Practical, Lab Visit, Lab Record, Class Performance	2010
2039	Molecular Modeling	BTH2209	Bachelor of Science (Hons.) (Biotechnology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2010
2040	Bio-safety and Bioethics	BTH2210	Bachelor of Science (Hons.) (Biotechnology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2010
2041	Bioinformatics	BTH2211	Bachelor of Science (Hons.) (Biotechnology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2010
2042	Term Paper	BTH2231	Bachelor of Science (Hons.) (Biotechnology)	Academic Writing, Presentation, Quiz	2010
2043	Project(with Presentation &Evaluation)	BTH2232	Bachelor of Science (Hons.) (Biotechnology)	Project writing, Presentation, Viva-Voce	2010
2044	Workshop/ Certification (Discipline Specific) (1credit per workshop)	BTH2233	Bachelor of Science (Hons.) (Biotechnology)	Quiz, Written Test	2010
2045	Study Abroad	BTH2234	Bachelor of Science (Hons.) (Biotechnology)	Written Test, Country Report	2010
2046	Microbiology	BTH2302	Bachelor of Science (Hons.) (Biotechnology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2010
2047	Enzymology	BTH2303	Bachelor of Science (Hons.) (Biotechnology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2010
2048	Biochemistry Lab	BTH2305	Bachelor of Science (Hons.) (Biotechnology)	Practical, Lab Visit, Lab Record, Class Performance	2010
2049	Microbiology Lab	BTH2306	Bachelor of Science (Hons.) (Biotechnology)	Practical, Lab Visit, Lab Record, Class Performance	2010
2050	Enzymology Lab	BTH2307	Bachelor of Science (Hons.) (Biotechnology)	Practical, Lab Visit, Lab Record, Class Performance	2010

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1.1.3 Total number of courses having focus on employability/ entrepreneurship / skill development offered during the year (2022)

Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
2051	Genetics & Cell Biology Lab	BTH2308	Bachelor of Science (Hons.) (Biotechnology)	Practical, Lab Visit, Lab Record, Class Performance	2010
2052	Intellectual property rights	BTH2309	Bachelor of Science (Hons.) (Biotechnology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2010
2053	Pharmaceutical Biotechnology	BTH2310	Bachelor of Science (Hons.) (Biotechnology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2010
2054	Clinical Biotechnology	BTH2311	Bachelor of Science (Hons.) (Biotechnology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2010
2055	Term Paper	BTH2331	Bachelor of Science (Hons.) (Biotechnology)	Academic Writing, Presentation, Quiz	2010
2056	Project(with Presentation &Evaluation)	BTH2332	Bachelor of Science (Hons.) (Biotechnology)	Project writing, Presentation, Viva-Voce	2010
2057	Workshop/ Certification (Discipline Specific) (1credit per workshop)	BTH2333	Bachelor of Science (Hons.) (Biotechnology)	Quiz, Written Test	2010
2058	Study Abroad	BTH2334	Bachelor of Science (Hons.) (Biotechnology)	Written Test, Country Report	2010
2059	Introductory Immunology	BTH2402	Bachelor of Science (Hons.) (Biotechnology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2010
2060	Instrumentation & Bioanalytical techniques	BTH2403	Bachelor of Science (Hons.) (Biotechnology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2010
2061	Research Methodology	BTH2404	Bachelor of Science (Hons.) (Biotechnology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2010
2062	In Silico analysis of Biomolecules	BTH2405	Bachelor of Science (Hons.) (Biotechnology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2010
2063	Molecular Biology Lab	BTH2406	Bachelor of Science (Hons.) (Biotechnology)	Practical, Lab Visit, Lab Record, Class Performance	2010
2064	Introductory Immunology Lab	BTH2407	Bachelor of Science (Hons.) (Biotechnology)	Practical, Lab Visit, Lab Record, Class Performance	2010
2065	In Silico analysis of Biomolecules Lab	BTH2408	Bachelor of Science (Hons.) (Biotechnology)	Practical, Lab Visit, Lab Record, Class Performance	2010
2066	Nano Biotechnology	BTH2409	Bachelor of Science (Hons.) (Biotechnology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2010
2067	Forensic Biotechnology	BTH2410	Bachelor of Science (Hons.) (Biotechnology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2010
2068	Genetically Modified Organism (Crops/Animals)	BTH2411	Bachelor of Science (Hons.) (Biotechnology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2010
2069	Term Paper	BTH2431	Bachelor of Science (Hons.) (Biotechnology)	Academic Writing, Presentation, Quiz	2010
2070	Project (with Presentation & Evaluation)	BTH2432	Bachelor of Science (Hons.) (Biotechnology)	Project writing, Presentation, Viva-Voce	2010

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1.1.3 Total number of courses having focus on employability/ entrepreneurship / skill development offered during the year (2022)

Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
2071	Workshop / Certification (Discipline Specific) (1credit per workshop)	BTH2433	Bachelor of Science (Hons.) (Biotechnology)	Quiz, Written Test	2010
2072	Study Abroad	BTH2434	Bachelor of Science (Hons.) (Biotechnology)	Written Test, Country Report	2010
2073	Marine biotechnology	BTH2504	Bachelor of Science (Hons.) (Biotechnology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2010
2074	Biosensors	BTH2505	Bachelor of Science (Hons.) (Biotechnology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2010
2075	Animal Biotechnology Lab	BTH2509	Bachelor of Science (Hons.) (Biotechnology)	Practical, Lab Visit, Lab Record, Class Performance	2010
2076	Plant Biotechnology Lab	BTH2510	Bachelor of Science (Hons.) (Biotechnology)	Practical, Lab Visit, Lab Record, Class Performance	2010
2077	Modern Killer diseases	BTH2506	Bachelor of Science (Hons.) (Biotechnology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2010
2078	Biofuels and Green Biotechnology	BTH2507	Bachelor of Science (Hons.) (Biotechnology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2010
2079	Artificial Neural Network	BTH2508	Bachelor of Science (Hons.) (Biotechnology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2010
2080	Introductory Nanobiotechnology	BTH2511	Bachelor of Science (Hons.) (Biotechnology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2010
2081	Integrated Biomaterials	BTH2512	Bachelor of Science (Hons.) (Biotechnology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2010
2082	Term Paper	BTH2531	Bachelor of Science (Hons.) (Biotechnology)	Academic Writing, Presentation, Quiz	2010
2083	Project (with Presentation & Evaluation)	BTH2532	Bachelor of Science (Hons.) (Biotechnology)	Project writing, Presentation, Viva-Voce	2010
2084	Workshop / Certification (Discipline Specific) (1credit per workshop)	BTH2533	Bachelor of Science (Hons.) (Biotechnology)	Quiz, Written Test	2010
2085	Study Abroad	BTH2534	Bachelor of Science (Hons.) (Biotechnology)	Written Test, Country Report	2010
2086	Genomics & Proteomics	BTH2602	Bachelor of Science (Hons.) (Biotechnology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2010
2087	Industrial Biotechnology	BTH2603	Bachelor of Science (Hons.) (Biotechnology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2010
2088	Stress Biology	BTH2604	Bachelor of Science (Hons.) (Biotechnology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2010
2089	Recombinant DNA Technology Lab	BTH2605	Bachelor of Science (Hons.) (Biotechnology)	Practical, Lab Visit, Lab Record, Class Performance	2010

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
2090	Genomics & Proteomics Lab	BTH2609	Bachelor of Science (Hons.) (Biotechnology)	Practical, Lab Visit, Lab Record, Class Performance	2010
2091	Biosafety Management	BTH2606	Bachelor of Science (Hons.) (Biotechnology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2010
2092	Drug Design and Development	BTH2607	Bachelor of Science (Hons.) (Biotechnology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2010
2093	Bioprocess Technology	BTH2608	Bachelor of Science (Hons.) (Biotechnology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2010
2094	Term Paper	BTH2631	Bachelor of Science (Hons.) (Biotechnology)	Academic Writing, Presentation, Quiz	2010
2095	Project (with Presentation & Evaluation)	BTH2632	Bachelor of Science (Hons.) (Biotechnology)	Project writing, Presentation, Viva-Voce	2010
2096	Workshop / Certification (Discipline Specific) (1credit per workshop)	BTH2633	Bachelor of Science (Hons.) (Biotechnology)	Quiz, Written Test	2010
2097	Study Abroad	BTH2634	Bachelor of Science (Hons.) (Biotechnology)	Written Test, Country Report	2010
2098	Plant & Animal Diversity Lab-I	BLS2106	Bachelor of Science (Hons.) (Biological Science)	Practical, Lab Visit, Lab Record, Class Performance	2014
2099	Chemistry Lab-I	BLS2107	Bachelor of Science (Hons.) (Biological Science)	Practical, Lab Visit, Lab Record, Class Performance	2014
2100	Physics Lab-I	BLS2108	Bachelor of Science (Hons.) (Biological Science)	Practical, Lab Visit, Lab Record, Class Performance	2014
2101	Plant Diversity Lab	BLS2206	Bachelor of Science (Hons.) (Biological Science)	Practical, Lab Visit, Lab Record, Class Performance	2014
2102	Chemistry Lab II	BLS2207	Bachelor of Science (Hons.) (Biological Science)	Practical, Lab Visit, Lab Record, Class Performance	2014
2103	Physics Lab II	BLS2208	Bachelor of Science (Hons.) (Biological Science)	Practical, Lab Visit, Lab Record, Class Performance	2014
2104	Plant & Animal Anatomy Lab	BLS2305	Bachelor of Science (Hons.) (Biological Science)	Practical, Lab Visit, Lab Record, Class Performance	2014
2105	Cell biology & Genetics Lab	BLS2306	Bachelor of Science (Hons.) (Biological Science)	Practical, Lab Visit, Lab Record, Class Performance	2014
2106	Project (with Presentation & Evaluation)	BLS2332	Bachelor of Science (Hons.) (Biological Science)	Project Writing, Presentation, Viva-Voce	2014
2107	Microbiology	BLS2403	Bachelor of Science (Hons.) (Biological Science)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2014
2108	Biostats & Bioinformatics	BLS2404	Bachelor of Science (Hons.) (Biological Science)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2014
2109	Ecology & Evolution	BLS2405	Bachelor of Science (Hons.) (Biological Science)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2014
2110	Plant & Animal Physiology Lab	BLS2406	Bachelor of Science (Hons.) (Biological Science)	Practical, Lab Visit, Lab Record, Class Performance	2014
2111	Microbiology Lab	BLS2407	Bachelor of Science (Hons.) (Biological Science)	Practical, Lab Visit, Lab Record, Class Performance	2014

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
2112	Molecular Biology	BLS2501	Bachelor of Science (Hons.) (Biological Science)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2014
2113	Immunology	BLS2503	Bachelor of Science (Hons.) (Biological Science)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2014
2114	Bio-analytical & Biophysical Techniques	BLS2504	Bachelor of Science (Hons.) (Biological Science)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2014
2115	Biomaterials	BLS2505	Bachelor of Science (Hons.) (Biological Science)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2014
2116	Molecular Biology Lab	BLS2506	Bachelor of Science (Hons.) (Biological Science)	Practical, Lab Visit, Lab Record, Class Performance	2014
2117	Immunology Lab	BLS2507	Bachelor of Science (Hons.) (Biological Science)	Practical, Lab Visit, Lab Record, Class Performance	2014
2118	Biochemistry & Bio-analytical Lab	BLS2508	Bachelor of Science (Hons.) (Biological Science)	Practical, Lab Visit, Lab Record, Class Performance	2014
2119	Summer Internship Project (Evaluation)	BLS2535	Bachelor of Science (Hons.) (Biological Science)	Report Writing, Presentation, Viva-Voce	2014
2120	Recombinant DNA Technology	BLS2601	Bachelor of Science (Hons.) (Biological Science)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2014
2121	Genomics & proteomics	BLS2602	Bachelor of Science (Hons.) (Biological Science)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2014
2122	IPR, Biosafety & Bioethics	BLS2603	Bachelor of Science (Hons.) (Biological Science)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2014
2123	Applied Biology	BLS2604	Bachelor of Science (Hons.) (Biological Science)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2014
2124	Recombinant DNA Technology Lab	BLS2605	Bachelor of Science (Hons.) (Biological Science)	Practical, Lab Visit, Lab Record, Class Performance	2014
2125	Applied Biology Lab	BLS2606	Bachelor of Science (Hons.) (Biological Science)	Practical, Lab Visit, Lab Record, Class Performance	2014
2126	Introduction to Computers & Programming in 'C'	BTE2104	Bachelor of Technology (Biotechnology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2010
2127	Electrical Science	BTE2106	Bachelor of Technology (Biotechnology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2010
2128	Programming in C Lab	BTE2108	Bachelor of Technology (Biotechnology)	Practical, Lab Visit, Lab Record, Class Performance	2010
2129	Electrical Science Lab	BTE2110	Bachelor of Technology (Biotechnology)	Practical, Lab Visit, Lab Record, Class Performance	2010
2130	Engineering Chemistry Lab	BTE2113	Bachelor of Technology (Biotechnology)	Practical, Lab Visit, Lab Record, Class Performance	2010
2131	Object Oriented Programming in C++	BTE2203	Bachelor of Technology (Biotechnology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2010

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
2132	Object Oriented Programming in C++ Lab	BTE2205	Bachelor of Technology (Biotechnology)	Practical, Lab Visit, Lab Record, Class Performance	2010
2133	Engineering Graphics Lab	BTE2206	Bachelor of Technology (Biotechnology)	Practical, Lab Visit, Lab Record, Class Performance	2010
2134	Life Sciences	BTE2210	Bachelor of Technology (Biotechnology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2010
2135	Cell Biology & Genetics	BTE2301	Bachelor of Technology (Biotechnology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2010
2136	Biostatistics	BTE2303	Bachelor of Technology (Biotechnology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2010
2137	Database Management System	BTE2304	Bachelor of Technology (Biotechnology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2010
2138	Cell Biology & Genetics Lab	BTE2307	Bachelor of Technology (Biotechnology)	Practical, Lab Visit, Lab Record, Class Performance	2010
2139	Database Management System Lab	BTE2308	Bachelor of Technology (Biotechnology)	Practical, Lab Visit, Lab Record, Class Performance	2010
2140	Industrial Biotechnology	BTE2309	Bachelor of Technology (Biotechnology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2010
2141	Fermentation Technology	BTE2310	Bachelor of Technology (Biotechnology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2010
2142	Drug Design and Development	BTE2311	Bachelor of Technology (Biotechnology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2010
2143	Recombinant DNA Technology	BTE2312	Bachelor of Technology (Biotechnology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2010
2144	Term Paper	BTE2331	Bachelor of Technology (Biotechnology)	Academic Writing, Presentation, Quiz	2010
2145	Project (with Presentation & Evaluation)	BTE2332	Bachelor of Technology (Biotechnology)	Project writing, Presentation, Viva-Voce	2010
2146	Workshop / Certification (Discipline Specific)	BTE2333	Bachelor of Technology (Biotechnology)	Quiz, Written Test	2010
2147	Study Abroad	BTE2334	Bachelor of Technology (Biotechnology)	Written Test, Country Report	2010
2148	Microbiology	BTE2401	Bachelor of Technology (Biotechnology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2010
2149	Enzymology & Enzyme Technology	BTE2403	Bachelor of Technology (Biotechnology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2010
2150	Chemical Engineering Principles	BTE2404	Bachelor of Technology (Biotechnology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2010

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
2151	Methods and Instrumentation in Biotechnology	BTE2405	Bachelor of Technology (Biotechnology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2010
2152	Microbiology Lab	BTE2406	Bachelor of Technology (Biotechnology)	Practical, Lab Visit, Lab Record, Class Performance	2010
2153	Enzymology & Enzyme Technology Lab	BTE2408	Bachelor of Technology (Biotechnology)	Practical, Lab Visit, Lab Record, Class Performance	2010
2154	Methods and Instrumentation in Biotechnology Lab	BTE2409	Bachelor of Technology (Biotechnology)	Practical, Lab Visit, Lab Record, Class Performance	2010
2155	Marine Biotechnology	BTE2410	Bachelor of Technology (Biotechnology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2010
2156	Vaccine Development	BTE2411	Bachelor of Technology (Biotechnology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2010
2157	Agricultural Biotechnology	BTE2412	Bachelor of Technology (Biotechnology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2010
2158	Natural products and medicinal chemistry	BTE2413	Bachelor of Technology (Biotechnology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2010
2159	Stem cell Technology	BTE2414	Bachelor of Technology (Biotechnology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2010
2160	Term Paper	BTE2431	Bachelor of Technology (Biotechnology)	Academic Writing, Presentation, Quiz	2010
2161	Project (with Presentation & Evaluation)	BTE2432	Bachelor of Technology (Biotechnology)	Project writing, Presentation, Viva-Voce	2010
2162	Workshop / Certification (Discipline Specific)	BTE2433	Bachelor of Technology (Biotechnology)	Quiz, Written Test	2010
2163	Study Abroad	BTE2434	Bachelor of Technology (Biotechnology)	Written Test, Country Report	2010
2164	Molecular Biology	BTE2501	Bachelor of Technology (Biotechnology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2010
2165	Bioinformatics	BTE2504	Bachelor of Technology (Biotechnology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2010
2166	Molecular Biology Lab	BTE2505	Bachelor of Technology (Biotechnology)	Practical, Lab Visit, Lab Record, Class Performance	2010
2167	Animal Biotechnology Lab	BTE2506	Bachelor of Technology (Biotechnology)	Practical, Lab Visit, Lab Record, Class Performance	2010
2168	Plant Biotechnology Lab	BTE2507	Bachelor of Technology (Biotechnology)	Practical, Lab Visit, Lab Record, Class Performance	2010
2169	Bioinformatics Lab	BTE2508	Bachelor of Technology (Biotechnology)	Practical, Lab Visit, Lab Record, Class Performance	2010
2170	Summer Internship Evaluation-I	BTE2535	Bachelor of Technology (Biotechnology)	Report Writing, Presentation, Viva-Voce	2010
2171	Biofuels & Green Technology	BTE2509	Bachelor of Technology (Biotechnology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2010

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
2172	Stem Cells and Tissue Engineering	BTE2510	Bachelor of Technology (Biotechnology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2010
2173	Java-I	BTE2511	Bachelor of Technology (Biotechnology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2010
2174	Term Paper	BTE2531	Bachelor of Technology (Biotechnology)	Academic Writing, Presentation, Quiz	2010
2175	Project (with Presentation & Evaluation)	BTE2532	Bachelor of Technology (Biotechnology)	Project writing, Presentation, Viva-Voce	2010
2176	Workshop / Certification (Discipline Specific)	BTE2533	Bachelor of Technology (Biotechnology)	Quiz, Written Test	2010
2177	Study Abroad	BTE2534	Bachelor of Technology (Biotechnology)	Written Test, Country Report	2010
2178	Recombinant DNA Technology	BTE2601	Bachelor of Technology (Biotechnology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2010
2179	Bioprocess Technology	BTE2602	Bachelor of Technology (Biotechnology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2010
2180	Immunology & Immunotechnology	BTE2603	Bachelor of Technology (Biotechnology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2010
2181	Fundamentals of Biochemical Engineering	BTE2604	Bachelor of Technology (Biotechnology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2010
2182	Recombinant DNA Technology Lab	BTE2605	Bachelor of Technology (Biotechnology)	Practical, Lab Visit, Lab Record, Class Performance	2010
2183	Bioprocess Technology Lab	BTE2606	Bachelor of Technology (Biotechnology)	Practical, Lab Visit, Lab Record, Class Performance	2010
2184	Immunology & Immunotechnology Lab	BTE2607	Bachelor of Technology (Biotechnology)	Practical, Lab Visit, Lab Record, Class Performance	2010
2185	Pharmaceutical Biotechnology	BTE2608	Bachelor of Technology (Biotechnology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2010
2186	JAVA –II	BTE2611	Bachelor of Technology (Biotechnology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2010
2187	RNA Biology	BTE2612	Bachelor of Technology (Biotechnology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2010
2188	Term Paper	BTE2631	Bachelor of Technology (Biotechnology)	Academic Writing, Presentation, Quiz	2010
2189	Project (with Presentation & Evaluation)	BTE2632	Bachelor of Technology (Biotechnology)	Project writing, Presentation, Viva-Voce	2010
2190	Workshop / Certification (Discipline Specific)	BTE2633	Bachelor of Technology (Biotechnology)	Quiz, Written Test	2010
2191	Study Abroad	BTE2634	Bachelor of Technology (Biotechnology)	Written Test, Country Report	2010

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
2192	Genomics & Proteomics	BTE2701	Bachelor of Technology (Biotechnology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2010
2193	IPR, Biosafety & Bioethics	BTE2702	Bachelor of Technology (Biotechnology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2010
2194	Research Methodology & Report Writing	BTE2703	Bachelor of Technology (Biotechnology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2010
2195	Genomics & Proteomics Lab	BTE2704	Bachelor of Technology (Biotechnology)	Practical, Lab Visit, Lab Record, Class Performance	2010
2196	Summer Internship Evaluation-II	BTE2735	Bachelor of Technology (Biotechnology)	Report Writing, Presentation, Viva-Voce	2010
2197	Molecular Medicine & Diagnosis	BTE2706	Bachelor of Technology (Biotechnology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2010
2198	Applications of Plant Biotechnology	BTE2707	Bachelor of Technology (Biotechnology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2010
2199	Bioenergy Engineering	BTE2708	Bachelor of Technology (Biotechnology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2010
2200	Advanced Nanobiotechnology	BTE2709	Bachelor of Technology (Biotechnology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2010
2201	Term Paper	BTE2731	Bachelor of Technology (Biotechnology)	Academic Writing, Presentation, Quiz	2010
2202	Project (with Presentation & Evaluation)	BTE2732	Bachelor of Technology (Biotechnology)	Project writing, Presentation, Viva-Voce	2010
2203	Workshop/ Certification (Discipline Specific)	BTE2733	Bachelor of Technology (Biotechnology)	Quiz, Written Test	2010
2204	Study Abroad	BTE2734	Bachelor of Technology (Biotechnology)	Written Test, Country Report	2010
2205	Dissertation / Project Report Presentation / Viva Voce	BTE2837	Bachelor of Technology (Biotechnology)	Report Writing, Presentation, Viva-Voce	2010
2206	Microbiology Lab	BTH4109	Master of Science (Biotechnology)	Practical, Lab Visit, Lab Record, Class Performance	2010
2207	Biochemistry and Analytical Techniques Lab	BTH4115	Master of Science (Biotechnology)	Practical, Lab Visit, Lab Record, Class Performance	2010
2208	Plant & Animal Biotechnology Lab	BTH4116	Master of Science (Biotechnology)	Practical, Lab Visit, Lab Record, Class Performance	2010
2209	Research Methodology & Scientific Communication Skills	BTH4214	Master of Science (Biotechnology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2010
2210	Immunology Lab	BTH4209	Master of Science (Biotechnology)	Practical, Lab Visit, Lab Record, Class Performance	2010
2211	Molecular Biology and Genetic Engineering Lab	BTH4215	Master of Science (Biotechnology)	Practical, Lab Visit, Lab Record, Class Performance	2010
2212	Seminar	BTH4238	Master of Science (Biotechnology)	Quiz, Written Test	2010

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
2213	Environmental Biotechnology	BTH4204	Master of Science (Biotechnology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2010
2214	RNA Biology	BTH4219	Master of Science (Biotechnology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2010
2215	Bioentrepreneurship, IPR, Biosafety & Bioethics	BTH4306	Master of Science (Biotechnology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2010
2216	Bioprocess Engineering & Technology Lab	BTH4323	Master of Science (Biotechnology)	Practical, Lab Visit, Lab Record, Class Performance	2010
2217	Bioinformatics Lab	BTH4324	Master of Science (Biotechnology)	Practical, Lab Visit, Lab Record, Class Performance	2010
2218	Project Proposal Preparation & Presentation	BTH4332	Master of Science (Biotechnology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2010
2219	Seminar	BTH4338	Master of Science (Biotechnology)	Quiz, Written Test	2010
2220	Summer Internship Evaluation	BTH4335	Master of Science (Biotechnology)	Report Writing, Presentation, Viva-Voce	2010
2221	Vaccines	BTH4327	Master of Science (Biotechnology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2010
2222	Cancer Biology	BTH4328	Master of Science (Biotechnology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2010
2223	Dissertation	BTH4437	Master of Science (Biotechnology)	Report Writing, Presentation, Viva-Voce	2010
2224	Machine Learning-I	DSC4102	Master of Science (Data Science)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2019
2225	Statistics & Exploratory Data Analysis	DSC4103	Master of Science (Data Science)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2019
2226	Database Management System-I	DSC4104	Master of Science (Data Science)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2019
2227	Programming Toolbox I-R	DSC4105	Master of Science (Data Science)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2019
2228	Programming ToolBox II- Python	DSC4106	Master of Science (Data Science)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2019
2229	Big Data Tools & Technologies-I	DSC4107	Master of Science (Data Science)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2019
2230	Introduction to Linux	DSC4108	Master of Science (Data Science)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2019
2231	Machine Learning-I Lab	DSC4109	Master of Science (Data Science)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2019
2232	Statistics & Exploratory Data Analysis Lab	DSC4110	Master of Science (Data Science)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2019

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
2233	Machine Learning-II	DSC4201	Master of Science (Data Science)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2019
2234	Regression Theory & Analysis	DSC4202	Master of Science (Data Science)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2019
2235	Database Management System-II	DSC4204	Master of Science (Data Science)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2019
2236	Spark	DSC4205	Master of Science (Data Science)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2019
2237	Data Visualization	DSC4206	Master of Science (Data Science)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2019
2238	Big Data Tools & Technologies-II	DSC4207	Master of Science (Data Science)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2019
2239	Machine Learning-II Lab	DSC4208	Master of Science (Data Science)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2019
2240	Regression Theory & Analysis Lab	DSC4209	Master of Science (Data Science)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2019
2241	Data Structure & Algorithm Design Lab	DSC4210	Master of Science (Data Science)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2019
2242	Pattern Recognition	DSC4211	Master of Science (Data Science)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2019
2243	Next Generation Sequencing Analysis	DSC4212	Master of Science (Data Science)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2019
2244	Association Rule Mining	DSC4213	Master of Science (Data Science)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2019
2245	Generalized & Linear Modeling	DSC4301	Master of Science (Data Science)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2019
2246	Deep Learning & Neural Networks	DSC4302	Master of Science (Data Science)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2019
2247	Time Series	DSC4303	Master of Science (Data Science)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2019
2248	Graph & Social Network Analysis	DSC4304	Master of Science (Data Science)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2019
2249	Natural Language Processing	DSC4305	Master of Science (Data Science)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2019
2250	Graph & Social Network Analysis Lab	DSC4306	Master of Science (Data Science)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2019

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
2251	Big Data Tools & Technologies-III	DSC4307	Master of Science (Data Science)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2019
2252	Generalized & Linear Modeling Lab	DSC4308	Master of Science (Data Science)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2019
2253	Time Series Lab	DSC4309	Master of Science (Data Science)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2019
2254	Deep Learning & Neural Networks Lab	DSC4310	Master of Science (Data Science)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2019
2255	Summer Internship Evaluation	DSC4335	Master of Science (Data Science)	Report Writing, Presentation, Viva-Voce	2019
2256	Weather Prediction	DSC4311	Master of Science (Data Science)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2019
2257	Disease Classification	DSC4312	Master of Science (Data Science)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2019
2258	Customer Behaviour Analysis	DSC4313	Master of Science (Data Science)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2019
2259	Dissertation / Project Report Presentation / Viva Voce	DSC4437	Master of Science (Data Science)	Report Writing, Presentation, Viva-Voce	2019
2260	Print Media – Reporting & Editing	JRN2151	Bachelor of Arts (Journalism & Mass Communication)	Group Discussion, Presentation, Class Performance, Report Writing	2010
2261	Computer Graphics & Animation	JRN2108	Bachelor of Arts (Journalism & Mass Communication)	Group Discussion, Presentation, Class Performance, Report Writing	2010
2262	Basic Photography	JRN2251	Bachelor of Arts (Journalism & Mass Communication)	Group Discussion, Presentation, Class Performance, Report Writing	2010
2263	Print Media – Specialized Reporting & Feature Writing	JRN2202	Bachelor of Arts (Journalism & Mass Communication)	Group Discussion, Presentation, Class Performance, Report Writing	2010
2264	Electronic Communication: Radio & TV	JRN2207	Bachelor of Arts (Journalism & Mass Communication)	Group Discussion, Presentation, Class Performance, Report Writing	2010
2265	Readings in Media	JRN2230	Bachelor of Arts (Journalism & Mass Communication)	Group Discussion, Presentation, Class Performance, Report Writing	2010
2266	Project (with Presentation & Evaluation)	JRN2232	Bachelor of Arts (Journalism & Mass Communication)	Report Writing, Presentation, Viva-Voce	2010
2267	Media Production Portfolio	JRN2236	Bachelor of Arts (Journalism & Mass Communication)	Group Discussion, Presentation, Class Performance, Report Writing	2010
2268	TV Journalism	JRN2351	Bachelor of Arts (Journalism & Mass Communication)	Group Discussion, Presentation, Class Performance, Report Writing	2010
2269	Digital Photography	JRN2303	Bachelor of Arts (Journalism & Mass Communication)	Group Discussion, Presentation, Class Performance, Report Writing	2010

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
2270	Public Relations	JRN2304	Bachelor of Arts (Journalism & Mass Communication)	Group Discussion, Presentation, Class Performance, Report Writing	2010
2271	Mass Communication Research-I	JRN2308	Bachelor of Arts (Journalism & Mass Communication)	Group Discussion, Presentation, Class Performance, Report Writing	2010
2272	Readings in Media	JRN2330	Bachelor of Arts (Journalism & Mass Communication)	Group Discussion, Presentation, Class Performance, Report Writing	2010
2273	Project (with Presentation & Evaluation)	JRN2332	Bachelor of Arts (Journalism & Mass Communication)	Report Writing, Presentation, Viva-Voce	2010
2274	Media Production Portfolio	JRN2336	Bachelor of Arts (Journalism & Mass Communication)	Group Discussion, Presentation, Class Performance, Report Writing	2010
2275	TV Production and Presentation	JRN2451	Bachelor of Arts (Journalism & Mass Communication)	Group Discussion, Presentation, Class Performance, Report Writing	2010
2276	Film Theory & Practice-I	JRN2401	Bachelor of Arts (Journalism & Mass Communication)	Group Discussion, Presentation, Class Performance, Report Writing	2010
2277	Project (with presentation & evaluation)	JRN2432	Bachelor of Arts (Journalism & Mass Communication)	Report Writing, Presentation, Viva-Voce	2010
2278	Web Designing	JRN2404	Bachelor of Arts (Journalism & Mass Communication)	Group Discussion, Presentation, Class Performance, Report Writing	2010
2279	Digital Marketing	JRN2409	Bachelor of Arts (Journalism & Mass Communication)	Group Discussion, Presentation, Class Performance, Report Writing	2010
2280	New Media	JRN2551	Bachelor of Arts (Journalism & Mass Communication)	Group Discussion, Presentation, Class Performance, Report Writing	2010
2281	Film Theory and Practice - II	JRN2501	Bachelor of Arts (Journalism & Mass Communication)	Group Discussion, Presentation, Class Performance, Report Writing	2010
2282	Mass Communication Research-II	JRN2507	Bachelor of Arts (Journalism & Mass Communication)	Group Discussion, Presentation, Class Performance, Report Writing	2010
2283	Summer Internship Evaluation	JRN2535	Bachelor of Arts (Journalism & Mass Communication)	Report Writing, Presentation, Viva-Voce	2010
2284	National and International Issues & Affairs	JRN2502	Bachelor of Arts (Journalism & Mass Communication)	Group Discussion, Presentation, Class Performance, Report Writing	2010
2285	Event Management	JRN2503	Bachelor of Arts (Journalism & Mass Communication)	Group Discussion, Presentation, Class Performance, Report Writing	2010
2286	Multimedia Journalism	JRN2504	Bachelor of Arts (Journalism & Mass Communication)	Group Discussion, Presentation, Class Performance, Report Writing	2010
2287	Internship	JRN2635	Bachelor of Arts (Journalism & Mass Communication)	Report Writing, Presentation, Viva-Voce	2010

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
2288	Professional Project OR Dissertation	JRN2637	Bachelor of Arts (Journalism & Mass Communication)	Report Writing, Presentation, Viva-Voce	2010
2289	Introduction to Multimedia and its Application	ANI2152	Bachelor of Science (Animation & Visual Graphics)	Practical Sessions in Lab, Class Performance, Presentation, Assignment	2012
2290	Design Software	ANI2106	Bachelor of Science (Animation & Visual Graphics)	Practical Sessions in Lab, Class Performance, Presentation, Assignment	2012
2291	Basics of Art History and Sketching & Drawing	ANI2108	Bachelor of Science (Animation & Visual Graphics)	Practical Sessions in Lab, Class Performance, Presentation, Assignment	2012
2292	Typography	ANI2101	Bachelor of Science (Animation & Visual Graphics)	Practical Sessions in Lab, Class Performance, Presentation, Assignment	2012
2293	Workshop / Certification (Discipline Specific) (1 credit per workshop)	ANI2133	Bachelor of Science (Animation & Visual Graphics)	Quiz, Written Test	2012
2294	Study Abroad	ANI2134	Bachelor of Science (Animation & Visual Graphics)	Written Test, Country Report	2012
2295	Creating 2D Animation	ANI2252	Bachelor of Science (Animation & Visual Graphics)	Practical Sessions in Lab, Class Performance, Presentation, Assignment	2012
2296	Web Design & Development	ANI2202	Bachelor of Science (Animation & Visual Graphics)	Practical Sessions in Lab, Class Performance, Presentation, Assignment	2012
2297	UI and UX Design	ANI2209	Bachelor of Science (Animation & Visual Graphics)	Practical Sessions in Lab, Class Performance, Presentation, Assignment	2012
2298	Production Pipeline	ANI2210	Bachelor of Science (Animation & Visual Graphics)	Practical Sessions in Lab, Class Performance, Presentation, Assignment	2012
2299	Digital Photography	ANI2201	Bachelor of Science (Animation & Visual Graphics)	Practical Sessions in Lab, Class Performance, Presentation, Assignment	2012
2300	Online Certification (Minimum 30 Hours)	ANI2212	Bachelor of Science (Animation & Visual Graphics)	Practical Sessions in Lab, Class Performance, Presentation, Assignment	2012
2301	Workshop / Certification (Discipline Specific) (1 credit per workshop)	ANI2233	Bachelor of Science (Animation & Visual Graphics)	Quiz, Written Test	2012
2302	Study Abroad	ANI2234	Bachelor of Science (Animation & Visual Graphics)	Written Test, Country Report	2012
2303	Summer Project Evaluation-I	ANI2335	Bachelor of Science (Animation & Visual Graphics)	Report writing, Presentation, Viva-Voce	2012
2304	Design Thinking	ANI2307	Bachelor of Science (Animation & Visual Graphics)	Practical Sessions in Lab, Class Performance, Presentation, Assignment	2012
2305	Online Certification (Minimum 30 Hours)	ANI2308	Bachelor of Science (Animation & Visual Graphics)	Practical Sessions in Lab, Class Performance, Presentation, Assignment	2012

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
2306	Workshop / Certification (Discipline Specific) (1 credit per workshop)	ANI2333	Bachelor of Science (Animation & Visual Graphics)	Quiz, Written Test	2012
2307	Study Abroad	ANI2334	Bachelor of Science (Animation & Visual Graphics)	Written Test, Country Report	2012
2308	Maya Modeling & Texturing	ANI2452	Bachelor of Science (Animation & Visual Graphics)	Practical Sessions in Lab, Class Performance, Presentation, Assignment	2012
2309	Digital Compositing	ANI2405	Bachelor of Science (Animation & Visual Graphics)	Practical Sessions in Lab, Class Performance, Presentation, Assignment	2012
2310	Introduction to Game Development	ANI2406	Bachelor of Science (Animation & Visual Graphics)	Practical Sessions in Lab, Class Performance, Presentation, Assignment	2012
2311	Motion Graphics	ANI2407	Bachelor of Science (Animation & Visual Graphics)	Practical Sessions in Lab, Class Performance, Presentation, Assignment	2012
2312	Online Certification (Minimum 30 Hours)	ANI2408	Bachelor of Science (Animation & Visual Graphics)	Practical Sessions in Lab, Class Performance, Presentation, Assignment	2012
2313	Workshop / Certification (Discipline Specific) (1 credit per workshop)	ANI2433	Bachelor of Science (Animation & Visual Graphics)	Quiz, Written Test	2012
2314	Study Abroad	ANI2434	Bachelor of Science (Animation & Visual Graphics)	Written Test, Country Report	2012
2315	Maya Rigging & Animation	ANI2505	Bachelor of Science (Animation & Visual Graphics)	Practical Sessions in Lab, Class Performance, Presentation, Assignment	2012
2316	Summer Project Evaluation-II	ANI2535	Bachelor of Science (Animation & Visual Graphics)	Report Writing, Presentation, Viva-Voce	2012
2317	Scripting & Storyboarding	ANI2552	Bachelor of Science (Animation & Visual Graphics)	Practical Sessions in Lab, Class Performance, Presentation, Assignment	2012
2318	Online Certification (Minimum 30 Hours)	ANI2508	Bachelor of Science (Animation & Visual Graphics)	Practical Sessions in Lab, Class Performance, Presentation, Assignment	2012
2319	Workshop / Certification (Discipline Specific) (1 credit per workshop)	ANI2533	Bachelor of Science (Animation & Visual Graphics)	Quiz, Written Test	2012
2320	Study Abroad	ANI2534	Bachelor of Science (Animation & Visual Graphics)	Written Test, Country Report	2012
2321	VFX	ANI2652	Bachelor of Science (Animation & Visual Graphics)	Practical Sessions in Lab, Class Performance, Presentation, Assignment	2012
2322	Internship	ANI2635	Bachelor of Science (Animation & Visual Graphics)	Report writing, Presentation, Viva-Voce	2012
2323	Professional Project	ANI2637	Bachelor of Science (Animation & Visual Graphics)	Report writing, Presentation, Viva-Voce	2012
2324	Media Arts - I: Radio & TV	JRN4103	Master of Arts (Journalism & Mass Communication)	Group Discussion, Presentation, Class Performance, Report Writing	2010

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
2325	Advertising : Concepts & Principles	JRN4104	Master of Arts (Journalism & Mass Communication)	Group Discussion, Presentation, Class Performance, Report Writing	2010
2326	Design Software	JRN4106	Master of Arts (Journalism & Mass Communication)	Group Discussion, Presentation, Class Performance, Report Writing	2010
2327	Print Design & Visualization	JRN4202	Master of Arts (Journalism & Mass Communication)	Group Discussion, Presentation, Class Performance, Report Writing	2010
2328	Specialized Reporting & Feature Writing	JRN4203	Master of Arts (Journalism & Mass Communication)	Group Discussion, Presentation, Class Performance, Report Writing	2010
2329	Media Arts - II: Radio & TV	JRN4204	Master of Arts (Journalism & Mass Communication)	Group Discussion, Presentation, Class Performance, Report Writing	2010
2330	Advanced Photography	JRN4207	Master of Arts (Journalism & Mass Communication)	Group Discussion, Presentation, Class Performance, Report Writing	2010
2331	Media Planning & Brand Management	JRN4209	Master of Arts (Journalism & Mass Communication)	Group Discussion, Presentation, Class Performance, Report Writing	2010
2332	Media Arts-III: Film	JRN4301	Master of Arts (Journalism & Mass Communication)	Group Discussion, Presentation, Class Performance, Report Writing	2010
2333	Media Laws & Ethics	JRN4304	Master of Arts (Journalism & Mass Communication)	Group Discussion, Presentation, Class Performance, Report Writing	2010
2334	Digital Media Production	JRN4306	Master of Arts (Journalism & Mass Communication)	Group Discussion, Presentation, Class Performance, Report Writing	2010
2335	Mass Media & Industry	JRN4307	Master of Arts (Journalism & Mass Communication)	Group Discussion, Presentation, Class Performance, Report Writing	2010
2336	Communication Research	JRN4308	Master of Arts (Journalism & Mass Communication)	Group Discussion, Presentation, Class Performance, Report Writing	2010
2337	Summer Internship Evaluation	JRN4335	Master of Arts (Journalism & Mass Communication)	Report writing, Presentation, Viva-Voce	2010
2338	Media Arts - IV: Cyber Media	JRN4402	Master of Arts (Journalism & Mass Communication)	Group Discussion, Presentation, Class Performance, Report Writing	2010
2339	Internship	JRN4435	Master of Arts (Journalism & Mass Communication)	Report writing, Presentation, Viva-Voce	2010
2340	Dissertation/ Professional Project	JRN4437	Master of Arts (Journalism & Mass Communication)	Report writing, Presentation, Viva-Voce	2010
2341	Print Journalism - Reporting & Editing	JRN3102	Post Graduate Diploma (Journalism & Mass Communication)	Group Discussion, Presentation, Class Performance, Report Writing	2011
2342	Media Arts - I: Radio & TV	JRN3103	Post Graduate Diploma (Journalism & Mass Communication)	Group Discussion, Presentation, Class Performance, Report Writing	2011

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
2343	Advertising : Concepts & Principles	JRN3104	Post Graduate Diploma (Journalism & Mass Communication)	Group Discussion, Presentation, Class Performance, Report Writing	2011
2344	Introduction to Photography	JRN3105	Post Graduate Diploma (Journalism & Mass Communication)	Group Discussion, Presentation, Class Performance, Report Writing	2011
2345	Design Software	JRN3106	Post Graduate Diploma (Journalism & Mass Communication)	Group Discussion, Presentation, Class Performance, Report Writing	2011
2346	Advertising Planning & Strategy	JRN3201	Post Graduate Diploma (Journalism & Mass Communication)	Group Discussion, Presentation, Class Performance, Report Writing	2011
2347	Print Design & Visualization	JRN3202	Post Graduate Diploma (Journalism & Mass Communication)	Group Discussion, Presentation, Class Performance, Report Writing	2011
2348	Specialized Reporting & Feature Writing	JRN3203	Post Graduate Diploma (Journalism & Mass Communication)	Group Discussion, Presentation, Class Performance, Report Writing	2011
2349	Media Arts - II: Radio & TV	JRN3204	Post Graduate Diploma (Journalism & Mass Communication)	Group Discussion, Presentation, Class Performance, Report Writing	2011
2350	Public Relations & Corporate Communication	JRN3206	Post Graduate Diploma (Journalism & Mass Communication)	Group Discussion, Presentation, Class Performance, Report Writing	2011
2351	Advanced Photography	JRN3207	Post Graduate Diploma (Journalism & Mass Communication)	Group Discussion, Presentation, Class Performance, Report Writing	2011
2352	Media Planning & Brand Management	JRN3209	Post Graduate Diploma (Journalism & Mass Communication)	Group Discussion, Presentation, Class Performance, Report Writing	2011
2353	Project	JRN3232	Post Graduate Diploma (Journalism & Mass Communication)	Project writing, Presentation, Viva-Voce	2011
2354	Introduction to Multimedia and its Application	ANI2152	Animation (OE)	Practical Sessions in Lab, Class Performance, Presentation, Assignment	2013
2355	Creating 2D Animation	ANI2252	Animation (OE)	Practical Sessions in Lab, Class Performance, Presentation, Assignment	2013
2356	3D Modeling & Texturing	ANI2352	Animation (OE)	Practical Sessions in Lab, Class Performance, Presentation, Assignment	2013
2357	Maya Modeling & Texturing	ANI2452	Animation (OE)	Practical Sessions in Lab, Class Performance, Presentation, Assignment	2013
2358	Scripting & Storyboarding	ANI2552	Animation (OE)	Practical Sessions in Lab, Class Performance, Presentation, Assignment	2013
2359	VFX	ANI2652	Animation (OE)	Practical Sessions in Lab, Class Performance, Presentation, Assignment	2016

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
2360	Print Media: Reporting & Editing	JRN2151	Journalism (OE)	Group Discussion, Presentation, Class Performance, Report Writing	2013
2361	Basic Photography	JRN2251	Journalism (OE)	Group Discussion, Presentation, Class Performance, Report Writing	2013
2362	TV Journalism	JRN2351	Journalism (OE)	Group Discussion, Presentation, Class Performance, Report Writing	2013
2363	TV Production & Presentation	JRN2451	Journalism (OE)	Group Discussion, Presentation, Class Performance, Report Writing	2013
2364	New Media	JRN2551	Journalism (OE)	Group Discussion, Presentation, Class Performance, Report Writing	2013
2365	Media Analysis	JRN2651	Journalism (OE)	Group Discussion, Presentation, Class Performance, Report Writing	2016
2366	Social Formations & Cultural Patterns of the Ancient World	HIS2104	Bachelor of Arts (Hons.) (History)	Quiz, Group Discussion, Presentation, Class Performance	2013
2367	History of Early India-I	HIS2105	Bachelor of Arts (Hons.) (History)	Quiz, Group Discussion, Presentation, Class Performance	2013
2368	Social Formations & Cultural Patterns of the Medieval World	HIS2106	Bachelor of Arts (Hons.) (History)	Quiz, Group Discussion, Presentation, Class Performance	2013
2369	History of Early India-II	HIS2205	Bachelor of Arts (Hons.) (History)	Quiz, Group Discussion, Presentation, Class Performance	2013
2370	Indo-Islamic Polity and Culture in Medieval India-I	HIS2206	Bachelor of Arts (Hons.) (History)	Quiz, Group Discussion, Presentation, Class Performance	2013
2371	Term Paper	HIS2231	Bachelor of Arts (Hons.) (History)	Academic Writing, Presentation, Quiz	2013
2372	Project with Presentation and Evaluation	HIS2232	Bachelor of Arts (Hons.) (History)	Project writing, Presentation, Viva-Voce	2013
2373	Indo-Islamic Polity and Culture in Medieval India-II	HIS2305	Bachelor of Arts (Hons.) (History)	Quiz, Group Discussion, Presentation, Class Performance	2013
2374	Rise of Modern West-II	HIS2306	Bachelor of Arts (Hons.) (History)	Quiz, Group Discussion, Presentation, Class Performance	2013
2375	History of British Rule in India-I	HIS2307	Bachelor of Arts (Hons.) (History)	Quiz, Group Discussion, Presentation, Class Performance	2013
2376	Summer Project Evaluation	HIS2335	Bachelor of Arts (Hons.) (History)	Report Writing, Presentation, Viva-Voce	2013
2377	Term Paper	HIS2331	Bachelor of Arts (Hons.) (History)	Academic Writing, Presentation, Quiz	2013
2378	Project Studies	HIS2332	Bachelor of Arts (Hons.) (History)	Project writing, Presentation, Viva-Voce	2013
2379	History of British Rule in India-II	HIS2405	Bachelor of Arts (Hons.) (History)	Quiz, Group Discussion, Presentation, Class Performance	2013
2380	History of USA	HIS2406	Bachelor of Arts (Hons.) (History)	Quiz, Group Discussion, Presentation, Class Performance	2013
2381	History of China and Japan	HIS2407	Bachelor of Arts (Hons.) (History)	Quiz, Group Discussion, Presentation, Class Performance	2013

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
2382	Historical Research Method	HIS2408	Bachelor of Arts (Hons.) (History)	Quiz, Group Discussion, Presentation, Class Performance	2013
2383	Term Paper	HIS2431	Bachelor of Arts (Hons.) (History)	Academic Writing, Presentation, Quiz	2013
2384	Project with Presentation & Evaluation	HIS2432	Bachelor of Arts (Hons.) (History)	Project writing, Presentation, Viva-Voce	2013
2385	History of USSR	HIS2504	Bachelor of Arts (Hons.) (History)	Quiz, Group Discussion, Presentation, Class Performance	2013
2386	History of West Asia	HIS2505	Bachelor of Arts (Hons.) (History)	Quiz, Group Discussion, Presentation, Class Performance	2013
2387	History of World Wars	HIS2506	Bachelor of Arts (Hons.) (History)	Quiz, Group Discussion, Presentation, Class Performance	2013
2388	History of Latin America	HIS2507	Bachelor of Arts (Hons.) (History)	Quiz, Group Discussion, Presentation, Class Performance	2013
2389	Term Paper	HIS2531	Bachelor of Arts (Hons.) (History)	Academic Writing, Presentation, Quiz	2013
2390	Project Studies	HIS2532	Bachelor of Arts (Hons.) (History)	Project writing, Presentation, Viva-Voce	2013
2391	Gender and History	HIS2604	Bachelor of Arts (Hons.) (History)	Quiz, Group Discussion, Presentation, Class Performance	2013
2392	History of Contemporary India	HIS2605	Bachelor of Arts (Hons.) (History)	Quiz, Group Discussion, Presentation, Class Performance	2013
2393	Dissertation/ Project Studies	HIS2637	Bachelor of Arts (Hons.) (History)	Report Writing, Presentation, Viva-Voce	2013
2394	Environmental History- Global Perspectives	HIS2606	Bachelor of Arts (Hons.) (History)	Quiz, Group Discussion, Presentation, Class Performance	2013
2395	Term Paper	HIS2631	Bachelor of Arts (Hons.) (History)	Academic Writing, Presentation, Quiz	2013
2396	Project with Presentation and Evaluation	HIS2632	Bachelor of Arts (Hons.) (History)	Project writing, Presentation, Viva-Voce	2013
2397	Indian Nationalism	POL2101	Bachelor of Arts (Hons.) (Political Science)	Quiz, Group Discussion, Presentation, Class Performance	2013
2398	British Colonialism in India	POL2102	Bachelor of Arts (Hons.) (Political Science)	Quiz, Group Discussion, Presentation, Class Performance	2013
2399	Political Philosophy-I	POL2103	Bachelor of Arts (Hons.) (Political Science)	Quiz, Group Discussion, Presentation, Class Performance	2013
2400	Political Philosophy-II	POL2202	Bachelor of Arts (Hons.) (Political Science)	Quiz, Group Discussion, Presentation, Class Performance	2013
2401	Current Themes in Indian Politics	POL2204	Bachelor of Arts (Hons.) (Political Science)	Quiz, Group Discussion, Presentation, Class Performance	2013
2402	Elections and Electoral Politics	POL2206	Bachelor of Arts (Hons.) (Political Science)	Quiz, Group Discussion, Presentation, Class Performance	2013
2403	Review of Contemporary Literature-I	POL2230	Bachelor of Arts (Hons.) (Political Science)	Quiz, Group Discussion, Presentation, Class Performance	2013
2404	Term Paper (Political Philosophy/Political Studies)	POL2231	Bachelor of Arts (Hons.) (Political Science)	Academic Writing, Presentation, Quiz	2013
2405	Project with Presentation and Evaluation	POL2232	Bachelor of Arts (Hons.) (Political Science)	Project writing, Presentation, Viva-Voce	2013
2406	State Politics in India	POL2302	Bachelor of Arts (Hons.) (Political Science)	Quiz, Group Discussion, Presentation, Class Performance	2013

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
2407	Politics of Post-Colonial States	POL2303	Bachelor of Arts (Hons.) (Political Science)	Quiz, Group Discussion, Presentation, Class Performance	2013
2408	Summer Project Evaluation	POL2335	Bachelor of Arts (Hons.) (Political Science)	Report Writing, Presentation, Viva-Voce	2013
2409	Politics and media	POL2304	Bachelor of Arts (Hons.) (Political Science)	Quiz, Group Discussion, Presentation, Class Performance	2013
2410	Review of Contemporary Literature-II	POL2330	Bachelor of Arts (Hons.) (Political Science)	Quiz, Group Discussion, Presentation, Class Performance	2013
2411	Term Paper (Political Philosophy/Political Studies)	POL2331	Bachelor of Arts (Hons.) (Political Science)	Academic Writing, Presentation, Quiz	2013
2412	Project with Presentation and Evaluation	POL2332	Bachelor of Arts (Hons.) (Political Science)	Project writing, Presentation, Viva-Voce	2013
2413	Religion and Politics in India	POL2404	Bachelor of Arts (Hons.) (Political Science)	Quiz, Group Discussion, Presentation, Class Performance	2013
2414	Cinema and Politics in India	POL2405	Bachelor of Arts (Hons.) (Political Science)	Quiz, Group Discussion, Presentation, Class Performance	2013
2415	Review of Contemporary Literature-III	POL2430	Bachelor of Arts (Hons.) (Political Science)	Quiz, Group Discussion, Presentation, Class Performance	2013
2416	Term Paper (Political Philosophy/Political Studies)	POL2431	Bachelor of Arts (Hons.) (Political Science)	Academic Writing, Presentation, Quiz	2013
2417	Project with presentation and evaluation	POL2432	Bachelor of Arts (Hons.) (Political Science)	Project writing, Presentation, Viva-Voce	2013
2418	Workshop on Contemporary Politics	POL2433	Bachelor of Arts (Hons.) (Political Science)	Quiz, Written Test	2013
2419	India's Foreign Policy	POL2503	Bachelor of Arts (Hons.) (Political Science)	Quiz, Group Discussion, Presentation, Class Performance	2013
2420	Reading Karl Marx	POL2504	Bachelor of Arts (Hons.) (Political Science)	Quiz, Group Discussion, Presentation, Class Performance	2013
2421	Civil Society in India	POL2505	Bachelor of Arts (Hons.) (Political Science)	Quiz, Group Discussion, Presentation, Class Performance	2013
2422	Post-Cold War World Politics	POL2506	Bachelor of Arts (Hons.) (Political Science)	Quiz, Group Discussion, Presentation, Class Performance	2013
2423	Review of Contemporary Literature-IV	POL2530	Bachelor of Arts (Hons.) (Political Science)	Quiz, Group Discussion, Presentation, Class Performance	2013
2424	Term Paper (Political Philosophy/Political Studies)	POL2531	Bachelor of Arts (Hons.) (Political Science)	Academic Writing, Presentation, Quiz	2013
2425	Project with Presentation and Evaluation	POL2532	Bachelor of Arts (Hons.) (Political Science)	Project writing, Presentation, Viva-Voce	2013
2426	Comparative Government and Politics	POL2601	Bachelor of Arts (Hons.) (Political Science)	Quiz, Group Discussion, Presentation, Class Performance	2013
2427	Dissertation	POL2637	Bachelor of Arts (Hons.) (Political Science)	Report Writing, Presentation, Viva-Voce	2013
2428	Reading Vivekananda	POL2603	Bachelor of Arts (Hons.) (Political Science)	Quiz, Group Discussion, Presentation, Class Performance	2013
2429	Reading Ambedkar	POL2604	Bachelor of Arts (Hons.) (Political Science)	Quiz, Group Discussion, Presentation, Class Performance	2013
2430	Modern Themes in Gender	POL2605	Bachelor of Arts (Hons.) (Political Science)	Quiz, Group Discussion, Presentation, Class Performance	2013
2431	Political violence: concepts and trends	POL2606	Bachelor of Arts (Hons.) (Political Science)	Quiz, Group Discussion, Presentation, Class Performance	2013

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
2432	Review of Contemporary Literature-V	POL2630	Bachelor of Arts (Hons.) (Political Science)	Quiz, Group Discussion, Presentation, Class Performance	2013
2433	Term Paper (Political Philosophy/Political Studies)	POL2631	Bachelor of Arts (Hons.) (Political Science)	Academic Writing, Presentation, Quiz	2013
2434	Project with Presentation and Evaluation	POL2632	Bachelor of Arts (Hons.) (Political Science)	Project writing, Presentation, Viva-Voce	2013
2435	Research Methodology-I	ENG2205	Bachelor of Arts (Hons.) (English)	Quiz, Group Discussion, Presentation, Class Performance	2012
2436	Research Methodology-II	ENG2304	Bachelor of Arts (Hons.) (English)	Quiz, Group Discussion, Presentation, Class Performance	2012
2437	Summer Project Evaluation	ENG2335	Bachelor of Arts (Hons.) (English)	Report Writing, Presentation, Viva-Voce	2012
2438	Research Methodology-III	ENG2410	Bachelor of Arts (Hons.) (English)	Quiz, Group Discussion, Presentation, Class Performance	2012
2439	Feminist Writings	ENG2408	Bachelor of Arts (Hons.) (English)	Quiz, Group Discussion, Presentation, Class Performance	2012
2440	Contemporary Literature	ENG2502	Bachelor of Arts (Hons.) (English)	Quiz, Group Discussion, Presentation, Class Performance	2012
2441	Indian Women Writing	ENG2506	Bachelor of Arts (Hons.) (English)	Quiz, Group Discussion, Presentation, Class Performance	2012
2442	Dissertation	ENG2637	Bachelor of Arts (Hons.) (English)	Report Writing, Presentation, Viva-Voce	2012
2443	Literature & Gender	ENG2605	Bachelor of Arts (Hons.) (English)	Quiz, Group Discussion, Presentation, Class Performance	2012
2444	Research Methodology-I	ENG4206	Master of Arts (English)	Quiz, Group Discussion, Presentation, Class Performance	2012
2445	Research Methodology-II	ENG4305	Master of Arts (English)	Quiz, Group Discussion, Presentation, Class Performance	2012
2446	Summer Project Evaluation	ENG4335	Master of Arts (English)	Report Writing, Presentation, Viva-Voce	2012
2447	Dissertation	ENG4437	Master of Arts (English)	Report Writing, Presentation, Viva-Voce	2012
2448	Linguistics and English Language Teaching	ENG4406	Master of Arts (English)	Quiz, Group Discussion, Presentation, Class Performance	2012
2449	Written Expression-I	FRE2101	Bachelor of Arts (Hons.) (French)	Quiz, Class Performance, Report Writing	2014
2450	Oral Expression-I	FRE2102	Bachelor of Arts (Hons.) (French)	Quiz, Class Performance, Report Writing	2014
2451	Practical Phonetics-I	FRE2104	Bachelor of Arts (Hons.) (French)	Quiz, Class Performance, Report Writing	2014
2452	Written Expression-II	FRE2201	Bachelor of Arts (Hons.) (French)	Quiz, Class Performance, Report Writing	2014
2453	Oral Expression-II	FRE2202	Bachelor of Arts (Hons.) (French)	Quiz, Class Performance, Report Writing	2014
2454	Practical Phonetics-II	FRE2204	Bachelor of Arts (Hons.) (French)	Quiz, Class Performance, Report Writing	2014
2455	Written Expression-III	FRE2301	Bachelor of Arts (Hons.) (French)	Quiz, Class Performance, Report Writing	2014
2456	Oral Expression-III	FRE2302	Bachelor of Arts (Hons.) (French)	Quiz, Class Performance, Report Writing	2014

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
2457	Understanding French Texts-I	FRE2304	Bachelor of Arts (Hons.) (French)	Quiz, Class Performance, Report Writing	2014
2458	Written Expression-IV	FRE2401	Bachelor of Arts (Hons.) (French)	Quiz, Class Performance, Report Writing	2014
2459	Oral Expression-IV	FRE2402	Bachelor of Arts (Hons.) (French)	Quiz, Class Performance, Report Writing	2014
2460	Understanding French Texts-II	FRE2406	Bachelor of Arts (Hons.) (French)	Quiz, Class Performance, Report Writing	2014
2461	French through activities	FRE2405	Bachelor of Arts (Hons.) (French)	Quiz, Class Performance, Report Writing	2014
2462	FOS: French for hotel and restaurant	FRE2408	Bachelor of Arts (Hons.) (French)	Quiz, Class Performance, Report Writing	2014
2463	Written Expression-V	FRE2501	Bachelor of Arts (Hons.) (French)	Quiz, Class Performance, Report Writing	2014
2464	Oral Expression-V	FRE2502	Bachelor of Arts (Hons.) (French)	Quiz, Class Performance, Report Writing	2014
2465	Introduction to French Literature-I	FRE2506	Bachelor of Arts (Hons.) (French)	Quiz, Class Performance, Report Writing	2014
2466	Initiation to Translation	FRE2507	Bachelor of Arts (Hons.) (French)	Quiz, Class Performance, Report Writing	2014
2467	FOS: French for Tourism	FRE2508	Bachelor of Arts (Hons.) (French)	Quiz, Class Performance, Report Writing	2014
2468	Written Expression-VI	FRE2601	Bachelor of Arts (Hons.) (French)	Quiz, Class Performance, Report Writing	2014
2469	Oral Expression-VI	FRE2602	Bachelor of Arts (Hons.) (French)	Quiz, Class Performance, Report Writing	2014
2470	Introduction to French Literature-II	FRE2603	Bachelor of Arts (Hons.) (French)	Quiz, Class Performance, Report Writing	2014
2471	FOS: Professional & Business French	FRE2606	Bachelor of Arts (Hons.) (French)	Quiz, Class Performance, Report Writing	2014
2472	Project Report	FRE2637	Bachelor of Arts (Hons.) (French)	Report Writing, Presentation, Viva-Voce	2014
2473	Written Expression-I	GER2101	Bachelor of Arts (Hons.) (German)	Quiz, Class Performance, Report Writing	2017
2474	Oral Expression-I	GER2102	Bachelor of Arts (Hons.) (German)	Quiz, Class Performance, Report Writing	2017
2475	Written Expression-II	GER2201	Bachelor of Arts (Hons.) (German)	Quiz, Class Performance, Report Writing	2017
2476	Oral Expression-II	GER2202	Bachelor of Arts (Hons.) (German)	Quiz, Class Performance, Report Writing	2017
2477	German through Activities	GER2203	Bachelor of Arts (Hons.) (German)	Quiz, Class Performance, Report Writing	2017
2478	Written Expression-III	GER2301	Bachelor of Arts (Hons.) (German)	Quiz, Class Performance, Report Writing	2017
2479	Oral Expression-III	GER2302	Bachelor of Arts (Hons.) (German)	Quiz, Class Performance, Report Writing	2017
2480	Written Expression-IV	GER2401	Bachelor of Arts (Hons.) (German)	Quiz, Class Performance, Report Writing	2017
2481	Oral Expression-IV	GER2402	Bachelor of Arts (Hons.) (German)	Quiz, Class Performance, Report Writing	2017

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
2482	German through Literary Texts	GER2403	Bachelor of Arts (Hons.) (German)	Quiz, Class Performance, Report Writing	2017
2483	Enhancing language proficiency	GER2404	Bachelor of Arts (Hons.) (German)	Quiz, Class Performance, Report Writing	2017
2484	German Culture and Civilization (Landeskunde) II	GER2405	Bachelor of Arts (Hons.) (German)	Quiz, Class Performance, Report Writing	2017
2485	Written Expression-V	GER2501	Bachelor of Arts (Hons.) (German)	Quiz, Class Performance, Report Writing	2017
2486	Oral Expression-V	GER2502	Bachelor of Arts (Hons.) (German)	Quiz, Class Performance, Report Writing	2017
2487	Introduction to German Literature	GER2503	Bachelor of Arts (Hons.) (German)	Quiz, Class Performance, Report Writing	2017
2488	Summer Project Evaluation	GER2535	Bachelor of Arts (Hons.) (German)	Report Writing, Presentation, Viva-Voce	2017
2489	Introduction to Linguistics	GER2504	Bachelor of Arts (Hons.) (German)	Quiz, Class Performance, Report Writing	2017
2490	Business German-I	GER2505	Bachelor of Arts (Hons.) (German)	Quiz, Class Performance, Report Writing	2017
2491	Written Expression-VI	GER2601	Bachelor of Arts (Hons.) (German)	Quiz, Class Performance, Report Writing	2017
2492	Oral Expression-VI	GER2602	Bachelor of Arts (Hons.) (German)	Quiz, Class Performance, Report Writing	2017
2493	Dissertation	GER2637	Bachelor of Arts (Hons.) (German)	Report Writing, Presentation, Viva-Voce	2017
2494	Business German-II	GER2605	Bachelor of Arts (Hons.) (German)	Quiz, Class Performance, Report Writing	2017
2495	Written Expression-I	SPA2101	Bachelor of Arts (Hons.) (Spanish)	Quiz, Class Performance, Report Writing	2018
2496	Oral Expression-I	SPA2102	Bachelor of Arts (Hons.) (Spanish)	Quiz, Class Performance, Report Writing	2018
2497	Grammar and Communicative Spanish-I	SPA2103	Bachelor of Arts (Hons.) (Spanish)	Quiz, Class Performance, Report Writing	2018
2498	Written Expression-II	SPA2201	Bachelor of Arts (Hons.) (Spanish)	Quiz, Class Performance, Report Writing	2018
2499	Oral Expression-II	SPA2202	Bachelor of Arts (Hons.) (Spanish)	Quiz, Class Performance, Report Writing	2018
2500	Grammar and Communicative Spanish-II	SPA2203	Bachelor of Arts (Hons.) (Spanish)	Quiz, Class Performance, Report Writing	2018
2501	Written Expression-III	SPA2301	Bachelor of Arts (Hons.) (Spanish)	Quiz, Class Performance, Report Writing	2018
2502	Oral Expression-III	SPA2302	Bachelor of Arts (Hons.) (Spanish)	Quiz, Class Performance, Report Writing	2018
2503	Written Expression-IV	SPA2401	Bachelor of Arts (Hons.) (Spanish)	Quiz, Class Performance, Report Writing	2018
2504	Oral Expression-IV	SPA2402	Bachelor of Arts (Hons.) (Spanish)	Quiz, Class Performance, Report Writing	2018
2505	Business Spanish	SPA2403	Bachelor of Arts (Hons.) (Spanish)	Quiz, Class Performance, Report Writing	2018
2506	Written Expression-V	SPA2501	Bachelor of Arts (Hons.) (Spanish)	Quiz, Class Performance, Report Writing	2018

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1.1.3 Total number of courses having focus on employability/ entrepreneurship / skill development offered during the year (2022)

Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
2507	Oral Expression-V	SPA2502	Bachelor of Arts (Hons.) (Spanish)	Quiz, Class Performance, Report Writing	2018
2508	Introduction to Translation	SPA2503	Bachelor of Arts (Hons.) (Spanish)	Quiz, Class Performance, Report Writing	2018
2509	Summer Project Evaluation	SPA2535	Bachelor of Arts (Hons.) (Spanish)	Report Writing, Presentation, Viva-Voce	2018
2510	Introduction to Linguistics	SPA2504	Bachelor of Arts (Hons.) (Spanish)	Quiz, Class Performance, Report Writing	2018
2511	Written Expression-VI	SPA2601	Bachelor of Arts (Hons.) (Spanish)	Quiz, Class Performance, Report Writing	2018
2512	Oral Expression-VI	SPA2602	Bachelor of Arts (Hons.) (Spanish)	Quiz, Class Performance, Report Writing	2018
2513	Introduction to Spanish Literature	SPA2603	Bachelor of Arts (Hons.) (Spanish)	Quiz, Class Performance, Report Writing	2018
2514	Dissertation	SPA2637	Bachelor of Arts (Hons.) (Spanish)	Report Writing, Presentation, Viva-Voce	2018
2515	Applied Spanish Grammar and Introduction to linguistics	SPA2604	Bachelor of Arts (Hons.) (Spanish)	Quiz, Class Performance, Report Writing	2018
2516	Effective Listening	CSS2151	Communication Skills (OE)	Quiz, Group Discussion, Group Presentation	2010
2517	Presentation Skills	CSS2251	Communication Skills (OE)	Quiz, Group Discussion, Group Presentation	2010
2518	Reading and Comprehension	CSS2351	Communication Skills (OE)	Quiz, Group Discussion, Group Presentation	2010
2519	Corporate Communication	CSS2451	Communication Skills (OE)	Quiz, Group Discussion, Group Presentation	2010
2520	Employability Skills	CSS2551	Communication Skills (OE)	Quiz, Group Discussion, Group Presentation	2010
2521	Workplace Communication	CSS2651	Communication Skills (OE)	Quiz, Group Discussion, Group Presentation	2010
2522	English-I	CSS2152	Communication Skills (OE)	Quiz, Group Discussion, Group Presentation	2010
2523	English-II	CSS2252	Communication Skills (OE)	Quiz, Group Discussion, Group Presentation	2010
2524	Basics of Communication	CSS4151	Communication Skills (OE)	Quiz, Group Discussion, Group Presentation	2010
2525	Corporate Communication	CSS4251	Communication Skills (OE)	Quiz, Group Discussion, Group Presentation	2010
2526	Interpersonal Communication	CSS4351	Communication Skills (OE)	Quiz, Group Discussion, Group Presentation	2010
2527	Cross Cultural Communication	CSS4451	Communication Skills (OE)	Quiz, Group Discussion, Group Presentation	2010
2528	Managerial Communication	CSS4152	Communication Skills (OE)	Quiz, Group Discussion, Group Presentation	2010
2529	Shakespearean Comedy	ENG2151	English Literature (OE)	Quiz, Group Discussion, Presentation, Class Performance	2013
2530	Romantic Poetry	ENG2251	English Literature (OE)	Quiz, Group Discussion, Presentation, Class Performance	2013
2531	The Novels of England	ENG2351	English Literature (OE)	Quiz, Group Discussion, Presentation, Class Performance	2013

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
2532	The English Novels of India	ENG2451	English Literature (OE)	Quiz, Group Discussion, Presentation, Class Performance	2013
2533	Genre Fiction	ENG2551	English Literature (OE)	Quiz, Group Discussion, Presentation, Class Performance	2013
2534	Contemporary Literature	ENG2651	English Literature (OE)	Quiz, Group Discussion, Presentation, Class Performance	2013
2535	History of Ancient India	HIS2151	History (OE)	Quiz, Group Discussion, Presentation, Class Performance	2016
2536	History of Medieval India	HIS2251	History (OE)	Quiz, Group Discussion, Presentation, Class Performance	2016
2537	History of Modern India	HIS2351	History (OE)	Quiz, Group Discussion, Presentation, Class Performance	2016
2538	The Ancient World	HIS2451	History (OE)	Quiz, Group Discussion, Presentation, Class Performance	2016
2539	Rise of the Modern West	HIS2551	History (OE)	Quiz, Group Discussion, Presentation, Class Performance	2016
2540	History of the World from Mid 20 th Century to the 21 st Century	HIS2651	History (OE)	Quiz, Group Discussion, Presentation, Class Performance	2016
2541	Health Education and Sports	PED2151	Physical Education and Sports Management (OE)	Quiz, Class Performance, Fitness Assignment, Presentation	2014
2542	Human Anatomy and Exercise	PED2251	Physical Education and Sports Management (OE)	Quiz, Class Performance, Fitness Assignment, Presentation	2014
2543	Sports Training and Conditioning	PED2351	Physical Education and Sports Management (OE)	Quiz, Class Performance, Fitness Assignment, Presentation	2014
2544	Basics of Sports Management	PED2451	Physical Education and Sports Management (OE)	Quiz, Class Performance, Fitness Assignment, Presentation	2014
2545	Sports Psychology	PED2551	Physical Education and Sports Management (OE)	Quiz, Class Performance, Fitness Assignment, Presentation	2014
2546	Sports Medicine	PED2651	Physical Education and Sports Management (OE)	Quiz, Class Performance, Fitness Assignment, Presentation	2014
2547	Indian National Movement	POL2151	Political Studies (OE)	Quiz, Group Discussion, Presentation, Class Performance	2014
2548	Indian State and Politics after Independence	POL2251	Political Studies (OE)	Quiz, Group Discussion, Presentation, Class Performance	2014
2549	State Politics in India	POL2351	Political Studies (OE)	Quiz, Group Discussion, Presentation, Class Performance	2014
2550	Politics and Media	POL2451	Political Studies (OE)	Quiz, Group Discussion, Presentation, Class Performance	2014
2551	South Asia: Political Perspectives	POL2551	Political Studies (OE)	Quiz, Group Discussion, Presentation, Class Performance	2014
2552	Post-Cold War World Politics	POL2651	Political Studies (OE)	Quiz, Group Discussion, Presentation, Class Performance	2014
2553	Introduction to Performing Arts	PAR2151	Performing Arts (OE)	Quiz, Report Writing, Class Performance, Presentation, Viva-Voce	2019
2554	Dynamics of Dance, Music & Theatre	PAR2251	Performing Arts (OE)	Quiz, Report Writing, Class Performance, Presentation, Viva-Voce	2019

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
2555	Social relevance of Dance, Music & Drama in Contemporary Indian Scene	PAR2351	Performing Arts (OE)	Quiz, Report Writing, Class Performance, Presentation, Viva-Voce	2019
2556	Indian Folk Arts	PAR2451	Performing Arts (OE)	Quiz, Report Writing, Class Performance, Presentation, Viva-Voce	2019
2557	Modern Indian Performing Arts	PAR2551	Performing Arts (OE)	Quiz, Report Writing, Class Performance, Presentation, Viva-Voce	2019
2558	Arts, Aesthetic & Society	PAR2651	Performing Arts (OE)	Quiz, Report Writing, Class Performance, Presentation, Viva-Voce	2019
2559	Introduction to Sanskrit Language	SKT2151	Sanskrit (OE)	Quiz, Report Writing, Class Performance, Presentation, Viva-Voce	2019
2560	General Introduction to Vedic Literature & Conversational Sanskrit	SKT2251	Sanskrit (OE)	Quiz, Report Writing, Class Performance, Presentation, Viva-Voce	2019
2561	General Introduction to Sanskrit Literature & Sanskrit Conversation	SKT2351	Sanskrit (OE)	Quiz, Report Writing, Class Performance, Presentation, Viva-Voce	2019
2562	Sanskrit Language & Indian Culture	SKT2451	Sanskrit (OE)	Quiz, Report Writing, Class Performance, Presentation, Viva-Voce	2019
2563	Introduction to Sanskrit Linguistics	SKT2551	Sanskrit (OE)	Quiz, Report Writing, Class Performance, Presentation, Viva-Voce	2019
2564	General Introduction to Indian Philosophy & Sanskrit Grammar	SKT2651	Sanskrit (OE)	Quiz, Report Writing, Class Performance, Presentation, Viva-Voce	2019
2565	Rabindranath Tagore in the 21 st Century	ENG2152	Tagore Studies (OE)	Quiz, Report Writing, Presentation, Viva-Voce	2017
2566	Tagore- Autobiographies & Biographical Sketches	ENG2252	Tagore Studies (OE)	Quiz, Report Writing, Presentation, Viva-Voce	2017
2567	Tagore as a Cultural Icon – Tagore as a Painter & Performer	ENG2352	Tagore Studies (OE)	Quiz, Report Writing, Presentation, Viva-Voce	2017
2568	Tagore as a Poet	ENG2452	Tagore Studies (OE)	Quiz, Report Writing, Presentation, Viva-Voce	2017
2569	Tagore as a Fiction Writer	ENG2552	Tagore Studies (OE)	Quiz, Report Writing, Presentation, Viva-Voce	2017
2570	Tagore and Mass Media	ENG2652	Tagore Studies (OE)	Quiz, Report Writing, Presentation, Viva-Voce	2017
2571	French-I	LAN2151	French (OE)	Quiz, Project Report, Presentation, Viva-Voce	2010
2572	French-II	LAN2251	French (OE)	Quiz, Project Report, Presentation, Viva-Voce	2010
2573	French-III	LAN2351	French (OE)	Quiz, Project Report, Presentation, Viva-Voce	2010
2574	French-IV	LAN2451	French (OE)	Quiz, Project Report, Presentation, Viva-Voce	2010

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
2575	French-V	LAN2551	French (OE)	Quiz, Project Report, Presentation, Viva-Voce	2010
2576	French-VI	LAN2651	French (OE)	Quiz, Project Report, Presentation, Viva-Voce	2010
2577	French-VII	LAN2751	French (OE)	Quiz, Project Report, Presentation, Viva-Voce	2010
2578	French-VIII	LAN2851	French (OE)	Quiz, Project Report, Presentation, Viva-Voce	2010
2579	French-IX	LAN2951	French (OE)	Quiz, Project Report, Presentation, Viva-Voce	2010
2580	French for Technology-I	LAN2170	French (OE)	Quiz, Project Report, Presentation, Viva-Voce	2015
2581	French for Technology-II	LAN2270	French (OE)	Quiz, Project Report, Presentation, Viva-Voce	2015
2582	French for Technology-III	LAN2370	French (OE)	Quiz, Project Report, Presentation, Viva-Voce	2015
2583	French for Technology-IV	LAN2470	French (OE)	Quiz, Project Report, Presentation, Viva-Voce	2015
2584	French for Technology-V	LAN2570	French (OE)	Quiz, Project Report, Presentation, Viva-Voce	2015
2585	French for Technology-VI	LAN2670	French (OE)	Quiz, Project Report, Presentation, Viva-Voce	2015
2586	French for Technology-VII	LAN2770	French (OE)	Quiz, Project Report, Presentation, Viva-Voce	2015
2587	French-I	LAN4151	French (OE)	Quiz, Project Report, Presentation, Viva-Voce	2010
2588	French-II	LAN4251	French (OE)	Quiz, Project Report, Presentation, Viva-Voce	2010
2589	French-III	LAN4351	French (OE)	Quiz, Project Report, Presentation, Viva-Voce	2010
2590	French-IV	LAN4451	French (OE)	Quiz, Project Report, Presentation, Viva-Voce	2010
2591	French-V	LAN4551	French (OE)	Quiz, Project Report, Presentation, Viva-Voce	2010
2592	German-I	LAN2152	German (OE)	Quiz, Project Report, Presentation, Viva-Voce	2010
2593	German-II	LAN2252	German (OE)	Quiz, Project Report, Presentation, Viva-Voce	2010
2594	German-III	LAN2352	German (OE)	Quiz, Project Report, Presentation, Viva-Voce	2010
2595	German-IV	LAN2452	German (OE)	Quiz, Project Report, Presentation, Viva-Voce	2010
2596	German-V	LAN2552	German (OE)	Quiz, Project Report, Presentation, Viva-Voce	2010
2597	German-VI	LAN2652	German (OE)	Quiz, Project Report, Presentation, Viva-Voce	2010
2598	German-VII	LAN2752	German (OE)	Quiz, Project Report, Presentation, Viva-Voce	2010
2599	German-VIII	LAN2852	German (OE)	Quiz, Project Report, Presentation, Viva-Voce	2010

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
2600	German-IX	LAN2952	German (OE)	Quiz, Project Report, Presentation, Viva-Voce	2010
2601	German-I	LAN4152	German (OE)	Quiz, Project Report, Presentation, Viva-Voce	2010
2602	German-II	LAN4252	German (OE)	Quiz, Project Report, Presentation, Viva-Voce	2010
2603	German-III	LAN4352	German (OE)	Quiz, Project Report, Presentation, Viva-Voce	2010
2604	German-IV	LAN4452	German (OE)	Quiz, Project Report, Presentation, Viva-Voce	2010
2605	German-V	LAN4552	German (OE)	Quiz, Project Report, Presentation, Viva-Voce	2010
2606	Spanish-I	LAN2153	Spanish (OE)	Quiz, Project Report, Presentation, Viva-Voce	2010
2607	Spanish-II	LAN2253	Spanish (OE)	Quiz, Project Report, Presentation, Viva-Voce	2010
2608	Spanish-III	LAN2353	Spanish (OE)	Quiz, Project Report, Presentation, Viva-Voce	2010
2609	Spanish-IV	LAN2453	Spanish (OE)	Quiz, Project Report, Presentation, Viva-Voce	2010
2610	Spanish-V	LAN2553	Spanish (OE)	Quiz, Project Report, Presentation, Viva-Voce	2010
2611	Spanish-VI	LAN2653	Spanish (OE)	Quiz, Project Report, Presentation, Viva-Voce	2010
2612	Spanish-VII	LAN2753	Spanish (OE)	Quiz, Project Report, Presentation, Viva-Voce	2010
2613	Spanish-VIII	LAN2853	Spanish (OE)	Quiz, Project Report, Presentation, Viva-Voce	2010
2614	Spanish-IX	LAN2953	Spanish (OE)	Quiz, Project Report, Presentation, Viva-Voce	2010
2615	Spanish-I	LAN4153	Spanish (OE)	Quiz, Project Report, Presentation, Viva-Voce	2010
2616	Spanish-II	LAN4253	Spanish (OE)	Quiz, Project Report, Presentation, Viva-Voce	2010
2617	Spanish-III	LAN4353	Spanish (OE)	Quiz, Project Report, Presentation, Viva-Voce	2010
2618	Spanish-IV	LAN4453	Spanish (OE)	Quiz, Project Report, Presentation, Viva-Voce	2010
2619	Spanish-V	LAN4553	Spanish (OE)	Quiz, Project Report, Presentation, Viva-Voce	2010
2620	Russian-I	LAN2154	Russian (OE)	Quiz, Project Report, Presentation, Viva-Voce	2010
2621	Russian-II	LAN2254	Russian (OE)	Quiz, Project Report, Presentation, Viva-Voce	2010
2622	Russian-III	LAN2354	Russian (OE)	Quiz, Project Report, Presentation, Viva-Voce	2010
2623	Russian-IV	LAN2454	Russian (OE)	Quiz, Project Report, Presentation, Viva-Voce	2010
2624	Russian-V	LAN2554	Russian (OE)	Quiz, Project Report, Presentation, Viva-Voce	2010

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
2625	Russian-VI	LAN2654	Russian (OE)	Quiz, Project Report, Presentation, Viva-Voce	2010
2626	Russian-VII	LAN2754	Russian (OE)	Quiz, Project Report, Presentation, Viva-Voce	2010
2627	Russian-VIII	LAN2854	Russian (OE)	Quiz, Project Report, Presentation, Viva-Voce	2010
2628	Russian-IX	LAN2954	Russian (OE)	Quiz, Project Report, Presentation, Viva-Voce	2010
2629	Russian-I	LAN4154	Russian (OE)	Quiz, Project Report, Presentation, Viva-Voce	2010
2630	Russian-II	LAN4254	Russian (OE)	Quiz, Project Report, Presentation, Viva-Voce	2010
2631	Russian-III	LAN4354	Russian (OE)	Quiz, Project Report, Presentation, Viva-Voce	2010
2632	Russian-IV	LAN4454	Russian (OE)	Quiz, Project Report, Presentation, Viva-Voce	2010
2633	Russian-V	LAN4554	Russian (OE)	Quiz, Project Report, Presentation, Viva-Voce	2010
2634	Chinese-I	LAN2155	Chinese (OE)	Quiz, Project Report, Presentation, Viva-Voce	2010
2635	Chinese-II	LAN2255	Chinese (OE)	Quiz, Project Report, Presentation, Viva-Voce	2010
2636	Chinese-III	LAN2355	Chinese (OE)	Quiz, Project Report, Presentation, Viva-Voce	2010
2637	Chinese-IV	LAN2455	Chinese (OE)	Quiz, Project Report, Presentation, Viva-Voce	2010
2638	Chinese-V	LAN2555	Chinese (OE)	Quiz, Project Report, Presentation, Viva-Voce	2010
2639	Chinese-VI	LAN2655	Chinese (OE)	Quiz, Project Report, Presentation, Viva-Voce	2010
2640	Chinese-VII	LAN2755	Chinese (OE)	Quiz, Project Report, Presentation, Viva-Voce	2010
2641	Chinese-VIII	LAN2855	Chinese (OE)	Quiz, Project Report, Presentation, Viva-Voce	2010
2642	Chinese-IX	LAN2955	Chinese (OE)	Quiz, Project Report, Presentation, Viva-Voce	2010
2643	Chinese-I	LAN4155	Chinese (OE)	Quiz, Project Report, Presentation, Viva-Voce	2010
2644	Chinese-II	LAN4255	Chinese (OE)	Quiz, Project Report, Presentation, Viva-Voce	2010
2645	Chinese-III	LAN4355	Chinese (OE)	Quiz, Project Report, Presentation, Viva-Voce	2010
2646	Chinese-IV	LAN4455	Chinese (OE)	Quiz, Project Report, Presentation, Viva-Voce	2010
2647	Chinese-V	LAN4555	Chinese (OE)	Quiz, Project Report, Presentation, Viva-Voce	2010
2648	Korean-I	LAN2157	Korean (OE)	Quiz, Project Report, Presentation, Viva-Voce	2014
2649	Korean-II	LAN2257	Korean (OE)	Quiz, Project Report, Presentation, Viva-Voce	2014

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2650	Korean-III	LAN2357	Korean (OE)	Quiz, Project Report, Presentation, Viva-Voce	2014
2651	Korean-IV	LAN2457	Korean (OE)	Quiz, Project Report, Presentation, Viva-Voce	2014
2652	Korean-V	LAN2557	Korean (OE)	Quiz, Project Report, Presentation, Viva-Voce	2014
2653	Korean-VI	LAN2657	Korean (OE)	Quiz, Project Report, Presentation, Viva-Voce	2014
2654	Korean-VII	LAN2757	Korean (OE)	Quiz, Project Report, Presentation, Viva-Voce	2014
2655	Korean-VIII	LAN2857	Korean (OE)	Quiz, Project Report, Presentation, Viva-Voce	2014
2656	Korean-IX	LAN2957	Korean (OE)	Quiz, Project Report, Presentation, Viva-Voce	2014
2657	Korean-I	LAN4157	Korean (OE)	Quiz, Project Report, Presentation, Viva-Voce	2014
2658	Korean-II	LAN4257	Korean (OE)	Quiz, Project Report, Presentation, Viva-Voce	2014
2659	Korean-III	LAN4357	Korean (OE)	Quiz, Project Report, Presentation, Viva-Voce	2014
2660	Korean-IV	LAN4457	Korean (OE)	Quiz, Project Report, Presentation, Viva-Voce	2014
2661	Korean-V	LAN4557	Korean (OE)	Quiz, Project Report, Presentation, Viva-Voce	2014
2662	Japanese-I	LAN2158	Japanese (OE)	Quiz, Project Report, Presentation, Viva-Voce	2014
2663	Japanese-II	LAN2258	Japanese (OE)	Quiz, Project Report, Presentation, Viva-Voce	2014
2664	Japanese-III	LAN2358	Japanese (OE)	Quiz, Project Report, Presentation, Viva-Voce	2014
2665	Japanese-IV	LAN2458	Japanese (OE)	Quiz, Project Report, Presentation, Viva-Voce	2014
2666	Japanese-V	LAN2558	Japanese (OE)	Quiz, Project Report, Presentation, Viva-Voce	2014
2667	Japanese-VI	LAN2658	Japanese (OE)	Quiz, Project Report, Presentation, Viva-Voce	2014
2668	Japanese-VII	LAN2758	Japanese (OE)	Quiz, Project Report, Presentation, Viva-Voce	2014
2669	Japanese-VIII	LAN2858	Japanese (OE)	Quiz, Project Report, Presentation, Viva-Voce	2014
2670	Japanese-IX	LAN2958	Japanese (OE)	Quiz, Project Report, Presentation, Viva-Voce	2014
2671	Japanese-I	LAN4158	Japanese (OE)	Quiz, Project Report, Presentation, Viva-Voce	2014
2672	Japanese-II	LAN4258	Japanese (OE)	Quiz, Project Report, Presentation, Viva-Voce	2014
2673	Japanese-III	LAN4358	Japanese (OE)	Quiz, Project Report, Presentation, Viva-Voce	2014
2674	Japanese-IV	LAN4458	Japanese (OE)	Quiz, Project Report, Presentation, Viva-Voce	2014

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2675	Japanese-V	LAN4558	Japanese (OE)	Quiz, Project Report, Presentation, Viva-Voce	2014
2676	Hindi-I	LAN2159	Hindi (OE)	Quiz, Project Report, Presentation, Viva-Voce	2017
2677	Hindi-II	LAN2259	Hindi (OE)	Quiz, Project Report, Presentation, Viva-Voce	2017
2678	Hindi-III	LAN2359	Hindi (OE)	Quiz, Project Report, Presentation, Viva-Voce	2017
2679	Hindi-IV	LAN2459	Hindi (OE)	Quiz, Project Report, Presentation, Viva-Voce	2017
2680	Hindi-V	LAN2559	Hindi (OE)	Quiz, Project Report, Presentation, Viva-Voce	2017
2681	Hindi-VI	LAN2659	Hindi (OE)	Quiz, Project Report, Presentation, Viva-Voce	2017
2682	Hindi-VII	LAN2759	Hindi (OE)	Quiz, Project Report, Presentation, Viva-Voce	2017
2683	Hindi-VIII	LAN2859	Hindi (OE)	Quiz, Project Report, Presentation, Viva-Voce	2017
2684	Hindi-IX	LAN2959	Hindi (OE)	Quiz, Project Report, Presentation, Viva-Voce	2017
2685	Hindi-I	LAN4159	Hindi (OE)	Quiz, Project Report, Presentation, Viva-Voce	2017
2686	Hindi-II	LAN4259	Hindi (OE)	Quiz, Project Report, Presentation, Viva-Voce	2017
2687	Hindi-III	LAN4359	Hindi (OE)	Quiz, Project Report, Presentation, Viva-Voce	2017
2688	Hindi-IV	LAN4459	Hindi (OE)	Quiz, Project Report, Presentation, Viva-Voce	2017
2689	Hindi-V	LAN4559	Hindi (OE)	Quiz, Project Report, Presentation, Viva-Voce	2017
2690	Professional French for Business-1	LAN2161	French Studies (OE)	Quiz, Project Report, Presentation, Viva-Voce	2013
2691	Professional French for Business-2	LAN2261	French Studies (OE)	Quiz, Project Report, Presentation, Viva-Voce	2013
2692	Professional French for Business-3	LAN2361	French Studies (OE)	Quiz, Project Report, Presentation, Viva-Voce	2013
2693	Professional French for Business-4	LAN2461	French Studies (OE)	Quiz, Project Report, Presentation, Viva-Voce	2013
2694	Introduction to French Literature & select socio-cultural aspects of France	LAN2561	French Studies (OE)	Quiz, Project Report, Presentation, Viva-Voce	2013
2695	French through activities	LAN2661	French Studies (OE)	Quiz, Project Report, Presentation, Viva-Voce	2013
2696	Professional German for Business-1	LAN2162	German Studies (OE)	Quiz, Project Report, Presentation, Viva-Voce	2013
2697	Professional German for Business-2	LAN2262	German Studies (OE)	Quiz, Project Report, Presentation, Viva-Voce	2013
2698	Professional German for Business-3	LAN2362	German Studies (OE)	Quiz, Project Report, Presentation, Viva-Voce	2013
2699	Professional German for Business-4	LAN2462	German Studies (OE)	Quiz, Project Report, Presentation, Viva-Voce	2013

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
2700	Introduction to German Literature & select socio-cultural aspects of Germany	LAN2562	German Studies (OE)	Quiz, Project Report, Presentation, Viva-Voce	2013
2701	German through activities	LAN2662	German Studies (OE)	Quiz, Project Report, Presentation, Viva-Voce	2013
2702	Introduction to Korean History & Geography	LAN2165	Korean Studies (OE)	Quiz, Project Report, Presentation, Viva-Voce	2018
2703	Korean Cultural Perspectives	LAN2265	Korean Studies (OE)	Quiz, Project Report, Presentation, Viva-Voce	2018
2704	Modern History of Korea & Introduction to Korean Language	LAN2365	Korean Studies (OE)	Quiz, Project Report, Presentation, Viva-Voce	2018
2705	Contemporary Korea	LAN2465	Korean Studies (OE)	Quiz, Project Report, Presentation, Viva-Voce	2018
2706	Polity & Economy of Korea	LAN2565	Korean Studies (OE)	Quiz, Project Report, Presentation, Viva-Voce	2018
2707	Themes in Korean Literature	LAN2665	Korean Studies (OE)	Quiz, Project Report, Presentation, Viva-Voce	2018
2708	Introduction to the French North America- a short history of Quebec	LAN2164	Quebec Studies (OE)	Quiz, Project Report, Presentation, Viva-Voce	2018
2709	Quebec Society Culture & Language	LAN2264	Quebec Studies (OE)	Quiz, Project Report, Presentation, Viva-Voce	2018
2710	Quebec in the World Affairs	LAN2364	Quebec Studies (OE)	Quiz, Project Report, Presentation, Viva-Voce	2018
2711	Political Economy of Quebec	LAN2464	Quebec Studies (OE)	Quiz, Project Report, Presentation, Viva-Voce	2018
2712	Introduction to Major Literary Movements in Quebec-I	LAN2564	Quebec Studies (OE)	Quiz, Project Report, Presentation, Viva-Voce	2018
2713	Introduction to Major Literary Movements in Quebec-II	LAN2664	Quebec Studies (OE)	Quiz, Project Report, Presentation, Viva-Voce	2018
2714	EFE Professional Spanish for Business-I	LAN2163	Spanish Studies (OE)	Quiz, Project Report, Presentation, Viva-Voce	2014
2715	EFE Professional Spanish for Business-II	LAN2263	Spanish Studies (OE)	Quiz, Project Report, Presentation, Viva-Voce	2014
2716	EFE Professional Spanish for Business-III	LAN2363	Spanish Studies (OE)	Quiz, Project Report, Presentation, Viva-Voce	2014
2717	EFE Professional Spanish for Business-IV	LAN2463	Spanish Studies (OE)	Quiz, Project Report, Presentation, Viva-Voce	2014
2718	Introduction to Spanish Literature & select socio-cultural aspects of Spain	LAN2563	Spanish Studies (OE)	Quiz, Project Report, Presentation, Viva-Voce	2014
2719	Spanish through activities	LAN2663	Spanish Studies (OE)	Quiz, Project Report, Presentation, Viva-Voce	2014
2720	Computer Applications	FST2103	Bachelor of Design in Fashion Design	Quiz, Class Performance, Report Writing, Presentation	2015
2721	Pattern Making & Drafting-II	FST2202	Bachelor of Design in Fashion Design	Quiz, Class Performance, Report Writing, Presentation	2015
2722	Garment Construction-I	FST2203	Bachelor of Design in Fashion Design	Quiz, Class Performance, Report Writing, Presentation	2015
2723	Computer Aided Design-I	FST2204	Bachelor of Design in Fashion Design	Quiz, Class Performance, Report Writing, Presentation	2015

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
2724	Fabric Artistry & Embroidery	FST2205	Bachelor of Design in Fashion Design	Quiz, Class Performance, Report Writing, Presentation	2015
2725	Fashion-Business Laws, Ethics & Communication	FST2208	Bachelor of Design in Fashion Design	Quiz, Class Performance, Report Writing, Presentation	2015
2726	Fashion Art Illustration & Model Drawing-III	FST2301	Bachelor of Design in Fashion Design	Quiz, Class Performance, Report Writing, Presentation	2015
2727	Advance Pattern Making-I	FST2302	Bachelor of Design in Fashion Design	Quiz, Class Performance, Report Writing, Presentation	2015
2728	Garment Construction-II	FST2303	Bachelor of Design in Fashion Design	Quiz, Class Performance, Report Writing, Presentation	2015
2729	Apparel Production	FST2306	Bachelor of Design in Fashion Design	Quiz, Class Performance, Report Writing, Presentation	2015
2730	Computer Aided Manufacturing	FST2309	Bachelor of Design in Fashion Design	Quiz, Class Performance, Report Writing, Presentation	2015
2731	Project Presentation	FST2332	Bachelor of Design in Fashion Design	Report Writing, Viva-Voce, Presentation	2015
2732	Fashion Art Illustration & Model Drawing-IV	FST2401	Bachelor of Design in Fashion Design	Quiz, Class Performance, Report Writing, Presentation	2015
2733	Advance Pattern Making-II	FST2402	Bachelor of Design in Fashion Design	Quiz, Class Performance, Report Writing, Presentation	2015
2734	Garment Construction-III	FST2403	Bachelor of Design in Fashion Design	Quiz, Class Performance, Report Writing, Presentation	2015
2735	Computer Aided Design-III	FST2404	Bachelor of Design in Fashion Design	Quiz, Class Performance, Report Writing, Presentation	2015
2736	Visual Merchandising	FST2408	Bachelor of Design in Fashion Design	Quiz, Class Performance, Report Writing, Presentation	2015
2737	Term Paper	FST2431	Bachelor of Design in Fashion Design	Quiz, Written Test	2015
2738	Workshops / Certification (Discipline specific)	FST2433	Bachelor of Design in Fashion Design	Quiz, Written Test	2015
2739	Fashion Art Illustration and Model Drawing-V	FST2501	Bachelor of Design in Fashion Design	Quiz, Class Performance, Report Writing, Presentation	2015
2740	Garment Construction-IV	FST2502	Bachelor of Design in Fashion Design	Quiz, Class Performance, Report Writing, Presentation	2015
2741	Computer Aided Design-IV	FST2503	Bachelor of Design in Fashion Design	Quiz, Class Performance, Report Writing, Presentation	2015
2742	Pattern Draping	FST2504	Bachelor of Design in Fashion Design	Quiz, Class Performance, Report Writing, Presentation	2015
2743	Pattern Grading	FST2505	Bachelor of Design in Fashion Design	Quiz, Class Performance, Report Writing, Presentation	2015
2744	Fashion Merchandizing-II	FST2506	Bachelor of Design in Fashion Design	Quiz, Class Performance, Report Writing, Presentation	2015
2745	Quality Control & Production Management-II	FST2507	Bachelor of Design in Fashion Design	Quiz, Class Performance, Report Writing, Presentation	2015
2746	Fashion Forecasting	FST2508	Bachelor of Design in Fashion Design	Quiz, Class Performance, Report Writing, Presentation	2015
2747	Craft Documentation (Market Visit, Field Trip, Documentation & Presentation, Scope & Final Presentation)	FST2535	Bachelor of Design in Fashion Design	Report Writing, Viva-Voce, Presentation	2015

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
2748	Fashion Promotion	FST2512	Bachelor of Design in Fashion Design	Quiz, Class Performance, Report Writing, Presentation	2015
2749	The Business of Luxury Fashion	FST2513	Bachelor of Design in Fashion Design	Quiz, Class Performance, Report Writing, Presentation	2015
2750	Couture Design	FST2514	Bachelor of Design in Fashion Design	Quiz, Class Performance, Report Writing, Presentation	2015
2751	Retail Merchandising and Management	FST2601	Bachelor of Design in Fashion Design	Quiz, Class Performance, Report Writing, Presentation	2015
2752	Entrepreneurship	FST2604	Bachelor of Design in Fashion Design	Quiz, Class Performance, Report Writing, Presentation	2015
2753	Designing and Development of Fashion Accessories	FST2606	Bachelor of Design in Fashion Design	Quiz, Class Performance, Report Writing, Presentation	2015
2754	Sportswear Design & Development	FST2607	Bachelor of Design in Fashion Design	Quiz, Class Performance, Report Writing, Presentation	2015
2755	Costume Design Pertaining to Performing Arts	FST2608	Bachelor of Design in Fashion Design	Quiz, Class Performance, Report Writing, Presentation	2015
2756	Functions of Indian Buying Houses / Agents - A Study	FST2609	Bachelor of Design in Fashion Design	Quiz, Class Performance, Report Writing, Presentation	2015
2757	Field Trip / Visit Documentation Evaluation	FST2702	Bachelor of Design in Fashion Design	Report Writing, Viva-Voce, Presentation	2015
2758	Computer Aided Design-V	FST2703	Bachelor of Design in Fashion Design	Quiz, Class Performance, Report Writing, Presentation	2015
2759	Graduate Design Collection	FST2704	Bachelor of Design in Fashion Design	Quiz, Class Performance, Report Writing, Presentation	2015
2760	Graduation Project	FST2837	Bachelor of Design in Fashion Design	Report Writing, Viva-Voce, Presentation	2015
2761	Technical Drawing & Illustrations	IND2202	Bachelor of Interior Design	Quiz, Class Performance, Report Writing, Presentation	2015
2762	Design Studio-II (Photography & Videography)	IND2204	Bachelor of Interior Design	Quiz, Class Performance, Report Writing, Presentation	2015
2763	Typography Exploration	IND2207	Bachelor of Interior Design	Quiz, Class Performance, Report Writing, Presentation	2015
2764	Introduction to Prototyping Techniques	IND2208	Bachelor of Interior Design	Quiz, Class Performance, Report Writing, Presentation	2015
2765	Seminar or Guest Lecture or Workshop for Skill Development	IND2233	Bachelor of Interior Design	Quiz, Written Test	2015
2766	Interior Design Materials & Applications	IND2302	Bachelor of Interior Design	Quiz, Class Performance, Report Writing, Presentation	2015
2767	Elements of Interior Space Planning & Scaling	IND2303	Bachelor of Interior Design	Quiz, Class Performance, Report Writing, Presentation	2015
2768	Lighting & Colour in Interiors	IND2307	Bachelor of Interior Design	Quiz, Class Performance, Report Writing, Presentation	2015
2769	Interior Design Studio-I	IND2309	Bachelor of Interior Design	Quiz, Class Performance, Report Writing, Presentation	2015
2770	Interior Workshop Practice-I	IND2310	Bachelor of Interior Design	Quiz, Written Test	2015
2771	Advanced Interior Design Materials & Applications	IND2402	Bachelor of Interior Design	Quiz, Class Performance, Report Writing, Presentation	2015
2772	Estimation, Costing & Project Management	IND2404	Bachelor of Interior Design	Quiz, Class Performance, Report Writing, Presentation	2015

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
2773	Interior Design Studio-II	IND2406	Bachelor of Interior Design	Quiz, Class Performance, Report Writing, Presentation	2015
2774	Interior Workshop Practice-II	IND2407	Bachelor of Interior Design	Quiz, Written Test	2015
2775	Seminar or Guest Lecture or Workshop for Skill Development	IND2433	Bachelor of Interior Design	Quiz, Written Test	2015
2776	Design Thinking & Creative Problem Solving #	IND2501	Bachelor of Interior Design	Quiz, Class Performance, Report Writing, Presentation	2015
2777	Revitalization of Arts & Crafts	IND2502	Bachelor of Interior Design	Quiz, Class Performance, Report Writing, Presentation	2015
2778	Interior Safety Systems & Building Management	IND2503	Bachelor of Interior Design	Quiz, Class Performance, Report Writing, Presentation	2015
2779	Textile in Interiors	IND2504	Bachelor of Interior Design	Quiz, Class Performance, Report Writing, Presentation	2015
2780	Interior Design Studio-III	IND2506	Bachelor of Interior Design	Quiz, Class Performance, Report Writing, Presentation	2015
2781	Computer Aided Interior Design & Drafting	IND2507	Bachelor of Interior Design	Quiz, Class Performance, Report Writing, Presentation	2015
2782	Interior Space Modeling Workshop-I	IND2508	Bachelor of Interior Design	Quiz, Class Performance, Report Writing, Presentation	2015
2783	Integrated Project Work	IND2532	Bachelor of Interior Design	Report Writing, Presentation, Viva-Voce	2015
2784	Marketing & Entrepreneurship Development	IND2602	Bachelor of Interior Design	Quiz, Class Performance, Report Writing, Presentation	2015
2785	Professional Practice & Office Management	IND2603	Bachelor of Interior Design	Quiz, Class Performance, Report Writing, Presentation	2015
2786	Interior Design Studio-IV	IND2604	Bachelor of Interior Design	Quiz, Class Performance, Report Writing, Presentation	2015
2787	Computer Aided Interior Design & Visualization	IND2605	Bachelor of Interior Design	Quiz, Class Performance, Report Writing, Presentation	2015
2788	Interior Space Modeling Workshop-II	IND2606	Bachelor of Interior Design	Quiz, Written Test	2015
2789	Seminar or Guest Lecture or Workshop for Skill Development	IND2633	Bachelor of Interior Design	Quiz, Written Test	2015
2790	Furniture Ergonomics & Design	IND2607	Bachelor of Interior Design	Quiz, Class Performance, Report Writing, Presentation	2015
2791	Furniture Construction and Detailing	IND2609	Bachelor of Interior Design	Quiz, Class Performance, Report Writing, Presentation	2015
2792	Sustainable Interior Design& Materials	IND2610	Bachelor of Interior Design	Quiz, Class Performance, Report Writing, Presentation	2015
2793	Design Research Methods & Presentation Techniques	IND2702	Bachelor of Interior Design	Quiz, Class Performance, Report Writing, Presentation	2015
2794	Seminar	IND2733	Bachelor of Interior Design	Quiz, Written Test	2015
2795	Interior Design Portfolio Development	IND2736	Bachelor of Interior Design	Quiz, Class Performance, Report Writing, Presentation	2015
2796	Interior Design Dissertation	IND2737	Bachelor of Interior Design	Report Writing, Presentation, Viva-Voce	2015
2797	Training & Onsite Learning	IND2837	Bachelor of Interior Design	Report Writing, Presentation, Viva-Voce	2015
2798	Fashion Art Illustration and Model Drawing	FDT2151	Fashion Management (OE)	Quiz, Class Performance, Report Writing, Presentation	2013

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
2799	Fashion Theory	FDT2251	Fashion Management (OE)	Quiz, Class Performance, Report Writing, Presentation	2013
2800	Computer Aided Manufacturing	FDT2351	Fashion Management (OE)	Quiz, Class Performance, Report Writing, Presentation	2013
2801	Fashion Management	FDT2451	Fashion Management (OE)	Quiz, Class Performance, Report Writing, Presentation	2013
2802	Fashion Forecasting	FDT2551	Fashion Management (OE)	Quiz, Class Performance, Report Writing, Presentation	2013
2803	Fashion Retailing & Visual Merchandising	FDT2651	Fashion Management (OE)	Quiz, Class Performance, Report Writing, Presentation	2016
2804	Introduction to Apparel Merchandising	VFD2151	Apparel Merchandising (OE)	Quiz, Class Performance, Report Writing, Presentation	2016
2805	Apparel Market Research & Product Analysis	VFD2251	Apparel Merchandising (OE)	Quiz, Class Performance, Report Writing, Presentation	2016
2806	Vendor Management & Product Evaluation	VFD2351	Apparel Merchandising (OE)	Quiz, Class Performance, Report Writing, Presentation	2016
2807	Prototype Preparation & Merchandise Plan	VFD2451	Apparel Merchandising (OE)	Quiz, Class Performance, Report Writing, Presentation	2016
2808	Pre-Production Management	VFD2551	Apparel Merchandising (OE)	Quiz, Class Performance, Report Writing, Presentation	2016
2809	Shipment & Documentation Management	VFD2651	Apparel Merchandising (OE)	Quiz, Class Performance, Report Writing, Presentation	2016
2810	Design Eco-System	VFD2152	Fashion Design (OE)	Quiz, Class Performance, Report Writing, Presentation	2016
2811	Fashion Design Research	VFD2252	Fashion Design (OE)	Report Writing, Viva-Voce, Presentation	2016
2812	Design Preparatory Process	VFD2352	Fashion Design (OE)	Quiz, Class Performance, Report Writing, Presentation	2016
2813	Prototype Garment Development	VFD2452	Fashion Design (OE)	Quiz, Class Performance, Report Writing, Presentation	2016
2814	Design Development	VFD2552	Fashion Design (OE)	Quiz, Class Performance, Report Writing, Presentation	2016
2815	Health & Safety Equilibrium	VFD2652	Fashion Design (OE)	Quiz, Class Performance, Report Writing, Presentation	2016
2816	Drawing-I	FNA2101	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
2817	Geometrical Drawing & Perspective-I	FNA2102	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
2818	Design-I	FNA2103	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
2819	Painting-I	FNA2104	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
2820	Sculpture-I	FNA2105	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
2821	Print Making-I	FNA2106	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
2822	Visual Graphics-I	FNA2108	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
2823	Photography-I	FNA2109	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
2824	Drawing-II	FNA2201	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
2825	Geometrical Drawing & Perspective-II	FNA2202	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
2826	Design-II	FNA2203	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
2827	Painting-II	FNA2204	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
2828	Sculpture-II	FNA2205	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
2829	Print Making-II	FNA2206	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
2830	Visual Graphics-II	FNA2208	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
2831	Photography-II	FNA2209	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
2832	Summer Project Evaluation-I	FNA2335	Bachelor of Fine Arts	Report Writing, Presentation, Viva-Voce	2011
2833	Composition -I	FNA2304	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
2834	Carving-I	FNA2305	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
2835	Mural-I	FNA2306	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
2836	Photography-I	FNA2307	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
2837	Ceramics-I	FNA2308	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
2838	Assemblage-I	FNA2309	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
2839	Sculpture Methods & Materials - I	FNA2310	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
2840	Drawing & Illustration-I	FNA2311	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
2841	Design-III	FNA2312	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
2842	Lettering & Typography-I	FNA2313	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
2843	Photography-III	FNA2314	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
2844	Printing Techniques-I	FNA2315	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
2845	Computer Graphic-I	FNA2316	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
2846	Drawing-III	FNA2318	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
2847	Painting-III	FNA2319	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
2848	Composition-I	FNA2320	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
2849	Photography-III	FNA2321	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
2850	Print Making-III	FNA2322	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
2851	Computer Graphic-I	FNA2323	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
2852	Painting Methods & Materials-I	FNA2324	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
2853	Composition- II	FNA2404	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
2854	Carving- II	FNA2405	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
2855	Mural - II	FNA2406	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
2856	Photography - II	FNA2407	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
2857	Ceramics - II	FNA2408	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
2858	Assemblage - II	FNA2409	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
2859	Sculpture Methods & Materials - II	FNA2410	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
2860	Drawing & Illustration - II	FNA2411	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
2861	Design - IV	FNA2412	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
2862	Lettering & Typography - II	FNA2413	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
2863	Computer Graphics - II	FNA2414	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
2864	Printing Techniques - II	FNA2415	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
2865	Drawing - IV	FNA2417	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
2866	Painting - IV	FNA2418	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
2867	Composition - II	FNA2419	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
2868	Mural - I	FNA2420	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
2869	Print Making - II	FNA2421	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
2870	Painting Methods & Materials - II	FNA2422	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
2871	Practical Training - I (Evaluation)	FNA2535	Bachelor of Fine Arts	Report Writing, Presentation, Viva-Voce	2011
2872	Study from Life - III	FNA2503	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
2873	Composition - III	FNA2504	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
2874	Metal Casting - I	FNA2505	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
2875	Mural - III	FNA2506	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
2876	Photography - III	FNA2507	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
2877	Ceramics - III	FNA2508	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
2878	Assemblage - III	FNA2509	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
2879	Sculpture Methods & Materials - III	FNA2510	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
2880	Drawing & Illustration - III	FNA2511	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
2881	Design - V	FNA2512	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
2882	Packaging - I	FNA2513	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
2883	Computer Graphics - III	FNA2514	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
2884	Printing Techniques - III	FNA2515	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
2885	Textile Design - I	FNA2516	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
2886	Drawing - V	FNA2518	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
2887	Painting - V	FNA2519	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
2888	Composition - III	FNA2520	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
2889	Photography - III	FNA2521	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
2890	Print Making - III	FNA2522	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
2891	Traditional Painting - I	FNA2523	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
2892	Painting Methods & Materials - III	FNA2524	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
2893	Study Abroad	FNA2534	Bachelor of Fine Arts	Written Test, Country Report	2011
2894	Project - I	FNA2532	Bachelor of Fine Arts	Project writing, Presentation, Viva-Voce	2011
2895	Dissertation-I	FNA2637	Bachelor of Fine Arts	Report Writing, Presentation, Viva-Voce	2011
2896	Composition - IV	FNA2604	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
2897	Metal Casting - II	FNA2605	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
2898	Mural - IV	FNA2606	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
2899	Photography - IV	FNA2607	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
2900	Ceramics - IV	FNA2608	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
2901	Assemblage - IV	FNA2609	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
2902	Sculpture Methods & Materials - IV	FNA2610	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
2903	Drawing & Illustration - IV	FNA2611	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
2904	Design-VI	FNA2612	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
2905	Packaging-II	FNA2613	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
2906	Printing Techniques-IV	FNA2614	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
2907	Computer Graphics - IV	FNA2615	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
2908	Textile Design - II	FNA2616	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
2909	Drawing - VI	FNA2618	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
2910	Painting - VI	FNA2619	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
2911	Composition - IV	FNA2620	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
2912	Mural - II	FNA2621	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
2913	Print Making - II	FNA2622	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
2914	Painting Methods & Materials - IV	FNA2623	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
2915	Study Abroad	FNA2634	Bachelor of Fine Arts	Written Test, Country Report	2011
2916	Traditional Artwork	FNA2630	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
2917	Practical Training Evaluation-II	FNA2735	Bachelor of Fine Arts	Report Writing, Presentation, Viva-Voce	2011
2918	Composition - V	FNA2703	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
2919	Metal Casting - III	FNA2704	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
2920	Mural - V	FNA2705	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
2921	Photography -V	FNA2706	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
2922	Ceramics - V	FNA2707	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
2923	Assemblage - V	FNA2708	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
2924	Sculpture Methods & Materials - V	FNA2709	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
2925	Design - VII	FNA2710	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
2926	Packaging - III	FNA2711	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
2927	Drawing & Illustration - V	FNA2712	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
2928	Computer Graphics - V	FNA2713	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
2929	Photography - V	FNA2714	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
2930	Drawing - VII	FNA2716	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
2931	Painting & Composition - I	FNA2717	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
2932	Mural - III	FNA2718	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
2933	Print Making - III	FNA2719	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
2934	Painting Methods & Materials - V	FNA2720	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
2935	Project- II	FNA2732	Bachelor of Fine Arts	Project writing, Presentation, Viva-Voce	2011
2936	Workshops/Certification/Exhibition (Discipline specific)	FNA2733	Bachelor of Fine Arts	Quiz, Written Test	2011
2937	Portfolio Development & Presentation with exhibitions	FNA2837	Bachelor of Fine Arts	Report Writing, Presentation, Viva-Voce	2011
2938	Composition - VI	FNA2803	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
2939	Metal Casting - IV	FNA2804	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
2940	Mural - IV	FNA2805	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
2941	Photography – IV	FNA2806	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
2942	Ceramics - IV	FNA2807	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
2943	Assemblage - IV	FNA2808	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
2944	Sculpture Methods & Materials - IV	FNA2809	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
2945	Design - VIII	FNA2810	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
2946	Packaging - IV	FNA2811	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
2947	Drawing & Illustration - VI	FNA2812	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
2948	Computer Graphics - VI	FNA2813	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
2949	Photography - VI	FNA2814	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
2950	Drawing - VIII	FNA2816	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
2951	Painting & Composition - II	FNA2817	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
2952	Mural - IV	FNA2818	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
2953	Print Making - IV	FNA2819	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
2954	Painting Methods & Materials - VI	FNA2820	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
2955	Visualization - I	FNA4101	Master of Fine Arts	Practical, Report Writing, Class Performance	2011
2956	Graphic Designing – I	FNA4102	Master of Fine Arts	Practical, Report Writing, Class Performance	2011
2957	TV Graphics – I	FNA4103	Master of Fine Arts	Practical, Report Writing, Class Performance	2011
2958	Illustration - I	FNA4104	Master of Fine Arts	Practical, Report Writing, Class Performance	2011
2959	Drawing - I	FNA4106	Master of Fine Arts	Practical, Report Writing, Class Performance	2011
2960	Creative Painting - I	FNA4107	Master of Fine Arts	Practical, Report Writing, Class Performance	2011
2961	Mural (Painting) - I	FNA4108	Master of Fine Arts	Practical, Report Writing, Class Performance	2011
2962	Portraiture - I	FNA4109	Master of Fine Arts	Practical, Report Writing, Class Performance	2011
2963	Creative Drawing - I	FNA4111	Master of Fine Arts	Practical, Report Writing, Class Performance	2011
2964	Portraiture Sculpture- I	FNA4113	Master of Fine Arts	Practical, Report Writing, Class Performance	2011
2965	Mural (Sculpture)- I	FNA4114	Master of Fine Arts	Practical, Report Writing, Class Performance	2011
2966	Creative Sculpture-I	FNA4115	Master of Fine Arts	Practical, Report Writing, Class Performance	2011
2967	Report & Viva (Specialization Specific)	FNA4237	Master of Fine Arts	Report Writing, Presentation, Viva-Voce	2011
2968	Visualization - II	FNA4201	Master of Fine Arts	Practical, Report Writing, Class Performance	2011
2969	Graphic Designing - II	FNA4202	Master of Fine Arts	Practical, Report Writing, Class Performance	2011
2970	TV Graphics - II	FNA4203	Master of Fine Arts	Practical, Report Writing, Class Performance	2011
2971	Illustration - II	FNA4204	Master of Fine Arts	Practical, Report Writing, Class Performance	2011
2972	Drawing -II	FNA4206	Master of Fine Arts	Practical, Report Writing, Class Performance	2011
2973	Creative Painting - II	FNA4207	Master of Fine Arts	Practical, Report Writing, Class Performance	2011

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
2974	Mural (Painting) - II	FNA4208	Master of Fine Arts	Practical, Report Writing, Class Performance	2011
2975	Portraiture - II	FNA4209	Master of Fine Arts	Practical, Report Writing, Class Performance	2011
2976	Creative Drawing -II	FNA4211	Master of Fine Arts	Practical, Report Writing, Class Performance	2011
2977	Portraiture Sculpture- II	FNA4212	Master of Fine Arts	Practical, Report Writing, Class Performance	2011
2978	Mural (Sculpture) - II	FNA4213	Master of Fine Arts	Practical, Report Writing, Class Performance	2011
2979	Creative Sculpture- II	FNA4214	Master of Fine Arts	Practical, Report Writing, Class Performance	2011
2980	Dissertation & Viva (Specialization Specific)-I	FNA4337	Master of Fine Arts	Report Writing, Presentation, Viva-Voce	2011
2981	Visualization - III	FNA4301	Master of Fine Arts	Practical, Report Writing, Class Performance	2011
2982	Graphic Designing-III	FNA4302	Master of Fine Arts	Practical, Report Writing, Class Performance	2011
2983	TV Graphics - III	FNA4303	Master of Fine Arts	Practical, Report Writing, Class Performance	2011
2984	Illustration - III	FNA4304	Master of Fine Arts	Practical, Report Writing, Class Performance	2011
2985	Drawing – III	FNA4306	Master of Fine Arts	Practical, Report Writing, Class Performance	2011
2986	Creative Painting - III	FNA4307	Master of Fine Arts	Practical, Report Writing, Class Performance	2011
2987	Mural Painting - III	FNA4308	Master of Fine Arts	Practical, Report Writing, Class Performance	2011
2988	Portraiture - III	FNA4309	Master of Fine Arts	Practical, Report Writing, Class Performance	2011
2989	Art Criticism (Painting) - I	FNA4310	Master of Fine Arts	Practical, Report Writing, Class Performance	2011
2990	Creative Sculpture - III	FNA4311	Master of Fine Arts	Practical, Report Writing, Class Performance	2011
2991	Portraiture Sculpture - III	FNA4312	Master of Fine Arts	Practical, Report Writing, Class Performance	2011
2992	Mural (Sculpture) - III	FNA4313	Master of Fine Arts	Practical, Report Writing, Class Performance	2011
2993	Art Criticism (Sculpture) - I	FNA4315	Master of Fine Arts	Practical, Report Writing, Class Performance	2011
2994	Dissertation & Viva (Specialization Specific) - II	FNA4437	Master of Fine Arts	Report Writing, Presentation, Viva-Voce	2011
2995	Visualization - IV	FNA4401	Master of Fine Arts	Practical, Report Writing, Class Performance	2011
2996	Graphic Designing - IV	FNA4402	Master of Fine Arts	Practical, Report Writing, Class Performance	2011
2997	TV Graphics - IV	FNA4403	Master of Fine Arts	Practical, Report Writing, Class Performance	2011
2998	Illustration - IV	FNA4404	Master of Fine Arts	Practical, Report Writing, Class Performance	2011

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
2999	Drawing - IV	FNA4406	Master of Fine Arts	Practical, Report Writing, Class Performance	2011
3000	Creative Painting - IV	FNA4407	Master of Fine Arts	Practical, Report Writing, Class Performance	2011
3001	Mural (Painting) - IV	FNA4408	Master of Fine Arts	Practical, Report Writing, Class Performance	2011
3002	Portraiture - IV	FNA4409	Master of Fine Arts	Practical, Report Writing, Class Performance	2011
3003	Art Criticism (Painting) - II	FNA4410	Master of Fine Arts	Practical, Report Writing, Class Performance	2011
3004	Creative Drawing - IV	FNA4411	Master of Fine Arts	Practical, Report Writing, Class Performance	2011
3005	Portraiture Sculpture - IV	FNA4412	Master of Fine Arts	Practical, Report Writing, Class Performance	2011
3006	Mural (Sculpture) - IV	FNA4413	Master of Fine Arts	Practical, Report Writing, Class Performance	2011
3007	Creative Sculpture - II	FNA4414	Master of Fine Arts	Practical, Report Writing, Class Performance	2011
3008	Art Criticism (Sculpture) - II	FNA4415	Master of Fine Arts	Practical, Report Writing, Class Performance	2011
3009	Basics of Drawing and Asian Landscape	FNA2151	Painting Arts (OE)	Practical, Report Writing, Class Performance	2013
3010	Basics of Drawing and Monochrome Folk Composition	FNA2251	Painting Arts (OE)	Practical, Report Writing, Class Performance	2013
3011	Advanced Drawing and Illustration of Indian Temple Sculpture	FNA2351	Painting Arts (OE)	Practical, Report Writing, Class Performance	2013
3012	Advanced Drawing with Ink with brush Illustration	FNA2451	Painting Arts (OE)	Practical, Report Writing, Class Performance	2013
3013	Advanced Drawing and Illustration with Mural Art	FNA2551	Painting Arts (OE)	Practical, Report Writing, Class Performance	2013
3014	Advanced Drawing and Illustration with Visual Design	FNA2651	Painting Arts (OE)	Practical, Report Writing, Class Performance	2013
3015	Legal Method	LAW2104	B.A., LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3016	Law of Contract-I	LAW2105	B.A., LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3017	Micro Economics-I	LAW2106	B.A., LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3018	Law of Contract-II	LAW2204	B.A., LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3019	Micro Economics-II	LAW2205	B.A., LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3020	Macro Economics-I	LAW2302	B.A., LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3021	Constitutional Law-I	LAW2303	B.A., LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3022	Law of Crimes-I (Indian Penal Code Section-1 to 120B)	LAW2304	B.A., LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3023	Family Law-I	LAW2305	B.A., LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
3024	Code of Criminal Procedure	LAW2311	B.A., LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3025	Summer Internship Evaluation-I	LAW2335	B.A., LLB (Hons.)	Report Writing, Presentation, Viva-Voce	2012
3026	Macro Economics-II	LAW2402	B.A., LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3027	Constitutional Law-II	LAW2403	B.A., LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3028	Administrative Law	LAW2404	B.A., LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3029	Family Law-II	LAW2405	B.A., LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3030	Law of Crimes-II (Indian Penal Code Section 121-511)	LAW2406	B.A., LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3031	Law of Evidence	LAW2502	B.A., LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3032	Code of Civil Procedure	LAW2503	B.A., LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3033	Labour Law-I	LAW2504	B.A., LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3034	Property Law	LAW2505	B.A., LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3035	Summer Internship Evaluation-II	LAW2535	B.A., LLB (Hons.)	Report Writing, Presentation, Viva-Voce	2012
3036	Company Law	LAW2603	B.A., LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3037	Law of Torts (Motor Vehicles Act & Consumer Protection Act, 1986)	LAW2604	B.A., LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3038	Labour Law - II	LAW2605	B.A., LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3039	Cyber Laws	LAW2606	B.A., LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3040	Environmental Law	LAW2702	B.A., LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3041	Jurisprudence	LAW2703	B.A., LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3042	Public International Law	LAW2704	B.A., LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3043	Arbitration & Alternate Dispute Resolution	LAW2705	B.A., LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3044	Summer Internship Evaluation-III	LAW2735	B.A., LLB (Hons.)	Report Writing, Presentation, Viva-Voce	2012
3045	Human Rights Law	LAW2701	B.A., LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3046	Forensic Science-I	LAW2707	B.A., LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3047	Offences against Child & Juvenile Offence Human Rights Law	LAW2708	B.A., LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3048	Law and Medicine-I	LAW2709	B.A., LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012

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3049	Military Law	LAW2710	B.A., LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3050	Taxation Law	LAW2802	B.A., LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3051	Interpretation of Statutes	LAW2803	B.A., LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3052	International Trade Law	LAW2804	B.A., LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3053	Land Laws	LAW2805	B.A., LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3054	Women & Criminal Law	LAW2806	B.A., LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3055	Probation & Parole	LAW2807	B.A., LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3056	Forensic Science-II	LAW2808	B.A., LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3057	Law and Medicine-II	LAW2809	B.A., LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3058	Medical Jurisprudence	LAW2810	B.A., LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3059	Intellectual Property Rights	LAW2902	B.A., LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3060	Law Poverty & Development	LAW2903	B.A., LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3061	Professional Ethics	LAW2904	B.A., LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3062	Summer Internship Evaluation-IV	LAW2935	B.A., LLB (Hons.)	Report Writing, Presentation, Viva-Voce	2012
3063	Private International Law	LAW2905	B.A., LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3064	Election Law	LAW2906	B.A., LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3065	Banking & Insurance Laws	LAW2907	B.A., LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3066	International Humanitarian & Refugee Law	LAW2908	B.A., LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3067	Corruption Laws	LAW2911	B.A., LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3068	Moot Court / Internship	LAW2003	B.A., LLB (Hons.)	Report Writing, Presentation, Viva-Voce	2012
3069	Dissertation	LAW2037	B.A., LLB (Hons.)	Report Writing, Presentation, Viva-Voce	2012
3070	Legal Method	LAW2104	B.Com, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3071	Law of Contract-I	LAW2105	B.Com, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3072	Financial Accounting-I	LAW2107	B.Com, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3073	Readings in Management	MGT2130	B.Com, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012

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1.1.3 Total number of courses having focus on employability/ entrepreneurship / skill development offered during the year (2022)

Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
3074	Term Paper	COM2131	B.Com, LLB (Hons.)	Academic Writing, Presentation	2012
3075	Project (with Presentation & Evaluation)	COM2132	B.Com, LLB (Hons.)	Project writing, Presentation, Viva-Voce	2012
3076	Workshop / Certification (Discipline Specific) (1credit per workshop)	COM2133	B.Com, LLB (Hons.)	Quiz, Written Test	2012
3077	Study Abroad	COM2134	B.Com, LLB (Hons.)	Written Test, Country Report	2012
3078	Law of Contract-II	LAW2204	B.Com, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3079	Financial Accounting-II	LAW2206	B.Com, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3080	Computer Applications in Business	COM2204	B.Com, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3081	Human Values & Professional Ethics	MGT2206	B.Com, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3082	Readings in Management	MGT2230	B.Com, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3083	Term Paper	COM2231	B.Com, LLB (Hons.)	Academic Writing, Presentation	2012
3084	Project(with Presentation &Evaluation)	COM2232	B.Com, LLB (Hons.)	Project writing, Presentation, Viva-Voce	2012
3085	Workshop/ Certification (Discipline Specific) (1credit per workshop)	COM2233	B.Com, LLB (Hons.)	Quiz, Written Test	2012
3086	Study Abroad	COM2234	B.Com, LLB (Hons.)	Written Test, Country Report	2012
3087	Constitutional Law-I	LAW2303	B.Com, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3088	Law of Crimes-I (Indian Penal Code Section-1 to 120B)	LAW2304	B.Com, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3089	Family Law-I	LAW2305	B.Com, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3090	Corporate Accounting	LAW2307	B.Com, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3091	Statistical Methods in Research-I	LAW2308	B.Com, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3092	Code of Criminal Procedure	LAW2311	B.Com, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3093	Summer Internship Evaluation-I	LAW2335	B.Com, LLB (Hons.)	Report Writing, Presentation, Viva-Voce	2012
3094	Constitutional Law-II	LAW2403	B.Com, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3095	Administrative Law	LAW2404	B.Com, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3096	Family Law-II	LAW2405	B.Com, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3097	Law of Crimes-II (Indian Penal Code Section 121-511)	LAW2406	B.Com, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3098	Statistical Methods in Research-II	LAW2408	B.Com, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3099	Law of Evidence	LAW2502	B.Com, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
3100	Code of Civil Procedure	LAW2503	B.Com, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3101	Labour Law-I	LAW2504	B.Com, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3102	Property Law	LAW2505	B.Com, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3103	Cost Accounting	LAW2507	B.Com, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3104	Macro Economics	LAW2508	B.Com, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3105	Summer Internship Evaluation-II	LAW2535	B.Com, LLB (Hons.)	Report Writing, Presentation, Viva-Voce	2012
3106	Advanced Corporate Accounting	COM2503	B.Com, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3107	Corporate Tax Law and Practice	COM2504	B.Com, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3108	Business Taxation	COM2505	B.Com, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3109	Company Law	LAW2603	B.Com, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3110	Law of Torts (Motor Vehicles Act & Consumer Protection Act, 1986)	LAW2604	B.Com, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3111	Labour Law-II	LAW2605	B.Com, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3112	Cyber Laws	LAW2606	B.Com, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3113	Management Accounting	LAW2607	B.Com, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3114	Advanced Cost Accounting	COM2603	B.Com, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3115	Indirect Taxes including GST	COM2604	B.Com, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3116	Public Finance and Tax Practices	COM2605	B.Com, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3117	Environmental Law	LAW2702	B.Com, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3118	Jurisprudence	LAW2703	B.Com, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3119	Public International Law	LAW2704	B.Com, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3120	Summer Internship Evaluation-III	LAW2735	B.Com, LLB (Hons.)	Report Writing, Presentation, Viva-Voce	2012
3121	Human Rights Law	LAW2701	B.Com, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3122	Forensic Science-I	LAW2707	B.Com, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3123	Offences against Child & Juvenile Offence Human Rights Law	LAW2708	B.Com, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3124	Law and Medicine-I	LAW2709	B.Com, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
3125	Military Law	LAW2710	B.Com, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3126	Taxation Law	LAW2802	B.Com, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3127	Land Laws	LAW2805	B.Com, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3128	Investment & Competition Law	LAW2801	B.Com, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3129	Women & Criminal Law	LAW2806	B.Com, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3130	Probation & Parole	LAW2807	B.Com, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3131	Forensic Science-II	LAW2808	B.Com, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3132	Law and Medicine-II	LAW2809	B.Com, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3133	Medical Jurisprudence	LAW2810	B.Com, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3134	Intellectual Property Rights	LAW2902	B.Com, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3135	Law Poverty & Development	LAW2903	B.Com, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3136	Professional Ethics	LAW2904	B.Com, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3137	Summer Internship Evaluation-IV	LAW2935	B.Com, LLB (Hons.)	Report Writing, Presentation, Viva-Voce	2012
3138	Private International Law	LAW2905	B.Com, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3139	Election Law	LAW2906	B.Com, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3140	Banking & Insurance Laws	LAW2907	B.Com, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3141	International Humanitarian & Refugee Law	LAW2908	B.Com, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3142	Criminology & Victimology	LAW2909	B.Com, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3143	Corruption Laws	LAW2911	B.Com, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3144	Moot Court / Internship	LAW2003	B.Com, LLB (Hons.)	Report Writing, Presentation, Viva-Voce	2012
3145	Dissertation	LAW2037	B.Com, LLB (Hons.)	Report Writing, Presentation, Viva-Voce	2012
3146	Legal Methods	LAW2104	BBA, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3147	Law of Contract-I	LAW2105	BBA, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3148	Financial Accounting	LAW2110	BBA, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3149	E-Commerce	COM2103	BBA, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
3150	Economic System and Society	ECO2104	BBA, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3151	Readings in Management	MGT2130	BBA, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3152	Term Paper	MGT2131	BBA, LLB (Hons.)	Academic Writing, Presentation	2012
3153	Project (with Presentation & Evaluation)	MGT2132	BBA, LLB (Hons.)	Project writing, Presentation, Viva-Voce	2012
3154	Workshop / Certification (Discipline Specific) (1credit per workshop)	MGT2133	BBA, LLB (Hons.)	Quiz, Written Test	2012
3155	Study Abroad	MGT2134	BBA, LLB (Hons.)	Written Test, Country Report	2012
3156	Law of Contract-II	LAW2204	BBA, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3157	Analysis & Design of Business System	MGT2204	BBA, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3158	Innovation & Creativity Management	MGT2205	BBA, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3159	Human Values & Professional Ethics	MGT2206	BBA, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3160	Readings in Management	MGT2230	BBA, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3161	Term Paper	MGT2231	BBA, LLB (Hons.)	Academic Writing, Presentation	2012
3162	Project (with Presentation & Evaluation)	MGT2232	BBA, LLB (Hons.)	Project writing, Presentation, Viva-Voce	2012
3163	Workshop / Certification (Discipline Specific) (1credit per workshop)	MGT2233	BBA, LLB (Hons.)	Quiz, Written Test	2012
3164	Study Abroad	MGT2234	BBA, LLB (Hons.)	Written Test, Country Report	2012
3165	Constitutional Law-I	LAW2303	BBA, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3166	Law of Crimes - I (Indian Penal Code Section-1 to 120B)	LAW2304	BBA, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3167	Family Law-I	LAW2305	BBA, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3168	Code of Criminal Procedure	LAW2311	BBA, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3169	Summer Internship Evaluation-I	LAW2335	BBA, LLB (Hons.)	Report Writing, Presentation, Viva-Voce	2012
3170	Industrial Psychology	MGT2305	BBA, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3171	Term Paper	MGT2331	BBA, LLB (Hons.)	Academic Writing, Presentation	2012
3172	Project (with Presentation & Evaluation)	MGT2332	BBA, LLB (Hons.)	Project writing, Presentation, Viva-Voce	2012
3173	Workshop / Certification (Discipline Specific) (1credit per workshop)	MGT2333	BBA, LLB (Hons.)	Quiz, Written Test	2012
3174	Study Abroad	MGT2334	BBA, LLB (Hons.)	Written Test, Country Report	2012
3175	Constitutional Law – II	LAW2403	BBA, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
3176	Administrative Law	LAW2404	BBA, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3177	Family Law - II	LAW2405	BBA, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3178	Law of Crimes - II (Indian Penal Code Section 121-511)	LAW2406	BBA, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3179	Research Methodology & Report Preparation	LAW2410	BBA, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3180	Business Information & Database System	MGT2404	BBA, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3181	Personal Financial Planning	MGT2405	BBA, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3182	Term Paper	MGT2431	BBA, LLB (Hons.)	Academic Writing, Presentation	2012
3183	Project (with Presentation & Evaluation)	MGT2432	BBA, LLB (Hons.)	Project writing, Presentation, Viva-Voce	2012
3184	Workshop / Certification (Discipline Specific) (1credit per workshop)	MGT2433	BBA, LLB (Hons.)	Quiz, Written Test	2012
3185	Study Abroad	MGT2434	BBA, LLB (Hons.)	Written Test, Country Report	2012
3186	Law of Evidence	LAW2502	BBA, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3187	Code of Civil Procedure	LAW2503	BBA, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3188	Labour Law - I	LAW2504	BBA, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3189	Property Law	LAW2505	BBA, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3190	Summer Internship Evaluation-II	LAW2535	BBA, LLB (Hons.)	Report Writing, Presentation, Viva-Voce	2012
3191	Term Paper	MGT2531	BBA, LLB (Hons.)	Academic Writing, Presentation	2012
3192	Project (with Presentation & Evaluation)	MGT2532	BBA, LLB (Hons.)	Project writing, Presentation, Viva-Voce	2012
3193	Workshop / Certification (Discipline Specific) (1credit per workshop)	MGT2533	BBA, LLB (Hons.)	Quiz, Written Test	2012
3194	Study Abroad	MGT2534	BBA, LLB (Hons.)	Written Test, Country Report	2012
3195	Training & Development	MGT2510	BBA, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3196	Company Law	LAW2603	BBA, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3197	Law of Torts (Motor Vehicles Act & Consumer Protection Act, 1986)	LAW2604	BBA, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3198	Labour Law -II	LAW2605	BBA, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3199	Cyber Laws	LAW2606	BBA, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3200	Brand Management	MGT2602	BBA, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3201	Advertising & Sales Promotion	MGT2603	BBA, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
3202	Term Paper	MGT2631	BBA, LLB (Hons.)	Academic Writing, Presentation	2012
3203	Project (with Presentation & Evaluation)	MGT2632	BBA, LLB (Hons.)	Project writing, Presentation, Viva-Voce	2012
3204	Workshop / Certification (Discipline Specific) (1credit per workshop)	MGT2633	BBA, LLB (Hons.)	Quiz, Written Test	2012
3205	Corporate Tax Planning	MGT2605	BBA, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3206	Banking & Financial Institutions	MGT2606	BBA, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3207	Advanced Corporate Finance	MGT2607	BBA, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3208	Industrial Relations & Labour Law	MGT2608	BBA, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3209	Performance Management System	MGT2609	BBA, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3210	Compensation & Reward Management	MGT2610	BBA, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3211	Environmental Law	LAW2702	BBA, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3212	Jurisprudence	LAW2703	BBA, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3213	Public International Law	LAW2704	BBA, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3214	Summer Internship Evaluation-III	LAW2735	BBA, LLB (Hons.)	Report Writing, Presentation, Viva-Voce	2012
3215	Human Rights Law	LAW2701	BBA, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3216	Forensic Science-I	LAW2707	BBA, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3217	Offences against Child & Juvenile Offence Human Rights Law	LAW2708	BBA, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3218	Law and Medicine-I	LAW2709	BBA, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3219	Military Law	LAW2710	BBA, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3220	Taxation Law	LAW2802	BBA, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3221	Interpretation of Statutes	LAW2803	BBA, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3222	International Trade Law	LAW2804	BBA, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3223	Land Laws	LAW2805	BBA, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3224	Investment & Competition Law	LAW2801	BBA, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3225	Women & Criminal Law	LAW2806	BBA, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3226	Probation & Parole	LAW2807	BBA, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
3227	Forensic Science-II	LAW2808	BBA, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3228	Law and Medicine-II	LAW2809	BBA, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3229	Medical Jurisprudence	LAW2810	BBA, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3230	Intellectual Property Rights	LAW2902	BBA, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3231	Law Poverty & Development	LAW2903	BBA, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3232	Professional Ethics	LAW2904	BBA, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3233	Summer Internship Evaluation-IV	LAW2935	BBA, LLB (Hons.)	Report Writing, Presentation, Viva-Voce	2012
3234	Private International Law	LAW2905	BBA, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3235	Election Law	LAW2906	BBA, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3236	Banking & Insurance Law	LAW2907	BBA, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3237	International Humanitarian & Refugee Law	LAW2908	BBA, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3238	Criminology & Victimology	LAW2909	BBA, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3239	Corruption Laws	LAW2911	BBA, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3240	Moot Court / Internship	LAW2003	BBA, LLB (Hons.)	Report Writing, Presentation, Viva-Voce	2012
3241	Dissertation	LAW2037	BBA, LLB (Hons.)	Report Writing, Presentation, Viva-Voce	2012
3242	Research Method & Legal Writing	LAW4101	Master of Law (LLM)	Quiz, Project, Presentation, Viva-Voce	2011
3243	Comparative Public Law/ System of Governance	LAW4102	Master of Law (LLM)	Quiz, Project, Presentation, Viva-Voce	2011
3244	Intellectual Property Law	LAW4105	Master of Law (LLM)	Quiz, Project, Presentation, Viva-Voce	2011
3245	Fundamental Rights & Directive Principles	LAW4106	Master of Law (LLM)	Quiz, Project, Presentation, Viva-Voce	2011
3246	International and Regional Instruments on Child Protection	LAW4113	Master of Law (LLM)	Quiz, Project, Presentation, Viva-Voce	2022
3247	National and State Policies for Child Protection and Development	LAW4114	Master of Law (LLM)	Quiz, Project, Presentation, Viva-Voce	2022
3248	Dissertation	LAW4237	Master of Law (LLM)	Report Writing, Presentation, Viva-Voce	2011
3249	Competition Law	LAW4202	Master of Law (LLM)	Quiz, Project, Presentation, Viva-Voce	2011
3250	International Trade Law	LAW4203	Master of Law (LLM)	Quiz, Project, Presentation, Viva-Voce	2011
3251	Banking & Insurance Law	LAW4205	Master of Law (LLM)	Quiz, Project, Presentation, Viva-Voce	2011

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1.1.3 Total number of courses having focus on employability/ entrepreneurship / skill development offered during the year (2022)

Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
3252	Administrative Law	LAW4206	Master of Law (LLM)	Quiz, Project, Presentation, Viva-Voce	2011
3253	Religion Diversity & Law	LAW4207	Master of Law (LLM)	Quiz, Project, Presentation, Viva-Voce	2011
3254	Media Law	LAW4208	Master of Law (LLM)	Quiz, Project, Presentation, Viva-Voce	2011
3255	International Criminal Law	LAW4209	Master of Law (LLM)	Quiz, Project, Presentation, Viva-Voce	2011
3256	Police Law and Administration	LAW4210	Master of Law (LLM)	Quiz, Project, Presentation, Viva-Voce	2011
3257	Corporate Crimes/ White Collar Crimes	LAW4211	Master of Law (LLM)	Quiz, Project, Presentation, Viva-Voce	2011
3258	Civil Laws for Child Rights	LAW4212	Master of Law (LLM)	Quiz, Project, Presentation, Viva-Voce	2022
3259	Crimes against Children	LAW4213	Master of Law (LLM)	Quiz, Project, Presentation, Viva-Voce	2022
3260	Concept and Theoretical Understanding of Human Rights	LAW2152	Human Rights (OE)	Quiz, Project, Presentation, Viva-Voce	2013
3261	Systems, Organizations and Instruments of Human Rights	LAW2252	Human Rights (OE)	Quiz, Project, Presentation, Viva-Voce	2013
3262	Contemporary Human Rights Situations and Issues	LAW2352	Human Rights (OE)	Quiz, Project, Presentation, Viva-Voce	2013
3263	Specific Themes in Human Rights	LAW2452	Human Rights (OE)	Quiz, Project, Presentation, Viva-Voce	2013
3264	Legislation Themes in Human Rights	LAW2552	Human Rights (OE)	Quiz, Project, Presentation, Viva-Voce	2013
3265	Report Writing and Thesis Preparation (Human Rights)	LAW2652	Human Rights (OE)	Report Writing, Viva-Voce, Presentation	2013
3266	Principles of IPR	LAW2151	Intellectual Property Rights (OE)	Quiz, Project, Presentation, Viva-Voce	2013
3267	Patent Law and Practices	LAW2251	Intellectual Property Rights (OE)	Quiz, Project, Presentation, Viva-Voce	2013
3268	Copyright Law and Practices	LAW2351	Intellectual Property Rights (OE)	Quiz, Project, Presentation, Viva-Voce	2013
3269	Trademark Law and Practices	LAW2451	Intellectual Property Rights (OE)	Quiz, Project, Presentation, Viva-Voce	2013
3270	Emerging Legal Issues and Challenges	LAW2551	Intellectual Property Rights (OE)	Quiz, Project, Presentation, Viva-Voce	2013
3271	Future Aspects of Intellectual Property Rights	LAW2651	Intellectual Property Rights (OE)	Quiz, Project, Presentation, Viva-Voce	2016
3272	Food Science- I Lab	DAN2103	Bachelor of Science (Dietetics & Applied Nutrition)	Practical, Lab Record, Presentation, Class Performance	2011
3273	Nutritional Biochemistry Lab	DAN2104	Bachelor of Science (Dietetics & Applied Nutrition)	Practical, Lab Record, Presentation, Class Performance	2011
3274	Food Microbiology	DAN2202	Bachelor of Science (Dietetics & Applied Nutrition)	Quiz, Presentation, Group Discussion, Class Performance	2011
3275	Food Science II Lab	DAN2203	Bachelor of Science (Dietetics & Applied Nutrition)	Practical, Lab Record, Presentation, Class Performance	2011
3276	Food Microbiology Lab	DAN2204	Bachelor of Science (Dietetics & Applied Nutrition)	Practical, Lab Record, Presentation, Class Performance	2011

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3277	Quantity Food Services	DAN2301	Bachelor of Science (Dietetics & Applied Nutrition)	Quiz, Presentation, Group Discussion, Class Performance	2011
3278	Human Physiology Lab	DAN2303	Bachelor of Science (Dietetics & Applied Nutrition)	Practical, Lab Record, Presentation, Class Performance	2011
3279	Research Paper Writing	DAN2331	Bachelor of Science (Dietetics & Applied Nutrition)	Quiz, Presentation, Group Discussion, Class Performance	2011
3280	Project (with Presentation & Evaluation)	DAN2332	Bachelor of Science (Dietetics & Applied Nutrition)	Project writing, Presentation, Viva-Voce	2011
3281	Workshop (1 credit per workshop)	DAN2333	Bachelor of Science (Dietetics & Applied Nutrition)	Quiz, Written Test	2011
3282	Food Processing	DAN2304	Bachelor of Science (Dietetics & Applied Nutrition)	Quiz, Presentation, Group Discussion, Class Performance	2011
3283	Advanced Dietetics	DAN2451	Bachelor of Science (Dietetics & Applied Nutrition)	Quiz, Presentation, Group Discussion, Class Performance	2011
3284	Food Service Management Lab	DAN2404	Bachelor of Science (Dietetics & Applied Nutrition)	Practical, Lab Record, Presentation, Class Performance	2011
3285	Paper Writing	DAN2431	Bachelor of Science (Dietetics & Applied Nutrition)	Quiz, Presentation, Group Discussion, Class Performance	2011
3286	Project (with Presentation & Evaluation)	DAN2432	Bachelor of Science (Dietetics & Applied Nutrition)	Project writing, Presentation, Viva-Voce	2011
3287	Workshop (1 credit per workshop)	DAN2433	Bachelor of Science (Dietetics & Applied Nutrition)	Quiz, Written Test	2011
3288	Nutrition for Health & Fitness	DAN2501	Bachelor of Science (Dietetics & Applied Nutrition)	Quiz, Presentation, Group Discussion, Class Performance	2011
3289	Bakery	DAN2502	Bachelor of Science (Dietetics & Applied Nutrition)	Quiz, Presentation, Group Discussion, Class Performance	2011
3290	Bakery Lab	DAN2504	Bachelor of Science (Dietetics & Applied Nutrition)	Practical, Lab Record, Presentation, Class Performance	2011
3291	Food Quality Lab	DAN2505	Bachelor of Science (Dietetics & Applied Nutrition)	Practical, Lab Record, Presentation, Class Performance	2011
3292	Summer Internship Evaluation	DAN2535	Bachelor of Science (Dietetics & Applied Nutrition)	Report Writing, Presentation, Viva-Voce	2011
3293	Clinical & Therapeutic Nutrition	DAN2602	Bachelor of Science (Dietetics & Applied Nutrition)	Quiz, Presentation, Group Discussion, Class Performance	2011
3294	Food Preservation Lab	DAN2603	Bachelor of Science (Dietetics & Applied Nutrition)	Practical, Lab Record, Presentation, Class Performance	2011
3295	Clinical & Therapeutic Nutrition Lab	DAN2604	Bachelor of Science (Dietetics & Applied Nutrition)	Practical, Lab Record, Presentation, Class Performance	2011
3296	Internship	DAN2637	Bachelor of Science (Dietetics & Applied Nutrition)	Report Writing, Presentation, Viva-Voce	2011
3297	Haematology-I	MLT2108	Bachelor of Science (Medical Lab Technology)	Quiz, Presentation, Group Discussion, Class Performance	2014
3298	General Microbiology	MLT2109	Bachelor of Science (Medical Lab Technology)	Quiz, Presentation, Group Discussion, Class Performance	2014
3299	Anatomy and Physiology Lab-I	MLT2110	Bachelor of Science (Medical Lab Technology)	Practical, Lab Record, Presentation, Class Performance	2014
3300	Haematology Lab-I	MLT2111	Bachelor of Science (Medical Lab Technology)	Practical, Lab Record, Presentation, Class Performance	2014
3301	Clinical Training-I	MLT2112	Bachelor of Science (Medical Lab Technology)	Practical, Report Writing, Class Performance	2014

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
3302	Haematology-II	MLT2208	Bachelor of Science (Medical Lab Technology)	Quiz, Presentation, Group Discussion, Class Performance	2014
3303	Clinical Bacteriology	MLT2209	Bachelor of Science (Medical Lab Technology)	Quiz, Presentation, Group Discussion, Class Performance	2014
3304	Haematology Lab-II	MLT2211	Bachelor of Science (Medical Lab Technology)	Practical, Lab Record, Presentation, Class Performance	2014
3305	Clinical Training-II	MLT2212	Bachelor of Science (Medical Lab Technology)	Practical, Report Writing, Class Performance	2014
3306	Nutrition	MLT2205	Bachelor of Science (Medical Lab Technology)	Quiz, Presentation, Group Discussion, Class Performance	2014
3307	Medical Terminology	MLT2206	Bachelor of Science (Medical Lab Technology)	Quiz, Presentation, Group Discussion, Class Performance	2014
3308	Study Abroad	MLT2234	Bachelor of Science (Medical Lab Technology)	Written Test, Country Report	2014
3309	Immunology and Serology	MLT2307	Bachelor of Science (Medical Lab Technology)	Quiz, Presentation, Group Discussion, Class Performance	2014
3310	Haematology-III	MLT2308	Bachelor of Science (Medical Lab Technology)	Quiz, Presentation, Group Discussion, Class Performance	2014
3311	Clinical Parasitology	MLT2309	Bachelor of Science (Medical Lab Technology)	Quiz, Presentation, Group Discussion, Class Performance	2014
3312	Haematology Lab-III	MLT2311	Bachelor of Science (Medical Lab Technology)	Practical, Lab Record, Presentation, Class Performance	2014
3313	Clinical Biochemistry Lab	MLT2312	Bachelor of Science (Medical Lab Technology)	Practical, Lab Record, Presentation, Class Performance	2014
3314	Clinical Training-III	MLT2313	Bachelor of Science (Medical Lab Technology)	Practical, Report Writing, Class Performance	2014
3315	Hospital Administration	MLT2305	Bachelor of Science (Medical Lab Technology)	Quiz, Presentation, Group Discussion, Class Performance	2014
3316	Lab Management & Safety Process	MLT2306	Bachelor of Science (Medical Lab Technology)	Quiz, Presentation, Group Discussion, Class Performance	2014
3317	Study Abroad	MLT2334	Bachelor of Science (Medical Lab Technology)	Written Test, Country Report	2014
3318	Clinical Pathology and Cytology	MLT2405	Bachelor of Science (Medical Lab Technology)	Quiz, Presentation, Group Discussion, Class Performance	2014
3319	Clinical Virology and Mycology	MLT2406	Bachelor of Science (Medical Lab Technology)	Quiz, Presentation, Group Discussion, Class Performance	2014
3320	Diagnostic Biochemistry Lab-I	MLT2408	Bachelor of Science (Medical Lab Technology)	Practical, Lab Record, Presentation, Class Performance	2014
3321	Clinical Training-IV	MLT2409	Bachelor of Science (Medical Lab Technology)	Practical, Report Writing, Class Performance	2014
3322	Basics in Computers & PC Package	MLT2410	Bachelor of Science (Medical Lab Technology)	Quiz, Presentation, Group Discussion, Class Performance	2014
3323	Study Abroad	MLT2434	Bachelor of Science (Medical Lab Technology)	Written Test, Country Report	2014
3324	Histopathology	MLT2507	Bachelor of Science (Medical Lab Technology)	Quiz, Presentation, Group Discussion, Class Performance	2014
3325	Immunohematology and Blood Transfusion	MLT2508	Bachelor of Science (Medical Lab Technology)	Quiz, Presentation, Group Discussion, Class Performance	2014
3326	Biostatistics and Quality Assurance	MLT2509	Bachelor of Science (Medical Lab Technology)	Quiz, Presentation, Group Discussion, Class Performance	2014

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
3327	Diagnostic Biochemistry-II	MLT2510	Bachelor of Science (Medical Lab Technology)	Quiz, Presentation, Group Discussion, Class Performance	2014
3328	Diagnostic Biochemistry Lab-II	MLT2511	Bachelor of Science (Medical Lab Technology)	Practical, Lab Record, Presentation, Class Performance	2014
3329	Clinical Training-V	MLT2512	Bachelor of Science (Medical Lab Technology)	Practical, Report Writing, Class Performance	2014
3330	Summer Internship Evaluation	MLT2535	Bachelor of Science (Medical Lab Technology)	Report Writing, Presentation, Viva-Voce	2014
3331	Preventive & Social Medicine	MLT2505	Bachelor of Science (Medical Lab Technology)	Quiz, Presentation, Group Discussion, Class Performance	2014
3332	Project (with presentation & evaluation)	MLT2532	Bachelor of Science (Medical Lab Technology)	Project writing, Presentation, Viva-Voce	2014
3333	Study Abroad	MLT2534	Bachelor of Science (Medical Lab Technology)	Written Test, Country Report	2014
3334	Internship Evaluation	MLT2637	Bachelor of Science (Medical Lab Technology)	Report Writing, Presentation, Viva-Voce	2014
3335	Physical Optics	OPT2104	Bachelor of Optometry	Quiz, Presentation, Group Discussion, Class Performance	2012
3336	Geometrical Optics-I	OPT2105	Bachelor of Optometry	Quiz, Presentation, Group Discussion, Class Performance	2012
3337	Optometric Procedures-I	OPT2106	Bachelor of Optometry	Quiz, Presentation, Group Discussion, Class Performance	2012
3338	Basics in Computers and PC package	OPT2107	Bachelor of Optometry	Quiz, Presentation, Group Discussion, Class Performance	2012
3339	Geometrical Optics-II	OPT2204	Bachelor of Optometry	Quiz, Presentation, Group Discussion, Class Performance	2012
3340	Optometric Procedures-II	OPT2205	Bachelor of Optometry	Quiz, Presentation, Group Discussion, Class Performance	2012
3341	Clinics-I	OPT2206	Bachelor of Optometry	Practical, Report Writing, Class Performance	2012
3342	Nutrition	OPT2207	Bachelor of Optometry	Quiz, Presentation, Group Discussion, Class Performance	2012
3343	Project (with Presentation & Evaluation)	OPT2232	Bachelor of Optometry	Project writing, Presentation, Viva-Voce	2012
3344	Ocular Microbiology	OPT2301	Bachelor of Optometry	Quiz, Presentation, Group Discussion, Class Performance	2012
3345	Applied Optics-I (Optometric Optics)	OPT2302	Bachelor of Optometry	Quiz, Presentation, Group Discussion, Class Performance	2012
3346	Visual Optics-I (Visual Perception & Neurophysiology)	OPT2303	Bachelor of Optometry	Quiz, Presentation, Group Discussion, Class Performance	2012
3347	Clinical Optometric Procedures	OPT2306	Bachelor of Optometry	Quiz, Presentation, Group Discussion, Class Performance	2012
3348	Clinics-II	OPT2307	Bachelor of Optometry	Practical, Report Writing, Class Performance	2012
3349	Term Paper	OPT2331	Bachelor of Optometry	Academic Writing, Presentation	2012
3350	Project (with Presentation & Evaluation)	OPT2332	Bachelor of Optometry	Project writing, Presentation, Viva-Voce	2012
3351	Workshop / Certification (1credit per workshop)	OPT2333	Bachelor of Optometry	Quiz, Written Test	2012

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
3352	Medical Law and Ethics	OPT2310	Bachelor of Optometry	Quiz, Presentation, Group Discussion, Class Performance	2012
3353	Applied Optics-II (Dispensing Optics)	OPT2401	Bachelor of Optometry	Quiz, Presentation, Group Discussion, Class Performance	2012
3354	Visual Optics-II	OPT2402	Bachelor of Optometry	Quiz, Presentation, Group Discussion, Class Performance	2012
3355	Ocular Diseases-II	OPT2403	Bachelor of Optometry	Quiz, Presentation, Group Discussion, Class Performance	2012
3356	Clinics-III	OPT2406	Bachelor of Optometry	Practical, Report Writing, Class Performance	2012
3357	Ophthalmic Electrodiagnostic Procedures	OPT2408	Bachelor of Optometry	Quiz, Presentation, Group Discussion, Class Performance	2012
3358	Perimetry	OPT2409	Bachelor of Optometry	Quiz, Presentation, Group Discussion, Class Performance	2012
3359	Term Paper	OPT2431	Bachelor of Optometry	Academic Writing, Presentation	2012
3360	Project (with Presentation & Evaluation)	OPT2432	Bachelor of Optometry	Project writing, Presentation, Viva-Voce	2012
3361	Workshop / Certification (1credit per workshop)	OPT2433	Bachelor of Optometry	Quiz, Written Test	2012
3362	Contact Lens-I	OPT2501	Bachelor of Optometry	Quiz, Presentation, Group Discussion, Class Performance	2012
3363	Low Vision Care	OPT2502	Bachelor of Optometry	Quiz, Presentation, Group Discussion, Class Performance	2012
3364	Binocular Vision-I	OPT2504	Bachelor of Optometry	Quiz, Presentation, Group Discussion, Class Performance	2012
3365	Diseases of the Eye and Clinical Medicine	OPT2505	Bachelor of Optometry	Quiz, Presentation, Group Discussion, Class Performance	2012
3366	Clinics-IV	OPT2507	Bachelor of Optometry	Practical, Report Writing, Class Performance	2012
3367	Summer Internship Evaluation-I	OPT2535	Bachelor of Optometry	Report Writing, Presentation, Viva-Voce	2012
3368	Ocular Prosthesis	OPT2508	Bachelor of Optometry	Quiz, Presentation, Group Discussion, Class Performance	2012
3369	Refractive Surgery	OPT2509	Bachelor of Optometry	Quiz, Presentation, Group Discussion, Class Performance	2012
3370	Research Methodology	OPT2510	Bachelor of Optometry	Quiz, Presentation, Group Discussion, Class Performance	2012
3371	Term Paper	OPT2531	Bachelor of Optometry	Academic Writing, Presentation	2012
3372	Project (with Presentation & Evaluation)	OPT2532	Bachelor of Optometry	Project writing, Presentation, Viva-Voce	2012
3373	Workshop / Certification (1credit per workshop)	OPT2533	Bachelor of Optometry	Quiz, Written Test	2012
3374	Contact Lens-II	OPT2601	Bachelor of Optometry	Quiz, Presentation, Group Discussion, Class Performance	2012
3375	Binocular Vision-II	OPT2602	Bachelor of Optometry	Quiz, Presentation, Group Discussion, Class Performance	2012
3376	Clinic-V	OPT2605	Bachelor of Optometry	Practical, Report Writing, Class Performance	2012
3377	Visual Rehabilitation	OPT2606	Bachelor of Optometry	Quiz, Presentation, Group Discussion, Class Performance	2012

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
3378	Vision Therapy and Learning Disabilities	OPT2607	Bachelor of Optometry	Quiz, Presentation, Group Discussion, Class Performance	2012
3379	Eye Banking	OPT2608	Bachelor of Optometry	Quiz, Presentation, Group Discussion, Class Performance	2012
3380	Project (with Presentation & Evaluation)	OPT2632	Bachelor of Optometry	Project writing, Presentation, Viva-Voce	2012
3381	(Clinics-VI A.) Retina, Glaucoma, Low Vision	OPT2701	Bachelor of Optometry	Practical, Report Writing, Class Performance	2012
3382	(Clinics-VI B.) Pediatric & Binocular Vision	OPT2702	Bachelor of Optometry	Practical, Report Writing, Class Performance	2012
3383	(Clinics-VI C.) Cornea and Contact Lenses	OPT2703	Bachelor of Optometry	Practical, Report Writing, Class Performance	2012
3384	(Clinics-VI D.) Primary Eye Care	OPT2704	Bachelor of Optometry	Practical, Report Writing, Class Performance	2012
3385	Summer Internship Evaluation-II	OPT2735	Bachelor of Optometry	Report Writing, Presentation, Viva-Voce	2012
3386	Research Project (Mid-Term Evaluation)	OPT2737	Bachelor of Optometry	Report Writing, Presentation, Viva-Voce	2012
3387	Clinics VII (Comprehensive Eye Care and Refraction)	OPT2801	Bachelor of Optometry	Practical, Report Writing, Class Performance	2012
3388	Clinics VIII (Optometric Procedures and Instruments)	OPT2802	Bachelor of Optometry	Practical, Report Writing, Class Performance	2012
3389	Project - Dissertation	OPT2837	Bachelor of Optometry	Report Writing, Presentation, Viva-Voce	2012
3390	Anatomy and Physiology of Speech & Hearing	ASL2107	Bachelor of Audiology & Speech Language Pathology	Quiz, Presentation, Group Discussion, Class Performance	2014
3391	Clinical Psychology	ASL2108	Bachelor of Audiology & Speech Language Pathology	Quiz, Presentation, Group Discussion, Class Performance	2014
3392	Linguistics and Phonetics	ASL2109	Bachelor of Audiology & Speech Language Pathology	Quiz, Presentation, Group Discussion, Class Performance	2014
3393	Electronics and Acoustics	ASL2110	Bachelor of Audiology & Speech Language Pathology	Quiz, Presentation, Group Discussion, Class Performance	2014
3394	Research Methods and Statistics	ASL2111	Bachelor of Audiology & Speech Language Pathology	Quiz, Presentation, Group Discussion, Class Performance	2014
3395	Clinical Practicum	ASL2105	Bachelor of Audiology & Speech Language Pathology	Practical, Report Writing, Class Performance, Presentation	2014
3396	Speech Language Pathology	ASL2208	Bachelor of Audiology & Speech Language Pathology	Quiz, Presentation, Group Discussion, Class Performance	2014
3397	Audiology	ASL2209	Bachelor of Audiology & Speech Language Pathology	Quiz, Presentation, Group Discussion, Class Performance	2014
3398	Practicals in Speech Language Pathology	ASL2210	Bachelor of Audiology & Speech Language Pathology	Practical, Report Writing, Class Performance, Presentation	2014
3399	Practicals in Audiology	ASL2211	Bachelor of Audiology & Speech Language Pathology	Practical, Report Writing, Class Performance, Presentation	2014
3400	Voice and its Disorders	ASL2307	Bachelor of Audiology & Speech Language Pathology	Quiz, Presentation, Group Discussion, Class Performance	2014
3401	Speech Sound Disorders	ASL2308	Bachelor of Audiology & Speech Language Pathology	Quiz, Presentation, Group Discussion, Class Performance	2014
3402	Diagnostic Audiology Behavioral Test	ASL2309	Bachelor of Audiology & Speech Language Pathology	Quiz, Presentation, Group Discussion, Class Performance	2014

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3403	Amplification Devices	ASL2310	Bachelor of Audiology & Speech Language Pathology	Quiz, Presentation, Group Discussion, Class Performance	2014
3404	Clinicals in Speech Language Pathology-I	ASL2311	Bachelor of Audiology & Speech Language Pathology	Practical, Report Writing, Class Performance, Presentation	2014
3405	Clinicals in Audiology-I	ASL2312	Bachelor of Audiology & Speech Language Pathology	Practical, Report Writing, Class Performance, Presentation	2014
3406	Summer Internship Evaluation-I (Community Outreach Programs)	ASL2335	Bachelor of Audiology & Speech Language Pathology	Report Writing, Presentation, Viva-Voce	2014
3407	Motor Speech Disorders in Children	ASL2402	Bachelor of Audiology & Speech Language Pathology	Quiz, Presentation, Group Discussion, Class Performance	2014
3408	Diagnostic Audiology – Physiological Tests	ASL2407	Bachelor of Audiology & Speech Language Pathology	Quiz, Presentation, Group Discussion, Class Performance	2014
3409	Implantable Hearing Devices	ASL2408	Bachelor of Audiology & Speech Language Pathology	Quiz, Presentation, Group Discussion, Class Performance	2014
3410	Clinicals in Speech Language Pathology-II	ASL2409	Bachelor of Audiology & Speech Language Pathology	Practical, Report Writing, Class Performance, Presentation	2014
3411	Clinicals in Audiology-II	ASL2410	Bachelor of Audiology & Speech Language Pathology	Practical, Report Writing, Class Performance, Presentation	2014
3412	Fluency and its Disorders	ASL2501	Bachelor of Audiology & Speech Language Pathology	Quiz, Presentation, Group Discussion, Class Performance	2014
3413	Structural Anomalies & Speech Disorders	ASL2507	Bachelor of Audiology & Speech Language Pathology	Quiz, Presentation, Group Discussion, Class Performance	2014
3414	Pediatric Audiology	ASL2508	Bachelor of Audiology & Speech Language Pathology	Quiz, Presentation, Group Discussion, Class Performance	2014
3415	Aural Rehabilitation in Children	ASL2509	Bachelor of Audiology & Speech Language Pathology	Quiz, Presentation, Group Discussion, Class Performance	2014
3416	Clinicals in Speech Language Pathology-III	ASL2510	Bachelor of Audiology & Speech Language Pathology	Practical, Report Writing, Class Performance, Presentation	2014
3417	Clinicals in Audiology-III	ASL2511	Bachelor of Audiology & Speech Language Pathology	Practical, Report Writing, Class Performance, Presentation	2014
3418	Summer Internship Evaluation-II (Outreach Program)	ASL2535	Bachelor of Audiology & Speech Language Pathology	Report Writing, Presentation, Viva-Voce	2014
3419	Motor Speech Disorders in Adults	ASL2606	Bachelor of Audiology & Speech Language Pathology	Quiz, Presentation, Group Discussion, Class Performance	2014
3420	Audiology in Practice	ASL2609	Bachelor of Audiology & Speech Language Pathology	Quiz, Presentation, Group Discussion, Class Performance	2014
3421	Clinicals in Speech Language Pathology-IV	ASL2610	Bachelor of Audiology & Speech Language Pathology	Practical, Report Writing, Class Performance, Presentation	2014
3422	Clinicals in Audiology-IV	ASL2611	Bachelor of Audiology & Speech Language Pathology	Practical, Report Writing, Class Performance, Presentation	2014
3423	Clinicals in Speech Language Pathology and Audiology-I	ASL2701	Bachelor of Audiology & Speech Language Pathology	Practical, Report Writing, Class Performance, Presentation	2014
3424	Clinicals in Speech Language Pathology and Audiology-II	ASL2801	Bachelor of Audiology & Speech Language Pathology	Practical, Report Writing, Class Performance, Presentation	2014
3425	Statistics for Clinical Research	CLR4103	Master of Science (Clinical Research)	Quiz, Presentation, Group Discussion, Class Performance	2013
3426	Basics of Pharmacy, Drug discovery & Development	CLR4104	Master of Science (Clinical Research)	Quiz, Presentation, Group Discussion, Class Performance	2013
3427	Pre Clinical Studies and Safety	CLR4201	Master of Science (Clinical Research)	Quiz, Presentation, Group Discussion, Class Performance	2013

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3428	IPR & Data Exclusivity, Bioethics in Clinical Research	CLR4202	Master of Science (Clinical Research)	Quiz, Presentation, Group Discussion, Class Performance	2013
3429	Regulatory Affairs	CLR4204	Master of Science (Clinical Research)	Quiz, Presentation, Group Discussion, Class Performance	2013
3430	Audit & Inspection	CLR4206	Master of Science (Clinical Research)	Quiz, Presentation, Group Discussion, Class Performance	2013
3431	Reporting and Medical Writing	CLR4303	Master of Science (Clinical Research)	Report Writing, Presentation, Viva-Voce	2013
3432	Pharmacogenomics	CLR4304	Master of Science (Clinical Research)	Quiz, Presentation, Group Discussion, Class Performance	2013
3433	Project Management and Pharmacovigilance	CLR4306	Master of Science (Clinical Research)	Quiz, Presentation, Group Discussion, Class Performance	2013
3434	Diagnostics in Clinical Research	CLR4307	Master of Science (Clinical Research)	Quiz, Presentation, Group Discussion, Class Performance	2013
3435	Pathophysiology and Therapeutics	CLR4308	Master of Science (Clinical Research)	Quiz, Presentation, Group Discussion, Class Performance	2013
3436	Summer Internship Evaluation	CLR4335	Master of Science (Clinical Research)	Report Writing, Presentation, Viva-Voce	2013
3437	Dissertation	CLR4437	Master of Science (Clinical Research)	Report Writing, Presentation, Viva-Voce	2013
3438	Nutritional Biochemistry-I	DAN4102	Master of Science (Dietetics & Applied Nutrition)	Quiz, Presentation, Group Discussion, Class Performance	2012
3439	Food Science-I	DAN4104	Master of Science (Dietetics & Applied Nutrition)	Quiz, Presentation, Group Discussion, Class Performance	2012
3440	Nutritional Biochemistry Lab-I	DAN4106	Master of Science (Dietetics & Applied Nutrition)	Practical, Report Writing, Class Performance, Presentation	2012
3441	Food Science Lab-I	DAN4107	Master of Science (Dietetics & Applied Nutrition)	Practical, Report Writing, Class Performance, Presentation	2012
3442	Therapeutic Nutrition Lab-I	DAN4108	Master of Science (Dietetics & Applied Nutrition)	Practical, Report Writing, Class Performance, Presentation	2012
3443	Advanced Nutrition-II	DAN4201	Master of Science (Dietetics & Applied Nutrition)	Quiz, Presentation, Group Discussion, Class Performance	2012
3444	Nutritional Biochemistry-II	DAN4202	Master of Science (Dietetics & Applied Nutrition)	Quiz, Presentation, Group Discussion, Class Performance	2012
3445	Research Methodology	DAN4203	Master of Science (Dietetics & Applied Nutrition)	Quiz, Presentation, Group Discussion, Class Performance	2012
3446	Dietetic Technique and Patient Counseling	DAN4205	Master of Science (Dietetics & Applied Nutrition)	Quiz, Presentation, Group Discussion, Class Performance	2012
3447	Nutritional Biochemistry Lab-II	DAN4206	Master of Science (Dietetics & Applied Nutrition)	Practical, Report Writing, Class Performance, Presentation	2012
3448	Advanced Nutrition Lab-II	DAN4207	Master of Science (Dietetics & Applied Nutrition)	Practical, Report Writing, Class Performance, Presentation	2012
3449	Therapeutic Nutrition Lab-II	DAN4208	Master of Science (Dietetics & Applied Nutrition)	Practical, Report Writing, Class Performance, Presentation	2012
3450	Institutional Food Administration	DAN4302	Master of Science (Dietetics & Applied Nutrition)	Quiz, Presentation, Group Discussion, Class Performance	2012
3451	Community Nutrition Lab-I	DAN4305	Master of Science (Dietetics & Applied Nutrition)	Practical, Report Writing, Class Performance, Presentation	2012
3452	Food Science Lab-II	DAN4306	Master of Science (Dietetics & Applied Nutrition)	Practical, Report Writing, Class Performance, Presentation	2012

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
3453	Food Microbiology Lab	DAN4307	Master of Science (Dietetics & Applied Nutrition)	Practical, Report Writing, Class Performance, Presentation	2012
3454	Summer Internship Evaluation	DAN4335	Master of Science (Dietetics & Applied Nutrition)	Report Writing, Presentation, Viva-Voce	2012
3455	Food Processing & Technology	DAN4402	Master of Science (Dietetics & Applied Nutrition)	Quiz, Presentation, Group Discussion, Class Performance	2012
3456	Nutrition for Health and Fitness	DAN4403	Master of Science (Dietetics & Applied Nutrition)	Quiz, Presentation, Group Discussion, Class Performance	2012
3457	Community Nutrition Lab-II	DAN4404	Master of Science (Dietetics & Applied Nutrition)	Practical, Report Writing, Class Performance, Presentation	2012
3458	Food Processing & Technology Lab	DAN4405	Master of Science (Dietetics & Applied Nutrition)	Practical, Report Writing, Class Performance, Presentation	2012
3459	Dissertation	DAN4437	Master of Science (Dietetics & Applied Nutrition)	Report Writing, Presentation, Viva-Voce	2012
3460	Epidemiology Public Health & Community Optometry	OPT4101	Master of Optometry	Quiz, Presentation, Group Discussion, Class Performance	2011
3461	Clinic-I (General)	OPT4105	Master of Optometry	Practical, Report Writing, Class Performance, Presentation	2011
3462	Research Methodology & Biostatistics-I	OPT4106	Master of Optometry	Quiz, Presentation, Group Discussion, Class Performance	2011
3463	Applied Optics	OPT4110	Master of Optometry	Quiz, Presentation, Group Discussion, Class Performance	2011
3464	Advanced Contact Lens-I	OPT4204	Master of Optometry	Quiz, Presentation, Group Discussion, Class Performance	2011
3465	Clinics-II (Specialty)	OPT4205	Master of Optometry	Practical, Report Writing, Class Performance, Presentation	2011
3466	Research Methodology & Biostatistics-II	OPT4212	Master of Optometry	Quiz, Presentation, Group Discussion, Class Performance	2011
3467	Project (Research)	OPT4232	Master of Optometry	Report Writing, Presentation, Viva-Voce	2011
3468	Advanced Contact Lens-II	OPT4303	Master of Optometry	Quiz, Presentation, Group Discussion, Class Performance	2011
3469	Clinics-III (Specialty)	OPT4305	Master of Optometry	Practical, Report Writing, Class Performance, Presentation	2011
3470	Environmental Optometry	OPT4306	Master of Optometry	Quiz, Presentation, Group Discussion, Class Performance	2011
3471	Teaching Methodology	OPT4307	Master of Optometry	Quiz, Presentation, Group Discussion, Class Performance	2011
3472	Project	OPT4332	Master of Optometry	Report Writing, Presentation, Viva-Voce	2011
3473	Clinical Optometry (General)	OPT4401	Master of Optometry	Practical, Report Writing, Class Performance, Presentation	2011
3474	Clinical Internship-Dissertation	OPT4437	Master of Optometry	Report Writing, Presentation, Viva-Voce	2011
3475	Advance Applied Optics	OPT4409	Master of Optometry	Quiz, Presentation, Group Discussion, Class Performance	2011
3476	Epidemiology Public Health & Community Optometry	OPP4101	Master of Optometry (Practitioner)	Quiz, Presentation, Group Discussion, Class Performance	2012
3477	Clinic-I	OPP4105	Master of Optometry (Practitioner)	Practical, Report Writing, Class Performance, Presentation	2012

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
3478	Research Methodology & Biostatistics	OPP4106	Master of Optometry (Practitioner)	Quiz, Presentation, Group Discussion, Class Performance	2012
3479	Low Vision Care and Geriatric Optometry	OPP4109	Master of Optometry (Practitioner)	Quiz, Presentation, Group Discussion, Class Performance	2012
3480	Applied Optics (Dispensing)	OPP4110	Master of Optometry (Practitioner)	Quiz, Presentation, Group Discussion, Class Performance	2012
3481	Project (with Presentation & Evaluation)	OPP4132	Master of Optometry (Practitioner)	Report Writing, Presentation, Viva-Voce	2012
3482	Advanced Contact Lens-I	OPP4204	Master of Optometry (Practitioner)	Quiz, Presentation, Group Discussion, Class Performance	2012
3483	Clinics-II (Specialty)	OPP4205	Master of Optometry (Practitioner)	Practical, Report Writing, Class Performance, Presentation	2012
3484	Low Vision Care and Rehabilitation	OPP4212	Master of Optometry (Practitioner)	Quiz, Presentation, Group Discussion, Class Performance	2012
3485	Project	OPP4232	Master of Optometry (Practitioner)	Report Writing, Presentation, Viva-Voce	2012
3486	Advanced Contact Lens-II	OPP4303	Master of Optometry (Practitioner)	Quiz, Presentation, Group Discussion, Class Performance	2012
3487	Clinics-III (Specialty)	OPP4305	Master of Optometry (Practitioner)	Practical, Report Writing, Class Performance, Presentation	2012
3488	Environmental Optometry	OPP4306	Master of Optometry (Practitioner)	Quiz, Presentation, Group Discussion, Class Performance	2012
3489	Teaching Methodology	OPP4307	Master of Optometry (Practitioner)	Quiz, Presentation, Group Discussion, Class Performance	2012
3490	Project	OPP4332	Master of Optometry (Practitioner)	Report Writing, Presentation, Viva-Voce	2012
3491	Clinical Optometry (General)	OPP4401	Master of Optometry (Practitioner)	Practical, Report Writing, Class Performance, Presentation	2012
3492	Clinical Dissertation	OPP4437	Master of Optometry (Practitioner)	Report Writing, Presentation, Viva-Voce	2012
3493	Advance Applied Optics	OPP4410	Master of Optometry (Practitioner)	Quiz, Presentation, Group Discussion, Class Performance	2012
3494	Demography	PUH4101	Master of Public Health	Quiz, Presentation, Group Discussion, Class Performance	2012
3495	Social & Behavioral Aspects of Health	PUH4103	Master of Public Health	Quiz, Presentation, Group Discussion, Class Performance	2012
3496	Healthcare Delivery System & Policies	PUH4104	Master of Public Health	Quiz, Presentation, Group Discussion, Class Performance	2012
3497	Biostatistics	PUH4106	Master of Public Health	Quiz, Presentation, Group Discussion, Class Performance	2012
3498	Applied Epidemiology	PUH4201	Master of Public Health	Quiz, Presentation, Group Discussion, Class Performance	2012
3499	Environmental Health Sanitation	PUH4204	Master of Public Health	Quiz, Presentation, Group Discussion, Class Performance	2012
3500	Research Methodology	PUH4205	Master of Public Health	Quiz, Presentation, Group Discussion, Class Performance	2012
3501	National Health Programmes	PUH4206	Master of Public Health	Quiz, Presentation, Group Discussion, Class Performance	2012
3502	Health Economics	PUH4208	Master of Public Health	Quiz, Presentation, Group Discussion, Class Performance	2012

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
3503	Term Paper	PUH4231	Master of Public Health	Academic Writing, Presentation	2012
3504	Operations Research	PUH4301	Master of Public Health	Quiz, Presentation, Group Discussion, Class Performance	2012
3505	Quality in Healthcare	PUH4302	Master of Public Health	Quiz, Presentation, Group Discussion, Class Performance	2012
3506	Nutrition	PUH4303	Master of Public Health	Quiz, Presentation, Group Discussion, Class Performance	2012
3507	Women & Child Health	PUH4304	Master of Public Health	Quiz, Presentation, Group Discussion, Class Performance	2012
3508	Health Programme Management	PUH4305	Master of Public Health	Quiz, Presentation, Group Discussion, Class Performance	2012
3509	Summer Internship Evaluation	PUH4335	Master of Public Health	Report Writing, Presentation, Viva-Voce	2012
3510	Health Information System	PUH4401	Master of Public Health	Quiz, Presentation, Group Discussion, Class Performance	2012
3511	Health Insurance	PUH4402	Master of Public Health	Quiz, Presentation, Group Discussion, Class Performance	2012
3512	Disaster Management	PUH4403	Master of Public Health	Quiz, Presentation, Group Discussion, Class Performance	2012
3513	Dissertation	PUH4437	Master of Public Health	Report Writing, Presentation, Viva-Voce	2012
3514	Demography	MHA4102	Master of Hospital Administration	Quiz, Presentation, Group Discussion, Class Performance	2011
3515	Biostatistics	MHA4105	Master of Hospital Administration	Quiz, Presentation, Group Discussion, Class Performance	2011
3516	Information Technology for Managers	MHA4106	Master of Hospital Administration	Quiz, Presentation, Group Discussion, Class Performance	2011
3517	Essentials of Healthcare System	MHA4107	Master of Hospital Administration	Quiz, Presentation, Group Discussion, Class Performance	2011
3518	Hospital Planning	MHA4203	Master of Hospital Administration	Quiz, Presentation, Group Discussion, Class Performance	2011
3519	Health Economics	MHA4204	Master of Hospital Administration	Quiz, Presentation, Group Discussion, Class Performance	2011
3520	Research Methodology	MHA4205	Master of Hospital Administration	Quiz, Presentation, Group Discussion, Class Performance	2011
3521	Hospital Materials Management	MHA4206	Master of Hospital Administration	Quiz, Presentation, Group Discussion, Class Performance	2011
3522	Term Paper	MHA4231	Master of Hospital Administration	Academic Writing, Presentation	2011
3523	Operations Research	MHA4302	Master of Hospital Administration	Quiz, Presentation, Group Discussion, Class Performance	2011
3524	Quality Management	MHA4303	Master of Hospital Administration	Quiz, Presentation, Group Discussion, Class Performance	2011
3525	Medical & Health Laws	MHA4304	Master of Hospital Administration	Quiz, Presentation, Group Discussion, Class Performance	2011
3526	Management of Clinical Services	MHA4305	Master of Hospital Administration	Quiz, Presentation, Group Discussion, Class Performance	2011
3527	Summer Internship Evaluation	MHA4335	Master of Hospital Administration	Report Writing, Presentation, Viva-Voce	2011

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
3528	Hospital Management Information System	MHA4401	Master of Hospital Administration	Quiz, Presentation, Group Discussion, Class Performance	2011
3529	Health Insurance and Medical Tourism	MHA4402	Master of Hospital Administration	Quiz, Presentation, Group Discussion, Class Performance	2011
3530	Disaster Management	MHA4403	Master of Hospital Administration	Quiz, Presentation, Group Discussion, Class Performance	2011
3531	Dissertation	MHA4437	Master of Hospital Administration	Report Writing, Presentation, Viva-Voce	2011
3532	Laboratory Management & Quality Control	MLT4108	Master of Science (Medical Lab Technology)	Quiz, Presentation, Group Discussion, Class Performance	2015
3533	Clinical Immunology	MLT4113	Master of Science (Medical Lab Technology)	Quiz, Presentation, Group Discussion, Class Performance	2015
3534	Advanced Laboratory Technique	MLT4114	Master of Science (Medical Lab Technology)	Quiz, Presentation, Group Discussion, Class Performance	2015
3535	Lab Course	MLT4105	Master of Science (Medical Lab Technology)	Quiz, Presentation, Group Discussion, Class Performance	2015
3536	Clinical Training	MLT4112	Master of Science (Medical Lab Technology)	Practical, Lab Record, Presentation, Class Performance	2015
3537	Molecular Diagnostics	MLT4208	Master of Science (Medical Lab Technology)	Quiz, Presentation, Group Discussion, Class Performance	2015
3538	Research Methodology & Biostatistics	MLT4211	Master of Science (Medical Lab Technology)	Quiz, Presentation, Group Discussion, Class Performance	2015
3539	Clinical Nutrition	MLT4213	Master of Science (Medical Lab Technology)	Practical, Lab Record, Presentation, Class Performance	2015
3540	Clinical Biochemistry Lab Course-I	MLT4215	Master of Science (Medical Lab Technology)	Practical, Lab Record, Presentation, Class Performance	2015
3541	Clinical Biochemistry Clinical Training-I	MLT4216	Master of Science (Medical Lab Technology)	Practical, Lab Record, Presentation, Class Performance	2015
3542	General Microbiology	MLT4217	Master of Science (Medical Lab Technology)	Quiz, Presentation, Group Discussion, Class Performance	2015
3543	Clinical Bacteriology	MLT4219	Master of Science (Medical Lab Technology)	Practical, Lab Record, Presentation, Class Performance	2015
3544	Clinical Microbiology Lab Course-I	MLT4220	Master of Science (Medical Lab Technology)	Practical, Lab Record, Presentation, Class Performance	2015
3545	Clinical Microbiology Clinical Training-I	MLT4221	Master of Science (Medical Lab Technology)	Practical, Lab Record, Presentation, Class Performance	2015
3546	Summer Project Evaluation	MLT4335	Master of Science (Medical Lab Technology)	Report Writing, Presentation, Viva-Voce	2015
3547	Clinical Endocrinology	MLT4307	Master of Science (Medical Lab Technology)	Quiz, Presentation, Group Discussion, Class Performance	2015
3548	Clinical Enzymology	MLT4308	Master of Science (Medical Lab Technology)	Quiz, Presentation, Group Discussion, Class Performance	2015
3549	Advanced Chemical Pathology	MLT4313	Master of Science (Medical Lab Technology)	Quiz, Presentation, Group Discussion, Class Performance	2015
3550	Clinical Biochemistry Lab Course-II	MLT4314	Master of Science (Medical Lab Technology)	Practical, Lab Record, Presentation, Class Performance	2015
3551	Clinical Biochemistry Clinical Training-II	MLT4315	Master of Science (Medical Lab Technology)	Practical, Lab Record, Presentation, Class Performance	2015
3552	Clinical Virology	MLT4317	Master of Science (Medical Lab Technology)	Practical, Lab Record, Presentation, Class Performance	2015

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
3553	Clinical Mycology	MLT4318	Master of Science (Medical Lab Technology)	Practical, Lab Record, Presentation, Class Performance	2015
3554	Clinical Parasitology	MLT4319	Master of Science (Medical Lab Technology)	Practical, Lab Record, Presentation, Class Performance	2015
3555	Pharmaceutical Microbiology	MLT4320	Master of Science (Medical Lab Technology)	Quiz, Presentation, Group Discussion, Class Performance	2015
3556	Clinical Microbiology Lab Course-II	MLT4321	Master of Science (Medical Lab Technology)	Practical, Lab Record, Presentation, Class Performance	2015
3557	Clinical Microbiology Clinical Training-II	MLT4322	Master of Science (Medical Lab Technology)	Practical, Lab Record, Presentation, Class Performance	2015
3558	On Job Training	MLT4401	Master of Science (Medical Lab Technology)	Report Writing, Presentation, Viva-Voce	2015
3559	Dissertation-Clinical Research	MLT4437	Master of Science (Medical Lab Technology)	Report Writing, Presentation, Viva-Voce	2015
3560	Research Methods, Epidemiology and Statistics	SLP4101	Master of Science (Speech Language Pathology)	Quiz, Presentation, Group Discussion, Class Performance	2022
3561	Speech Science and Speech Production	SLP4102	Master of Science (Speech Language Pathology)	Quiz, Presentation, Group Discussion, Class Performance	2022
3562	Clinical (Internal)	SLP4106	Master of Science (Speech Language Pathology)	Practical, Report Writing, Class Performance, Presentation	2022
3563	Advanced in Speech Sound Disorder	SLP4201	Master of Science (Speech Language Pathology)	Quiz, Presentation, Group Discussion, Class Performance	2022
3564	Voice Science and Disorder	SLP4202	Master of Science (Speech Language Pathology)	Quiz, Presentation, Group Discussion, Class Performance	2022
3565	Disorder of Fluency	SLP4203	Master of Science (Speech Language Pathology)	Quiz, Presentation, Group Discussion, Class Performance	2022
3566	Clinical (External)	SLP4205	Master of Science (Speech Language Pathology)	Practical, Report Writing, Class Performance, Presentation	2022
3567	Neurogenic Speech Disorder	SLP4301	Master of Science (Speech Language Pathology)	Quiz, Presentation, Group Discussion, Class Performance	2022
3568	Language and Literacy Disorder	SLP4304	Master of Science (Speech Language Pathology)	Quiz, Presentation, Group Discussion, Class Performance	2022
3569	Cognitive Communication Disorder	SLP4305	Master of Science (Speech Language Pathology)	Quiz, Presentation, Group Discussion, Class Performance	2022
3570	Clinical (Internal)	SLP4306	Master of Science (Speech Language Pathology)	Practical, Report Writing, Class Performance, Presentation	2022
3571	Practices in Speech-Language Pathology	SLP4401	Master of Science (Speech Language Pathology)	Practical, Report Writing, Class Performance, Presentation	2022
3572	Dissertation	SLP4437	Master of Science (Speech Language Pathology)	Report Writing, Presentation, Viva-Voce	2022
3573	Clinical (External)	SLP4403	Master of Science (Speech Language Pathology)	Practical, Report Writing, Class Performance, Presentation	2022
3574	Biotechniques & Instrumentation	SCT2105	Bachelor of Science (Molecular Medicine & Stem Cell Technologies)	Quiz, Presentation, Group Discussion, Class Performance	2019
3575	Cell & Molecular Biology Lab	SCT2107	Bachelor of Science (Molecular Medicine & Stem Cell Technologies)	Practical, Lab Record, Presentation, Class Performance	2019
3576	Biochemistry Lab	SCT2108	Bachelor of Science (Molecular Medicine & Stem Cell Technologies)	Practical, Lab Record, Presentation, Class Performance	2019

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
3577	Biotechniques & Instrumentation Lab	SCT2109	Bachelor of Science (Molecular Medicine & Stem Cell Technologies)	Practical, Lab Record, Presentation, Class Performance	2019
3578	Research Presentation	SCT2110	Bachelor of Science (Molecular Medicine & Stem Cell Technologies)	Quiz, Presentation, Group Discussion, Class Performance	2019
3579	Term Paper	SCT2131	Bachelor of Science (Molecular Medicine & Stem Cell Technologies)	Academic Writing, Presentation, Viva-Voce	2019
3580	Immunology-I	SCT2202	Bachelor of Science (Molecular Medicine & Stem Cell Technologies)	Quiz, Presentation, Group Discussion, Class Performance	2019
3581	Biostatistics	SCT2205	Bachelor of Science (Molecular Medicine & Stem Cell Technologies)	Quiz, Presentation, Group Discussion, Class Performance	2019
3582	Molecular Biology Lab	SCT2207	Bachelor of Science (Molecular Medicine & Stem Cell Technologies)	Practical, Lab Record, Presentation, Class Performance	2019
3583	Microbiology & Virology Lab	SCT2208	Bachelor of Science (Molecular Medicine & Stem Cell Technologies)	Practical, Lab Record, Presentation, Class Performance	2019
3584	Immunology-I Lab	SCT2209	Bachelor of Science (Molecular Medicine & Stem Cell Technologies)	Practical, Lab Record, Presentation, Class Performance	2019
3585	Bioinformatics-II Lab	SCT2210	Bachelor of Science (Molecular Medicine & Stem Cell Technologies)	Practical, Lab Record, Presentation, Class Performance	2019
3586	Scientific Communication Skill Development (Seminar/ Workshop)	SCT2211	Bachelor of Science (Molecular Medicine & Stem Cell Technologies)	Quiz, Presentation, Group Discussion, Class Performance	2019
3587	Immunology-II	SCT2303	Bachelor of Science (Molecular Medicine & Stem Cell Technologies)	Quiz, Presentation, Group Discussion, Class Performance	2019
3588	Recombinant DNA Technology	SCT2304	Bachelor of Science (Molecular Medicine & Stem Cell Technologies)	Quiz, Presentation, Group Discussion, Class Performance	2019
3589	Immunology-II Lab	SCT2307	Bachelor of Science (Molecular Medicine & Stem Cell Technologies)	Practical, Lab Record, Presentation, Class Performance	2019
3590	Recombinant DNA Technology Lab	SCT2308	Bachelor of Science (Molecular Medicine & Stem Cell Technologies)	Practical, Lab Record, Presentation, Class Performance	2019
3591	Genomics & Proteomic Algorithms Lab	SCT2309	Bachelor of Science (Molecular Medicine & Stem Cell Technologies)	Practical, Lab Record, Presentation, Class Performance	2019
3592	Nano-Biotechnology and Nano-Medicine Lab	SCT2310	Bachelor of Science (Molecular Medicine & Stem Cell Technologies)	Practical, Lab Record, Presentation, Class Performance	2019
3593	Scientific Communication Skill Development (Seminar/ Workshop)	SCT2311	Bachelor of Science (Molecular Medicine & Stem Cell Technologies)	Quiz, Presentation, Group Discussion, Class Performance	2019

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
3594	Term Paper	SCT2331	Bachelor of Science (Molecular Medicine & Stem Cell Technologies)	Academic Writing, Presentation, Viva-Voce	2019
3595	Plant Biotechnology and Its Applications in Molecular Medicine	SCT2405	Bachelor of Science (Molecular Medicine & Stem Cell Technologies)	Quiz, Presentation, Group Discussion, Class Performance	2019
3596	Molecular Immunology Lab	SCT2406	Bachelor of Science (Molecular Medicine & Stem Cell Technologies)	Practical, Lab Record, Presentation, Class Performance	2019
3597	Molecular Modeling & Drug Development Lab	SCT2407	Bachelor of Science (Molecular Medicine & Stem Cell Technologies)	Practical, Lab Record, Presentation, Class Performance	2019
3598	Scientific Communication Skill Development (Seminar/ Workshop)	SCT2408	Bachelor of Science (Molecular Medicine & Stem Cell Technologies)	Quiz, Presentation, Group Discussion, Class Performance	2019
3599	Ethics of Biomedical Research, Intellectual Property (IP), IP rights (IPR)	SCT2503	Bachelor of Science (Molecular Medicine & Stem Cell Technologies)	Quiz, Presentation, Group Discussion, Class Performance	2019
3600	Stem Cells and Regenerative Medicine Lab	SCT2505	Bachelor of Science (Molecular Medicine & Stem Cell Technologies)	Practical, Lab Record, Presentation, Class Performance	2019
3601	Term Paper	SCT2531	Bachelor of Science (Molecular Medicine & Stem Cell Technologies)	Academic Writing, Presentation, Viva-Voce	2019
3602	Scientific Communication Skill Development (Seminar/ Workshop)	SCT2506	Bachelor of Science (Molecular Medicine & Stem Cell Technologies)	Quiz, Presentation, Group Discussion, Class Performance	2019
3603	Medical Writing (Online Resources)	SCT2507	Bachelor of Science (Molecular Medicine & Stem Cell Technologies)	Quiz, Presentation, Group Discussion, Class Performance	2019
3604	Summer Internship Evaluation	SCT2535	Bachelor of Science (Molecular Medicine & Stem Cell Technologies)	Report Writing, Presentation, Viva-Voce	2019
3605	Analysis of Business of Science & Alternative Careers in Molecular Medicine and Regenerative Medicine (Online Resources)	SCT2601	Bachelor of Science (Molecular Medicine & Stem Cell Technologies)	Quiz, Presentation, Group Discussion, Class Performance	2019
3606	Industry Trends and Campus Recruitment Events and Career Counseling (Online Resources)	SCT2602	Bachelor of Science (Molecular Medicine & Stem Cell Technologies)	Quiz, Presentation, Group Discussion, Class Performance	2019
3607	Dissertation/ Project Report Presentation/ Viva-Voce	SCT2637	Bachelor of Science (Molecular Medicine & Stem Cell Technologies)	Report Writing, Presentation, Viva-Voce	2019
3608	Microbiology & Virology	SCT4102	Master of Science (Molecular Medicine & Stem Cell Technologies)	Quiz, Presentation, Group Discussion, Class Performance	2019
3609	Molecular Biology & rDNA Technology	SCT4103	Master of Science (Molecular Medicine & Stem Cell Technologies)	Quiz, Presentation, Group Discussion, Class Performance	2019

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3610	Bioanalytical Technologies & Instrumentation	SCT4105	Master of Science (Molecular Medicine & Stem Cell Technologies)	Quiz, Presentation, Group Discussion, Class Performance	2019
3611	Biostatistics	SCT4106	Master of Science (Molecular Medicine & Stem Cell Technologies)	Quiz, Presentation, Group Discussion, Class Performance	2019
3612	Biological Programming-I (Bioinformatics)	SCT4107	Master of Science (Molecular Medicine & Stem Cell Technologies)	Quiz, Presentation, Group Discussion, Class Performance	2019
3613	Cell & Molecular Biology Lab	SCT4108	Master of Science (Molecular Medicine & Stem Cell Technologies)	Practical, Lab Record, Presentation, Class Performance	2019
3614	Molecular Biology & rDNA Technology Lab	SCT4109	Master of Science (Molecular Medicine & Stem Cell Technologies)	Practical, Lab Record, Presentation, Class Performance	2019
3615	Bioanalytical Technologies & Instrumentation Lab	SCT4110	Master of Science (Molecular Medicine & Stem Cell Technologies)	Practical, Lab Record, Presentation, Class Performance	2019
3616	Research Seminar/ Research Presentation/ Lit. Review & Presentation: Molecular Medicine	SCT4111	Master of Science (Molecular Medicine & Stem Cell Technologies)	Quiz, Presentation, Viva-Voce	2019
3617	Term Paper	SCT4131	Master of Science (Molecular Medicine & Stem Cell Technologies)	Academic Writing, Presentation, Viva-Voce	2019
3618	Stem Cell Technology	SCT4201	Master of Science (Molecular Medicine & Stem Cell Technologies)	Quiz, Presentation, Group Discussion, Class Performance	2019
3619	Biological Programming-II (Bioinformatics)	SCT4204	Master of Science (Molecular Medicine & Stem Cell Technologies)	Quiz, Presentation, Group Discussion, Class Performance	2019
3620	Molecular Medicine: Principles & Application	SCT4205	Master of Science (Molecular Medicine & Stem Cell Technologies)	Quiz, Presentation, Group Discussion, Class Performance	2019
3621	Nano-medicines and Technologies	SCT4206	Master of Science (Molecular Medicine & Stem Cell Technologies)	Quiz, Presentation, Group Discussion, Class Performance	2019
3622	Fermentation Technology & Its Applications in Molecular Medicine	SCT4207	Master of Science (Molecular Medicine & Stem Cell Technologies)	Quiz, Presentation, Group Discussion, Class Performance	2019
3623	Stem Cell Technology Lab	SCT4208	Master of Science (Molecular Medicine & Stem Cell Technologies)	Practical, Lab Record, Presentation, Class Performance	2019
3624	Nano-medicines and Technologies Lab	SCT4209	Master of Science (Molecular Medicine & Stem Cell Technologies)	Practical, Lab Record, Presentation, Class Performance	2019
3625	Fundamental Immunology-I Lab	SCT4210	Master of Science (Molecular Medicine & Stem Cell Technologies)	Practical, Lab Record, Presentation, Class Performance	2019
3626	Biological Programming (Bioinformatics)-II Lab	SCT4211	Master of Science (Molecular Medicine & Stem Cell Technologies)	Practical, Lab Record, Presentation, Class Performance	2019

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1.1.3 Total number of courses having focus on employability/ entrepreneurship / skill development offered during the year (2022)

Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
3627	Cancer Biology & Cancer Therapeutics (T cell & Antibody-based Therapeutics)	SCT4301	Master of Science (Molecular Medicine & Stem Cell Technologies)	Quiz, Presentation, Group Discussion, Class Performance	2019
3628	Vaccines and Preclinical Animal Models	SCT4303	Master of Science (Molecular Medicine & Stem Cell Technologies)	Quiz, Presentation, Group Discussion, Class Performance	2019
3629	Ethics of Biomedical Research Intellectual Property (IP), IP rights (IPR)	SCT4306	Master of Science (Molecular Medicine & Stem Cell Technologies)	Quiz, Presentation, Group Discussion, Class Performance	2019
3630	Plant Biotechnology and Its Applications in Molecular Medicine	SCT4307	Master of Science (Molecular Medicine & Stem Cell Technologies)	Quiz, Presentation, Group Discussion, Class Performance	2019
3631	Fundamental Immunology-II Lab	SCT4308	Master of Science (Molecular Medicine & Stem Cell Technologies)	Practical, Lab Record, Presentation, Class Performance	2019
3632	Genomics & Proteomics Lab	SCT4309	Master of Science (Molecular Medicine & Stem Cell Technologies)	Practical, Lab Record, Presentation, Class Performance	2019
3633	Stem Cell Culture Lab	SCT4310	Master of Science (Molecular Medicine & Stem Cell Technologies)	Practical, Lab Record, Presentation, Class Performance	2019
3634	Scientific Communication Skill Development (Seminar/ Workshop)	SCT4311	Master of Science (Molecular Medicine & Stem Cell Technologies)	Quiz, Presentation, Viva-Voce	2019
3635	Summer Internship Evaluation	SCT4335	Master of Science (Molecular Medicine & Stem Cell Technologies)	Report Writing, Presentation, Viva-Voce	2019
3636	Term Paper	SCT4331	Master of Science (Molecular Medicine & Stem Cell Technologies)	Academic Writing, Presentation, Viva-Voce	2019
3637	Analysis of Business of Science & Alternative Careers in Molecular Medicine & Regenerative Medicine (Online Resources)	SCT4401	Master of Science (Molecular Medicine & Stem Cell Technologies)	Quiz, Presentation, Group Discussion, Class Performance	2019
3638	Industry Trends & Campus Recruitment Events & Career Counseling (Online Resources)	SCT4402	Master of Science (Molecular Medicine & Stem Cell Technologies)	Quiz, Presentation, Group Discussion, Class Performance	2019
3639	Dissertation / Project Report Presentation / Viva Voce	SCT4437	Master of Science (Molecular Medicine & Stem Cell Technologies)	Report Writing, Presentation, Viva-Voce	2019
3640	Principles of Nutrition	DAN2151	Dietetics & Nutrition (OE)	Quiz, Presentation, Group Discussion, Class Performance	2013
3641	Family Meal Management	DAN2251	Dietetics & Nutrition (OE)	Quiz, Presentation, Group Discussion, Class Performance	2013
3642	Basics Dietetics	DAN2351	Dietetics & Nutrition (OE)	Quiz, Presentation, Group Discussion, Class Performance	2013
3643	Advanced Dietetics	DAN2451	Dietetics & Nutrition (OE)	Quiz, Presentation, Group Discussion, Class Performance	2013
3644	Community Nutrition	DAN2551	Dietetics & Nutrition (OE)	Quiz, Presentation, Group Discussion, Class Performance	2013

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
3645	Food Chemistry	DAN2651	Dietetics & Nutrition (OE)	Quiz, Presentation, Group Discussion, Class Performance	2016
3646	Introduction to Stem Cell Technology	SCT2151	Stem Cell Technology (OE)	Quiz, Report Writing, Presentation, Viva-Voce	2018
3647	Fundamental Human Embryology & Developmental Biology	SCT2251	Stem Cell Technology (OE)	Quiz, Report Writing, Presentation, Viva-Voce	2018
3648	Fundamental Cell Biology Human Anatomy & Physiology	SCT2351	Stem Cell Technology (OE)	Quiz, Report Writing, Presentation, Viva-Voce	2018
3649	Human Pluripotent Stem Cell Culture & Differentiation Methods	SCT2451	Stem Cell Technology (OE)	Quiz, Report Writing, Presentation, Viva-Voce	2018
3650	Therapeutic Applications of Human Pluripotent Stem Cells	SCT2551	Stem Cell Technology (OE)	Quiz, Report Writing, Presentation, Viva-Voce	2018
3651	Project & Paper Presentation	SCT2651	Stem Cell Technology (OE)	Quiz, Report Writing, Presentation, Viva-Voce	2018
3652	Communicative English	ENGL101	Bachelor of Science (Nursing)	Quiz, Presentation, Practical, Nursing Lab, Report writing, Class performance	2011
3653	Applied Anatomy and Applied Physiology	ANAT105 & PHYS110	Bachelor of Science (Nursing)	Quiz, Presentation, Practical, Nursing Lab, Report writing, Class performance	2011
3654	Applied Sociology and Applied Psychology	SOCI115 & PSYC120	Bachelor of Science (Nursing)	Quiz, Presentation, Practical, Nursing Lab, Report writing, Class performance	2011
3655	Nursing Foundation-I including First Aid module	N-NF(I) 125	Bachelor of Science (Nursing)	Quiz, Presentation, Practical, Nursing Lab, Report writing, Class performance	2011
3656	Self-study/ Co-curricular including First Aid module	SSCC(I) 130	Bachelor of Science (Nursing)	Quiz, Presentation, Practical, Nursing Lab, Report writing, Class performance	2011
3657	Applied Biochemistry and Applied Nutrition & Dietetics	BIOC135 & NUTR140	Bachelor of Science (Nursing)	Quiz, Presentation, Practical, Nursing Lab, Report writing, Class performance	2011
3658	Nursing Foundation-(I&II) including Health Assessment module	N-NF(II) 125	Bachelor of Science (Nursing)	Quiz, Presentation, Practical, Nursing Lab, Report writing, Class performance	2011
3659	Nursing Foundation-(I&II) Practical	N-NF(II)P 125	Bachelor of Science (Nursing)	Quiz, Presentation, Practical, Nursing Lab, Report writing, Class performance	2011
3660	Health/ Nursing Informatics & Technology	HNIT145	Bachelor of Science (Nursing)	Quiz, Presentation, Practical, Nursing Lab, Report writing, Class performance	2011
3661	Self-study/ Co-curricular	SSCC(II) 130	Bachelor of Science (Nursing)	Quiz, Presentation, Practical, Nursing Lab, Report writing, Class performance	2011
3662	Applied Microbiology and Infection Control including Safety	MICR201	Bachelor of Science (Nursing)	Quiz, Presentation, Practical, Nursing Lab, Report writing, Class performance	2011
3663	Pharmacology-I and Pathology-I	PHAR(I) 205 & PATH(I) 210	Bachelor of Science (Nursing)	Quiz, Presentation, Practical, Nursing Lab, Report writing, Class performance	2011

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
3664	Adult Health Nursing-I with integrated pathophysiology including BCLS module	N-AHN(I) 215	Bachelor of Science (Nursing)	Quiz, Presentation, Practical, Nursing Lab, Report writing, Class performance	2011
3665	Adult Health Nursing-I Practical	N-AHN (IP) 215	Bachelor of Science (Nursing)	Quiz, Presentation, Practical, Nursing Lab, Report writing, Class performance	2011
3666	Self-study/ Co-curricular	SSCC(I) 220	Bachelor of Science (Nursing)	Quiz, Presentation, Practical, Nursing Lab, Report writing, Class performance	2011
3667	Human Values	ELEC301	Bachelor of Science (Nursing)	Quiz, Presentation, Practical, Nursing Lab, Report writing, Class performance	2011
3668	Diabetes Care	ELEC302	Bachelor of Science (Nursing)	Quiz, Presentation, Practical, Nursing Lab, Report writing, Class performance	2011
3669	Soft Skills	ELEC303	Bachelor of Science (Nursing)	Quiz, Presentation, Practical, Nursing Lab, Report writing, Class performance	2011
3670	Pharmacology-(I&II) including Fundamentals of prescribing Module and Pathology- (I&II) & Genetics	PHAR(II) 205 & PATH(II) 210	Bachelor of Science (Nursing)	Quiz, Presentation, Practical, Nursing Lab, Report writing, Class performance	2011
3671	Adult Health Nursing-II with integrated pathophysiology including Geriatric Nursing + Palliative care module	N-AHN (II) 225	Bachelor of Science (Nursing)	Quiz, Presentation, Practical, Nursing Lab, Report writing, Class performance	2011
3672	Adult Health Nursing-II Practical	N-AHN (IIP) 225	Bachelor of Science (Nursing)	Quiz, Presentation, Practical, Nursing Lab, Report writing, Class performance	2011
3673	Professionalism, Professional Values and Ethics including Bioethics	PROF230	Bachelor of Science (Nursing)	Quiz, Presentation, Practical, Nursing Lab, Report writing, Class performance	2011
3674	Self-study/ Co-curricular	SSCC(II) 220	Bachelor of Science (Nursing)	Quiz, Presentation, Practical, Nursing Lab, Report writing, Class performance	2011
3675	Child Health Nursing-I including Essential Newborn Care (ENBC), FBNC, IMNCI and PLS, modules	N-CHN(I) 301	Bachelor of Science (Nursing)	Quiz, Presentation, Practical, Nursing Lab, Report writing, Class performance	2011
3676	Mental Health Nursing-I	N-MHN (I)305	Bachelor of Science (Nursing)	Quiz, Presentation, Practical, Nursing Lab, Report writing, Class performance	2011
3677	Community Health Nursing-I including Environmental Science & Epidemiology	N-COMH (I)310	Bachelor of Science (Nursing)	Quiz, Presentation, Practical, Nursing Lab, Report writing, Class performance	2011
3678	Community Health Nursing-I Practical	N-COMH (I)P 310	Bachelor of Science (Nursing)	Quiz, Presentation, Practical, Nursing Lab, Report writing, Class performance	2011
3679	Educational Technology/ Nursing Education	EDUC315	Bachelor of Science (Nursing)	Quiz, Presentation, Practical, Nursing Lab, Report writing, Class performance	2011

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
3680	Introduction to Forensic Nursing and Indian Laws	N-FORN 320	Bachelor of Science (Nursing)	Quiz, Presentation, Practical, Nursing Lab, Report writing, Class performance	2011
3681	Self-study/ Co-curricular	SSCC(I) 325	Bachelor of Science (Nursing)	Quiz, Presentation, Practical, Nursing Lab, Report writing, Class performance	2011
3682	CBT	ELEC501	Bachelor of Science (Nursing)	Quiz, Presentation, Practical, Nursing Lab, Report writing, Class performance	2011
3683	Personality Development	ELEC502	Bachelor of Science (Nursing)	Quiz, Presentation, Practical, Nursing Lab, Report writing, Class performance	2011
3684	Addiction Psychiatry	ELEC503	Bachelor of Science (Nursing)	Quiz, Presentation, Practical, Nursing Lab, Report writing, Class performance	2011
3685	Adolescent Health	ELEC504	Bachelor of Science (Nursing)	Quiz, Presentation, Practical, Nursing Lab, Report writing, Class performance	2011
3686	Sports Health	ELEC505	Bachelor of Science (Nursing)	Quiz, Presentation, Practical, Nursing Lab, Report writing, Class performance	2011
3687	Accreditation & Practice Standards	ELEC506	Bachelor of Science (Nursing)	Quiz, Presentation, Practical, Nursing Lab, Report writing, Class performance	2011
3688	Developmental Psychology	ELEC507	Bachelor of Science (Nursing)	Quiz, Presentation, Practical, Nursing Lab, Report writing, Class performance	2011
3689	Menopausal Health	ELEC508	Bachelor of Science (Nursing)	Quiz, Presentation, Practical, Nursing Lab, Report writing, Class performance	2011
3690	Health Economics	ELEC509	Bachelor of Science (Nursing)	Quiz, Presentation, Practical, Nursing Lab, Report writing, Class performance	2011
3691	Child Health Nursing-(I&II)	N-CHN (II)301	Bachelor of Science (Nursing)	Quiz, Presentation, Practical, Nursing Lab, Report writing, Class performance	2011
3692	Mental Health Nursing-(I&II)	N-MHN (II)305	Bachelor of Science (Nursing)	Quiz, Presentation, Practical, Nursing Lab, Report writing, Class performance	2011
3693	Nursing Management & Leadership	NMLE 330	Bachelor of Science (Nursing)	Quiz, Presentation, Practical, Nursing Lab, Report writing, Class performance	2011
3694	Midwifery/ Obstetrics and Gynaecology (OBG) Nursing-I including SBA module	N-MIDW (I)/ OBGN 335	Bachelor of Science (Nursing)	Quiz, Presentation, Practical, Nursing Lab, Report writing, Class performance	2011
3695	Child Health Nursing-(I&II) Practical	N-CHN (II)P 301	Bachelor of Science (Nursing)	Quiz, Presentation, Practical, Nursing Lab, Report writing, Class performance	2011
3696	Mental Health Nursing-(I&II) Practical	N-MHN (II)P 305	Bachelor of Science (Nursing)	Quiz, Presentation, Practical, Nursing Lab, Report writing, Class performance	2011

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
3697	Community Health Nursing-II	N-COMH (II)401	Bachelor of Science (Nursing)	Quiz, Presentation, Practical, Nursing Lab, Report writing, Class performance	2011
3698	Nursing Research & Statistics	NRST405	Bachelor of Science (Nursing)	Quiz, Presentation, Practical, Nursing Lab, Report writing, Class performance	2011
3699	Midwifery/ Obstetrics and Gynaecology (OBG) Nursing –II including safe delivery app module	N-MIDW (II)/ OBGN 410	Bachelor of Science (Nursing)	Quiz, Presentation, Practical, Nursing Lab, Report writing, Class performance	2011
3700	Community Health Nursing-II Practical	N-COMH (II)P 401	Bachelor of Science (Nursing)	Quiz, Presentation, Practical, Nursing Lab, Report writing, Class performance	2011
3701	Midwifery/ Obstetrics and Gynaecology (OBG) Nursing –(I&II) Practical	N-MIDW (II)P / OBGN 410	Bachelor of Science (Nursing)	Quiz, Presentation, Practical, Nursing Lab, Report writing, Class performance	2011
3702	Scientific Writing Skills	ELEC701	Bachelor of Science (Nursing)	Quiz, Presentation, Practical, Nursing Lab, Report writing, Class performance	2011
3703	Lactation Management	ELEC702	Bachelor of Science (Nursing)	Quiz, Presentation, Practical, Nursing Lab, Report writing, Class performance	2011
3704	Sexuality & Health	ELEC703	Bachelor of Science (Nursing)	Quiz, Presentation, Practical, Nursing Lab, Report writing, Class performance	2011
3705	Stress Management	ELEC704	Bachelor of Science (Nursing)	Quiz, Presentation, Practical, Nursing Lab, Report writing, Class performance	2011
3706	Job Readiness & Employability in Health Care Setting	ELEC705	Bachelor of Science (Nursing)	Quiz, Presentation, Practical, Nursing Lab, Report writing, Class performance	2011
3707	Internship (Intensive Practicum/ Residency Posting)	INTE440	Bachelor of Science (Nursing)	Report Writing, Presentation, Viva-Voce	2011
3708	Nutrition and Dietetics	NUR2106	Post Basic Bachelor of Science (Nursing)	Quiz, Presentation, Practical, Nursing Lab, Report writing, Class performance	2012
3709	Medical Surgical Nursing	NUR2108	Post Basic Bachelor of Science (Nursing)	Quiz, Presentation, Practical, Nursing Lab, Report writing, Class performance	2012
3710	Medical Surgical Nursing (Practical)	NUR2110	Post Basic Bachelor of Science (Nursing)	Quiz, Presentation, Practical, Nursing Lab, Report writing, Class performance	2012
3711	Maternal Nursing	NUR2208	Post Basic Bachelor of Science (Nursing)	Quiz, Presentation, Practical, Nursing Lab, Report writing, Class performance	2012
3712	Pediatric Nursing	NUR2209	Post Basic Bachelor of Science (Nursing)	Quiz, Presentation, Practical, Nursing Lab, Report writing, Class performance	2012
3713	Maternal Nursing (Practical)	NUR2211	Post Basic Bachelor of Science (Nursing)	Quiz, Presentation, Practical, Nursing Lab, Report writing, Class performance	2012

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
3714	Pediatric Nursing (Practical)	NUR2212	Post Basic Bachelor of Science (Nursing)	Quiz, Presentation, Practical, Nursing Lab, Report writing, Class performance	2012
3715	Community Health Nursing (Practical)	NUR2308	Post Basic Bachelor of Science (Nursing)	Quiz, Presentation, Practical, Nursing Lab, Report writing, Class performance	2012
3716	Introduction to Nursing Research and Statistics	NUR2407	Post Basic Bachelor of Science (Nursing)	Quiz, Presentation, Practical, Nursing Lab, Report writing, Class performance	2012
3717	Psychiatric Nursing (Practical)	NUR2408	Post Basic Bachelor of Science (Nursing)	Quiz, Presentation, Practical, Nursing Lab, Report writing, Class performance	2012
3718	Dissertation (Nursing Research)	NUR2437	Post Basic Bachelor of Science (Nursing)	Report Writing, Presentation, Viva-Voce	2012
3719	Nursing Education Practical	NUR4102	Master of Science (Nursing)	Quiz, Presentation, Practical, Nursing Lab, Report writing, Class performance	2015
3720	Advance Nursing Practice	NUR4201	Master of Science (Nursing)	Quiz, Presentation, Practical, Nursing Lab, Report writing, Class performance	2015
3721	Nursing Research & Statistics	NUR4202	Master of Science (Nursing)	Quiz, Presentation, Practical, Nursing Lab, Report writing, Class performance	2015
3722	Medical Surgical Nursing CS-I & II Practical	MSN4203	Master of Science (Nursing)	Quiz, Presentation, Practical, Nursing Lab, Report writing, Class performance	2015
3723	Community Health Nursing CS-I & II Practical	CHN4203	Master of Science (Nursing)	Quiz, Presentation, Practical, Nursing Lab, Report writing, Class performance	2015
3724	Psychiatric Nursing CS-I & II Practical	PSN4203	Master of Science (Nursing)	Quiz, Presentation, Practical, Nursing Lab, Report writing, Class performance	2015
3725	Obstetric & Gynaecological Nursing CS-I & II Practical	OGN4203	Master of Science (Nursing)	Quiz, Presentation, Practical, Nursing Lab, Report writing, Class performance	2015
3726	Child Health Nursing CS-I & II Practical	PDN4203	Master of Science (Nursing)	Quiz, Presentation, Practical, Nursing Lab, Report writing, Class performance	2015
3727	Nursing Research Project	NUR4337	Master of Science (Nursing)	Report Writing, Presentation, Viva-Voce	2015
3728	Nursing Research Dissertation	NUR4437	Master of Science (Nursing)	Report Writing, Presentation, Viva-Voce	2015
3729	Cardiothoracic & Vascular Nursing CS-III & IV Practical	MSN4402	Master of Science (Nursing)	Quiz, Presentation, Practical, Nursing Lab, Report writing, Class performance	2015
3730	Critical Care Nursing CS-III & IV Practical	MSN4403	Master of Science (Nursing)	Quiz, Presentation, Practical, Nursing Lab, Report writing, Class performance	2015
3731	Oncology Nursing CS-III & IV Practical	MSN4404	Master of Science (Nursing)	Quiz, Presentation, Practical, Nursing Lab, Report writing, Class performance	2015

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3732	Neurosciences Nursing CS-III & IV Practical	MSN4405	Master of Science (Nursing)	Quiz, Presentation, Practical, Nursing Lab, Report writing, Class performance	2015
3733	Nephro-Urology Nursing CS-III & IV Practical	MSN4406	Master of Science (Nursing)	Quiz, Presentation, Practical, Nursing Lab, Report writing, Class performance	2015
3734	Orthopedic Nursing CS-III & IV Practical	MSN4407	Master of Science (Nursing)	Quiz, Presentation, Practical, Nursing Lab, Report writing, Class performance	2015
3735	Gastro Enterology Nursing CS-III & IV Practical	MSN4408	Master of Science (Nursing)	Quiz, Presentation, Practical, Nursing Lab, Report writing, Class performance	2015
3736	Community Health Nursing CS-III & IV Practical	CHN4402	Master of Science (Nursing)	Quiz, Presentation, Practical, Nursing Lab, Report writing, Class performance	2015
3737	Psychiatric Nursing CS-III & IV Practical	PSN4402	Master of Science (Nursing)	Quiz, Presentation, Practical, Nursing Lab, Report writing, Class performance	2015
3738	Obstetric & Gynaecological Nursing CS-III & IV Practical	OGN4402	Master of Science (Nursing)	Quiz, Presentation, Practical, Nursing Lab, Report writing, Class performance	2015
3739	Child Health Nursing CS-III & IV Practical	PDN4402	Master of Science (Nursing)	Quiz, Presentation, Practical, Nursing Lab, Report writing, Class performance	2015
3740	Pharmaceutical Analysis	BP102T	Bachelor of Pharmacy	Quiz, Group Discussion, Presentation, Viva-Voce	2018
3741	Communication Skills	BP105T	Bachelor of Pharmacy	Quiz, Viva-Voce, Presentation	2018
3742	Human Anatomy and Physiology Practical-I	BP107P	Bachelor of Pharmacy	Quiz (Practical based), Viva-Voce, Practical, Lab record	2018
3743	Pharmaceutical Analysis Practical	BP108P	Bachelor of Pharmacy	Quiz (Practical based), Viva-Voce, Practical, Lab record	2018
3744	Pharmaceutics-I Practical	BP109P	Bachelor of Pharmacy	Quiz (Practical based), Viva-Voce, Practical, Lab record	2018
3745	Pharmaceutical Inorganic Chemistry Practical	BP110P	Bachelor of Pharmacy	Quiz (Practical based), Viva-Voce, Practical, Lab record	2018
3746	Communication Skills Practical	BP111P	Bachelor of Pharmacy	Quiz, Viva-Voce, Presentation	2018
3747	Remedial Biology Practical	BP112RBP	Bachelor of Pharmacy	Quiz (Practical based), Viva-Voce, Practical, Lab record	2018
3748	Computer Applications in Pharmacy	BP205T	Bachelor of Pharmacy	Quiz, Group Discussion, Presentation, Viva-Voce	2018
3749	Environmental Sciences	BP206T	Bachelor of Pharmacy	Quiz, Group Discussion, Presentation, Viva-Voce	2018
3750	Human Anatomy and Physiology Practical-II	BP207P	Bachelor of Pharmacy	Quiz (Practical based), Viva-Voce, Practical, Lab record	2018
3751	Pharmaceutical Organic Chemistry Practical-I	BP208P	Bachelor of Pharmacy	Quiz (Practical based), Viva-Voce, Practical, Lab record	2018
3752	Biochemistry Practical	BP209P	Bachelor of Pharmacy	Quiz (Practical based), Viva-Voce, Practical, Lab record	2018
3753	Computer Applications in Pharmacy Practical	BP210P	Bachelor of Pharmacy	Quiz (Practical based), Viva-Voce, Practical, Lab record	2018

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3754	Pharmaceutical Microbiology	BP303T	Bachelor of Pharmacy	Quiz, Group Discussion, Presentation, Viva-Voce	2018
3755	Pharmaceutical Engineering	BP304T	Bachelor of Pharmacy	Quiz, Group Discussion, Presentation, Viva-Voce	2018
3756	Pharmaceutical Organic Chemistry Practical-II	BP305P	Bachelor of Pharmacy	Quiz (Practical based), Viva-Voce, Practical, Lab record	2018
3757	Physical Pharmaceutics Practical-I	BP306P	Bachelor of Pharmacy	Quiz (Practical based), Viva-Voce, Practical, Lab record	2018
3758	Pharmaceutical Microbiology Practical	BP307P	Bachelor of Pharmacy	Quiz (Practical based), Viva-Voce, Practical, Lab record	2018
3759	Pharmaceutical Engineering Practical	BP308P	Bachelor of Pharmacy	Quiz (Practical based), Viva-Voce, Practical, Lab record	2018
3760	Medicinal Chemistry Practical-I	BP406P	Bachelor of Pharmacy	Quiz (Practical based), Viva-Voce, Practical, Lab record	2018
3761	Physical Pharmaceutics Practical-II	BP407P	Bachelor of Pharmacy	Quiz (Practical based), Viva-Voce, Practical, Lab record	2018
3762	Pharmacology Practical-I	BP408P	Bachelor of Pharmacy	Quiz (Practical based), Viva-Voce, Practical, Lab record	2018
3763	Pharmacognosy and Phytochemistry Practical-I	BP409P	Bachelor of Pharmacy	Quiz (Practical based), Viva-Voce, Practical, Lab record	2018
3764	Industrial Pharmacy-I	BP502T	Bachelor of Pharmacy	Quiz, Group Discussion, Presentation, Viva-Voce	2018
3765	Pharmaceutical Jurisprudence	BP505T	Bachelor of Pharmacy	Quiz, Group Discussion, Presentation, Viva-Voce	2018
3766	Industrial Pharmacy Practical-I	BP506P	Bachelor of Pharmacy	Quiz (Practical based), Viva-Voce, Practical, Lab record	2018
3767	Pharmacology Practical-II	BP507P	Bachelor of Pharmacy	Quiz (Practical based), Viva-Voce, Practical, Lab record	2018
3768	Pharmacognosy and Phytochemistry Practical-II	BP508P	Bachelor of Pharmacy	Quiz (Practical based), Viva-Voce, Practical, Lab record	2018
3769	Herbal Drug Technology	BP603T	Bachelor of Pharmacy	Quiz, Group Discussion, Presentation, Viva-Voce	2018
3770	Quality Assurance	BP606T	Bachelor of Pharmacy	Quiz, Group Discussion, Presentation, Viva-Voce	2018
3771	Medicinal Chemistry Practical-III	BP607P	Bachelor of Pharmacy	Quiz (Practical based), Viva-Voce, Practical, Lab record	2018
3772	Pharmacology Practical-III	BP608P	Bachelor of Pharmacy	Quiz (Practical based), Viva-Voce, Practical, Lab record	2018
3773	Herbal Drug Technology Practical	BP609P	Bachelor of Pharmacy	Quiz (Practical based), Viva-Voce, Practical, Lab record	2018
3774	Industrial Pharmacy-II	BP702T	Bachelor of Pharmacy	Quiz, Group Discussion, Presentation, Viva-Voce	2018
3775	Pharmacy Practice	BP703T	Bachelor of Pharmacy	Quiz, Group Discussion, Presentation, Viva-Voce	2018
3776	Novel Drug Delivery System	BP704T	Bachelor of Pharmacy	Quiz, Group Discussion, Presentation, Viva-Voce	2018
3777	Instrumental Methods of Analysis Practical	BP705P	Bachelor of Pharmacy	Quiz (Practical based), Viva-Voce, Practical, Lab record	2018
3778	Practice School	BP706PS	Bachelor of Pharmacy	Quiz (Practical based), Viva-Voce, Practical, Lab record	2018

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1.1.3 Total number of courses having focus on employability/ entrepreneurship / skill development offered during the year (2022)

Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
3779	Biostatistics and Research Methodology	BP801T	Bachelor of Pharmacy	Quiz, Group Discussion, Presentation, Viva-Voce	2018
3780	Social and Preventive Pharmacy	BP802T	Bachelor of Pharmacy	Quiz, Group Discussion, Presentation, Viva-Voce	2018
3781	Project Work	BP813PW	Bachelor of Pharmacy	Report Writing, Viva-Voce, Presentation	2018
3782	Quality Control and Standardization of Herbals	BP806ET	Bachelor of Pharmacy	Quiz, Group Discussion, Presentation, Viva-Voce	2018
3783	Computer Aided Drug Design	BP807ET	Bachelor of Pharmacy	Quiz, Group Discussion, Presentation, Viva-Voce	2018
3784	Cosmetic Science	BP809ET	Bachelor of Pharmacy	Quiz, Group Discussion, Presentation, Viva-Voce	2018
3785	Experimental Pharmacology	BP810ET	Bachelor of Pharmacy	Quiz, Group Discussion, Presentation, Viva-Voce	2018
3786	Advanced Instrumentation Techniques	BP811ET	Bachelor of Pharmacy	Quiz, Group Discussion, Presentation, Viva-Voce	2018
3787	Architectural Graphics Skills-I	ARC2104	Bachelor of Architecture	Portfolio, Project Report, Practical Report Writing, Quiz, Viva-Voce, Presentation, Case-Discussion	2012
3788	Visual Arts-I	ARC2105	Bachelor of Architecture	Portfolio, Project Report, Practical Report Writing, Quiz, Viva-Voce, Presentation, Case-Discussion	2012
3789	Structure-I	ARC2109	Bachelor of Architecture	Portfolio, Project Report, Practical Report Writing, Quiz, Viva-Voce, Presentation, Case-Discussion	2012
3790	Architectural Graphics Skills-II	ARC2204	Bachelor of Architecture	Portfolio, Project Report, Practical Report Writing, Quiz, Viva-Voce, Presentation, Case-Discussion	2012
3791	Visual Arts-II	ARC2205	Bachelor of Architecture	Portfolio, Project Report, Practical Report Writing, Quiz, Viva-Voce, Presentation, Case-Discussion	2012
3792	Structure-II	ARC2209	Bachelor of Architecture	Portfolio, Project Report, Practical Report Writing, Quiz, Viva-Voce, Presentation, Case-Discussion	2012
3793	Architectural Graphics Skills-III	ARC2304	Bachelor of Architecture	Portfolio, Project Report, Practical Report Writing, Quiz, Viva-Voce, Presentation, Case-Discussion	2012
3794	Visual Arts-III	ARC2305	Bachelor of Architecture	Portfolio, Project Report, Practical Report Writing, Quiz, Viva-Voce, Presentation, Case-Discussion	2012

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1.1.3 Total number of courses having focus on employability/ entrepreneurship / skill development offered during the year (2022)

Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
3795	Structure-III	ARC2308	Bachelor of Architecture	Portfolio, Project Report, Practical Report Writing, Quiz, Viva-Voce, Presentation, Case-Discussion	2012
3796	Surveying & Leveling	ARC2313	Bachelor of Architecture	Portfolio, Project Report, Practical Report Writing, Quiz, Viva-Voce, Presentation, Case-Discussion	2012
3797	Structure-IV	ARC2409	Bachelor of Architecture	Portfolio, Project Report, Practical Report Writing, Quiz, Viva-Voce, Presentation, Case-Discussion	2012
3798	Computer Applications-I	ARC2413	Bachelor of Architecture	Portfolio, Project Report, Practical Report Writing, Quiz, Viva-Voce, Presentation, Case-Discussion	2012
3799	Visual Arts-IV	ARC2414	Bachelor of Architecture	Portfolio, Project Report, Practical Report Writing, Quiz, Viva-Voce, Presentation, Case-Discussion	2012
3800	Structure-V	ARC2509	Bachelor of Architecture	Portfolio, Project Report, Practical Report Writing, Quiz, Viva-Voce, Presentation, Case-Discussion	2012
3801	Computer Applications-II	ARC2513	Bachelor of Architecture	Portfolio, Project Report, Practical Report Writing, Quiz, Viva-Voce, Presentation, Case-Discussion	2012
3802	People Culture & Built Environment-I	ARC2519	Bachelor of Architecture	Portfolio, Project Report, Practical Report Writing, Quiz, Viva-Voce, Presentation, Case-Discussion	2012
3803	Ecology, Environment & Sustainable Development-I	ARC2520	Bachelor of Architecture	Portfolio, Project Report, Practical Report Writing, Quiz, Viva-Voce, Presentation, Case-Discussion	2012
3804	Computer Applications & Advance Technologies-I	ARC2521	Bachelor of Architecture	Portfolio, Project Report, Practical Report Writing, Quiz, Viva-Voce, Presentation, Case-Discussion	2012
3805	Structure-VI	ARC2609	Bachelor of Architecture	Portfolio, Project Report, Practical Report Writing, Quiz, Viva-Voce, Presentation, Case-Discussion	2012
3806	Site Planning & Landscape	ARC2617	Bachelor of Architecture	Portfolio, Project Report, Practical Report Writing, Quiz, Viva-Voce, Presentation, Case-Discussion	2012

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1.1.3 Total number of courses having focus on employability/ entrepreneurship / skill development offered during the year (2022)

Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
3807	People Culture & Built Environment-II	ARC2620	Bachelor of Architecture	Portfolio, Project Report, Practical Report Writing, Quiz, Viva-Voce, Presentation, Case-Discussion	2012
3808	Ecology, Environment & Sustainable Development-II	ARC2621	Bachelor of Architecture	Portfolio, Project Report, Practical Report Writing, Quiz, Viva-Voce, Presentation, Case-Discussion	2012
3809	Computer Applications & Advance Technologies-II	ARC2622	Bachelor of Architecture	Portfolio, Project Report, Practical Report Writing, Quiz, Viva-Voce, Presentation, Case-Discussion	2012
3810	Structure-VII	ARC2703	Bachelor of Architecture	Portfolio, Project Report, Practical Report Writing, Quiz, Viva-Voce, Presentation, Case-Discussion	2012
3811	Research Methodology	ARC2705	Bachelor of Architecture	Portfolio, Project Report, Practical Report Writing, Quiz, Viva-Voce, Presentation, Case-Discussion	2012
3812	LEED Lab-I	ARC2717	Bachelor of Architecture	Portfolio, Project Report, Practical Report Writing, Quiz, Viva-Voce, Presentation, Case-Discussion	2012
3813	Interior Design	ARC2718	Bachelor of Architecture	Portfolio, Project Report, Practical Report Writing, Quiz, Viva-Voce, Presentation, Case-Discussion	2012
3814	Specification, Estimation & Valuation	ARC2720	Bachelor of Architecture	Portfolio, Project Report, Practical Report Writing, Quiz, Viva-Voce, Presentation, Case-Discussion	2012
3815	People Culture & Built Environment-III	ARC2721	Bachelor of Architecture	Portfolio, Project Report, Practical Report Writing, Quiz, Viva-Voce, Presentation, Case-Discussion	2012
3816	Ecology, Environment & Sustainable Development-III	ARC2722	Bachelor of Architecture	Portfolio, Project Report, Practical Report Writing, Quiz, Viva-Voce, Presentation, Case-Discussion	2012
3817	Computer Applications & Advance Technologies-III	ARC2723	Bachelor of Architecture	Portfolio, Project Report, Practical Report Writing, Quiz, Viva-Voce, Presentation, Case-Discussion	2012
3818	Structure-VIII	ARC2815	Bachelor of Architecture	Portfolio, Project Report, Practical Report Writing, Quiz, Viva-Voce, Presentation, Case-Discussion	2012

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1.1.3 Total number of courses having focus on employability/ entrepreneurship / skill development offered during the year (2022)

Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
3819	Town Planning	ARC2816	Bachelor of Architecture	Portfolio, Project Report, Practical Report Writing, Quiz, Viva-Voce, Presentation, Case-Discussion	2012
3820	LEED Lab-II	ARC2817	Bachelor of Architecture	Portfolio, Project Report, Practical Report Writing, Quiz, Viva-Voce, Presentation, Case-Discussion	2012
3821	Dissertation	ARC2837	Bachelor of Architecture	Portfolio, Report Writing, Viva-Voce, Presentation	2012
3822	People Culture & Built Environment-IV	ARC2818	Bachelor of Architecture	Portfolio, Project Report, Practical Report Writing, Quiz, Viva-Voce, Presentation, Case-Discussion	2012
3823	Ecology, Environment & Sustainable Development-IV	ARC2819	Bachelor of Architecture	Portfolio, Project Report, Practical Report Writing, Quiz, Viva-Voce, Presentation, Case-Discussion	2012
3824	Computer Applications & Advance Technologies-IV	ARC2820	Bachelor of Architecture	Portfolio, Project Report, Practical Report Writing, Quiz, Viva-Voce, Presentation, Case-Discussion	2012
3825	Practical Training	ARC2937	Bachelor of Architecture	Portfolio, Report Writing, Viva-Voce, Presentation	2012
3826	Architectural Thesis	ARC2037	Bachelor of Architecture	Portfolio, Report Writing, Viva-Voce, Presentation	2012
3827	Professional Practice	ARC2001	Bachelor of Architecture	Portfolio, Report Writing, Viva-Voce, Presentation	2012
3828	Career Development	ARC2002	Bachelor of Architecture	Portfolio, Report Writing, Viva-Voce, Presentation	2012
3829	Understanding Cultural Landscapes for Urban Renewal & Conservation	ARC2003	Bachelor of Architecture	Portfolio, Project Report, Practical Report Writing, Quiz, Viva-Voce, Presentation, Case-Discussion	2012
3830	Smart Cities and Smart Technologies	ARC2004	Bachelor of Architecture	Portfolio, Project Report, Practical Report Writing, Quiz, Viva-Voce, Presentation, Case-Discussion	2012
3831	Transit Oriented Development	ARC2005	Bachelor of Architecture	Portfolio, Project Report, Practical Report Writing, Quiz, Viva-Voce, Presentation, Case-Discussion	2012
3832	Statistical and Quantitative Methods in Planning	PLN2104	Bachelor of Planning	Project Report, Quiz, Viva-Voce, Presentation, Case-Discussion	2011
3833	Techniques of Planning-I	PLN2109	Bachelor of Planning	Project Report, Quiz, Viva-Voce, Presentation, Case-Discussion	2011
3834	Basic Computer Applications	PLN2110	Bachelor of Planning	Project Report, Quiz, Viva-Voce, Presentation, Case-Discussion	2011
3835	Planning and Design Lab-I	PLN2107	Bachelor of Planning	Project Report, Quiz, Viva-Voce, Presentation, Case-Discussion	2011

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1.1.3 Total number of courses having focus on employability/ entrepreneurship / skill development offered during the year (2022)

Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
3836	Geo-Informatics for Planning-I	PLN2211	Bachelor of Planning	Project Report, Quiz, Viva-Voce, Presentation, Case-Discussion	2011
3837	Planning and Design Lab-II	PLN2208	Bachelor of Planning	Project Report, Quiz, Viva-Voce, Presentation, Case-Discussion	2011
3838	Techniques of Planning-II	PLN2303	Bachelor of Planning	Project Report, Quiz, Viva-Voce, Presentation, Case-Discussion	2011
3839	Traffic and Transportation Planning-I	PLN2306	Bachelor of Planning	Project Report, Quiz, Viva-Voce, Presentation, Case-Discussion	2011
3840	Planning and Design Lab-III	PLN2307	Bachelor of Planning	Project Report, Quiz, Viva-Voce, Presentation, Case-Discussion	2011
3841	Planning Practice-I	PLN2402	Bachelor of Planning	Project Report, Quiz, Viva-Voce, Presentation, Case-Discussion	2011
3842	Traffic and Transportation Planning-II	PLN2403	Bachelor of Planning	Project Report, Quiz, Viva-Voce, Presentation, Case-Discussion	2011
3843	Planning and Design Lab-IV	PLN2407	Bachelor of Planning	Project Report, Quiz, Viva-Voce, Presentation, Case-Discussion	2011
3844	Real Estate Development and Management	PLN2411	Bachelor of Planning	Project Report, Quiz, Viva-Voce, Presentation, Case-Discussion	2011
3845	Disaster Risk Management and Climate Change Adaptations	PLN2509	Bachelor of Planning	Project Report, Quiz, Viva-Voce, Presentation, Case-Discussion	2011
3846	Ecology, Environment and Resource Development & Management	PLN2511	Bachelor of Planning	Project Report, Quiz, Viva-Voce, Presentation, Case-Discussion	2011
3847	Planning and Design Lab-V	PLN2507	Bachelor of Planning	Project Report, Quiz, Viva-Voce, Presentation, Case-Discussion	2011
3848	Professional Training-I	PLN2508	Bachelor of Planning	Project Report, Quiz, Viva-Voce, Presentation, Case-Discussion	2011
3849	Infographic and Storytelling Techniques	PLN2513	Bachelor of Planning	Project Report, Quiz, Viva-Voce, Presentation, Case-Discussion	2011
3850	Eco-Tourism	PLN2514	Bachelor of Planning	Project Report, Quiz, Viva-Voce, Presentation, Case-Discussion	2011
3851	Planning and Design Lab-VI	PLN2607	Bachelor of Planning	Project Report, Quiz, Viva-Voce, Presentation, Case-Discussion	2011
3852	Big Data and Data Analysis	PLN2614	Bachelor of Planning	Project Report, Quiz, Viva-Voce, Presentation, Case-Discussion	2011
3853	Project Formulation, Appraisal and Management	PLN2711	Bachelor of Planning	Project Report, Quiz, Viva-Voce, Presentation, Case-Discussion	2011
3854	Planning and Design Lab-VII	PLN2706	Bachelor of Planning	Project Report, Quiz, Viva-Voce, Presentation, Case-Discussion	2011
3855	Professional Training-II	PLN2707	Bachelor of Planning	Project Report, Quiz, Viva-Voce, Presentation	2011
3856	Dissertation	PLN2737	Bachelor of Planning	Project Report, Quiz, Viva-Voce, Presentation	2011
3857	Smart Cities and Advanced Technologies for Emerging Planning Issues	PLN2714	Bachelor of Planning	Project Report, Quiz, Viva-Voce, Presentation, Case-Discussion	2011
3858	Sustainable Cities and Regions	PLN2718	Bachelor of Planning	Project Report, Quiz, Viva-Voce, Presentation, Case-Discussion	2011
3859	Planning Practice – II	PLN2802	Bachelor of Planning	Project Report, Quiz, Viva-Voce, Presentation, Case-Discussion	2011

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1.1.3 Total number of courses having focus on employability/ entrepreneurship / skill development offered during the year (2022)

Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
3860	Planning Thesis	PLN2837	Bachelor of Planning	Project Report, Quiz, Viva-Voce, Presentation, Case-Discussion	2011
3861	Planning Techniques and Computer Applications	PLN4103	Master of Planning (Urban & Regional)	Project Report, Quiz, Viva-Voce, Presentation, Case-Discussion	2011
3862	Infrastructure Planning and Management	PLN4104	Master of Planning (Urban & Regional)	Project Report, Quiz, Viva-Voce, Presentation, Case-Discussion	2011
3863	Housing and Environmental Planning	PLN4105	Master of Planning (Urban & Regional)	Project Report, Quiz, Viva-Voce, Presentation, Case-Discussion	2011
3864	Planning Studio-I (i) Area Planning (ii) Village Development Plan	PLN4108	Master of Planning (Urban & Regional)	Project Report, Quiz, Viva-Voce, Presentation, Case-Discussion	2011
3865	Eco-Tourism	PLN4111	Master of Planning (Urban & Regional)	Project Report, Quiz, Viva-Voce, Presentation, Case-Discussion	2011
3866	Demography and Quantitative Analysis	PLN4212	Master of Planning (Urban & Regional)	Project Report, Quiz, Viva-Voce, Presentation, Case-Discussion	2011
3867	Planning Studio-II Urban Planning	PLN4206	Master of Planning (Urban & Regional)	Project Report, Quiz, Viva-Voce, Presentation, Case-Discussion	2011
3868	Special Area Planning	PLN4213	Master of Planning (Urban & Regional)	Project Report, Quiz, Viva-Voce, Presentation, Case-Discussion	2011
3869	Big Data and Data Analytics	PLN4216	Master of Planning (Urban & Regional)	Project Report, Quiz, Viva-Voce, Presentation, Case-Discussion	2011
3870	Research Methodology and Thesis Planning	PLN4310	Master of Planning (Urban & Regional)	Project Report, Quiz, Viva-Voce, Presentation, Case-Discussion	2011
3871	Planning Studio-III Regional Planning	PLN4307	Master of Planning (Urban & Regional)	Project Report, Quiz, Viva-Voce, Presentation, Case-Discussion	2011
3872	Smart Cities and Advanced Technologies for Emerging Planning Issues	PLN4312	Master of Planning (Urban & Regional)	Project Report, Quiz, Viva-Voce, Presentation, Case-Discussion	2011
3873	Sustainable Cities and Regions	PLN4315	Master of Planning (Urban & Regional)	Project Report, Quiz, Viva-Voce, Presentation, Case-Discussion	2011
3874	Planning Legislation and Professional Practice	PLN4403	Master of Planning (Urban & Regional)	Project Report, Quiz, Viva-Voce, Presentation, Case-Discussion	2011
3875	Planning Thesis	PLN4437	Master of Planning (Urban & Regional)	Project Report, Quiz, Viva-Voce, Presentation, Case-Discussion	2011
3876	Introduction to Disaster Management	DSM2151	Disaster Management & Sustainable Built Environment (OE)	Quiz, Class Performance, Project, Presentation, Viva-Voce	2021
3877	Resilience Building for Built Environment	DSM2251	Disaster Management & Sustainable Built Environment (OE)	Quiz, Class Performance, Project, Presentation, Viva-Voce	2021
3878	Emergency Management	DSM2351	Disaster Management & Sustainable Built Environment (OE)	Quiz, Class Performance, Project, Presentation, Viva-Voce	2021
3879	Rehabilitation Reconstruction and Recovery	DSM2451	Disaster Management & Sustainable Built Environment (OE)	Quiz, Class Performance, Project, Presentation, Viva-Voce	2021
3880	Climate Change Adaptations and Sustainable Development	DSM2551	Disaster Management & Sustainable Built Environment (OE)	Quiz, Class Performance, Project, Presentation, Viva-Voce	2021
3881	Geoinformatics in Disaster Management	DSM2651	Disaster Management & Sustainable Built Environment (OE)	Quiz, Class Performance, Project, Presentation, Viva-Voce	2021

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
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* OE- Open Electives

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List of MoU's focusing on Employability, Entrepreneurship and Skill Development

Sl. No.	Organisation with which MoU is signed	Year of Signing MoU
1	Bhansali Elektro Pvt. Ltd., IMT Manesar, Gurgaon	2022-23
2	Faculty of Legal Studies, Motherhood University, Roorkee	2022-23
3	Global Health Ltd (Medanta) Nursing	2022-23
4	M/S S K Enterprises	2022-23
5	Amplifon (India) Pvt. Ltd.	2022-23
6	University of Sao Paulo	2022-23
7	AIESEC in Delhi University	2022-23
8	Brandwidth Apparels LLP, Gurgaon	2022-23
9	Sanatan dharma college, Ambala Cantt.	2022-23
10	National Aeronautics and Space Administration (NASA) - Aerosol Robotic Network (AERONET), GSFC, Greenbelt, Maryland, USA	2022-23
11	McKinley Rice, Inc.	2022-23
12	Karat Lawz Academy	2022-23
13	India Meteorological Department (IMD), New Delhi	2022-23
14	Legal Bites	2022-23
15	Strategic Educational Professional Pvt. Ltd. (SEPPL)	2022-23
16	ISDC Projects India Pvt. Ltd.	2022-23
17	Aarvy Healthcare Super Speciality Hospital	2022-23
18	S.S. Rana & Co.	2022-23
19	School of Pharmaceutical Sciences, University of Sao paulo, Brazil	2022-23
20	Korean Ginseng Society Research Grant	2022-23


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Bachelor of Arts Economics (Honors)

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Curriculum & Scheme of Examination

2022

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Bachelor of Arts Economics (Honors)

COMPUTERS IN MANAGEMENT

Course Code: MGT2101

CreditUnits: 03

Course Objective:

The objective of this subject is to provide conceptual knowledge of the information technology to the future Managers. This subject highlights the topics like Database Management, Networking, Internet, E-commerce etc., which can help managers to take routine decisions very efficiently.

Course Contents:

Module I: World of Computers

Introduction to world of Computers, Computers in home (Reference, Education & Communications, Entertainment and Digital Media Delivery, Smart Appliances, Home Computers), Computers in education, Computers in workplace (productivity and decision making, customer services, communications), Computers on the move (Portable and Hand held computers, Self-Service kiosks, GPS Applications), Support Systems - Hardware and Software, Computer Peripherals, Memory Management.

Module II: Computer Networks

Introduction to Computer Networks, Networking components, Classification and types of Networks, Network Topologies – Overview with Advantages and Disadvantages, Communication Channels, Client Sever Architecture, LAN concepts.

Module III: Internet Technology & World Wide Web

Introduction to internet intranet and Extranet, Myths about the Internet, Basic concepts of internet, Domain Name Service, Internet Protocols and Addressing, Services of internet, Internet and support Technologies, Censorship and Privacy issues.

Module IV: E-commerce

Introduction, E-Commerce Vs E-Business, Advantages & Disadvantages, E-Commerce Business Models, E-Commerce Technologies, Hosting E-Commerce Site – Planning and constructing web services, E-Commerce Applications, E-Core Values – Ethical, Legal, Taxation and International issues, E-Commerce Security Issues, Internet based Payment System.

Module V: Enterprise Resource Planning

Introduction, Scope and Benefit, ERP and related technologies (BPR, MIS, DSS, EIS, SCM, OLAP, etc), ERP implementation methodology – implementation life cycle, ERP and its success factors, Pitfalls and management concerns, ERP Market – renowned vendors and the packages.

Module VI: Database Management System

Introduction, Need for DBMS, Components of DBMS, Benefits of DBMS over Tradition File System, classification and types of Database Models, Database Approach – Its benefits and Disadvantages.

Examination Scheme:

Components	A	P	HA	CT	EE
Weightage (%)	5	10	5	10	70

(A-Attendance; P-Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination)

Text & References:**Text:**

- Deborah Morley - Understanding Computers: Today & Tomorrow, Eleventh Edition, April 11, 2007, Thomson

References:

- Rajaraman, V. 1998, An Introduction to Computers, Prentice Hall of India.
- Nagpal, 1999, Computer Fundamentals, Wheeler Publishing, New Delhi.
- Bhatnagar, S.C. and Ramani, K.V., Computers and Information Management.
- Hunt and Shelly. 1994, Computers and Commonsense, Prentice Hall of India

E-COMMERCE

Course Code: COM2103

Credit Units: 03

Course Objective:

The subject will provide students with the knowledge to cover wide-ranging aspects of conducting business on the Internet.

Course Contents:

Module I:E-Commerce Concept

Meaning, definition, concept, features, function of E-Commerce, E-Commerce practices v/s traditional practices, scope and basic models of E-Commerce, limitations of E-Commerce, precaution for secure E-Commerce, proxy services. Concept of EDI, difference between paper based Business and EDI based business, advantages of EDI, Application areas for EDI, action plan for implementing EDI, factors influencing the choice of EDI, Software concept of Electronic Signature, Access Control.

Module II: Types of E-Commerce

Meaning of B2C, B2B, C2C, P2P, Applications in B2C- E-Banking, E-Trading. E-Auction - Introduction and overview of these concepts. Application of B2B- E-distributor, B2B service provider, benefits of B2B on Procurement, Just in time delivery. Consumer to consumer and peer to peer business model Introduction and basic concepts

Module III: E-Marketing

Traditional Marketing V/S E-Marketing, impact of Ecommerce on markets, marketing issue in E-Marketing, promoting your E-Business, Direct marketing, one to one marketing

Module IV: E-Finance

Areas of E-Financing, E-Banking, traditional v/s E-Banking, operations in E-Banking; E-Trading- Stock marketing, trading v/s E-Trading, importance of E-Trading, advantages of E-trading, operational aspects of E-Trading.

Module V: E-Payment

Transactions through Internet, requirements of E-Payment system, post paid payment system- credit card solutions, cyber cash Internet cheques. Instant paid payment system- debit card, direct debit. Prepaid payment system- Electronic cash, digicash, netcash, cybercash, smart cards

Examination Scheme:

Components	A	P	HA	CT	EE
Weightage (%)	5	10	5	10	70

(A-Attendance; P-Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination)

Text & References:

Text:

- S. Jaiswal, E-Commerce, Galgotia Publications Pvt. Ltd.

References:

- Computer Today, S. Bansundara
- Kamlesh Bajaj and Debjani Nag, (2005) E-Commerce: The Cutting Edge of Business, McGraw Hill

TERM PAPER

Course Code: ECO2131

Credit Units: 02

Objectives

The objective of this course is to judge the understanding as well as application of the knowledge gained by the students. The aim of the term paper is to provide the students with an opportunity to further enhance their knowledge in a sector of their choice by undertaking a significant practical unit of examining and analyzing various aspects of business management at a level commensurate with the learning outcomes of the various courses taken up by them in the ongoing semester.

A term paper is primarily a record of intelligent reading in several sources on a particular subject. The students will choose the topic at the beginning of the session in consultation with the faculty assigned. At least one middle level or senior level person of a company from the chosen sector may be interviewed face to face.

Guidelines:

1. The term paper will be related to the contemporary business issue and the topic will be given by the department.
2. The presentation of the term paper is scheduled to be held before the commencement of Semester examinations.
3. The paper will carry 100 marks that will be marked on the basis of understanding and organization of content based on the literature review. The Bibliography shall form an important part of the paper.
4. Examples of a few broad areas for Term Paper (List is indicative, not exhaustive)
 - Inflation
 - Unemployment
 - Fiscal Deficit
 - Poverty
 - Education
 - Malnutrition
 - Rural Development
 - Regional Imbalance
 - Globalization
 - Foreign Direct Investment

Evaluation Scheme

Organisation and relevance of content	Literature Review	Bibliography	Presentation	Total
30	30	20	20	100

PROJECT

Course Code: ECO2132

Credit Units: 03

Objectives:

The aim of the project is to provide the students with an opportunity to further their intellectual and personal development in the chosen field by undertaking a significant practical unit of activity. The project can be defined as a scholarly inquiry into a problem or issues, involving a systematic approach to gathering and analysis of information / data, leading to production of a structured report.

Chapter Scheme and distribution of marks:

Chapter 1: Introduction – 10 marks

Chapter 2: Conceptual Framework/ National/International Scenario – 25 marks

Chapter 3: Presentation, Analysis & Findings -- 25 marks

Chapter 4: Conclusion & Recommendations -- 10 marks

Chapter 5: Bibliography -- 05 marks

Components of a Project Report

The outcome of Project Work is the Project Report. A project report should have the following components:

1) Cover Page: This should contain the title of the project proposal, to whom it is submitted, for which degree, the name of the author, name of the supervisor, year of submission of the project work, name of the University.

2) Acknowledgement: Various organizations and individuals who might have provided assistance /co-operation during the process of carrying out the study.

3) Table of Content: Page-wise listing of the main contents in the report, i.e., different Chapters and its main Sections along with their page numbers.

4) Body of the Report: The body of the report should have these four logical divisions

a) Introduction: This will cover the background, rationale/ need / justification, brief review of literature, objectives, methodology (the area of the study, sample, type of study, tools for data collection, and method of analysis), Limitations of the Study, and Chapter Planning.

b) Conceptual Framework / National and International Scenario: (relating to the topic of the Project).

c) Presentation of Data, Analysis and Findings: (using the tools and techniques mentioned in the methodology).

d) Conclusion and Recommendations: In this section, the concluding observations based on the main findings and suggestions are to be provided.

5) Bibliography or References: This section will include the list of books and articles which have been used in the project work, and in writing a project report.

6) Annexures: Questionnaires (if any), relevant reports, etc.

(The main text of the Project should normally be in the range of 5000 words. However, there may be annexure in addition to the main text)

The Steps of a Project Report

STEP I : Selection of the topic for the project by taking following points into consideration:

- Suitability of the topic.
- Relevance of the topic
- Time available at the disposal.
- Feasibility of data collection within the given time limit.
- Challenges involved in the data collection (time & cost involved in the data collection, possibility of getting responses, etc.)

STEP II : Finalisation of the Topic and preparation of Project Proposal in consultation with the Supervisor.

STEP III : Collection of information and data relating to the topic and analysis of the same.

STEP IV : Writing the report dividing it into suitable chapters, viz.,

Chapter 1: Introduction,

Chapter 2: Conceptual Framework / National & International Scenario,

Chapter 3: Analysis & Findings

Chapter 4: Conclusion and Recommendations.

Chapter 5: Bibliography

STEP V : The following documents are to be attached with the Final Project Report.

- Approval letter from the supervisor (Annexure-IA)
- Student's declaration (Annexure-IB)
- Certificate from the Competent Authority of the Organisation / Institution, if the student undertakes the Project Work in any Organisation / Institution.

Guidelines for evaluation:

- Each of the students has to undertake a Project individually under the supervision of a teacher and to submit the same following the guidelines stated below.
- Language of Project Report and Viva-Voce Examination may be English. The Project Report must be typed and hard bound.
- Failure to submit the Project Report or failure to appear at the Viva-voce Examination will be treated as "Absent" in the Examination. He /she has to submit the Project Report and appear at the Viva-Voce Examination in the subsequent years (within the time period as per University Rules).
- No marks will be allotted on the Project Report unless a candidate appears at the Viva-Voce Examination. Similarly, no marks will be allotted on Viva-Voce Examination unless a candidate submits his/her Project Report.
- Evaluation of the Project Work to be done jointly by one internal expert and one external expert with equal weightage, i.e., average marks of the internal and external experts will be allotted to the candidate. The evaluation scheme shall be as follows:

Project Report	Power Point Presentation & Viva
75 marks	25 marks

Student's Declaration

Ihereby declare that the Project Work with the title
(in block letters).....
submitted by me for the partial fulfilment of the degree of B.A. Honours in Economics is
my original work and has not been submitted earlier to any other University /Institution for
the fulfilment of the requirement for any course of study.

I also declare that no chapter of this manuscript in whole or in part has been incorporated in
this report from any earlier work done by others or by me. However, extracts of any
literature which has been used for this report has been duly acknowledged providing details
of such literature in the references.

Signature of Supervisor:

Name

Signature of Student

Registration No.

Place:

Date:

WORKSHOP

Course Code: ECO2133

Credit Units: 01

Objectives

A workshop is primarily an activity based academic event that is organized to provide the students a one to one and hands on experience on any aspect of their learning. The communication in a workshop has to be necessarily two way. The trainer has to make sure that the aspect covered are practically practiced by the participants. The student will choose the option of workshop from amongst their concentration electives. The evaluation will be done by Board of examiners comprising of the faculties.

Major Themes for Workshop

The workshop may be conducted on any of the following major themes:

- Accounting
- Finance
- Human Resources
- Marketing
- Economics
- Operations
- Supply Chain Management

These themes are merely indicative and other recent and relevant topics of study may be included.

Guidelines for Workshop

The procedure for earning credits from workshop consists of the following steps:

1. Relevant study material and references will be provided by the trainer in advance.
2. The participants are expected to explore the topic in advance and take active part in the discussions held
3. Attending and Participating in all activities of the workshop
4. Group Activities have to be undertaken by students as guided by the trainer.
5. Evaluation of workshop activities would be done through test and quiz at the end of the workshop.
6. Submitting a write up of atleast 500 words about the learning outcome from the workshop.

Methodology

The methodology followed at the workshop could be based on any one or more of the following methods:

- Case Study
- Business Game
- Simulation
- Group Activity
- Role Play
- Business Planning
- Quiz

Evaluation Scheme:

Attendance	Active Participation	Multiple Choice Questions/ Quiz	Solving the case/ Assignment/ Write up	Total
10	30	30	30	100

STATISTICAL METHODS IN ECONOMICS-I

Course Code: ECO2202

CreditUnits: 04

Course Objective:

This subject will deal with all fundamental statistical methods of tools which the students have to use in economic analysis and decision making problems.

Course Contents:

Module I: Introduction:

Basic concepts: Population, Sample, Parameter, Statistic, Frequency distribution, Cumulative frequency distribution; Graphic and diagrammatic representation of data; Techniques of data collection. Sampling vs. Population, primary and secondary data.

Module II: Central Tendency and Dispersion:

Measures of Central Tendency: Mean, Median, Mode, Geometric mean, Harmonic mean; Measures of Dispersion; Range, Quartile deviation Mean deviation, Standard deviation; Skewness and Kurtosis, Moments.

Module III: Correlation and Regression:

Correlation: Simple; Coefficient of correlation; Karl Pearson and Rank correlation; Partial and Multiple Correlation analysis; Regression analysis – Estimation of a regression line in a bivariate distribution, Least squares method; Interpretation of correlation and regression coefficients; Coefficient of determination.

Module IV: Time Series:

Time Series Analysis - concept and components, determination of trend (Linear, Quadratic and Exponential) and seasonal indices

Module V: Index Numbers

Concept of an index number; Laspeyer's, Paasche's and Fisher's Index Numbers; Time Reversal, Factor reversal and circular tests; Chain base index; Problems in the Construction of an index number; splicing; base shifting and use of index number for deflating other series.

Examination Scheme:

Components	A	P	HA	CT	EE
Weightage (%)	5	10	5	10	70

(A-Attendance; P-Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination)

Text & References:

Text:

- Allen Webster, Applied Statistics for Business and Economics, (3rd edition), McGraw Hill, International Edition 1998.
- Richard J. Larsen and Morris L. Marx, An Introduction to Mathematical Statistics and its Applications, Prentice Hall, 2011.

References:

- P.H. Karmel and M. Polasek, Applied Statistics for Economists (4th edition), Pitman, Australia.
- M.R. Spiegel (2nd edition), Theory and Problems of Statistics, SchaumSerie

INNOVATION & CREATIVITY MANAGEMENT

Course Code: MGT2205

CreditUnits: 03

Course Objective:

To develop an appreciation for new ideas and out of the box thinking so that students can successfully imbibe the habit of innovative and creative thinking in situations is demanding such an approach.

Course Contents:

Module I

Innovation Management- Introduction, characteristics, components, types, models of Innovation process, Innovation Environment-Originators of Innovation, Key Drivers of Innovation, Factors influencing Innovation, Nurturing Innovation in e-business.

Module II

Organizing for Innovation- Organizational theories and structures, traits of innovative organizations, current trends, factors influencing organizational design and size decisions, Need & Characteristics for creative organization, 7S framework, creativity crushers, fostering innovation climate and culture, the creativity Hit List.

Module III

Research and Development management- Significance, prerequisites, process, technology development approaches, management of R &D, In source to open source environment, R&D in small industry, Managing creative employees, significance and challenges of managing creative employees, Traits of a creative person, motivation to creativity, strategies for unblocking creativity, factors influencing group creativity, Promoting group creativity, Left and right thinking, Linear and non-linear thinking process, creative thinking, Tradition vs creative thinking.

Module IV

Individual creativity techniques- Inner and Directed creativity techniques, Group Creativity Techniques-creativity methods, writing techniques, techniques based on pictures, maps and networks, Product innovation-types of new products, Target markets for Disruptive Innovation, Technology strategies for innovation, new product development, packaging and positioning innovations, beyond product innovation, New product failures.

Module V

Innovation Diffusion- Concept of diffusion and adaptation, diffusion types, Innovation diffusion theory, Innovation adoption by organizations, Innovation adoption across countries, Marketing strategy and the diffusion process.

Module VI

Legal aspects of innovation- IPR, Indian Patents Act, trademark, Copyrights, Trade secrets, Towards Innovative Society-Innovation for social development, Spirit of innovation in India, Favourable and Unfavourable factors.

Examination Scheme:

Components	A	P	HA	CT	EE
Weightage (%)	5	10	5	10	70

A-Attendance; P-Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination)

Text & References:

Text:

- Krishnamacharyulu and Lalitha, *Innovation Management*, Himalaya Publishing House, New Delhi-2007

References:

- Plsek, *Creativity, Innovation and Quality*, Prentice Hall of India, New Delhi-2003

HUMAN VALUES AND PROFESSIONAL ETHICS

Course Code: MGT2206

CreditUnits: 03

Course Objective:

The aim of this course is to facilitate the development of a Holistic perspective among students towards life, profession and happiness, based on a correct understanding of the human reality and the rest of existence. Such a holistic perspective forms the basis of value based living in a natural way, recognize the need for lifelong learning and have the knowledge and skills that prepare them to identify the moral issues involved in management areas and to provide an understanding of the interface between social, technological and natural environments.

Course Contents:

Module I: Human Values

Morals, Values, types of values, evolution of human values, Ethics – Integrity – Work Ethic – Honesty – Courage –Empathy – Self-Confidence – Character, Challenges at Work place

Module II: Values in Management

Relevance of values in Management, need for values in global change, values for managers, holistic approach for managers in decision making, problems related to stress in corporate management

Module III: Workplace Rights and Responsibilities and Work Environment

Organizational complaint procedures; Government agencies; Resolving employee concerns; Limits on acceptable behavior in large corporation.

Work Environment:Ethical and legal considerations, Organizational responses to offensive behavior and harassment; Ethics in a Global Context.

Module IV: Industrial Integrity

The epitome of industrial success, Integrity and organization, exploring learning process of integrity, Consequences of lack of integrity

Examination Scheme:

Components	A	P	HA	CT	EE
Weightage (%)	5	10	5	10	70

(A-Attendance; P-Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination)

Text &References:


Text:

- R R Gaur, R Sangal, G P Bagaria, 2010, A Foundation Course in Human Values and Professional Ethics, Excel Books

References:

- Ivan Illich, 1974, Energy & Equity, The Trinity Press, Worcester, and HarperCollins, USA
- E.F. Schumacher, 1973, Small is Beautiful: a study of economics as if people mattered, Blond & Briggs, Britain.
- A Nagaraj, 1998, JeevanVidyaekParichay, Divya Path Sansthan, Amarkantak.
- Sussan George, 1976, How the Other Half Dies, Penguin Press. Reprinted 1986, 1991
- PL Dhar, RR Gaur, 1990, Science and Humanism, Commonwealth Purblishers.
- A.N. Tripathy, 2003, Human Values, New Age International Publishers.

- Donella H. Meadows, Dennis L. Meadows, Jorgen Randers, William W. Behrens III, 1972, Limits to Growth – Club of Rome’s report, Universe Books.



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Amity University Haryana
Manesar Gurgaon-122413

READINGS IN ECONOMICS

Course Code: ECO2230

Credit Units: 02

Objectives:

The objective of this concentration elective is to inculcate reading habit alongwith value addition to the existing understanding of the subject. The book would be a kind of knowledge enhancer that would envision the student about some current thoughts related to the discipline. The book reading and its critical analysis would help broaden the intellectual horizon of the student. A contemporary and relevant book will be selected by the concerned department.

Guidelines

The student is expected to thoroughly go through the discipline related prescribed book with the objective of critically reviewing each aspect and character of the book. The student is supposed to have a detailed insight into the following:

1. Content
2. Writing style
3. Information/learning
4. Content handling
5. Characters(if any)
6. Thematic Clarity

The report is to be submitted in about 3000 words on A4 size sheets, Font 12pt., Times New Roman, 1.5 spacing. Headings in Font Size16

Evaluation Scheme

Report on the Book in 3000 words	Written Test
50 marks	50 marks

TERM PAPER

Course Code: ECO2231

Credit Units: 02

Objectives:

The objective of this course is to judge the understanding as well as application of the knowledge gained by the students. The aim of the term paper is to provide the students with an opportunity to further enhance their knowledge in a sector of their choice by undertaking a significant practical unit of examining and analyzing various aspects of business management at a level commensurate with the learning outcomes of the various courses taken up by them in the ongoing semester.

A term paper is primarily a record of intelligent reading in several sources on a particular subject. The students will choose the topic at the beginning of the session in consultation with the faculty assigned. At least one middle level or senior level person of a company from the chosen sector may be interviewed face to face.

Guidelines:

1. The term paper will be related to the contemporary business issue and the topic will be given by the department.
2. The presentation of the term paper is scheduled to be held before the commencement of Semester examinations.
3. The paper will carry 100 marks that will be marked on the basis of understanding and organization of content based on the literature review. The Bibliography shall form an important part of the paper.
4. Examples of a few broad areas for Term Paper (List is indicative, not exhaustive)
 - Inflation
 - Unemployment
 - Fiscal Deficit
 - Poverty
 - Education
 - Malnutrition
 - Rural Development
 - Regional Imbalance
 - Globalization
 - Foreign Direct Investment

Evaluation Scheme:

Organisation and relevance of content	Literature Review	Bibliography	Presentation	Total
30	30	20	20	100

PROJECT

Course Code: ECO2232

Credit Units: 03

Objectives:

The aim of the project is to provide the students with an opportunity to further their intellectual and personal development in the chosen field by undertaking a significant practical unit of activity. The project can be defined as a scholarly inquiry into a problem or issues, involving a systematic approach to gathering and analysis of information / data, leading to production of a structured report.

Chapter Scheme and distribution of marks:

Chapter 1: Introduction – 10 marks

Chapter 2: Conceptual Framework/ National/International Scenario – 25 marks

Chapter 3: Presentation, Analysis & Findings -- 25 marks

Chapter 4: Conclusion & Recommendations -- 10 marks

Chapter 5: Bibliography -- 05 marks

Components of a Project Report

The outcome of Project Work is the Project Report. A project report should have the following components:

1) Cover Page: This should contain the title of the project proposal, to whom it is submitted, for which degree, the name of the author, name of the supervisor, year of submission of the project work, name of the University.

2) Acknowledgement: Various organizations and individuals who might have provided assistance /co-operation during the process of carrying out the study.

3) Table of Content: Page-wise listing of the main contents in the report, i.e., different Chapters and its main Sections along with their page numbers.

4) Body of the Report: The body of the report should have these four logical divisions

a) Introduction: This will cover the background, rationale/ need / justification, brief review of literature, objectives, methodology (the area of the study, sample, type of study, tools for data collection, and method of analysis), Limitations of the Study, and Chapter Planning.

b) Conceptual Framework / National and International Scenario: (relating to the topic of the Project).

c) Presentation of Data, Analysis and Findings: (using the tools and techniques mentioned in the methodology).

d) Conclusion and Recommendations: In this section, the concluding observations based on the main findings and suggestions are to be provided.

5) Bibliography or References: This section will include the list of books and articles which have been used in the project work, and in writing a project report.

6) Annexures: Questionnaires (if any), relevant reports, etc.

(The main text of the Project should normally be in the range of 5000 words. However, there may be annexure in addition to the main text)

The Steps of a Project Report

STEP I : Selection of the topic for the project by taking following points into consideration:

- Suitability of the topic.
- Relevance of the topic
- Time available at the disposal.
- Feasibility of data collection within the given time limit.

- Challenges involved in the data collection (time & cost involved in the data collection, possibility of getting responses, etc.)

STEP II : Finalisation of the Topic and preparation of Project Proposal in consultation with the Supervisor.

STEP III : Collection of information and data relating to the topic and analysis of the same.

STEP IV : Writing the report dividing it into suitable chapters, viz.,

Chapter 1: Introduction,

Chapter 2: Conceptual Framework / National & International Scenario,

Chapter 3: Analysis & Findings

Chapter 4: Conclusion and Recommendations.

Chapter 5: Bibliography

STEP V : The following documents are to be attached with the Final Project Report.

- Approval letter from the supervisor (Annexure-IA)
- Student's declaration (Annexure-IB)
- Certificate from the Competent Authority of the Organisation / Institution, if the student undertakes the Project Work in any Organisation / Institution.

Guidelines for evaluation:

- Each of the students has to undertake a Project individually under the supervision of a teacher and to submit the same following the guidelines stated below.
- Language of Project Report and Viva-Voce Examination may be English. The Project Report must be typed and hard bound.
- Failure to submit the Project Report or failure to appear at the Viva-voce Examination will be treated as "Absent" in the Examination. He /she has to submit the Project Report and appear at the Viva-Voce Examination in the subsequent years (within the time period as per University Rules).
- No marks will be allotted on the Project Report unless a candidate appears at the Viva-Voce Examination. Similarly, no marks will be allotted on Viva-Voce Examination unless a candidate submits his/her Project Report.
- Evaluation of the Project Work to be done jointly by one internal expert and one external expert with equal weightage, i.e., average marks of the internal and external experts will be allotted to the candidate. The evaluation scheme shall be as follows:

Project Report	Power Point Presentation & Viva
75 marks	25 marks

Student's Declaration

Ihereby declare that the Project Work with the title
(in block letters).....
submitted by me for the partial fulfilment of the degree of B.A. Honours in Economics is
my original work and has not been submitted earlier to any other University /Institution for
the fulfilment of the requirement for any course of study.

I also declare that no chapter of this manuscript in whole or in part has been incorporated in
this report from any earlier work done by others or by me. However, extracts of any
literature which has been used for this report has been duly acknowledged providing details
of such literature in the references.

Signature of Supervisor:

Name

Signature of Student

Registration No.

Place:

Date:

WORKSHOP

Course Code: ECO2233

Credit Units: 01

Objectives:

A workshop is primarily an activity based academic event that is organized to provide the students a one to one and hands on experience on any aspect of their learning. The communication in a workshop has to be necessarily two way. The trainer has to make sure that the aspect covered are practically practiced by the participants. The student will choose the option of workshop from amongst their concentration electives. The evaluation will be done by Board of examiners comprising of the faculties.

Major Themes for Workshop

The workshop may be conducted on any of the following major themes:

- Accounting
- Finance
- Human Resources
- Marketing
- Economics
- Operations
- Supply Chain Management

These themes are merely indicative and other recent and relevant topics of study may be included.

Guidelines for Workshop

The procedure for earning credits from workshop consists of the following steps:

1. Relevant study material and references will be provided by the trainer in advance.
2. The participants are expected to explore the topic in advance and take active part in the discussions held
3. Attending and Participating in all activities of the workshop
4. Group Activities have to be undertaken by students as guided by the trainer.
5. Evaluation of workshop activities would be done through test and quiz at the end of the workshop.
6. Submitting a write up of atleast 500 words about the learning outcome from the workshop.

Methodology

The methodology followed at the workshop could be based on any one or more of the following methods:

- Case Study
- Business Game
- Simulation
- Group Activity
- Role Play
- Business Planning
- Quiz

Evaluation Scheme:

Attendance	Active Participation	Multiple Choice Questions/ Quiz	Solving the case/ Assignment/ Write up	Total
10	30	30	30	100

STATISTICAL METHODS IN ECONOMICS - II

Course Code: ECO2302

Credit Units: 04

Course Objective:

This subject will lead the students into the field of probability and hypothesis testing. Each one of them has a lot of application in the practical problems of economics.

Course Contents:

Module I: Probability Theory

Elements of Probability Theory: Sample space Events, meaning of probability Classical definition of probability, The addition rule, Multiplication Rule, Theorems of total probability, conditional and statistical independence, limitation of classical definition, Bayes formula, random variable, expectation and variance of random variable (for random sampling with or without replacement)

Module II: Random Variables and Probability Distributions

Defining random variables; probability distributions; expected values of random variables and of functions of random variables; properties of commonly used discrete and continuous distributions (uniform, binomial, normal, poisson and exponential random variables).

Module III: Introduction to Estimation

Methods of sampling; sampling distribution of a statistic; distribution of the sample mean; sampling error and standard error of a statistic with special reference to the mean; Point and interval estimation of parameters; properties of an estimator; unbiasedness, relative efficiency and consistency.

Module IV: Hypothesis Testing

Testing of Hypothesis; type I and type II errors, power of a test; large sample tests, “t” test for the mean; one tail and two tail tests for difference of means; z-test, f-test, Chi-square test for (i) goodness of fit and (ii) independence of two attributes.

Examination Scheme:

Components	A	P	HA	CT	EE
Weightage (%)	5	10	5	10	70

(A-Attendance; P-Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination)

Text & References:

Text:

- Allen Webster, Applied Statistics for Business and Economics, (3rd edition), McGraw Hill, International Edition 1998.
- K. Sydsaeter and P. Hammond, Mathematics for Economic Analysis, Pearson Educational Asia, Delhi, 2002

References:

- P.H. Karmel and M. Polasek, Applied Statistics for Economists (4th edition), Pitman, Australia. M.R. Spiegel (2nd edition), Theory and Problems of Statistics, Schaum Series.

ECONOMICS OF ENTREPRENEURSHIP

Course Code: ECO2303

CreditUnits: 03

Course Objective:

The twenty first century has dawned with entrepreneurship as a major force shaping the global economy. The future growth of this economy lies in the hands of men and women committed to achieving success through innovative customer focussed new products and services. Therefore it is high time that the students had a glimpse of a few aspects of entrepreneurship.

Course Content:

Module I

Entrepreneurs - Concepts and qualities - Barriers - Structures - Definitions - Entrepreneur - Traits and types - Functions - Motivation - Project identification - Theories of entrepreneurship.

Module II

Steps for starting a small scale industry - selection of types of organisation - Small Scale Industry - Problems and sickness of small scale industry - Government Policy

Module III

Women Entrepreneur - Concept of women entrepreneur - Growth and Development of entrepreneurs - Functions - Rural women entrepreneurs - Problems of Women Entrepreneur - Role of Women's Association

Module IV

Financial Analysis - Social Cost and Benefit Analysis - Sources of Project Finance - Institutions helping entrepreneurs - Role of Commercial Banks - New Entrepreneurial Development Agencies

Module V

Entrepreneurial Development Programme (EDP) - Indian EDP - Risk - Development Strategy - Backward Area Development - International Business - Small Companies "going global"

Examination Scheme:

Components	A	P	HA	CT	EE
Weightage (%)	5	10	5	10	70

(A-Attendance; P-Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination)

Text and References:

Text:

- BhalthaCharjee; Entrepreneurial Development, Himalaya Publications
- Gupta &Srinivasan,N.P.; Entrepreneurial Development, S.Chand& Co.
- Nandan; Fundamentals of Entrepreneurship, Prentice Hall

References:

- Coulter; Entrepreneurship in action, Prentice Hall of India
- Edward F Marvicka, Jr; The Rational Investor, S.Chand& Co.
- Jayashree Suresh; Entrepreneurial Development, Margham Publications
- Khanka; Entrepreneurial Development, S.Chand& Co.
- Lankan Pal; Entrepreneurial Development
- Manimala; Entrepreneurship Theory at Cross Roads, S.Chand& Co
- Rastogi; Reengineering and Re-inventing the enterprise, S.Chand& Co.
- Robert D.Hisrich& Michael P.Peters; Entrepreneurship, Tata McGraw Hill
- Saini; Entrepreneurship, Theory and Practice, S.Chand& Co.

AGRICULTURAL ECONOMICS

Course Code: ECO2305

Credit Units: 03

Course Objective:

This subject is aimed at providing knowledge on the agricultural economy of India, its development, productivity, rural indebtedness and defects in the agricultural market and to develop a critical study on recent agricultural crises in India To familiarize the agricultural situation in India To provide sound knowledge base on India's Agricultural economy before green revolution and after it. To develop a critical study on recent Agricultural crises in India

Course Contents:

Module I

Features of Agriculture - Importance of Agriculture in the Indian Economy – Relationship between Agriculture and Non-Agriculture sectors

Module II

Agriculture Development in India - Subdivision and Fragmentation of holdings in India and causes - Land Tenure and Land Reforms
Productivity in Agriculture - New Agriculture Strategy - Green Revolution - Nature of Food Economy - Agriculture price policy in India - Public Distribution system

Module III

Rural Indebtedness - Causes of Rural Indebtedness - Sources of Agricultural Finance.
Market and Marketed Surplus - Defects in marketing Agricultural produce – Regulated markets - Co-operative marketing - Farmers Market.

Module IV

Current Issues in Indian Agriculture
Sustainable Agricultural growth- Concepts & Constraints

Examination Scheme:

Components	A	P	HA	CT	EE
Weightage (%)	5	10	5	10	70

(A-Attendance; P-Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination)

Text & References:

Text:

- RuddarDutt and K P M Sundaram(2012), Indian Economy, S. Chand & Co. Ltd, New Delhi.
- Bansil.B.C. Agricultural Problems of India, Vikas Publishing House. Pvt. Ltd., New Delhi.

References:

- Misra and Puri, Indian Economy, Himalaya Publishing House, Bombay.
- Sankaran.A. Agricultural Economy of India, Progressive Corporation. Pvt. Ltd., Bombay.
- Srivastava.O.S. Agricultural Economics, Rawat Publications, Jaipur, 1996.
- Ashok Gulati (2000), Indian Agriculture in an Open Economy: Will it Prosper? In Ahluwalia & Little (eds) India's Economic reforms & developmet: Essay for Manmohan Singh, Oxford University Press.

INDUSTRIAL PSYCHOLOGY

Course Code: MGT2305

Credit Units: 03

Course Objective:

This course is designed to provide an overview of Industrial Psychology including individual, group, and organizational issues resulting in enhanced understanding of the world of business and related career concerns. The main aim is to create awareness about the role and importance of psychological factors and processes in the world of work

Course Contents:

Module I: Introduction

Nature and scope of organizational Psychology – History and development of field; major problems of industrial psychology, current trends in organizational psychology

Module II: Types of Psychology

Mental psychology, Male & Female psychology; Impact on behavior and efficiency

Module III: Test of Psychology

Types of tests, Effectiveness of these tests; Measures to control the tests, steps to improve the psychology

Module IV: Individual and Group Behavior

Interaction and psychology involved in individuals; Improving psychology; Group Dynamics – Characteristics of group behavior; attitude measurement; methods of measuring attitudes; leadership and supervision; theories of leadership

Module IV: Performance Management

Performance appraisal- Introduction, types, importance; Training and development- Introduction, significance and categories/types of training

Examination Scheme:

Components	A	P	HA	CT	EE
Weightage (%)	5	10	5	10	70

A-Attendance; P-Project; HA-Home Assignment; CT-Class Test; EE-End Semester Examination


Text &References:

Text:

- Miner J.B. (1992) Industrial/Organizational Psychology. N Y : McGraw Hill.
- Blum & Naylor (2004) Industrial Psychology. Its Theoretical & Social Foundations CBS Publication.

References:

- Aamodt, M.G. (2012) Industrial/Organizational Psychology : An Applied Approach (7th edition) Wadsworth/Thompson : Belmont, C.A.
- Aswathappa K. (2008). Human Resource Management (fifth edition) New Delhi : Tata McGraw Hill.


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Registrar
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TERM PAPER

Course Code: ECO2331

Credit Units: 02

Objectives

The objective of this course is to judge the understanding as well as application of the knowledge gained by the students. The aim of the term paper is to provide the students with an opportunity to further enhance their knowledge in a sector of their choice by undertaking a significant practical unit of examining and analyzing various aspects of business management at a level commensurate with the learning outcomes of the various courses taken up by them in the ongoing semester.

A term paper is primarily a record of intelligent reading in several sources on a particular subject. The students will choose the topic at the beginning of the session in consultation with the faculty assigned. At least one middle level or senior level person of a company from the chosen sector may be interviewed face to face.

Guidelines:

1. The term paper will be related to the contemporary business issue and the topic will be given by the department.
2. The presentation of the term paper is scheduled to be held before the commencement of Semester examinations.
3. The paper will carry 100 marks that will be marked on the basis of understanding and organization of content based on the literature review. The Bibliography shall form an important part of the paper.
4. Examples of a few broad areas for Term Paper (List is indicative, not exhaustive)
 - Inflation
 - Unemployment
 - Fiscal Deficit
 - Poverty
 - Education
 - Malnutrition
 - Rural Development
 - Regional Imbalance
 - Globalization
 - Foreign Direct Investment

Evaluation Scheme

Organisation and relevance of content	Literature Review	Bibliography	Presentation	Total
30	30	20	20	100

PROJECT

Course Code: ECO2332

Credit Units: 03

Objectives:

The aim of the project is to provide the students with an opportunity to further their intellectual and personal development in the chosen field by undertaking a significant practical unit of activity. The project can be defined as a scholarly inquiry into a problem or issues, involving a systematic approach to gathering and analysis of information / data, leading to production of a structured report.

Chapter Scheme and distribution of marks:

Chapter 1: Introduction – 10 marks

Chapter 2: Conceptual Framework/ National/International Scenario – 25 marks

Chapter 3: Presentation, Analysis & Findings -- 25 marks

Chapter 4: Conclusion & Recommendations -- 10 marks

Chapter 5: Bibliography -- 05 marks

Components of a Project Report

The outcome of Project Work is the Project Report. A project report should have the following components:

1) Cover Page: This should contain the title of the project proposal, to whom it is submitted, for which degree, the name of the author, name of the supervisor, year of submission of the project work, name of the University.

2) Acknowledgement: Various organizations and individuals who might have provided assistance /co-operation during the process of carrying out the study.

3) Table of Content: Page-wise listing of the main contents in the report, i.e., different Chapters and its main Sections along with their page numbers.

4) Body of the Report: The body of the report should have these four logical divisions

a) Introduction: This will cover the background, rationale/ need / justification, brief review of literature, objectives, methodology (the area of the study, sample, type of study, tools for data collection, and method of analysis), Limitations of the Study, and Chapter Planning.

b) Conceptual Framework / National and International Scenario: (relating to the topic of the Project).

c) Presentation of Data, Analysis and Findings: (using the tools and techniques mentioned in the methodology).

d) Conclusion and Recommendations: In this section, the concluding observations based on the main findings and suggestions are to be provided.

5) Bibliography or References: This section will include the list of books and articles which have been used in the project work, and in writing a project report.

6) Annexures: Questionnaires (if any), relevant reports, etc.

(The main text of the Project should normally be in the range of 5000 words. However, there may be annexure in addition to the main text)

The Steps of a Project Report

STEP I : Selection of the topic for the project by taking following points into consideration:

- Suitability of the topic.
- Relevance of the topic
- Time available at the disposal.
- Feasibility of data collection within the given time limit.
- Challenges involved in the data collection (time & cost involved in the data collection, possibility of getting responses, etc.)

STEP II : Finalisation of the Topic and preparation of Project Proposal in consultation with the Supervisor.

STEP III : Collection of information and data relating to the topic and analysis of the same.

STEP IV : Writing the report dividing it into suitable chapters, viz.,

Chapter 1: Introduction,

Chapter 2: Conceptual Framework / National & International Scenario,

Chapter 3: Analysis & Findings

Chapter 4: Conclusion and Recommendations.

Chapter 5: Bibliography

STEP V : The following documents are to be attached with the Final Project Report.

- Approval letter from the supervisor (Annexure-IA)
- Student's declaration (Annexure-IB)
- Certificate from the Competent Authority of the Organisation / Institution, if the student undertakes the Project Work in any Organisation / Institution.

Guidelines for evaluation:

- Each of the students has to undertake a Project individually under the supervision of a teacher and to submit the same following the guidelines stated below.
- Language of Project Report and Viva-Voce Examination may be English. The Project Report must be typed and hard bound.
- Failure to submit the Project Report or failure to appear at the Viva-voce Examination will be treated as "Absent" in the Examination. He /she has to submit the Project Report and appear at the Viva-Voce Examination in the subsequent years (within the time period as per University Rules).
- No marks will be allotted on the Project Report unless a candidate appears at the Viva-Voce Examination. Similarly, no marks will be allotted on Viva-Voce Examination unless a candidate submits his/her Project Report.
- Evaluation of the Project Work to be done jointly by one internal expert and one external expert with equal weightage, i.e., average marks of the internal and external experts will be allotted to the candidate. The evaluation scheme shall be as follows:

Project Report	Power Point Presentation & Viva
75 marks	25 marks

Student's Declaration

Ihereby declare that the Project Work with the title
(in block letters).....
submitted by me for the partial fulfilment of the degree of B.A. Honours in Economics is
my original work and has not been submitted earlier to any other University /Institution for
the fulfilment of the requirement for any course of study.

I also declare that no chapter of this manuscript in whole or in part has been incorporated in
this report from any earlier work done by others or by me. However, extracts of any
literature which has been used for this report has been duly acknowledged providing details
of such literature in the references.

Signature of Supervisor:

Name

Signature of Student

Registration No.

Place:

Date:

WORKSHOP

Course Code: ECO2333

Credit Units: 01

Objectives:

A workshop is primarily an activity based academic event that is organized to provide the students a one to one and hands on experience on any aspect of their learning. The communication in a workshop has to be necessarily two way. The trainer has to make sure that the aspect covered are practically practiced by the participants. The student will choose the option of workshop from amongst their concentration electives. The evaluation will be done by Board of examiners comprising of the faculties.

Major Themes for Workshop

The workshop may be conducted on any of the following major themes:

- Accounting
- Finance
- Human Resources
- Marketing
- Economics
- Operations
- Supply Chain Management

These themes are merely indicative and other recent and relevant topics of study may be included.

Guidelines for Workshop

The procedure for earning credits from workshop consists of the following steps:

- 1) Relevant study material and references will be provided by the trainer in advance.
- 2) The participants are expected to explore the topic in advance and take active part in the discussions held
- 3) Attending and Participating in all activities of the workshop
- 4) Group Activities have to be undertaken by students as guided by the trainer.
- 5) Evaluation of workshop activities would be done through test and quiz at the end of the workshop.
- 6) Submitting a write up of atleast 500 words about the learning outcome from the workshop.

Methodology

The methodology followed at the workshop could be based on any one or more of the following methods:

- Case Study
- Business Game
- Simulation
- Group Activity
- Role Play
- Business Planning
- Quiz

Evaluation Scheme:

Attendance	Active Participation	Multiple Choice Questions/ Quiz	Solving the case/ Assignment/ Write up	Total
10	30	30	30	100

BUSINESS INFORMATION & DATABASE SYSTEM

Course Code: MGT2404

Credit Units: 03

Course Objective:

The aim of this course is to introduce the students to the managerial issues relating to information systems, its role in organization and how information technology can be leveraged to provide business value.

Course Contents:

Module I

MIS need and concepts, characteristics, Typology of MIS, Structure of MIS. Planning for MIS, System Development Methodologies, Conceptual and detailed designs of MIS, System Implementation strategies and process, System Evaluation and Maintenance.

Module II

Introduction to data base management system- Data versus information, record, file; data dictionary, database administrator, functions and responsibilities, file-oriented system versus databases system.

Module III

Advanced Concepts in Information Systems: Enterprise Resource Planning, Supply Chain Management, Customer Relationship Management, Data, Warehousing and Data Mining.

Module IV

Database system architecture- Introduction, schemas, sub schemas and instances; data base architecture, data independence, mapping, data models, types of database systems.

Module V

Data base security- Threats and security issues, firewalls and database recovery; techniques of data base security; distributed data base.

Examination Scheme:

Components	A	P	HA	CT	EE
Weightage (%)	5	10	5	10	70

(A-Attendance; P-Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination)

Text & References:

Text

- James, A. O'Brien, Introduction to Information Systems, Tata McGraw-Hill Publishing Co. Ltd., New Delhi, 2005.
- Kenneth C. Laudon and Jane P. Laudon, Management Information Systems, Prentice-Hall of India, New Delhi, 9th Edition, 2006.

References:

- Navathe, Data Base System Concepts 3rd, McGraw Hill.
- Date, C.J., An Introduction to Data Base System 7ed, Addison Wesley.
- Singh, C.S., Data Base System, New Age Publications, New Delhi.

TERM PAPER

Course Code: ECO2431

Credit Units: 02

Objectives:

The objective of this course is to judge the understanding as well as application of the knowledge gained by the students. The aim of the term paper is to provide the students with an opportunity to further enhance their knowledge in a sector of their choice by undertaking a significant practical unit of examining and analyzing various aspects of business management at a level commensurate with the learning outcomes of the various courses taken up by them in the ongoing semester.


A term paper is primarily a record of intelligent reading in several sources on a particular subject. The students will choose the topic at the beginning of the session in consultation with the faculty assigned. At least one middle level or senior level person of a company from the chosen sector may be interviewed face to face.

Guidelines:

1. The term paper will be related to the contemporary business issue and the topic will be given by the department.
2. The presentation of the term paper is scheduled to be held before the commencement of Semester examinations.
3. The paper will carry 100 marks that will be marked on the basis of understanding and organization of content based on the literature review. The Bibliography shall form an important part of the paper.
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 - Inflation
 - Unemployment
 - Fiscal Deficit
 - Poverty
 - Education
 - Malnutrition
 - Rural Development
 - Regional Imbalance
 - Globalization
 - Foreign Direct Investment

Evaluation Scheme

Organisation and relevance of content	Literature Review	Bibliography	Presentation	Total
30	30	20	20	100


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PROJECT

Course Code: ECO2432

Credit Units: 03

Objectives:

The aim of the project is to provide the students with an opportunity to further their intellectual and personal development in the chosen field by undertaking a significant practical unit of activity. The project can be defined as a scholarly inquiry into a problem or issues, involving a systematic approach to gathering and analysis of information / data, leading to production of a structured report.

Chapter Scheme and distribution of marks:

Chapter 1: Introduction – 10 marks

Chapter 2: Conceptual Framework/ National/International Scenario – 25 marks

Chapter 3: Presentation, Analysis & Findings -- 25 marks

Chapter 4: Conclusion & Recommendations -- 10 marks

Chapter 5: Bibliography -- 05 marks

Components of a Project Report

The outcome of Project Work is the Project Report. A project report should have the following components:

1) Cover Page: This should contain the title of the project proposal, to whom it is submitted, for which degree, the name of the author, name of the supervisor, year of submission of the project work, name of the University.

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a) Introduction: This will cover the background, rationale/ need / justification, brief review of literature, objectives, methodology (the area of the study, sample, type of study, tools for data collection, and method of analysis), Limitations of the Study, and Chapter Planning.

b) Conceptual Framework / National and International Scenario: (relating to the topic of the Project).

c) Presentation of Data, Analysis and Findings: (using the tools and techniques mentioned in the methodology).

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5) Bibliography or References: This section will include the list of books and articles which have been used in the project work, and in writing a project report.

6) Annexures: Questionnaires (if any), relevant reports, etc.

(The main text of the Project should normally be in the range of 5000 words. However, there may be annexure in addition to the main text)

The Steps of a Project Report

STEP I : Selection of the topic for the project by taking following points into consideration:

- Suitability of the topic.
- Relevance of the topic
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STEP II : Finalisation of the Topic and preparation of Project Proposal in consultation with the Supervisor.

STEP III : Collection of information and data relating to the topic and analysis of the same.

STEP IV : Writing the report dividing it into suitable chapters, viz.,

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Chapter 4: Conclusion and Recommendations.

Chapter 5: Bibliography

STEP V : The following documents are to be attached with the Final Project Report.

- Approval letter from the supervisor (Annexure-IA)
- Student's declaration (Annexure-IB)
- Certificate from the Competent Authority of the Organisation / Institution, if the student undertakes the Project Work in any Organisation / Institution.

Guidelines for evaluation:

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- Failure to submit the Project Report or failure to appear at the Viva-voce Examination will be treated as "Absent" in the Examination. He /she has to submit the Project Report and appear at the Viva-Voce Examination in the subsequent years (within the time period as per University Rules).
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Project Report	Power Point Presentation & Viva
75 marks	25 marks

Student's Declaration

Ihereby declare that the Project Work with the title
(in block letters).....
submitted by me for the partial fulfilment of the degree of B.A. Honours in Economics is
my original work and has not been submitted earlier to any other University /Institution for
the fulfilment of the requirement for any course of study.

I also declare that no chapter of this manuscript in whole or in part has been incorporated in
this report from any earlier work done by others or by me. However, extracts of any
literature which has been used for this report has been duly acknowledged providing details
of such literature in the references.

Signature of Supervisor:

Name

Signature of Student

Registration No.

Place:

Date:

WORKSHOP

Course Code: ECO2433

Credit Units: 01

Objectives:

A workshop is primarily an activity based academic event that is organized to provide the students a one to one and hands on experience on any aspect of their learning. The communication in a workshop has to be necessarily two way. The trainer has to make sure that the aspects covered are practically practiced by the participants. The student will choose the option of workshop from amongst their concentration electives. The evaluation will be done by Board of examiners comprising of the faculties.

Major Themes for Workshop

The workshop may be conducted on any of the following major themes:

- Accounting
- Finance
- Human Resources
- Marketing
- Economics
- Operations
- Supply Chain Management

These themes are merely indicative and other recent and relevant topics of study may be included.

Guidelines for Workshop

The procedure for earning credits from workshop consists of the following steps:

1. Relevant study material and references will be provided by the trainer in advance.
2. The participants are expected to explore the topic in advance and take active part in the discussions held
3. Attending and Participating in all activities of the workshop
4. Group Activities have to be undertaken by students as guided by the trainer.
5. Evaluation of workshop activities would be done through test and quiz at the end of the workshop.
6. Submitting a write up of at least 500 words about the learning outcome from the workshop.

Methodology

The methodology followed at the workshop could be based on any one or more of the following methods:

- Case Study
- Business Game
- Simulation
- Group Activity
- Role Play
- Business Planning
- Quiz

Evaluation Scheme:

Attendance	Active Participation	Multiple Choice Questions/ Quiz	Solving the case/ Assignment/ Write up	Total
10	30	30	30	100

ECONOMETRICS - BASIC THEORY AND APPLICATION

Course Code: ECO2551

Credit Units: 03

Course Objective:

This course presents the basic econometrics techniques emphasizing numerical estimation of economic relationships as applied to practical economic and managerial problems. It enables the students to learn the basic econometric techniques relating to the estimation of parameters. On successful completion of the course the students should have understood the estimation techniques, learned the difficulties involved in the estimation process, evaluation of parameters and enable understanding of scientific decision making process.

Course Contents:

Module I: Nature and Scope of Econometrics, The methodology of econometric research; Specification and estimation of an econometric model; Basic concepts of estimation

Module II: Simple Linear Regression Model: Two Variable Case

Estimation of model by method of ordinary least squares, properties of estimators, goodness of fit; tests of hypotheses, scaling and units of measurement, confidence intervals, GaussMarkov theorem, forecasting.

Module III: Multiple Linear Regression Model.

Estimation of parameters; properties of OLS estimators, goodness of fit, partial regression coefficients, testing hypotheses, functional forms of regression models, qualitative (dummy variables) independent variables

Module IV: Violations of Classical Assumptions and Remedies

Multicollinearity, Heteroscedasticity and Auto-correlation

Module V: Specification Analysis

Omission of a relevant variable; Inclusion of irrelevant variable; Tests of Specification Errors

Examination Scheme:

Components	A	P	HA	CT	EE
Weightage (%)	5	10	5	10	70

(A-Attendance; P-Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination)

Text & References:

Text:

- A Koutsoyiannis, "Theory of Econometrics: An Introduction Exposition of Econometric Methods", Educational Low-Priced Books Scheme, McMillan Education Ltd. (1992).
- DamodarGujarathi "Basic Econometrics", Tata McGraw Hill Ltd, 2010

References:

- Christopher Dougherty, Introduction to Econometrics, Oxford University Press, 3rd Edition, Indian Edition, 2007.
- Jan Kmenta, Elements of Econometrics, Indian Reprint, Khosla Publishing House, 2nd edition, 2008.A.S. Goldberger (1998), Introductory Econometrics, Harvard University Press, Cambridge.
- Suresh K.Ghose "Econometrics", Prentice Hall of India private limited, New Delhi

SUMMER INTERNSHIP EVALUATION

Course code: ECO2535

Credit Units:06

Objective:

The basic objective of a Summer Internship is to refine the practical exposure of the corporate functioning. This summer training will provide an opportunity to the students to apply their theoretical understanding while working on the concerned project in the industry. Thus this summer internship programme is an attempt to bridge the gap between theory and practice. This will also enhance the students' intellectual ability and attributes related to data handling, decision making, report writing, oral presentation and imbining an interdisciplinary approach.

General Guidelines:

Every student of B.A (Honors) shall be required to undergo a practical training in a corporate organization approved by the Institute for eight weeks, normally in the Summer Vacation, after the end of the fourth semester examinations. The candidates shall be required to undergo training in the various areas of the organization concerned. The organization may assign a specific project to the candidate, which will be completed by him/her during the period of training. The work done by the candidate during the training period shall be submitted in form of a training report.

The last date for the receipt of training report in the department shall be one month after the date of completion of training, i.e. at the beginning of the fifth semester.

Chapter Scheme

Chapter I: Introduction: 20 marks

Chapter II: Conceptual Framework/National/International Scenario: 5 marks

Chapter III: Presentation, Analysis and Findings: 35 marks

Chapter IV: Conclusion and Recommendations: 15 marks

The report has to be type written in font Times New Roman, 12 points, 1.5 line spacing on both sides of the paper, Spiral Bound. The report should comprise of a maximum of 80 to 100 pages and has to be submitted in two copies.

Components of the Report

The outcome of Summer Internship is the Project Report. A project report should have the following components:

1) Cover Page: This should contain the title of the project proposal, to whom it is submitted, for which degree, the name of the author, name of the supervisor, year of submission of the project work, name of the University.

2) Acknowledgement: Various organizations and individuals who might have provided assistance /co-operation during the process of carrying out the study.

3) Table of Content: Page-wise listing of the main contents in the report, i.e., different Chapters and its main Sections along with their page numbers.

4)Body of the Report: The body of the report should have these four logical divisions

a)Introduction: This will cover the background, rationale/ need / justification, brief review of literature, objectives, methodology (the area of the study, sample, type of study, tools for data collection, and method of analysis), Limitations of the Study, and Chapter Planning.

b)Conceptual Framework / National and International Scenario: (relating to the topic of the Project).

c) Presentation of Data, Analysis and Findings: (using the tools and techniques mentioned in the methodology).

d)Conclusion and Recommendations: In this section, the concluding observations based on the main findings and suggestions are to be provided.

5) Bibliography or References: This section will include the list of books and articles which have been used in the project work, and in writing a project report.

6) Annexures: Questionnaires (if any), relevant reports, etc.

EvaluationScheme:

SIP Report	Power Point Presentation & Viva
75 marks	25 marks



RELATIONAL DATABASE MANAGEMENT SYSTEM

Course Code: MGT2512

CreditUnits: 03

Course Objective:

The objective of the course is to give knowledge of the Relational Database Management Software, in particular ORACLE. It is expected that a student at the end of the course would attain a good conceptual and practical understanding of databases.

Course Contents:

Module I: Introduction to RDBMS

RDBMS: Introduction, Relational Model concept and Relational data structure, Relational Model constraints as domain constraints, Key constraints, Entity integrity constraints, Referential Integrity constraints.

Module II: Introduction to oracle

Tools of Oracle, Features of oracle

Module III: SQL

Overview of SQL, Component of SQL (DDL, DML, DCL), Advantage of SQL, Basics of syntax writing, Data Definition Language, Create command, Data type, Constraints, ALTER & DROP, UPDATE & DELETE Commands, Substitutions variables, Run time Environments variables, SELECT Commands Basic Constructs, Functions, Nested Queries, Correlated queries, Views, Sequence, User Management Commands.

Module IV: PL/SQL

Basic features, Block Structure of a PL/SQL Programs, Control Structures, Exception Handling, Cursor, Procedure, Functions and Triggers, Internet features of Oracle.

Module V: Database Technologies

Client/Server Databases, Distributed Databases, Web Databases

Module VI: Administration of Oracle databases

Examination Scheme:

Components	A	P	HA	CT	EE
Weightage (%)	5	10	5	10	70

(A-Attendance; P-Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination)

Text & References:

Text:

- S.Sumathi, S. Esakkirajan (2010), Fundamentals of Relational Database Management Systems, Springer

References:

- Oracle8i: The Complete Reference, McGraw Hill
- Narang Rajesh, Database Management systems

TERM PAPER

Course Code: ECO2531

Credit Units: 02

Objectives

The objective of this course is to judge the understanding as well as application of the knowledge gained by the students. The aim of the term paper is to provide the students with an opportunity to further enhance their knowledge in a sector of their choice by undertaking a significant practical unit of examining and analyzing various aspects of business management at a level commensurate with the learning outcomes of the various courses taken up them in the ongoing semester.

A term paper is primarily a record of intelligent reading in several sources on a particular subject. The students will choose the topic at the beginning of the session in consultation with the faculty assigned. At least one middle level or senior level person of a company from the chosen sector may be interviewed face to face

Guidelines:

1. The term paper will be related to the contemporary business issue and the topic will be given by the department.
2. The presentation of the term paper is scheduled to be held before the commencement of Semester examinations.
3. The paper will carry 100 marks that will be marked on the basis of understanding and organization of content based on the literature review. The Bibliography shall form an important part of the paper.
4. Examples of a few broad areas for Term Paper (List is indicative, not exhaustive)
 - Inflation
 - Unemployment
 - Fiscal Deficit
 - Poverty
 - Education
 - Malnutrition
 - Rural Development
 - Regional Imbalance
 - Globalization
 - Foreign Direct Investment

Evaluation Scheme

Organisation and relevance of content	Literature Review	Bibliography	Presentation	Total
30	30	20	20	100

PROJECT

Course Code: ECO2532

Credit Units: 03

Objectives:

The aim of the project is to provide the students with an opportunity to further their intellectual and personal development in the chosen field by undertaking a significant practical unit of activity. The project can be defined as a scholarly inquiry into a problem or issues, involving a systematic approach to gathering and analysis of information / data, leading to production of a structured report.

Chapter Scheme and distribution of marks:

Chapter 1: Introduction – 10 marks

Chapter 2: Conceptual Framework/ National/International Scenario – 25 marks

Chapter 3: Presentation, Analysis & Findings -- 25 marks

Chapter 4: Conclusion & Recommendations -- 10 marks

Chapter 5: Bibliography -- 05 marks

Components of a Project Report

The outcome of Project Work is the Project Report. A project report should have the following components:

1) Cover Page: This should contain the title of the project proposal, to whom it is submitted, for which degree, the name of the author, name of the supervisor, year of submission of the project work, name of the University.

2) Acknowledgement: Various organizations and individuals who might have provided assistance /co-operation during the process of carrying out the study.

3) Table of Content: Page-wise listing of the main contents in the report, i.e., different Chapters and its main Sections along with their page numbers.

4) Body of the Report: The body of the report should have these four logical divisions

a) Introduction: This will cover the background, rationale/ need / justification, brief review of literature, objectives, methodology (the area of the study, sample, type of study, tools for data collection, and method of analysis), Limitations of the Study, and Chapter Planning.

b) Conceptual Framework / National and International Scenario: (relating to the topic of the Project).

c) Presentation of Data, Analysis and Findings: (using the tools and techniques mentioned in the methodology).

d) Conclusion and Recommendations: In this section, the concluding observations based on the main findings and suggestions are to be provided.

5) Bibliography or References: This section will include the list of books and articles which have been used in the project work, and in writing a project report.

6) Annexures: Questionnaires (if any), relevant reports, etc.

(The main text of the Project should normally be in the range of 5000 words. However, there may be annexure in addition to the main text)

The Steps of a Project Report

STEP I : Selection of the topic for the project by taking following points into consideration:

- Suitability of the topic.
- Relevance of the topic
- Time available at the disposal.
- Feasibility of data collection within the given time limit.
- Challenges involved in the data collection (time & cost involved in the data collection, possibility of getting responses, etc.)

STEP II : Finalisation of the Topic and preparation of Project Proposal in consultation with the Supervisor.

STEP III : Collection of information and data relating to the topic and analysis of the same.

STEP IV : Writing the report dividing it into suitable chapters, viz.,

Chapter 1: Introduction,

Chapter 2: Conceptual Framework / National & International Scenario,

Chapter 3: Analysis & Findings

Chapter 4: Conclusion and Recommendations.

Chapter 5: Bibliography

STEP V : The following documents are to be attached with the Final Project Report.

- Approval letter from the supervisor (Annexure-IA)
- Student's declaration (Annexure-IB)
- Certificate from the Competent Authority of the Organisation / Institution, if the student undertakes the Project Work in any Organisation / Institution.

Guidelines for Evaluation:

- Each of the students has to undertake a Project individually under the supervision of a teacher and to submit the same following the guidelines stated below.
- Language of Project Report and Viva-Voce Examination may be English. The Project Report must be typed and hard bound.
- Failure to submit the Project Report or failure to appear at the Viva-voce Examination will be treated as "Absent" in the Examination. He /she has to submit the Project Report and appear at the Viva-Voce Examination in the subsequent years (within the time period as per University Rules).
- No marks will be allotted on the Project Report unless a candidate appears at the Viva-Voce Examination. Similarly, no marks will be allotted on Viva-Voce Examination unless a candidate submits his/her Project Report.
- Evaluation of the Project Work to be done jointly by one internal expert and one external expert with equal weightage, i.e., average marks of the internal and external experts will be allotted to the candidate. The evaluation scheme shall be as follows:

Project Report	Power Point Presentation & Viva
75 marks	25 marks

Student's Declaration

Ihereby declare that the Project Work with the title
(in block letters).....
submitted by me for the partial fulfilment of the degree of B.A. Honours in Economics is
my original work and has not been submitted earlier to any other University /Institution for
the fulfilment of the requirement for any course of study.

I also declare that no chapter of this manuscript in whole or in part has been incorporated in
this report from any earlier work done by others or by me. However, extracts of any
literature which has been used for this report has been duly acknowledged providing details
of such literature in the references.

Signature of Supervisor:

Name

Signature of Student

Registration No.

Place:

Date:

WORKSHOP

Course Code: ECO2533

Credit Units: 01

Objectives:

A workshop is primarily an activity based academic event that is organized to provide the students a one to one and hands on experience on any aspect of their learning. The communication in a workshop has to be necessarily two way. The trainer has to make sure that the aspect covered are practically practiced by the participants. The student will choose the option of workshop from amongst their concentration electives. The evaluation will be done by Board of examiners comprising of the faculties.

Major Themes for Workshop

The workshop may be conducted on any of the following major themes:

- Accounting
- Finance
- Human Resources
- Marketing
- Economics
- Operations
- Supply Chain Management

These themes are merely indicative and other recent and relevant topics of study may be included.

Guidelines for Workshop

The procedure for earning credits from workshop consists of the following steps:

1. Relevant study material and references will be provided by the trainer in advance.
2. The participants are expected to explore the topic in advance and take active part in the discussions held
3. Attending and Participating in all activities of the workshop
4. Group Activities have to be undertaken by students as guided by the trainer.
5. Evaluation of workshop activities would be done through test and quiz at the end of the workshop.
6. Submitting a write up of atleast 500 words about the learning outcome from the workshop.

Methodology

The methodology followed at the workshop could be based on any one or more of the following methods:

- Case Study
- Business Game
- Simulation
- Group Activity
- Role Play
- Business Planning
- Quiz

Evaluation Scheme:

Attendance	Active Participation	Multiple Choice Questions/ Quiz	Solving the case/ Assignment/ Write up	Total
10	30	30	30	100

BANKING & FINANCIAL INSTITUTIONS

Course Code: ECO2603

Credit Units: 03

Course Objective:

The objective of this course is to make the candidates aware about the banking system prevalent in India and the role of financial Institution in the Indian financial system.

Course Contents:

Module I: Introduction

Bank - Concept, classification, objectives & functions. Bank Management - Concept, Functions, Importance. Legal framework of regulation of banks: Banking Regulation Act 1949 and main amendments. Reserve requirements: CRR, SLR, Forex Reserves, bank fee based services; innovative products in banking.

Module II: RBI and Banking Reforms:

The RBI Act, 1934 and main amendments; Reforms in banking after 1991. Micro Financing in India.

Module III: Financial Institutions:

Commercial banks: Meaning, functions, management and investment policies, E-banking and E-trading; Present structure and recent developments in commercial banking.

Development banks: Concept, objectives and functions of development banks; Operational and promotional activities of development Banks; IFCI, ICICI, IDBI, IRBI, SIDBI, state development banks and state financial corporations.

Module IV: Other Financial Institutions:

Introduction; Life Insurance Corporation of India, General Insurance Corporation of India, Unit Trust of India.

Module V: Mutual Funds:

Concept, performance appraisal and regulation of mutual funds (with special reference of SEBI guidelines); Designing and marketing of mutual funds schemes; Latest mutual fund schemes in India – an overview.

Examination Scheme:

Components	A	P	HA	CT	EE
Weightage (%)	5	10	5	10	70

(A-Attendance; P-Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination)

Text & References:

Text:

- Viganim, BML, 'Banking, law and practice', Konak Publication 2005.

References:

- Justin Paul and Padmalatha Suresh, 'Management of Banking and financial services', TMH 2009.
- M. RavathySriram and P.K. Bamanan, 'Core banking solution', PHI 2008.
- JyotsnaSethi and Nishevan Bhatia, 'Elements of Banking and Insurance', PHI 2008.
- VijayaragavanIyengar, 'Introduction to Banking', Excel Books Pvt. Ltd. 2007.
- K.C. Shekhar, LakshmyShekhar, 'Banking, theory and practice', Pearson publications, 2009

DISSERTATION

Course Code: ECO2637

CreditUnits:09

Objectives:

The aim of the dissertation is to provide you with an opportunity to further your intellectual and personal development in your chosen field by undertaking a significant practical unit of activity, having an educational value at a level commensurate with the award of your degree. The dissertation can be defined as a scholarly inquiry into a problem or issues, involving a systematic approach to gathering and analysis of information / data, leading to production of a structured report.

Chapter Scheme and distribution of marks:

Chapter 1: Introduction – 10 marks

Chapter 2: Conceptual Framework/ National/International Scenario – 25 marks

Chapter 3: Presentation, Analysis & Findings -- 25 marks

Chapter 4: Conclusion & Recommendations -- 10 marks

Chapter 5: Bibliography-- 5marks

The Components of a Dissertation

A Dissertation should have the following components:

- 1) **Cover Page:** This should contain the title of the, to whom it is submitted, for which degree, the name of the author, name of the supervisor, year of submission of the work and name of the University.
- 2) **Acknowledgement:** Various organizations and individuals who might have provided assistance /co-operation during the process of carrying out the study.
- 3) **Table of Content:** Page-wise listing of the main contents in the report, i.e., different Chapters and its main Sections along with their page numbers.
- 4) **Body of the Report:** The body of the report should have these four logical divisions
 - a) **Introduction:** This will cover the background, rationale/ need / justification, brief review of literature, objectives, methodology (the area of the study, sample, type of study, tools for data collection, and method of analysis), Limitations of the Study, and Chapter Planning.
 - b) **Conceptual Framework / National and International Scenario:** (relating to the topic of the Dissertation).
 - c) **Presentation of Data, Analysis and Findings:** (using the tools and techniques mentioned in the methodology).
 - d) **Conclusion and Recommendations:** In this section, the concluding observations based on the main findings and suggestions are to be provided.
- 5) **Bibliography or References:** This section will include the list of books and articles which have been used in the work, and in writing the report.
- 6) **Annexures:** Questionnaires (if any), relevant reports, etc.
(The main text of the Dissertation should normally be in the range of 5000 words. However, there may be annexure in addition to the main text)

Steps of the Dissertation Work

Step I: Selection of the topic should be made keeping the following points into consideration:

- Suitability of the topic.
- Relevance of the topic
- Time available at the disposal.
- Feasibility of data collection within the given time limit.
- Challenges involved in the data collection (time & cost involved in the data collection, possibility of getting responses, etc.)

Step II: Finalisation of the Topic and preparation of Dissertation Proposal in consultation with the Supervisor.

Step III: Collection of information and data relating to the topic and analysis of the same.

Step IV: Writing the report dividing it into suitable chapters, viz.,

Chapter 1: Introduction,

Chapter 2: Conceptual Framework / National & International Scenario,

Chapter 3: Analysis & Findings

Chapter 4: Conclusion and Recommendations.

Step V: The following documents are to be attached with the Dissertation:

1) Approval letter from the supervisor (Annexure-IA)

2) Student's declaration (Annexure-IB)

3) Certificate from the Competent Authority of the Organisation / Institution, if the student undertakes the Dissertation Work in any Organisation / Institution.

Annexures,

References / Bibliography

Guidelines for evaluation:

- Each of the students has to undertake a topic individually under the supervision of a teacher and to submit the same following the guidelines stated below.
- Language of Dissertation and Viva-Voce Examination has to be English. The Dissertation must be typed and hard bound.
- Failure to submit the Dissertation or failure to appear at the Viva-voce Examination will be treated as "Absent" in the Examination. He /she has to submit the Dissertation and appear at the Viva-Voce Examination in the subsequent years (within the time period as per University Rules).
- No marks will be allotted on the Dissertation unless a candidate appears at the Viva-Voce Examination. Similarly, no marks will be allotted on Viva-Voce Examination unless a candidate submits his/her Dissertation.
- Evaluation of the Dissertation to be done jointly by one internal expert and one external expert with equal weightage, i.e., average marks of the internal and external experts will be allotted to the candidate.
- A candidate has to qualify in the Dissertation separately, obtaining a minimum marks of 40 (Dissertation and Viva-Voce taken together) in paper 3.5.
- Marking Scheme for Dissertation and Viva-Voce Examination:

Dissertation	Power Point Presentation & Viva
75 marks	25 marks

Cover Page / Title page

Project Report on

Title of the Project

XXXXXXXXXXXXXXXXXXXX

(Submitted for the partial fulfilment for the award of Degree of B.A. Honours in

Economics

To

Amity College of Economics

Submitted by

Name of the Candidate :.....

Registration No.

Name of the College

College Roll No.

Supervised by

Name of the Supervisor:


Designation

Month & Year of Submission

University Logo and Name



Prof. (Dr.) Anil Kumar
Deputy Dean Academics
Amity University Haryana
Manesar, Gurugram
Haryana-122413



Registrar
Amity University Haryana
Manesar Gurgaon-122413

Student's Declaration

Ihereby declare that the Project Work with the title
(in block letters).....
submitted by me for the partial fulfilment of the degree of B.A. Honours in Economics is
my original work and has not been submitted earlier to any other University /Institution for
the fulfilment of the requirement for any course of study.
I also declare that no chapter of this manuscript in whole or in part has been incorporated in
this report from any earlier work done by others or by me. However, extracts of any
literature which has been used for this report has been duly acknowledged providing details
of such literature in the references.

Signature of Supervisor:
Name

Signature of Student

Registration No.

Place:

Date:

TERM PAPER

Course Code: ECO2631

Credit Units: 02

Objectives:

The objective of this course is to judge the understanding as well as application of the knowledge gained by the students. The aim of the term paper is to provide the students with an opportunity to further enhance their knowledge in a sector of their choice by undertaking a significant practical unit of examining and analyzing various aspects of business management at a level commensurate with the learning outcomes of the various courses taken up them in the ongoing semester.

A term paper is primarily a record of intelligent reading in several sources on a particular subject. The students will choose the topic at the beginning of the session in consultation with the faculty assigned. At least one middle level or senior level person of a company from the chosen sector may be interviewed face to face

Guidelines:

1. The term paper will be related to the contemporary business issue and the topic will be given by the department.
2. The presentation of the term paper is scheduled to be held before the commencement of Semester examinations.
3. The paper will carry 100 marks that will be marked on the basis of understanding and organization of content based on the literature review. The Bibliography shall form an important part of the paper.
4. Examples of a few broad areas for Term Paper (List is indicative, not exhaustive)
 - Inflation
 - Unemployment
 - Fiscal Deficit
 - Poverty
 - Education
 - Malnutrition
 - Rural Development
 - Regional Imbalance
 - Globalization
 - Foreign Direct Investment

Evaluation Scheme

Organisation and relevance of content	Literature Review	Bibliography	Presentation	Total
30	30	20	20	100

WORKSHOP

Course Code: ECO2633

Credit Units: 01

Objectives:

A workshop is primarily an activity based academic event that is organized to provide the students a one to one and hands on experience on any aspect of their learning. The communication in a workshop has to be necessarily two way. The trainer has to make sure that the aspect covered are practically practiced by the participants. The student will choose the option of workshop from amongst their concentration electives. The evaluation will be done by Board of examiners comprising of the faculties.

Major Themes for Workshop

The workshop may be conducted on any of the following major themes:

- Accounting
- Finance
- Human Resources
- Marketing
- Economics
- Operations
- Supply Chain Management

These themes are merely indicative and other recent and relevant topics of study may be included.

Guidelines for Workshop

The procedure for earning credits from workshop consists of the following steps:

1. Relevant study material and references will be provided by the trainer in advance.
2. The participants are expected to explore the topic in advance and take active part in the discussions held
3. Attending and Participating in all activities of the workshop
4. Group Activities have to be undertaken by students as guided by the trainer.
5. Evaluation of workshop activities would be done through test and quiz at the end of the workshop.
6. Submitting a write up of atleast 500 words about the learning outcome from the workshop.

Methodology

The methodology followed at the workshop could be based on any one or more of the following methods:

- Case Study
- Business Game
- Simulation
- Group Activity
- Role Play
- Business Planning
- Quiz

Evaluation Scheme:

Attendance	Active Participation	Multiple Choice Questions/ Quiz	Solving the case/ Assignment/ Write up	Total
10	30	30	30	100

Bachelor of Business Administration (Banking & Finance)

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Curriculum & Scheme of Examination

2022

AMITY UNIVERSITY HARYANA

GURUGRAM

A handwritten signature in blue ink, appearing to read 'Anil'.

Prof. (Dr.) Anil Kumar
Deputy Dean Academics
Amity University Haryana
Manesar, Gurugram
Haryana-122413

A handwritten signature in blue ink, appearing to read 'Manesar'.

Registrar
Amity University Haryana
Manesar Gurgaon-122413

Bachelor of Business Administration (Banking & Finance)

FINANCIAL ACCOUNTING

Course Code: MBF2103

Credit Units: 03

Course Objective:

To understand the basics of accounting and concepts of double entry system. The students will be given a detailed grounding on recording of transactions and preparation of final accounting statements for business organizations.

Course Contents:

Module I: Introduction to Accounting

Understanding the meaning, nature, functions and usefulness of accounting, branches of Accounting, Accounting Equation, Accounting Concepts and Generally Accepted Accounting Principles. Difference between Indian GAAP and US GAAP

Module II: Recording of Transactions and Subsidiary Books

Concept of Double Entry System. Understanding the Accounting cycle, Preparation of Voucher, Journal, Ledger and Trial Balance and Numerical on the Same. Preparation of subsidiary Books including Purchase Book, Sales Book, Purchase Returns Book and Sales Return Books (and numerical on the same), Cash book, types of cash book and balancing of cashbook. Numerical on single column cashbook, Double column cashbook, triple column cashbook and petty cash book.

Module III: Reconciliation of Bank Accounts

Causes for difference in the Balance as per Pass book and balance as per cashbook, Procedure for preparation of bank reconciliation statement when there is favorable balance and in case of overdraft (and numerical on the same).

Module IV: Financial Statements

Preparation of Trading Account, Manufacturing Account, Profit And Loss Account and balance sheet along with adjustments (and numerical on the same) and non-profit making organizations an overview. AS-1, AS-21 (no numerical)

Module V: Accounting For Partnership

Introduction to Partnership Accounts, Partnership Deed. **Admission of a new partner**- Revaluation account, Computation of New Profit Sharing Ratio and Sacrificing Ratio, Proportionate Capital, Treatment of goodwill in partnership accounts and its valuation. **Retirement and Death of a partner**: Determining the gaining ratio, Revaluation of assets and liabilities, Reserve, Final payment to retiring partner, Treatment and adjustment of goodwill. Numericals on preparation of various accounts in case of retirement and death of a partner. **Dissolution of the firm**: Circumstances leading to dissolution of partnership, Settlement of the accounts, Capital ratio on insolvency, Insolvency of all partners and Garner Vs Murray decision.

Examination Scheme:

Components	CT	HA	C	P	A	EE
Weightage (%)	10	5	5	5	5	70

(C - Case Discussion/ Presentation; HA - Home Assignment; V - Viva; CT - Class Test; P - Project A - Attendance; EE - End Semester Examination)


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Amity University Haryana
Manesar Gurgaon-122413

Text & References:**Text:**


- Maheshwari, S.N., Advanced Accountancy Volume-I, Ninth Edition, Vikas Publishing House Pvt. Ltd.

References:

- Grewal, T. S., Shukla, M .C, Advanced Accountancy, Sixteenth Edition, Sultan Chand and Sons.
- Tulsian, P.C (2009), Financial Accounting 2nd Edition, Pearson Education.
- Narayanaswamy, R. Financial Accounting- A Managerial Perspective, Second Edition, Prentice Hall India.
- Ramachandran, N., Kakani, R.K., Financial Accounting for Management, Tata McGraw Hill Publishing Company Limited.



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Registrar
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MARKETING MANAGEMENT

Course Code: MBF2201

Credit Units: 03

Course Objective:

The main objective of this course is to give students an elementary knowledge of the fundamentals in the field of marketing. The focus will be both on developing and helping them imbibe basic marketing principles and establishing an appreciation of contemporary realities.

Course Contents:

Module I: Introduction to Marketing

Meaning of marketing, Core concepts of marketing, Evolution and its role in the changing business environment, various marketing management philosophies, viz., the production concept, the product concept, selling concept and the marketing concept, Newer definitions of marketing- societal marketing and relationship marketing, Strategies planning in marketing, Formulation of marketing plan.

Module II: Analyzing Marketing Opportunities

Internal and External Marketing Environment Analysis, Introduction to Marketing Information System and Marketing Research, BCG matrix, GE 9 cell model.

Module III: Studying Consumer Behaviour and Selecting Markets

Buying Behaviour for Consumer Markets and Industrial Markets, Types of Buying Situations, Buying Decision Process and Factors Affecting Buyer Behaviour, Consumer Adoption Process, Concept of Market Segmentation, Bases for segmenting Consumer and Business markets, Approaches for Targeting, Differentiation and Positioning.

Module IV: Product Mix Strategy

Product: concept & levels, Classification of consumer and industrial products, Product Differentiation, Product Mix, Product Life Cycle and various strategies, Branding: concept and challenges, Brand decisions, Packaging and Labeling.

Module V: Product Development Decision and Pricing

Product Line Decisions, New Product Development: Challenges & Process; Consumer Adoption Process, Diffusion of Innovation, Pricing Strategies; Setting the price, Understanding various pricing strategies and their application.

Module VI: Distribution and Logistics Decision and Integrated Communication Mix

Nature of Marketing Channels, Channel Functions and Flows, Channel Design and Management Decisions, Channel Dynamics, Introduction to Wholesaling, Retailing and Logistics, Marketing communication mix and Introduction to various elements of integrated marketing communications briefly

Module VII: Emerging Marketing Paradigms

E-marketing, Global marketing, Mobile marketing, Kiosk marketing, Green marketing, Tele marketing, Multi level marketing, Rural marketing.

Examination Scheme:

Components	CT	HA	C	V	A	EE
Weightage (%)	10	5	5	5	5	70

C - Case Discussion/ Presentation; HA - Home Assignment; P - Project; S - Seminar; V - Viva; Q - Quiz; CT - Class Test; A - Attendance; EE - End Semester Examination

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Text & References:

Text:


- Kotler, Philip & Armstrong, Gray, Principles of Marketing, 10th Edition, Pearson Education.
- Saxena, Rajan (2008), Marketing Management, 3rd Edition, McGraw Hills Education.

References:

- Ramaswamy and Namkumar, S (2009), Marketing Management Global Perspective: Indian Context, McMillan, New Delhi.
- Kumar, Arun and Meenakshi, N (2009), Marketing Management, Vikas Publishing House.
- Russel, Wines, Marketing Management, 3rd Edition, Pearson Education.
- Kotler, KoshiJha (2009), Marketing Management, 13th Edition, Pearson Education.



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BUSINESS STATISTICS

Course Code: MBF2203

Credit Units: 03

Course Objective:

The objective of this course is to familiarize the students with various statistical tools which can help them in analysis and interpretation of business data. This course will provide students with hands-on experience to promote the use of statistical thinking and techniques to apply them to make educated decisions whenever there is variation in business data. Therefore, it is a course in statistical thinking via a data-oriented approach.

Course Contents:

Module I: Introduction to Statistics

Definitions, Functions of Statistics, Statistics and Computers, Limitation of Statistics, Application of Statistics.

Module II: Data Collection and Analysis

Methods of Data Collection, Primary and Secondary Data, Graphic Representation of Data, Measures of Dispersion-Range, Quartile Deviation, Mean Deviation, Standard Deviation, Coefficient of Variation.(Absolute & Relative Measure of Dispersion), Skewness-Karl-Pearson's Coefficient of Skewness, Bowley's Coefficient of Skewness, Kurtosis.

Module III: Correlation Analysis and Regression Analysis

Introduction-Importance of Correlation, Types of Correlation, Scatter Diagram Method, Karl Pearson's coefficient of Correlation (Grouped and Ungrouped). Spearman's Coefficient of Rank Correlation, Rank Correlation for Tied Ranks, Regression Analysis- Concepts of Regression, Difference b/w Correlation and Regression, Regression Lines.

Module IV: Time Series Analysis

Meaning and Significance, Components of Time Series, Trend Measurement, Moving Average Method, Least Square Method (Fitting of Straight Line Only).

Module V: Probability

Introduction, Terminology used in Probability, Definitions of Probability, Mathematical, Statistical and Axiomatic Approach to Probability, Probability Rules-Addition Rule, Multiplication Rule of Probability, Conditional Probability- Bayes Theorem, Problems on Bayes Theorem.


Module VI: Probability Distribution

Discrete Probability Distributions-Binomial Probability Distribution, Poisson Probability Distribution, Properties, Applications, Continuous Probability Distributions-Normal Probability distribution, Properties of the Normal Curve, Applications, Relation b/w distributions.

Examination Scheme:

Components	CT	HA	Q	V	A	EE
Weightage (%)	10	5	5	5	5	70

C - Case Discussion/ Presentation; HA - Home Assignment; P - Project; S - Seminar; V - Viva; Q - Quiz; CT - Class Test; A - Attendance; EE - End Semester Examination


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Manesar Gurgaon-122413

Text & References:

Text:

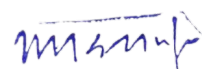
- Aditham B Rao, Quantitative Techniques in Business, Second Edition, Jaico Publications

References:

- Gupta S P, Statistical Methods, S. Chand & Co. New Delhi.
- Kapoor & Sancheti, Business Statistics, Sultan Chand & Sons, New Delhi.
- Khanna K K, Prof. Jagjit Singh & Dr. Chandan J S, Business Statistics, Second edition, Vikas Publishing House
- Anderson Sweeney Williams, Statistics for Business and Economics, Eighth edition, Thomson
- Kothari C R, Quantitative Techniques, Third edition, Vikas Publishing House
- Aggarwal B M, Business Statistics, S. Chand & Co.
- Hooda R P, (2002), Introduction to Statistics, Macmillan
- Rubin & Levin, Statistics for Management, Seventh edition, Pearson, Prentice Hall of India.



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CORPORATE ACCOUNTING

Course Code: MBF2204

Credit Units: 03

Course Objective:

This course enables the students to develop awareness about Corporate Accounting in conformity with the Provision of Companies' Act and latest amendments thereto with adoption of Accounting Standards that are likely to be introduced from time to time.

Course Contents:

Module I

Statutory records to be maintained by a company, Accounting standards - relevance and significance; National and international accounting standards.

Module II

Accounting for share capital transactions - issue of shares at par, at premium and at discount; forfeiture and re-issue of shares; buy-back of shares; redemption of preference shares - Statutory requirements, Disclosure in balance sheet; Rights issue, Underwriting.

Module III

Issue of debentures - accounting treatment and procedures; Redemption of debentures; Conversion of debentures into shares.

Module IV

Preparation and presentation of final accounts of joint stock companies as per company law requirements; Provisions and reserves; Determination of managerial remuneration; Appropriation out of profits; Transfer of profits to reserves; Payment of dividend, Transfer of unpaid dividend to Investor Education and Protection Fund; Bonus shares and payment of interest out of capital.

Module V

Holding and subsidiary companies - Accounting treatment and disclosures; Consolidation of accounts.

Module VI

Valuation of goodwill and shares

Good will – Meaning, Definition, Elements, Types and Methods of Valuation of Goodwill, Methods of share valuation (Equity & preference shares).

Module VII

Accounting treatment for amalgamation, Absorption and reconstruction of companies; Internal and external reconstruction, Liquidation- Preparation of liquidators statement & affairs, Deficiency/surplus statement, Calculation of pro rata treatment of uncalled capital.

Examination Scheme:

Components	HA	CT	C	A	EE
Weightage (%)	5	10	10	5	70

C - Case Discussion/ Presentation; HA - Home Assignment; P - Project; S - Seminar; V - Viva; Q - Quiz; CT - Class Test; A - Attendance; EE - End Semester Examination

Text & References:

Text:

- Maheswari, S.N. (2009), Principles of Management Accounting, Sultan Chand & Sons, N Delhi.

References:

- Tulsian, P C, (2009), Financial Accounting, 2nd Edition, Pearson Education.
- Rajasekaran, (2010), Financial Accounting, 1st Edition, Pearson Education.
- Narayanaswamy, Financial Accounting

• S.P. Tyagar, Advanced Accountancy

• R.L. Gupta, Advanced Accountancy

• Jain and Narang, Corporate Accounting

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FINANCIAL MANAGEMENT

Course Code: MBF2302

CreditUnits: 03

Course Objective:

To take decisions which are effective, a manager in any of the functional areas be it Marketing, HR or IT requires a thorough cost and benefit analysis and a feel for Finance so as to look at the long term implications of his/her decision. This course is a "nut and bolts" course on Finance where the basic Financial decisions will be explained through problems and exercises, thus giving the student an understanding and a feel for Financial decision making.

Course Contents:

Module I: Introduction to Financial Management

Evolution of Financial Management, Key activities of Finance Manager Changing Role of Finance Managers, Key Decision Areas in Financial Management, Objectives of the firm.

Module II: Financial Statement Analysis

Introduction, objectives of financial statement analysis, Techniques-Ratio analysis, Comparative analysis and limitations of financial statement analysis, AS-20 (no numerical)

Module III: Valuation Concepts

Concept of Time value of Money, Process of Compounding and Discounting, Future Value of a Single amount, Future Value of an Annuity, Present Value of a Single Amount, Present Value of an Annuity, Cost of capital, Weighted average cost of capital, Leverage Analysis

Module IV: Financing Decision

Capital structure, Factors affecting Capital Structure decisions, Theory of Capital Structure Decisions, MM Theory, NI, NOI and Traditional theory, Pecking order theory.

Module V: Investment Decision

Basics of Capital Budgeting, Types of capital budgeting decisions, Estimating cash flows for project appraisal, Green capital budgeting, Non-discounted Cash Flow Techniques: Payback Period, ARR, Discounted Cash Flow Techniques: NPV, IRR, PI. Risk Analysis of Capital Budgeting: Risk adjusted discount rate, Certainty Equivalent Approach.

Module VI: Working Capital Management

Meaning and importance of adequate working capital, Excess or Inadequate working capital, Determinants of working capital requirement, Cash management, Receivable management and Inventory management – Sources of working capital.

Module VII: Dividend Decisions

Importance of dividend decisions, Theories of Dividend decisions: Irrelevance theory, Optimal dividend decision, Relevance theory, Determinants of dividend policy: Bonus Shares, Stock Splits & Buyback of shares. Tax considerations.

Examination Scheme:

Components	CT	HA	C	V	A	EE
Weightage (%)	10	5	5	5	5	70

C - Case Discussion/ Presentation; HA - Home Assignment; P - Project; S - Seminar; V - Viva; Q - Quiz; CT - Class Test; A - Attendance; EE - End Semester Examination

Text & References:

Text:

- Pandey, I. M, (2010), Financial Management. 10th Edition, Vikas Publishing House Pvt. Ltd.

References:

- Van Horne, J.C (2008), Financial Management & Policy, 13th Edition, Prentice Hall
- Chandra, P., Fundamentals of Financial Management, Sixth Edition, Tata McGraw Hill.
- Brearly R.A. and Myers, S.C. Principles of Corporate Finance, 8th Edition, Tata McGraw Hill

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COMPUTERS & MANAGEMENT INFORMATION SYSTEMS

Course Code: MBF2303

CreditUnits: 03

Course Objective:

This course focuses on the relationships among management, information, and systems as well as the relationship between a manager's need for information and his/her position in the organization, how hardware, software, data, people, and procedures are combined to form an information system, how information technology can be used by a business organization to gain a competitive advantage why a knowledge of information systems is crucial to anyone who plans a career in business Organization.

Course Contents:

Module I: Organizations, Management and Information

Meaning of MIS, Components of MIS, IS in Business, Data Information and knowledge, Characteristics of Information in context, Issues with Information, System and Subsystems, Organization as a System, Different Organizational Structures: Hierarchical Structure – (Different Levels of Management, Information disposition at different levels), Matrix Structure, Business Process (Management, Operational and Support).

Module II: Information Technology Architecture

Managing Hardware Assets – Considerations in Procurement and installation, Managing Software Assets – Consideration in procurement and configuration, Data Resource Management (Database Management System – Types and Structure of Database, Data Warehousing – Phases in building Data Warehouses in an organization, Data Mining – Data Mining Applications, Data Banking)

Module III: Management and Organizational Support Systems for the Firm

Information, Decision and Management, Decision Support System (Phases in Decision Making, Problems and Decision Types, DSS components, and Analytical Models in Decision Making), Executive Information System – Characteristics and benefits, Managing Knowledge (Knowledge Engineering, Knowledge Management Activities and Knowledge Representation Methodologies), Artificial Intelligence (Domains of AI, AI in Business), Expert System (Components, Benefits and Limitations, Suitability Criteria for ES)

Module IV: Building Information Systems in the Digital Firm

Organizational Planning – Planning at distinct Managerial Levels, Approaches in Planning (Top Down, Bottom Up, Planning through CSF), IT and IS Planning – Prerequisites and factors, IT and IS Architecture (Centralized, Decentralized and Distributed), Implementing IT and IS (Factors and Resistance in implementation), Change Management with BPR, System Development (System Development Life Cycle-Overview, Prototyping), Evaluating Factors for IT and IS services.

Module V: Managing Information Systems in the Digital Firm


Managing Security (Security Challenges of IT, Business and Technological Ethics), Computer Crime (Tools for Computer Crime, Tools for Security Management), IS Security Management Control (Information System Control, Auditing the Security), Managing World Wide Information System (Managing Multi Site IT and IS – Cultural and Technical Differences), World Wide IT and IS Strategies (Multinational, International and Global Strategies)

Module VI: Key System Applications for the Digital Age

Enterprise Systems – Supply Chain Management & Customer Relationship Management Systems, Using Enterprise Applications and Achieving Operational Excellence & Customer Intimacy, E-Commerce: Digital Market & Digital Goods, M-Commerce: Services & Applications, Enterprise Applications: New Opportunities and Challenges.



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Examination Scheme:

Components	CT	HA	C	V	A	EE
Weightage (%)	10	5	5	5	5	70

C - Case Discussion/ Presentation; **HA** - Home Assignment; **P** - Project; **S** - Seminar; **V** - Viva; **Q** - Quiz; **CT** - Class Test; **A** - Attendance; **EE** - End Semester Examination

Text & References:**Text:**

- Housley, Trevor, Data Communication and Teleprocessing System, (Digitalised in 2010) Prentice Hall.

References:

- Uyless D. Black, Data Communication and Distributed Networks.



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COST ACCOUNTING

Course Code: MBF2304

CreditUnits: 03

Course Objective:

To get an expert knowledge in the area of cost management and cost control to enable effective management decisions.

Course Contents:

Module I: Cost Accounting

Introduction – Meaning of Cost, costing and Cost Accounting, Comparison between Financial Accounts and Cost Accounts, Application of Cost Accounting, Designing and installing a Cost Accounting system, Cost concepts and Classification of Costs, Cost Module, Cost Center, Elements of Cost, Preparation of cost sheet, Tenders and Quotations, Problems.

Module II: Material Costing

Classification of materials, Material Control, Purchasing procedure, store keeping, techniques of Inventory control, Setting of stock levels, EOQ, Methods of pricing materials issues, LIFO, FIFO, Weighted Average Method, Simple Average Method, Problems.

Module III: Labour Costing

Control of labour cost, Labour Turn Turnover, Causes and effects of labour turnover, Meaning of Time and Motion Study, Merit Rating, Job Analysis, Time keeping and Time booking, Idle time, causes and treatment, Overtime, Methods of Wage Payment, Time rate and Piece Rate, Incentive Schemes.

Module IV: Overhead Costing

Definition, Classification of overheads, Procedure for accounting and control of overheads, Allocation of overheads, Apportionment of overheads, Apportionment of Service department costs to production departments, Repeated Distribution method, Simultaneous equation method, absorption of OH's, Methods of Absorption, Percentage of direct material cost, Direct Labour Cost, Prime Cost, Direct Labour hour rate and Machine Hour Rate, Problems.

Module V

Costing Methods Introduction, Job Costing, Batch Costing, Contract Costing, Process Costing, principles, distinction between Process and Job, Preparation of process accounts, treatment of normal loss, abnormal loss, abnormal gain, Joint and By-products, Service costing.

Module VI

Reconciliation of Cost and Financial Accounts, Need for reconciliation, Reasons for difference in profits, Problems on preparation of Reconciliation statements including Memorandum Reconciliation account.

Examination Scheme:

Components	A	CT	C	H	EE
Weightage (%)	5	15	5	5	70

C - Case Discussion/ Presentation; HA - Home Assignment; P - Project; S - Seminar; V - Viva; Q - Quiz; CT - Class Test; A - Attendance; EE - End Semester Examination

Text & References:

Text:

- N.K. Prasad, Cost Accounting
- Nigam & Sharma, Advanced Cost Accounting, 5th edition, Himalaya Publishing House

References:

- Khanna Pandey & Ahuja: Practical Costing
- M.L. Agarwal, (2010), Cost Accounting, SahityaBhawan.
- Jain & Narang, Cost Accounting, Kalyani Publishers.
- S.N. Maheshwari: Cost Accounting
- M. N. Arora: Cost Accounting

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CORPORATE TAX PLANNING

Course Code: MBF2306

CreditUnits: 03

Course Objective:

To provide understanding of Direct Tax including Rules pertaining there to and application to different business situations. To understand principles underlying the Service Tax and concepts of VAT.

Course Contents:

Module I: Introduction to Tax Management

Concept of tax planning, Tax avoidance and tax evasions, Corporate taxation.

Module II Income from Business

Residential Status of companies, Taxable income under Business and Profession, Computation of Profit and Gains from business profession, Deemed business profits, Assessment of Retail Business, Deemed incomes (cash credit, unexplained investments, unexplained money and other assets, unexplained expenditures, investments and valuable articles not fully disclosed in books of accounts).

Module III: Deductions Allowed Under Business and Profession

Deduction Expressly allowed section 30-35, Depreciation deduction calculation, Setoff and carry forward of unabsorbed depreciation section 32(2). Determining Actual Cost 43(1), Set-off and Carry Forward Losses, Bonus or commission to employees section, Interest on borrowed capital, Insurance premium 36(1(i)), Employees contribution to provident fund, Bad debts 36, Revenue expenditure incurred by statutory corporation, Banking transaction tax, Security transaction tax, Commodity transaction tax, provision for admissibility of general deduction 37(1),

Module IV: International Accounting and Taxation

Analysis of foreign financial statement, Accounting standard: US GAAP, Indian GAAP, IAS, IFRS. Transfer Pricing – Meaning, measurement, strategic considerations Norms & Practices, tax havens, Double taxation agreement among countries, Tax implication of activities of foreign enterprise in India: Mode of entry and taxation respectively.

Module V: Indirect Tax - Concepts and General Principles

Service tax - Charge of service tax and taxable services, Valuation of taxable services, Payment of service tax and filing of returns.

VAT – Introduction, Calculation of VAT Liability including input Tax Credits, Small Dealers and Composition Scheme, VAT Procedures, Central Sales Tax.

Module VI: Tax Planning and Financial Management Decisions

Tax planning relating to capital structure decision, Dividend policy, Inter – corporate, dividends and bonus shares, Tax provisions relating to free trade zones, Infrastructure sector and backward areas, Tax incentives for exports. Tax deductions and collection at source, Advance payment of tax.

Examination Scheme:

Components	CT	HA	Q	C	A	EE
Weightage (%)	10	5	5	5	5	70

C - Case Discussion/ Presentation; HA - Home Assignment; P - Project; S - Seminar; V - Viva; Q - Quiz; CT - Class Test; A - Attendance; EE - End Semester Examination

Text & Reference:

Text:

- Lal & Vashisht, Direct Taxes, 29th Edition, Pearson

References:

Singhania & Singhania, Income Tax, 39th Edition, Taxmann

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MANAGEMENT ACCOUNTING

Course Code: MBF2401

Credit Units: 03

Course Objective:

To provide the students knowledge about the use of costing data for planning, control and decision making.

Course Contents:

Module I: Management Accounting

Meaning and Definition, Nature & Scope: Objectives of Management Accounting, Management Accounting and Financial Accounting, Management Accounting and Cost Accounting, Utility of Management Accounting, Limitations of Management Accounting, Position of Management Accountant in the Organization.

Module II: Cash Flow Analysis

Distinction of Cash from Funds, Utility of Cash Flow Statement, Construction of Cash Flow Statement

Module III: Budgets and Budgetary Control

Concept of Budgets and Budgetary Control, Nature and Objectives of Budgetary Control, Advantages and Limitations of Budgetary Control, Establishing a system of Budgetary Control, Preparation of Sales Budget, Selling and Distribution Cost Budget, Production Budget, Purchase Budget, Cash Budget, Flexible Budgets and Master Budgets.

Module IV: Responsibility Accounting

Concept of Responsibility Accounting, Cost Centers and Profit Centers, Contribution by Segments

Module V: Marginal Costing

Meaning, assumptions, cost- volume profit analysis, Break- Even analysis, Decision making areas- product mix, make/ buy, pricing decision.

Examination Scheme:

Components	A	CT	C	H	EE
Weightage (%)	5	10	10	5	70

C - Case Discussion/ Presentation; HA - Home Assignment; P - Project; S - Seminar; V - Viva; Q - Quiz; CT - Class Test; A - Attendance; EE - End Semester Examination

Text & References:

Text:

- Maheswari, S.N., (2009) Principles of Management Accounting, Sultan Chand & Sons
- Sexana, Management Accounting

References:

- Made Gowda, Management Accounting
- S.N. Goyal and Manmohan, Management Accounting
- B.S. Raman, Management Accounting
- R.S.N. Pillai and Bagavathi, Management Accounting
- Sharma and Gupta, Management Accounting, 1st Edition, Kalyani Publisher
- J. Batty, Management Accounting
- Foster, Financial Statement Analysis, Pearson.
- PN Reddy & Appanaiah, Essentials of Management Accounting
- Saxena, V.K. and Vashist, Cost Accounting, Sultan Chand & Sons, new Dwlhi

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RESEARCH METHODOLOGY AND REPORT PREPARATION

Course Code: MBF2403

Credit Units: 03

Course Objective:

To provide an exposure to the students pertaining to the nature and extent of research orientation, which they are expected to possess when they enter the industry as practitioners. To give them an understanding of the basic techniques and tools of marketing research. To train the students in evaluating and developing the marketing information system.

Course Contents:

Module I: Introduction

Nature and scope of marketing research, Marketing research as input in decision making process, Marketing research and marketing information system. Applications of marketing research, Planning a research project, Problem identification and formulation of Research Design, introduction to Research Design, Market research on the Internet.

Module II: Data collection methods

Attitudes measurement and scaling techniques, Ratio, Interval, Ordinal and Nominal scales, Likert's scale, Thurstone scale, Semantic differentiation method, Observation methods and questionnaire method, Questionnaire design, Steps in constructing a questionnaire, Types of questions, introduction to Projective techniques and perceptual mapping.

Module III: Sampling

Sampling decisions, Sampling frame, Sample selection methods - Probability and non probability, Sample size, sampling error, Application of sampling methods to marketing problems.

Module IV: Data Collection Field Force

Data collection field force, Fieldwork procedure, common sources of error in the fieldwork, minimizing fieldwork errors, Tabulation of collected data.

Module V: Data Analysis

Data analysis-I, Test of significance Z, t, F and chi-square, Data analysis-II, Correlation and Regression techniques, Data analysis – III – Cluster Analysis, Introduction to Statistical Package

Module VI: Report Writing

Research presentation and research process examination; Report writing - Types of research report. Examination of the research procedure, Selected applications of marketing research, identifying market segments, Product research, Advertising research.

Examination Scheme:

Components	CT	HA	C	V	A	EE
Weightage (%)	10	5	5	5	5	70

C - Case Discussion/ Presentation; HA - Home Assignment; P - Project; S - Seminar; V - Viva; Q - Quiz; CT - Class Test; A - Attendance; EE - End Semester Examination

Text & References:

Text:

- Malhotra, Naresh, (2008), Marketing Research, 5th Edition, Pearson Education.
- Luck, David J and Rubin, Ronald S., Marketing Research, Seventh edition, Prentice Hall of India

References:

- Aaker, David A; Kumar V and George S., Marketing Research, Sixth edition, John Wiley & Sons
- Boyd, Harper W, Westphall, Ralph & Stasch, Stanely F, Market Research – Text & Cases,
- Sekaran, Uma (2003), Research Methods for Business 4th Edition, Willey.

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ENTREPRENEURSHIP DEVELOPMENT

Course Code: MBF2503

Credit Units: 03

Course Objective:

The objective of the course is to provide students an understanding of entrepreneurship & the process of creating and growing a new venture. The course also focuses on giving the students the concept of an entrepreneur who is willing to accept all the risks & put forth the effort necessary to create a new venture.

Course Contents:

Module I: Basic Concepts

Qualities, Characteristics of an entrepreneur, Venture idea generation, Ideas and the entrepreneurship, Women entrepreneurs, Preliminary Screening, Drawbacks or Problems of entrepreneurship, Reasons of failure, Overview of setting up an enterprise with organizational forms – MSMED Act and SMERA Overview.

Module II: Project Appraisal

Pre-feasibility Report, Project Report, Comparative Rating of Product ideas, Cash Flow, Financial Analysis and Planning, Sources of Finance, Stages of Project Feasibility Analysis-Market, Technical, Financial, Social Analysis, Project Implementation Stages

Module III: Financial Analysis

Financing the project, Sources of finance, Venture Capital Sources, What Investor looks in the Investment Proposal, Outline for a Venture Capital Proposal, Sources of finance from different banks, Proposal with IDBI etc.

Module IV: Market and Materials Management Analysis

Vendor development, vendor selection decision factors, methods of price determination, direct and hidden cost in material management, market development, market feasibility, activities and decisions in materials management – International Markets.

Module V: Project Management

Steps and procedure for setting up small scale, Role of Banks and Financial Institutions in Development, E-Commerce, E-Business, E-Auction, Project management problems. SEZ, Cluster Development.

Examination Scheme:

Components	CT	HA	C	V	A	EE
Weightage (%)	10	5	5	5	5	70

C - Case Discussion/ Presentation; **HA** - Home Assignment; **P** - Project; **S** - Seminar; **V** - Viva; **Q** - Quiz; **CT** - Class Test; **A** - Attendance; **EE** - End Semester Examination

Text & References:

Text:

- Developing Entrepreneurship, Udai Pareek Sanjeev & Rao T.V, Printers, Ahmedabad
- Issues and Problems: Small: 1, Sharma, S.V.S., Industry Extension Training Institute, Hyderabad

References:

- A Practical Guide to Industrial Entrepreneurs; Srivastave, S.B., Sultan Chand & Sons
- Entrepreneurship Development; Bhanussali, Himalaya Publishing, Bombay

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SUMMER INTERNSHIP EVALUATION

Course Code: MBF2535

CreditUnits: 06

Objective:

The basic objective of a summer internship is to provide first hand practical exposure of the corporate functioning and to acquaint students with the culture of corporate. The summer training will also provide an opportunity to the students to apply their theoretical understanding while working on the concerned project in the industry. Thus, this summer internship programme is an attempt to bridge the gap between theory and practice. This will also enhance the students' intellectual ability and attributes related to data handling, decision making, report writing, oral presentation and imbibing an interdisciplinary approach.

General Guidelines:

Every student of under graduate courses will be required to undergo a practical training in a corporate organization approved by the Institute for eight weeks, normally in the Summer Vacation, after the end of the fourth semester examinations. The candidates shall be required to undergo training in the various areas of the organization concerned. The organization may assign a specific project to the candidate, which will be completed by him/her during the period of training. The work done by the candidate during the training period shall be submitted in the form of a report as per the guidelines provided by the Department.

Chapter Scheme for the SIP Report:

Chapter I: Introduction	- 20 marks
Chapter II: Conceptual Framework/National/International Scenario	- 5 marks
Chapter III: Presentation, Analysis and Findings	- 35 marks
Chapter IV: Conclusion and Recommendations	- 15 marks

The report has to be written in font Times New Roman, 12 points, 1.5 line spacing on both sides of the paper, Spiral Bound. The report should comprise of a maximum of 70 pages and has to be submitted in two copies.

THE COMPONENTS OF A SIP REPORT

The outcome of Summer Internship is the Project Report. A project report should have the following components:

- 1) Cover Page:** This should contain the title of the project proposal, to whom it is submitted, for which degree, the name of the author, name of the supervisor, year of submission of the project work, name of the University.
- 2) Acknowledgement:** Various organizations and individuals who might have provided assistance /co-operation during the process of carrying out the study.
- 3) Table of Content:** Page-wise listing of the main contents in the report, i.e., different Chapters and its main Sections along with their page numbers.
- 4) Body of the Report:** The body of the report should have these four logical divisions
 - a. Introduction:** This will cover the background, rationale/ need / justification, brief review of literature, objectives, methodology (the area of the study, sample, type of study, tools for data collection, and method of analysis), Limitations of the Study, and Chapter Planning.
 - b. Conceptual Framework / National and International Scenario:** (relating to the topic of the Project).
 - c. Presentation of Data, Analysis and Findings:** (using the tools and techniques mentioned in the methodology).
 - d. Conclusion and Recommendations:** In this section, the concluding observations based on the main findings and suggestions are to be provided.
- 5) Bibliography or References:** This section will include the list of books and articles which have been used in the project work, and in writing a project report.
- 6) Annexure:** Questionnaires (if any), relevant reports, etc.

Evaluation Scheme:

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SIP Report	Power Point Presentation & Viva
75 marks	25 marks

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ADVANCED CORPORATE FINANCE

Course Code: MBF2604

Credit Units: 03

Course Objective:

The basic objective of this course is to acquaint the students with the latest developments in the field of corporate finance. This course will be a step above Financial Management II where they will learn advanced topics related to behavioural finance, corporate restructuring & corporate governance

Course Contents:

Module I: Introduction

Objectives of Corporate finance, Shareholder wealth maximization, Agency Problems, Management Compensation & measurement of Performance

Module II: Valuation Concepts

Valuation Models, Application of Valuation Model, EVA/MVA, Balanced scorecard and other methods/measures of financial performance.

Module III: Corporate restructuring

Differential Efficiency & Financial Synergy: Theory of Mergers, Operating Synergy & Pure Diversification: Theory of mergers, Costs and Benefits of Merger, Evaluation of Merger as a Capital Budgeting Decision, Poison Pills, Turnaround Strategies, Tax Planning relating to mergers and Amalgamation

Module IV: Corporate Governance & Business Ethics

Implementation of Corporate Governance, Ethics and finance, Ethical practices in market place, Corporate Responsibility, Social Audit and Ethical Investing.

Module V: Behavioural Finance

Introduction and Expected Utility, Non-Expected Utility Preferences, A review of classical probability theory, Beliefs, Biases and Heuristics, Preferences and Anomalies in the Financial markets

Module VI: Strategic Cost management

Financial aspects of Supply Chain Management, Operations management perspective on Costs, Strategic cost analysis (using activity based costing, target costing and life cycle costing) and Product pricing at Different stages of product's life cycle.

Examination Scheme:

Components	CT	HA	Q	C	A	EE
Weightage (%)	10	5	5	5	5	70

C - Case Discussion/ Presentation; HA - Home Assignment; P - Project; S - Seminar; V - Viva; Q - Quiz; CT - Class Test; A - Attendance; EE - End Semester Examination

Text & References:

Text:

- Brealey and Myers, Principles of Corporate Finance, Eighth Edition, Tata McGraw Hill Publishing Company Limited.

References:

- Ross, Westerfield and Jaffe, Seventeenth Edition, Tata McGraw Hill.
- Quiry, P., Dallochio, M., YannLEFur, AntonioSalvi, Seventh Edition, John Wiley and Sons


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PROJECT WORK/ DISSERTATION

Course Code: MBF2637

CreditUnits: 09

Objectives:

The aim of the dissertation is to provide you with an opportunity to further your intellectual and personal development in your chosen field by undertaking a significant practical unit of activity, having an educational value at a level commensurate with the award of your degree. The dissertation can be defined as a scholarly inquiry into a problem or issues, involving a systematic approach to gathering and analysis of information / data, leading to production of a structured report.

Chapter Scheme and distribution of marks:

Chapter 1: Introduction	- 10 marks
Chapter 2: Conceptual Framework/ National/International Scenario	- 5 marks
Chapter 3: Presentation, Analysis & Findings	- 25 marks
Chapter 4: Conclusion & Recommendations	- 10 marks

THE COMPONENTS OF A PROJECT REPORT

The outcome of Project Work is the Project Report. A project report should have the following components:

1) Cover Page: This should contain the title of the project proposal, to whom it is submitted, for which degree, the name of the author, name of the supervisor, year of submission of the project work, name of the University.

2) Acknowledgement: Various organizations and individuals who might have provided assistance /co-operation during the process of carrying out the study.

3) Table of Content: Page-wise listing of the main contents in the report, i.e., different Chapters and its main Sections along with their page numbers.

4) Body of the Report: The body of the report should have these four logical divisions

- Introduction:* This will cover the background, rationale/ need / justification, brief review of literature, objectives, methodology (the area of the study, sample, type of study, tools for data collection, and method of analysis), Limitations of the Study, and Chapter Planning.
- Conceptual Framework / National and International Scenario:* (relating to the topic of the Project).
- Presentation of Data, Analysis and Findings:* (using the tools and techniques mentioned in the methodology).
- Conclusion and Recommendations:* In this section, the concluding observations based on the main findings and suggestions are to be provided.

5) Bibliography or References: This section will include the list of books and articles which have been used in the project work, and in writing a project report.

6) Annexures: Questionnaires (if any), relevant reports, etc.

(The main text of the Project should normally be in the range of 5000 words. However, there may be annexure in addition to the main text)

THE STEPS OF PROJECT WORK

STEP I : Selection of the topic for the project by taking following points into consideration:

- Suitability of the topic.
- Relevance of the topic
- Time available at the disposal.
- Feasibility of data collection within the given time limit.
- Challenges involved in the data collection (time & cost involved in the data collection, possibility of getting responses, etc.)

STEP II: Finalisation of the Topic and preparation of Project Proposal in consultation with the Supervisor.

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STEP III: Collection of information and data relating to the topic and analysis of the same.

STEP IV: Writing the report dividing it into suitable chapters, viz.,

Chapter 1: Introduction,

Chapter 2: Conceptual Framework / National & International Scenario,

Chapter 3: Analysis & Findings

Chapter 4: Conclusion and Recommendations.

STEP V : The following documents are to be attached with the Final Project Report.

1) Approval letter from the supervisor (Annexure-IA)

2) Student's declaration (Annexure-IB)

3) Certificate from the Competent Authority of the Organisation / Institution, if the student undertakes the Project Work in any Organisation / Institution.

Annexures, References / Bibliography

Guidelines for Evaluation:

- Each of the students has to undertake a Project individually under the supervision of a teacher and to submit the same following the guidelines stated below.
- Language of Project Report and Viva-Voce Examination may be English. The Project Report must be typed and hard bound.
- Failure to submit the Project Report or failure to appear at the Viva-voce Examination will be treated as "Absent" in the Examination. He /she have to submit the Project Report and appear at the Viva-Voce Examination in the subsequent years (within the time period as per University Rules).
- No marks will be allotted on the Project Report unless a candidate appears at the Viva-Voce Examination. Similarly, no marks will be allotted on Viva-Voce Examination unless a candidate submits his/her Project Report.
- Evaluation of the Project Work to be done jointly by one internal expert and one external expert with equal weightage, i.e., average marks of the internal and external experts will be allotted to the candidate.
- A candidate has to qualify in the Project Work separately, obtaining minimum marks of 40 (Project Report and Viva-Voce taken together).

Evaluation Scheme:

Dissertation	Power Point Presentation & Viva
75 marks	25 marks


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Bachelor of Business Administration

COMPUTERS IN MANAGEMENT

Course Code: MGT2101

Credit Units: 03

Course Objective:

The objective of this subject is to provide conceptual knowledge of the information technology to the future Managers. This subject highlights the topics like Database Management, Networking, Internet, E-commerce etc., which can help managers to take routine decisions very efficiently.

Course Contents:

Module I: World of Computers

Introduction to world of Computers, Computers in Home (Reference, Education & Communications, Entertainment and Digital Media Delivery, Smart Appliances, Home Computers), Computers in Education, Computers in workplace (productivity and decision making, customer services, communications), Computers on the move (Portable and Hand held computers, Self-Service kiosks, GPS Applications), Computer Peripherals, Memory Management.

Module II: Computer Networks

Introduction to Computer Networks, Networking Components, Classification and Types of Networks, Network Topologies – Overview with Advantages and Disadvantages, Communication Channels, Client Server Architecture, LAN concepts.

Module III: Internet Technology & World Wide Web

Introduction to Internet Intranet and Extranet, Myths about the Internet, Basic Concepts of Internet, Domain Name Service, Internet Protocols and Addressing, Services of internet, Internet and support Technologies, Censorship and Privacy issues.

Module IV: E-commerce

Introduction, E-Commerce Vs E-Business, Advantages & Disadvantages, E-Commerce Business Models, E-Commerce Technologies, Hosting E-Commerce Site – Planning and constructing web services, E-Commerce Applications, E-Core Values – Ethical, Legal, Taxation and International issues, E-Commerce Security Issues, Internet based Payment System.

Module V: Enterprise Resource Planning

Introduction, Scope and Benefit, ERP and related technologies (BPR, MIS, DSS, EIS, SCM, OLAP, etc), ERP implementation methodology – implementation life cycle, ERP and its success factors, Pitfalls and management concerns, ERP Market – renowned vendors and the packages.


Module VI: Database Management System

Introduction, Need for DBMS, Components of DBMS, Benefits of DBMS over Tradition File System, classification and types of Database Models, Database Approach – Its benefits and Disadvantages.

Examination Scheme:

Components	CT	HA	C	V	A	EE
Weightage (%)	10	5	5	5	5	70

(C - Case Discussion/ Presentation; HA - Home Assignment; V - Viva; CT - Class Test; A - Attendance; EE - End Semester Examination)


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Text & References:

Text:

- Deborah Morley (2007), Understanding Computers: Today & Tomorrow, Eleventh Edition, Thomson

References:

- Rajaraman, V. (1998), An Introduction to Computers, Prentice Hall of India.
- Nagpal, (1999), Computer Fundamentals, Wheeler Publishing, New Delhi.
- Bhatnagar, S.C. and Ramani, K.V., Computers and Information Management.
- Hunt and Shelly. (1994), Computers and Commonsense, Prentice Hall of India.



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FINANCIAL ACCOUNTING

Course Code: MGT2102

Credit Units: 03

Course Objective:

To understand the basics of accounting and concepts of double entry system. The students will be given a detailed grounding on recording of transactions and preparation of final accounting statements for business organizations.

Course Contents:

Module I: Introduction to Accounting

Understanding the meaning, nature, functions and usefulness of accounting, branches of Accounting, Accounting Equation, Accounting Concepts and Generally Accepted Accounting Principles. Difference between Indian GAAP and US GAAP

Module II: Recording of Transactions and Subsidiary Books

Concept of Double Entry System. Understanding the Accounting cycle, Preparation of Voucher, Journal, Ledger and Trial Balance and Numerical on the Same. Preparation of subsidiary Books including Purchase Book, Sales Book, Purchase Returns Book and Sales Return Books (and numerical on the same), Cash book, types of cash book and balancing of cashbook. Numerical on single column cashbook, Double column cashbook, triple column cashbook and petty cash book.

Module III: Reconciliation of Bank Accounts

Causes for difference in the Balance as per Pass book and balance as per cashbook, Procedure for preparation of bank reconciliation statement when there is favorable balance and in case of overdraft (and numerical on the same).

Module IV: Financial Statements

Preparation of Trading Account, Manufacturing Account, Profit And Loss Account and balance sheet along with adjustments (and numerical on the same) and non-profit making organizations an overview. AS-1, AS-21 (no numerical)

Module V: Accounting For Partnership

Introduction to Partnership Accounts, Partnership Deed. **Admission of a new partner**- Revaluation account, Computation of New Profit Sharing Ratio and Sacrificing Ratio, Proportionate Capital, Treatment of goodwill in partnership accounts and its valuation. **Retirement and Death of a partner**: Determining the gaining ratio, Revaluation of assets and liabilities, Reserve, Final payment to retiring partner, Treatment and adjustment of goodwill. Numericals on preparation of various accounts in case of retirement and death of a partner. **Dissolution of the firm**: Circumstances leading to dissolution of partnership, Settlement of the accounts, Capital ratio on insolvency, Insolvency of all partners and Garner Vs Murray decision.

Examination Scheme:

Components	CT	HA	C	P	A	EE
Weightage (%)	10	5	5	5	5	70

(C - Case Discussion/ Presentation; HA - Home Assignment; V - Viva; CT - Class Test; P - Project A - Attendance; EE - End Semester Examination)

Text & References:

Text:

- Maheshwari, S.N., Advanced Accountancy Volume-I, Ninth Edition, Vikas Publishing House Pvt. Ltd.

References:

- Grewal, T. S., Shukla, M. C., Advanced Accountancy, Sixteenth Edition, Sultan Chand and Sons.
- Tulsian, P.C (2009), Financial Accounting 2nd Edition, Pearson Education.
- Narayanaswamy, R. Financial Accounting- A Managerial Perspective, Second Edition, Prentice Hall India.
- Ramachandran, N., Kakani, R.K., Financial Accounting for Management, Tata McGraw Hill Publishing Company Limited.

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E-COMMERCE

Course Code: COM2103

CreditUnits: 03

Course Objective:

In the changed business environment of today, it has become imperative for businesses to understand, appreciate and learn to create their presence in cyber space. This course focuses on exposing the students to the world of e-commerce, the opportunities, and the threats and teaches them the strategies of making businesses viable and successful.

Course Contents:

Module I: E-Commerce Concept

Meaning, Definition, Concept, Features, Function of E-Commerce, E-Commerce Practices v/s Traditional Practices, Scope and basic models of E-Commerce, Limitations of E-Commerce, Precaution for secure E-Commerce, proxy services. Concept of EDI, Difference between paper based Business and EDI Based business, Advantages of EDI, Application areas for EDI, Action plan for Implementing EDI, Factors influencing the choice of EDI, Software Concept of Electronic Signature, Access Control.

Module II: Types of E-Commerce

Meaning of B2C, B2B, C2C, P2P, Applications in B2C- E-Banking, E-Trading. E-Auction - Introduction and overview of these concepts, Application of B2B- E-distributor, B2B service provider, benefits of B2B on Procurement, Just in time delivery, Consumer to consumer and peer to peer business model introduction and basic concepts.

Module III: E-Marketing

Traditional Marketing V/S E-Marketing, Impact of Ecommerce on markets, Marketing issue in E-Marketing, Promoting your E-Business, Direct marketing, one to one marketing.

Module IV: E-Finance

Areas of E-Financing, E-Banking, traditional v/s E-Banking, operations in E-Banking, E-Trading- Stock marketing, Trading v/s E-Trading, Importance of E-Trading, Advantages of E-trading, operational aspects of E-Trading.

Module V: E-Payment

Transactions through Internet, Requirements of E-Payment system, Post paid payment system- Credit card solutions, Cyber cash Internet Cheques, Instant Paid payment system- Debit card, Direct Debit, Prepaid payment system- Electronic cash, Digicash, Netcash, Cybercash, Smart Cards.

Examination Scheme:

Components	CT	HA	C	V	A	EE
Weightage (%)	10	5	5	5	5	70

(C - Case Discussion/ Presentation; HA - Home Assignment; V - Viva; CT - Class Test; A - Attendance; EE - End Semester Examination)

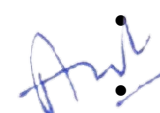
Text & References:

Text:

- Elias M Awad, Electronic Commerce from Vision to fulfilment, Third Edition, Pearson Education

References:

- Ravi Kalakota & Andrew B. Shinston, Electronic Commerce – A manager's Guide, Pearson Education.
- Bhaskar Bharat, Electronic Commerce - Technologies & Applications, Tata McGraw Hill.
- J. Christopher & T.H.K. Clerk, Global E-Commerce, University Press.


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READINGS IN MANAGEMENT

Course Code: MGT2130

Credit Units: 02

Course Objective:

The objective of this concentration elective is to inculcate reading habit along with value addition to the existing understanding of the subject. The book would be a kind of knowledge enhancer that would envision the student about some current thoughts related to the discipline. The book reading and its critical analysis would help broaden the intellectual horizon of the student. The selection of the book will be department specific so that it can be discipline specific.

Guidelines:

The student is expected to thoroughly go through the discipline related prescribed book with the objective of critically reviewing each aspect and character of the book. The student is supposed to have a detailed insight into the following:

1. Content
2. Writing style
3. Information/learning
4. Content handling
5. Characters (if any)
6. Thematic Clarity

The report is to be submitted in about 3000 words on A4 size sheets, Font 12pt., Times New Roman, 1.5 spacing. Headings in Font Size 16

Evaluation Scheme:

Report on the Book in 3000 words	Written Test
50 marks	50 marks


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TERM PAPER

Course Code: MGT2131

Credit Units: 02

Course Objective:

The objective of this course is to judge the understanding as well as application of the knowledge gained by the students. The aim of the term paper is to provide the students with an opportunity to further enhance their knowledge in a sector of their choice by undertaking a significant practical unit of examining and analyzing various aspects of business management at a level commensurate with the learning outcomes of the various courses taken up them in the ongoing semester.

A term paper is primarily a record of intelligent reading in several sources on a particular subject. The students will choose the topic at the beginning of the session in consultation with the faculty assigned. At least one middle level or senior level person of a company from the chosen sector may be interviewed face to face.

Guidelines:

1. The term paper will be related to the contemporary business issue and the topic will be given by the department.
2. The presentation of the term paper is scheduled to be held before the commencement of Semester examinations.
3. The paper will carry 100 marks that will be marked on the basis of understanding and organization of content based on the literature review. The Bibliography shall form an important part of the paper.
4. Examples of a few broad areas for Term Paper (List is indicative, not exhaustive)
 - Management practices
 - Talent management
 - HR cases from any Indian industry
 - Employee motivation
 - Managerial competencies
 - Employability skills
 - Industrial relations
 - Knowledge management
 - Social media
 - Green marketing
 - Six Sigma
 - Sustainable branding practices
 - Training and development
 - Relationship management
 - CSR
 - Performance management system
 - Balanced Score Card
 - Corporate Governance
 - Employee retention
 - NGOs.

Evaluation Scheme:

Organisation and relevance of content	Literature Review	Bibliography	Presentation & Viva	Total
30	30	20	20	100


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PROJECT

Course code: MGT2132

Credit Units: 03

Objectives:

The aim of the project is to provide the students with an opportunity to further their intellectual and personal development in the chosen field by undertaking a significant practical unit of activity. The project can be defined as a scholarly inquiry into a problem or issues, involving a systematic approach to gathering and analysis of information / data, leading to production of a structured report.

Chapter Scheme and distribution of marks:

Chapter 1: Introduction	– 10 marks
Chapter 2: Conceptual Framework/ National/International Scenario	– 25 marks
Chapter 3: Presentation, Analysis & Findings	– 25 marks
Chapter 4: Conclusion & Recommendations	– 10 marks
Chapter 5: Bibliography	– 05 marks

Components of a Project Report

The outcome of Project Work is the Project Report. A project report should have the following components:

1) Cover Page: This should contain the title of the project proposal, to whom it is submitted, for which degree, the name of the author, name of the supervisor, year of submission of the project work, name of the University.

2) Acknowledgement: Various organizations and individuals who might have provided assistance /co-operation during the process of carrying out the study.

3) Table of Content: Page-wise listing of the main contents in the report, i.e., different Chapters and its main Sections along with their page numbers.

4) Body of the Report: The body of the report should have these four logical divisions

- Introduction:** This will cover the background, rationale/ need / justification, brief review of literature, objectives, methodology (the area of the study, sample, type of study, tools for data collection, and method of analysis), Limitations of the Study, and Chapter Planning.
- Conceptual Framework / National and International Scenario:** (relating to the topic of the Project).
- Presentation of Data, Analysis and Findings:** (using the tools and techniques mentioned in the methodology).
- Conclusion and Recommendations:** In this section, the concluding observations based on the main findings and suggestions are to be provided.

5) Bibliography or References: This section will include the list of books and articles which have been used in the project work, and in writing a project report.

6) Annexures: Questionnaires (if any), relevant reports, etc.

(The main text of the Project should normally be in the range of 5000 words. However, there may be annexure in addition to the main text)

The Steps of a Project Report

Step I: Selection of the topic for the project by taking following points into consideration:

- Suitability of the topic.
- Relevance of the topic
- Time available at the disposal.
- Feasibility of data collection within the given time limit.
- Challenges involved in the data collection (time & cost involved in the data collection, possibility of getting responses, etc.)

Step II: Finalisation of the Topic and preparation of Project Proposal in consultation with the Supervisor

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Step III: Collection of information and data relating to the topic and analysis of the same.

Step IV: Writing the report dividing it into suitable chapters, viz.,

Chapter 1: Introduction,

Chapter 2: Conceptual Framework / National & International Scenario,

Chapter 3: Analysis & Findings

Chapter 4: Conclusion and Recommendations.

Step V: The following documents are to be attached with the Final Project Report.

1) Approval letter from the supervisor (Annexure-IA)

2) Student's declaration (Annexure-IB)

3) Certificate from the Competent Authority of the Organisation / Institution, if the student undertakes the Project Work in any Organisation / Institution.

Guidelines for Evaluation:

Each of the students has to undertake a Project individually under the supervision of a teacher and to submit the same following the guidelines stated below:

- Language of Project Report and Viva-Voce Examination may be English. The Project Report must be typed and hard bounded.
- Failure to submit the Project Report or failure to appear at the Viva-voce Examination will be treated as "Absent" in the Examination. He /she has to submit the Project Report and appear at the Viva-Voce Examination in the subsequent years (within the time period as per University Rules).
- No marks will be allotted on the Project Report unless a candidate appears at the Viva-Voce Examination. Similarly, no marks will be allotted on Viva-Voce Examination unless a candidate submits his/her Project Report.
- Evaluation of the Project Work to be done jointly by one internal expert and one external expert with equal weightage, i.e., average marks of the internal and external experts will be allotted to the candidate.

Evaluation Scheme:

Project Report	Power Point Presentation & Viva	Total
75 marks	25 marks	100



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Declaration

Ihereby declare that the Project Work with the title (in block letters).....
submitted by me for the partial fulfilment of the degree of BBA is my original work and has not been submitted earlier to any other University /Institution for the fulfilment of the requirement for any course of study.

I also declare that no chapter of this manuscript in whole or in part has been incorporated in this report from any earlier work done by others or by me. However, extracts of any literature which has been used for this report has been duly acknowledged providing details of such literature in the references.

Signature of supervisor:

Name:

Signature of the student

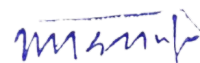
Registration No

Place:

Date:



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WORKSHOP

Course Code: MGT2133

Credit Units: 01

Course Objective:

A workshop is primarily an activity based academic event that is organized to provide the students a one to one and hands on experience on any aspect of their learning. The communication in a workshop has to be necessarily two ways. The trainer has to make sure that the aspects covered are practically practiced by the participants. The student will choose the option of workshop from amongst their concentration electives. The evaluation will be done by Board of examiners comprising of faculties.

Major Themes for Workshop:

The workshop may be conducted on any of the following major themes:

- Accounting
- Finance
- Human Resources
- Marketing
- Economics
- Operations
- Supply Chain Management

These themes are merely indicative and the trainer may choose any recent and relevant topic of study.

Guidelines for Workshop:

The procedure for earning credits from workshop consists of the following steps:

1. Relevant study material and references will be provided by the trainer in advance.
2. The participants are expected to explore the topic in advance and take active part in the discussions to be held.
3. Attending and Participating in all activities of the workshop
4. Group Activities have to be undertaken by students as guided by the trainer.
5. Evaluation of workshop activities would be done through test and quiz at the end of the workshop.
6. Submitting a write up of at least 500 words about the learning outcome from the workshop.

Methodology:

The methodology followed at the workshop could be based on any one or more of the following methods:

- Case Study
- Business Game
- Simulation
- Group Activity
- Role Play
- Business Planning
- Quiz

Evaluation Scheme:

Attendance	Active Participation	Multiple Choice Questions/ Quiz	Solving the case/ Assignment/ Write up	Total
10	30	30	30	100


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BUSINESS STATISTICS

Course Code: MGT2202

Credit Units: 03

Course Objective:

The objective of this course is to familiarize the students with various statistical tools which can help them in analysis and interpretation of business data. This course will provide students with hands-on experience to promote the use of statistical thinking and techniques to apply them to make educated decisions whenever there is variation in business data. Therefore, it is a course in statistical thinking via a data-oriented approach.

Course Contents:

Module I: Introduction to Statistics

Definitions, Functions of Statistics, Statistics and Computers, Limitation of Statistics, Application of Statistics.

Module II: Data Collection and Analysis

Methods of Data Collection, Primary and Secondary Data, Graphic Representation of Data, Measures of Dispersion-Range, Quartile Deviation, Mean Deviation, Standard Deviation, Coefficient of Variation.(Absolute & Relative Measure of Dispersion), Skewness-Karl-Pearson's Coefficient of Skewness, Bowley's Coefficient of Skewness, Kurtosis.

Module III: Correlation Analysis and Regression Analysis

Introduction-Importance of Correlation, Types of Correlation, Scatter Diagram Method, Karl Pearson's coefficient of Correlation (Grouped and Ungrouped). Spearman's Coefficient of Rank Correlation, Rank Correlation for Tied Ranks, Regression Analysis- Concepts of Regression, Difference b/w Correlation and Regression, Regression Lines.

Module IV: Time Series Analysis

Meaning and Significance, Components of Time Series, Trend Measurement, Moving Average Method, Least Square Method (Fitting of Straight Line Only).

Module V: Probability

Introduction, Terminology used in Probability, Definitions of Probability, Mathematical, Statistical and Axiomatic Approach to Probability, Probability Rules-Addition Rule, Multiplication Rule of Probability, Conditional Probability- Bayes Theorem, Problems on Bayes Theorem.

Module VI: Probability Distribution

Discrete Probability Distributions-Binomial Probability Distribution, Poisson Probability Distribution, Properties, Applications, Continuous Probability Distributions-Normal Probability distribution, Properties of the Normal Curve, Applications, Relation b/w distributions.

Examination Scheme:

Components	CT	HA	Q	V	A	EE
Weightage (%)	10	5	5	5	5	70

C - Case Discussion/ Presentation; HA - Home Assignment; P - Project; S - Seminar; V - Viva; Q - Quiz; CT - Class Test; A - Attendance; EE - End Semester Examination


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Text & References:

Text:

- Aditham B Rao, Quantitative Techniques in Business, Second Edition, Jaico Publications

References:

- Gupta S P, Statistical Methods, S. Chand & Co. New Delhi.
- Kapoor & Sancheti, Business Statistics, Sultan Chand & Sons, New Delhi.
- Khanna K K, Prof. Jagjit Singh & Dr. Chandan J S, Business Statistics, Second edition, Vikas Publishing House
- Anderson Sweeney Williams, Statistics for Business and Economics, Eighth edition, Thomson
- Kothari C R, Quantitative Techniques, Third edition, Vikas Publishing House
- Aggarwal B M, Business Statistics, S. Chand & Co.
- Hooda R P, (2002), Introduction to Statistics, Macmillan
- Rubin & Levin, Statistics for Management, Seventh edition, Pearson, Prentice Hall of India.



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CORPORATE ACCOUNTING

Course Code: MGT2203

Credit Units: 03

Course Objective:

This course enables the students to develop awareness about Corporate Accounting in conformity with the Provision of Companies' Act and latest amendments thereto with adoption of Accounting Standards that are likely to be introduced from time to time.

Course Contents:

Module I

Statutory records to be maintained by a company, Accounting standards - relevance and significance; National and international accounting standards.

Module II

Accounting for share capital transactions - issue of shares at par, at premium and at discount; forfeiture and re-issue of shares; buy-back of shares; redemption of preference shares - Statutory requirements, Disclosure in balance sheet; Rights issue, Underwriting.

Module III

Issue of debentures - accounting treatment and procedures; Redemption of debentures; Conversion of debentures into shares.

Module IV

Preparation and presentation of final accounts of joint stock companies as per company law requirements; Provisions and reserves; Determination of managerial remuneration; Appropriation out of profits; Transfer of profits to reserves; Payment of dividend, Transfer of unpaid dividend to Investor Education and Protection Fund; Bonus shares and payment of interest out of capital.

Module V

Holding and subsidiary companies - Accounting treatment and disclosures; Consolidation of accounts.

Module VI

Valuation of goodwill and shares

Good will – Meaning, Definition, Elements, Types and Methods of Valuation of Goodwill, Methods of share valuation (Equity & preference shares).

Module VII

Accounting treatment for amalgamation, Absorption and reconstruction of companies; Internal and external reconstruction, Liquidation- Preparation of liquidators statement & affairs, Deficiency/surplus statement, Calculation of pro rata treatment of uncalled capital.

Examination Scheme:

Components	HA	CT	C	A	EE
Weightage (%)	5	10	10	5	70

C - Case Discussion/ Presentation; **HA** - Home Assignment; **P** - Project; **S** - Seminar; **V** - Viva; **Q** - Quiz; **CT** - Class Test; **A** - Attendance; **EE** - End Semester Examination

Text & References:

- Maheswari, S.N. (2009), Principles of Management Accounting, Sultan Chand & Sons, N Delhi.
- Tulsian, P C, (2009), Financial Accounting, 2nd Edition, Pearson Education.
- Rajasekaran, (2010), Financial Accounting, 1st Edition, Pearson Education.
- Narayanaswamy, Financial Accounting
- SP Iyengar, Advanced Accountancy
- RL Gupta, Advanced Accountancy
- Jain and Narang, Corporate Accounting

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ANALYSIS AND DESIGN OF BUSINESS SYSTEM

Course Code: MGT2204

CreditUnits: 03

Course Objective:

The course aims at preparing students conceptualize and define scope and domain of system analysis and design. It also focuses on system development life cycle using conventional and structural look.

Course Contents:

Module I: Systems Development Environment. (Information system development life cycle)

System & its parts, Types of Systems, Characteristics of a System, System Analyst in system Development, Developing Systems- SDLC, Approaches to System Development (Prototyping, Joint Application Design (JAD), Participatory Design (PD)), System Development Models (Waterfall model & Spiral Model), System Planning & Selection (Identifying, Selecting, Initiating & Planning System Development Project).

Module II: System Planning and Selection (Graphic technology modeling tool)

Identifying and Selecting Projects (Identifying potential development projects, classifying and ranking projects, and selecting projects for development), Methods for project identification and selection, Evaluation criteria for classifying and ranking projects, Initiating and Planning System Development Projects (Process & performed Activities, Deliverables & Outcomes), Assessing Project Feasibility (Economic, Operational, Technical, Schedule, Legal & Contractual, Political Feasibility)

Module III: System & Data Analysis (Data Analyzing Modeling)

Determining System Requirements (Traditional Methods, Modern & Radical Methods), Structuring System Requirements (Process Modeling – DFD, Logic Modeling – Structured English & Decision Tables, Conceptual Modeling – ER Model), Data Analysis & Techniques (Interpretive, Coding, Recursive Abstraction and Mechanical Technique), Types of Analysis (Descriptive, Exploratory, Confirmatory and Predictive), Modeling Methodologies (Bottom Up method & Top Down Method), Generic and Schematic Data Modeling.

Module IV: System & Database Design

System Design (Design Objectives, Phases in Designing, Purpose of System Design), System Design Goals, Type of Design, Design Strategy, System Decomposition (Modeling, Connection and Coupling of a System), System Design Methodologies, Database Design, Database Management System – an introduction, Overview of Data Models, Relational Database Model – Well structured relations, Keys, Schema & Subschema, Structure, Facilities & Users, Constraints, Anomalies, Functional Dependency, Normalization, Roles & Duties of System Administration.

Module V: System Implementation & Operation (System Management)

Activities in implementing (Coding, Testing & Installation, Documentation, Training, Support, Maintenance), Types of testing, planning installation, approaches to installation, Documenting a system, Training and Supporting users, Types & Frequencies of Training Methods, Reasons of System Implementation Failures, Project Closedown, Conducting System Maintenance – Types of Maintenance (Corrective, Adaptive and Perfective Maintenance), effective maintenance, Evaluation of System's Success, System Enhancement, Quality Assurance in System Cycle.

Module VI: System Security and Auditing

System Security: Data Security, Backup & Recovery during System & Database failure, Ethical Issues in System Development, Threat and Risk Analysis, Audit, System Audit, System Audit Standards (Planning, Implantation and Reporting Standards), System Analysis and Programming (Overview, Role & Duties of System Experts as Analyst and Programmer).


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Examination Scheme:

Components	CT	HA	C	V	A	EE
Weightage (%)	10	5	5	5	5	70

C - Case Discussion/ Presentation; **HA** - Home Assignment; **P** - Project; **S** - Seminar; **V** - Viva; **Q** - Quiz; **CT** - Class Test; **A** - Attendance; **EE** - End Semester Examination

Text & References:**Text:**

- Valacich George Hoffer, Essentials of System Analysis & Design, Second Edition, Prentice-Hall India.

References:

- James A. Senn, Analysis and Design of information systems.
- Kroeber, Donald W. and Watron, Hugh J., Computer Based Information Systems.
- E. M. Awad, Systems Analysis & Design.
- Dennis Wixom and Wiley, Systems Analysis and Design – An Applied Approach.



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INNOVATION & CREATIVITY MANAGEMENT

Course Code: MGT2205

CreditUnits: 03

Course Objective:

To develop an appreciation for new ideas and out of the box thinking so that students can successfully imbibe the habit of innovative and creative thinking in situations.

Course Contents:

Module I

Innovation Management- Introduction, Characteristics, Components, Types, Models of Innovation process, Innovation Environment-Originators of Innovation, Key Drivers of Innovation, Factors influencing innovation, Nurturing innovation in e-business.

Module II

Organizing for Innovation- Organizational theories and structures, Traits of innovative organizations, Current trends, Factors influencing organizational design and size decisions, Need & Characteristics for creative organization, 7S framework, Creativity crushers, Fostering innovation climate and culture, The creativity Hit List.

Module III

Research and Development management- Significance, Prerequisites, Process, Technology development approaches, Management of R &D, In source to open source environment, R&D in small industry, Managing Creative employees, Significance and challenges of managing creative employees, Traits of a creative person, Motivation to creativity, Strategies for unblocking creativity, Factors influencing group creativity, Promoting group creativity, Left and right thinking, Linear and non-linear thinking process, Creative thinking, Traditional vs Creative thinking.

Module IV

Individual creativity techniques- Inner and Directed creativity techniques, Group Creativity Techniques-creativity methods, Writing techniques, Techniques based on pictures, maps and networks, Product innovation-types of new products, Target markets for Disruptive Innovation, Technology strategies for innovation, New product development, Packaging and Positioning innovations, Beyond product innovation, New product failures.

Module V

Innovation Diffusion- Concept of diffusion and adaptation, diffusion types, Innovation diffusion theory, Innovation adoption by organizations, Innovation adoption across countries, Marketing strategy and the diffusion process.


Module VI

Legal aspects of innovation- IPR, Indian Patents Act, Trademark, Copyrights, Trade secrets, Towards Innovative Society-Innovation for social development, Spirit of innovation in India, Favourable and Unfavourable factors.

Examination Scheme:

Components	CT	HA	V	A	EE
Weightage (%)	10	10	5	5	70

C - Case Discussion/ Presentation; **HA** - Home Assignment; **P** - Project; **S** - Seminar; **V** - Viva; **Q** - Quiz; **CT** - Class Test; **A** - Attendance; **EE** - End Semester Examination


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Text & References:**Text:**

- Krishnamacharyulu and Lalitha, (2007), Innovation Management, Himalaya Publishing House, New Delhi- 2007

References:


- Plsek, (2003) Creativity, Innovation and Quality, Prentice Hall of India, New Delhi.

Salient Pedagogical Features-

1. Classroom teaching to focus on enhancing out of the box thinking.
2. Assignments: Practical tasks emphasising on honing up creative thinking.
3. Case study analysis: To enable students to appreciate the application of concepts in real life environment.
4. Active student participation in class discussions.
5. Role plays to boost spontaneity.



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HUMAN VALUES AND PROFESSIONAL ETHICS

Course Code: MGT2206

Credit Units: 03

Course Objective:

The aim of this course is to facilitate the development of a Holistic perspective among students towards life, profession and happiness, based on a correct understanding of the Human reality and the rest of Existence. Such a holistic perspective forms the basis of value based living in a natural way. Recognize the need for lifelong learning and have the knowledge and skills that prepare them to identify the Moral issues involved in Management areas and to provide an understanding of the interface between Social, Technological and Natural environments.

Course Contents:

Module I: Human Values

Morals, Values, Types of values, Evolution of human values, Ethics, Integrity, Work Ethic, Honesty, Courage, Empathy, Self-Confidence, Character, Challenges at Work place

Module II: Values in Management

Relevance of values in Management, Need for values in global change, Values for managers, Holistic approach for managers in decision making, Problems related to stress in corporate management.

Module III

Workplace Rights and Responsibilities: Organizational complaint procedures. Government agencies, Resolving Employee concerns, Limits on acceptable behavior in large corporation.

Work environment: Ethical and legal considerations, Organizational responses to offensive behavior and harassment, Ethics in a Global Context.

Module IV: Industrial Integrity

The epitome of industrial success, Integrity and organization, Exploring learning process of integrity, Consequences of lack of integrity.

Examination Scheme:

Components	C	V	HA	A	ME	EE
Weightage (%)	5	5	5	5	10	70

C - Case Discussion/ Presentation; HA - Home Assignment; P - Project; S - Seminar; V - Viva; Q - Quiz; CT - Class Test; A - Attendance; EE - End Semester Examination

Text & References:

- R R Gaur, R Sangal, G P Bagaria, (2010), A Foundation Course in Human Values and Professional Ethics, Excel Books

References:

- Ivan Illich, (2000), Energy & Equity, Marion Boyers Publishing Ltd.
- E.F. Schumacher, (1973), Small is Beautiful: a study of economics as if people mattered, Blond & Briggs, Britain.
- A Nagraj, (1998), JeevanVidyaekParichay, Divya Path Sansthan, Amarkantak.
- Sussan George, (1976), How the Other Half Dies, Penguin Press.
- PL Dhar, RR Gaur, (1990), Science and Humanism, Commonwealth Purblishers.
- A.N. Tripathy, (2003), Human Values, New Age International Publishers.
- Donella H. Meadows, Dennis L. Meadows, Jorgen Randers, William W. Behrens III, 1972, Limits to Growth – Club of Rome's report, Universe Books.


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READINGS IN MANAGEMENT

Course Code: MGT2230

Credit Units: 02

Course Objective:

The objective of this concentration elective is to inculcate reading habit along with value addition to the existing understanding of the subject. The book would be a kind of knowledge enhancer that would envision the student about some current thoughts related to the discipline. The book reading and its critical analysis would help broaden the intellectual horizon of the student. The selection of the book will be department specific so that it can be discipline specific.

Guidelines:

The student is expected to thoroughly go through the discipline related prescribed book with the objective of critically reviewing each aspect and character of the book. The student is supposed to have a detailed insight into the following:

1. Content
2. Writing style
3. Information/learning
4. Content handling
5. Characters(if any)
6. Thematic Clarity

The report is to be submitted in about 3000 words on A4 size sheets, Font 12pt., Times New Roman, 1.5 spacing. Headings in Font Size 16

Evaluation:

Report on the Book in 3000 words	Written Test
50 marks	50 marks


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TERM PAPER

Course Code: MGT2231

Credit Units: 02

Course Objective:

The objective of this course is to judge the understanding as well as application of the knowledge gained by the students. The aim of the term paper is to provide the students with an opportunity to further enhance their knowledge in a sector of their choice by undertaking a significant practical unit of examining and analyzing various aspects of business management at a level commensurate with the learning outcomes of the various courses taken up them in the ongoing semester.

A term paper is primarily a record of intelligent reading in several sources on a particular subject. The students will choose the topic at the beginning of the session in consultation with the faculty assigned. At least one middle level or senior level person of a company from the chosen sector may be interviewed face to face.

Guidelines:

1. The term paper will be related to the contemporary business issue and the topic will be given by the department.
2. The presentation of the term paper is scheduled to be held before the commencement of Semester examinations.
3. The paper will carry 100 marks that will be marked on the basis of understanding and organization of content based on the literature review. The Bibliography shall form an important part of the paper.
4. Examples of a few broad areas for Term Paper (List is indicative, not exhaustive)
 - Management practices
 - Talent management
 - HR cases from any Indian industry
 - Employee motivation
 - Managerial competencies
 - Employability skills
 - Industrial relations
 - Knowledge management
 - Social media
 - Green marketing
 - Six Sigma
 - Sustainable branding practices
 - Training and development
 - Relationship management
 - CSR
 - Performance management system
 - Balanced Score Card
 - Corporate Governance
 - Employee retention
 - NGOs.

Evaluation Scheme:

Organisation and relevance of content	Literature Review	Bibliography	Presentation & Viva	Total
30	30	20	20	100


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PROJECT

Course code: MGT2232

Credit Units: 03

Objectives:

The aim of the project is to provide the students with an opportunity to further their intellectual and personal development in the chosen field by undertaking a significant practical unit of activity. The project can be defined as a scholarly inquiry into a problem or issues, involving a systematic approach to gathering and analysis of information / data, leading to production of a structured report.

Chapter Scheme and distribution of marks:

Chapter 1: Introduction	– 10 marks
Chapter 2: Conceptual Framework/ National/International Scenario	– 25 marks
Chapter 3: Presentation, Analysis & Findings	– 25 marks
Chapter 4: Conclusion & Recommendations	– 10 marks
Chapter 5: Bibliography	– 05 marks

Components of a Project Report

The outcome of Project Work is the Project Report. A project report should have the following components:

1) Cover Page: This should contain the title of the project proposal, to whom it is submitted, for which degree, the name of the author, name of the supervisor, year of submission of the project work, name of the University.

2) Acknowledgement: Various organizations and individuals who might have provided assistance /co-operation during the process of carrying out the study.

3) Table of Content: Page-wise listing of the main contents in the report, i.e., different Chapters and its main Sections along with their page numbers.

4) Body of the Report: The body of the report should have these four logical divisions

a) Introduction: This will cover the background, rationale/ need / justification, brief review of literature, objectives, methodology (the area of the study, sample, type of study, tools for data collection, and method of analysis), Limitations of the Study, and Chapter Planning.

b) Conceptual Framework / National and International Scenario: (relating to the topic of the Project).

c) Presentation of Data, Analysis and Findings: (using the tools and techniques mentioned in the methodology).

d) Conclusion and Recommendations: In this section, the concluding observations based on the main findings and suggestions are to be provided.

5) Bibliography or References: This section will include the list of books and articles which have been used in the project work, and in writing a project report.

6) Annexures: Questionnaires (if any), relevant reports, etc.

(The main text of the Project should normally be in the range of 5000 words. However, there may be annexure in addition to the main text)

The Steps of a Project Report

Step I: Selection of the topic for the project by taking following points into consideration:

- Suitability of the topic.
- Relevance of the topic
- Time available at the disposal.
- Feasibility of data collection within the given time limit.
- Challenges involved in the data collection (time & cost involved in the data collection, possibility of getting responses, etc.)

Step II: Finalisation of the Topic and preparation of Project Proposal in consultation with the Supervisor.

Step III: Collection of information and data relating to the topic and analysis of the same.

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Step IV: Writing the report dividing it into suitable chapters, viz.,

Chapter 1: Introduction,

Chapter 2: Conceptual Framework / National & International Scenario,

Chapter 3: Analysis & Findings

Chapter 4: Conclusion and Recommendations.

Step V: The following documents are to be attached with the Final Project Report.

1) Approval letter from the supervisor (Annexure-IA)

2) Student's declaration (Annexure-IB)

3) Certificate from the Competent Authority of the Organisation / Institution, if the student undertakes the Project Work in any Organisation / Institution.

Guidelines for evaluation:

Each of the students has to undertake a Project individually under the supervision of a teacher and to submit the same following the guidelines stated below:

- Language of Project Report and Viva-Voce Examination may be English. The Project Report must be typed and hard bounded.
- Failure to submit the Project Report or failure to appear at the Viva-voce Examination will be treated as "Absent" in the Examination. He /she has to submit the Project Report and appear at the Viva-Voce Examination in the subsequent years (within the time period as per University Rules).
- No marks will be allotted on the Project Report unless a candidate appears at the Viva-Voce Examination. Similarly, no marks will be allotted on Viva-Voce Examination unless a candidate submits his/her Project Report.
- Evaluation of the Project Work to be done jointly by one internal expert and one external expert with equal weightage, i.e., average marks of the internal and external experts will be allotted to the candidate.

Evaluation Scheme:

Project Report	Power Point Presentation & Viva	Total
75 marks	25 marks	100



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Declaration

Ihereby declare that the Project Work with the title (in block letters).....
submitted by me for the partial fulfilment of the degree of BBA is my original work and has not been submitted earlier to any other University /Institution for the fulfilment of the requirement for any course of study.

I also declare that no chapter of this manuscript in whole or in part has been incorporated in this report from any earlier work done by others or by me. However, extracts of any literature which has been used for this report has been duly acknowledged providing details of such literature in the references.

Signature of supervisor:

Name:

Signature of the student

Registration No

Place:

Date:



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WORKSHOP

Course Code: MGT2233

Credit Units: 01

Course Objective:

A workshop is primarily an activity based academic event that is organized to provide the students a one to one and hands on experience on any aspect of their learning. The communication in a workshop has to be necessarily two ways. The trainer has to make sure that the aspects covered are practically practiced by the participants. The student will choose the option of workshop from amongst their concentration electives. The evaluation will be done by Board of examiners comprising of the faculties.

Major Themes for Workshop:

The workshop may be conducted on any of the following major themes:

- Accounting
- Finance
- Human Resources
- Marketing
- Economics
- Operations
- Supply Chain Management

These themes are merely indicative and the trainer may choose any recent and relevant topic of study.

Guidelines for Workshop:

The procedure for earning credits from workshop consists of the following steps:

1. Relevant study material and references will be provided by the trainer in advance.
2. The participants are expected to explore the topic in advance and take active part in the discussions held
3. Attending and Participating in all activities of the workshop
4. Group Activities have to be undertaken by students as guided by the trainer.
5. Evaluation of workshop activities would be done through test and quiz at the end of the workshop.
6. Submitting a write up of atleast 500 words about the learning outcome from the workshop.

Methodology:

The methodology followed at the workshop could be based on any one or more of the following methods:

- Case Study
- Business Game
- Simulation
- Group Activity
- Role Play
- Business Planning
- Quiz

Evaluation Scheme:

Attendance	Active Participation	Multiple Choice Questions/ Quiz	Solving the case/ Assignment/ Write up	Total
10	30	30	30	100


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COST ACCOUNTING

Course Code: MGT2303

CreditUnits: 03

Course Objective:

To get an expert knowledge in the area of cost management and cost control to enable effective management decisions.

Course Contents:

Module I: Cost Accounting

Introduction – Meaning of Cost, costing and Cost Accounting, Comparison between Financial Accounts and Cost Accounts, Application of Cost Accounting, Designing and installing a Cost Accounting system, Cost concepts and Classification of Costs, Cost Module, Cost Center, Elements of Cost, Preparation of cost sheet, Tenders and Quotations, Problems.

Module II: Material Costing

Classification of materials, Material Control, Purchasing procedure, store keeping, techniques of Inventory control, Setting of stock levels, EOQ, Methods of pricing materials issues, LIFO, FIFO, Weighted Average Method, Simple Average Method, Problems.

Module III: Labour Costing

Control of labour cost, Labour Turn Turnover, Causes and effects of labour turnover, Meaning of Time and Motion Study, Merit Rating, Job Analysis, Time keeping and Time booking, Idle time, causes and treatment, Overtime, Methods of Wage Payment, Time rate and Piece Rate, Incentive Schemes.

Module IV: Overhead Costing

Definition, Classification of overheads, Procedure for accounting and control of overheads, Allocation of overheads, Apportionment of overheads, Apportionment of Service department costs to production departments, Repeated Distribution method, Simultaneous equation method, absorption of OH's, Methods of Absorption, Percentage of direct material cost, Direct Labour Cost, Prime Cost, Direct Labour hour rate and Machine Hour Rate, Problems.

Module V

Costing Methods Introduction, Job Costing, Batch Costing, Contract Costing, Process Costing, principles, distinction between Process and Job, Preparation of process accounts, treatment of normal loss, abnormal loss, abnormal gain, Joint and By-products, Service costing.

Module VI

Reconciliation of Cost and Financial Accounts, Need for reconciliation, Reasons for difference in profits, Problems on preparation of Reconciliation statements including Memorandum Reconciliation account.

Examination Scheme:

Components	A	CT	C	H	EE
Weightage (%)	5	15	5	5	70

C - Case Discussion/ Presentation; HA - Home Assignment; P - Project; S - Seminar; V - Viva; Q - Quiz; CT - Class Test; A - Attendance; EE - End Semester Examination

Text & References:

Text:

- N.K. Prasad, Cost Accounting
- Nigam & Sharma, Advanced Cost Accounting, 5th edition, Himalaya Publishing House

References:

- Khanna Pandey & Ahuja: Practical Costing
- M.L. Agarwal, (2010), Cost Accounting, SahityaBhawan.
- Jain & Narang, Cost Accounting, Kalyani Publishers.
- S.P. Iyengar: Cost Accounting
- S.N. Maheshwari: Cost Accounting
- M. N. Arora: Cost Accounting

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ANALYTICAL DECISION MAKING

Course Code: MGT2304

Credit Units: 02

Course Objective:

To develop in students skills of analytical and logical reasoning this will be a great asset for them in their future careers.

Course Contents:

Module I: Quantitative Reasoning

Number System & Number Theory, Percentage method, Profit & Loss, Speed, Time & Distance

Module II: Quantitative Reasoning

Ratio, Proportion, Mixtures & Alligations, Set Theory, Co-ordinate Geometry (2-D only), Mensuration

Module III: Data Interpretation

Bar Graph, Line Graph, Pie Chart, Table, Table Three Dimensional or Triangular Bar Diagram, Misc. (Radar, Area, Network), Caselets.

Module IV: Data Sufficiency & Logical reasoning

Mathematical, reasoning based, Data Decoding: Analytical: Assumption, Courses of Action, Argument, Weak/ Strong, Pictorial Analysis

Module V: Verbal Ability, Reasoning & Reading Comprehension

Vocabulary based questions, English Usage, Grammar Types of statements and their relationship / Reversibility of idea, Re-arranging sentences of a paragraph, Paraphrasing, Fact, Inference, Judgment & deductions. Four types of Passages: The social science passage, The Science passage, the business passage & the entertainment passage.

Module VI: General Awareness and Current Affairs

Economic, Political, Financial & Social Affairs based on International & Indian Issues.


Examination Scheme:

Components	CT	HA	C	V	A	EE
Weightage (%)	10	5	5	5	5	70

C - Case Discussion/ Presentation; **HA** - Home Assignment; **P** - Project; **S** - Seminar; **V** - Viva; **Q** - Quiz; **CT** - Class Test; **A** - Attendance; **EE** - End Semester Examination

Text & References:

- This course is aimed at enhancing students' skills in the area of English, General knowledge and Quantitative aptitude. No textbooks or reference books are required as the course is carried out in the form of classroom exercises, which are circulated by the faculty himself.


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TERM PAPER

Course Code: MGT2331

Credit Units: 02

Course Objective:

The objective of this course is to judge the understanding as well as application of the knowledge gained by the students. The aim of the term paper is to provide the students with an opportunity to further enhance their knowledge in a sector of their choice by undertaking a significant practical unit of examining and analyzing various aspects of business management at a level commensurate with the learning outcomes of the various courses taken up them in the ongoing semester.

A term paper is primarily a record of intelligent reading in several sources on a particular subject. The students will choose the topic at the beginning of the session in consultation with the faculty assigned. At least one middle level or senior level person of a company from the chosen sector may be interviewed face to face.

Guidelines:

1. The term paper will be related to the contemporary business issue and the topic will be given by the department.
2. The presentation of the term paper is scheduled to be held before the commencement of Semester examinations.
3. The paper will carry 100 marks that will be marked on the basis of understanding and organization of content based on the literature review. The Bibliography shall form an important part of the paper.
4. Examples of a few broad areas for Term Paper (List is indicative, not exhaustive)
 - Management practices
 - Talent management
 - HR cases from Indian any industry
 - Employee motivation
 - Managerial competencies
 - Employability skills
 - Industrial relations
 - Knowledge management
 - Social media
 - Green marketing
 - Six Sigma
 - Sustainable branding practices
 - Training and development
 - Relationship management
 - CSR
 - Performance management system
 - Balanced Score Card
 - Corporate Governance
 - Employee retention
 - NGOs.

Evaluation Scheme:

Organisation and relevance of content	Literature Review	Bibliography	Presentation & Viva	Total
30	30	20	20	100


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PROJECT

Course code: MGT2332

Credit Units:03

Objectives:

The aim of the project is to provide the students with an opportunity to further their intellectual and personal development in the chosen field by undertaking a significant practical unit of activity. The project can be defined as a scholarly inquiry into a problem or issues, involving a systematic approach to gathering and analysis of information / data, leading to production of a structured report.

Chapter Scheme and distribution of marks:

Chapter 1: Introduction	– 10 marks
Chapter 2: Conceptual Framework/ National/International Scenario	– 25 marks
Chapter 3: Presentation, Analysis & Findings	-- 25 marks
Chapter 4: Conclusion & Recommendations	-- 10 marks
Chapter 5: Bibliography	-- 05 marks

Components of a Project Report

The outcome of Project Work is the Project Report. A project report should have the following components:

1) Cover Page: This should contain the title of the project proposal, to whom it is submitted, for which degree, the name of the author, name of the supervisor, year of submission of the project work, name of the University.

2) Acknowledgement: Various organizations and individuals who might have provided assistance /co-operation during the process of carrying out the study.

3) Table of Content: Page-wise listing of the main contents in the report, i.e., different Chapters and its main Sections along with their page numbers.

4) Body of the Report: The body of the report should have these four logical divisions

- Introduction:* This will cover the background, rationale/ need / justification, brief review of literature, objectives, methodology (the area of the study, sample, type of study, tools for data collection, and method of analysis), Limitations of the Study, and Chapter Planning.
- Conceptual Framework / National and International Scenario:* (relating to the topic of the Project).
- Presentation of Data, Analysis and Findings:* (using the tools and techniques mentioned in the methodology).
- Conclusion and Recommendations:* In this section, the concluding observations based on the main findings and suggestions are to be provided.

5) Bibliography or References: This section will include the list of books and articles which have been used in the project work, and in writing a project report.

6) Annexure: Questionnaires (if any), relevant reports, etc.

(The main text of the Project should normally be in the range of 5000 words. However, there may be annexure in addition to the main text)

Steps of a Project Report

Step I: Selection of the topic for the project by taking following points into consideration:

- Suitability of the topic.
- Relevance of the topic
- Time available at the disposal.
- Feasibility of data collection within the given time limit.

Challenges involved in the data collection (time & cost involved in the data collection, possibility of getting responses, etc.)

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Step II: Finalisation of the Topic and preparation of Project Proposal in consultation with the Supervisor.

Step III: Collection of information and data relating to the topic and analysis of the same.

Step IV: Writing the report dividing it into suitable chapters, viz.,
Chapter 1: Introduction,
Chapter 2: Conceptual Framework / National & International Scenario,
Chapter 3: Analysis & Findings
Chapter 4: Conclusion and Recommendations.

Step V: The following documents are to be attached with the Final Project Report.

- 1) Approval letter from the supervisor (Annexure-IA)
- 2) Student's declaration (Annexure-IB)
- 3) Certificate from the Competent Authority of the Organisation / Institution, if the student undertakes the Project Work in any Organisation / Institution.

Guidelines for evaluation:

Each of the students has to undertake a Project individually under the supervision of a teacher and to submit the same following the guidelines stated below:

- Language of Project Report and Viva-Voce Examination may be English. The Project Report must be typed and hard bounded.
- Failure to submit the Project Report or failure to appear at the Viva-voce Examination will be treated as "Absent" in the Examination. He /she has to submit the Project Report and appear at the Viva-Voce Examination in the subsequent years (within the time period as per University Rules).
- No marks will be allotted on the Project Report unless a candidate appears at the Viva-Voce Examination. Similarly, no marks will be allotted on Viva-Voce Examination unless a candidate submits his/her Project Report.
- Evaluation of the Project Work to be done jointly by one internal expert and one external expert with equal weightage, i.e., average marks of the internal and external experts will be allotted to the candidate.

Evaluation Scheme:

Project Report	Power Point Presentation & Viva	Total
75 marks	25 marks	100


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Declaration

Ihereby declare that the Project Work with the title (in block letters).....
submitted by me for the partial fulfilment of the degree of BBA is my original work and has not been submitted earlier to any other University /Institution for the fulfilment of the requirement for any course of study.

I also declare that no chapter of this manuscript in whole or in part has been incorporated in this report from any earlier work done by others or by me. However, extracts of any literature which has been used for this report has been duly acknowledged providing details of such literature in the references.

Signature of supervisor:

Name:

Signature of the student

Registration No

Place:

Date:



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WORKSHOP

Course Code: MGT2333

Credit Units: 01

Course Objective:

A workshop is primarily an activity based academic event that is organized to provide the students a one to one and hands on experience on any aspect of their learning. The communication in a workshop has to be necessarily two ways. The trainer has to make sure that the aspects covered are practically practiced by the participants. The student will choose the option of workshop from amongst their concentration electives. The evaluation will be done by Board of examiners comprising of faculties.

Major Themes for Workshop:

The workshop may be conducted on any of the following major themes:

- Accounting
- Finance
- Human Resources
- Marketing
- Economics
- Operations
- Supply Chain Management

These themes are merely indicative and the trainer may choose any recent and relevant topic of study.

Guidelines for Workshop:

The procedure for earning credits from workshop consists of the following steps:

1. Relevant study material and references will be provided by the trainer in advance.
2. The participants are expected to explore the topic in advance and take active part in the discussions to be held
3. Attending and Participating in all activities of the workshop
4. Group Activities have to be undertaken by students as guided by the trainer.
5. Evaluation of workshop activities would be done through test and quiz at the end of the workshop.
6. Submitting a write up of atleast 500 words about the learning outcome from the workshop.

Methodology:

The methodology followed at the workshop could be based on any one or more of the following methods:

- Case Study
- Business Game
- Simulation
- Group Activity
- Role Play
- Business Planning
- Quiz

Evaluation Scheme:

Attendance	Active Participation	Multiple Choice Questions/ Quiz	Solving the case/ Assignment/ Write up	Total
10	30	30	30	100


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RESEARCH METHODOLOGY AND REPORT PREPARATION

Course Code: MGT2402

Credit Units: 03

Course Objective:

To provide an exposure to the students pertaining to the nature and extent of research orientation, which they are expected to possess when they enter the industry as practitioners. To give them an understanding of the basic techniques and tools of marketing research. To train the students in evaluating and developing the marketing information system.

Course Contents:

Module I: Introduction

Nature and scope of marketing research, Marketing research as input in decision making process, Marketing research and marketing information system. Applications of marketing research, Planning a research project, Problem identification and formulation of Research Design, introduction to Research Design, Market research on the Internet.

Module II: Data collection methods

Attitudes measurement and scaling techniques, Ratio, Interval, Ordinal and Nominal scales, Likert's scale, Thurstone scale, Semantic differentiation method, Observation methods and questionnaire method, Questionnaire design, Steps in constructing a questionnaire, Types of questions, introduction to Projective techniques and perceptual mapping.

Module III: Sampling

Sampling decisions, Sampling frame, Sample selection methods - Probability and non probability, Sample size, sampling error, Application of sampling methods to marketing problems.

Module IV: Data Collection Field Force

Data collection field force, Fieldwork procedure, common sources of error in the fieldwork, minimizing fieldwork errors, Tabulation of collected data.

Module V: Data Analysis

Data analysis-I, Test of significance Z, t, F and chi-square, Data analysis-II, Correlation and Regression techniques, Data analysis – III – Cluster Analysis, Introduction to Statistical Package

Module VI: Report Writing

Research presentation and research process examination; Report writing - Types of research report. Examination of the research procedure, Selected applications of marketing research, identifying market segments, Product research, Advertising research.

Examination Scheme:

Components	CT	HA	C	V	A	EE
Weightage (%)	10	5	5	5	5	70

C - Case Discussion/ Presentation; HA - Home Assignment; P - Project; S - Seminar; V - Viva; Q - Quiz; CT - Class Test; A - Attendance; EE - End Semester Examination

Text & References:

Text:

- Malhotra, Naresh, (2008), Marketing Research, 5th Edition, Pearson Education.
- Luck, David J and Rubin, Ronald S., Marketing Research, Seventh edition, Prentice Hall of India

References:

- Aaker, David A; Kumar V and George S., Marketing Research, Sixth edition, John Wiley & Sons
- Boyd, Harper W, Westphall, Ralph & Stasch, Stanley F, Market Research – Text & Cases, Richard D. Irwin Inc. Homewood, Illinois.
- Sekaran, Uma (2003), Research Methods for Business 4th Edition, Wiley.

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MANAGEMENT ACCOUNTING

Course Code: MGT2403

Credit Units: 03

Course Objective:

To provide the students knowledge about the use of costing data for planning, control and decision making.

Course Contents:

Module I: Management Accounting

Meaning and Definition, Nature & Scope: Objectives of Management Accounting, Management Accounting and Financial Accounting, Management Accounting and Cost Accounting, Utility of Management Accounting, Limitations of Management Accounting, Position of Management Accountant in the Organization.

Module II: Cash Flow Analysis

Distinction of Cash from Funds, Utility of Cash Flow Statement, Construction of Cash Flow Statement

Module III: Budgets and Budgetary Control

Concept of Budgets and Budgetary Control, Nature and Objectives of Budgetary Control, Advantages and Limitations of Budgetary Control, Establishing a system of Budgetary Control, Preparation of Sales Budget, Selling and Distribution Cost Budget, Production Budget, Purchase Budget, Cash Budget, Flexible Budgets and Master Budgets.

Module IV: Responsibility Accounting

Concept of Responsibility Accounting, Cost Centers and Profit Centers, Contribution by Segments

Module V: Marginal Costing

Meaning, assumptions, cost- volume profit analysis, Break- Even analysis, Decision making areas- product mix, make/ buy, pricing decision.

Examination Scheme:

Components	A	CT	C	H	EE
Weightage (%)	5	10	10	5	70

C - Case Discussion/ Presentation; HA - Home Assignment; P - Project; S - Seminar; V - Viva; Q - Quiz; CT - Class Test; A - Attendance; EE - End Semester Examination

Text & References:

Text:

- Maheswari, S.N., (2009) Principles of Management Accounting, Sultan Chand & Sons
- Sexana, Management Accounting

References:

- Made Gowda, Management Accounting
- S.N. Goyal and Manmohan, Management Accounting
- B.S. Raman, Management Accounting
- R.S.N. Pillai and Bagavathi, Management Accounting
- Sharma and Gupta, Management Accounting, 1st Edition, Kalyani Publisher
- J. Batty, Management Accounting
- Foster, Financial Statement Analysis, Pearson.
- PN Reddy & Appanaiah, Essentials of Management Accounting
- Saxena, V.K. and Vashist, Cost Accounting, Sultan Chand & Sons, new Delhi

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BUSINESS INFORMATION AND DATABASE SYSTEM

Course Code: MGT2404

CreditUnits: 03

Course Objective:

The aim of this course is to introduce the students to the managerial issues relating to information systems, its role in organization and how information technology can be leveraged to provide business value.

Course Contents:

Module I:

MIS need and concepts, characteristics, Typology of MIS, Structure of MIS. Planning for MIS, System Development Methodologies, Conceptual and detailed designs of MIS, System Implementation strategies and process, System Evaluation and Maintenance.

Module II:

Introduction to data base management system- Data versus information, record, file; data dictionary, database administrator, functions and responsibilities, file-oriented system versus databases system.

Module III:

Advanced Concepts in Information Systems: Enterprise Resource Planning, Supply Chain Management, Customer Relationship Management, Data, Warehousing and Data Mining.

Module IV:

Database system architecture- Introduction, schemas, sub schemas and instances; data base architecture, data independence, mapping, data models, types of database systems.

Module V:

Data base security- Threats and security issues, firewalls and database recovery; techniques of data base security; distributed data base.

Examination Scheme:

Components	C	H	CT	V	A	EE
Weightage (%)	5	5	10	5	5	70

C - Case Discussion/ Presentation; **HA** - Home Assignment; **P** - Project; **S** - Seminar; **V** - Viva; **Q** - Quiz; **CT** - Class Test; **A** - Attendance; **EE** - End Semester Examination


Text & References:

Text:

- James, A. O'Brien, Introduction to Information Systems, Tata McGraw-Hill Publishing Co. Ltd., New Delhi, 2005.
- Kenneth C. Laudon and Jane P. Laudon, Management Information Systems, Prentice-Hall of India, New Delhi, 9th Edition, (2006).

References:

- Navathe, Data Base System Concepts 3rd, McGraw Hill.
- Date, C.J., An Introduction to Data Base System 7ed, Addison Wesley.
- Singh, C.S., Data Base System, New Age Publications, New Delhi.


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TERM PAPER

Course Code: MGT2431

Credit Units: 02

Course Objective:

The objective of this course is to judge the understanding as well as application of the knowledge gained by the students. The aim of the term paper is to provide the students with an opportunity to further enhance their knowledge in a sector of their choice by undertaking a significant practical unit of examining and analyzing various aspects of business management at a level commensurate with the learning outcomes of the various courses taken up them in the ongoing semester.

A term paper is primarily a record of intelligent reading in several sources on a particular subject. The students will choose the topic at the beginning of the session in consultation with the faculty assigned. At least one middle level or senior level person of a company from the chosen sector may be interviewed face to face.

Guidelines:

1. The term paper will be related to the contemporary business issue and the topic will be given by the department.
2. The presentation of the term paper is scheduled to be held before the commencement of Semester examinations.
3. The paper will carry 100 marks that will be marked on the basis of understanding and organization of content based on the literature review. The Bibliography shall form an important part of the paper.
4. Examples of a few broad areas for Term Paper (List is indicative, not exhaustive)
 - Management practices
 - Talent management
 - HR cases from any Indian industry
 - Employee motivation
 - Managerial competencies
 - Employability skills
 - Industrial relations
 - Knowledge management
 - Social media
 - Green marketing
 - Six Sigma
 - Sustainable branding practices
 - Training and development
 - Relationship management
 - CSR
 - Performance management system
 - Balanced Score Card
 - Corporate Governance
 - Employee retention
 - NGOs.

Evaluation Scheme:

Organization and relevance of content	Literature Review	Bibliography	Presentation & Viva	Total
30	30	20	20	100


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PROJECT

Course code: MGT2432

Credit Units: 03

Objectives:

The aim of the project is to provide the students with an opportunity to further their intellectual and personal development in the chosen field by undertaking a significant practical unit of activity. The project can be defined as a scholarly inquiry into a problem or issues, involving a systematic approach to gathering and analysis of information / data, leading to production of a structured report.

Chapter Scheme and distribution of marks:

Chapter 1: Introduction	-- 10 marks
Chapter 2: Conceptual Framework/ National/International Scenario	-- 25 marks
Chapter 3: Presentation, Analysis & Findings	-- 25 marks
Chapter 4: Conclusion & Recommendations	-- 10 marks
Chapter 5: Bibliography	-- 05 marks

Components of a Project Report

The outcome of Project Work is the Project Report. A project report should have the following components:

1) Cover Page: This should contain the title of the project proposal, to whom it is submitted, for which degree, the name of the author, name of the supervisor, year of submission of the project work, name of the University.

2) Acknowledgement: Various organizations and individuals who might have provided assistance /co-operation during the process of carrying out the study.

3) Table of Content: Page-wise listing of the main contents in the report, i.e., different Chapters and its main Sections along with their page numbers.

4) Body of the Report: The body of the report should have these four logical divisions

- Introduction:* This will cover the background, rationale/ need / justification, brief review of literature, objectives, methodology (the area of the study, sample, type of study, tools for data collection, and method of analysis), Limitations of the Study, and Chapter Planning.
- Conceptual Framework / National and International Scenario:* (relating to the topic of the Project).
- Presentation of Data, Analysis and Findings:* (using the tools and techniques mentioned in the methodology).
- Conclusion and Recommendations:* In this section, the concluding observations based on the main findings and suggestions are to be provided.

5) Bibliography or References: This section will include the list of books and articles which have been used in the project work, and in writing a project report.

6) Annexures: Questionnaires (if any), relevant reports, etc.

(The main text of the Project should normally be in the range of 5000 words. However, there may be annexure in addition to the main text)

Steps of a Project Report

Step I: Selection of the topic for the project by taking following points into consideration:

- Suitability of the topic.
- Relevance of the topic
- Time available at the disposal.

• Feasibility of data collection within the given time limit.

• Challenges involved in the data collection (time & cost involved in the data collection,

possibility of getting responses, etc.)

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Step II: Finalisation of the Topic and preparation of Project Proposal in consultation with the Supervisor.

Step III: Collection of information and data relating to the topic and analysis of the same.

Step IV: Writing the report dividing it into suitable chapters, viz.,

Chapter 1: Introduction,

Chapter 2: Conceptual Framework / National & International Scenario,

Chapter 3: Analysis & Findings

Chapter 4: Conclusion and Recommendations.

Step V: The following documents are to be attached with the Final Project Report.

1) Approval letter from the supervisor (Annexure-IA)

2) Student's declaration (Annexure-IB)

3) Certificate from the Competent Authority of the Organisation / Institution, if the student undertakes the Project Work in any Organisation / Institution.

Guidelines for evaluation:

Each of the students has to undertake a Project individually under the supervision of a teacher and to submit the same following the guidelines stated below:

- Language of Project Report and Viva-Voce Examination may be English. The Project Report must be typed and hard bounded.
- Failure to submit the Project Report or failure to appear at the Viva-voce Examination will be treated as "Absent" in the Examination. He /she has to submit the Project Report and appear at the Viva-Voce Examination in the subsequent years (within the time period as per University Rules).
- No marks will be allotted on the Project Report unless a candidate appears at the Viva-Voce Examination. Similarly, no marks will be allotted on Viva-Voce Examination unless a candidate submits his/her Project Report.
- Evaluation of the Project Work to be done jointly by one internal expert and one external expert with equal weightage, i.e., average marks of the internal and external experts will be allotted to the candidate.

Evaluation Scheme:

Project Report	Power Point Presentation & Viva	Total
75 marks	25 marks	100



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Declaration

Ihereby declare that the Project Work with the title (in block letters).....
submitted by me for the partial fulfilment of the degree of BBA is my original work and has not been submitted earlier to any other University /Institution for the fulfilment of the requirement for any course of study.

I also declare that no chapter of this manuscript in whole or in part has been incorporated in this report from any earlier work done by others or by me. However, extracts of any literature which has been used for this report has been duly acknowledged providing details of such literature in the references.

Signature of supervisor:

Name:

Signature of the student

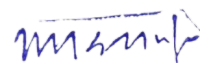
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Date:



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WORKSHOP

Course Code: MGT2433

Credit Units: 01

Course Objective:

A workshop is primarily an activity based academic event that is organized to provide the students a one to one and hands on experience on any aspect of their learning. The communication in a workshop has to be necessarily two ways. The trainer has to make sure that the aspects covered are practically practiced by the participants. The student will choose the option of workshop from amongst their concentration electives. The evaluation will be done by Board of examiners comprising of faculties.

Major Themes for Workshop:

The workshop may be conducted on any of the following major themes:

- Accounting
- Finance
- Human Resources
- Marketing
- Economics
- Operations
- Supply Chain Management

These themes are merely indicative and the trainer may choose any recent and relevant topic of study.

Guidelines for Workshop:

The procedure for earning credits from workshop consists of the following steps:

1. Relevant study material and references will be provided by the trainer in advance.
2. The participants are expected to explore the topic in advance and take active part in the discussions to be held
3. Attending and Participating in all activities of the workshop
4. Group Activities have to be undertaken by students as guided by the trainer.
5. Evaluation of workshop activities would be done through test and quiz at the end of the workshop.
6. Submitting a write up of at least 500 words about the learning outcome from the workshop.

Methodology:

The methodology followed at the workshop could be based on any one or more of the following methods:

- Case Study
- Business Game
- Simulation
- Group Activity
- Role Play
- Business Planning
- Quiz

Evaluation Scheme:

Attendance	Active Participation	Multiple Choice Questions/ Quiz	Solving the case/ Assignment/ Write up	Total
10	30	30	30	100


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OPERATIONS RESEARCH

Course Code: MGT2551

Credit Units: 03

Course Objective:

The objective of this paper is to make students familiar with basic concepts and tools in Operations Research. These techniques assist in solving complex problems and help in decision making.

Course Contents:

Module I: Introduction

Introduction to Operations Research, Definition, scope and limitations of Operations Research

Module II: Linear Programming

Linear Programming – Basic Concepts, Model formulation; Solution methods – Graphical Solution method, Simplex method (problems involving only upto 3 constraints and of inequality <), Application of LPP in business decision making.

Module III: Transportation Problem

Transportation problem- Initial Basic feasible solution (North - West corner rule, Vogels approximation method), Test for optimality (Modified Distribution (MODI) method)

Module IV: Assignment Problem

Assignment Problem – Introduction, Approach of the Assignment model, Solution Methods (Hungarian method)

Module V: Game Theory

Game Theory - Concept and definition; Solution methods of Pure Strategy games (with saddle point), Significance of Game Theory.

Module VI: Queuing & Simulation

Introduction, Elementary queuing system, Introduction to Single – channel queuing model (with Poisson arrivals and Exponential service times), (no numerical); Introduction to Simulation, applications, advantages and drawbacks of simulation, Introduction to Monte – Carlo Simulation, Role of computers in Simulation.

Examination Scheme:

Components	CT	HA	Q	C	A	EE
Weightage (%)	10	5	5	5	5	70

C - Case Discussion/ Presentation; HA - Home Assignment; P - Project; S - Seminar; V - Viva; Q - Quiz; CT - Class Test; A - Attendance; EE - End Semester Examination

Text & References:

Text:

- Kapoor V K, Operations Research (Techniques for Management), Seventh edition, Sultan Chand & Sons.

References:

- Sharma J K, Operations Research (Theory & Practices), Second edition, Macmillan India Ltd.
- Hamdy A Taha, Operations Research, Seventh edition, Prentice Hall India
- Kothari C R, An introduction to Operations Research, Third edition, Vikas Publishing House

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ENTREPRENEURSHIP DEVELOPMENT

Course Code: MGT2502

Credit Units: 03

Course Objective:

The objective of the course is to provide students an understanding of entrepreneurship & the process of creating and growing a new venture. The course also focuses on giving the students the concept of an entrepreneur who is willing to accept all the risks & put forth the effort necessary to create a new venture.

Course Contents:

Module I: Basic Concepts

Qualities, Characteristics of an entrepreneur, Venture idea generation, Ideas and the entrepreneurship, Women entrepreneurs, Preliminary Screening, Drawbacks or Problems of entrepreneurship, Reasons of failure, Overview of setting up an enterprise with organizational forms – MSMED Act and SMERA Overview.

Module II: Project Appraisal

Pre-feasibility Report, Project Report, Comparative Rating of Product ideas, Cash Flow, Financial Analysis and Planning, Sources of Finance, Stages of Project Feasibility Analysis-Market, Technical, Financial, Social Analysis, Project Implementation Stages

Module III: Financial Analysis

Financing the project, Sources of finance, Venture Capital Sources, What Investor looks in the Investment Proposal, Outline for a Venture Capital Proposal, Sources of finance from different banks, Proposal with IDBI etc.

Module IV: Market and Materials Management Analysis

Vendor development, vendor selection decision factors, methods of price determination, direct and hidden cost in material management, market development, market feasibility, activities and decisions in materials management – International Markets.

Module V: Project Management

Steps and procedure for setting up small scale, Role of Banks and Financial Institutions in Development, E-Commerce, E-Business, E-Auction, Project management problems. SEZ, Cluster Development.

Examination Scheme:

Components	CT	HA	C	V	A	EE
Weightage (%)	10	5	5	5	5	70

C - Case Discussion/ Presentation; HA - Home Assignment; P - Project; S - Seminar; V - Viva; Q - Quiz; CT - Class Test; A - Attendance; EE - End Semester Examination

Text & References:

Text:

- Developing Entrepreneurship, Udai Pareek Sanjeev & Rao T.V, Printers, Ahmedabad
- Issues and Problems: Small: 1, Sharma, S.V.S., Industry Extension Training Institute, Hyderabad

References:

- A Practical Guide to Industrial Entrepreneurs; Srivastava, S.B., Sultan Chand & Sons
- Entrepreneurship Development; Bhanussali, Himalaya Publishing, Bombay


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SUMMER INTERNSHIP EVALUATION

Course Code: MGT2535

CreditUnits: 06

Objectives:

The basic objective of a summer internship is to provide first hand practical exposure of the corporate functioning and to acquaint students with the culture of corporate. The summer training will also provide an opportunity to the students to apply their theoretical understanding while working on the concerned project in the industry. Thus, this summer internship programme is an attempt to bridge the gap between theory and practice. This will also enhance the students' intellectual ability and attributes related to data handling, decision making, report writing, oral presentation and imbibing an interdisciplinary approach.

General Guidelines:

Every student of under graduate courses will be required to undergo a practical training in a corporate organization approved by the Institute for eight weeks, normally in the Summer Vacation, after the end of the fourth semester examinations. The candidates shall be required to undergo training in the various areas of the organization concerned. The organization may assign a specific project to the candidate, which will be completed by him/her during the period of training. The work done by the candidate during the training period shall be submitted in the form of a report as per the guidelines provided by the Department.

Chapter Scheme for the SIP Report:

Chapter I: Introduction	- 20 marks
Chapter II: Conceptual Framework/National/International Scenario	- 5 marks
Chapter III: Presentation, Analysis and Findings	- 35 marks
Chapter IV: Conclusion and Recommendations	- 15 marks

The report has to be written in font Times New Roman, 12 points, 1.5 line spacing on both sides of the paper, Spiral Bound. The report should comprise of a maximum of 70 pages and has to be submitted in two copies.

THE COMPONENTS OF A SIP REPORT

The outcome of Summer Internship is the Project Report. A project report should have the following components:

1) Cover Page: This should contain the title of the project proposal, to whom it is submitted, for which degree, the name of the author, name of the supervisor, year of submission of the project work, name of the University.

2) Acknowledgement: Various organizations and individuals who might have provided assistance /co-operation during the process of carrying out the study.

3) Table of Content: Page-wise listing of the main contents in the report, i.e., different Chapters and its main Sections along with their page numbers.

4) Body of the Report: The body of the report should have these four logical divisions

- Introduction:* This will cover the background, rationale/ need / justification, brief review of literature, objectives, methodology (the area of the study, sample, type of study, tools for data collection, and method of analysis), Limitations of the Study, and Chapter Planning.
- Conceptual Framework / National and International Scenario:* (relating to the topic of the Project).
- Presentation of Data, Analysis and Findings:* (using the tools and techniques mentioned in the methodology).
- Conclusion and Recommendations:* In this section, the concluding observations based on the main findings and suggestions are to be provided.

5) Bibliography or References: This section will include the list of books and articles which have been used in the project work, and in writing a project report.

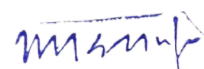
6) Annexure: Questionnaires (if any), relevant reports, etc.

Evaluation Scheme:

SIP Report	Power Point Presentation & Viva
75 marks	25 marks



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TERM PAPER

Course Code: MGT2531

Credit Units: 02

Course Objective:

The objective of this course is to judge the understanding as well as application of the knowledge gained by the students. The aim of the term paper is to provide the students with an opportunity to further enhance their knowledge in a sector of their choice by undertaking a significant practical unit of examining and analyzing various aspects of business management at a level commensurate with the learning outcomes of the various courses taken up them in the ongoing semester.

A term paper is primarily a record of intelligent reading in several sources on a particular subject. The students will choose the topic at the beginning of the session in consultation with the faculty assigned. At least one middle level or senior level person of a company from the chosen sector may be interviewed face to face.

Guidelines:

1. The term paper will be related to the contemporary business issue and the topic will be given by the department.
2. The presentation of the term paper is scheduled to be held before the commencement of Semester examinations.
3. The paper will carry 100 marks that will be marked on the basis of understanding and organization of content based on the literature review. The Bibliography shall form an important part of the paper.
4. Examples of a few broad areas for Term Paper (List is indicative, not exhaustive)
 - Management practices
 - Talent management
 - HR cases from any Indian industry
 - Employee motivation
 - Managerial competencies
 - Employability skills
 - Industrial relations
 - Knowledge management
 - Social media
 - Green marketing
 - Six Sigma
 - Sustainable branding practices
 - Training and development
 - Relationship management
 - CSR
 - Performance management system
 - Balanced Score Card
 - Corporate Governance
 - Employee retention
 - NGOs.

Evaluation Scheme:

Organisation and relevance of content	Literature Review	Bibliography	Presentation & Viva	Total
30	30	20	20	100


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PROJECT

Course code: MGT2532

Credit Units: 03

Objectives:

The aim of the project is to provide the students with an opportunity to further their intellectual and personal development in the chosen field by undertaking a significant practical unit of activity. The project can be defined as a scholarly inquiry into a problem or issues, involving a systematic approach to gathering and analysis of information / data, leading to production of a structured report.

Chapter Scheme and distribution of marks:

Chapter 1: Introduction	– 10 marks
Chapter 2: Conceptual Framework/ National/International Scenario	– 25 marks
Chapter 3: Presentation, Analysis & Findings	-- 25 marks
Chapter 4: Conclusion & Recommendations	-- 10 marks
Chapter 5: Bibliography	-- 05 marks

Components of a Project Report

The outcome of Project Work is the Project Report. A project report should have the following components:

1) Cover Page: This should contain the title of the project proposal, to whom it is submitted, for which degree, the name of the author, name of the supervisor, year of submission of the project work, name of the University.

2) Acknowledgement: Various organizations and individuals who might have provided assistance /co-operation during the process of carrying out the study.

3) Table of Content: Page-wise listing of the main contents in the report, i.e., different Chapters and its main Sections along with their page numbers.

4) Body of the Report: The body of the report should have these four logical divisions

- Introduction:* This will cover the background, rationale/ need / justification, brief review of literature, objectives, methodology (the area of the study, sample, type of study, tools for data collection, and method of analysis), Limitations of the Study, and Chapter Planning.
- Conceptual Framework / National and International Scenario:* (relating to the topic of the Project).
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- Conclusion and Recommendations:* In this section, the concluding observations based on the main findings and suggestions are to be provided.

5) Bibliography or References: This section will include the list of books and articles which have been used in the project work, and in writing a project report.

6) Annexures: Questionnaires (if any), relevant reports, etc.

(The main text of the Project should normally be in the range of 5000 words. However, there may be annexure in addition to the main text)

Steps of a Project Report

Step I: Selection of the topic for the project by taking following points into consideration:

- Suitability of the topic.
- Relevance of the topic
- Time available at the disposal.

• Feasibility of data collection within the given time limit.

• Challenges involved in the data collection (time & cost involved in the data collection,

possibility of getting responses, etc.)

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Step II: Finalisation of the Topic and preparation of Project Proposal in consultation with the Supervisor.

Step III: Collection of information and data relating to the topic and analysis of the same.

Step IV: Writing the report dividing it into suitable chapters, viz.,

Chapter 1: Introduction,

Chapter 2: Conceptual Framework / National & International Scenario,

Chapter 3: Analysis & Findings

Chapter 4: Conclusion and Recommendations.

Step V: The following documents are to be attached with the Final Project Report.

1) Approval letter from the supervisor (Annexure-IA)

2) Student's declaration (Annexure-IB)

3) Certificate from the Competent Authority of the Organisation / Institution, if the student undertakes the Project Work in any Organisation / Institution.


Guidelines for Evaluation:

Each of the students has to undertake a Project individually under the supervision of a teacher and to submit the same following the guidelines stated below:

- Language of Project Report and Viva-Voce Examination may be English. The Project Report must be typed and hard bounded.
- Failure to submit the Project Report or failure to appear at the Viva-voce Examination will be treated as "Absent" in the Examination. He /she has to submit the Project Report and appear at the Viva-Voce Examination in the subsequent years (within the time period as per University Rules).
- No marks will be allotted on the Project Report unless a candidate appears at the Viva-Voce Examination. Similarly, no marks will be allotted on Viva-Voce Examination unless a candidate submits his/her Project Report.
- Evaluation of the Project Work to be done jointly by one internal expert and one external expert with equal weightage, i.e., average marks of the internal and external experts will be allotted to the candidate.

Evaluation Scheme:

Project Report	Power Point Presentation & Viva	Total
75 marks	25 marks	100


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Declaration

Ihereby declare that the Project Work with the title (in block letters).....
submitted by me for the partial fulfilment of the degree of BBA is my original work and has not been submitted earlier to any other University /Institution for the fulfilment of the requirement for any course of study.

I also declare that no chapter of this manuscript in whole or in part has been incorporated in this report from any earlier work done by others or by me. However, extracts of any literature which has been used for this report has been duly acknowledged providing details of such literature in the references.

Signature of supervisor:

Name:

Signature of the student

Registration No

Place:

Date:



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WORKSHOP

Course Code: MGT2533

Credit Units: 01

Course Objective:

A workshop is primarily an activity based academic event that is organized to provide the students a one to one and hands on experience on any aspect of their learning. The communication in a workshop has to be necessarily two ways. The trainer has to make sure that the aspects covered are practically practiced by the participants. The student will choose the option of workshop from amongst their concentration electives. The evaluation will be done by Board of examiners comprising of the faculties.

Major Themes for Workshop:

The workshop may be conducted on any of the following major themes:

- Accounting
- Finance
- Human Resources
- Marketing
- Economics
- Operations
- Supply Chain Management

These themes are merely indicative and the trainer may choose any recent and relevant topic of study.

Guidelines for Workshop:

The procedure for earning credits from workshop consists of the following steps:

1. Relevant study material and references will be provided by the trainer in advance.
2. The participants are expected to explore the topic in advance and take active part in the discussions to be held
3. Attending and Participating in all activities of the workshop
4. Group Activities have to be undertaken by students as guided by the trainer.
5. Evaluation of workshop activities would be done through test and quiz at the end of the workshop.
6. Submitting a write up of atleast 500 words about the learning outcome from the workshop.

Methodology:

The methodology followed at the workshop could be based on any one or more of the following methods:

- Case Study
- Business Game
- Simulation
- Group Activity
- Role Play
- Business Planning
- Quiz

Evaluation Scheme:

Attendance	Active Participation	Multiple Choice Questions/ Quiz	Solving the case/ Assignment/ Write up	Total
10	30	30	30	100


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TRAINING AND DEVELOPMENT

Course Code: MGT2510

Credit Units: 03

Course Objective:

The objective of the course is to help students acquire and enhance their knowledge of how to plan, develop, carry out, and evaluate training and executive development programmes in Business Organizations.

Course Contents:

Module I: Introduction

Meaning and definition of training, Training vs Education, Culture and Context, Introduction to training Strategy.

Module II: Process of Training

Establishing objectives, Training need assessment, Designing the programs, Training methods, Trainers and training styles, Introduction to Management Development program.

Module III: Evaluation of Training & Development

Training Evaluation – Need for evaluation, Measuring Training Effectiveness, Concept of Return on Investment, Cost – Benefit Analysis, Models of Training Evaluation.

Module IV: Training Systems

Action Research for better training, Knowledge management, Career development, Succession planning, Diversity training, Orientation training.

Module V: Changes in Training Needs for Modern Organizations

Concept and Need for Learning Organizations, Training for Trainers, Leadership, Team Playing and Group Dynamics, Basics of Sensitivity Training, Computer Based Training.

Module VI: Development

Executive Development – significance & nature, Identifying development needs and setting objectives. Techniques of development and advantages, Role of HRD in 21st Century.

Examination Scheme:

Components	CT	HA	C	V	A	EE
Weightage (%)	10	5	5	5	5	70

C - Case Discussion/ Presentation; **HA** - Home Assignment; **P** - Project; **S** - Seminar; **V** - Viva; **Q** - Quiz; **CT** - Class Test; **A** - Attendance; **EE** - End Semester Examination

Text & References:

Text:

- Lynton R.P and Pareek U, Training for Development, Vistaar Publications, New Delhi

References:

- Goldstein, Training in Organizations, Thomson Learning
- Pareek Udai, Training and Development, Tata McGraw Hill.
- Srivastava, S., Recruitment, Selection & Retention, ABS Course pack.
- Wexley, K & Lathan Gary, Developing & Training HR in Organization. P. Hall.


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RELATIONAL DATABASE MANAGEMENT SYSTEM

Course Code: MGT2512

CreditUnits: 03

Course Objective:

The objective of the course is to give knowledge of the Relational Database Management Software, in particular ORACLE. It is expected that a student at the end of the course would attain a good conceptual and practical understanding of databases.

Course Contents:

Module I: Introduction to RDBMS

RDBMS: Introduction, Relational Model concept and Relational data structure, Relational Model constraints as domain constraints, Key constraints, Entity integrity constraints, Referential Integrity constraints.

Module II: Introduction to Oracle

Tools of Oracle, Features of oracle.

Module III: SQL

Overview of SQL, Component of SQL (DDL, DML, DCL), Advantage of SQL, Basics of syntax writing, Data Definition Language, Create command, Data type, Constraints, ALTER & DROP, UPDATE & DELETE Commands, Substitutions variables, Run time Environments variables, SELECT Commands Basic Constructs, Functions, Nested Queries, Correlated queries, Views, Sequence, User Management Commands.

Module IV: PL/SQL

Basic features, Block Structure of a PL/SQL Programs, Control Structures, Exception Handling, Cursor, Procedure, Functions and Triggers, Internet features of Oracle.

Module V: Database Technologies

Client/Server Databases, Distributed Databases, Web Databases

Module VI: Administration of Oracle databases

Examination Scheme:

Components	CT	HA	Q	V	A	EE
Weightage (%)	10	5	5	5	5	70

C - Case Discussion/ Presentation; **HA** - Home Assignment; **P** - Project; **S** - Seminar; **V** - Viva; **Q** - Quiz; **CT** - Class Test; **A** - Attendance; **EE** - End Semester Examination

Text & References:

- Oracle8i: The Complete Reference, McGraw Hill


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PROGRAMMING WITH MICROSOFT VISUAL BASIC

Course Code: MGT2514

Credit Units: 03

Course Objective:

The objective of the course is to offer the students all key concepts and capabilities to be bound in Microsoft Visual Basic. This course seeks to provide very clear and straightforward implementation of key features of Visual Basic with explanations of each work. The student should walk away with an in-depth understanding of how to utilize all of Visual Basic's capabilities for building industrial strength enterprise application and understand the process of software development. The course will make the students learn real world context.

Course Contents:

Module I: Visual Basic Overview

Opening, writing and running Visual Basic Program, Working with controls and defining their properties, Working with menus and dialog boxes.

Module II: Programming Fundamentals

Visual Basic Variables and Operators, Using Decision Structure, Using Iterations and Timers.

Module III: Creating the Perfect User Interface

Working with Forms, Printers and Error Handling, Adding Artwork and Special Effects

Module IV: Managing Corporate Data

Using Modules and Procedures, Working with Arrays, Exploring text files and string processing, Managing access databases.

Module V: Professional Edition Tools and Techniques

Word Processing with the Rich Text box control, Displaying progress and status information, Integrating music and video with the multimedia MCI control, Using the windows API.

Module VI: Advanced Database Programming

Managing data with the Flex Grid Control, Exploring database handling using DAO, RDO and ADO, Handling the Recordset.

Examination Scheme:

Components	CT	HA	Q	C	A	EE
Weightage (%)	10	5	5	5	5	70

C - Case Discussion/ Presentation; HA - Home Assignment; P - Project; S - Seminar; V - Viva; Q - Quiz; CT - Class Test; A - Attendance; EE - End Semester Examination

Text & References:

Text:

- Michael Halvorson: Microsoft Visual Basic 6.0 – Prentice Hall of India P Ltd.

References:

- Noel Jerke: The Complete Reference Visual Basic 6.0 – Tata Mc-Graw Hill
- Smith & Amundsen: Database Programming with Visual Basic 6 – Techmedia
- Rob Thayer: Visual Basic 6 Unleashed – Techmedia


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DISSERTATION

Course Code: MGT2637

Credit Units: 09

Objectives:

The aim of the dissertation is to provide you with an opportunity to further your intellectual and personal development in your chosen field by undertaking a significant practical unit of activity, having an educational value at a level commensurate with the award of your degree. The dissertation can be defined as a scholarly inquiry into a problem or issues, involving a systematic approach to gathering and analysis of information / data, leading to production of a structured report.

Chapter Scheme and distribution of marks:

Chapter 1: Introduction	- 10 marks
Chapter 2: Conceptual Framework/ National/International Scenario	- 5 marks
Chapter 3: Presentation, Analysis & Findings	- 25 marks
Chapter 4: Conclusion & Recommendations	- 10 marks

THE COMPONENTS OF A PROJECT REPORT

The outcome of Project Work is the Project Report. A project report should have the following components:

1) Cover Page: This should contain the title of the project proposal, to whom it is submitted, for which degree, the name of the author, name of the supervisor, year of submission of the project work, name of the University.

2) Acknowledgement: Various organizations and individuals who might have provided assistance /co-operation during the process of carrying out the study.

3) Table of Content: Page-wise listing of the main contents in the report, i.e., different Chapters and its main Sections along with their page numbers.

4) Body of the Report: The body of the report should have these four logical divisions

- Introduction:* This will cover the background, rationale/ need / justification, brief review of literature, objectives, methodology (the area of the study, sample, type of study, tools for data collection, and method of analysis), Limitations of the Study, and Chapter Planning.
- Conceptual Framework / National and International Scenario:* (relating to the topic of the Project).
- Presentation of Data, Analysis and Findings:* (using the tools and techniques mentioned in the methodology).
- Conclusion and Recommendations:* In this section, the concluding observations based on the main findings and suggestions are to be provided.

5) Bibliography or References: This section will include the list of books and articles which have been used in the project work, and in writing a project report.

6) Annexures: Questionnaires (if any), relevant reports, etc.

(The main text of the Project should normally be in the range of 5000 words. However, there may be annexure in addition to the main text)

THE STEPS OF PROJECT WORK

STEP I : Selection of the topic for the project by taking following points into consideration:

- Suitability of the topic.
- Relevance of the topic
- Time available at the disposal.
- Feasibility of data collection within the given time limit.
- Challenges involved in the data collection (time & cost involved in the data collection, possibility of getting responses, etc.)

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STEP II : Finalisation of the Topic and preparation of Project Proposal in consultation with the Supervisor.

STEP III : Collection of information and data relating to the topic and analysis of the same.

STEP IV : Writing the report dividing it into suitable chapters, viz.,
Chapter 1: Introduction,
Chapter 2: Conceptual Framework / National & International Scenario,
Chapter 3: Analysis & Findings
Chapter 4: Conclusion and Recommendations.

STEP V : The following documents are to be attached with the Final Project Report.

- 1) Approval letter from the supervisor (Annexure-IA)
- 2) Student's declaration (Annexure-IB)
- 3) Certificate from the Competent Authority of the Organisation / Institution, if the student undertakes the Project Work in any Organisation / Institution.

Annexures,


References / Bibliography

Guidelines for Evaluation:

- Each of the students has to undertake a Project individually under the supervision of a teacher and to submit the same following the guidelines stated below.
- Language of Project Report and Viva-Voce Examination may be English. The Project Report must be typed and hard bound.
- Failure to submit the Project Report or failure to appear at the Viva-voce Examination will be treated as "Absent" in the Examination. He /she has to submit the Project Report and appear at the Viva-Voce Examination in the subsequent years (within the time period as per University Rules).
- No marks will be allotted on the Project Report unless a candidate appears at the Viva-Voce Examination. Similarly, no marks will be allotted on Viva-Voce Examination unless a candidate submits his/her Project Report.
- Evaluation of the Project Work to be done jointly by one internal expert and one external expert with equal weightage, i.e., average marks of the internal and external experts will be allotted to the candidate.
- A candidate has to qualify in the Project Work separately, obtaining minimum marks of 40 (Project Report and Viva-Voce taken together).

Evaluation Scheme:

Dissertation	Power Point Presentation & Viva
75 marks	25 marks


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BRAND MANAGEMENT

Course Code: MGT2602

Credit Units: 03

Course Objective:

The objective of the course is to help the students understand and appreciate the theoretical concepts of brands. To generate the ability to apply the concepts in real life.

Course Contents:

Module I: Introduction

Meaning and importance of brands, Brands v/s products, Challenges and opportunities of branding, Concept of Brand Equity, Brand management process, Role of CRM in building brands.

Module II: Brand Positioning and value

Sources of brand equity, Brand Building, Implications of brand building, Brand positioning: Brand value, Internal branding.

Module III: Brand Marketing

Criteria for choosing Brand elements, Building brand equity: Product strategy, pricing strategy, Integrated marketing communication, Celebrity endorsements, Concept of co-branding

Module IV: Brand Performance and Branding strategies

Brand value chain, Brand equity management system, Brand hierarchy, Designing branding strategy, Brand extension: Concept, Advantages and disadvantages, Evaluating opportunities of brand extension, Branding strategy over PLC.

Module V: Managing Brands

Reinforcing Brands, Brands revitalization Managing brands internationally, Advantages and disadvantages of global marketing, Standardization v/s customization, Global Brand strategy.

Examination Scheme:

Components	CT	HA	C	V	A	EE
Weightage (%)	10	5	5	5	5	70

C - Case Discussion/ Presentation; **HA** - Home Assignment; **P** - Project; **S** - Seminar; **V** - Viva; **Q** - Quiz; **CT** - Class Test; **A** - Attendance; **EE** - End Semester Examination

Text & References:

Text:

- Keller Kevin Lane, Strategic Brand Management: Building, Measuring and Managing Brand Equity, Second Edititon, Printice Hall.

References:

- Jean Noel Kampferer, Kogan Page, Strategic Brand Management, Second Edition
- Cowley D., Understanding Brands.


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ADVERTISING AND SALES PROMOTION

Course Code: MGT2603

Credit Units: 03

Course Objective:

The objective of the course is to familiarize students with advertising concepts and strategies, the methods and tools used. Enabling them to develop advertising strategies and plans and to develop the judgment parameters required in product management, to evaluate advertising.

Course Contents:

Module I: Introduction

Role of Promotion in Marketing Mix, Components of promotion mix viz Advertising Publicity, Personal selling, Public relations and Sales promotion, Concept of integrated marketing communication.

Module II: Advertising

Need, scope objectives and importance of advertising, Strengths and Weaknesses of Advertising as a Promotion Tool, role of advertising in current market, advertising and society- latest trends in advertisements different types of advertisements.

Module III: Advertising Campaign Planning

Setting advertising goals and objectives- The DAGMAR Approach, Message strategies and tactics- Creative approaches, Copywriting and testing, Advertising copy design, Copy layout, Advertising appeals and themes, Classification of advertisement copies-Essentials of a good copy Ethics in advertising.

Module IV: Advertising Media and Agencies

Types of media, media planning and scheduling, Advertising budgets, Approaches to advertising budgeting, Measuring advertising effectiveness, Advertising business in India, Rural advertising, Legal and ethical aspects of advertising, Advertising in international perspective.

Module V: Sales Promotion

Need, Scope, Objectives and Importance of sales promotion, Management of sales Promotion at the consumer, Trade and sales force levels, Strengths and weaknesses of Sales Promotion.

Module VI: Sales Promotion Strategy

Planning and designing sales promotion programme with specific reference to sales contest, Trade in discount coupons etc. Sales display and merchandising, Latest trends in sales promotion.

Examination Scheme:

Components	CT	HA	C	V	A	EE
Weightage (%)	10	5	5	5	5	70

C - Case Discussion/ Presentation; HA - Home Assignment; P - Project; S - Seminar; V - Viva; Q - Quiz; CT - Class Test; A - Attendance; EE - End Semester Examination

Text & References:

Text:

- Belch and Belch, Advertising and Promotion, Sixth Edition, Tata McGraw Hill

References:

- Batra Rajeev, Aaker, David A and Myere John G. Advertising Management, Fifth Edition, Pearson Education
- Advertising Management – Chunawalla


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TERM PAPER

Course Code: MGT2631

Credit Units: 02

Course Objective:

The objective of this course is to judge the understanding as well as application of the knowledge gained by the students. The aim of the term paper is to provide the students with an opportunity to further enhance their knowledge in a sector of their choice by undertaking a significant practical unit of examining and analyzing various aspects of business management at a level commensurate with the learning outcomes of the various courses taken up them in the ongoing semester.

A term paper is primarily a record of intelligent reading in several sources on a particular subject. The students will choose the topic at the beginning of the session in consultation with the faculty assigned. At least one middle level or senior level person of a company from the chosen sector may be interviewed face to face.

Guidelines:

1. The term paper will be related to the contemporary business issue and the topic will be given by the department.
2. The presentation of the term paper is scheduled to be held before the commencement of Semester examinations.
3. The paper will carry 100 marks that will be marked on the basis of understanding and organization of content based on the literature review. The Bibliography shall form an important part of the paper.
4. Examples of a few broad areas for Term Paper (List is indicative, not exhaustive)
 - Management practices
 - Talent management
 - HR cases from Indian any industry
 - Employee motivation
 - Managerial competencies
 - Employability skills
 - Industrial relations
 - Knowledge management
 - Social media
 - Green marketing
 - Six Sigma
 - Sustainable branding practices
 - Training and development
 - Relationship management
 - CSR
 - Performance management system
 - Balanced Score Card
 - Corporate Governance
 - Employee retention
 - NGOs.

Evaluation Scheme:

Organisation and relevance of content	Literature Review	Bibliography	Presentation & Viva	Total
30	30	20	20	100


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PROJECT

Course code: MGT2632

Credit Units:03

Objectives:

The aim of the project is to provide the students with an opportunity to further their intellectual and personal development in the chosen field by undertaking a significant practical unit of activity. The project can be defined as a scholarly inquiry into a problem or issues, involving a systematic approach to gathering and analysis of information / data, leading to production of a structured report.

Chapter Scheme and distribution of marks:

Chapter 1: Introduction	– 10 marks
Chapter 2: Conceptual Framework/ National/International Scenario	– 25 marks
Chapter 3: Presentation, Analysis & Findings	-- 25 marks
Chapter 4: Conclusion & Recommendations	-- 10 marks
Chapter 5: Bibliography	-- 05 marks

Components of a Project Report

The outcome of Project Work is the Project Report. A project report should have the following components:

1) Cover Page: This should contain the title of the project proposal, to whom it is submitted, for which degree, the name of the author, name of the supervisor, year of submission of the project work, name of the University.

2) Acknowledgement: Various organizations and individuals who might have provided assistance /co-operation during the process of carrying out the study.

3) Table of Content: Page-wise listing of the main contents in the report, i.e., different Chapters and its main Sections along with their page numbers.

4) Body of the Report: The body of the report should have these four logical divisions

- Introduction:* This will cover the background, rationale/ need / justification, brief review of literature, objectives, methodology (the area of the study, sample, type of study, tools for data collection, and method of analysis), Limitations of the Study, and Chapter Planning.
- Conceptual Framework / National and International Scenario:* (relating to the topic of the Project).
- Presentation of Data, Analysis and Findings:* (using the tools and techniques mentioned in the methodology).
- Conclusion and Recommendations:* In this section, the concluding observations based on the main findings and suggestions are to be provided.

5) Bibliography or References: This section will include the list of books and articles which have been used in the project work, and in writing a project report.

6) Annexures: Questionnaires (if any), relevant reports, etc.

(The main text of the Project should normally be in the range of 5000 words. However, there may be annexure in addition to the main text)

The Steps of a Project Report

Step I: Selection of the topic for the project by taking following points into consideration:

- Suitability of the topic.
- Relevance of the topic
- Time available at the disposal.

• Feasibility of data collection within the given time limit.

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possibility of getting responses, etc.)

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Step II: Finalisation of the Topic and preparation of Project Proposal in consultation with the Supervisor.

Step III: Collection of information and data relating to the topic and analysis of the same.

Step IV: Writing the report dividing it into suitable chapters, viz.,

Chapter 1: Introduction,

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Step V: The following documents are to be attached with the Final Project Report.

1) Approval letter from the supervisor (Annexure-IA)

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3) Certificate from the Competent Authority of the Organisation / Institution, if the student undertakes the Project Work in any Organisation / Institution.

Guidelines for evaluation:

Each of the students has to undertake a Project individually under the supervision of a teacher and to submit the same following the guidelines stated below:

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- No marks will be allotted on the Project Report unless a candidate appears at the Viva-Voce Examination. Similarly, no marks will be allotted on Viva-Voce Examination unless a candidate submits his/her Project Report.
- Evaluation of the Project Work to be done jointly by one internal expert and one external expert with equal weightage, i.e., average marks of the internal and external experts will be allotted to the candidate.

Evaluation Scheme:

Project Report	Power Point Presentation & Viva	Total
75 marks	25 marks	100


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Declaration

Ihereby declare that the Project Work with the title (in block letters).....
submitted by me for the partial fulfilment of the degree of BBA is my original work and has not been submitted earlier to any other University /Institution for the fulfilment of the requirement for any course of study.

I also declare that no chapter of this manuscript in whole or in part has been incorporated in this report from any earlier work done by others or by me. However, extracts of any literature which has been used for this report has been duly acknowledged providing details of such literature in the references.

Signature of supervisor:

Name:

Signature of the student

Registration No

Place:

Date:



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WORKSHOP

Course Code: MGT2633

Credit Units: 01

Course Objective:

A workshop is primarily an activity based academic event that is organized to provide the students a one to one and hands on experience on any aspect of their learning. The communication in a workshop has to be necessarily two ways. The trainer has to make sure that the aspects covered are practically practiced by the participants. The student will choose the option of workshop from amongst their concentration electives. The evaluation will be done by Board of examiners comprising of the faculties.

Major Themes for Workshop:

The workshop may be conducted on any of the following major themes:

- Accounting
- Finance
- Human Resources
- Marketing
- Economics
- Operations
- Supply Chain Management

These themes are merely indicative and the trainer may choose any recent and relevant topic of study.

Guidelines for Workshop:

The procedure for earning credits from workshop consists of the following steps:

1. Relevant study material and references will be provided by the trainer in advance.
2. The participants are expected to explore the topic in advance and take active part in the discussions to be held
3. Attending and Participating in all activities of the workshop
4. Group Activities have to be undertaken by students as guided by the trainer.
5. Evaluation of workshop activities would be done through test and quiz at the end of the workshop.
6. Submitting a write up of atleast 500 words about the learning outcome from the workshop.

Methodology:

The methodology followed at the workshop could be based on any one or more of the following methods:

- Case Study
- Business Game
- Simulation
- Group Activity
- Role Play
- Business Planning
- Quiz

Evaluation Scheme:

Attendance	Active Participation	Multiple Choice Questions/ Quiz	Solving the case/ Assignment/ Write up	Total
10	30	30	30	100


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CORPORATE TAX PLANNING

Course Code: MGT2605

CreditUnits: 03

Course Objective:

To provide understanding of Direct Tax including Rules pertaining there to and application to different business situations. To understand principles underlying the Service Tax and concepts of VAT

Course Contents:

Module I: Introduction to Tax Management

Concept of tax planning, Tax avoidance and tax evasions, Corporate taxation.

Module II Income from Business

Residential Status of companies, Taxable income under Business and Profession, Computation of Profit and Gains from business profession, Deemed business profits, Assessment of Retail Business, Deemed incomes (cash credit, unexplained investments, unexplained money and other assets, unexplained expenditures, investments and valuable articles not fully disclosed in books of accounts).

Module III: Deductions Allowed Under Business and Profession

Deduction Expressly allowed section 30-35, Depreciation deduction calculation, Setoff and carry forward of unabsorbed depreciation section 32(2). Determining Actual Cost 43(1), Set-off and Carry Forward Losses, Bonus or commission to employees section, Interest on borrowed capital, Insurance premium 36(1(i)), Employees contribution to provident fund, Bad debts 36, Revenue expenditure incurred by statutory corporation, Banking transaction tax, Security transaction tax, Commodity transaction tax, provision for admissibility of general deduction 37(1),

Module IV: International Accounting and Taxation

Analysis of foreign financial statement, Accounting standard: US GAAP, Indian GAAP, IAS, IFRS. Transfer Pricing – Meaning, measurement, strategic considerations Norms & Practices, tax havens, Double taxation agreement among countries, Tax implication of activities of foreign enterprise in India: Mode of entry and taxation respectively.

Module V: Indirect Tax - Concepts and General Principles

Service tax - Charge of service tax and taxable services, Valuation of taxable services, Payment of service tax and filing of returns.

VAT – Introduction, Calculation of VAT Liability including input Tax Credits, Small Dealers and Composition Scheme, VAT Procedures, Central Sales Tax.

Module VI: Tax Planning and Financial Management Decisions

Tax planning relating to capital structure decision, Dividend policy, Inter – corporate, dividends and bonus shares, Tax provisions relating to free trade zones, Infrastructure sector and backward areas, Tax incentives for exports. Tax deductions and collection at source, Advance payment of tax.

Examination Scheme:

Components	CT	HA	Q	C	A	EE
Weightage (%)	10	5	5	5	5	70

C - Case Discussion/ Presentation; HA - Home Assignment; P - Project; S - Seminar; V - Viva; Q - Quiz; CT - Class Test; A - Attendance; EE - End Semester Examination

Text & Reference:

Text:

- Lal & Vashisht, Direct Taxes, 29th Edition, Pearson

References:

- Singhania & Singhania, Income Tax, 39th Edition, Taxmann

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COMPENSATION AND REWARD MANAGEMENT

Course Code: MGT2610

Credit Units: 03

Course Objective:

The objective of this course is to familiarize students with the dynamics of wage and salary administration and current trends in India.

Course Contents:

Module I: Introduction

Overview of Compensation Management, Wage and Salary Administration – Nature, Importance, Philosophy, Objectives, Definition, Goals Role of various parties – Employees, Employers, Unions & Government and Legislations for compensation.

Module II: Developing Compensation Programs

Job Evaluation, Basic systems Time wage, Piece wage, Incentives, Wage payments and Total Salary Structure, Compensation Surveys, Hay Plan, Developing Competitive Compensation Programs, Developing Salary Structures

Module III: Derivatives of Compensation

Pay for Performance, Merit pay and Performance Appraisal, Performance based rewards, Performance Criteria Choices, and Competency Mapping & Developing Performance Matrix, Performance based Compensation Schemes.

Module IV: Incentive Plans

Incentive Plans: individual and group incentive plans, Productivity Gain sharing plans, Profit Sharing Plans, Non - Financial and Financial incentives, Measuring Cost- to – Company (CTC).

Module V: Employee Benefits

Employee Benefits: Supplemented Pay benefits (pay for time not worked) insurance benefits, Retirement benefits, Employees' service benefits, Introduction to ESOPs, Flexible benefits and Benefit Surveys.

Module VI: Current Trends

Current Trends in Compensation and Reward Management

Examination Scheme:

Components	CT	HA	C	V	A	EE
Weightage (%)	10	5	5	5	5	70

C - Case Discussion/ Presentation; HA - Home Assignment; P - Project; S - Seminar; V - Viva; Q - Quiz; CT - Class Test; A - Attendance; EE - End Semester Examination

Text & References:

Text:

- Garry Dressler, "Personnel / Human Resource Management", London, Prentice Hall.
- William B. Werther Jr. and Keith Davis "Human Resource Management". New Jersey: McGraw Hill.
- Milkovich & Newman, Compensation, Irwin/McGraw-Hill 8th Ed.

References:

- Frans Poets, The Art of HRD – Job Evaluation & Remuneration, Crest Publishing, Volume 7 1st Edition
- Michael Armstrong, Helen Murlis, The Art of HRD – Reward Management, Crest Publishing
- Michael Armstrong, Employee Reward, (University Press)
- P. Zingheim, The New Pay, Linking Employee & Organization Performance, Schuster, (Jossey-Bass)
- Sara Rynes, Compensation in Organization, Gerhart (Jossey BASS)
- Wendell L French, "Human Resource Management", USA, Houghton Mifflin Company.
- David D. Decenzo and Stephen P. Robbins, "Human Resource Management", New Delhi, Prentice Hall.

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OBJECT ORIENTED PROGRAMMING WITH JAVA

Course Code: MGT2611

Credit Units: 03

Course Objective:

The objective of the course is to give knowledge of the Object Oriented approach to development of software using Java Language. It is expected that a student at the end of the course would attain a good conceptual understanding and logical approach of software development.

Course Contents:

Module I: Basics of OOPS

Object, Class, Abstraction & Encapsulation, Inheritance, Polymorphism Genesis and overview of Java. The creation of Java, Java's importance to the Internet, Lexical issues (White space, Identifiers, Literals, Comments, Separators, Keywords), The Java Class Libraries.

Module II: Data types, Variables and Arrays

Integer Data Type, Floating Data Type, Characters, Booleans, Literals, Variables, Type Conversion & Casting, Arrays & Strings Operators Arithmetic Operators, Bitwise Operators, Relational Operators, Boolean Logical Operators, the Assignment Operator, Operator.

Module III: The Control Statements

Selection Statements, Iteration Statements, Jump Statements. Classes, Class Fundamentals, Declaration of Object, Methods, Constructors, A Stack Class, Overloading Methods and Constructors, Argument Passing, Objects as Parameters, Returning Objects, Introducing Final & Understanding Static.

Module IV: Inheritance

Inheritance Basics, Using Super, Multilevel Hierarchy, Method Overriding, Dynamic Method Dispatch, using Abstract Classes, Exception handling Fundamentals of Exception Handling, Exception Types, using Try and Catch, Throw and Throws, nested Try statements.

Module V: I/O Applets

I/O basics, Reading console inputs and outputs, The Print Writer Class, Applet fundamentals, the Transient and Volatile modifiers, native methods and their problems, The Java Libraries String Handling, Exploring Java.lang, the collections framework with java.util, managing Input/ Output by exploring java.io.

Module VI: The Applet Class

Applet architecture, an applet skeleton, Applet display methods, passing parameters to Applets, Applet context and show Document, Networking, Java and the net, InetAddress, TCP/IP Client and Server Socket, URL Connections.

Examination Scheme:

Components	CT	HA	Q	V	A	EE
Weightage (%)	10	5	5	5	5	70

C - Case Discussion/ Presentation; HA - Home Assignment; P - Project; S - Seminar; V - Viva; Q - Quiz; CT - Class Test; A - Attendance; EE - End Semester Examination

Text & References:

Text:

- Herbert Schildt: The Complete Reference – Java 2, Fourth Edition. Tata McGraw-Hill.

References:

- C. Thomas Wu - An introduction to Object Oriented Programming with Java 2nd Edition. Tata McGraw Hill
- Cay S. Horstmann, Gary Cornell – Core Java. Pearson Education Asia
- Deitel&Deitel – Java, How to Program, 3rd Edition. Pearson Education Asia

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WEB DATABASE PROGRAMMING WITH ASP

Course Code: MGT2613

CreditUnits: 03

Course Objective:

The objective of the course is to capacitate students to build and deploy dynamic web applications that interact with a powerful database. The modules provide background on subjects such as HTML, client side scripting and relational databases. At the end of the course, the students will be able to set up their own personal dynamic web site using a Microsoft web server to illustrate web site creation and administration principles. The curriculum will make the students learn real world context.

Course Contents:

Module I: ASP Fundamentals

Software requirements, Installing personal web server, Installing IIS, IIS service features, Hardware requirement, ASP connection with IIS, Built in objects. Understanding request and response objects, The ASP request object, Requesting information from forms, QueryString collection & Server variables, cookies, ASP response object, response object methods and properties.

Module II: Understanding VB Script Language

Scripting, VB Scripting, Understanding variables, Integrating Script with HTML, Client side and server side scripting, Converting variable types, Operators, Message Box, Accessing objects, Using built in functions and statements, Program control statements.

Error Handling: Error Handling, ASP.

Module III:

Understanding Procedures and Classes

Understanding procedures, Sub-procedures, Functions, Classes, Methods, Events.

Session and Application Objects

The Session Object and collection of Session Object, Methods, properties and events, The Application object collections and methods, Using session and application objects.

Module IV: The ADO connect Object

Data Access components, Universal data access architecture, ADO, DAO, RDO architectures, OLE DB and ODBC, The ADO connection object, Creating and opening connection object, Creating DSN, connection with ODBC, connecting with OLE DB, using ADO connection and SQL statements.

Module V: ADO Record set Object

Creating and opening a record set object, Moving through a record set, The fields collection, using ADO record set, Bookmarks, Filtering Record sets, Searching for records, Modifying Records, The Get String method.

The ADO command object: Creating a command object, using a stored procedure, using stored procedure with parameters, return values, Output parameters and the command object.

Examination Scheme:

Components	CT	HA	Q	C	A	EE
Weightage (%)	10	5	5	5	5	70

C - Case Discussion/ Presentation; HA - Home Assignment; P - Project; S - Seminar; V - Viva; Q - Quiz; CT - Class Test; A - Attendance; EE - End Semester Examination

Text & References:

Text:

- Joline Morrison, Mike Morrison: Database Driven Web Sites, Second Edition - Thomson.

References:

- BhanuPratap: Understanding Active Server Pages – Cyber Tech Publication
- Patrick Carey: New Perspective on HTML, XHTML, and Dynamic HTML, Comprehensive, Third Edition - Thomson
- Keith Morneau, Jill Batistick: Active Server Pages – Thomson

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INTELLECTUAL PROPERTY RIGHTS

Course Code: MGT2614

Credit Units: 03

Course Objective:

The objective of this course is to acquaint the students with basics of intellectual property rights with special reference to Indian law and practice.

Course Contents:

Module I: Introduction

Types of Intellectual Property Rights, Inventions vs. Discoveries, Conventions .

Module II: Copyright

Nature and Meaning, Scope of protection, Procedure for protection, Enforcement and Remedies.

Module III: Patents

Nature and Meaning, Scope of protection, Procedure for protection, Enforcement and Remedies .

Module IV: Trademarks

Nature and Meaning, Scope of protection, Procedure for protection, Enforcement and Remedies .

Module V: Designs

Nature and Meaning, Scope of protection, Procedure for protection, Enforcement and Remedies.

Module VI: Current Scenario:

Role of WTO and essential elements under TRIPS.

Examination Scheme:

Components	CT	HA	C	V	A	EE
Weightage (%)	10	5	5	5	5	70

C - Case Discussion/ Presentation; **HA** - Home Assignment; **P** - Project; **S** - Seminar; **V** - Viva; **Q** - Quiz; **CT** - Class Test; **A** - Attendance; **EE** - End Semester Examination

Text & References:


Compulsory Readings (Latest editions only)

Text:

- Paris Convention for the Protection of Industrial Property, 1883
- Berne Convention for the Protection of Literary and Artistic Works, 1886
- Indian Copyright Act, 1957
- Indian Patents Act, 1970
- Agreement on Trade-Related Aspects of Intellectual Property Rights, 1994 (the TRIPS Agreement)
- Indian Trademarks Act, 1999
- Indian Designs Act, 2000
- Patents Amendment Ordinance, 2004.

References:

- Nair and Kumar, eds., Intellectual Property Rights (N. Delhi: Allied, 1994)
- Narayanan, P., Patent Law, Kolkata: Eastern Law House, 1998)


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HUMAN RIGHTS

Course Code: MGT2615

Credit Units: 03

Course objective:

The objective of this course is to lay the foundation of the Human Rights Law and acquaint the students with basic human rights institutions.

Course Contents:

Module I: Introduction

Concept & Development of Human Rights.

Module II: UN Charter and Human Rights

Contribution of United Nations in the Development & Implementation of Human Rights, Universal Declaration of Human Rights, International Covenants

Module III: Human Rights and the Indian Constitution

Fundamental Rights & Directive principles of State Policy.

Module IV: Protection of Human Rights Act 1993

Meaning & scope, Nature of Human Rights violations Role of National Human Rights Commission.

Module V: Group Rights

Rights of Marginalised Groups

Women

Children

Refugees

Refugees

Prisoners

Disabled

Module VI: Protection of Human Rights

Role of National Human Rights Commission, role of NGO's, the role of Judiciary, Recent developments in Human Rights.

Examination Scheme:

Components	CT	HA	C	V	A	EE
Weightage (%)	10	5	5	5	5	70

C - Case Discussion/ Presentation; **HA** - Home Assignment; **P** - Project; **S** - Seminar; **V** - Viva; **Q** - Quiz; **CT** - Class Test; **A** - Attendance; **EE** - End Semester Examination

Text & References:

Text: (Compulsory Readings)

- UN Charter
- Constitution of India
- Human Rights Act 1993
- Sinha, M.K. – Implementation of Non-Derogation Human Rights (Delhi 1999)

References:

- D.D. Basu – Human Rights
- UpenderBaxi – Human Rights
- Thomas Buergenthal – Human Rights
- Henry Steiner & Philip Alston – International Human Rights Law
- B.G. Ramcharan – International Human Rights (Oxford, 1998)
- Y.K. Tyagi – British Yearbook (2001).

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ECONOMICS

Programme Structure

Course Code	Course Title	Lecture (L) Hours Per Week	Tutorial (T) Hours Per Week	Practical (P) Hours Per Week	Total Credits
ECO2151	Micro Economics-I	3	-	-	3
ECO2251	Indian Economy	3	-	-	3
ECO2351	Macro Economics-I	3	-	-	3
ECO2451	Public Finance	3	-	-	3
ECO2552	Statistical Methods in Economics	3	-	-	3
ECO2651	Money, Banking & Financial Markets	3	-	-	3
	TOTAL				18



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ECONOMICS

Syllabus - Semester First

MICRO ECONOMICS-I

Course Code: ECO2151

Credit Units: 03

Course Objective:

This course is designed to expose first –year students, who may be new to economics, the basic principles of microeconomic theory. The emphasis would be on thinking like an economists & the course will illustrate how microeconomic concepts can be applied to analyze real life situations.

Course Contents:

Module I: Exploring the Subject Matter of Economics

Why study economics? The scope and method of economics; scarcity and choice; questions of what, how and for whom to produce and how to distribute output

Module II: Supply and Demand: How Markets Work, Markets and Welfare

Individual demand and supply schedules and the derivation of market demand and supply; shifts in demand and supply curves; the role prices in resource allocation; Elasticity of Demand — price, income and cross; Consumer's surplus

Module III: Consumer's Behavior

Utility-cardinal and ordinal approaches, Indifference curves; budget constraints;. Consumer's equilibrium (Hicks and Slutsky); Giffin goods; Compensated demand; Revealed preference theory; Engel curve.

Module IV: Theory of Production and Costs:

Technology, Isoquants, production with one and more variable inputs, Returns to scale, short run and long run costs, cost curves in the short run and long run, total, average, and marginal product, cost minimization and expansion path, elasticity of substitution.

Examination Scheme:

Components	A	P	HA	CT	EE
Weight age (%)	5	10	5	10	70

(A-Attendance; P-Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination)

Text & References:

Text:

- C. Snyder and W. Nicholson, Fundamentals of Microeconomics, Cengage Learning (India), 2010.
- B. Douglas Bernheim and Michael D. Whinston, Microeconomics, Tata McGraw-Hill (India), 2009
- Ahuja H.L. (2010) Principles of Microeconomics, 18th Edition, S. Chand & Co. Ltd.
- Robert S. Pindyck and D.L. Rubinfeld, (2000), Microeconomics, 3rd edition, Prentice Hall India.

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- Ferguson & Gould (1989) Micro Economic Theory, 6th edition, all India Traveller Bookseller.
- Koutsoyiannis, A. (1990), Modern Microeconomics, Macmillan

References:

- N. Gregory Mankiw (2007), Economics: Principles and Applications, 4th edition, India edition by South-Western, a part of Cengage Learning, Cengage Learning India Private



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Syllabus - Semester Second

INDIAN ECONOMY

Course Code: ECO2251

Credit Units: 03

Course Objective:

This subject covers the major features of Indian Economy at Independence in the field of agriculture industry and other infrastructure of the economy. It also deals with growth of development of different phases on the current issues in Indian economy policy.

Course Contents:

Module I: Economic Development at the time of Independence

Major features of the economy at independence: Colonial economy; Semi-feudal economy; Backward economy; Stagnant economy

Module II: Planning in India

Objectives; Strategy; Broad achievements and failures; Current Five Year Plan — objectives, allocation and targets; New economic reforms — Liberalization, privatization and globalization; Rationale behind economic reforms; Progress of privatization and globalization

Module III: Major Economic Issues

Demographic trends and issues; education; poverty and inequality; unemployment, inflation

Module IV: External Sector

Role of foreign trade; Trends in exports and imports; Composition and direction of India's foreign trade; Balance of payments crisis; Export promotion measures and the new trade policies

Module V: Agriculture

Nature and importance; Trends in agricultural production and productivity; Factors determining productivity; Land Reforms; New agricultural strategy and green revolution


Module VI: Industry

Industrial development during the planning period; Industrial policy of 1991 and the latest Industrial policy; Growth and problems of small scale industries; Role of public sector enterprises in India's industrialization

Examination Scheme:

Components	A	P	HA	CT	EE
Weightage (%)	5	10	5	10	70

(A-Attendance; P-Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination)


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Text & References:

Text:

- RuddarDutt and K.P.M Sundaram(2012) Indian Economy, S.Chand& Co. Ltd, Delhi
- Mishra &Puri(2005) Indian Economy, Himalayan Publishing House, Bombay
- V.M. Dandekar (1992), Forty Years after Independence in B. Jalan (ed.), The Indian Economy, Problems and Prospects, Viking Press.

References:

- Sebastian Morris (2001), Issues in Infrastructure Development Today: The Interlinkages, in India Infrastructure Report, OUP
- MontekAhluwalia, (2002), State level Performance under Economic Reforms in India, in A.O. Krueger(ed), Economic Policy Reforms and the Indian Economy, Univ. of Chicago Press.
- PranabBardhan(2003), Poverty, Agrarian Structure and Political Economy in India: Selected Essay, OUP, CH.5.
- JagdishBhagwati, (1993), India in Tansition, Freeing the Economy, Clarendon Press, Ch. 2.
- J. Bhagwati and Padma Desai (1970), India: Planning for Industrialization, Ch 2 OUP.
- S. Chakravarty (1987), Development Planning: The Indian Experience, Clarendon Press.
- Jean Dreze and AmartyaSen (2002), India: Development and Participation, OUP, Chs. 2, 3,5,6,9.
- B.S. Minhas (1991), Public vs Private sectors: Neglect of Lessons of Economics in Indian Policy Formulation, R.R. Kale Lecture, Gokhale Institute of Politics & Economics, Pune.
- MihirRakshit (2001), On Correcting Fiscal Imbalances In the Indian Economy: Some Perspectives
- Government of India, Economic Survey(annual) New Delhi
- Reserve Bank of India, Handbook of statistics of Indian Economy(Annual)



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Syllabus - Semester Third

MACRO ECONOMICS-I

Course Code: ECO2351

Credit Units: 03

Course Objective:

This course aims at introducing the fundamentals of Macroeconomic theories, policies and models in a historical perspective. It will enable the students to develop a critical insight on Classical and Keynesian macroeconomic models, to understand the relationship between inflation and employment by providing exposure to the constructions of Friedman, Phelps & Phillips.

Course Contents:

Module I: Introduction to Macroeconomics

The roots of macroeconomics, macroeconomic concerns, the role of government in the macro economy, the components of the macro economy, the methodology of macroeconomics

Module II: Introduction to National Income Accounting

Concepts of GDP and national income, approaches to calculating GDP, GDP and personal income, Nominal and real GDP, Limitations of the GDP concept.

Module III: Schools of Macroeconomic Thoughts

Classical, Neo Classical and Keynesian Models.; Say's Law of Markets and Classical Theory of Employment

Module IV: Keynesian Model

Keynes theory of income and employment; Consumption function; theory of investment-marginal efficiency of capital; saving and investment; The Investment Multiplier and its application to LDC's

Module V: Money in the Modern Economy

Theories of Demand for Money: Quantity Theory and Keynes approach; Characteristics of a monetary economy; the supply of money and overall liquidity position; credit creation

Module VI: Inflation

Inflation: types, causes, consequences and impact on the Indian economy; remedial measures.

Examination Scheme:

Components	A	P	HA	CT	EE
Weightage (%)	5	10	5	10	70

(A-Attendance; P-Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination)



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Text & References:

Text:

- Dornbusch, Fischer and Startz, Macroeconomics, McGraw Hill, 11th edition, 2010 Ahuja H.I. (2010) Macroeconomics: Theory and Policy, S. Chand & Co. Ltd.
- Mc Connell. C.R & H.C. Gupta, "Introduction to Macro Economics", Tata McGraw Hill, Delhi
- Gardner Ackeley, "Macro Economics".

References:

- J.E. Stiglitz, and C.E. Walsh (2002), Principles of Economics, 3rd Edition, W.W. Norton & Company, New York.
- R. Stone and G. Stone (1977), National Income and Expenditure, 10th edition, Bowes and Bowes London.
- K.K. Dewett: Modern Economic Theory, New Delhi, Shyamlal Charitable Trust.



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Syllabus - Semester Fourth

PUBLIC FINANCE

Course Code: ECO2451

Credit Units: 03

Course Objective:

This subject is primarily aimed at introducing principles of public finance, role of different governments, public expenditure, taxation, budget and fiscal policy in India. The government plays different roles and performs varied functions which are different from earlier societies. In this context the public financial functions of the government need to be understood by a student, by studying the relevant theory and empirical analysis.

Course Contents:

Module I: Introduction

Nature, Scope and Importance, Theory of Maximum Social Advantage, Private goods, Public goods and Merit goods; Role of government in managing the economy under different economic systems – Social Welfare Function; Theory of Public goods - Market failure - Externalities - problems in allocation of resources - theoretical developments in Demand revelation for social goods -Public choice.

Module II: Public Expenditure

Theories of Public Expenditure -Structure and growth of public expenditure - Criteria for public investment - Income Redistribution – Expenditure Programmes for the poor - Social Insurance: Unemployment Insurance, Health Care, and Education - Social cost-benefit analysis - benefit estimation and evaluation.

Module III: Taxation

Theory of Taxation - Benefit and ability-to-pay approaches - Indian Direct and Indirect Taxes - Effects of taxation - Requirements of a sound tax system - Canons of taxation - Tax reforms since 1975 - Chelliah Committee Report - Evaluation of Tax Reforms -Taxation Incidence and alternative concepts of Incidence.

Module IV Budgeting and Debt

Budget - Concept of PPB - Zero-based Budgeting - Cash budgeting : Cash management and Treasury functions in Government - Deficit Budgeting - Types of Deficits - Public Debt: Trends and composition of Indian Public Debt: Instruments - Treasury bills, bonds and other securities, Role of RBI - Debt management - Methods of debt redemption.

Module V: Fiscal Policy

Role of Fiscal Policy in India - Principles of Fiscal federalism in India; Finance Commissions and Planning Commission



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Examination Scheme:

Components	A	P	HA	CT	EE
Weightage (%)	5	10	5	10	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination)

Text & References:**Text:**

- Musgrave, R.A. and P.B. Musgrave (1976), Public Finance in Theory and Practice, 3rd edition, McGraw- Hill Kogakusha, Tokyo.
- RaghbendraJha : (1998), Modern Public Economics.
- Rosen, Harway, S. - Public Finance, IVthEdn. Irwin.

References:

- Mueller, D.C. (1979), Public Choice, Cambridge University Press, Cambridge.
- Brown, C.V. and Jackson - Public Sector Economics
- Raja J. Chellia et al. - Trends in Federal Finance.
- D.N. Dwivedi, Readings in India Public finance
- Government of India, Report of the 13th Finance Commission.
- Economic Survey, Government of India (latest).
- State Finances: A Study of Budgets, Reserve Bank of India (latest).



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Syllabus - Semester Fifth

STATISTICAL METHODS IN ECONOMICS

Course Code: ECO2552

Credit Units: 03

Course Objective:

This subject will deal with all fundamental statistical methods of tools which the students have to use in economic analysis and decision making problems.

Course Contents:

Module I: Introduction:

Basic concepts: Population, Sample, Parameter, Statistic, Frequency distribution, Cumulative frequency distribution; Graphic and diagrammatic representation of data; Techniques of data collection. Sampling vs. Population, primary and secondary data.

Module II: Central Tendency and Dispersion:

Measures of Central Tendency: Mean, Median, Mode, Geometric mean, Harmonic mean; Measures of Dispersion; Range, Quartile deviation Mean deviation, Standard deviation; Skewness and Kurtosis, Moments.

Module III: Correlation and Regression:

Correlation: Simple; Coefficient of correlation; Karl Pearson and Rank correlation; Partial and Multiple Correlation analysis; Regression analysis – Estimation of a regression line in a bivariate distribution, Least squares method; Interpretation of correlation and regression coefficients; Coefficient of determination.

Module IV: Time Series:

Time Series Analysis - concept and components, determination of trend (Linear, Quadratic and Exponential) and seasonal indices

Module V: Index Numbers

Concept of an index number; Laspeyer's, Paasche's and Fisher's Index Numbers; Time Reversal, Factor reversal and circular tests; Chain base index; Problems in the Construction of an index number; splicing; base shifting and use of index number for deflating other series.

Examination Scheme:

Components	A	P	HA	CT	EE
Weightage (%)	5	10	5	10	70

(A-Attendance; P-Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination)



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Text & References:

Text:

- Allen Webster, Applied Statistics for Business and Economics, (3rd edition), McGraw Hill, International Edition 1998.
- Richard J. Larsen and Morris L. Marx, An Introduction to Mathematical Statistics and its Applications, Prentice Hall, 2011.

References:

- P.H. Karmel and M. Polasek, Applied Statistics for Economists (4th edition), Pitman, Australia.
- M.R. Spiegel (2nd edition), Theory and Problems of Statistics, Schaum Series.



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Syllabus - Semester Sixth

MONEY, BANKING AND FINANCIAL MARKETS

Course Code: ECO2651

Credit Units: 03

Course Objective:

The main objective of the course is to impart knowledge about the concept of money, financial markets, financial instruments & banking industry; The concepts like estimation of demand for & Supply of money, financial deepening etc. will also be introduced.

Course Contents:

Module I: Money in the Financial System

Role of money in the economy - various schools of economic thought. Functions of money, financial markets, financial instruments and financial deepening;

Module II :Financial Markets

Structure of Money and Capital market in India. Monetary and Financial sector reforms in India. Concept of risk and return ; management of risk and return, Optimal Portfolio, Financial Innovations.

Module III: Interest Rates

Theories of Interest, Determination and Interest rates differentials, Structure of interest rates in India. Theories of term structure of interest rates.

Module IV: Banking System

Introduction to the Banking system, Role and functions of commercial banks, Balance sheet and Portfolio Management, Indian Banking system –Changing role and structure, Banking Regulations, Banking sector reforms in India.

Module V: Central Banking and Monetary Policy

Functions of Central Banking, Various measures of money supply, Reserve Money .Goals, Targets, Instruments of Monetary Control, Monetary Policy Transmission mechanism, Monetary- management in an open economy, current monetary policy of India.

Examination Scheme:

Components	A	P	HA	CT	EE
Weightage(%)	5	10	5	10	70

(A-Attendance; P-Project/Seminar/Quiz/Viva;HA-Home Assignment;CT-Class Test;EE-End Semester Examination)



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ENTREPRENEURSHIP

Programme Structure

Course Code	Course Title	Lecture (L) Hours /Week	Tutorial (T) Hours /Week	Practical (P) Hours/Week	Total Credits
MGT2152	Orientation Programme in Entrepreneurship	2	-	2	3
MGT2252	Exploring Business Opportunity	2	-	2	3
MGT2352	Developing a Business Model	2	-	2	3
MGT2452	Translating Business Model into Startup	2	-	2	3
MGT2552	Advanced Programme in Entrepreneurship: Growth	2	-	2	3
MGT2652	Advanced Programme in Entrepreneurship: Expansion	2	-	2	3
	TOTAL				18



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ENTREPRENEURSHIP

Syllabus - Semester First

ORIENTATION PROGRAMME IN ENTREPRENEURSHIP

Course Code: MGT2152

Credit Units: 03

Course Overview

The goals of this programme are to inspire students and help them imbibe an entrepreneurial mind-set. The students will learn what entrepreneurship is and how it has impacted the world and their country. They will be introduced to key traits and the DNA of an entrepreneur, and be given an opportunity to assess their own strengths and identify gaps that need to be addressed to become a successful entrepreneur.

The programme comprises several short courses, each focusing on a specific entrepreneurial knowledge or skill requirement such as creative thinking, communication, risk taking, and resilience and helping them become career ready, whether it is entrepreneurship or any other career.

Course Contents:

Module-I: Introduction to Entrepreneurship

Meaning and concept of entrepreneurship, the history of entrepreneurship development, role of entrepreneurship in economic development, Myths about entrepreneurs, agencies in entrepreneurship management and future of entrepreneurship types of entrepreneurs.

Module-II: The Entrepreneur

Why to become entrepreneur, the skills/ traits required to be an entrepreneur, Creative and Design Thinking, the entrepreneurial decision process, skill gap analysis, and role models, mentors and support system, entrepreneurial success stories.

Module-III: E-Cell

Meaning and concept of E-cells, advantages to join E-cell, significance of E-cell, various activities conducted by E-cell

Module-IV: Communication

Importance of communication, barriers and gateways to communication, listening to people, the power of talk, personal selling, risk taking & resilience, negotiation.

Module-V: Introduction to various form of business organization (sole proprietorship, partnership, corporations, Limited Liability company), mission, vision and strategy formulation.

Examination Scheme:

Components	CT	HA	C	V	A	EE
Weightage (%)	10	5	5	5	5	70

(C - Case Discussion/ Presentation; HA - Home Assignment; V - Viva; CT- Class Test; A - Attendance; EE - End Semester Examination)

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Learning Outcomes

At the end of the course, the students will:

- Develop awareness about entrepreneurship and successful entrepreneurs.
- Develop an entrepreneurial mind-set by learning key skills such as design, personal selling, and communication.
- Understand the DNA of an entrepreneur and assess their strengths and weaknesses from an entrepreneurial perspective.

Learning Methods

Videos and quizzes through the on-line Learning Management System (LMS); Classroom learning through an experienced Facilitator/Faculty on campus (Videos, In-class Activities, Outbound Activities); Assignments and Projects; and Practical Experiences including challenges, internships and apprenticeships.



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Syllabus - Semester Second

EXPLORING BUSINESS OPPORTUNITY

Course Code: MGT2252

Credit Units: 03

Course Overview

The goal of this programme is to provide a space and platform for discovery, both self discovery and opportunity discovery. Students will discover their strengths in terms of an entrepreneurial founding team and learn basics such as opportunity discovery, prototyping, competition analysis, and early customer insights and participate in on-line and campus activities and events such as idea competitions, business plan challenges, etc.

Course Contents:

Module-I: Self-Discovery

Natural born entrepreneur, the reluctant entrepreneur, the hidden traits, discovers your own strength.

Module-II: Idea Generation

Sources of business ideas, how to find & assess ideas? Where to find data for ideation? What is a good problem? Opportunity recognition.

Module-III: Idea Evaluation

Design thinking for finding solutions, prototyping, idea evaluation, entrepreneurial Outlook, value proposition design, customer insight, ideas development, capstone project presentation.

Module-IV: Feasibility Analysis

Product/Service Feasibility Analysis, Industry & competition analysis, environment analysis, financial feasibility analysis.

Examination Scheme:

Components	CT	HA	C	V	A	EE
Weightage (%)	10	5	5	5	5	70

(C - Case Discussion/ Presentation; HA - Home Assignment; V - Viva; CT- Class Test; A - Attendance; EE - End Semester Examination)

Learning Outcomes

At the end of the course, the students will be able to:

- Further discover their strengths and weaknesses in terms of qualities and traits required to be a successful entrepreneur in the context of a founding team.
- Identify gaps in terms of qualities and traits required to be an entrepreneur, if any, and make a personal action plan to close those gaps.
- Develop the entrepreneurial mind-set further in terms of acquiring a business focus, creative thinking, risk-taking ability, and more.
- Learn about opportunity discovery and evaluation of viable business ideas for new venture creation.


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- Practice critical talents and traits required for entrepreneurs such as problem solving, creativity, communication, business math, sales, and negotiation.
- Start customer development, validate their ideas, and learn what prototyping is.
- Understand the value of mentorship in the success of an entrepreneur and their ventures.

Learning Methods

Videos and quizzes through the on-line Learning Management System (LMS); Classroom learning through an experienced Facilitator/Faculty on campus (Videos, In-class Activities, Outbound Activities); Assignments and Projects; and Practical Experiences including challenges, internships and apprenticeships.



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Syllabus - Semester Third

DEVELOPING A BUSINESS MODEL

Course Code: MGT2352

Credit Units: 03

Course Overview

The goal of this program is to take the students from the MVP (Minimum Viable Product) stage to the Business Model stage, i.e. the students will acquire the skills required to transform their MVP into a business model. In this course, they will start building their teams by finding co-founders and perhaps even hiring. They will transform their business idea into the Business Model Canvas and will use it to further refine their MVP. They will also set up a digital presence and learn to use promotional channels and distribution channels to engage and serve their customers. Additionally, they will get started with various legal and operational aspects as well as initial funding concepts such as bootstrapping.

Course Contents:

Module-I: Team

Finding your team, art of team formation, teamwork planning, chief mentor/ founder & Co founders, team formation, and delegation of work.

Module-II: Preparation of Business model/Plan

Meaning and significance of a business plan, components of a business plan, and feasibility study, Iterating the MVP, Digital Presence for Ventures, Clarifying the value proposition, Guidelines for writing BP, pre-requisites from the perspective of investor.

Module-III: Business Model

The importance and diversity of business model, how business model emerge, potential fatal flaws of business models, components of an effective business model, core strategy, strategic resources, partnership network, customer interface.

Module-IV: Product/ Market Fit

Understanding basics of unit economics, cost and profitability, Refining the product/service, Establish the success and operational matrix, Starting Operations.

Customer Validation: Evaluate the efficiency with which customers can be captured and kept, Early insights on cost of customer acquisition, Other Stakeholder Validation, Customer Development and Experience.

Examination Scheme:

Components	CT	HA	C	V	A	EE
Weightage (%)	10	5	5	5	5	70

(C - Case Discussion/ Presentation; HA - Home Assignment; V - Viva; CT- Class Test; A - Attendance; EE - End Semester Examination)


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Learning Outcomes

At the end of this course, the students will be able to:

- Acquire the skills and knowledge related to the various phases in venture creation process such as creating a business model and building a prototype.
- Practice entrepreneurship by forming and running a Campus Venture as part of a team.

Learning Methods

Videos and quizzes through the on-line Learning Management System (LMS); Classroom learning through an experienced Facilitator/Faculty on campus (Videos, In-class Activities, Outbound Activities); Assignments and Projects; and Practical Experiences including challenges, internships and apprenticeships.



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Syllabus - Semester Fourth

TRANSLATING BUSINESS MODEL INTO STARTUP

Course Code: MGT2452

Credit Units: 03

Course Overview

The students who are keen to launch their own venture will take this course. Students will select a vertical and launch their own venture. They will learn about market size, costs, channels and customer acquisition, business model and plan finalization, efficiency and growth processes.

Course Contents:

Module-I: Gaining marketing Intelligence

Identify the vertical you will operate in and the business opportunity, understand your customers and accurately assess market opportunity, minimum viable product and the lean method.

Module-II: Develop and validate business model for your venture

Value Proposition, Customer Segments, Channels and Partners, Revenue Model and Streams, Key Resources, Activities, and Costs Customer Relationships and Customer.

Module-III: Development Processes

Translate Business Model into a Business Plan, Visioning for venture, Take product or service to market, Deliver an investor pitch to a panel of investors, Identify possible sources of funding for your venture – customers, friends and family, Angels, VCs, Bank Loans and key elements of raising money for a new venture.

Module-IV: Business Plan & Startup-I

Get to market Plan, Effective ways of marketing for start-ups – Digital and Viral Marketing; Hire and Manage a Team, Managing start-up finance: The Concept of Costs, Profits, and Losses, Manage your Cash Flow, analyse your Financial Performance, budgeting.

Module-V: Business Plan & Startup-II

Establishing a ethical culture for a firm, Legal and regulatory aspects for starting up specific to your venture, Enhancing the growth process and creating scalability (customers, market share, and/or sales), Thorough understanding of market size, costs, margins, delivery channels, customer acquisition costs, Identify areas to build efficiency (product making, service delivery, and channels - key areas of the BM Canvas are identified by now), Finalize business model and plan, Have a 1-2 year roadmap and trajectory.

Module-VI: Obtaining Business Licenses and permits

Business Licenses, business permits, choosing a form of business organization, sole proprietorship, partnership, corporations, Limited Liability company.

Examination Scheme:

Components	CT	HA	C	V	A	EE
Weightage (%)	10	5	5	5	5	70

(C - Case Discussion/ Presentation; HA - Home Assignment; V - Viva; CT- Class Test; A - Attendance; EE - End Semester Examination)

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Learning Outcomes

At the end of the course, the students will be able to:

- Launch a sustainable venture with a valid business model, with co-founder(s) on or off campus, and real paying customers.
- Create and validate a business model and business plan for their idea.
- Develop the Minimum Viable Product (MVP).
- Implement an inexpensive and optimum Go-to-Market plan for their business.
- Craft and present an effective business pitch for investors, partners and other stakeholders.
- Gain in-depth knowledge and relevant skills about a specific vertical.
- Students build a prototype or service, generate jobs and revenue.

Learning Methods

Videos and quizzes through the on-line Learning Management System (LMS); Classroom learning through an experienced Facilitator/Faculty on campus (Videos, In-class Activities, Outbound Activities); Assignments and Projects including Student Venture; and Practical Experiences including challenges, internships and apprenticeships.



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Syllabus - Semester Fifth

ADVANCED PROGRAMME IN ENTREPRENEURSHIP: GROWTH

Course Code: MGT2552

Credit Units: 03

Course Overview

The students who already have their own venture will take this course to focus on a growth agenda. They will learn advanced concepts and build sustainability in their venture in various ways such as Growth Financing, process refinement, and scalability.

Course Contents:

Module-I: Growth Opportunities

Characteristics of high growth new ventures, strategies for growth, and building the new venture capital, discovering and assessing opportunities for growth, developing a growth mind-set and visioning for growth, review the robustness and relevance of business model vis-à-vis current market situation, map financing decisions to business models and reiterating business models

Module-II: Retention & Expansion Strategies

Dealing with stagnation of customer base and developing customer base: expansion to new markets – options and strategies, product Life Cycle – Product Road Map; Getting to Plan B, *project to Process*: Build, adapt, test, and establish key processes and systems that enable efficiency, continuous and sustained innovation

Module-III: Developing the organizational capabilities for growth

Develop strong leadership capabilities, ability to delegate and manage key leadership tasks. o Streamline operations and organizational design to accommodate growth, Implement new and effective approaches to marketing and communication for customers, suppliers, and employees, Acquire new resources for strategic growth: executive hires.

Module-IV: Planning and streamlining financial/ Legal processes:

Managing cash for growth, Balance between profitability and growth costs, Role of business services – accountant, lawyer, Understanding legal requirements, and compliance issues, Exit options :Evaluating opportunities for acquisition; Growth financing, Scalability & efficiency improvements, IPR.

Examination Scheme:

Components	CT	HA	C	V	A	EE
Weightage (%)	10	5	5	5	5	70

(C - Case Discussion/ Presentation; HA - Home Assignment; V - Viva; CT- Class Test; A - Attendance; EE - End Semester Examination)

Learning Outcomes

At the end of the course, the students will be able to:

- Manage and grow their business in terms of jobs and revenue.
- Make a Growth Plan and pitch it to all stakeholders (investors, partners, key employees etc.).
- Sign up for advanced support for entrepreneurs – Mentor Platform.
- Identify key drivers of growth in a venture.

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- Develop a growth mind-set.
- Understand the basics of organization and team building; and establishing policies to hire and retain staff.
- Understanding legal and compliance issues related to their business.
- Present a pitch for funding their growth plan.

Learning Methods

Videos and quizzes through the on-line Learning Management System (LMS); Classroom learning through an experienced Facilitator/Faculty on campus (Videos, In-class Activities, Outbound Activities); Assignments and Projects; and Practical Experiences including challenges, internships and apprenticeships.



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Syllabus - Semester Sixth

ADVANCED PROGRAMME IN ENTREPRENEURSHIP: EXPANSION

Course Code: MGT2652

Credit Units: 03

Course Overview

The students who have a sustainable venture will get ready for the expansion phase. They will focus on expansion and go on the path of creating a high-performance company. They will learn advanced concepts such as franchising, renewal, and profit maximization.

Audience

This course will be offered to all the students who have gone through Advanced Programme in Entrepreneurship. It is suitable for students, keen to continue to grow their ventures. Ideally, they will have a reasonable understanding of growth challenges and how to tackle them and would seek to expand further through inputs from this course.

Course Contents:

Module-I: Expansion model – Geographical/Franchising/Licensing routes to new market expansion

Module-II: Maximizing Profits- Testing price elasticity, Cost reduction through scaling up, Expanding offerings, other revenue streams (partnerships)

Module-III: Renewal - Similar to Take-off and Resource Maturity of SMEs

Module-IV: Harvesting Rewards- Exit strategies for entrepreneurs, bankruptcy, and succession and harvesting strategy

Examination Scheme:

Components	CT	HA	C	V	A	EE
Weightage (%)	10	5	5	5	5	70

(C - Case Discussion/ Presentation; HA - Home Assignment; V - Viva; CT- Class Test; A - Attendance; EE - End Semester Examination)

Learning Outcomes

At the end of the course, the students will be able to:

- Effectively tackle growth challenges of their venture.
- Nurture and apply a growth mind-set.
- Continue refining their business model.
- Draw an expansion plan for their venture.
- Scale up their business.
- HR policies, How to attract and retain key management team.
- Focus on revenue maximization.
- Build key aspects of adaptation and sustainability.
- Manage and grow their business in terms of expansion and look for partnerships.


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Learning Methods

Videos and quizzes through the on-line Learning Management System (LMS); Classroom learning through an experienced Facilitator/Faculty on campus (Videos, In-class Activities, Outbound Activities); Assignments and Projects; and Practical Experiences including challenges, internships and apprenticeships.

PRACTICUM PROGRAMMES

- Practicum programmes enable real-world experiences that empower students to explore and strengthen their entrepreneurial abilities. Students join E-cells in the first year, build their skills through a series of activities, and practice by starting campus companies as they move forward.
- The Practicum Approach motivates and nurtures entrepreneurial development through hands-on work at the E-Cells. By managing operations of E-cells, interacting with entrepreneurs, organizing workshops, enabling start-up internships, and running campus companies, students apply learnings to real world situations and challenges. Additionally, all E-Cells participate in entrepreneurship events through the year.
- The Practicum Programme is designed to cater the learning needs of new (basic) students and advanced students in the entrepreneurship learning curve.
- A bouquet of 16 activities, 8 per category will be offered both for the Basic and Advanced students. In addition to two hands-on Programs.
- Additionally, a select number of students from each institute will be trained as leaders. These E-leaders manage the E-cells and run the Practicum activities along with the designated faculty.
- The structure of the Programme is provided in the below table.

Text & References:

- Ramachandran , Entrepreneurship Development, Mc Graw Hill
- Katz , Entrepreneurship Small Business, Mc Graw Hill
- Byrd Megginson,,Small Business Management An Entrepreneur's Guidebook 7th ed, McGraw-Hill
- Fayolle A (2007) Entrepreneurship and new value creation. Cambridge, Cambridge University Press
- Hougard S. (2005) The business idea. Berlin, Springer
- Lowe R & S Mariott (2006) Enterprise: Entrepreneurship & Innovation. Burlington, ButterworthHeinemann
- Léo-Paul Dana ,World Encyclopedia of Entrepreneurship, , Edward Elgar



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Master of Arts Economics

COMPUTER APPLICATION IN ECONOMIC ANALYSIS

Course Code: ECO4103

Credit Unit: 03

Course Objective:

The objective of the course is to demonstrate knowledge of the computer applications in economic analysis and be able to choose the appropriate application for a given task.

Course Content:

Module 1: Computers and Peripherals

Basic components of computer – CPU, input-output devices, keyboard, mouse and scanner, Video display, printers and plotters, data storage and retrieval, hard disk, floppy disk and CD ROM; Types of computers and their applications; Computer networking and resource sharing, Hardware and software - Operating system.

Module 2: Data Processing, Techniques and Algorithms

Concept of data, record and file; Types of data and data structures, data analysis; File handling and, appending and cascading, closing and attribute control; Data storage and retrieval; Data operations; Algorithms like sorting, merging, joining and bifurcation; Database concepts and operation on database; DBMS and RDBMS. Introduction to MS Excel and MS Access

Module 3: Software-based Analysis

SPSS/STATISTICA: A package for Statistical Analysis in Social Sciences. Basic Operations; File, Edit, View, Data, Transformation, Graph and Utilities. Statistical Analysis using SPSS/STATISTICA: Summary, Tabulation and Comparison of Summary Statistics; Correlation and Regression (Linear and Non-linear) using SPSS/STATISTICA; Discriminant analysis, Principal Components, Factor Analysis and Cluster analysis by SPSS/STATISTICA; Use of MATLAB.

Module 4: IT Application to Economics

On line banking; ATM's Electronic stock exchange; Electronic trading; Data sharing and dissemination; Electronic transaction; Document delivery; Authentication and validation transaction processing – Electronic trading and marketing; On line shopping and malls, B2B, B2C, models, Document and transaction security and digital signature; Integrated transaction on mobile platforms. E-Commerce applications in India

Examination Scheme:

Components	P0(Att.)	P1	C1	CT	EE
Weightage (%)	5	5	5	15	70

Text & References:


Text:

- Krishnamurthy and Sen :Computer-Based Numerical Algorithms, Affiliated East-West Press, ND
- Lipschultz, M.M. and S. Lipschultz (1982): Theory and Problems of Data Processing, Schaum's Outline Series, McGraw Hill, NY.
- Mishra, S.K. and J.C. Binwal (1991): Computer Applications in Social Science Research, Vikas, Delhi.
- Rajaraman, V. (1996): Fundamental of Computers, Prentice Hall, ND.

- Sanders, D.H. (1988): Computer Today, McGraw Hill (3e), NY.
- Sinha, P.K. (1992): Computer Fundamentals, BPB Publications, ND

References:

- Kim, J. and C.W. Muller (1989): Factor Analysis: Statistical Methods and Practical Issues, Sage, ND.
- Kuester, J.L. and J.H. Mize (1973): Optimization Techniques with FORTRAN IV, McGraw Hill, NY.
- Nie, N.H. (1970): SPSS – Statistical Package for Social Sciences, McGraw Hill, NY
- Rushton, G., M.F. Goodchild and L.M. Ostresh (1973): Computer Programs for Location-Allocation Problems. Monograph 6, Dept. of Geography, Univ. of Iowa, Iowa
- Sharma, J.K. (1997): Operations Research, Macmillan, Delhi.

INDIAN ECONOMY-ISSUES & POLICY

Course Code: ECO4105

Credit Unit: 04

Course Objective:

The objective of this course is to provide to students the basic knowledge of the structure of Indian Economy and its current developments.

Course Contents

Module I: Growth and Structure of Indian Economy Since 1950

Growth of Indian economy since 1950; Measures for raising economic growth; Trends in the nature and magnitude of poverty, inequality and unemployment; Changes in occupational Pattern, Demographic trends and economic development; Rate and trend in saving, Investment and growth rate

Module II: Growth of Agricultural and Industrial Sectors

Trends in agricultural production and productivity; Food policy and Public Distribution System (PDS); Impact of liberalization in agricultural sector; Industrial Growth performance and problems; Industrial concentration; its nature and extent; Cottage and small scale industries; Impact of liberalization and privatization on the Industrial sector

Module III: Money Supply, Inflation and Public Policies

Factors determining interest rates; Money supply and inflation in India; financial sector reforms during 1990's Recent tax reforms; Growth and structure of Subsidies in India; Macro-economic policies – fiscal policy, income policy and Stabilization policy; Parallel economy and its implications

Module IV: International Trade Policies

Composition and directions of India's foreign trade; Factors determining the Balance of payment. Is equilibrium in the balance of payment? Causes, consequences; and policy measure; India's policies towards foreign capital; collaboration, export; Promotion and import substitution. Exchange rate policy and the convertibility of Rupee

Module V: Development Policies

India's planned development; Successes and failures. Policies for social justice (With special reference to the alleviation of poverty, inequality and unemployment) Sectoral policies: Industrial and agrarian. Policies for liberalization and privatization

Examination Scheme:

Components	P0(Att.)	P1	C1	CT	EE
Weight age (%)	5	5	5	15	70

Text & References:

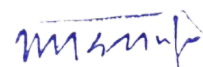
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- Bardhan, P. (1984). The political Economy of Development in India, Oxford University Press, New Delhi.
- Brahmandnda, P. R. and V. R. Panchumkhi, (Eds) (1987). The Development

- Process of the Indian Economy, Himalaya Publishing House, Bombay.
- Dandekar, V. M. & N. Rath. Poverty in India; Indian School of Political Economy, Bombay.
- Datta, Bhabatosh (1977). The Contents of Economic Growth, and other Essay, Research India Publication, Calcutta.
- Rao, V. K. R. V. (1983). India's National Income : 1950-1980, Sage Publications, New Delhi.

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- Kapila, U., (Ed.) (1988). Indian Economy Since Independence, Vol. – I, Academic foundation, New Delhi.
- N. Aggarwal (1995). Indian Economy Problems of Development and Planning, WishwaParkashan, New Delhi.
- Misra S. K. and Puri V. K. (1993). Indian Economy-its Development Experience, Hinday Publishing House.

TERM PAPER/ REVIEW OF DISSERTATION-I

Course Code: ECO4231

Credit Units: 02

GUIDELINES FOR TERM PAPER

A term (or research) paper is primarily a record of intelligent articulation through several sources on a particular topic of a given subject.

The students will choose the topic at the beginning of the session in consultation with the faculty assigned/chosen. The progress of the paper will be monitored regularly by the faculty. At the end of the semester the detailed paper on the topic will be submitted to the faculty assigned/chosen. The evaluation will be done by Board of examiners comprising of the faculties.

The procedure for writing a term paper may consists of the following steps:

Choosing a topic

1. Finding sources of material
2. Collecting the notes
3. Outlining the paper
4. Writing the first draft
5. Editing & preparing the final paper

1. Choosing a Topic

The topic chosen should not be too general. Student will normally consult the faculty guide while finalizing the topic.

2. Finding Sources of material

- The material sources should be not more than 5 years old unless the nature of the paper is such that it involves examining older writings from a historical point of view.
- Begin by making a list of subject-headings under which you might expect the topics to be listed.
- The sources could be books and magazines articles, news stories, periodicals, journals, internet etc.

3. Collecting the notes

Skim through sources, locate the useful material, make notes of it, including quotes and information for footnotes.

- *Get facts, not just opinions.* Compare the facts with author's conclusion(s)/recommendations.
- In research studies, notice the methods and procedures, results & conclusions.
- Check cross references.

4. Outlining the paper

- Review notes to find main sub-divisions of the topic.
- Sort the collected material again under each main division to find sub-sections for outline so that it begins to look more coherent and takes on a definite structure. If it does not, try going back and sorting again for main divisions, to see if another general pattern is possible.

5. Writing the first draft

Write the paper around the outline, being sure that you indicate in the first part of the paper what its purpose is. You may follow the following:

- statement of purpose/objectives
- main body of the paper
- statement of summary and possible conclusion(s)/recommendations

Avoid short, bumpy telegraphic sentences and long straggling sentences with more than one main ideas.

6. Editing & preparing the final paper

- a) Before writing a term paper, you should ensure you have an issue(s) which you attempt to address in your paper and this should be kept in mind throughout the paper. Include only information/ details/ analyses that are relevant to the issue(s) at hand. Sometimes, the relevance of a particular section may be clear to you but not to your readers. To avoid this, ensure that you briefly explain the relevance of every section.
- b) Read the paper to ensure that the language is not awkward, and that it "flows" smoothly.
- c) Check for proper spelling, phrasing and sentence construction.
- d) Check for proper form on footnotes, quotes, and punctuation.
- e) Check to see that quotations serve one of the following purposes:
 - (i) Show evidence of what an author has said.
 - (ii) Avoid misrepresentation through restatement.
 - (iii) Save unnecessary writing when ideas have been well expressed by the original author.
- f) Check for proper form on tables and graphs. Be certain that any table or graph is self-explanatory.

Term papers should be composed of the following sections:

1. Title page
2. Abstract
3. Introduction
4. Review of the Literature
5. Discussion&Conclusion
6. References
7. Appendix

Generally, the introduction, discussion, conclusion and references should account for a third of the paper and the review part should be two thirds of the paper.

Discussion

The discussion section either follows the results or may alternatively be integrated in the results section. The section should consist of a discussion of the results of the study focusing on the question posed in the paper.

Conclusion

The conclusion is often thought of as the easiest part of the paper but should by no means be disregarded. There are a number of key components which should not be omitted. These include:

- a. summary of objectives and issues raised.
- b. summary of findings
- c. summary of limitations of the study at hand
- d. details of possibilities for related future research

References

From the very beginning of the research work, one should be careful to note all details of articles or any other material gathered. The Reference part should list ALL references included in the paper. References not included in the text in any form should NOT be listed here. The key issue here is consistency. Choose a particular convention and stick to this.

The Conventions

Monographs

Crystal, D. (2001), *Language and the internet*. Cambridge: Cambridge University Press.

Edited volumes

Gass, S./Neu, J. (eds.) (1996), *Speech acts across cultures. Challenges to communication in a second language*. Berlin/ NY: Mouton de Gruyter.

[(eds.) is used when there is more than one editor; and (ed.) where there is only one editor. In German the abbreviation used is (Hrsg.) for Herausgeber].

Edited articles

Schmidt, R./Shimura, A./Wang, Z./Jeong, H. (1996), Suggestions to buy: Television commercials from the U.S., Japan, China, and Korea. In: Gass, S./Neu, J. (eds.) (1996), *Speech acts across cultures. Challenges to communication in a second language*. Berlin/ NY: Mouton de Gruyter: 285-316.

Journal articles

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Electronic book

Chandler, D. (1994), *Semiotics for beginners* [HTML document]. Retrieved [5.10.'01] from the World Wide Web, <http://www.aber.ac.uk/media/Documents/S4B/>.

Electronic journal articles

Watts, S. (2000) Teaching talk: Should students learn 'real German'? [HTML document]. *German as a Foreign Language Journal [online] 1*. Retrieved [12.09.'00] from the World Wide Web, <http://www.gfl-journal.com/>.

Other websites

Verterhus, S.A. (n.y.), Anglicisms in German car advertising. The problem of gender assignment [HTML document]. Retrieved [13.10.'01] from the World Wide Web, <http://olaf.hiof.no/~sverrev/eng.html>.

Appendix

The appendix should be used for data collected (e.g. questionnaires, transcripts etc.) and for tables and graphs not included in the main text due to their subsidiary nature or to space constraints in the main text.

The Layout Guidelines for the Term Paper

- A4 size Paper
 - Font: Arial (10 points) or Times New Roman (12 points)
 - Line spacing: 1.5
 - Top and bottom margins: 1 inch/ 2.5 cm; left and right margins: 1.25 inches/ 3 cm

Assessment Scheme:

Continuous Evaluation:

40%

(Based on abstract writing, interim draft, general approach, research orientation, readings undertaken etc.)

Final Evaluation:

60%

(Based on the organization of the paper, objectives/ problem profile/ issue outlining, comprehensiveness of the research, flow of the idea/ ideas, relevance of material used/presented, outcomes vs. objectives, presentation/ viva etc.)

FUNDAMENTALS OF ECONOMETRICS

Course Code: ECO4301

CreditUnits: 04

Course Objective:

This course presents the basic econometrics techniques emphasizing numerical estimation of economic relationships as applied to practical economic and managerial problems

Course Contents:

Module I: Basic Econometrics

Nature, meaning and scope of econometrics; Simple and general linear regression model — Assumptions, Estimation (through OLS approach) and properties of estimators; Gauss-Markov theorem; Concepts and derivation of R^2 and adjusted R^2 ; Concept and analysis of variance approach and its application in regression analysis;

Module II: Problems in Regression Analysis

Nature, test, consequences and remedial steps of problems of heteroscedasticity; Multicollinearity and auto-correlation; Problems of specification error; Errors of measurement

Module III: Regressions with Qualitative Independent Variables

Dummy variable technique — Testing structural stability of regression models comparing to regressions, interaction effects, seasonal analysis, piecewise linear regression, use of dummy variables, regression with dummy dependent variables; The LPM, Logit, Probit and Tobit models — Applications.

Module IV: Dynamic Econometric Model

Autoregressive and distributed lag models — Koyak model, Partial adjustment model, adaptive expectations; Instrumental variables; Problem of auto-correlation — Application; Almon approach to distributed-lag models; Error correlation mechanism, Causality test, Granger test and Sim's test

Examination Scheme:

Components	P0(Att.)	P1	C1	CT	EE
Weightage (%)	5	5	5	15	70

Text & References:

Text:

- Gujarati, D.N. (1995), Basic Econometrics (2nd Edition), McGraw Hill, New Delhi.
- Theil, H. (1981), Introduction to Econometrics, Prentice Hall of India, New Delhi.

References:

- A.S. Goldberger (1998), Introductory Econometrics, Harvard University Press, Cambridge
- Suresh K. Ghoshe, "Econometrics", Prentice Hall of India Private Limited, New Delhi
- A. Koutsoyiannis, "The theory of Econometrics: An introduction exposition of econometric methods", Educational low-priced books scheme, McMillan Education (1992)
- Damodar N. Gujarathi, "Basic Econometrics", Tata McGraw Hill Ltd., 1999 (4thed.)
- J. Johnson, "Econometric Methods"
- Christopher Dougherty, "Introduction to Econometrics", Oxford University Press (3rd edition)
- Amemiya, T. (1985), Advanced Econometrics, Harvard University Press, Cambridge, Mass.
- Baltagi, B.H. (1998), Econometrics, Springer, New York.
- Dougherty, C. (1992), Introduction to Econometrics, Oxford University Press, New York.
- Goldberger, A.S. (1998), Introductory Econometrics, Harvard University Press, Cambridge, Mass.

RESEARCH METHODS IN ECONOMICS

Course Code: ECO4303

Credit Units: 03

Course Objective:

The need of this subject is for those concerned with research to pay due attention to the designing and adhering to the appropriate methodology for improving the quality of research and specifically for introducing the different techniques of doing marketing research.

Course Contents:

Module I -Preliminaries

Meaning and definition of research- classification of research(pure, applied, exploratory, descriptive, historical, diagnostic, experimental, qualitative, quantitative) - importance, applications and limitations of social science research- interdisciplinary and trans-disciplinary approaches Statistics and information -communication technology in research- Basic elements of the scientific method-theory and research- the meaning of methodology

Module II- Research problem and design

An overview of the different steps in research process-selection of the topic and formulation of the research problem in Economics with illustrations- review of literature- Research design, features of a good design-different research designs for exploratory, descriptive, diagnostic and experimental research

Module III -Collection and analysis of data

Sample design- probability and non probability sampling- complex random sampling designs-Methods of collecting primary data- questionnaire and schedules- sources of secondary data on Indian economy- case study method -processing of data- sources of hypothesis-Testing of hypothesis – procedure for testing hypothesis-one tailed and two tailed tests – basics of the important parametric and non-parametric tests- basic awareness of SPSS

Module IV- Interpretation and preparation of the report

Interpretation, drawing conclusions and reporting it-Structure of the research report- Types of reports-Methods of footnotes and referencing

Examination Scheme:

Components	P0(Att.)	P1	C1	CT	EE
Weightage (%)	5	5	5	15	70

Text & References:

Text:

- William J Goode and Paul K Hatt, 1981 Methods in social Research, McGraw- Hill
- Wilkinson and Bhandarkar, 2002 Methodology and Techniques of Social Research, Himalaya
- Kothari, C.R., Research Methodology, Wiley Eastern Ltd, New Delhi

References:

- William J Goode and Paul K Hatt, 1981 Methods in social Research, McGraw- Hill
- Wilkinson and Bhandarkar, 2002 Methodology and Techniques of Social Research, Himalaya
- Marc Blaug The Methodology of Economics, or How Economics Explain, Cambridge University
- P.S Mohanakumar(Edited), 1998 : A Handbook on Research Methodology. Right Publishers, Kudavechoor

ENVIRONMENTAL ECONOMICS

Course Code: ECO4309

Credit Units: 03

Course Objective:

The course will provide an insight into basics of environmental problems environmental management and interrelationship between environment and economic development.

Course Contents:

Module I: Introduction

Environmental Economics - Meaning, nature and Historical development of environmental economics. Structure of environment, Characteristics of Environment, Sustainable development: concept, indicator and measurement.

Module II: Waste management

Pollution prevention, physical operations of waste treatment, Water pollution, Air pollution and control, Global Environmental Issues

Module III: Environmental Management

Environmental Legislations in India, Environment Quality Objectives and standards, Institutional Environmental agreements; Tools for environmental management; Environmental economics

Module IV: Environment and Economic Development

Interrelationship between environment and economic development; Environmental pollution in global perspective; Case studies on environmental management – Textile Industries and Tanneries

Examination Scheme:

Components	P0(Att.)	P1	C1	CT	EE
Weightage (%)	5	5	5	15	70

Text & References:

Text:

- Joseph, K. and R. Nagendran; Essentials of Environmental Studies, Pearson Education.
- DeshBandhu, H Singh and A.K. Mitra (1990). Environmental Education and Sustainable Development. New Delhi, Indian Environmental Society

References:

- Dhaliwal, G.S., G.S Sangha and P.K. Ralhan (1998); Fundamentals of Environmental Science; New Delhi; Kalyani Publishers.
- Dixon, John A., Louise F. Scura, Richard A. Carpenter and Paul B. Sherman (1994); Economic Analysis of Environmental Impacts. London: Earthscan Publications.
- Elkins, Paul (2001); Economic Growth, Human welfare and Environmental Sustainability; New York; Routledge.

TERM PAPER/ REVIEW OF DISSERTATION-II

Course Code: ECO4331

Credit Units: 02

GUIDELINES FOR TERM PAPER

A term (or research) paper is primarily a record of intelligent articulation through several sources on a particular topic of a given subject.

The students will choose the topic at the beginning of the session in consultation with the faculty assigned/chosen. The progress of the paper will be monitored regularly by the faculty. At the end of the semester the detailed paper on the topic will be submitted to the faculty assigned/chosen. The evaluation will be done by Board of examiners comprising of the faculties.

The procedure for writing a term paper may consists of the following steps:

Choosing a topic

1. Finding sources of material
2. Collecting the notes
3. Outlining the paper
4. Writing the first draft
5. Editing & preparing the final paper

1. Choosing a Topic

The topic chosen should not be too general. Student will normally consult the faculty guide while finalizing the topic.

2. Finding Sources of material

- The material sources should be not more than 5 years old unless the nature of the paper is such that it involves examining older writings from a historical point of view.
- Begin by making a list of subject-headings under which you might expect the topics to be listed.
- The sources could be books and magazines articles, news stories, periodicals, journals, internet etc.

3. Collecting the notes

Skim through sources, locate the useful material, make notes of it, including quotes and information for footnotes.

- *Get facts, not just opinions.* Compare the facts with author's conclusion(s)/recommendations.
- In research studies, notice the methods and procedures, results & conclusions.
- Check cross references.

4. Outlining the paper

- Review notes to find main sub-divisions of the topic.
- Sort the collected material again under each main division to find sub-sections for outline so that it begins to look more coherent and takes on a definite structure. If it does not, try going back and sorting again for main divisions, to see if another general pattern is possible.

5. Writing the first draft

Write the paper around the outline, being sure that you indicate in the first part of the paper what its purpose is. You may follow the following:

- statement of purpose/objectives
- main body of the paper
- statement of summary and possible conclusion(s)/recommendations

Avoid short, bumpy telegraphic sentences and long straggling sentences with more than one main ideas.

6. Editing & preparing the final paper

- a. Before writing a term paper, you should ensure you have an issue(s) which you attempt to address in your paper and this should be kept in mind throughout the paper. Include only information/ details/ analyses that are relevant to the issue(s) at hand. Sometimes, the relevance of a particular section may be clear to you but not to your readers. To avoid this, ensure that you briefly explain the relevance of every section.
- b. Read the paper to ensure that the language is not awkward, and that it "flows" smoothly.
- c. Check for proper spelling, phrasing and sentence construction.
- d. Check for proper form on footnotes, quotes, and punctuation.
- e. Check to see that quotations serve one of the following purposes:
 - (i) Show evidence of what an author has said.
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Term papers should be composed of the following sections:

1. Title page
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5. Discussion&Conclusion
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7. Appendix

Generally, the introduction, discussion, conclusion and references should account for a third of the paper and the review part should be two thirds of the paper.

Discussion

The discussion section either follows the results or may alternatively be integrated in the results section. The section should consist of a discussion of the results of the study focusing on the question posed in the paper.

Conclusion

The conclusion is often thought of as the easiest part of the paper but should by no means be disregarded. There are a number of key components which should not be omitted. These include:

- a) summary of objectives and issues raised.
- b) summary of findings
- c) summary of limitations of the study at hand
- d) details of possibilities for related future research

References

From the very beginning of the research work, one should be careful to note all details of articles or any other material gathered. The Reference part should list ALL references included in the paper. References not included in the text in any form should NOT be listed here. The key issue here is consistency. Choose a particular convention and stick to this.

The Conventions

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Edited volumes

Gass, S./Neu, J. (eds.) (1996), *Speech acts across cultures. Challenges to communication in a second language*. Berlin/ NY: Mouton de Gruyter.

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Chandler, D. (1994), *Semiotics for beginners* [HTML document]. Retrieved [5.10.'01] from the World Wide Web, <http://www.aber.ac.uk/media/Documents/S4B/>.

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Appendix

The appendix should be used for data collected (e.g. questionnaires, transcripts etc.) and for tables and graphs not included in the main text due to their subsidiary nature or to space constraints in the main text.

The Layout Guidelines for the Term Paper

- A4 size Paper
 - Font: Arial (10 points) or Times New Roman (12 points)
 - Line spacing: 1.5
 - Top and bottom margins: 1 inch/ 2.5 cm; left and right margins: 1.25 inches/ 3 cm

Assessment Scheme:

Continuous Evaluation: 40%

(Based on abstract writing, interim draft, general approach, research orientation, readings undertaken etc.)

Final Evaluation: 60%

(Based on the organization of the paper, objectives/ problem profile/ issue outlining, comprehensiveness of the research, flow of the idea/ ideas, relevance of material used/presented, outcomes vs. objectives, presentation/ viva etc.)

SUMMER INTERNSHIP EVALUATION

Course Code: ECO4335

Credit Units: 06

GUIDELINES FOR INTERNSHIP FILE AND INTERNSHIP REPORT

(These guidelines will be useful for undertaking an internship programme during the summer or at any other time wherein the student/ researcher works full time with a company/organisation)

There are certain phases of every Intern's professional development that cannot be effectively taught in the academic environment. These facets can only be learned through direct, on-the-job experience working with successful professionals and experts in the field. The internship programme can best be described as an attempt to institutionalize efforts to bridge the gap between the professional world and the academic institutions. Entire effort in internship is in terms of extending the program of education and evaluation beyond the classroom of a university or institution. The educational process in the internship course seeks out and focuses attention on many latent attributes, which do not surface in the normal class room situations. These attributes are intellectual ability, professional judgment and decision making ability, inter-disciplinary approach, skills for data handling, ability in written and oral presentation, sense of responsibility etc.

In order to achieve these objectives, each student will maintain and submit a file (**Internship File**) and a report (**Internship Report**).

INTERNSHIP FILE

The Internship File aims to encourage students to keep a personal record of their learning and achievements throughout the Programme. It can be used as the basis for lifelong learning and for job applications. *Items can be drawn from activities completed in the course modules and from the workplace to demonstrate learning and personal development.*

The File will assess the student's analytical skills and ability to present supportive evidence, whilst demonstrating understanding of their organization, its needs and his/her own personal contribution to the organization.

The File is essentially a comprehensive documentation of how one proceeds while working on the assignment and should be regularly checked by the faculty guide/ supervisor, issues discussed with the students, doubts if any clarified and signed as having done so. This will form the basis of **continuous evaluation** of the project.

The File will include *five sections* in the order described below.

1. **The Title Page** – An Internship Experience Report For (Your Name), name of internship organization, name of the Supervisor/Guide and his/her designation, date started and completed, and number of credits for which the report is submitted.
2. **Table of Content** – An outline of the contents of the file by topics and subtopics with the page number and location of each section.
3. **Introduction** – Short, but should include how and why you obtained the internship experience position and the relationship it has to your academic/professional and career goals.
4. **Main Body** – Should include a brief summary/ executive summary of the **Internship Project Report** that the student has worked on, an **analysis of the company/organization** in which the student is working, a **personal review** of the student's management skills and how they have been developed through the programme, the daily tasks performed, major projects contributed to, dates

and hours spent on a task, observations and feelings, meetings attended and their purposes, listing of tools and materials and their suppliers, and photographs if possible of projects, buildings and co-workers.

5. **Appendices** – Include pamphlets, forms, charts, brochures, technical and descriptive literature, graphs and other information related to your Internship experience.

INTERNSHIP REPORT

The **Internship Report** is the research report that the student has to prepare on the project assigned by the organization. (Incase a student is not assigned a specific research project in the organization, he has to select any one aspect of the organization and prepare a research report on it). The lay out of the report should be as per the standard layout prescribed by the organization wherein the student undertakes the Internship. In case, there is no layout prescribed by the organization the following components should be included in the report:

➤ **Title or Cover Page.**

The title page should contain Project Title; Student's Name; Programme; Year and Semester and Name of the Faculty Guide.

➤ **Acknowledgements**

Acknowledgment to any advisory or financial assistance received in the course of work may be given. It is incomplete without student's signature.

➤ **Abstract**

A good "Abstract" should be straight to the point; not too descriptive but fully informative. First paragraph should state what was accomplished with regard to the objectives. The abstract does not have to be an entire summary of the project, but rather a concise summary of the scope and results of the project. It should not exceed more than 1000 words.

➤ **Table of Contents**

Titles and subtitles are to correspond exactly with those in the text.

➤ **Introduction**

Here a brief introduction to the problem that is central to the project and an outline of the structure of the rest of the report should be provided. The introduction should aim to catch the imagination of the reader, so excessive details should be avoided.

➤ **Materials and Methods**

This section should aim at experimental designs, materials used (wherever applicable). Methodology should be mentioned in details including modifications undertaken, if any. It includes organization site(s), sample, instruments used with its validation, procedures followed and precautions.

➤ **Results and Discussion**

Present results, discuss and compare these with those from other workers, etc. In writing this section, emphasis should be laid on what has been performed and achieved in the course of the work, rather than discuss in detail what is readily available in text books. Avoid abrupt changes in contents from section to section and maintain a lucid flow throughout the thesis. An opening and closing paragraph in every chapter could be included to aid in smooth flow.

Note that in writing the various sections, all figures and tables should as far as possible be next to the associated text, in the same orientation as the main text, numbered, and given appropriate

titles or captions. All major equations should also be numbered and unless it is really necessary, do not write in “point” form.

While presenting the results, write at length about the the various statistical tools used in the data interpretation. The result interpretation should be simple but full of data and statistical analysis. This data interpretation should be in congruence with the written objectives and the inferences should be drawn on data and not on impression. Avoid writing straight forward conclusion rather, it should lead to generalization of data on the chosen sample.

Results and its discussion should be supporting/contradicting with the previous research work in the given area. Usually one should not use more than two researches in either case of supporting or contradicting the present case of research.

➤ **Conclusion(s) & Recommendations**

A conclusion should be the final section in which the outcome of the work is mentioned briefly. Check that your work answers the following questions:

- Did the research project meet its aims (check back to introduction for stated aims)?
- What are the main findings of the research?
- Are there any recommendations?
- Do you have any conclusion on the research process itself?

➤ **Implications for Future Research**

This should bring out further prospects for the study either thrown open by the present work or with the purpose of making it more comprehensive.

➤ **Appendices**

The Appendices contain material which is of interest to the reader but not an integral part of the thesis and any problem that have arisen that may be useful to document for future reference.

➤ **References**

References should include papers, books etc. referred to in the body of the report. These should be written in the alphabetical order of the author's surname. The titles of journals preferably should not be abbreviated; if they are, abbreviations must comply with an internationally recognised system.

The Layout Guidelines for the Internship File & Internship Report:

- A4 size Paper
- Font: Arial (10 points) or Times New Roman (12 points)
- Line spacing: 1.5
- Top and bottom margins: 1 inch/ 2.5 cm; left and right margins: 1.25 inches/ 3 cm

Assessment Scheme:

Continuous Evaluation: 30%
(based on Internship File and the observations of the faculty guide/ supervisor)

Feedback from Company/ Organization: 10%

Final Evaluation: 60%
(Based on Internship Report, Viva/ Presentation)

ENTREPRENEURSHIP & SMALL SCALE BUSINESS

Course Code: ECO4404

Credit Units: 03

Course Objective: The purpose of this paper is to prepare a ground where the students view Entrepreneurship as a desirable and feasible career option. In particular the paper seeks to build the necessary competencies and motivation for a career in Entrepreneurship.

Course Content:

Module I: Er.-Entrepreneurship-Enterprise: Conceptual issues. Entrepreneurship vs. Management. Roles and functions of er in relation to the enterprise and in relation to the economy. Entrepreneurship is an interactive process between the individual and the environment. Small business as seedbed of Entrepreneurship; Entrepreneur competencies, Entrepreneur motivation, performance and rewards

Module II: Opportunity scouting and idea generation: role of creativity and innovation and business research. Sources of business ideas; Entrepreneur opportunities in contemporary business environment, for example opportunities in net-work marketing, franchising, business process outsourcing in the early 21 century. The process of setting up a small business: Preliminary screening and aspects of the detailed study of the feasibility of the business idea and financing/non-financing support agencies to familiarize themselves with the policies/programs and procedures and the available schemes.

Module III: Management roles and functions in a small business. Designing and re-designing business process, location, layout, operations planning and control. Basic awareness on the issues impinging on quality, productivity and environment; Managing business growth; The pros and cons of alternative growth options: internal expansion, acquisitions and mergers, integration and diversification; Crisis in business growth

Module IV: Sources of risk/venture capital, fixed capital, working capital and a basic awareness of financial services such as leasing and factoring.

Module V: Issues in small business marketing. The concept and application of product life cycle [plc], advertising and publicity, sales and distribution management; The idea of consortium marketing, competitive bidding/tender marketing, negotiating with principal customers. The contemporary perspectives on Infrastructure Development, Product and Procurement Reservation, Marketing Assistance, Subsidies and other Fiscal and Monetary Incentives. National state level and grass-root level financial and non-financial institutions in support of small business development.

Examination Scheme:

Components	P0(Att.)	P1	C1	CT	EE
Weightage (%)	5	5	5	15	70

Text & References:

Text:

- Bhide, Amar V., The Origin and Evolution of New Business, Oxford University Press, New York, 2000.
- Desai, Vasant Dr. (2004) Management of small scale enterprises New Delhi: Himalaya Publishing House

References

- Taneja, Gupta, Entrepreneur Development New Venture Creation,: 2nd ed. Galgotia Publishing Company
- Dollinger M.J., 'Entrepreneurship strategies and Resources', 3rd edition, Pearson Education, New Delhi 2006.
- Brandt, Steven C., The 10 Commandments for Building a Growth Company, Third Edition, Macmillan Business Books, Delhi, 1977
- Holt, David H., Entrepreneurship: Strategies and Resources, Illinois, Irwin, 1955.
- Panda, ShibaCharan, Entrepreneurship Development, New Delhi, Anmol Publications.
- Patel, V.G., The Seven Business Crises and How to Beat Them, Tata-Mcgraw, New Delhi, 1995.
- SIDBI Report n Small Scale Industries Sector[latest edition]
- Verma, J.C., and Gurpal Singh, Small Business and Industry-A Handbook for Entrepreneurs, Sage, New Delhi, 2002 11. Vesper, Karl H., New Venture Strategies, [Revised Edition], New Jersey, Prentice Hall, 1990

DISSERTATION

Course Code: ECO4437

Credit Units: 06

GUIDELINES FOR DISSERTATION

The aim of the dissertation is to provide you with an opportunity to further your intellectual and personal development in your chosen field by undertaking a significant practical unit of activity, having an educational value at a level commensurate with the award of your degree

The dissertation can be defined as a scholarly inquiry into a problem or issues, involving a systematic approach to gathering and analysis of information / data, leading to production of a structured report.

Selecting the Dissertation Topic

It is usual to give you some discretion in the choice of topic for the dissertation and the approach to be adopted. You will need to ensure that your dissertation is related to your field of specialization.

Deciding this is often the most difficult part of the dissertation process, and perhaps, you have been thinking of a topic for some time.

It is important to distinguish here between ‘dissertation topic’ and ‘dissertation title’. The topic is the specific area that you wish to investigate. The title may not be decided until the dissertation has been written so as to reflect its content properly.

Few restrictions are placed on the choice of the topic. Normally we would expect it to be:

- relevant to business, defined broadly;
- related to one or more of the subjects or areas of study within the core program and specialisation stream;
- clearly focused so as to facilitate an in-depth approach, subject to the availability of adequate sources of information and to your own knowledge;
- of value and interest to you and your personal and professional development.

Planning the Dissertation

This will entail following:

- Selecting a topic for investigation.
- Establishing the precise focus of your study by deciding on the aims and objectives of the dissertation, or formulating questions to be investigated. Consider very carefully what is worth investigating and its feasibility.
- Drawing up initial dissertation outlines considering the aims and objectives of the dissertation. Workout various stages of dissertation
- Devising a timetable to ensure that all stages of dissertation are completed in time. The timetable should include writing of the dissertation and regular meetings with your dissertation guide.

The Dissertation plan or outline

It is recommended that you should have a dissertation plan to guide you right from the outset. Essentially, the dissertation plan is an outline of what you intend to do, chapter wise and therefore should reflect the aims and objectives of your dissertation.

There are several reasons for having a dissertation plan

- It provides a focus to your thoughts.
- It provides your faculty-guide with an opportunity, at an early stage of your work, to make constructive comments and help guide the direction of your research.

- The writing of a plan is the first formal stage of the writing process, and therefore helps build up your confidence.
- In many ways, the plan encourages you to come to terms with the reading, thinking and writing in a systematic and integrated way, with plenty of time left for changes.
- Finally, the dissertation plan generally provides a revision point in the development of your dissertation report in order to allow appropriate changes in the scope and even direction of your work as it progresses.

Keeping records

This includes the following:

- Making a note of everything you read; including those discarded.
- Ensuring that when recording sources, author's name and initials, date of publication, title, place of publication and publisher are included. (You may consider starting a card index or database from the outset). Making an accurate note of all quotations at the time you read them.
- Make clear what is a direct quotation and what is your paraphrase.

Dissertation format

All students must follow the following rules in submitting their dissertation.

- Front page should provide title, author, Name of degree/diploma and the date of submission.
- Second page should be the table of contents giving page references for each chapter and section.
- The next page should be the table of appendices, graphs and tables giving titles and page references.
- Next to follow should be a synopsis or abstract of the dissertation (approximately 500 words) titled: **Executive Summary**.
- Next is the 'acknowledgements'.
- Chapter I should be a general introduction, giving the background to the dissertation, the objectives of the dissertation, the rationale for the dissertation, the plan, methodological issues and problems. The limitations of the dissertation should also be hinted in this chapter.
- Other chapters will constitute the body of the dissertation. The number of chapters and their sequence will usually vary depending on, among others, on a critical review of the previous relevant work relating to your major findings, a discussion of their implications, and conclusions, possibly with a suggestion of the direction of future research on the area.
- After this concluding chapter, you should give a list of all the references you have used. These should be cross - references with your text. For articles from journals, the following details are required e.g.

Draper P and Pandyal K. 1991, The Investment Trust Discount Revisited, Journal of Business Finance and Accounting, Vol18, No6, Nov, pp 791-832.

For books, the following details are required:

Levi, M. 1996, International Financial Management, Prentice Hall, New York, 3rd Ed, 1996

- Finally, you should give any appendices. These should only include relevant statistical data or material that cannot be fitted into the above categories.

The Layout Guidelines for the Dissertation:

- A4 size Paper
- Font: Arial (10 points) or Times New Roman (12 points)
- Line spacing: 1.5
- Top and bottom margins: 1 inch/ 2.5 cm; left and right margins: 1.25 inches/ 3 cm

Guidelines for the Assessment of the Dissertation

While evaluating the dissertation, faculty guide will consider the following aspects:

1. Has the student made a clear statement of the objective or objective(s).
2. If there is more than one objective, do these constitute parts of a whole?
3. Has the student developed an appropriate analytical framework for addressing the problem at hand.
4. Is this based on up-to-date developments in the topic area?
5. Has the student collected information / data suitable to the frameworks?
6. Are the techniques employed by the student to analyse the data / information appropriate and relevant?
7. Has the student succeeded in drawing conclusion form the analysis?
8. Do the conclusions relate well to the objectives of the project?
9. Has the student been regular in his work?
10. Layout of the written report.

Assessment Scheme:

Continuous Evaluation: (Based on Abstract, Regularity, Adherence to initial plan, Records etc.)	40%
Final Evaluation: Based on,	60%
Contents & Layout of the Report,	25
Conceptual Framework,	10
Objectives & Methodology and	10
Implications & Conclusions	15

MANAGEMENT

Programme Structure

Course code	Course title	Lectures(L) Hour per week	Tutorial (T) Hour per week	Practical (P) Hours per week	Total Credits
MGT2151	Management Foundations	2	1	-	3
MGT2251	Marketing Management	2	1	-	3
MGT2351	Organisational Behaviour	2	1	-	3
MGT2451	Business Environment	2	1	-	3
MGT2551	Operations Research	2	1	-	3
MGT2651	Business Law	-	-	6	3
	TOTAL				18



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MANAGEMENT

Syllabus - Semester First

MANAGEMENT FOUNDATIONS

Course Code: MGT2151

Credit Units: 03

Course Objective:

The aim of the course is to orient the students in theories and practices of Management so as to apply the acquired knowledge in actual business practices. This is a gateway to the real world of management and decision-making.

Course Contents:

Module I: Introduction

Concept, Nature, Scope and Functions of Management, Levels of Management, Evolution and Foundations of Management Theories - Classical and Neo - Classical Theories, Systems Approach to organization, Modern Organization Theory.

Module II: Management Planning Process

Planning objectives and characteristics, Hierarchies of planning, the concept and techniques of forecasting, Decision making – concepts & process, MBO, concept and relevance.

Module III: Organization

Meaning, Importance and Principles, Departmentalization, Span of Control, Types of Organization, Authority, Delegation of Authority.

Module IV: Staffing

Meaning, Job analysis, Manpower planning, Recruitment, Transfers and Promotions, Appraisals, Management Development, Job Rotation, Training, Rewards and Recognition.

Module V: Directing

Motivation, Co-ordination, Communication, Directing and Management Control, Decision Making, Management by objectives (MBO) the concept and relevance.

Module VI: Management Control

Coordination, Meaning, Nature, Features, Objectives and Process of Management Control, Techniques and Behavioural Aspects of Management control.

Examination Scheme:

Components	CT	HA	C	V	A	EE
Weightage (%)	10	5	5	5	5	70

(C - Case Discussion/ Presentation; HA - Home Assignment; V - Viva; CT- Class Test; A - Attendance; EE - End Semester Examination)

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Text & References:

Text:

- Stoner, Freeman and Gilbert Jr. (2010), Management, 8th Edition, Pearson Education
- Robbins, (2009), Fundamentals of Management: Essential concepts and Applications, 6th edition, Pearson Education

References:

- Prasad, L.M. Principles & Practice of Management, 1st Edition, Tata McGraw Hills.
- Gupta, C.B., Management Concepts and Practices, Sultan Chand & Sons, New Delhi



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Syllabus - Semester Second

MARKETING MANAGEMENT

Course Code: MGT2251

Credit Units: 03

Course Objective:

The main objective of this course is to give students an elementary knowledge of the fundamentals in the field of marketing. The focus will be both on developing and helping them imbibe basic marketing principles and establishing an appreciation of contemporary realities.

Course Contents:

Module I: Introduction to Marketing

Meaning of marketing, Core concepts of marketing, Evolution and its role in the changing business environment, various marketing management philosophies, viz., the production concept, the product concept, selling concept and the marketing concept, Newer definitions of marketing- societal marketing and relationship marketing, Strategies planning in marketing, Formulation of marketing plan.

Module II: Analyzing Marketing Opportunities

Internal and External Marketing Environment Analysis, Introduction to Marketing Information System and Marketing Research, BCG matrix, GE 9 cell model.

Module III: Studying Consumer Behaviour and Selecting Markets

Buying Behaviour for Consumer Markets and Industrial Markets, Types of Buying Situations, Buying Decision Process and Factors Affecting Buyer Behaviour, Consumer Adoption Process, Concept of Market Segmentation, Bases for segmenting Consumer and Business markets, Approaches for Targeting, Differentiation and Positioning.

Module IV: Product Mix Strategy

Product: concept & levels, Classification of consumer and industrial products, Product Differentiation, Product Mix, Product Life Cycle and various strategies, Branding: concept and challenges, Brand decisions, Packaging and Labeling.

Module V: Product Development Decision and Pricing

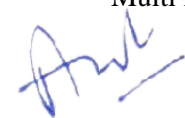
Product Line Decisions, New Product Development: Challenges & Process; Consumer Adoption Process, Diffusion of Innovation, Pricing Strategies; Setting the price, Understanding various pricing strategies and their application.

Module VI: Distribution and Logistics Decision and Integrated Communication Mix

Nature of Marketing Channels, Channel Functions and Flows, Channel Design and Management Decisions, Channel Dynamics, Introduction to Wholesaling, Retailing and Logistics, Marketing communication mix and Introduction to various elements of integrated marketing communications briefly

Module VII: Emerging Marketing Paradigms

E-marketing, Global marketing, Mobile marketing, Kiosk marketing, Green marketing, Tele marketing, Multi level marketing, Rural marketing.



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Examination Scheme:

Components	CT	HA	C	V	A	EE
Weightage (%)	10	5	5	5	5	70

C - Case Discussion/ Presentation; **HA** - Home Assignment; **P** - Project; **S** - Seminar; **V** - Viva; **Q** - Quiz; **CT** - Class Test; **A** - Attendance; **EE** - End Semester Examination

Text & References:**Text:**

- Kotler, Philip & Armstrong, Gray, Principles of Marketing, 10th Edition, Pearson Education.
- Saxena, Rajan (2008), Marketing Management, 3rd Edition, McGraw Hills Education.

References:

- Ramaswamy and Namkumar, S (2009), Marketing Management Global Perspective: Indian Context, McMillan, New Delhi.
- Kumar, Arun and Meenakshi, N (2009), Marketing Management, Vikas Publishing House.
- Russel, Wines, Marketing Management, 3rd Edition, Pearson Education.
- Kotler, Koshi Jha (2009), Marketing Management, 13th Edition, Pearson Education.



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Syllabus - Semester Third

ORGANISATIONAL BEHAVIOUR

Course Code: MGT2351

Credit Units: 03

Course Objective:

The objective of this course is to familiarize the students with the behavioural patterns of Human beings at individual and group levels.

Course Contents:

Module I: Understanding Human Behaviour

Concept, Nature and Significance of Human Behaviour, Factors Affecting Human Behaviour, Levels of Human Behaviour; Disciplines contributing to OB.

Module II: Individual Behaviour

Individual Differences; Personality and Theories of Personality; Perception; Learning and Behaviour reinforcement, Values.

Module III: Motivation & Attitude

Concept, Significance and Theories of Motivation, Motivation and Behaviour, Motivation at Work, Attitudes, Meaning and nature, Formation and change in attitudes, Job related attitudes.

Module IV: Interpersonal Behaviour, Power & Politics

Interpersonal Dimensions of Behaviour; Transactional Analysis Implications of TA, Organizational communication, making communication effective, Power: Concept, determinants, types; Organizational Politics: Tactics, Impression Management.

Module V: Group Behaviour and Leadership

Group Behaviour; Types, Functions, Determinants of Group Behaviour, Inter Group Problems, Leadership: Nature and Significance of Leadership, Leadership Styles, Theories of Leadership; Trait Theory, Behavioural Theory, Managerial Grid.

Module VI: Change and Conflicts

Organizational conflict, Nature and types of conflict, Management of organizational conflict, Approaches to conflict management, Organizational culture, Learning and maintaining organizational culture, Organizational change, Planned change, Resistance to change, Organization development, Definition, Need for organization development, Organization development process.

Examination Scheme:

Components	CT	HA	C	V	A	EE
Weightage (%)	10	5	5	5	5	70

C - Case Discussion/ Presentation; HA - Home Assignment; P - Project; S - Seminar; V - Viva; Q - Quiz; CT - Class Test; A - Attendance; EE - End Semester Examination


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Text & References:

Text:

- Stephen Robbins, Organisational Behaviour, 15th Edition PHI.

References:

- K. Ashwathappa, (2005) Organisational Behaviour, Tata McGrae Hill
- Keith Davis, Organisational Behaviour, Tata Mc Graw-Hill
- Keith Davis, Human Behaviour at Work, Tata McGraw-Hill



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Syllabus - Semester Fourth

BUSINESS ENVIRONMENT

Course Code: MGT2451

Credit Units: 03

Course Objective:

The aim of the course is to orient the students towards the basic concepts of Indian and global business environment.

Course Contents:

Module I: Overview of Business Environment

Meaning and types of business environment, Internal and external environment, Micro and macro environment, Factors (Cultural, social, Political economic legal, demographic and technological) effecting business environment.

Module II: Indian Industrial environment

Industrial policy up to 1991, New industrial policy, Liberalization, Privatization and Globalization process in India, Disinvestment, Industrial sickness, MRTP act 1969, Competition law 2002, Foreign Exchange Regulation Act and Foreign Exchange Management Act (FERA and FEMA).

Module III: Financial Environment

Indian money and capital markets: meaning, functions and constituents, Stock exchange- importance and functions, SEBI, Capital market reforms and development, Industrial financial institutions (IDBI, SIDBI, ICICI, IFCI etc.).

Module IV: Labour Environment

Labour legislation in India, Social security benefits, Industrial disputes- causes and preventive measures, Settlement of disputes, International Labour Organisation (ILO), Trade union- meaning and functions, Trade Union Act.

Module V: Economic Planning and Development

Planning in India- needs and objectives, five year plans, planning commission, 11th five year plan, Green and white revolution- achievements and failures, Second green revolution, foreign trade policy 2009, Export processing zones, Export oriented units, Special economic zones (EPZ's, EOU's, SEZ's) and trading houses in India.

Module VI: Global Environment

Bretton woods system, features of Uruguay round of negotiations, GATT/ WTO- role, functions and ministerial conferences, IMF, World Bank (International Bank for Reconstruction and Development), Regional economic cooperation institutions, SAARC, EU, NAFTA and ASEAN.

Examination Scheme:

Components	CT	HA	C	V	A	EE
Weightage (%)	10	5	5	5	5	70

C - Case Discussion/ Presentation; HA - Home Assignment; P - Project; S - Seminar; V - Viva; Q - Quiz; CT - Class Test; A - Attendance; EE - End Semester Examination

Text & References:

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Text:

- Francis Cherunillam, (2007), Business Environment Text and Cases, Himalaya Publications.

References:

- Bedi Suresh, (2004), Business Environment, Excel Books, N. Delhi.
- Shaikh Saleem, (2010), Business Environment, 2nd Edition, Pearson Education.
- Bhatia H.L, International Economics, Vikas Publications.
- Mishra S.K, and Puri V.K, Indian Economy, Himalaya Publishing House.
- Gupta, C B, (2008), Business Environment, 4th Edition, S. Chand & Co. New Delhi
- Rudra Dutta and Sundharam, Indian Economy, S. Chand & Co. New Delhi



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Syllabus - Semester Fifth

OPERATIONS RESEARCH

Course Code: MGT2551

Credit Units: 03

Course Objective:

The objective of this paper is to make students familiar with basic concepts and tools in Operations Research. These techniques assist in solving complex problems and help in decision making.

Course Contents:

Module I: Introduction

Introduction to Operations Research, Definition, scope and limitations of Operations Research

Module II: Linear Programming

Linear Programming – Basic Concepts, Model formulation; Solution methods – Graphical Solution method, Simplex method (problems involving only upto 3 constraints and of inequality <), Application of LPP in business decision making.

Module III: Transportation Problem

Transportation problem- Initial Basic feasible solution (North - West corner rule, Vogels approximation method), Test for optimality (Modified Distribution (MODI) method)

Module IV: Assignment Problem

Assignment Problem – Introduction, Approach of the Assignment model, Solution Methods (Hungarian method)

Module V: Game Theory

Game Theory - Concept and definition; Solution methods of Pure Strategy games (with saddle point), Significance of Game Theory.


Module VI: Queuing & Simulation

Introduction, Elementary queuing system, Introduction to Single – channel queuing model (with Poisson arrivals and Exponential service times), (no numerical); Introduction to Simulation, applications, advantages and drawbacks of simulation, Introduction to Monte – Carlo Simulation, Role of computers in Simulation.

Examination Scheme:

Components	CT	HA	Q	C	A	EE
Weightage (%)	10	5	5	5	5	70

C - Case Discussion/ Presentation; HA - Home Assignment; P - Project; S - Seminar; V - Viva; Q - Quiz; CT - Class Test; A - Attendance; EE - End Semester Examination


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Text & References:

Text:

- Kapoor V K, Operations Research (Techniques for Management), Seventh edition, Sultan Chand & Sons.

References:

- Sharma J K, Operations Research (Theory & Practices), Second edition, Macmillan India Ltd.
- Hamdy A Taha, Operations Research, Seventh edition, Prentice Hall India
- Kothari C R, An introduction to Operations Research, Third edition, Vikas Publishing House



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Syllabus - Semester Sixth

BUSINESS LAW

Course Code: MGT2651

Credit Units: 03

Course Objective:

The objective of the course is to acquaint the students with the fundamentals of business related laws, which have an important role over smooth conduct of business.

Course Contents:

Module I: Legal Environment of Business

Importance of Law, Legal environment of business, Sources of law, Function of law.

Module II: Indian Contract Act, 1872

Nature and kinds of Contracts, Concepts related to offer, Acceptance and Consideration, Principles Governing Capacity of Parties and Free Consent, Legality of Objects, Performance and Discharge of Contract, Breach of Contract and its Remedies, Basic Elements of Law Relating to Agency, Guarantee and Pledge.

Module III: Indian Sale of Goods Act, 1930

Sale and Agreement to Sell, Hire Purchase, Pledge, Mortgage, Hypothecation Lease, Goods, Different types of Goods, Passing of Property in Goods, Conditions and Warranties, Doctrine of Caveat emptor, Rights of an unpaid Seller.

Module IV: Negotiable Instruments Act, 1881

Meaning of Negotiability and Definition of Negotiable Instruments, Features, Cheques, Bill of Exchange and Promissory Note, Holder in Due Course, Crossing of Cheques, Endorsement and Dishonour of Cheques.

Module V: Elements of Company Law

Meaning and types of companies, Formation of a company, Memorandum and Articles of Association, Prospectus and Issue of Shares, Share Capital and Shareholders, Company Meetings and Proceedings, Powers and Liabilities of Directors, meeting, Managerial Remuneration and Winding up of Company.

Module VI: Consumer Protection Act 1986 and Torts

Need for Consumer Protection, Meaning of Consumer, Different Redressal Forums for Consumers, Rights of Consumers, Unfair Trade Practices, and Procedure for Filing Complaints, Meaning of tort, Application of Tortious Liability in Business Situations.

Examination Scheme:

Components	CT	HA	C	V	A	EE
Weightage (%)	10	5	5	5	5	70

C - Case Discussion/ Presentation; **HA** - Home Assignment; **P** - Project; **S** - Seminar; **V** - Viva; **Q** - Quiz; **CT** - Class Test; **A** - Attendance; **EE** - End Semester Examination

Text & References:

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Text:

- N.D. Kapoor, Mercantile Law
- P.K Goel, Business Law for managers Biztantra.

References:

- Shukla, S.M. and Gupta, O P, Mercantile Law.
- S. S. Gulshan Mercantile Law, Excel Book.
- Maheshwari & Maheshwari Business Law.



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Master of Business Administration (Business Analytics)

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2022

AMITY UNIVERSITY HARYANA

GURUGRAM

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Master of Business Administration (Business Analytics)

Programme Mission:

The mission of the MBA programme is to foster an environment of academic excellence in Business Management through research and innovation, industry integration, internationalization and extension activities and develop highly trained and employable professionals with specialization in the area of Marketing & Sales, Finance, Banking & Finance, Human Resource Management, International Business, Information Technology, E-Commerce and Hospital & Healthcare, who are socially responsible and globally minded professional to meet the current and emerging needs of business and society.

Programme Description:

The two year full time Masters in Business Administration programme is to educate and prepare students with the knowledge, analytical ability, and management perspectives and skills needed to lead, to motivate and to manage diversified workforce, rapid technological change and competitive marketplace while considering the principles of ethical, legal and corporate governance fundamentals.

Programme Outcome (PO):

PO1	Apply the knowledge of marketing, human resource management, finance and other functional areas of management to solve complex management issues in volatile business environment
PO2	Student shall have ability to acquire & evaluate new knowledge through Business Research Methods, have the ability to identify, define, investigate, and solve critical business issues using management principles, analyse data/information and interpret results for reaching optimum solutions.
PO3	Student shall be able to understand global issues from different perspectives, recognize the opportunities to improve the business value chain as an entrepreneur and shall develop and display basic business acumen & business skills and be able to apply different forms of communication in diversified cultural settings.
PO4	Student shall be able to critically think to assess societal, health, safety, legal, and cultural issues and apply range of strategies for solving a problem and decision making
PO5	Student shall be able to practice ethical principles and commit to professional ethics and responsibilities and norms of the management practice.
PO6	Student shall develop range of Leadership skills and shall demonstrate excellent interpersonal skills, understanding of group dynamics and effective teamwork, including awareness about personal strengths and limitations.
PO7	Student shall be able to communicate effectively on complex management activities with various stakeholders being able to comprehend and write effective reports, design documentation, make effective presentations, and give & receive clear instructions.
PO8	Student shall recognize the need for, and have the ability to engage in independent and life-long learning in the broadest context of technological change.
PO9	Student shall be able to create, select, and apply appropriate techniques, resources, and modern management and IT tools including prediction and modeling to make decisions.

Supporting document for PSOs (Programme Specific Outcomes) of MBA BA

PSO 1			PSO 2	PSO 3		PSO4	
Student shall be able to describe fundamental knowledge of general and functional management courses & relevant technological tools to identify opportunities and apply appropriate business strategies & solutions.			Student shall be able to apply knowledge of business analytics to solve business problems using appropriate technology such as machine learning/artificial intelligence and software solutions such as R, Python, SPSS, SAS to make holistic judgment. Student shall also apply technical skills to design effective advanced analytics models and simulations for effective decision making.	Student shall be able to apply specific and cross functional knowledge to solve critical business and management issues, write effective reports, demonstrate leadership and interpersonal skills, understanding of group dynamics and effective teamwork, including awareness about personal strengths and limitations.		Student shall be able to communicate effectively on complex management issues, make effective presentation with various stakeholders being able to comprehend and shall be able to practice ethical principles, professional values and fulfil social responsibilities and engage in life-long learning	
Fundamental Business Management	Functional Management domain	Research, Analysis and Technical Management Domain	Business Analytics	NTCC		Communication	Value Added
Management Process and Organizational Behaviour	Accounting for Management	Operations and Supply Chain Management	Datamining	Financial Analytics	Summer Internship Evaluation	Basics of Communication	Self Development & Interpersonal Skills
Economics for Management	Marketing Management	Business Research Methods	Predictive Analytics-I Machine Learning using R	Supply Chain Analytics	Dissertation (Analytics Project)	Corporate Communication	Behavioural Communication & Relationship Management
Strategic Management	Human Resource Management		Predictive Analytics-II Machine Learning using Python	HR Analytics		Interpersonal Communication	Leading Through Teams
Total Quality Management	Financial Management		Big Data Analytics-Hadoop	Marketing Analytics		Cross Cultural Communication	Professional Excellence
	Consumer Behaviour		Financial Decision Analysis	Data Privacy and Data Security Laws		Foreign Business Language	
			Visual Analytics- Tableau/ Power BI	Statistical Techniques		Chinese	French
			Econometrics	Excel for Decision Making		Portuguese	German

			Programming for Analytics using R	Optimization Techniques		Korean	Spanish
			Programming for Analytics using Python	Database Management System		Japanese	Russian



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BUA4102	ACCOUNTING FOR MANAGEMENT	L	T	P	C
Version 1.1	Latest Approved	3	0	0	3
Pre-requisites/Exposure	Basic knowledge of general Management				
Co-requisites	Student must have basic understanding of General Management.				

Catalog Description

The intent of this course is to acquaint the students with fundamental concepts and processes of accounting so that they are able to appreciate the nature of item presented in the annual accounts of an organization. The student will be able to familiarize with the significant tools and techniques of financial analysis further useful in the interpretation of the financial statements. The aim of this course does not focus on to make the student's expert accountant but to have a good comprehension on the management planning and control systems. However, the principal focus will be related to the interpretation and use of the financial data by non-accounting students to gain the ability of using accounting information as a tool in applying solutions for managerial problems, evaluating the financial performance, and interpreting the financial structure.

Course Objectives

The objective of this course is to:

1. Equip the students to develop the essential ability of all managers, to use complex accounting information as a platform for decision-making. As the course unfolds, students will build an increasingly sophisticated level of understanding of the language of accounting and its key concepts.
2. Develop skills in interpreting earnings statements, balance sheets, and cash flow reports. This ability to analyze financial statements will enable participants to deal more effectively with strategic options for their businesses or business units.

Course Outcome:

On completion of this course, the students will be able to:

CO1: Enable the students to combine practice and theoretical knowledge of financial accounting.

CO2: Demonstrate the decision-making skills to the students in the financial analysis context,

CO3: Develop an ability to identify and analyze complex financial accounting problems and opportunities in real life situations.

CO4: Develop skills in applying management accounting techniques to assist in decision making.

Modules	Blooms Level	Number of Hours
Module 1: Introduction	L1, L2, L3	8

The Financial Accounting Framework, Accounting Policies, Need of Accounting. Users of Accounting Information, Accounting Cycle, Accounting and Management Control. Balance sheet- Classification Items of Balance Sheet, Formats of Balance Sheet. Preparation of Balance Sheet. Income Statement- Realization vs. Accrual Principle, Format of Income Statement), Preparation of Income Statement (IAS,GAAP&IFRS), Depreciation Accounting.		
Module 2: Measuring and Reporting Measuring and Reporting Assets, Liabilities & Equity: Cost of sales and Inventories, Debentures, Investments, Shareholder Equity; Human Resource Accounting: Valuation of Human Resources, Recording and Disclosure in Financial Statements.	L1, L2, L5	8
Module 3: Analyzing and Interpreting Financial Statements Financial Statement Analysis – Basic Relationship, Overall Measures, Profitability Ratios, Investment Utilization Ratios, Financial Condition Ratios, Making Comparisons. The Statement of Cash Flows-Profit versus Cash, Purpose and Use of Cash Flow Statement, Format of Cash Flow Statement (AS-3), Preparation of Cash Flow Statement (IAS,GAAP&IFRS).	L4, L5, L6	9
Module 4: Management Accounting Emergence of Management Account, Managerial costing and Cost-Volume-Profit Analysis, Budgeting and Budgetary control, Variance Analysis .	L1, L2, L5	5
Module 5: Cost Accounting: Elements of Cost, Cost Classification and Allocation, Cost sheet, Process Costing, Job Costing.	L1, L2, L5	5

*Bloom's Level: L1 – Knowledge; L2-Comprehension, L3 – Application, L4 – Analysis, L5 – Synthesis, L6 – Evaluation

Text Books

1. Anthony, N.R; Hawking, F. D; Merchant, A.K (2014), Accounting Text and Cases, 13th Edition, McGraw Hill.
2. Ramachandran, N (2011), Financial Accounting for Management, 3rd Edition, McGraw Hill.

Reference Books

1. Bhattacharya, S.K. and Dearden, J, 3rd Edition, Accounting for Management, Text and Cases, Vikas Publishing House
2. Narayanaswamy R (2014), Financial Accounting – A Managerial Perspective, Prentice Hall of India.
3. Maheshwari S N; Maheshwari SK and Maheshwari SK, 3rd Edition, A Text Book for Accounting for Management, Vikas Publishing House.
4. Tulsian, P.C (2006), Financial Accounting, Tata McGraw Hill.
5. Banerjee, A (2005), Financial Accounting, Excel Books.
6. Ghosh, T.P (2005), Fundamentals of Management Accounting, Excel Books
7. M.N Arora 10th Edition, A Text Book of Cost and Management Accounting, Vikas Publishing House.

Modes of Evaluation: Quiz/Assignment/Presentation/Written Examination
Examination Scheme:

Components	Group Presentation	In Class Quiz	Class Test/Mid Term Exam	Attendance	External Exam
Weightage (%)	10	5	10	5	70

CO, PO and PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3	PSO4
CO1	-	1	1	--	--	--	--	--	--	1	--	--	--
CO2	1	1	1	--	--	--	1	--	--	1	--	--	--
CO3	1	1	--	1	--	--	--	--	--	1	--	--	--
CO4	1	1	--	--	--	--	--	--	--	1	--	--	--

1: strongly related, 2: moderately related and 3: weakly related



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BUA4104	STATISTICAL TECHNIQUES	L	T	P	C
Version 1.1	Latest Approved	3	0	0	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

This course offers the understanding on identification of data, analysis and interpretation of data using basic quantitative tools & techniques. In this course, students can apply the quantitative techniques in the analysis of statistical and economic problems. Probability and hypothesis testing are major topics to be covered. Basic understanding of statistical concepts helps in deciding on the suitable technique for data analysis and also to interpret results.

Course Objectives

The objectives of this course are to

1. Familiarize the students with basic quantitative tools & techniques for data analysis.
2. Equip the students with the concept of probability, hypothesis testing, data identification, and data analysis and interpretation using statistical tools.
3. Facilitate hands on experience to various statistical problems.

Course Outcomes

On completion of this course, the students will be able to

CO1: Explain the basic concepts of probability and Bayes Theorem and manipulate the probability models that are most widely used in economics, and apply them correctly and carry out the appropriate statistical analysis.

CO2: Apply the appropriate statistical tools and techniques for data analysis of economic models.

CO3: Apply graphical, numerical methods and Excel to make calculate and illustrate descriptive statistics and critically evaluate the basis for these calculations.

CO4: Identify the appropriate regression model to apply to an economics dataset and also the problems associated with these models such as autocorrelation. Multicollinearity, heteroscedasticity, non Stationarity data series that may affect regression analyses.

Modules	Blooms level*	Number of hours
MODULE 1: Probability Theory Elements of Probability Theory: Sample space Events, meaning of probability Classical definition of probability, The addition rule, Multiplication Rule, Theorems of total probability, conditional and statistical independence, limitation of classical definition, Bayes formula, random variable, expectation and variance of random variable (for random sampling with or without replacement)	L1, L2,L3	9
MODULE 2: Random Variables and Probability Distributions Defining random variables; probability distributions; expected	L1, L2,L3	9

values of random variables and of functions of random variables; properties of commonly used discrete and continuous distributions (uniform, binomial, normal, poisson and exponential random variables).		
MODULE 3: Introduction to Estimation Methods of sampling; sampling distribution of a statistic; distribution of the sample mean; sampling error and standard error of a statistic with special reference to the mean; Point and interval estimation of parameters; properties of an estimator; unbiasedness, relative efficiency and consistency.	L1, L2,L3	9
MODULE 4: Hypothesis Testing Testing of Hypothesis; type I and type II errors, power of a test; large sample tests, “t” test for the mean; one tail and two tail tests for difference of means; z-test, f-test, Chi-square test for (i) goodness of fit and (ii) independence of two attributes.	L1, L2,L3	9

*Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. Gupta S.C, *Fundamentals of Statistical Methods*, Sultanchand& Sons.
2. Allen Webster, *Applied Statistics for Business and Economics*, (3rd edition), McGraw Hill, International Edition 1998.
3. Pitman, Australia. M.R. Spiegel (2nd edition), *Theory and Problems of Statistics*, Schaum Series.

Reference Books

1. P.H. Karmel and M. Polasek, *Applied Statistics for Economists* (4th edition)
2. N.G.Das, *Statistical Methods* (Edition 1&2), Tata McGraw Hill

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3	PSO4
CO1	3	1	2	1	--	--	3	1	1	2	1	--	--
CO2	1	1	3	1	--	--	3	1	2	2	1	--	--
CO3	1	2	2	1	--	--	3	1	1	2	1	--	--
CO4	2	1	3	1	--	--	3	1	2	2	1	--	--

1: strongly related, 2: moderately related and 3: weakly related

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BUA4105	EXCEL FOR DECISION MAKING	L	T	P	C
Version 1.1	Latest Approved	1	0	2	2
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

Microsoft Excel is a very popular business productivity application for the management and manipulation of data. With the right training and understanding of Excel, businesses and individual users can unlock the world of opportunities that this powerful business application offers. This course will provide all the tools necessary to create and use basic and advanced spreadsheets.

Course Objectives

The course enables students to:

1. Explore the Microsoft Excel as a tool for facilitating solutions for business problems/decision making
2. Have an understanding on the advanced functions of excel through guided demonstration.
3. Enhance excel skills of students and develops a set of fundamental skills that are essential for survival in business amid global uncertainty.

Course Outcomes

On completion of this course, the students will be able to

CO1: Manage data in excel.

CO2: Explore the functions of basic and advanced excel.

CO3: Analyze the real time series dataset.

CO4: Explain insights about decision making in business.

Modules	Blooms level*	Number of hours
Module 1: Overview of Excel Contents: Introduction to Spreadsheets: data entry using autofill, sort & filter feature, widening rows and columns, inserting & deleting rows and columns, creating lists, wrapping & merging text and cells. Introduction to basic data formatting, saving work in excel. Protecting & sharing workbooks, freeze panes, understanding normal, page layout and page break preview in excel, page orientation and print area in Excel. How to adding hyperlinks to cells, inserting images, objects, equations and symbols. Introduction to Figures and Charts: Inserting bar charts, pie charts, column charts and line charts in spreadsheets, formatting and resizing the chart.	L1, L3, L4	4
Module 2: Data Cleansing and Lookups Contents: Textual functions- TRIM, SUBSTITUTE, CLEAN, STORED AS TEXT, DE-DUPLICATING, LEN & FIND,	L1, L3, L4	4

CONCATENATE, UPPER, LOWER, REPLACE functions and Data validation; Look up functions- VLookup, multiple VLook up together and HLookup with index and match; Basics of Macros.		
Module 3: Logical Functions and Pivot Tables Contents: Basic functions- ROUNDING, SUM, PRODUCT, MIN, MAX, AVERAGE, CONDITIONAL COUNTS, LARGE, RANK, VAR, Std Dev, CONDITIONAL SUMS. Date functions and Time functions. Logical functions- IF, THEN, AND, OR, NOT, COUNTIFS, SUMIFS, TRUE, FALSE Functions. Financial functions: Time value of money- Present value, Future value, PMT with beginning date, PMT with ending date, NPV, Goal seek, Scenario Manager. Pivot table, pivot charts and conditional formatting.	L1, L3, L4	4
Module 4: Simulation and Decision Making Contents: Basics of simulation, Monte Carlo Experiment, Decision Analysis (DA): Terminology, DA without probabilities (Maximax, Maximin, Minimax Regret), DA with probabilities: (Decision point / branch, chance event / branch, Decision tree with examples.	L1, L3, L4	4

*Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	Written Test	Practical	Viva	File/Assignment	Attendance
Weightage (%)	20	30	30	15	5

Text Books

1. Carlberg CG, "Business Analysis with Microsoft Excel (2nd Edition)", Que Publishing, ISBN 0974415626.
2. Harvey G (2012), "Excel 2013 for Dummies" John Wiley & Sons, ISBN 9781118559703

Reference Book

Excel 2013 for Dummies by Greg Harvey, John Wiley & Sons, 2012, ISBN 9781118559703

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3	PSO4
CO1	1	-	-	-	-	-	-	-	1	-	1	-	-
CO2	-	-	-	-	-	-	-	-	1	-	1	-	-
CO3	-	-	-	-	-	-	-	-	1	-	1	-	-
CO4	-	-	-	-	-	-	-	-	1	-	1	-	-

1: strongly related, 2: moderately related and 3: weakly related

BUA4106	OPTIMIZATION TECHNIQUES	L	T	P	C
Version 1	Latest approved	2	0	2	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

The main objective of the course is to provide the students the insight into structures and processes that management science can offer and the enormous practical utility of its various utility. The course is designed to introduce the fundamental tools of MS and their application to real life business problems. It will help students to take well informed decisions in their corporate life.

Course Objective:

The main objectives of this course are to:

1. Take decision under certain, uncertain and risky environment
2. Understand various business problems and applying a suitable MS model
3. Formulate Linear Programming Problem and solving using graphical and Simplex methods
4. Design the transportation and assignment problem, solve them and interpret the result
5. Design and solving the problems of game theory for the optimal solution
6. Describe the application of simulations.

Course Outcomes

On completion of this course, students shall be able to:

- CO1. To recall the evolution of OR and specify currently used OR models for different business situations
- CO2. To describe a business problem and analyzing it for the optimum solution
- CO3. To illustrate different prevailing constraints while finding out optimum solution
- CO4. To evaluate various models to take better and improved decisions

Modules	Blooms level*	Number of hours
Module I: Introduction Optimization Techniques: uses, scope, applications in managerial decision making; assumptions of management science models, decision making environments: decisions under certainty, uncertainty and risk situation; decision tree approach and its applications.	L1, L2, L3	6
Module II: Linear Programming Problems Linear Programming Problems: Modeling and Solution Methods- graphical method, simplex methods, problems with maximization and minimization objects, duality and its managerial interpretation; Sensitivity analysis: meaning, Change in Objective Function Coefficients, Change in Right Hand Side Values, Change in Availability of resources and Addition of a new variable.	L1, L2, L3, L4, L6	8

Module III: Transportation and Assignment Model Transportation model: various methods of finding initial basic feasible solution and optimal solution, MODI method, degeneracy, unbalanced problems, prohibited route problems, maximization transportation problems Assignment Model: Hungarian method for solution, unbalanced assignment problems, restrictions on assignments, travelling salesman problem.	L1, L2, L3, L4, L6	8
Module IV: Game Theory Two-Person Zero Sum Games, Pure Strategies: Games with Saddle Point, Mixed Strategies: Games without Saddle Point, Principle of Dominance, and Solution Methods for Games without saddle point – Algebraic Method, Arithmetic Method, Graphical Method.	L1, L2, L3, L4, L6	8
Module VI: Simulation Simulation: meaning, types of simulation, steps of simulation process, Monte Carlo simulation, applications of simulation	L1, L2, L3, L4, L6	6

*Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. Vohra, N.D. (2007). *Quantitative Techniques in Management (3rd ed.)*. New Delhi, India: Tata McGraw-Hill Publishing Company Limited
2. Sharma, J.K. (2013). *Operation Research: Theory and Applications (5th ed.)*. New Delhi, India: Macmillan Publishers India limited
3. Jaishankar, S. (2010). *Operation Research*. New Delhi, India: Excel Books
4. Kalavathy, S. (2002). *Operation Research (2nd ed.)*. New Delhi, India: Vikas Publishing House
5. Kapoor, V.K. (2008). *Operation Research: Techniques for Management (7th ed.)*. New Delhi, India: Sultan Chand and Sons

Reference Books

1. Frederick Shiller & Gerald J Liberman. *Introduction to Operation Research*. New Delhi, India: Tata McGraw- Hill Education (India) Private Limited
2. Taha, H.A. *Operation Ressearch*. New Delhi, India: Prentice Hall India
3. Gillet, B.E. *Introduction to Business Research*. Tata McGraw Hill

Modes of Evaluation: Class Test/Assignment /Written Examination

Examination Scheme:

Components	ME	A	Q/S	Asn	CT	EE
Weightage (%)	10	5	5	5	5	70

ME- Mid Term Examination; A- Attendance; Q/S- Quiz/Seminar; Asn- Assignment, EE- External Examination, CT- Class test

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3	PSO4
CO1	-	1	2	--	--	--	--	--	--	1	1	--	
CO2	-	1	2	--	--	--	--	--	--	1	2	2	
CO3	-	1	--	--	--	--	--	--	--	1	2	2	
CO4	-	1	1	1	--	--	--	--	--	1	3	3	

1: strongly related, 2: moderately related and 3: weakly related

BUA4107	DATABASE MANAGEMENT SYSTEMS	L	T	P	C
Version 1.1	Latest Approved	3	0	0	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

In this course the students will learn about the importance and usage of database management systems in the modern day organizations. The students shall grasp sound knowledge of various types of databases that exist, creation of data warehouse and application areas of data mining. Also, the students will be learning SQL, the language of databases.

Course Objectives

The course aims to make the students

1. Understand the basic and advanced concepts in databases and database management systems
2. Analyze the importance of databases in day to day life.
3. Get a hands-on experience on the SQL-the language of databases.

Course Outcomes

On completion of this course, the students will be able to

CO1: Define the basic terminology used in databases.

CO2: Describe the concepts related to databases architecture.

CO3: Apply the knowledge of SQL in creating databases using DBMS software for a business organization.

CO4: Compare and contrast various types of keys used in database creation.

CO5: Review and assess the organization's data and network security aspects.

Modules	Blooms level*	Number of hours
Module I: Introduction to DBMS Definition of DBMS, Concept and Goals of DBMS, Data Independence, DBMS Architecture, Levels, Database Administrator, File System Approach Vs DBMS Approach, Advantages of Using a DBMS, Data Models, Schemas, and Instances, Database Languages, Database Users, Database Abstraction.	L1, L2	6
Module II: Relational Database & ER Model Relational Database: Relational System, Codd's Rule, Relational Model, Optimization, Tables and Views ER Model: Entity Type, Entity Set, Relationship type, Relationship sets, Constraints: Cardinality Ratio and Participation Constraint, Keys, Mapping, Design of ER diagrams.	L2, L3	7

Module III: Relational Model Objects Domains and Relations, Relations and predicates, Relational Data Integrity; Primary Key, Candidate Key, Foreign Key and their rules, Relational operators, Relational Algebra	L1, L2	7
Module 4: SQL SQL Language, DDL, DML and DCL commands. Data definition, Data retrieval and update operations on MS ACCESS and SQL Server DBMS.	L1, L2	8
Module 5: Database Applications and Types Distributed Database, Object Oriented Database, Multimedia Database, Data Mining, Digital Libraries. Data Warehouse.	L1, L2	8

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. Elmasari, Navathe, "Fundamentals of Database Systems", Addison Wesley.
2. Korth, Silbertz, Sudarshan, "Database Concepts". McGraw Hill.

Reference Books

1. Majumdar & Bhattacharya, "Database Management System", Tata McGraw Hill.
2. Date C J." An Introduction to Database Systems", Addison Wesley.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70

ME- Mid Term Examination; A- Attendance; Q/S- Quiz/Seminar; Asn- Assignment, EE- External Examination

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3	PSO4
CO1	1			-				-	-		1		
CO2	1			-				-	-		1		
CO3	2			-				-	1		1		
CO4	-			-				1	2		1		
CO5	-			1				2	-		1		

1: strongly related, 2: moderately related and 3: weakly related

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BUA4204	BUSINESS RESEARCH METHODS	L	T	P	C
Version 1.1	Latest Approved	1	0	2	2
Pre-requisites/Exposure					
Co-requisites					

Catalog Description:

The main objective of the course is to equip the students with the basic understanding of research methodology in changing business scenario. It will also provide them an insight into the application of dynamic analytical tools to face the stormy challenges aimed at fulfilling the purpose of business decision making.

Course Objectives:

The objectives of this course are to ensure that students are able to:

1. Understand the basic framework of research process.
2. Comprehend of various research designs and techniques.
3. Identify various sources of information for literature review and data collection.
4. Understand some basic concepts of research and its methodologies
5. Understand as how to organize and conduct research in a more appropriate manner and write a research report, thesis and a research proposal

Course Outcomes (CO):

On completion of this course, the students will be able to:

CO1: Apply a range of quantitative and / or qualitative research techniques to business and management problems / issues

CO2: Determine and apply research approaches, techniques and strategies in the appropriate manner for managerial decision making

CO3: Demonstrate knowledge and understanding of data analysis and interpretation in relation to the research process

CO4: Develop necessary critical thinking skills in order to evaluate different research approaches utilised in the different industries and be able to critically assess the overall process of designing a research study from its inception to its final report preparation.

Modules	Blooms level*	Number of hours
Module I: Introduction Meaning of research, importance of scientific research in business decision making, types of research, complete research process, research methodology, criterion for good research, Identification of research problem and formulation of hypothesis, research designs, drafting a research proposal	L1, L2	2
Module II: Measurement and Data Collection	L1,	8

Primary data, secondary data, design of questionnaire, sampling fundamentals and sample designs, Qualitative and quantitative research, measurement and scaling techniques, measures of central tendency mean, median, mode; measures of dispersion, data processing	L2,L3,L4, L5	
Module III: Data Analysis I Cross tabulation, univariate analysis, bivariate analysis: Correlation, Karl Pearson's coefficient of correlation, Spearman's coefficient of correlation, hypothesis testing, t-test, Z test, F-test, Chi- square test, Analysis of variance, Non-parametric tests: Sign test, Run test, Krushall-Wallis test	L1, L2,L3,L4,L5	6
Module IV: Data Analysis-II Simple linear regression: coefficient of determination, significance tests, residual analysis, Multivariate techniques: multiple linear regression: Multiple coefficient of determination, interpretation of regression coefficients, heteroscedasticity, multicollinearity, outliers, auto regression, factor analysis, cluster analysis (concept)	L1,L2,L3,L4, L5	4
Module V: Report Writing Pre-Writing Considerations, structure of research report, common problems encountered while preparing the research report, presentation of research report, ethical issues while preparing a research report	L1,L2,L3,L4, L5	4

*Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Book:

Cooper, R.D., Schindler, S. P. and Sharma, J.K. (2015). Business Research Methods. New Delhi, India: McGraw Hill Education (India) Private Limited

Reference Books:

1. Zikmund, William C (1997). Business Research Methods (5th Ed.). The Dryden Press, Harcourt Brace College Publishers
2. Levin & Rubin (2004), Statistics for Management, 8th Ed, Prentice Hall of India

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	CT	HA	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70

CT: Class Test, HA: Home Assignment, Q/S: Seminar/Viva/Quiz, ME: Mid Term Exam
EE: End Semester Examination; A: Attendance

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3	PSO4
CO1	1	1	--	-	--	--	--	-	--	1	3	-	-
CO2	1	1	-	--	--	-	--	-	-	1	2	-	-
CO3	1	2	--	-	--	--	-	--	--	1	3	-	-
CO4	1	1	--	--	3	-	2	--	--	1	3	2	2

1: strongly related, 2: moderately related and 3: weakly related

BUA4206	PROGRAMMING FOR ANALYTICS USING R	L	T	P	C
Version 1.1	Date of Approval: Latest Approved	2	0	2	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

This course offers the specialization on R (powerful language used widely for data analysis and statistical computing). This course facilitates a good understanding on the process of data manipulation and visualization. The course provides ample working examples on statistical data analysis using R.

Course Objectives

The objective of this course is to:

1. Provide learning on how to program in R, how to use R for effective data analysis, how to install and configure software necessary for a statistical programming environment.
2. Provide applications on statistical computing which includes programming in R, reading data into R, accessing R packages, writing R functions, debugging, profiling R code, and organizing and commenting R code.
3. Facilitate hands on experience to various real world business problems using R.

Course Outcomes

On completion of this course, the students will be able to:

CO1: Analyze different datasets using R

CO2: Explore real time data at various levels using appropriate visualizations

CO3: Apply critical programming language concepts such as data types, iteration, control structures, functions, and boolean operators by writing R programs and through examples

Modules	Blooms level*	Number of hours
MODULE 1: Introduction: Introducing to R , R Data Structures , Help functions in R , Vectors , Scalars , Declarations , recycling , Common Vector operations , Using all and any, Vectorized operations , NA and NULL values , Filtering , Vectorized if-then else , Vector Equality , Vector Element names	L1, L2,L3	8
MODULE 2: Matrices, Arrays And Lists: Creating matrices , Matrix operations , Applying Functions to Matrix Rows and Columns , Adding and deleting rows and columns , Vector/Matrix Distinction , Avoiding Dimension Reduction , Higher Dimensional arrays , lists , Creating lists , General list operations , Accessing list components and values , applying functions to lists , recursive lists	L1, L2,L3	7
MODULE 3: Data Frames: Creating Data Frames , Matrix-like operations in frames , Merging Data Frames , Applying functions to Data frames , Factors and Tables , factors and levels , Common	L1, L2,L3	7

functions used with factors , Working with tables - Other factors and table related functions - Control statements , Arithmetic and Boolean operators and values , Default values for arguments - Returning Boolean values , functions are objects , Environment and Scope issues , Writing Upstairs - Recursion , Replacement functions , Tools for composing function code , Math and Simulations in R		
MODULE 4: OOP: S3 Classes , S4 Classes , Managing your objects , Input/ Output , accessing keyboard and monitor , reading and writing files , accessing the internet , String Manipulation , Graphics , Creating Graphs , Customizing Graphs , Saving graphs to files , Creating three-dimensional plots	L1, L2,L3	7
MODULE 5: Interfacing: Interfacing R to other languages , Parallel R , Basic Statistics , Linear Model , Generalized Linear models , Non-linear models , Time Series and Auto-correlation , Clustering	L1, L2, L3	7

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis;L6-Evaluation*

Text and Reference Books

1. Beginning R – The Statistical Programming Language by Mark Gardener, Wiley, 2013
2. Introductory R: A Beginner's Guide to Data Visualisation, Statistical Analysis and Programming in R
3. ByRobert Knell, Amazon Digital South Asia Services Inc, 2013

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	IP	EE	EP
Weightage (%)	5	25	50	20

IP: Internal Practical, EE: End Semester Examination; EP: External Practical; A: Attendance

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3	PSO4
CO1	3	1	2	1	--	--	3	1	1	2	1	--	--
CO2	1	1	3	1	--	--	3	1	2	2	1	--	--
CO3	1	2	2	1	--	--	3	1	1	2	1	--	--

1: strongly related, 2: moderately related and 3: weakly related

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BUA4207	PROGRAMMING FOR ANALYTICS USING PYTHON	L	T	P	C
Version 1.1	Latest Approved	2	0	2	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

This course is designed in such a way that leads the students from the basics of writing and running Python scripts to more advanced features such as file operations, regular expressions, working with binary data, and using the extensive functionality of Python modules.

Course Objectives

The objective of this course is to:

1. Equip students with the concepts of the fundamental programming concepts including data structures, networked application program interfaces, and databases, using the Python programming language.
2. Provide applications on statistical, machine learning, information visualization, text analysis, and social network analysis techniques through popular python toolkits such as pandas, matplotlib, scikit-learn, nltk, and networkx to gain insights into data analysis process.

Course Outcomes

On completion of this course, the students will be able to

CO1: Create applications for data retrieval and processing

CO2: Conduct an inferential statistical analysis of various business problems

CO3: Explain fundamental Python functionality and features used for data science

CO4: Apply techniques such as lambdas and manipulate csv files

Modules	Blooms level*	Number of hours
MODULE 1: Installing Python; basic syntax, interactive shell, editing, saving, and running a script, Concept of data types; variables, assignments; immutable variables; numerical types; arithmetic operators and expressions; comments in the program; understanding error messages Conditions, boolean logic, logical operators; ranges; Control statements: if-else, loops (for, while); short-circuit (lazy) evaluation	L1, L2, L3	8
MODULE 2: Strings and text files; manipulating files and directories, os and sys modules; text files: reading/writing text and numbers from/to a file; creating and reading a formatted file (csv or tab-separated). String manipulations: subscript operator, indexing, slicing a string; strings and number system: converting strings to numbers and vice versa. Binary, octal, hexadecimal numbers	L1, L2, L3	7
MODULE 3: Lists, tuples, and dictionaries; basic list operators,	L1,	7

replacing, inserting, removing an element; searching and sorting lists; dictionary literals, adding and removing keys, accessing and replacing values; traversing dictionaries. Design with functions: hiding redundancy, complexity; arguments and return values; formal vs actual arguments, named arguments, Program structure and design, Recursive functions	L2,L3	
MODULE 4: Simple Graphics and Image Processing: “turtle” module; simple 2d drawing - colors, shapes; digital images, image file formats, image processing Simple image manipulations with 'image' module (convert to bw, greyscale, blur, etc).Classes and OOP: classes, objects, attributes and methods; defining classes; design with classes, data modeling; persistent storage of objects OOP, continued: inheritance, polymorphism, operator overloading (<code>_eq_</code> , <code>_str_</code> , etc); abstract classes; exception handling, try block	L1, L2,L3	7
MODULE 5: Graphical user interfaces; event-driven programming paradigm; tkinter module, creating simple GUI; buttons, labels, entry fields, dialogs; widget attributes - sizes, fonts, colors layouts, nested frames Multithreading, Networks, and Client/Server Programming; introduction to HTML, interacting with remote HTML server, running html-based queries, downloading pages; CGI programming, programming a simple CGI form. Searching, Sorting, and Complexity Analysis	L1, L2, L3	7

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis;L6-Evaluation*

Text and Reference Books

1. Core Python Programming by Wesley Chun,Prentice Hall
2. Fundamentals of Python: First Programs By Kenneth Lambert,Course Technology, Cengage Learning
3. Learning Python by David Ascher and Mark Lutz,Oreilly

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:


Components	A	IP	EE	EP
Weightage (%)	5	25	50	20

IP: Internal Practical, EE: End Semester Examination; EP: External Practical; A: Attendance

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3	PSO4
CO1	3	1	2	1	--	--	3	1	1	2	1	--	--
CO2	1	1	3	2	--	--	3	1	2	2	1	--	--
CO3	1	2	2	1	--	--	3	1	1	2	1	--	--
CO4	2	1	3	2	--	--	3	1	2	2	1	--	--

1: strongly related, 2: moderately related and 3: weakly related


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BUA4302	DATAMINING	L	T	P	C
Version 1.1	Latest Approved	2	0	2	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

Every business organization is realizing the importance of data. They are harnessing the benefits offered by Data Mining as it allows them to see hidden patterns from the data and helps in framing business policies. This course emphasizes on utilizing the techniques offered by Data Mining.

Course Objectives

This course enable students to:

1. Understand the basic concepts, principles, methods, implementation techniques, and applications of data mining, with a focus on major data mining functions such as cluster analysis.
2. Develops skills to use data mining software and other data mining techniques to solve business problems.

Course Outcomes

On completion of this course, the students will be able to

CO1: Evaluate and implement a wide range of emerging and new technologies to facilitate the knowledge discovery.

CO2: Assess raw input data, and process it to provide suitable input for a range of data mining algorithms.

CO3: Compare and evaluate different data mining techniques like classification, prediction, clustering and association rule mining

CO4: Discover and measure interesting patterns from different kind of databases.

CO5: Determine data mining functionalities.

CO6: Identify appropriate data mining algorithms, and apply and interpret and report the output appropriately.

CO7: Describe complex data types with respect to spatial and web mining

CO8: Analyze data using the powerful data mining tool Weka.

Modules	Blooms level*	Number of hours
Module I: Introduction to Data Mining What is data mining? Related technologies - Machine Learning, DBMS, OLAP, Statistics, Data Mining Goals, Stages of the Data Mining Process, Data Mining Techniques, Knowledge Representation Methods, Applications, Example: weather data, Data Warehouse and DBMS, Multidimensional data model, OLAP operations, Example: loan data set. Data cleaning, Data	L1, L2	6

transformation, Data reduction, Discretization and generating concept hierarchies, Installing Weka 3 Data Mining System, Experiments with Weka - filters, discretization		
Module II: Data mining knowledge representation and Attribute oriented Analysis Data mining knowledge representation Task relevant data, Background knowledge, Interestingness measures, Representing input data and output knowledge, Visualization techniques, Experiments with Weka – visualization. Attribute oriented Analysis: Attribute generalization, Attribute relevance, Class comparison, Statistical measures, Experiments with Weka - using filters and statistics.	L2, L3	7
Module III: Data mining algorithms Association rules: Motivation and terminology, Example: mining weather data , Basic idea: item sets, Generating item sets and rules efficiently, Correlation analysis, Experiments with Weka - mining association rules Classification: Basic learning/mining tasks, Inferring rudimentary rules: 1R algorithm, Decision trees, Covering rules, Experiments with Weka - decision trees, rules Prediction: The prediction task, Statistical (Bayesian) classification, Bayesian networks, Instance-based methods (nearest neighbor), Linear models, Experiments with Weka - Prediction	L1, L2, L3	7
Module IV: Cluster Analysis: Concepts and Methods Basic issues in clustering, First conceptual clustering system: Cluster/2, Partitioning methods: k-means, expectation maximization (EM), Hierarchical methods: distance-based agglomerative and divisible clustering, Density Based, Grid based Methods, Conceptual clustering: Cobweb, Experiments with Weka - k-means, EM, Cobweb	L1, L2, L3	8
Module V: Advanced techniques- Data Mining software and applications Text mining: extracting attributes (keywords), structural approaches (parsing, soft parsing), Bayesian approach to classifying text, Web mining: classifying web pages, extracting knowledge from the web, Data Mining software and applications	L1, L2, L3	8

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation*

Text & References:

1. Han, J., Kamber, M., & Pei, J. (2011). Data mining: Concepts and techniques (3rd ed.). Waltham: Morgan Kaufmann.
2. Alex Berson, Data Warehousing, Data Mining, and Olap, Tata McGraw Hill.
3. George M Marakas, Modern Data Warehousing, Mining & Visualization Core Concepts, Pearson Education.
4. (Berry, Michael)Data Mining Techniques.
5. (Sharma, Gajendra)Data Mining, Data Warehousing and OLAP.
6. (Gupta, GK) Data Mining with Case Studies.
7. (Han &Kamber)Data Mining: Concepts and Techniques.
8. (PaulrajPonniah) Datawarehousing Fundamentals

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination**Examination Scheme:**

Components	A	IP	EE	EP
Weightage (%)	5	25	50	20

IP: Internal Practical, EE: End Semester Examination; EP: External Practical; A: Attendance

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3	PSO4
CO1	1							1			1		
CO2	1							1			1		
CO3	2							1	1		1		
CO4	1							1	2		1		
CO5	1			1				2			1		
CO6	1										1		
CO7	1										1		
CO8	1										1		

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BUA4303	PREDICTIVE ANALYTICS-I MACHINE LEARNING USING R	L	T	P	C
Version 1.1	Latest Approved	2	0	2	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

This course offers fundamental and applied evidence based knowledge to improve professional practice of students. It provides a detailed understanding of both supervised and unsupervised learning as it is vital for a data scientist. This course offer insight on text mining using “tidytext.”

Course Objectives

The objective of this course is to:

1. Facilitate an introduction to machine learning techniques using several popular algorithms.
2. Internalize a core set of practical and effective machine learning methods and concepts, and apply them to solve some real world problems.

Course Outcomes

On completion of this course, the students will be able to:

CO1: Explain and apply a set of unsupervised learning concepts and methods, classification methods of increasing complexity (rules, trees, random forests), and associated optimization methods (gradient descent and variants)

CO2: Explain the common idioms of large-scale graph analytics, including structural query, traversals and recursive queries, PageRank, and community detection

CO3: Apply the popular algorithms of machine learning using R

CO4: Analyze and interpret the results using specific statistical tools and techniques in R.

Modules	Blooms level*	Number of hours
MODULE 1: Linear Methods for Regression and Classification: Overview of supervised learning, Linear regression models and least squares, Multiple regression, Multiple outputs, Subset selection, Ridge regression, Lasso regression , Linear Discriminant Analysis , Logistic regression, Perception learning algorithm	L1, L2,L3,L4	8
MODULE 2: Model Assessment and Selection: Bias, Variance, and model complexity, Bias-variance trade off, Optimism of the training error rate, Estimate of In-sample prediction error, Effective number of parameters, Bayesian approach and BIC, Cross- validation, Boot strap methods, conditional or expected test error	L1, L2,L3,L4	7
MODULE 3: Additive Models, Trees and Boosting: Generalized additive models, Regression and classification trees, Boosting methods-exponential loss and AdaBoost, Numerical Optimization via gradient boosting	L1, L2,L3,L4	7

MODULE 4: Neural Networks (NN), Support Vector Machines (SVM), and K-nearest Neighbor: Fitting neural networks, Back propagation, Issues in training NN, SVM for classification, Reproducing Kernels, SVM for regression, K-nearest –Neighbour classifiers (Image Scene Classification)	L1, L2,L3,L4	7
MODULE 5: Implementation of following methods using R Simple and multiple linear regression, Logistic regression, Linear discriminant analysis, Ridge regression, Cross-validation and boot strap, Fitting classification and regression trees, K-nearest neighbours, Principal component analysis, K-means clustering	L1, L2, L3,L4	7

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis; L6-Evaluation*

Text and Reference Books

1. Trevor Hastie, Robert Tibshirani, Jerome Friedman , *The Elements of Statistical Learning-Data Mining, Inference, and Prediction* ,Second Edition , Springer Verlag, 2009.
2. G.James, D.Witten,T.Hastie,R.Tibshirani-*An introduction to statistical learning with applications in R*,Springer,2013.
3. E.Alpaydin, *Introduction to Machine Learning*, Prentice Hall Of India, 2010

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	IP	EE	EP
Weightage (%)	5	25	50	20

IP: Internal Practical, EE: End Semester Examination; EP: External Practical; A: Attendance

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3	PSO4
CO1	2	--	3	--	--	--	--	2	1	3	1	--	--
CO2	3	2	1	2	--	2	1	--	1	2	1	3	--
CO3	2	1	1	2	--	--	1	3	1	2	1	3	--
CO4	3	1	2	1	--	--	1	--	1	2	1	3	--

1: strongly related, 2: moderately related and 3: weakly related

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BUA4304	PREDICTIVE ANALYTICS-II MACHINE LEARNING USING PYTHON	L	T	P	C
Version 1.1	Latest Approved	2	0	2	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

This course offers the specialization of Python starting with data strategy. This course covers the two core paradigms that account for most business applications of predictive modeling: classification and prediction. It also covers the use of partitioning to divide the data into training data (data used to build a model), validation data (data used to assess the performance of different models, or, in some cases, to fine tune the model) and test data (data used to predict the performance of the final model).

Course Objectives

The objective of this course is to:

1. Facilitates a good learning to students on how to make meaningful predictions for a wide range of business purposes.
2. Provide provides a sufficient understanding on development of statistical models and how to devise data-driven workflows.

Course Outcomes

On completion of this course, the students will be able to:

CO1: Apply data science techniques to extract insights from a wide range of data sources and to provide an assessment basis for predictive models. Also, students shall be able to explain how ensemble models improve predictions

CO2: Visualize and explore data to better understand relationships among variables

CO3: Identify and implement appropriate performance measures for predictive models with popular algorithms

Modules	Blooms level*	Number of hours
MODULE 1: Data Cleaning: Reading the data – variations and examples, Data frames, Delimiters, Various methods of importing data in Python: csv method, open method in Python, reading data from a URL, reading .xlsx or .xls files, Reading from an .xls or .xlsx file, Writing to a CSV or Excel file. Handling missing values, Creating dummy variables, Visualizing a dataset by basic plotting, Scatter plots, Histograms, Boxplots	L1, L2, L3, L4	8
MODULE 2: Data Wrangling: Subsetting a dataset, Selecting columns, Selecting rows, Selecting a combination of rows and columns, Creating new columns, Generating random numbers and their usage, Seeding a random number, Generating random numbers following probability distributions, Probability density	L1, L2, L3	7

function, Cumulative density function, Uniform distribution, Normal distribution, Using the Monte-Carlo simulation to find the value of pi, Geometry and mathematics behind the calculation of pi, Generating a dummy data frame, Grouping the data: aggregation, filtering, and transformation		
MODULE 3: Statistical Concepts for Predictive Modelling, Random sampling and the central limit theorem, Hypothesis testing, Null versus alternate hypothesis, Linear Regression with Python: Understanding the math behind linear regression, Linear regression using simulated data, Fitting a linear regression model and checking its efficacy, Finding the optimum value of variable coefficients ,Making sense of result parameters, p-values, F-statistics, Residual Standard Error, Implementing linear regression with Python, Linear regression using the stats model library, Multiple linear regression, Multi-collinearity, Variance Inflation Factor, Model validation, Training and testing data split , Handling categorical variables, Transforming a variable to fit non-linear relations	L1, L2,L3,L4	7
MODULE 4: Logistic Regression with Python, Linear regression versus logistic regression, Understanding the math behind logistic regression, Contingency tables, Conditional probability, Odds ratio, Moving on to logistic regression from linear regression, Estimation using the Maximum Likelihood Method, Likelihood function: Log likelihood function, Building the logistic regression model from scratch, Making sense of logistic regression parameters, Wald test, Likelihood Ratio Test statistic, Chi-square test, Implementing logistic regression with Python, Processing the data, Data exploration, Data visualization, Creating dummy variables for categorical variables, Feature selection, Implementing the model, Model validation and evaluation, Cross validation, Model validation, The ROC curve, Confusion matrix.	L1, L2,L3,L4	7
MODULE 5: Trees and Random Forests with Python: Introducing decision trees, A decision tree Understanding the mathematics behind decision trees, Homogeneity, Entropy, Information gain, ID3 algorithm to create a decision tree, Gini index, Reduction in Variance, Pruning a tree, Handling a continuous numerical variable, Handling a missing value of an attribute, Implementing a decision tree with scikit-learn, Visualizing the tree, Cross-validating and pruning the decision tree, Understanding and implementing regression trees, Regression tree algorithm, Implementing a regression tree using Python, Understanding and implementing random forests, The random forest algorithm, Implementing a random forest using Python, Why do random forests work?, Important parameters for random forests	L1, L2, L3,L4	7

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis;L6-Evaluation*



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Text and Reference Books

1. A. I. Khuri. Introduction to linear regression analysis, by Douglas C. Montgomery, Elizabeth A. Peck, G. Geoffrey Vining. International Statistical Review, 81(2):318–319, 2013.
2. A. Toescher, M. Jahrer, and R. M. Bell. The bigchaos solution to the netflix grand prize. Netflix prize documentation, 2009.
3. C. J. Burges. A tutorial on support vector machines for pattern recognition. Data mining and knowledge discovery, 2(2):121–167, 1998.
4. D. H. Wolpert and W. G. Macready. No free lunch theorems for optimization. Evolutionary Computation, IEEE Transactions on, 1(1):67–82, 1997.
5. D. H. Wolpert. Stacked generalization. Neural networks, 5(2):241–259, 1992.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	IP	EE	EP
Weightage (%)	5	25	50	20

IP: Internal Practical, EE: End Semester Examination; EP: External Practical; A: Attendance

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3	PSO4
CO1	2	1	--	2	--	2	1	--	1	2	1	--	--
CO2	2	1	--	2	--	2	1	--	1	--	1	--	--
CO3	2	1	--	2	--	2	1	--	1	2	1	--	--

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BUA4305	BIG DATA ANALYTICS- HADOOP	L	T	P	C
Version 1.1	Latest Approved	2	0	2	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

This course familiarizes the students on how to perform analytical operations on structured and unstructured data to gain insights from data processed through Hadoop. This offers a specialization on Big Data Platform and its use cases providing an overview of Apache Hadoop.

Course Objectives

The objective of this course is to:

1. Equip students with the concepts of how to use Pig, Hive, and Impala to practice and examine tremendous datasets stored in the HDFS, and use Sqoop and Flume for data ingestion.
2. Provide applications on components of Hadoop and Hadoop Eco-System such as Hadoop Cluster Architecture, Important Configuration files in a Hadoop Cluster, Data Loading Techniques, how to setup single node Hadoop clusterl installation of VM player and Hadoop, Important Configuration files in a Hadoop Cluster, Linux commands, Importing Hadoop Jars, Data Loading Techniques

Course Outcomes

On completion of this course, the students will be able to:

CO1: Identify Big Data and its Business Implications

CO2: Access and Process Data on Distributed File System

CO3: Manage Job Execution in Hadoop Environment

CO4: Develop Big Data Solutions using Hadoop Eco System

Modules	Blooms level*	Number of hours
MODULE 1: Introduction to Big Data Definition of Big Data, The 5 V's of Big Data(Volume, Variety, Velocity, Veracity, Value), Comparison of Traditional Data with Big Data, Management of Big Data, Analyzing Big Data, and Technology Challenges for Big Data. Big Data Sources, Big Data Applications, Big Data Architecture	L1, L2,L3	8
MODULE 2: Technologies for Handling Big Data Introduction to Traditional RDBMS, OLTP, OLAP, Data Mining, Data Warehouse, Basic SQL Commands and queries: CREATE, INSERT, DELETE, UPDATE, SELECT Cloud Computing : Definition, Characteristics, Applications, Deployment Model, Service Models	L1, L2,L3	7
MODULE 3:Distributed Computing Using Hadoop	L1,	7

Introduction, Hadoop Framework, Hadoop Distributed File System, Map Reduce, Hive, Pig Sample Map Reduce Application, HIVE language capabilities, Pig Language capabilities, HIVE query examples, Pig Scripts examples	L2,L3	
MODULE 4: Big Data in Business Case Studies: Big Data in Marketing, Retail Hospitality, Customer Services, Decision Support using Big Data. Developing a Big Data Strategy/ Defining a Big Data strategy for your organization, Big Data Platform for Internet of Things	L1, L2,L3	7
MODULE 5: Visualization and Analytics Visualizations - Visual Data Analysis Techniques - Interaction Techniques; Systems and Analytics Applications - Analytics using Statistical packages-Approaches to modeling in Analytics – correlation, regression, decision trees, classification, association-Intelligence from unstructured information	L1, L2, L3	7

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis; L6-Evaluation*

Text and Reference Books

1. Michael Berthold, David J. Hand, "Intelligent Data Analysis", Springer, 2007
2. Anand Rajaraman and Jeffrey David Ullman, "Mining of Massive Datasets", Cambridge University Press, 2012
3. Bill Franks, "Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with Advanced Analytics", John Wiley & sons, 2012
4. Glenn J. Myatt, "Making Sense of Data", John Wiley & Sons, 2007
5. Pete Warden, "Big Data Glossary", O'Reilly, 2011
6. Jiawei Han, Micheline Kamber "Data Mining Concepts and Techniques", Second Edition, Elsevier, Reprinted 2008.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	IP	EE	EP
Weightage (%)	5	25	50	20

IP: Internal Practical, EE: End Semester Examination; EP: External Practical; A: Attendance

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3	PSO4
CO1	3	1	2	1	--	--	3	1	1	2	1	--	--
CO2	1	1	3	2	--	--	3	1	2	2	1	--	--
CO3	1	2	2	1	--	--	3	1	1	2	1	--	--
CO4	2	1	3	2	--	--	3	1	2	2	1	--	--

1: strongly related, 2: moderately related and 3: weakly related

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BUA4306	FINANCIAL DECISION ANALYSIS	L	T	P	C
Version 1.1	Latest Approved	2	0	2	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

Financial decision making involves analyzing the financial problems that the company faces and deciding which course of action should be taken. In order to make financial decisions, you must be able to identify potential financial problems and analyze the effects of alternative courses of action.

Course Objectives

This course provides a specialization on financial tools to apply to decision-making within organizations. The course helps the student to

1. Develop a range of financial analysis skills through a combination of class discussions and analyses of case studies of specific organizations.
2. Demonstrates the complex relationships between finance, impact, strategy, and governance in business organizations.

Course Outcomes

By the end of the course the participants should be better able to:

CO1: Explain how organisations make value optimising financial decisions, and reflectively and critically assess the ethical issues arising from these decisions.

CO2: Critically analyse and evaluate various financial models and decision making techniques and their impact on different constituencies of stakeholder. Apply financial analysis skills in the facilitation of strategic decision making.

CO3: Review Assess the features of alternative and diverse sources of finance and critically evaluate their appropriateness under different circumstances and evaluate elements of risk, return and value in a range of strategic operational financial decisions and understand the implications in regulatory and governance terms of the consequences of doing so.

Modules	Blooms level*	Number of hours
Module I : Financial governance: objectives and environment The role of shareholder wealth maximisation in modern financial management, Shareholder v stakeholder perspectives, Role of the finance , function Balancing risk and return, Shareholder wealth maximisation and ethical behaviour Ethics and the finance function, Corporate Governance : Corporate Governance and the agency problem, Financial aspects of the Indian Corporate Governance Code New public management, Listing requirements in the Stock Exchanges.	L1,L2, L3	5

Module II: Management performance measurement Financial ratio analysis – Profitability – Efficiency – Liquidity - Investment performance. Operating, Financial and Combined Leverage. Financial distress and insolvency, including the use of financial ratios based on univariate and multivariate analysis to predict financial failure. Analysis of Risk and Uncertainty in Capital Budgeting, Description and Measurement of Risk; and Risk Evaluation Approaches. Risk and Return - Conceptual Framework of Risk and Return: Type of Risks; Risk and Return of a Single Asset; Risk and Return of Portfolio (only two asset portfolio); Portfolio Selection; and Capital Asset Pricing Model (CAPM)	L1, L2, L3	6
Module III:-Making distributions to shareholders Dividend policy and shareholder wealth – Traditional v Modigliani and Miller arguments Reasons for the importance of dividends, Factors determining the level of dividends Scrip dividends, Special dividends and share buybacks, Tax Aspects associated with Dividend Decision	L1, L3	6
Module IV: - Long term investment decisions The nature of investment decisions - Investment appraisal methods - Payback period (including discounted payback period) - Accounting rate of return - Net present value - Internal rate of return – MIRR – XIRR- CAGR, Investment opportunities and risk - Risk and Return preferences of investors. Risk appraisal methods – Sensitivity analysis – Scenario analysis –Simulations - Expected net present value - Risk-adjusted discount rate. Shareholder value analysis: Shareholder value and the need for new forms of measurement-Shareholder value analysis and net present value -Comparison of shareholder value analysis and Economic value added -Total shareholder return (TSR) and market value added (MVA) , Cash Value added, Market to Book Value , Evaluation of the shareholder value approach. Analysis of securities: Cost method and market method. Equity method of accounting and analysis of minority interest.	L1, L3, L4	7
Module V: Business combinations and share valuation Business Valuation: Conceptual Framework of Valuation; Approaches/Methods of Valuation; and other Approaches to Value Measurement, Corporate Restructuring: Conceptual Framework; Financial Framework; Tax Aspect of Amalgamation; Merger and Demergers; Legal and Procedural Aspects of Mergers/Amalgamations and Acquisition/Takeovers; and other forms of Corporate Restructuring. Economic rationale for mergers and acquisitions, forms of purchase consideration with DCF model. Option Valuation: Concept and Types of Options; Option Payoffs; Call Option Boundaries; Factors Influencing Option Valuation; and The Black-Scholes Option Pricing Model. Valuation and forecasting - Valuation models: Asset based models, DCF models and abnormal earnings or Edwards-Bells-Ohlson model. Forecasting models: Extrapolative models and index models, Forecasting with disintegrated data,	L1, L3, L4	5

Comparison with financial analysts' forecast.		
Module VI: Capital markets and long-term financing decisions Financial markets and institutions-The role of the Stock Exchange Advantages and disadvantages of a Stock Exchange listing Stock market efficiency – Long term sources of financing – Shares– Debts - Debentures – Personal financing -		7

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation*

Text and Reference Books:

1. Khan, M.Y & Jain, P.K.: Financial Management; Tata McGraw Hill, New Delhi, 2015.
2. Pandey, I. M.: Financial Management; Vikas Publishing House, New Delhi, 2015.
3. Chandra, Prasanna: Financial Management; Tata McGraw Hill, New Delhi, 2008.
4. Brealey and Myers: Principles of Corporate Finance: Tata McGraw Hill, New Delhi, 2008.
5. Keown, Martin, Petty and Scott (Jr): Financial Management: Principles and Applications; Prentice Hall of India, New Delhi, 2002.
6. Gitman, L.J: Principles of Managerial Finance; Addison Wesley, 2009.
7. Vanhorne, James C: Financial Management and Policy; Prentice Hall of India, New Delhi, 2015.
8. Kishore Ravi, M: Financial Management; Taxman, 2018.
9. Gerald I. White, Ashin Paul C. Sondhi and Dov Fiedler, "The Analysis and use of Financial Statements", (3rd Ed.), , Wiley-India

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	CT	HA	P	A	EE
Weightage (%)	10	5	10	5	70

C - Case Discussion/ Presentation; HA - Home Assignment; P - Project; S - Seminar; V - Viva; Q - Quiz; CT - Class Test; A - Attendance; EE - End Semester Examination

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3	PSO4
CO1	1	1	--	--	--	--	--	--	1	1	1	--	--
CO2	1	1	--	--	--	--	--	--	1	1	1	--	--
CO3	1	1	--	--	--	--	--	--	1	1	1	--	--

1: strongly related, 2: moderately related and 3: weakly related

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BUA4307	VISUAL ANALYTICS- TABLEAU /POWER BI	L	T	P	C
Version 1.1	Latest Approved	2	0	2	3
Pre-requisites/ Exposure					
Co-requisites					

Catalog Description

This course familiarizes the students on data visualization tools. This course is designed to provide a fundamental and strategic understanding on the concepts of Business Intelligence using Tableau.

Course Objectives

The objective of this course is to:

1. Equip students with the concepts of BIs and its types and how to connect to and import data, author reports using Power BI Desktop, and publish those reports to the Power BI service
2. Emphasize on how to create dashboards and share with business users—on the web and on mobile devices

Course Outcomes

On completion of this course, the students will be able to:

CO1: Connect, import, shape, and transform data for business intelligence (BI)

CO2: Visualize data, author reports, and schedule automated refresh of your reports

CO3: Create and share dashboards based on reports in Power BI desktop and Excel

CO4: Use natural language queries and create real-time dashboards

Modules	Blooms level*	Number of hours
MODULE 1: Tableau: Introduction, Getting Started with Tableau, Connecting to Data, Data Prep with Excel, Overview of the Tableau User Interface, Working with Discrete vs. Continuous Data, Calculated fields Power BI: Understanding key concepts in business intelligence, data analysis, and data visualization, Importing data and automatically creating dashboards from services such as Marketo, Salesforce, and Google Analytics, Connecting to and importing your data, then shaping and transforming that data, Enriching your data with business calculations.	L1, L2, L3	8
MODULE 2: Tableau: Introduction to data visualization, the evolution of the BI industry, Understanding the business value of visual analytics, Data visualization best practices (overview), Power BI: Visualizing your data and authoring reports, Scheduling automated refresh of your reports, Creating dashboards based on reports and natural language queries, Sharing dashboards across	L1, L2, L3	7

your organization, Consuming dashboards in mobile apps		
MODULE 3: Tableau: Basic charts, Design considerations for effective data visualization, Human cognition and visual perception, Using Maps to Visualize Spatial Data, Power BI: Leveraging your Excel reports within Power BI, Creating custom visualizations that you can use in dashboards and reports, Collaborating within groups to author reports and dashboards, Sharing dashboards effectively based on your organization's needs.	L1, L2, L3	7
MODULE 4: Tableau: The visual storytelling framework, the business value of visual stories, Creating dashboards and story points, Formatting worksheets and dashboards. Power BI: Exploring live connections to data with Power BI, Connecting directly to SQL Azure, HD Spark, and SQL Server Analysis Services, Introduction to Power BI Development API, Leveraging custom visuals in Power BI	L1, L2, L3	7
MODULE 5: Common pitfalls of data visualization, Common pitfalls of data narratives, Share and critique an example of a data visualization, Provide your Tableau Public URL, Share data visualization on Tableau Public, Building a Dashboard in Tableau and Power BI, Develop a data story pitch	L1, L2, L3	7

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis; L6-Evaluation*

Text and Reference Books

1. Microsoft Business Intelligence Tools for Excel Analysts: Michael Alexander, Jared Decker, Bernard Wehbe, John Wiley & Sons, 2014
2. Introducing Microsoft Power BI: Alberto Ferrari and Marco Russo, Microsoft Press 2016
3. Getting started with Watson Analytics: IBM Corporation 2015
4. Tableau Your Data! Fast and Easy Visual Analysis with Tableau Software: Daniel G. Murray and the InterWorks BI Team, John Wiley & Sons 2013
5. Beginning Big Data with Power BI and Excel 2013: Neil Dunlop, Apress 2015
6. IBM Watson Content Analytics Discovering Actionable Insight from Your Content: Wei-Dong (Jackie)
7. Zhu Bob Foyle, Daniel Gagné, Vijay Gupta, Josemina Magdalen, Amarjeet S Mundi, Tetsuya Nasukawa Mark Paulis, Jane Singer, Martin Triska, ibm.com/redbooks, IBM Corporation July 2014

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	IP	EE	EP
Weightage (%)	5	25	50	20

IP: Internal Practical, EE: End Semester Examination; EP: External Practical; A: Attendance

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3	PSO4
CO1	3	1	2	1	--	--	3	1	1	2	1	--	--
CO2	1	1	3	2	--	--	3	1	2	2	1	--	--
CO3	1	2	2	1	--	--	3	1	1	2	1	--	--
CO4	2	1	3	2	--	--	3	1	2	2	1	--	--

1: strongly related, 2: moderately related and 3: weakly related



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BUA4335	SUMMER INTERNSHIP EVALUATION	L	T	P	C
Version 1.1	Latest Approved	0	0	0	6
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

There are certain phases of every Intern's professional development that cannot be effectively taught in the academic environment. These facets can only be learned through direct, on-the-job experience working with successful professionals and experts in the field. The internship programme can best be described as an attempt to institutionalize efforts to bridge the gap between the professional world and the academic institutions. Entire effort in internship is in terms of extending the program of education and evaluation beyond the classroom of a university or institution. The educational process in the internship course seeks out and focuses attention on many latent attributes, which do not surface in the normal class room situations. These attributes are intellectual ability, professional judgment and decision making ability, inter-disciplinary approach, skills for data handling, ability in written and oral presentation, sense of responsibility etc.

Course Objectives

The objective of this course is to:

1. Offer students the opportunity to apply their knowledge in real-life environments through an industry placement for eight-weeks.
2. Provided desired skills to students that will help them perform better on their jobs after graduation.

Course Outcomes

On completion of Summer Internship, the students will be able to:

CO1: Get hands-on experience about real world problems in a field relevant to their major of studies.

CO2: Acquire confidence for employment after graduation.

CO3: Acquire skills important for time management, discipline, self-learning, effective communication and so on.

CO4: Learn practically about team-work, collaboration, and leadership.

Credit Hours: 6 hours

Course Duration: Six-Eight weeks

Semester Offered: Summer

Format for Report Writing	Blooms level*	Number of hours
1. Title of the project 2. About the organization 3. Introduction and objectives of the project/ programme / organization	L1, L2 ,L3,L4,L5,L6	6hours (Duration- 6-8 weeks during

4. Funding agency—about the agency, how to get funding, Nature of funding agency 5. Staffing pattern of the project with their functions 6. Major activities going under project 7. Results achieved so far (target Vs achievement) 8. Role of the candidate in the project/programme / organization 9. Evaluation by the candidate		summer)
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**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis; L6-Evaluation*

SIP Guidelines

1. Every student is required to write an Internship report upon completion of their internship and required to submit two copies (student copy + department copy) of the report to concerned department HOD (along with internal marks certificate given by the company) for final evaluation and awarding of end examination marks.

2. Before submitting the report to the HOD, the student required to go through multiple rounds of revision in collaboration with the industry guide and department internship mentor/coordinator/supervisor.

The Internship Report serves multiple purposes:

- Help the student develop written communication skills.
- Serve as an archival record of the internship experience.
- Give the student an opportunity to reflect on the professional aspects of the internship experience and the skills that were learned.
- Allow the student to describe the science content of the internship.
- Have the student to reflect on the initial goals of the internship and how they were (or were not) achieved during the internship.

Modes of Evaluation: Presentation/Viva/ Report /Assignment Examination

Examination Scheme:

Components	Content & Layout of Report	Conceptual Framework	Objectives & Methodology	Implications & Conclusions	Presentation
Weightage	30	10	15	15	30

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3	PSO4
CO1	1	--	--	--	--	--	--	1	--	--	--	1	--
CO2	--	1	--	--	--	--	--	--	--	--	--	1	--
CO3	--	--	1	--	--	1	1	--	--	--	--	1	2
CO4	--	--	--	--	--	--	1	--	--	--	--	1	2

1: strongly related, 2: moderately related and 3: weakly related

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BUA4402	FINANCIAL ANALYTICS	L	T	P	C
Version 1.1	Latest Approved	2	0	2	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

Every business in the industry is generating loads of financial data and they understand the significance of deriving logical inferences out of it to streamline their decision making process. Lately, accurate financial data analysis is not enough for a business to sail through. They need predictive insights which can improve their real time day to day decision making. Financial analytics helps in combining internal and external financial information by using social media and big data to provide predictive insights. Whether it is with respect to stock market prediction or customer profitability, finance analytics enables to provide a direction in predicting all. This course blends easy-to-use statistical tools with complex machine learning tools and algorithms to equip the participants with the requisite skill set in analysing data. By the end of this course, the participants should be able to perform financial analysis using powerful tools like R and Python.

Course Objectives

The objective of this course is to:

1. Make students understand and diagnose the information contained in financial statement with a view to judge the profitability and financial soundness of the firm, and to make forecast about future prospects of the firm.
2. Provide understanding on diverse needs of the traditional financial department, and advancements in technology, all point to the need for financial analytics.
3. Help students to shape up the business' future goals and to improve the decision-making strategies for various business situations.
4. Emphasize on measuring and managing business' tangible assets such as cash and equipment.
5. Provides an in-depth insight into the organization's financial status and improves the cash flow, profitability, and business value.

Course Outcomes

On completion of this course, the students will be able to:

CO1: Understand and interpret the financial data about the company

CO2: Forecast the firm financial position and interpret accordingly

CO3: Evaluate the financial position with the support of various financial tools like financial statement analysis, time value of money, bond valuation and valuation of the firm

CO4: Equip the requisite skill set in analyzing data in terms of finance

Modules	Blooms level*	Number of hours
Module I: Introduction to Financial Analytics and Time Series Data Subjective Forecasting, Business Forecasting and Time Series Data, Introduction to Financial Analytics, Forecasting Performance Measurements: Distance, Forecasting Performance Measurements: Metrics.	L1,L2,L3	7
Module II: Performance Measures and Holt-Winters Model Introduction to Forecasting: Average Method, Naive Method, Linear regression, R example, Moving Averages, Introduction to Exponential Smoothing, Simple Exponential Smoothing, R example on Simple exponential smoothing, Holt's Exponential Smoothing, Holt-Winter's Forecasting Model, Holt-Winter's Model: R Example, Autoregression: Introduction, Autoregression: R Example	L1, L2, L3,L4, L6	8
Module III : Financial Statement Analysis Balance Sheet, Income Statement, Cash Flow Statement, Understanding the Financial Statements and their interlinking, Financial Ratios, Ratio Analysis Present Value (single and multiple cash flows), Future Value (single and multiple cash flows), Annuity, Perpetuity, Growing Annuity. Application: Loan Amortization, Compounding the interest rate	L1, L2, L4, L6	7
Module IV: Modern Portfolio Theory and Introduction to Algorithmic Trading Portfolio Theory: Introduction, Expected Returns, Risk of a Security, Efficient Frontier, Portfolio Weights, Capital Allocation Line, Diversification, Introduction to Algorithmic Trading, Trend Following Strategy, Backtesting, R Example	L1, L2, L3,L4	7
Module V:Linear Regression, Predicting Binary Outcomes (Credit Prediction) Single and Multiple Linear Regression, Modelling and Prediction (Examples using financial data), Logistic Regression, Multiple Logistic Model, Historical Simulation, Simple Variance based approach, Risk Metrics, Monte Carlo Simulation, Value-at-Risk Estimation and Backtesting	L1, L2, L3,L4	7

*Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books:

Edward E Williams (Author), John A Dobelman , Quantitative Financial Analytics: The Path To Investment Profits, 2017, Publisher: WSPC, ISBN-10: 9813224258I

Reference Books:

1. Thomas Mazzoni , A First Course in Quantitative Finance, 2018, Cambridge University Press (March 22, 2018)ISBN-10: 9781108411431
2. Mark J. Bennett and Dirk L. Hugen, Financial Analytics with R: Building a Laptop Laboratory for Data Science, 2016 by Cambridge University Press

**Modes of Evaluation: Presentation/Viva/ Report /Assignment Examination
Examination Scheme:**

Components	A	IP	EE	EP
Weightage (%)	5	25	50	20

IP: Internal Practical, EE: End Semester Examination; EP: External Practical; A: Attendance

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3	PSO4
CO1	1	1	--	--	--	2	--	2	1	2	1	--	--
CO2	1	1	--	--	--	2	--	2	1	2	1	--	--
CO3	1	1	--	--	--	2	--	2	1	2	1	--	--
CO4	1	1	--	--	--	2	--	2	1	2	1	--	--

1: strongly related, 2: moderately related and 3: weakly related



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BUA4403	SUPPLY CHAIN ANALYTICS	L	T	P	C
Version 1.1	Latest Approved	2	0	2	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

This course provides foundational knowledge associated with the operations analytics. The course offers insights on the various tools and techniques for implementation of analytics based on the supply chain drivers such as location, logistics and inventory.

Course Objectives

The objective of this course is to:

1. Manage uncertainty and risk within supply chain management
2. Segment different customers, products, and channels and design an optimal portfolio of logistics approaches and strategies for these various segments
3. Understand the appropriate forecasting methodology for each segment

Course Outcomes

On completion of this course, the students will be able to:

CO1: Describe the various techniques for analytics based on the Multi Attribute Decision Making (MADM) and risk.

CO2: Identify the inventory techniques for analytics and the different network models.

CO3: Analyze the inventory using aggregate production model.

CO4: Illustrate the transportation problems for analytics in network design.

CO5: Analyze the different dimensions using Analytic Hierarchy Process.

Modules	Blooms level*	Number of hours
Module I: Warehousing Decisions, Mathematical Programming Models, P-Median Methods, Guided LP Approach, Balmer – Wolfe Method, Greedy Drop Heuristics, Dynamic Location Models, Space Determination and Layout Methods.	L1, L2	7
Module II: Inventory Management, Inventory aggregation Models, Dynamic Lot sizing Methods, MultiEchelon Inventory models, Aggregate Inventory system and LIMIT, Transportation Network Models, Notion of Graphs, Minimal Spanning Tree.	L1, L2	8
Module III: Shortest Path Algorithms, Maximal Flow Problems, Multistage Transshipment and Transportation Problems, Set covering and Set Partitioning Problems, Traveling Salesman Algorithms, Advanced Vehicle Routing Problem Heuristics, Scheduling Algorithms-Deficit function Approach and Linking Algorithms.	L1, L2	6

Module IV: Analytic Hierarchy Process, Data Envelopment Analysis, Risk Analysis in Supply Chain, Measuring transit risks, supply risks, delivering risks	L1,L2	5
Module V: Risk pooling strategies, Fuzzy Logic and Techniques-Application in SCM	L1, L2	6

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation*

Text Books:

1. Gerad Feigin, Supply Chain planning and analytics – The right product in the right place at the right time, Business Expert Press, 2011
2. Peter Bolstorff, Robert G. Rosenbaum, Supply Chain Excellence: A Handbook for Dramatic Improvement Using the SCOR Model, AMACOM Div American Mgmt Assn, 2007
3. Robert Penn Burrows, Lora Cecere, Gregory P. Hackett, The Market-Driven Supply Chain: A Revolutionary Model for Sales and Operations Planning in the New On Demand Economy, AMACOM Div American Mgmt Assn, 2013.

Reference Books:

1. Hamdy A. Taha, "Operations Research An Introduction", Prentice Hall India. Sixth, Edition
2. Anderson, Sweeney and Williams, "An Introduction to Management Science: Quantitative Approaches to Decision Making", Cengage Learning, Fifth India Edition
3. Barry Render, Ralph M. Stair Jr. "Quantitative Analysis for Management, Pearson Education, Eighth Edition
4. Frederick S. Hillier and Mark S. Hillier, Introduction to Management Science: A Modeling and Case Studies Approach with Spreadsheets, Tata McGraw-Hill Edition, Second Edition

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	IP	EE	EP
Weightage (%)	5	25	50	20

IP: Internal Practical, EE: End Semester Examination; EP: External Practical; A: Attendance

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3	PSO4
CO1	1	1	-	-	-	-	-	-	3	-	1	--	3
CO2	1	1	-	-	-	-	-	-	3	-	1	--	3
CO3	1	1	-	-	-	-	-	-	3	-	1	--	3
CO4	1	1	-	-	-	-	-	-	3	-	1	--	3
CO5	1	2	-	-	-	-	-	-	3	-	1	--	3

1: strongly related, 2: moderately related and 3: weakly related

BUA4404	HR ANALYTICS	L	T	P	C
Version 1.1	Latest Approved	2	0	2	3
Pre-requisites/Exposure					
Co-requisites					

Catalogue Description:

Developing the right HR metrics and analytics for your specific context which support long-term performance and improving the decision making is a key competitive edge in the modern economy. HR is increasingly difficult in an era of talent wars, complex environments and a deluge of information.

Course Objective:

The course aims to:

1. Give students a good understanding on the concepts and techniques of human resource analytics.
2. Familiarize the students on how to prepare HR reports and identify decision technologies.
3. Develop a structured approach among students to apply judgment, and generate insight from data for enhanced decision making.

Course Outcomes:

On successful completion of the course a student will be able to:

CO1. Explain internal and external human resource metrics benchmarks and indicators.

CO2. Reproduce knowledge on relational databases and make recommendations regarding the appropriate HRIS to meet organization's human resource needs.

CO3. To identify appropriate software to record, maintain, retrieve and analyze human resources information (e.g., staffing, skills, performance ratings and compensation information).

CO4. To describe both the quantitative and qualitative analysis to understand trends and indicators in human resource data.

Modules	Blooms level*	Number of hours
Module I: Introduction to HR Analytics Basics of HR Analytics: Concept and Evolution of HR Analytics & data sources - HCM: 21Model, Use of workforce analytics to improve decision making, Analytics and Prediction, Introduction to HR Metrics and predictive analytics, Importance of HR Analytics, Data Analytic techniques using software packages, Future of Human Resource Analytics. HR Metrics and HR Analytics; Intuition versus analytical thinking.	L1, L2	7
Module II: Creating business understanding for HR initiatives	L1, L2	6

Workforce segmentation and search for critical job roles; Statistical driver analysis – association and causation; Linking HR measures to business results; choosing the right measures for scorecards; Identifying and using key HR Metrics.		
Module III:Forecasting budget numbers for HR costs Workforce planning including internal mobility and career pathing; training and development requirement forecasting and measuring the value and results of improvement initiatives; optimizing selection and promotion decisions	L1, L2	8
Module IV:Predictive modelling in HR Employee retention and turnover; workforce productivity and performance; scenario planning.	L1,L2	6
Module V:Communicating with data and visuals Data requirements; identifying data needs and gathering data; HR data quality, validity and consistency; Using historical data; Data exploration; Data visualization; Association between variables; Insights from reports; Root cause analysis of HR issues	L1, L2	4

*Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text and Reference Books:

1. Fitz-Enz, J (2010)*The New HR Analytics: Predicting the Economic Value of Your Company's Human Capital Investments*, Amacom.
2. Pease,G Byerly, B& Fitz-enz, J(2012).*Human Capital Analytics: How to Harness the Potential of Your Organization's Greatest Asset*, John Wiley & Sons

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	IP	EE	EP
Weightage (%)	5	25	50	20

IP: Internal Practical, EE: End Semester Examination; EP: External Practical; A: Attendance

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3	PSO4
CO1	2									1	1		
CO2	1						1			2	1		
CO3								2	1		1		
CO4	2	1									1		

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BUA4405	MARKETING ANALYTICS	L	T	P	C
Version 1.1	Latest Approved	2	0	2	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

This course provides an understanding on the use of analytics in Marketing Management. The course offers insights to the students on the use of predictive analysis in decision making. The course familiarizes the students on the concept of the market place, various segments of products and services in the markets, and changing consumer needs in the markets.

Course Objectives

The objective of this course is to

1. Develop the ability to critically evaluate business problems and to determine the most appropriate analytical technique address marketing problems.
2. Acquaint the students to develop and implement the marketing strategy by providing a framework from which to identify and evaluate strategic options and programs.
3. Enable students to solve real-world marketing problems across a wide range of industries, giving them a competitive edge.

Course Outcomes

On completion of this course, the students will be able to:

CO1: Identify various methods followed build CRM practices and various positioning strategies followed by the companies.

CO2: Contrast the characteristics of industrial and consumer goods.

CO3: Identify and apply the various techniques of predictive analysis in the different market situations.

CO4: Explain the need for digital evolution in marketing.

Modules	Blooms level*	Number of hours
Module 1: Introduction to Marketing Understanding the marketplace and consumer needs, Designing a Customer Driven Marketing Strategy, Building Customer Relationships, Consumer Behaviour and Business Buyer Behaviour	L2,L5	7
Module 2: Marketing Strategy Market Segmentation and Product Positioning, Market Segmentation, Market Targeting, Target Market Strategies, Product Positioning and Differentiation, Choosing a Differentiation and Positioning Strategy.	L1, L4	8
Module 3: Product and Service Products and services, product and service classifications, consumer products, industrial products, product and service decisions, product	L2,L4	7

and service attributes, product support services, services marketing – the nature and characteristics of a service.		
Module 4: Retail Analytics – I Customer Analytics Overview; Quantifying Customer Value, Using Stata for Basic Customer Analysis, Predicting Response with RFM Analysis, Statistics Review, Predicting Response with Logistic Regression, Predicting Response with Neural Networks, Predicting Response with Decision Trees.	L2,L3, L5	6
Module 5: Retail Analytics – II The digital evolution of retail marketing, Digital natives, Constant connectivity Social interaction, Predictive modelling, Keeping track, Data availability, Efficiency optimization.	L2,L4	8

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation*

Text Books:

1. Kotler, P., Keller, K. L., Koshy, A., Jha, M. Marketing Management: A South Asian Perspective. New Delhi: Pearson Education, 14th edn., 2013
2. Rajan, S. Marketing Management. India: New Delhi: Tata McGraw-Hill Education. 4th edn., 2005

Reference Books:

1. Karunakaran, K. Marketing Management. New Delhi: Himalaya Publishing House. 3rd edition, 2013.
2. Kumar, A., Meenakshi. Marketing Management. New Delhi: Vikas Publishing House Pvt Ltd., 2nd edition, 2013
3. Ramaswamy, V. S., Namakumari, S. Marketing Management Global Perspective, Indian Context. New Delhi: Macmillan India Limited. 3rd edition, 2009

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	IP	EE	EP
Weightage (%)	5	25	50	20

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CO, PO and PSO mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3	PSO4
CO1	-	-	1	1	-	-	1	1	1	1	1	-	-
CO2	-	-	1	1	-	-	1	1	1	1	1	-	-
CO3	-	-	1	1	-	-	1	1	1	1	1	-	-
CO4	-	-	1	1	-	-	1	1	1	1	1	-	-

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BUA4406	DATA PRIVACY AND DATA SECURITY LAWS	L	T	P	C
Version 1.1	Latest Approved	2	0	0	2
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

This course is designed to familiarize the students with the basic concepts of data privacy issues and security laws including current and proposed laws and regulations that govern data security and privacy.

Course Objectives

The objective of this course is to:

1. Provide the foundational knowledge based on data security investigation and data policy questions concerning the value of data security and data privacy regulations.
2. Emphasize on the real world effects of data breaches on individuals and businesses.
3. Provide an understanding on how to secure data and balancing of interests among individuals, government, and enterprises from the technical and legal perspective.

Course Outcomes

On completion of this course, the students will be able to:

CO1: Explain the fundamental concepts of data security and security laws.

CO2: Explain the business needs for data privacy and security investigation.

CO3: Assess the risk for data security.

CO4: Identify the legal, professional and ethical issues related to data.

Modules	Blooms level*	Number of hours
MODULE 1: Introduction to Data Security History of data security, Meaning of data Security and data privacy, Critical Characteristics and components of Data security, Need for Security, Business Needs, Threats, Attacks, Meaning of term personal data, data processing, data protection, NSTISSC Data Security Model, Balancing Security and Access to data, The SDLC model, The Security SDLC	L1, L2	6
MODULE 2: Introduction to Data Security Laws Introduction of the General Data Protection Regulation (GDPR), rationale for the introduction of the GDPR , primary objectives of the General Data Protection Regulation, scope of data processing activities covered by the GDPR, territorial scope of the GDPR regarding the location of personal data processing and data subjects, GDPR impact on Indian Companies, Data protection Laws in India	L1, L2	6

MODULE 3: Data Privacy: Legal Issues and Landscape Development of Privacy Laws (historical and legal context), Fair Information Principles, The Statutory Landscape in the US, Indian IT Act, Adjudication under Indian IT ACT, IT Service Management Concept, IT Audit standards, ISO/IEC 27000 Series, COBIT, HIPPA, SOX, System audit, Information security audit, ISMS, SoA (Statement of Applicability), BCP (Business Continuity Plan), DR (Disaster Recovery), RA (Risk Analysis/Assessment)	L1, L2	6
MODULE 4: Data Security Analysis and Risk Management Risk Management: Identification, Assessment and controlling of Risk Logical Design: Blueprint for Security, Information Security Policy, Standards and Practices, ISO17799/BS 7799, NIST Models, VISA International Security Model, Design of Security Architecture, Planning for Continuity Physical Design: Security Technology, IDS, Scanning and Analysis Tools, Cryptography, Access Control Devices, Physical Security, Security and Personnel	L1, L2	6

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis; L6-Evaluation*

Text and Reference Books

1. Micki Krause, Harold F. Tipton, "Handbook of Information Security Management", Vol 1-3 CRC Press LLC, 2004.
2. Stuart McClure, Joel Scrambray, George Kurtz, "Hacking Exposed", Tata McGraw-Hill, 2003.
3. Matt Bishop, "Computer Security Art and Science", Pearson/PHI, 2002.
4. International Guide to Privacy – American Bar Association (Privacy)
5. International Guide to Cyber Security – American Bar Association (Cyber Security)
6. Roadmap to an Enterprise Security Program - American Bar Association (Roadmap)
7. The Executive Guide to Information Security – Egan and Mather (Guide)
8. Case studies from the Harvard Business School;
<http://cb.hbsp.harvard.edu/cb/access/5263390>

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3	PSO4
CO1	2	3	2	1	3	--	2	2	2	--	1	--	3
CO2	2	2	--	1	3	--	2	2	--	--	1	--	2
CO3	2	3	1	1	2	--	2	--	2	--	1	--	3
CO4	2	2	2	1	1	--	2	2	2	--	1	--	--

1: strongly related, 2: moderately related and 3: weakly related

BUA4437	DISSERTATION (ANALYTICS PROJECT)	L	T	P	C
Version 1.1		0	0	0	6
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

Under this, it is usual to give the student some discretion in the choice of topic for the dissertation and the approach to be adopted. The dissertation topic is related to the field of specialization. Deciding this is often the most difficult part of the dissertation process, and requires thorough preparation and background research.

The aim of the dissertation is to provide the students with an opportunity to further their intellectual and personal development in their chosen field by undertaking a significant practical unit of activity, having an educational value at a level commensurate with the award of their degree.

Course Objectives

The objective of this course is to:

1. Understand and apply theoretical frameworks to the chosen area of study.
2. Produce a coherent and logically argued piece of writing that demonstrates competence in research and the ability to operate independently.

Course Outcomes

On completion of Dissertation, the students will be able to

CO1: Describe a relevant area of career development, career coaching, coaching or work-related learning studies.

CO2: Identify research methods and state research questions.

CO3: Critically analyze and evaluate the knowledge and understanding in relation to the agreed area of study.

CO4: Integrate theory and practice for the development of responses on the basis of the evaluation and analysis undertaken.

CO5: Communicate in written form by integrating, analyzing and applying key texts and practices.

CO6: Demonstrate advanced critical research skills in relation to career development or work-related learning studies.

Planning the dissertation	Blooms level*	Number of hours
<ul style="list-style-type: none"> • Selecting a topic for investigation. • Establishing the precise focus of the study by deciding on the aims and objectives of the dissertation, or formulating questions to be investigated. Consider very carefully what is worth investigating and its feasibility. • Drawing up initial dissertation outlines considering the aims 	L1, L2 ,L3,L4,L5,L6	6hours a Week

and objectives of the dissertation. Workout various stages of dissertation		
<ul style="list-style-type: none"> Devising a timetable to ensure that all stages of dissertation are completed in time. The timetable should include writing of the dissertation and regular meetings with your dissertation guide. 		

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis; L6-Evaluation*

Modes of Evaluation: Viva/ Report Examination

Examination Scheme:

Components	Content & Layout of Report	Conceptual Framework	Objectives & Methodology	Implications & Conclusions	Viva-Voce
Weightage	30	10	15	15	30

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3	PSO4
CO1	1	--	--	--	--	--	--	1	--	--	--	1	--
CO2	--	1	--	--	--	--	--	--	--	--	--	1	--
CO3	--	1	2	--	--	--	--	--	--	--	--	1	--
CO4	1	--	--	--	--	--	--	--	--	--	--	1	--
CO5	--	--	--	--	--	--	1	--	--	--	--	1	2
CO6	--	--	--	--	--	--	--	--	1	--	--	1	--

1: strongly related, 2: moderately related and 3: weakly related

Anil

Manesar

Master of Business Administration (Banking & Finance)

FLEXILEARN
-Freedom to design your degree



Curriculum & Scheme of Examination

2022

AMITY UNIVERSITY HARYANA

GURUGRAM

A handwritten signature in blue ink, appearing to read 'Anil'.

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A handwritten signature in blue ink, appearing to read 'Manesar'.

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Master of Business Administration (Banking & Finance)

ACCOUNTING FOR MANAGEMENT

Course Code: MBF4102

Credit Units: 03

Course Objective:

Participants in this course will develop the essential ability of all managers, to use complex accounting information as a platform for decision-making. As the course unfolds, participants will build an increasingly sophisticated level of understanding of the language of accounting and its key concepts. In addition the course develops skills in interpreting earnings statements, balance sheets, and cash flow reports. This ability to analyze financial statements will enable participants to deal more effectively with strategic options for their businesses or business units.

Course Contents:

Module I: Introduction

The Financial Accounting Framework, Accounting Policies, Need of Accounting. Users of Accounting Information, Accounting Cycle, Accounting and Management Control. Balance sheet- Dual Aspect principle, Classification Items of Balance Sheet, Formats of Balance Sheet. Preparation of Balance Sheet. Income Statement- Realization vs. Accrual Principle, Format of Income Statement), Preparation of Income Statement (IAS, GAAP & IFRS) Depreciation Accounting.

Module II: Measuring and Reporting

Measuring and Reporting :Cost of sales and Inventories, Debentures, Investments, Shareholder Equity. Human Resource Accounting-Valuation of Human Resources, Recording and Disclosure in Financial Statements

Module III: Management Accounting

Contrast between Management Accounting and Financial Accounting and Reporting, Types of Management Accounting Information and their uses, General Observation on Management Accounting. Statement of Cash Flows-Profit versus Cash, Purpose and Use of Cash Flow Statement, Format of Cash Flow Statement (AS-3), Preparation of Cash Flow Statement (IAS, GAAP & IFRS).

Module IV: Analyzing and Interpreting Financial Statements

Financial Statement Analysis – Basic Relationship, Overall Measures, Profitability Ratios, Investment Utilization Ratios, Financial Condition Ratios, Making Comparisons. Du-pont analysis. Interpretations of calculated Ratios.

Module V: Cost Accounting: The behavior of cost- Relation of cost to volume, BEP & Profit graph- CVP analysis, Full cost and its uses. Techniques of costing. Standard costing. Strategic planning and budgeting.

Examination Scheme:

Components	Assessment 1 Group Presentation	Assessment 2 In Class Quiz	Class Test/Mid Term Exam	Attendance	External
Weightage (%)	10	5	10	5	70


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Core Text Book:

- Anthony, N.R; Hawkings, F. D; Merchant, A.K (2014), Accounting Text and Cases, 13th Edition, McGraw Hill.
- Ramachandran, N (2011), Financial Accounting for Management, 3rd Edition, McGraw Hill.

References Book:

- Bhattacharya, S.K. and Dearden, J, 3rd Edition, Accounting for Management, Text and Cases, Vikas Publishing house
- Narayanaswamy R (2014), Financial Accounting – A Managerial Perspective, 5th Edition, Prentice Hall of India.
- Maheshwari S N; Maheshwari SK and Maheshwari SK, 3rd Edition, A Text Book for Accounting for Management, Vikas Publishing House.
- M.N Arora 10th Edition, A Text Book of Cost and Management Accounting, Vikas Publishing House.



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QUANTITATIVE TECHNIQUES IN MANAGEMENT

Course Code: MBF4106

Credit Units: 03

Course Objective:

The aim of this course is to develop the understanding of various statistical tools used for decisions making and how each applies to and can be used in the business environment using contemporary software.

Course Contents:

Module I: Introduction

Application of Statistics in Business; Classification of Data; Interpretation of computer output of diagrammatic and graphical presentation of data, measures of central tendency, measures of dispersion and skewness.

Module II: Probability and Probability Distributions

Concepts of Probability, addition theorem, multiplication theorem, Baye's Theorem; continuous and discrete probability distribution: Binomial Probability Distribution, Poisson Probability Distribution and Normal Probability Distribution.

Module III: Sampling and Sampling Distribution

Sampling: Basic Concept, Types of Sampling, Errors and Precautions in sampling, size of sample, Parameter and Statistic, Sampling Distribution of the mean, Sampling distribution of proportion, Estimation – point estimation, Interval Estimation,

Module IV: Tests of Hypothesis

Null and Alternative hypothesis, One-Tailed and Two-Tailed tests of hypothesis, Type I and Type II error, rejection rule using p – Value and critical value approach. Hypothesis Testing to compare two populations: Test for one sample mean, Test for two population means (Independent Samples), Tests for two population means (Dependent Samples), Tests for two population proportions (Independent Samples), Tests for two population variances (Dependent Samples), F-test, Chi – Square Test

Module V: Forecasting Techniques

Correlation - Karl Person, Spearman's Rank methods, simple linear regression analysis – Estimated regression equation, least squares method, coefficient of determination, interpretation of computer output for Regression, Introduction to time series, trend analysis

Module VI: Introduction to SPSS, performing univariate and bivariate analysis on SPSS

Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70

Text & References:

- Anderson D.R; Sweeny D.J, Williams T.A (2002), Statistics for Business and Economics, Cengage learning.
- Kazmier L.J., & Pohl N.F. (2004), Basic Statistics for Business and Economics, New York: McGraw Hill.
- Levin Richard I. & Rubin David S. (1998), Statistics for Management, Pearson Education India
- Stephen .K.C. (2002), Applied Business Statistics: Text, Problems and Cases. New York: Harper and Row.
- Sharma, J.K. (2007), Business Statistics, Pearson Education India.


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INFORMATION TECHNOLOGY AND E-COMMERCE

Course Code: MBF4109

Credit Units: 02

Course Objective:

This course will expose students to developments in computer technology and understand the working of a computer system. It will introduce end-user computing and build skills in using IT and understanding various technologies like internet, telecom, DBMS concepts, e-commerce etc. The course will expose the students to the latest trends in e-business models, electronic payment systems and data & information security

Course Contents:

Module I: Modern Computer Systems

Evolution of Computer Systems, Input, output and storage technologies, Computer Assisted Control and Automation, (e.g. Delhi Metro , Digitally Controlled Car engines etc.), Computer Controlled Biometric/RFID based Access Control , Contemporary hardware and software platforms(Open Source, Web Software etc.), Storage of Data Resources

Module II: Data Resource Management

Introduction to DBMS, Benefits of DBMS over traditional file system, Types of DBMS, Application of DBMS using MS-ACCESS / ORACLE as a tool for understanding of DBMS concepts. SQL Query handling, Forms, Concept of Data Warehouses and Data Marts, Introduction to Data Centers. Storage Technologies and Architecture (DAT, NAS, SAN etc.). Live examples of storage strategies of companies like Google, Amazon Wal-Mart dealing with storage crisis

Module III: Telecommunications and Computer Networks

Networked Enterprise :- Components, Types of networks, Advantages of Network Environment, Business Uses of Internet, Intranet and Extranet, Network Topologies, Web 2.0/3.0, Distributed/Cloud/Grid Computing, GSM & CDMA, GPRS ,Features of 3G & 4G technologies, VOIP and IPTV.

Module IV: Electronic Commerce Systems

Meaning, Definition, Concept, Features, Function of E-Commerce, E-Commerce Practices v/s Traditional Practices, Scope and basic models of E-Commerce, Limitations of E-Commerce, Precaution for secure E-Commerce, proxy services.

Module V: E-Commerce Business Models & EDI

Concept of EDI, Difference between paper based Business and EDI Based business, Advantages of EDI, Application areas for EDI, Action plan for Implementing EDI, Factors influencing the choice of EDI. Various business models in Ecommerce like B2C, B2B, C2C.

Module VI: E-Payment Systems and Security Management

Transactions through Internet, Requirements of E-Payment system, Post paid payment system- Credit card solutions, Cyber cash Internet Cheques, Instant Paid payment system- Debit card, Direct Debit, Prepaid payment system- Electronic cash, Digicash, Netcash, Cybercash, Smart Cards.

The Information Security, System Vulnerability and Abuse, Security Threats (Malicious Software, Hacking etc.) and counter measure. Definition of Cyber Crime and Types. Antivirus, Firewalls, Anti-Spyware, Security Audit, Discussion on Overview of IT-ACT 2000.

Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70

Text & References:

- Norton P (2010), Introduction to Computers, Tata McGraw-Hill
- Potter T (2010), Introduction to Computers, John Wiley & Sons (Asia) Pvt Ltd
- Monley D & Parker CS (2009), Understanding Computers – Today and Tomorrow, Thompson Press
- Elias M Awad, Electronic Commerce from Vision to fulfilment, Third Edition, Pearson Education

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- Ravi Kalakota & Andrew B. Shinston, Electronic Commerce – A manager's Guide, Pearson Education.
- Bhaskar Bharat, Electronic Commerce - Technologies & Applications, Tata McGraw Hill.
- J. Christopher & T.H.K. Clerk, Global E-Commerce, University Press.



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BUSINESS RESEARCH METHODS

Course Code: MBF4203

Credit Units: 02

Course Objective:

The main objective of the course is to equip the students with the basic understanding of research methodology in changing business scenario. It will also provide them an insight into the application of dynamic analytical tools to face the stormy challenges aimed at fulfilling the purpose of business decision making.

Course Contents:

Module I: Introduction

Meaning of research, importance of scientific research in business decision making, types of research, complete research process, research methodology, criterion for good research, Identification of research problem and formulation of hypothesis, research designs, drafting a research proposal

Module II: Measurement and Data Collection

Primary data, secondary data, design of questionnaire, sampling fundamentals and sample designs, Qualitative and quantitative research, measurement and scaling techniques, measures of central tendency mean, median, mode; measures of dispersion, data processing

Module III: Data Analysis I

Cross tabulation, univariate analysis, bivariate analysis: Correlation, Karl Pearson's coefficient of correlation, Spearman's coefficient of correlation, hypothesis testing, t-test, Z test, F-test, Chi-square test, Analysis of variance, Non-parametric tests: Sign test, Run test, Krushall-Wallis test

Module IV: Data Analysis-II

Simple linear regression: coefficient of determination, significance tests, residual analysis, Multivariate techniques: multiple linear regression: Multiple coefficient of determination, interpretation of regression coefficients, heteroscedasticity, multicollinearity, outliers, auto regression, factor analysis, cluster analysis (concept)

Module V: Report Writing

Pre-Writing Considerations, structure of research report, common problems encountered while preparing the research report, presentation of research report, ethical issues while preparing a research report

Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70

Case study must be included in the discussion.

Text & References:

- Cooper, R.D., Schindler, S. P. and Sharma, J.K. (2015). Business Research Methods. New Delhi, India: McGraw Hill Education (India) Private Limited
- Zikmund, William C (1997). *Business Research Methods (5th Ed.)*. The Dryden Press, Harcourt Brace College Publishers
- Kothari C R, (2014) Research Methodology: Methods & Techniques, Vikas Publishing House Pvt.Ltd
- Levin & Rubin (2004), Statistics for Management, 8th Ed, Prentice Hall of India
- Srivastava, Shenoy and Sharma (2002)., Quantitative Techniques for Business Decisions, 4th Ed , Allied Publishers
- Bajpai, Naval (2013). *Business Research Methods*. Pearson
- Shajahan, S. (2004) , Research Methods for Management 2nd Edition, Jaico Publishers
- Kumar, Ranjit (2005), Research Methodology, Pearson Education

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BUSINESS ANALYTICS

Course Code: MBF4210

Credit Units: 02

Course Objective:

The course provides an introduction to data analytics to be used in business. The students will learn how data analysts describe, predict and make informed business decisions in various business domains like marketing, human resources, finance and operations. The aim of the course is to develop basic data literacy and an analytic mindset in students that will help them to make strategic decisions based on data.

Course Contents:

Module I: Introduction to Business Analytics

Importance and role of data driven decisions. Business Analytics – Definition, Market, Trends; Paradigm Shift from Data to Insight and from Business Intelligence to Business Analytics; Examples and Types of Business Analytics Analysis- Forecasting & Predictive Modeling; Descriptive, Prescriptive and Predictive Analytics. Data Summarization, Data visualization – Various visualization techniques, standardized reporting and Pivot Tables – Using Excel

Module II: Data Mining

Introduction to Data Mining; Crucial processes in data mining; Data Warehousing; Data Mining Techniques and Exploratory Data Analysis; Data Mining Tool – XL Miner.

Module III: Decision Making & Optimization

Decision making under uncertainty – Decision Trees and Risk Profiles; Sensitivity Analysis; Optimizing complex decisions – Optimization of a large number of decisions while accounting for different kinds of physical and business decisions. Introduction to Optimization Techniques –Linear Programming; Optimization – Use of Excel to solve business problems like marketing mix, capital budgeting and portfolio optimization.

Module IV: Big Data and Introduction to R

Introduction to Big Data, Big Data driven decisions in business organizations – Benefits and Security/Privacy concerns.

Building Business and Economic Models –Tools to leverage data for Prediction purposes; Logistic Regression.

Introduction to Machine Learning; Statistical Learning vs. Machine Learning; Major classes of Learning Algorithms –Supervised Vs Unsupervised Learning.

Introduction to R Programing

Module V: Simulation using R and Excel

Hands on Regression using R; Introduction to Simulation; Applications of Simulation and Building a Simulation Model. (Using Excel and R)

Capstone Project.

Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70

Text & References:

- Aczel, D.A., Sounderpandian, J., Saravanan, P. and Joshi, R. (2012). *Complete Business Statistics (7th ed.)*. New Delhi, India: McGraw Hill Education (India) Private Limited
- Cooper, R.D., Schindler, S. P. and Sharma, J.K. (2015). *Business Research Methods*. New Delhi, India: McGraw Hill Education (India) Private Limited
- Gujrati, Damodar N and Sangeetha (2011). *Basic Econometrics (4th Ed.)*. New Delhi, India: McGraw Hill Education (India) Private Limited
- Beri, C. (2016). *Business Statistics*. New Delhi, India: McGraw Hill Education (India) Private Limited
- Kothari, C.R. (2009). *Research Methodology: Methods and Techniques (2nd revised ed.)*. New Delhi, India: New Age International Publisher

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- Sharma, J.K. (2013). *Operation Research: Theory and Applications (5thed.)*. New Delhi, India: Macmillan Publishers India limited
- Albright and Winston. *Business Analytics: Data Analysis and Decision Making*, 5th Edition.
- Stephen Powell and Ken Baker., “The Art of Modeling with Spreadsheet”
- Data, data everywhere, “Special report on managing information,Economist”, February 27th, 2010.
- Liberatore and Luo, “The Analytics Movement, Interfaces, Articles inAdvance”, pp. 1–12, 2010.
- “Using R for Data Analysis and Graphics”. Introduction, Code andCommentary,



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EXCEL FOR MANAGERS

Course Code: MBF4211

Credit Units: 01

Course Overview:

Microsoft Excel is a very popular business productivity application for the management and manipulation of data. With the right training and understanding of Excel, businesses and individual users can unlock the world of opportunities that this powerful business application offers. This course will provide all the tools necessary to create and use basic and advanced spreadsheets. After completion of this course, students will be able to learn the various methods for entering and editing data and also learn the various ways to write simple formulas.

Course Contents:

Module-I: Getting Started with Excel

Introduction to Spreadsheets: Launching Excel, entering data in spreadsheet, widening rows and columns, applying basic formatting in spreadsheet, saving work in excel. Entering Data into cells: Using autofill, sort & filter feature, creating lists, inserting & deleting rows and columns. Wrapping & merging text and cells,

Module-II: Basics in excel

Protecting & sharing workbooks, freeze panes, understanding normal, page layout and page break preview in excel. Setting the page orientation and print area. Adding hyperlinks to cells, inserting images, objects, equations and symbols.

Module-III: Charts & Formulas in Excel

Understanding Charts: Inserting bar charts, pie charts, column charts and line charts in spreadsheets, formatting and resizing the chart. Using Basic functions- average, sum, min, max, product etc. date functions, time functions. Math Operators in Excel, combining mathematical operators.

Module-IV: Functions in Excel

Logical- using IF, AND, OR, NOT, TRUE, FALSE Functions. Textual- using TRIM, UPPER, LOWER, REPLACE Functions. Import data into excel, Look up functions with index and match. Rounding, sum product, conditional counts and conditional sums, Filtering data, pivot table, pivot charts, conditional formatting.

Module-V: Financial and Statistical Functions in Excel

Financial functions: Time value of money- Present value, Future value, PMT with beginning date, PMT with ending date, NPV, Goal seek, Scenario Manager, IRR. Statistical functions: Max, Min, Average, Large, Rank, Small, Var, Std Dev.

Examination Scheme:

Components	Written Test	Practical	V/P	File/Assignment	Attendance
Weightage (%)	20	30	30	15	5

Suggested Readings & Textbooks

- Business Analysis with Microsoft Excel by Conrad George Carlberg,,Que Publishing, second edition, ISBN 0974415626.
- Excel 2013 for Dummies by Greg Harvey, John Wiley & Sons , 2012, ISBN 9781118559703

Web Resources

- <https://spreadsheeto.com/>
- <https://www.tutorialspoint.com/excel/>


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SECURITY ANALYSIS AND PORTFOLIO MANAGEMENT

Course Code: MBF4308

Credit Units: 03

Course Objective:

This course aims at providing a clear understanding of the changing domestic and global investment scenario in general and Indian capital market in particular with reference to availability of various financial products and operations of stock exchanges. Important theories, techniques, regulations and certain advancements in theory of investment will be covered with an aim of helping the participants make sound investment decisions both in the context of individual security and portfolio investment.

Course Contents:

Module I: Background of Capital market/Corporate Governance and Methods of Fund Raising

Importance of Strong Capital market in Economy, Investment opportunities available to Investors, relation of demographic characteristics with investment pattern of individuals, Process of investment in Financial assets, intermediaries and Role of SEBI/OTCEI/ROC/Stock exchanges-Listing agreement, clause 49, Importance of Corporate Governance and changes taking place/required in the law. Salient features and operation of stock exchanges, Trading arrangements, Changing scenario of Indian stock market. Relationship of Primary market with Secondary market, raising of Funds by IPO/FPO/Right issue and intermediaries involved. Merchant banking and its functions, contemporary issue in Capital market.

Module II: Debt

Malkiel's Law, Interrelationship of Bond Market and Stock market, International events and its impact on security market Risk and return in the context of Portfolio, , Common stock valuation models, Term structure of Interest Rates, Role of FII'S, DII/MF /QIB in Capital market. Participatory notes and its Impact, index formation..

Module III

Fundamental analysis-Economic & industry analysis, concept of Business Cycles, Indicators of economic prosperity, Industry analysis, Company analysis, Company valuation. DOW's Theory, Various Technical analysis tools like Moving averages, Volume Analysis, Indicators, RSI, Pattern analysis, Candlesicks, Market breadth analysis, Trend analysis, Elliot wave Rules Fibonacci numbers, ROC/RSI, CAPM and Fama and French challenge, lagging indicators and leading indicators analysis, reading and interpretations of technical patterns and charts, Other tools to Forecast the market and take Entry and exit decisions.

Module IV

Arbitrage pricing theory, Generating the efficient frontier, Efficient market theory, Valuation by PE ratio /Book value to price value analysis, Motivation for partitioning of risk, Markowitz Risk -return optimisation,

Module V

Types of Mutual Funds--SIP/ELSS, Tax Implications. , Investment Banking, Role of Fund Manager, Portfolio management services, Churning and revision of Portfolio, Portfolio re balancing and up gradation, Sharpe's performance Index, Treynor's performance Index, Jensen's performance Index.

Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70

Text & References:

- Chandra, P. (2002), Investment Analysis, Tata McGraw Hill
- Fischer, D.E. and Jordan, R.J. (1995), Security Analysis & Portfolio Management, Prentice Hall of India

- Bhat, S. N. (2011); Security Analysis & Portfolio Management; Biztantra
- Dash, A.P.; (2009); Security Analysis & Portfolio Management; I.K. International
- Sudhindra; (2009); Security Analysis & Portfolio Management; Excel Books

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- Rangnatham M., Madhumalathi, R.,(2006); Security Analysis & Portfolio Management; Pearson Education
- Khatri, Dhanesh;(2010); Security Analysis & Portfolio Management; MacMillan India Ltd.



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BUSINESS VALUATION

Course Code: MBF4311

Credit Units: 03

COURSE DESCRIPTION AND OBJECTIVES:

The objective of this course is to develop a detailed understanding of the tools used by market professionals and corporate managers to analyze the value of companies and stocks. The central theme of the course will be the pricing of equity securities using discounted cash flow and relative valuation techniques. Students will apply what they've learned to the valuation of a specific company, with the goal of becoming an expert on that firm. After completing this course, students should be able to: (i) Develop quantitative models for firm and equity valuation based on DCF and multiples. (ii) Identify and interpret accounting and non-accounting information necessary for valuation. (iii) Identify and interpret the key value drivers for a firm or industry. (iv) Critically analyze firm and equity valuation models and assumptions developed by others. (v) Present valuation analyses and assumptions in a professional manner.

Course Contents:

Module-I: Introduction to Valuation

Valuation vs. Pricing. A philosophical basis for Valuation, Misconceptions about Valuation, Biasness in Valuation, Uncertainties in Valuation. Approaches to Valuation, Understanding Financial Statements, Basics of Risk.

Module-II: Discounted Cash Flow Valuation

Discounted Cashflow Valuation: Basis for Approach, Going Concern versus Liquidation Valuation, Equity Valuation versus Firm Valuation, Three pathways to DCF value, Advantages & Disadvantages of DCF Valuation, Riskless Rates and Risk Premiums, Estimating Risk Parameters and Costs of Financing, Measuring Earnings, Earnings to Cash Flows, Estimating Growth, Closure in Valuation: Estimating Terminal Value, Free Cash flow to Equity Models,

Module-III: Relative Valuation

Fundamental Principles of Relative Valuation, Choices with multiples- Earnings Multiples, Book Value Multiples, Choosing the Comparable firm: Making the comparison, Revenue and Sector-Specific Multiples, Advantages & Disadvantages of Relative Valuation, DCF vs Relative valuation.

Module-IV: Applicability of Valuation (Cases and research papers); Valuing Financial Services firm, Valuing Firms with Negative Earnings, Valuing Young and Start-up Firms, Valuing Private Firms, valuing Acquisitions and Takeovers,

Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70

Required Textbook

- Investment Valuation: Tools and Techniques for Determining the Value of Any Asset, Second Edition, University Edition
- by Aswath Damodaran

Recommended other Textbook

- Krishna G. Palepu and Paul M. Healy: *Business Analysis & Valuation Using Financial Statements*, Text Only (PHB) 5th Edition, Cengage Learning 2012.
- Joshua Rosenbaum and Joshua Pearl: *Investment Banking: Valuation, Leveraged Buyouts, and Mergers and Acquisitions*, John Wiley & Sons; 2nd edition (2013), ISBN: 1118656210


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FINANCIAL MODELING USING MS- EXCEL/SPREADSHEET

Course Code: MBF4313

Credit Units: 03

Introduction

Modeling techniques for accurate financial forecasting are used in many areas of finance, such as derivatives, valuation, project evaluation, deal structuring, portfolio management and the like. In the course, the participants will learn the model building skills required to build powerful models in finance with the help of excel. There are many features of model building that are common irrespective of the final model that one intends to build. In the course we will also emphasize on the different model building skills that one should have irrespective of the final use that one is going to make of it.

By the end of the course the participants should be better able to:

- Understand the basic and advanced features of excel
- Understand how to build models in excel to suit one's purpose
- Building models in different areas of finance including investments, corporate finance and derivatives
- Identifying and controlling the key sensitivities with advanced spreadsheet simulation
- Understand how risk can be built into the model to enhance decision making process

Course Contents:

Module-I: Understanding the Basic Features of Excel : Introduction to Modeling, Introduction to Excel, Database Functions in Excel Creating Charts Using Forms and Control Toolbox Understanding Finance Functions present in Excel Creating Dynamic Models

Module-II: Simulation using Excel: Different Statistical Distributions used in Simulation Generating Random Numbers that follow a particular distribution Building Models in Finance using Simulation

Module-III: Excel in Capital Budgeting, valuation: Preparing common size statements directly from Trial Balance Forecasting Financial Statements using Excel Analysing Financial Statements by using Spreadsheet Model ; Determining Project Viability Risk Analysis in Project Appraisal Simulation in Project Appraisal; Determination of Value Drivers, DCF Valuation, Risk Analysis in Valuation; Determining Efficient Portfolio, Creating Dynamic Portfolios Portfolio Insurance Fixed Income Portfolio Management using Excel.

Module-IV: Understanding Subroutines and Functions and building simple financial models using subroutines and functions Recording and Editing Macros Subroutines and Functions Decision Rules Message Box and Input Box Debugging, **Designing Advanced Financial Models** using VBA User Forms Other Advanced Features Actual Model Building.

Examination Scheme:

Components	CT	HA	C	V	A	EE
Weightage (%)	10	5	5	5	5	70

(C - Case Discussion/ Presentation; HA - Home Assignment; Q – Quiz; V - Viva; CT - Class Test; A- Attendance; EE - End Semester Examination)

Text & References:

Text:

- Benninga, S., 2008, Financial Modeling, The MIT Press, Third Edition

References:

- J & S: Jackson M. and Staunton M., 2001, Advanced Modelling in Finance using Excel and VBA, John Wiley and Sons Ltd
- B & M: Brealey R.A. and Myers S., 2003, Principles of Corporate Finance, Seventh Edition, McGraw Hill
- Financial Analysis and Modeling using Excel and VBA – Chandan Sengupta
- Building Financial Models, John Tjia


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FINANCIAL RISK MANAGEMENT

Course Code: MBF4314

Credit Units: 03

Course Objectives:

The FRM challenges candidates to understand and apply a range of knowledge and skills necessary to function effectively as a risk manager. Its curriculum is updated annually by a group of distinguished risk professionals and leading academics with diverse backgrounds, ensuring that the designation meets the evolving demands of the financial industry. The FRM helps professionals in risk management, investment management, or other critical areas of the financial services industry to broaden their knowledge of the different types of financial risk and enhance their current skill set. Those who are just beginning their careers benefit from the breadth of the curriculum, which exposes candidates to the major strategic aspects of risk management. More established practitioners often choose to become Certified FRMs in order to ensure that they are apprised of the latest trends in risk management, or because they want to challenge themselves by testing their knowledge against an elite pool of risk managers.

Course Contents:

Module I: Foundations of Risk Management

Basic risk types, measurement and management tools, Creating value with risk management; The role of risk management in corporate governance; Enterprise Risk Management (ERM); Financial disasters and risk management failures; The Capital Asset Pricing Model (CAPM); Risk-adjusted performance measurement; Multifactor models; Data aggregation and risk reporting; Ethics and the GARP Code of Conduct.

Module II: Financial Markets and Products

Structures and functions of financial institutions, Structure and mechanics of OTC and exchange markets Structure, mechanics, and valuation of forwards, futures, swaps, and options ; Hedging with derivatives; Interest rates and measures of interest rate sensitivity; Foreign exchange risk; Corporate bonds; Mortgage-backed securities

Module III : Valuation and Risk Models

Value-at-Risk (VaR)-VaR mapping • Expected shortfall (ES), Stress testing and scenario analysis • Option valuation • Fixed income valuation • Hedging • Country and sovereign risk models and management • External and internal credit ratings • Expected and unexpected losses • Operational risk

Module IV: Basel-I, Basel-II, Solvency-II, Basel 2.5, Basel-III:

The reasons for regulating Banks, Bank Regulation Pre-1988, 1988BIS Accord, The G-30 Policy recommendation, Netting, 1996 Amendment, Basel II, Credit Risk capital under Basel II, Operational Risk capital under Basel II, Pillar 2- Supervisory Review, Pillar 3- Market Discipline, Basel 2.5, Basel-III.

Module V: Credit Risk Measurement and Management

• Credit analysis • Default risk: Quantitative methodologies • Expected and unexpected loss • Credit VaR • Counterparty risk • Credit derivatives • Structured finance and securitization

Module VI: Operational and Integrated Risk Management

Risk-adjusted return on capital (RAROC) • Economic capital frameworks and capital planning • Liquidity risk measurement and management • Failure mechanics of dealer banks • Stress testing banks • Third-party outsourcing risk • Risks related to money laundering and financing of terrorism • Regulation and the Basel Accords
Banking Resolution and Deposit Insurance Act (BRDI) 2017, Insolvency and Bankruptcy Code (IBC).

Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70

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Text Books & References:

- John C. Hull, Risk Management and Financial Institutions, 4th Edition (Hoboken, NJ: John Wiley & Sons, 2015).
- Keep on updating of www.garp.org/frm (Global association of Risk professional)
- Michel Crouhy, Dan Galai, and Robert Mark, The Essentials of Risk Management, 2nd Edition (New York, NY: McGraw-Hill, 2014).
- James Lam, Enterprise Risk Management: From Incentives to Controls, 2nd Edition (Hoboken, NJ: John Wiley & Sons, 2014)
- René Stulz, “Risk Management, Governance, Culture and Risk Taking in Banks,” FRBNY Economic Policy Review, (August 2016): 43-59.
- Edwin J. Elton, Martin J. Gruber, Stephen J. Brown and William N. Goetzmann, Modern Portfolio Theory and Investment Analysis, 9th Edition (Hoboken, NJ: John Wiley & Sons, 2014).
- Noel Amenc and Veronique Le Sourd, Portfolio Theory and Performance Analysis (West Sussex, UK: John Wiley & Sons, 2003).
- ZviBodie, Alex Kane, and Alan J. Marcus, Investments, 10th Edition (New York, NY: McGraw-Hill, 2013).
- “Principles for Effective Data Aggregation and Risk Reporting,” (Basel Committee on Banking Supervision Publication, January 2013).
- Michael Miller, Mathematics and Statistics for Financial Risk Management, 2nd Edition (Hoboken, NJ: John Wiley & Sons, 2013).
- James Stock and Mark Watson, Introduction to Econometrics, Brief Edition (Boston, MA: Pearson, 2008).
- Robert McDonald, Derivatives Markets, 3rd Edition (Boston, MA: Addison-Wesley, 2013).
- Frank Fabozzi (editor), The Handbook of Fixed Income Securities, 8th Edition (New York, NY: McGraw-Hill, 2012).
- AswathDamodaran, “Country Risk: Determinants, Measures and Implications - The 2017 Edition” (July 19, 2017).
- Gunter Meissner, Correlation Risk Modeling and Management (New York, NY: John Wiley & Sons, 2014).
- Jon Gregory, The xVA Challenge: Counterparty Credit Risk, Funding, Collateral, and Capital (West Sussex, UK: John Wiley & Sons, 2015)
- “Principles for the Sound Management of Operational Risk,” (Basel Committee on Banking Supervision Publication, June 2011)
- Philippa X. Girling, Operational Risk Management: A Complete Guide to a Successful Operational Risk Framework (Hoboken, NJ: John Wiley & Sons, 2013).
- Bruce Tuckman and Angel Serrat, Fixed Income Securities: Tools for Today’s Markets, 3rd Edition (Hoboken, NJ: John Wiley & Sons, 2011)
- Case studies published from various journals.



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FIXED INCOME SECURITIES ANALYSIS

Course Code: MBF4315

Credit Units: 03

Course Objectives:

This course is intended to analyze the fixed income securities markets and its implications for investments. It will analyze the market characteristics, instruments, selling techniques, pricing and valuation issues, floating rate instruments, relations with money market instruments, risk and return of fixed income securities, portfolio management techniques, term structure modeling, bond indexing, corporate debt and convertibles, bonds with embedded options, municipal bonds markets, corporate bonds & credit risk analysis, interest rate risk management with swaps, options and futures, bond management & trading. The course intends to cover the specific features of the Indian Fixed Income Securities Markets. The course will construct several Excel based techniques to analyze bond valuation, term structure, portfolio statistics and risk mapping

Course Contents:

Module-I: Overview of Fixed Income Securities, The Grammar of Fixed Income Securities, Fixed Income Markets, Institutional Arrangements, Market Participants and Instruments, Investors Perspectives, & Market Conventions, features of a government securities market

Module-II: Bond Valuation, Time Value of Money, Price and Yield Conventions, Bond Valuation under flat term structure, Yield & return, & horizon return, Valuation of other Bonds, Floating Rate securities, index bonds, illiquid bonds

Module-III: Understanding market linkages, bonds and money market instruments, MIFOR Curve Risk Identification in Bonds: Duration, Convexity, and Immunization Risk measurement in fixed income securities using value at risk, Corporate Debt, Valuation, valuation of convertibles Yield Curve Analysis: Par Value, Zero, Spot Curve, Bootstrapping, spot & forward rates, (Nelson-Seigel model of the Indian NSE)

Module-IV: Government securities auction & Bidding, Uniform vs discriminatory auction, bidding behavior, winners curse analysis Auction Game: students run a game in groups, with bidding an upcoming auction, using real time market prices, and finalist selected based on their success, performance in WI trade, Bond Indexing, methodology for constructing a bond index, index return comparison

Module-V: Portfolio construction, setting portfolio objectives, interpreting portfolio parameters, Passive vs Active portfolio management strategies, bullet vs barbell, other strategies. Global Bond Markets, foreign currency bonds, dual currency bonds, analysis of global bond spread behavior in recent times.

Module-VI: Fixed Income Derivative Markets: FRAs, Interest rate Swaps, swap pricing and swap curve, Fixed Income Derivative Markets: Interest rate futures, Fixed Income Derivative Markets: Interest Rate Options, Caps & Floors pricing

Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70

Required Textbook:

- Frank Fabozzi, Bond Markets, Analysis, and Strategies, Seventh or Eighth Edition,
- Pearson Suresh Sundaresan, Fixed Income Markets and Their Derivatives, 2009,


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SUMMER INTERNSHIP EVALUATION

Course Code: MBF4335

Credit Units: 06

There are certain phases of every Intern's professional development that cannot be effectively taught in the academic environment. These facets can only be learned through direct, on-the-job experience working with successful professionals and experts in the field. The internship programme can best be described as an attempt to institutionalize efforts to bridge the gap between the professional world and the academic institutions. Entire effort in internship is in terms of extending the program of education and evaluation beyond the classroom of a university or institution. The educational process in the internship course seeks out and focuses attention on many latent attributes, which do not surface in the normal class room situations. These attributes are intellectual ability, professional judgment and decision making ability, inter-disciplinary approach, skills for data handling, ability in written and oral presentation, sense of responsibility etc.

In order to achieve these objectives, each student will maintain and submit a file (**Internship File**) and a report (**Internship Report**)

INTERNSHIP FILE

The Internship File aims to encourage students to keep a personal record of their learning and achievements throughout the Programme. It can be used as the basis for lifelong learning and for job applications. **Items can be drawn from activities completed in the course modules and from the workplace to demonstrate learning and personal development.**

The File will assess the student's analytical skills and ability to present supportive evidence, whilst demonstrating understanding of their organization, its needs and his/her own personal contribution to the organization.

The File is essentially a comprehensive documentation of how one proceeds while working on the assignment and should be regularly checked by the faculty guide/ supervisor, issues discussed with the students, doubts if any clarified and signed as having done so. This will form the basis of **continuous evaluation** of the project.

The File will include **five sections** in the order described below.

1. **The Title Page** – An Internship Experience Report For (Your Name), name of internship organization, name of the Supervisor/Guide and his/her designation, date started and completed, and number of credits for which the report is submitted.
2. **Table of Content** – An outline of the contents of the file by topics and subtopics with the page number and location of each section.
3. **Introduction** – Short, but should include how and why you obtained the internship experience position and the relationship it has to your academic/professional and career goals.
4. **Main Body** – Should include a brief summary/ executive summary of the **Internship Project Report** that the student has worked on, an **analysis of the company/organization** in which the student is working, a **personal review** of the student's management skills and how they have been developed through the programme, the daily tasks performed, major projects contributed to, dates and hours spent on a task, observations and feelings, meetings attended and their purposes, listing of tools and materials and their suppliers, and photographs if possible of projects, buildings and co-workers.
5. **Appendices** – Include pamphlets, forms, charts, brochures, technical and descriptive literature, graphs and other information related to your Internship experience.

INTERNSHIP REPORT

The **Internship Report** is the research report that the student has to prepare on the project assigned by the organization. (Incase a student is not assigned a specific research project in the organization, he has to select any one aspect of the organization and prepare a research report on it). The lay out of the report should be as per the standard layout prescribed by the organization wherein the student

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undertakes the Internship. In case, there is no layout prescribed by the organization the following components should be included in the report:

➤ **Title or Cover Page**

The title page should contain Project Title; Student's Name; Programme; Year and Semester and Name of the Faculty Guide.

➤ **Acknowledgements**

Acknowledgment to any advisory or financial assistance received in the course of work may be given. It is incomplete without student's signature.

➤ **Abstract**

A good "Abstract" should be straight to the point; not too descriptive but fully informative. First paragraph should state what was accomplished with regard to the objectives. The abstract does not have to be an entire summary of the project, but rather a concise summary of the scope and results of the project. It should not exceed more than 1000 words.

➤ **Table of Contents**

Titles and subtitles are to correspond exactly with those in the text.

➤ **Introduction**

Here a brief introduction to the problem that is central to the project and an outline of the structure of the rest of the report should be provided. The introduction should aim to catch the imagination of the reader, so excessive details should be avoided.

➤ **Materials and Methods**

This section should aim at experimental designs, materials used (wherever applicable). Methodology should be mentioned in details including modifications undertaken, if any. It includes organization site(s), sample, instruments used with its validation, procedures followed and precautions.

➤ **Results and Discussion**

Present results, discuss and compare these with those from other workers, etc. In writing this section, emphasis should be laid on what has been performed and achieved in the course of the work, rather than discuss in detail what is readily available in text books. Avoid abrupt changes in contents from section to section and maintain a lucid flow throughout the thesis. An opening and closing paragraph in every chapter could be included to aid in smooth flow.

Note that in writing the various sections, all figures and tables should as far as possible be next to the associated text, in the same orientation as the main text, numbered, and given appropriate titles or captions. All major equations should also be numbered and unless it is really necessary, do not write in "point" form.

While presenting the results, write at length about the various statistical tools used in the data interpretation. The result interpretation should be simple but full of data and statistical analysis. This data interpretation should be in congruence with the written objectives and the inferences should be drawn on data and not on impression. Avoid writing straight forward conclusion rather, it should lead to generalization of data on the chosen sample.

Results and its discussion should be supporting/contradicting with the previous research work in the given area. Usually one should not use more than two researches in either case of supporting or contradicting the present case of research.

➤ **Conclusion(s) & Recommendations**

A conclusion should be the final section in which the outcome of the work is mentioned briefly.

Check that your work answers the following questions:

- Did the research project meet its aims (check back to introduction for stated aims)?
- What are the main findings of the research?
- Are there any recommendations?
- Do you have any conclusion on the research process itself?

➤ **Implications for Future Research**

This should bring out further prospects for the study either thrown open by the present work or with the purpose of making it more comprehensive.

➤ **Appendices**

The Appendices contain material which is of interest to the reader but not an integral part of the thesis and any problem that have arisen that may be useful to document for future reference.

➤ **References**

References should include papers, books etc. referred to in the body of the report. These should be written in the alphabetical order of the author's surname. The titles of journals preferably should not be abbreviated; if they are, abbreviations must comply with an internationally recognised system.

Examples

For research article

Voravuthikunchai SP, Lortheeranuwat A, Ninrprom T, Popaya W, Pongpaichit S, Supawita T. (2002) Antibacterial activity of Thai medicinal plants against enterohaemorrhagic Escherichia coli O157: H7. ClinMicrobiol Infect, 8(suppl 1): 116–117.

For book

Kowalski,M.(1976) Transduction of effectiveness in Rhizobium meliloti. SYMBIOTIC NITROGEN FIXATION PLANTS (editor P.S. Nutman IBP), 7: 63-67

The Layout Guidelines for the Internship File & Internship Report

- A4 size Paper
- Font: Arial (10 points) or Times New Roman (12 points)
- Line spacing: 1.5
- Top and bottom margins: 1 inch/ 2.5 cm; left and right margins: 1.25 inches/ 3 cm

Examination Scheme:

Continuous Evaluation by faculty guide	15%
Continuous evaluation by CRC	15%
Feedback from industry guide	35%
Report, Presentation & Viva Voce	35%
TOTAL	100%



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ENTREPRENEURSHIP DEVELOPMENT

Course Code: MBF4413

Credit Units: 02

Course Contents:

Module I: Decision to Become an Entrepreneur

Introduction to Entrepreneurship: What Is Entrepreneurship? Why Become an Entrepreneur?, Characteristics of Successful Entrepreneurs, Common Myths About Entrepreneurs, Types of Start-Up Firms, Changing Demographics Of Entrepreneurs.

Entrepreneurship's Importance: Economic Impact of Entrepreneurial Firms, Entrepreneurial Firms' Impact on Society, and Entrepreneurial Firms' Impact on Larger Firms.

The Entrepreneurial Process: Decision to Become an Entrepreneur, Developing Successful Business Ideas Moving from an Idea to an Entrepreneurial Firm, Managing and Growing an Entrepreneurial Firm.

Module II: Developing Successful Business Ideas

Identifying And Recognizing Opportunities: Observing Trends, Solving a Problem, Finding Gaps In The Marketplace, Personal Characteristics of the Entrepreneur.

Techniques for Generating Ideas: Brainstorming, Focus Groups Library and Internet Research, Other Techniques.

Encouraging and Protecting New Ideas: Establishing a Focal Point for Ideas, Encouraging Creativity at the Firm Level, Protecting Ideas from Being Lost or Stolen, Find a mentor.

Feasibility Analysis: Product/Service Feasibility Analysis, Industry/Target Market Feasibility Analysis, organizational Feasibility Analysis, Financial Feasibility Analysis.

The Business Plan: Reasons for Writing a Business Plan, Who Reads the Business Plan—And What Are They Looking For? Guidelines for Writing a Business Plan, Outline Of the Business Plan and Exploring Each Section of the Plan Oral Presentation of a Business Plan, Questions and Feedback to Expect from Investors.

Industry and Competitor Analysis: Studying Industry Trends, The Five Forces Model, The Value of the Five Forces Model, Industry Types and the Opportunities They Offer, Identifying Competitors, Sources of Competitive Intelligence, Completing a Competitive Analysis Grid.

Business Models: The Importance and Diversity of Business Models, How Business Models Emerge, Potential Fatal Flaws of Business Models, Components of An Effective Business Model, Core Strategy, Strategic Resources, Partnership Network, customer interface.

Module III: Moving from an Idea to an reality

Initial Ethical and Legal Issues Facing a New Firm: Establishing a Strong Ethical Culture for a Firm, Choosing an Attorney for a Firm, Drafting a Founders' Agreement.

Obtaining Business Licenses and Permits: Business Licenses, Business Permits, Choosing a Form of Business Organization, Sole Proprietorship, Partnerships, Corporations, Limited Liability Company.

Introduction To Financial Management : Financial Objectives of a Firm, The Process of Financial Management, Financial Statements, Forecasts, Pro Forma Income Statement, Pro Forma Balance Sheet, Pro Forma Statement of Cash Flows, Ratio Analysis.

Building a New-Venture: Recruiting and Selecting Key Employees, Roles of the Board of Directors Board of Advisers, Lenders and Other Professionals.

Getting Financing or Funding: The Importance, Sources of Personal Financing, Preparing to Raise Debt or Equity Financing, business Angels, Venture Capital, Initial Public Offering, Commercial Banks, SBA Guaranteed Loans, Other Sources of Debt Financing, Leasing, Strategic Partners.

Module IV: Managing and Growing the new venture

Marketing Issues: Segmenting the Market, Selecting a Target Market, Establishing a Unique Positioning, Branding, 4Ps/7Ps Of Marketing For New Ventures.

The Importance of Intellectual Property: Determining What Intellectual Property to Legally Protect, The Four Key Forms of Intellectual Property, Types of Patents, Who Can Apply for a Patent?

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The Process of Obtaining a Patent, Patent Infringement, The Four Types of Trademarks, What Is Protected Under Trademark Law? Exclusions from Trademark Protection, The Process of Obtaining a Trademark, What Is Protected by a Copyright? Exclusions from Copyright Protection, How to Obtain a Copyright , Copyright Infringement, Copyrights and the Internet , Conducting an Intellectual Property Audit, The Process of Conducting an Intellectual Property Audit.

Preparing for and Evaluating the Challenges of Growth :Appreciating the Nature of Business Growth ,Staying Committed to a Core Strategy ,Planning for Growth, Knowing and Managing the Stages of Growth , Challenges Of Growth , Strategies for Firm Growth (internal and external),Franchising.

Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70

Text & References:

- Alejandro Cremades (2016) , The Art of Startup Fundraising: Pitching Investors, Negotiating the Deal, and Everything Else Entrepreneurs Need to Know. Wiley, New York.
- Burton and Bragg (2006),Accounting and Finance for your Small Business. John Wiley and Sons, New York.
- Peter Drucker (2015), Innovation And Entrepreneurship. Harper Collins, India.
- [Nandan H](#) (2013), Fundamentals of Entrepreneurship. Prentice Hall India Learning Private Limited; Third edition: India.



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DISSERTATION

Course Code: MBF4437

Credit Units: 06

The aim of the dissertation is to provide you with an opportunity to further your intellectual and personal development in your chosen field by undertaking a significant practical unit of activity, having an educational value at a level commensurate with the award of your degree

The dissertation can be defined as a scholarly inquiry into a problem or issues, involving a systematic approach to gathering and analysis of information / data, leading to production of a structured report.

Selecting the Dissertation Topic

It is usual to give you some discretion in the choice of topic for the dissertation and the approach to be adopted. You will need to ensure that your dissertation is related to your field of specialization.

Deciding this is often the most difficult part of the dissertation process, and perhaps, you have been thinking of a topic for some time.

It is important to distinguish here between 'dissertation topic' and 'dissertation title'. The topic is the specific area that you wish to investigate. The title may not be decided until the dissertation has been written so as to reflect its content properly.

Few restrictions are placed on the choice of the topic. Normally we would expect it to be:

- relevant to business, defined broadly;
- related to one or more of the subjects or areas of study within the core program and specialisation stream;
- clearly focused so as to facilitate an in-depth approach, subject to the availability of adequate sources of information and to your own knowledge;
- of value and interest to you and your personal and professional development.

Planning the Dissertation

This will entail following:


- Selecting a topic for investigation.
- Establishing the precise focus of your study by deciding on the aims and objectives of the dissertation, or formulating questions to be investigated. Consider very carefully what is worth investigating and its feasibility.
- Drawing up initial dissertation outlines considering the aims and objectives of the dissertation. Workout various stages of dissertation
- Devising a timetable to ensure that all stages of dissertation are completed in time. The timetable should include writing of the dissertation and regular meetings with your dissertation guide.

The Dissertation plan or outline

It is recommended that you should have a dissertation plan to guide you right from the outset. Essentially, the dissertation plan is an outline of what you intend to do, chapter wise and therefore should reflect the aims and objectives of your dissertation.

There are several reasons for having a dissertation plan

- It provides a focus to your thoughts.
- It provides your faculty-guide with an opportunity, at an early stage of your work, to make constructive comments and help guide the direction of your research.
- The writing of a plan is the first formal stage of the writing process, and therefore helps build up your confidence.
- In many ways, the plan encourages you to come to terms with the reading, thinking and writing in a systematic and integrated way, with plenty of time left for changes.
- Finally, the dissertation plan generally provides a revision point in the development of your dissertation report in order to allow appropriate changes in the scope and even direction of your work as it progresses.


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Keeping records

This includes the following:

- Making a note of everything you read; including those discarded.
- Ensuring that when recording sources, author's name and initials, date of publication, title, place of publication and publisher are included. (You may consider starting a card index or database from the outset). Making an accurate note of all quotations at the time you read them.
- Make clear what is a direct quotation and what is your paraphrase.

Dissertation format

All students must follow the following rules in submitting their dissertation.

- Front page should provide title, author, Name of degree/diploma and the date of submission.
- Second page should be the table of contents giving page references for each chapter and section.
- The next page should be the table of appendices, graphs and tables giving titles and page references.
- Next to follow should be a synopsis or abstract of the dissertation (approximately 500 words) titled: **Executive Summary**
- Next is the 'acknowledgements'.
- Chapter I should be a general introduction, giving the background to the dissertation, the objectives of the dissertation, the rationale for the dissertation, the plan, methodological issues and problems. The limitations of the dissertation should also be hinted in this chapter.
- Other chapters will constitute the body of the dissertation. The number of chapters and their sequence will usually vary depending on, among others, on a critical review of the previous relevant work relating to your major findings, a discussion of their implications, and conclusions, possibly with a suggestion of the direction of future research on the area.
- After this concluding chapter, you should give a list of all the references you have used. These should be cross - references with your text. For articles from journals, the following details are required e.g.

Draper P and Pandyal K. 1991, The Investment Trust Discount Revisited, Journal of Business Finance and Accounting, Vol18, No6, Nov, pp 791-832.

For books, the following details are required:

Levi, M. 1996, International Financial Management, Prentice Hall, New York, 3rd Ed, 1996

- Finally, you should give any appendices. These should only include relevant statistical data or material that cannot be fitted into the above categories.

The Layout Guidelines for the Dissertation

- A4 size Paper
- Font: Arial (10 points) or Times New Roman (12 points)
- Line spacing: 1.5
- Top and bottom margins: 1 inch/ 2.5 cm; left and right margins: 1.25 inches/ 3 cm

Guidelines for the Assessment of the Dissertation

While evaluating the dissertation, faculty guide will consider the following aspects:

1. Has the student made a clear statement of the objective or objective(s).
2. If there is more than one objective, do these constitute parts of a whole?
3. Has the student developed an appropriate analytical framework for addressing the problem at hand.
4. Is this based on up-to-date developments in the topic area?
5. Has the student collected information / data suitable to the frameworks?
6. Are the techniques employed by the student to analyse the data / information appropriate and relevant?
7. Has the student succeeded in drawing conclusion from the analysis?
8. Do the conclusions relate well to the objectives of the project?
9. Has the student been regular in his work?
10. Layout of the written report.

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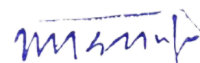
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Examination Scheme:

Contents & Layout of the Report	30
Conceptual Framework	10
Objectives & Methodology	15
Implications & Conclusions	15
Viva/ Presentations	30
TOTAL	100



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Haryana-122413



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CORPORATE TAX PLANNING

Course Code: MBF4408

Credit Units: 03

Course Objective:

At the end of the course, the students should be able to understand Indian accounting Standards and the impact of USGAAP on Financial Statements. To create an understanding of the accounting of Mergers and Acquisitions and Valuation of goodwill & Shares.

In addition to Corporate Accounting the students should be able to demonstrate an understanding of the tax provisions enabling them to make use of legitimate tax shelters, deductions, exceptions, rebates and allowances; with the ultimate aim of minimizing the corporate tax liability.

Course Contents:

Module I: Accounting Norms

Various Accounting Standards in India and comparison with International accounting Standards and US.GAAP.

Module II: Accounting for Merger and Acquisitions

Accounting for Acquisition of Business, Calculation of Purchase consideration and Profit (Loss) Prior to Incorporation. Accounting for Amalgamation in the nature of Merger and in the nature of Purchase.

Module III: Valuation of Goodwill and Shares

Valuation of Goodwill – Different Methods of Valuation of Goodwill, Valuation of Shares – Net Asset Backing Method and Yield Method.

Module IV: Basic Concepts of Income Tax

Introduction to Income Tax Act, 1961, Residential Status, Exempted Incomes of Companies An overview of various provisions of Business & profession & Capital gains – applicable to companies Goods and Services Tax – Features - Implications - Rate slap - Model - Products Excluded From GST – Registration Procedure

Module V: Assessment of Companies

Computation of taxable income, MAT, Set off & carry forward of losses in companies, Deductions from Gross total income applicable to companies, Tax planning with reference to new projects/expansions/rehabilitation plans including mergers, amalgamation or de-mergers of companies, Concept of avoidance of double taxation.

Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70

Text & References:

- Singhanian V.K. & Singhanian Kapil, Direct Taxes law & practices, Taxmann
- Ravi M Kishore, Advanced Accounting, Taxmann.
- Lakhotia, R.N. & Lakhotia, Corporate Tax Planning, Vision books
- Singhanian, V.K., Student's guide to Income Tax, Taxmann
- International dictionary of taxation by Indian Tax Institute, 1st Edition.
- Maheshwari S.N and Maheshwari S.K Advanced Accountancy, Vikas Publishing House.


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PRIVATE EQUITY AND ENTREPRENEURIAL FINANCE

Course Code: MBF4412

Credit Units: 03

Description

Private equity is composed of funds and investors that directly invest in **private** companies, or that engage in buyouts of public companies, resulting in the delisting of public **equity**. In finance, **private equity** is a type of **equity** and one of the asset classes consisting of **equity** securities and debt in operating companies that are not publicly traded on a stock exchange. A **private equity** investment will generally be made by a **private equity** firm, a venture capital firm or an angel investor. With support of Private equity, the new entrepreneur will hope up to start a new firm for the benefit of economic development.

Objectives

1. To understand the various types of activities that falls under the purview of Private equity. Corporate Restructuring
2. To understand intricacies of raising of various methods of financing
3. To deal with Issues involved in Private financing and entrepreneurial development activities.
4. To examine key elements of understanding a business from a private equity investment perspective

Assessment

The subject would comprise of both theory and numerical solving. The assessment of the learner would be done through assignments, case discussion, articles on current research & issues, problem solving and simulation. The students would be expected to do a project, quiz and comprehend the application part of the concepts taught in the class.

Course Contents:

Module-I: Introduction: Over view of the Private Equity Industry, Development and Growth, terminology, and categories within the asset class, participants, anatomy of funds and partnership agreements, perspectives and negotiations and perspectives of companies

Module-II: The Fundamentals of Private Equity Investing:, financing, structuring and negotiating - buyout and growth capital transactions, and managing the portfolio company over the life of the investment and including an exit and / or value realization transaction.

Module-III: Understanding and Evaluating Private Equity Firms in Financial Markets: We will consider how the financial community assesses firms and chooses which funds to invest in and how funds assemble portfolios of companies and how LP investors assemble their portfolios of LP interests. Other topics will include understanding and managing LP liquidity options; the rise and role of other alternative investment vehicles, most notably hedge funds and sovereign wealth funds; the publicly traded private equity firm; the impact of the financial crisis and current issues under discussion in the area of financial regulation

Module-IV: Private Equity in Secondary Markets – Key components of value creation- Relative value Matrix – Industry Value creation.

Module-V: Private Equity - corporate governance and ethics - Investments in developing markets - Sourcing of private equity - Deals and management of portfolio company - Expectations and Negotiation

Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70

Reference books

- Jason A. Scharfman, Private Equity Operational Due Diligence: Tools to Evaluate Liquidity, Valuation, and Documentation, + Website, ISBN: 978-1-118-11390-5, March 2012
- Stowell D, An Introduction To Investment Banks, Hedge Funds, And Private Equity – 2011, Elsevier (2011), ISBN : 978-9380931074
- Case studies published from various journals.

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MBA-Executive (Working Professionals)

FLEXILEARN
-Freedom to design your degree



Curriculum & Scheme of Examination

2022

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Master of Business Administration (Executive Working Professional)

Programme Mission:

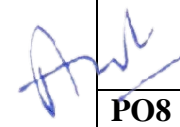
The mission of the MBA programme is to foster an environment of academic excellence in Business Management through research and innovation, industry integration, internationalization and extension activities and develop highly trained and employable professionals with specialization in the area of Marketing & Sales, Finance, Banking & Finance, Human Resource Management, International Business, Information Technology, E-Commerce and Hospital & Healthcare, who are socially responsible and globally minded professional to meet the current and emerging needs of business and society.

Programme Description:

The two year full time Masters in Business Administration programme is to educate and prepare students with the knowledge, analytical ability, and management perspectives and skills needed to lead, to motivate and to manage diversified workforce, rapid technological change and competitive marketplace while considering the principles of ethical, legal and corporate governance fundamentals.

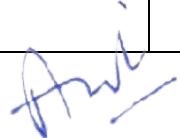
Programme Outcome (PO):

PO1	Apply the knowledge of marketing, human resource management, finance and other functional areas of management to solve complex management issues in volatile business environment
PO2	Student shall have ability to acquire & evaluate new knowledge through Business Research Methods, have the ability to identify, define, investigate, and solve critical business issues using management principles, analyse data/information and interpret results for reaching optimum solutions.
PO3	Student shall be able to understand global issues from different perspectives, recognize the opportunities to improve the business value chain as an entrepreneur and shall develop and display basic business acumen & business skills and be able to apply different forms of communication in diversified cultural settings.
PO4	Student shall able to critically think to assess societal, health, safety, legal, and cultural issues and apply range of strategies for solving a problem and decision making
PO5	Student shall be able to practice ethical principles and commit to professional ethics and responsibilities and norms of the management practice.
PO6	Student shall develop range of Leadership skills and shall demonstrate excellent interpersonal skills, understanding of group dynamics and effective teamwork, including awareness about personal strengths and limitations.
PO7	Student shall be able to communicate effectively on complex management activities with various stakeholders being able to comprehend and write effective reports, design documentation, make effective presentations, and give & receive clear instructions.
PO8	Student shall recognize the need for, and have the ability to engage in independent


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	and life-long learning in the broadest context of technological change.
PO9	Student shall be able to create, select, and apply appropriate techniques, resources, and modern management and IT tools including prediction and modeling to make decisions.

PSO 1			PSO 2					PSO 3
Student shall be able to describe fundamental knowledge of general and functional management courses & relevant technological tools to identify opportunities relating their existing industry knowledge base			Student shall be able to apply technical and management knowledge in the domain of finance, marketing, human resources and information technologies to solve complex business and management problems in global business environment					Student shall be able to apply specific and cross functional knowledge to solve critical
Fundamental Business Management	Functional Management domain	Research, Analysis and Technical Management Domain	M&S/IT&EC/Finance/HR/BA					NTCC
Economics for Managers	Marketing Management	Business Statistics	Sales and Distribution Management	Database Management System for Business	Mergers, Acquisitions & Re-Structuring	Compensation and Reward Management	Programming for Analytics using R	Research Project
Information Technology for Managers	Accounting for Managers	Operations & Supply Chain Management	Marketing of Services	E-Commerce Fundamentals	Management of Banks and Financial Institutions	Learning and Development	Programming for Analytics using Python	Dissertation
Strategic Management	Strategic Human Resource Management	Research Methods & Report Preparations	Consumer Behaviour	System Analysis & Design	Security Analysis and Portfolio Management	Organizational Development & Change	Visual Analytics- Tableau/ Power BI	

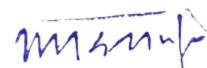

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			Advertisi ng Manage ment and Sales Promotio n	Dynamic Web Design & Developm ent	Corporate Valuation	Perform ance Manage ment System	Econo metrics	
			Retail Manage ment	Data Warehous ing & Data Mining	Fintech	Internati onal Human Resourc e Manage ment	Predict ive Analyti cs-I Machi ne Learni ng using R	
			Digital Marketin g	ERP for Businesse s	Strategic Financial Managem ent	Leaders hip Develop ment	Predict ive Analyti cs-II Machi ne Learni ng using Python	
			Strategic Brand Manage ment	Digital Marketing	Internatio nal Finance	Strategic Human Resourc e Manage ment	Big Data Analyti cs- Hadoo p	
			Custome r Relation ship Manage ment	E-Supply Chain Managem ent	Private Equity and Entrepren eurial Finance	Talent Manage ment and Successi on Planning	Data Mining	



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MWP4106	BUSINESS STATISTICS	L	T	P	C
Version	Latest Approved	2	0	1	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

This course not only exposes the students to the theory of probability and sampling distribution but also includes the various types of statistical tools which are to be used in the present rapidly changing business environment. Its main focus is on the application of data analytic tools to enable the students to make correct decision making under the complex and dynamic business scenario. The content of the course will also include the different forecasting techniques with main focus on the quantitative technique that would be immensely beneficial for the students to make the predictions correctly. Numerous empirical examples and real business cases are used to illustrate applications of the material covered

Course Objectives

The aim of this course is to:

1. Develop the understanding of the various statistical models used for decisions making
2. To appreciate the problems of obtaining or gathering the desired information or data.
3. To understand the types of classification of data, representation of data in the form of diagrams, graphs or tables.
4. To appreciate the basics of central value, dispersion, skewness etc and their applications in real business problems.
5. To examine the problems related to theory of probability, various types of probability distribution and particularly Baye's theorem and their application in real-life problems.
6. To describe the process of hypothesis testing for large and small samples and its uses in business problems
7. To equip with the knowledge of correlation, regression and time series; enabling them to make the correct future predictions

Course Outcomes

On completion of this course, the students will be able to:

CO1. Define and apply basic statistical concepts to various field of management

CO2: Apply statistical methods such as statistical collection, species characteristics, statistical series, tabular and graphical representation of data, measures of central tendency, and dispersion for managerial decision making.

CO3. Apply various forecasting techniques.

CO4. Describe different types of probability distributions

CO5. Explain and analyze a given business problem and applying required statistical hypothesis and sampling tool accordingly

CO6. Define the decision theories for practical business problems.

Modules	Blooms level*	Number of hours
Module I: Introduction Application of Statistics in Business & Management; Basic Concepts of Statistical Studies: Variable and Classification of Data; Diagrammatic & Graphical Presentation of Data, Measures of Central Tendency, Measures of Dispersion	L1, L2	9
Module II: Forecasting Techniques Simple Correlation & Regression Analysis, Time Series Analysis-Introduction, Variation in Time Series, Trend Analysis, Cyclical Analysis, Seasonal Analysis, Irregular Variation	L1, L2, L3	9
Module III: Probability & Probability Distributions Probability: Basic Terminology in Probability, Types of Probability, Probability rules, Probabilities under condition of Statistical Independence, Probabilities under condition of Statistical dependence, Baye's Theorem Probability Distributions: Binomial Distribution, Poisson Distribution, The Normal Distribution	L2,L3	9
Module IV: Sampling, Estimation and Testing of Hypotheses Sampling & Sampling Distribution: Parameter and Statistic, Point and Interval Estimation, Interval Estimation of three common parameters viz. Mean Standard Deviation and Proportion. Hypothesis Testing for a Single Population: Concept of Hypothesis, Test involving a population mean, Test involving a population proportion, Test involving population Standard Deviation, Test for two population means (Independent Samples), Tests for two population means (Dependent Samples), Tests for two population proportions (Independent Samples), Tests for two population variances (Dependent Samples), F-test, Non-parametric Tests (Chi – Square Test)	L1, L2	9

*Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. Levin R.I. & Rubin S.R. 2012, Statistics for Management, 7th Ed. Prentice Hall Of India
2. Gupta S P, Statistical Methods, S. Chand & Co. New Delhi, 35th edition

Reference Books

1. Anderson David R, Sweeny Dennis J, Williams Thomas A, Statistics for Business and Economics 12th ed, Cengage learning, 2018.
2. Keller Gerald, Statistics for Management, Cengage Learning, 2014
3. Rubin & Levin, Statistics for Management, Eighth edition, Pearson, Prentice Hall of India, 2017.
4. Vohra N.D., Quantitative Techniques in Management, Tata McGraw Hill, 2017

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Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	C	A	CT	EE
Weightage (%)	10	5	5	70

CT: Class Test, A: Attendance, EE: End Semester Examination; A: Attendance, C: Case Analysis

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3
CO1	1	1	--	--	--	--	--	--	--	1	--	--
CO2	1	1	--	--	--	--	--	--	--	1	--	--
CO3	1	1	--	--	--	--	--	--	--	1	--	--
CO4	1	1	--	--	--	--	--	--	2	1	--	--
CO5	1	1	--	--	--	--	--	--	2	1	--	--
CO6	1	1	--	--	--	--	--	--	2	1	--	--

1: strongly related, 2: moderately related and 3: weakly related



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MWP4109	INFORMATION TECHNOLOGY FOR MANAGERS	L	T	P	C
Version 1.1	Latest Approved	2	0	1	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

In this course the students will learn the concepts of computer evolution, database management systems, networking fundamentals and management information system. The aim of this course is to make the students familiar with the basic concepts of Information Technology that assists managers in executing their tasks with efficiency.

Course Objectives

This course will expose students to

1. Developments in computer technology and understand the advancements in Information Technology.
2. Introduce end-user computing and build skills in using IT and understanding various technologies like internet, telecom, DBMS concepts and information systems.
3. The latest trends in information system development and its relevance in present scenario for modern businesses.

Course Outcomes

On completion of this course, the students will be able to

CO1: State the strategic use of Information Technology in Business and differentiate between functional and cross functional information systems.

CO2: Describe the concepts related to databases and networking.

CO3: Apply the knowledge of Information Technology in managing the broad array of responsibilities in the business organization.

CO4: Analyze how are information systems transforming business and what is their relationship to globalization.

CO5: Review and assess the available tools and technologies pertaining to organization's information system.

Modules	Blooms level*	Number of hours
Module I: Information Technology Infrastructure Defining IT Infrastructure, Evolution of Computer Systems, Input, output and storage technologies, Contemporary hardware and software platforms (Open Source, Web Software etc.), Introduction to Cloud Computing Storage of Data Resources.	L1, L2	4
Module II: Databases and Information Management Organizing Data in traditional file environment, Introduction to	L2, L3	4

Databases and Database Management System, Types of DBMS, Capabilities of Databases, Designing databases through Entity Relationship Diagrams, Concept of Data Warehouses and Data Marts, Tools for Business Intelligence: Multidimensional data analysis and Data Mining.		
Module III: Telecommunications and Networking in Business Networking and Communication Trends, Computer Networks Types of networks, Advantages of Network Environment, Network in large companies, Network Topologies, Various network components, Physical Transmission Media, Business Uses of Internet, Intranet and Extranet, Internet Addressing and Architecture, Internet Services	L1, L2	4
Module IV: Information System Essentials: Role of information systems in business, Introduction to MIS and its relevance for business firms, Components of MIS, Types of information systems, Digital firms and business processes, Strategic Business Objectives of information systems, Dimensions of Information Systems, Collaboration and teamwork, Tools and technologies for collaboration and teamwork, Information System function in Business- Roles and Responsibilities of IT Department Personnel	L1, L2	4

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation*

Text Books

1. Kenneth C. Laudon and Jane P. Laudon (2017), Management Information Systems: Managing the Digital Firm, Pearson Education, 15th Edition, ISBN 978-0134639710.

Reference Books

1. Morley D & Parker CS (2009), Understanding Computers – Today and Tomorrow, Thompson Press.
2. Norton P (2010), Introduction to Computers, Tata McGraw-Hill
3. Potter T (2010), Introduction to Computers, John Wiley & Sons (Asia) Pvt Ltd

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3	PSO4
CO1	1									1			
CO2	1	2								2			
CO3	2	1	1							2			
CO4									2	1			
CO5		1							2	1			

1: strongly related, 2: moderately related and 3: weakly related

MWP4204	Research Methodology & Report Preparation	L	T	P	C
Course Version	Latest Approved	2	0	1	3
Pre-requisites/Exposure					
Co-requisites					

Catalogue Description:

The main objective of the course is to equip the students with the basic understanding of research methodology in changing business scenario. It will also provide them an insight into the application of dynamic analytical tools to face the stormy challenges aimed at fulfilling the purpose of business decision making.

Course Objectives :

The objectives of this course are to ensure that students are able to-

- 1: Understand the basic framework of research process.
- 2: Comprehend of various research designs and techniques.
- 3: Identify various sources of information for literature review and data collection.
- 4: Understand some basic concepts of research and its methodologies.
- 5: Understand as how to organize and conduct research in a more appropriate manner and write a research report, thesis and a research proposal.

Course Outcomes :

On completion of this course, the students will be able to:

CO1: Apply a range of quantitative and / or qualitative research techniques to business and management problems / issues

CO2: Determine and apply research approaches, techniques and strategies in the appropriate manner for managerial decision making

CO3: Demonstrate knowledge and understanding of data analysis and interpretation in relation to the research process

CO4: Synthesize and Evaluate different research approaches utilised in the different industries and be able to critically assess the overall process of designing a research study from its inception to its final report preparation.

Modules	Blooms level*	Number of hours
Module I: Introduction Meaning of research, importance of scientific research in business decision making, types of research, complete research process, research methodology, criterion for good research, Identification of research problem and formulation	L1, L2	9

of hypothesis, research designs, drafting a research proposal		
Module II: Measurement and Data Collection Primary data, secondary data, design of questionnaire, sampling fundamentals and sample designs, Qualitative and quantitative research, measurement and scaling techniques, measures of central tendency mean, median, mode; measures of dispersion, data processing	L1, L2,L3,L4, L6	9
Module III: Data Analysis I Cross tabulation, univariate analysis, bivariate analysis: Correlation, Karl Pearson's coefficient of correlation, Spearman's coefficient of correlation, hypothesis testing, t-test, Z test, F-test, Chi- square test, Analysis of variance, Non-parametric tests: Sign test, Run test, Krushall-Wallis test	L1, L2,L3,L4,L5,L6	9
Module IV: Report Writing Pre-Writing Considerations, structure of research report, common problems encountered while preparing the research report, presentation of research report, ethical issues while preparing a research report	L1,L2,L3,L4,L5,L6	9

*Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Book:

Cooper, R.D., Schindler, S. P. and Sharma, J.K. (2015). Business Research Methods. New Delhi, India: McGraw Hill Education (India) Private Limited

Reference Book/s:

- 1 .Zikmund, William C (1997). *Business Research Methods (5th Ed.)*. The Dryden Press, Harcourt Brace College Publishers
- 2 Levin & Rubin (2004), Statistics for Management, 8th Ed, Prentice Hall of India

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	CT	HA	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70

CT: Class Test, HA: Home Assignment, Q/S: Seminar/Viva/Quiz, ME: Mid Term Exam EE: End Semester Examination; A: Attendance

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3	PSO4
CO1	1	1	--	-	--	--	--	-	--	1	3	-	-
CO2	1	1	-	--	--	-	--	-	-	1	2	-	-
CO3	1	2	--	-	--	--	-	--	--	1	3	-	-
CO4	1	1	--	--	3	-	2	--	--	1	3	2	2

1: strongly related, 2: moderately related and 3: weakly related

MWP4205	FUNDAMENTALS OF DATA ANALYTICS	L	T	P	C
Version 1.1	Latest Approved	2	0	1	3
Pre-requisites/Exposure					
Co-requisites					

Course Description

The course is designed at par with current industry needs for data analysis. It includes many cutting-edge learning modules which will provide a rich experience and exposure to different modern data analytical tools and techniques to the students.

Course Objectives:

1. To provide detail knowledge of data analytics and data science
2. To provide basic understanding of MS excel as a tool of data analysis
3. To help the students to know about different types of data, sources of data and data generation techniques
4. To provide the basic understanding of salesforce platform

Course Outcomes

On completion of this course, the students will be able to,

CO1:To develop a comprehensive understanding about data analytics and data science. It will help the students to identify the business problems where data analytics can be used.

CO2:To develop basic understanding of MS Excel that can further be used to apply basic data analytic tools.

CO3:To develop an integrated knowledge about different types of data, data sources and data generation techniques which will help the students in decision making.

CO4:To develop the knowledge about wave analysis using salesforce platform. It will help the students to create various dashboards to understand the real business situation and suggesting possible solutions.



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Modules	Blooms level*	Number of hours
Module I: Introduction to Data Analytics <ul style="list-style-type: none"> • Introduction to Data Analytics • Data Analytics vs Data Science • Data Analytics in business needs • Data Analysis Types, Process, Techniques and Tools • Role of Data Analyst in Analytics • ELT Process • DWH, Benefit of DWH, Use, Type of DWH 	L1, L2, L5, L6.	8
Module II: Data Analytics using MS-Excel <ul style="list-style-type: none"> • Data Analysis with Excel, Advantages, Business need and usage • Data Import – Text, CSV, JSON, XML, SQL Query • Data Table, Pivot Table • Excel Formula, usage, advantages, formula use in Data Analysis. • What-If-Analysis, scenario Manager, Goal Seek, Solver. • Data Visualization with Charts – Histogram, Run Chart, Line, Scatter, Bar • Functions – Financial, Logical, Text and Mathematical 	L1, L2, L3, L5, L6.	8
Module III: Introduction to Data Science <ul style="list-style-type: none"> • Data Mining Process Techniques and Tools • Exploratively Data Analysis • Machine learning, Advantage Algorithms, Types • Machine learning VS Statistical Learning • Supervised ML VS Unsupervised ML vs Reinforcement ML 	L1, L2, L5, L6.	8
Module IV: Industry Wave Analytics using Salesforce CRM <ul style="list-style-type: none"> • SFDC Data Analysis, Advantages, Industry Needs and Usage • Reports, Reports Types – Tabular, Summary, Matrix, Joined • Charts – Line, Bar, Pie, Funnel, Scatter, Donut • Dashboard: Executive Dashboard, Sales & Service Dashboards • Reports & Dashboards Access and Security with Users, Groups and Roles 	L1, L2, L3, L5, L6.	8

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Reference Books

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1. Introduction to Data Mining by *Pang-Ning Tan & Vipin Kumar*
2. Business Analytics: The Science of Data - Driven Decision Making by *U Dinesh Kumar*
3. Microsoft Excel Data Analysis and Business Modeling by *Wayne L. Winston*
4. Advance/Data Analysis with Excel by *Manisha Nigam*
5. Data Science for Business by *Foster Provost*
6. Data Science for Business Professionals by *Probyto Data Science and Consulting Pvt. Ltd.*
7. Salesforce Lightning Reporting and Dashboards by *Yu Johan*
8. Pro Salesforce Analytics Cloud: A Guide to Wave Platform, Builder, and Explorer by *William Smith & Helen Sun*

Modes of Evaluation: Quiz/Assignment/ Practical lab/ Seminar/Written Examination

Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6
CO1	1	1	1	2	2	1
CO2	1	1	1	-	2	1
CO3	2	1	1	-	1	1
CO4	2	1	1	2	3	1

1: strongly related, 2: moderately related and 3: weakly related



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MWP4231	TERM PAPER	L	T	P	C
Version 1.1	Latest Approved	2	0	0	2
Pre-requisites/Exposure					
Co-requisites					

Course Description

A term paper is primarily a record of intelligent reading in several sources on a particular subject. The students will choose the topic at the beginning of the session in consultation with the faculty assigned. At least one middle level or senior level person of a company from the chosen sector may be interviewed face to face

Course Objectives

The objective of this course is to judge the understanding as well as application of the knowledge gained by the students. The aim of the term paper is to provide the students with an opportunity to further enhance their knowledge in a sector of their choice by undertaking a significant practical unit of examining and analyzing various aspects of business management at a level commensurate with the learning outcomes of the various courses taken up them in the ongoing semester.

Guidelines:

1. The term paper will be related to the contemporary business issue and the topic will be given by the department.
2. The presentation of the term paper is scheduled to be held before the commencement of Semester examinations.
3. The paper will carry 100 marks that will be marked on the basis of understanding and organization of content based on the literature review. The Bibliography shall form an important part of the paper.
4. Examples of a few broad areas for Term Paper (List is indicative, not exhaustive)
 - Inflation
 - Unemployment
 - Fiscal Deficit
 - Poverty
 - Education
 - Malnutrition
 - Rural Development
 - Regional Imbalance
 - Globalization
 - Foreign Direct Investment
 - Current trends in consumer behavior

- Innovative management
- Company rituals and corporate culture
- Negotiation and diplomacy
- Effective advertising
- International trade trends in the USA
- Geo-arbitrage and business success
- Advantages of increasing brand awareness
- Social media as a new market
- Healthy work environment and employee diversity

Evaluation Scheme

Organisation and relevance of content	Literature Review	Bibliography	Presentation	Total
30	30	20	20	100



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MWP4311	INNOVATION AND ENTREPRENEURSHIP	L	T	P	C
Course Version	Latest Approved	2	1	0	3
Pre-requisites/Exposure	NA				
Co-requisites	NA				

Catalog Description:

The objective of the course is to provide students an understanding of entrepreneurship & the process of creating and grooming a new venture. students will be introduced to the basic terminology, typology of innovations and historical context for better comprehension. Also issues of innovation management will be introduced. Students will become familiar with the impact of innovation on competitiveness as well as individual companies with innovative processes and aspects that affect it, including applicable methods and innovation management techniques. The course also focuses on giving the students the concept of an entrepreneur who is willing to accept all the risks & put forth the effort necessary to create a new venture. The challenge rolls out in a learning environment corresponding to current and future workplace requirements - cross-functional and virtual teams with crowd-sourced work tasks, multicultural work force and extremely demanding organisation, planning and communication skills.

Course Objectives:

The objectives of this course are to ensure that-

- 1:** The student is able to understand the concepts and theories related to entrepreneurship.
- 2:** The student has gained up to date understanding of the field in regard to the process of assessing the commercial potential of new markets.
- 3:** The student has acquired a cutting edge understanding when it comes to identifying opportunities and challenges affiliated with the organization and financing of new initiatives such as new business ventures.
- 4:** The candidate is also aware of challenges affiliated with the rapid growth of new business ventures.

Course Outcomes (CO):

On completion of this course, the students will be able to-

CO1: Apply the various principles of entrepreneurship.

CO2: Apply the theories of viability of businesses, new business proposals, and opportunities within existing businesses;

CO3: Apply the principles of entrepreneurial management and develop strategic plans and prepare a startup business plan emphasizing financing, marketing, and organizing;

CO4: Able to define, identify and evaluate the concept related not only to creating but also to defend an entrepreneurial marketing plan along with developing pro forma financial statements.

Modules	Blooms level*	Number of hours
Module I: Entrepreneurship: What Is Entrepreneurship? Why Become an Entrepreneur? Characteristics of Successful Entrepreneurs ,Common Myths About Entrepreneurs, Types of Start-Up Firms ,Changing Demographics Of Entrepreneurs.	L1, L2	9
Module II: Innovation: the basic definition and classification. The relationship of innovation and entrepreneurship, creation of competitive advantage based on innovation.Innovative models. Product, process, organizational and marketing innovation and their role in business development. Sources of innovation, transfer of technology. Barriers to innovation in business, innovation failure.	L1, L2,L3,L4, L6	9
Module III: Developing Successful Business Ideas Identifying And Recognizing Opportunities: Observing Trends, Solving a Problem, Finding Gaps In The Marketplace,Personal Characteristics of the Entrepreneur.Techniques for Generating Ideas, Team Formation, Product/ Market Fit, Customer Validation, Prototyping, Feasibility Analysis. The Business Plan: Reasons for Writing a Business Plan , Who Reads the Business Plan—And What Are They Looking For? Outline Of the Business Plan.	L1, L2,L3,L4	9
Module IV:Moving from an Idea to a reality Obtaining Business Licenses and Permits: Introduction to various form of business organization (sole proprietorship, partnership, corporations, Limited Liability company), mission, vision and strategy formulation. Intellectual Property. Getting Financing or Funding: The Importance, Sources of Personal Financing, Preparing to Raise Debt or Equity Financing, Venture Capital, Initial Public Offering, Commercial Banks, Other Sources of Debt Financing. Managing and Growing the new venture: Segmenting the Market, Selecting a Target Market, Establishing a Unique Positioning, Branding, 4Ps/7Ps Of Marketing For New Ventures	L1,L2,L3	9

*Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books:

1. Robert D. Hisrich, Michael P. Peters, Dean A Shepherd, *Entrepreneurship*, 6th edition, Tata McGraw-Hill Publishing company Ltd. New Delhi

Reference Book/s:

1. Barringer, Bruce R. & Ireland, R. D. (2012). *Entrepreneurship: Successfully Launching New Venture*, 4th edition. New Jersey.USA: Pearson Education
2. M.J. Dollinger (2003), *Entrepreneurship: Strategies and Resources*, 3rd edition, Delhi: Pearson Education

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3.Clifton, Davis S and Fyffe, David E, “Project Feasibility Analysis”, 1977 John Wiley, New York.

S. Carter and D. Jones-Evans, Enterprise and small business- Principal Practice and Policy, Pearson Education (2006)

T. H. Byers, R. C. Dorf, A. Nelson, Technology Ventures: From Idea to Enterprise, McGraw Hill (2013)

Prasad, Rohit (2013), Start-up sutra: what the angels won't tell you about business and life, Hachette India

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	CT	HA	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70

CT: Class Test, HA: Home Assignment, Q/S: Seminar/Viva/Quiz, ME: Mid Term Exam EE: End Semester Examination; A: Attendance

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3	PSO4
CO1	1	3	--	2	--	--	--	1	--	1	1	1	--
CO2	1	1	2	--	--	--	--		--	1	2	1	--
CO3	1	3	--	2	--	--	--	--	--	2	1	1	1
CO4	1	2	--	--	--	--	--	--	--	1	1	1	--

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MWP4337	PROJECT-I	L	T	P	C
Course Version	Latest Approved	-	-	-	8
Pre-requisites/Exposure	NA				
Co-requisites	NA				

Catalog Description

Under this, it is usual to give the student some discretion in the choice of topic for the Research Project and the approach to be adopted. The Research Project topic is related to the field of specialization. Deciding this is often the most difficult part of the Research Project process, and requires thorough preparation and background research.

The aim of the Research Project is to provide the students with an opportunity to further their intellectual and personal development in their chosen field by undertaking a significant practical unit of activity, having an educational value at a level commensurate with the award of their degree.

Course Objectives

The objective of this course is to

1. Understand and apply theoretical frameworks to the chosen area of study.
2. Produce a coherent and logically argued piece of writing that demonstrates competence in research and the ability to operate independently.

Course Outcomes

On completion of Research Project, the students will be able to

CO1: Describe a relevant area of career development, career coaching, coaching or work-related learning studies.

CO2: Identify research methods and state research questions.

CO3: Critically analyze and evaluate the knowledge and understanding in relation to the agreed area of study.

CO4: Integrate theory and practice for the development of responses on the basis of the evaluation and analysis undertaken.

CO5: Communicate in written form by integrating, analyzing and applying key texts and practices.

CO6: Demonstrate advanced critical research skills in relation to career development or work-related learning studies.

 Planning the Research Project	Blooms level*	Number of hours
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<ul style="list-style-type: none"> • Selecting a topic for investigation. • Establishing the precise focus of the study by deciding on the aims and objectives of the Research Project, or formulating questions to be investigated. Consider very carefully what is worth investigating and its feasibility. • Drawing up initial Research Project outlines considering the aims and objectives of the Research Project. Workout various stages of Research Project • Devising a timetable to ensure that all stages of Research Project are completed in time. The timetable should include writing of the Research Project and regular meetings with your Research Project guide 	L1, L2 ,L3,L4,L5,L6	6hours a Week
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**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis; L6-Evaluation*

Modes of Evaluation: Viva/ Report Examination

Examination Scheme:

Components	Content & Layout of Report	Conceptual Framework	Objectives & Methodology	Implications & Conclusions	Viva-Voce
Weightage	30	10	15	15	30

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3
CO1	1	--	--	--	--	--	--	1	--	--	--	1
CO2	--	1	--	--	--	--	--	--	--	--	--	1
CO3	--	1	2	--	--	--	--	--	--	--	--	1
CO4	1	--	--	--	--	--	--	--	--	--	--	1
CO5	--	--	--	--	--	--	1	--	--	--	--	1
CO6	--	--	--	--	--	--	--	--	1	--	--	1

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MWP4322	DATABASE MANAGEMENT SYSTEM FOR BUSINESS	L	T	P	C
Version 1.1	Latest Approved	2	0	1	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

In this course the students will learn about the importance and usage of database management systems in the modern day organizations. The students shall grasp sound knowledge of various types of databases that exist, creation of data warehouse and application areas of data mining. Also, the students will be learning SQL, the language of databases.

Course Objectives

The course aims to make the students:

1. Understand the basic and advanced concepts in databases and database management systems.
2. Grasp the importance of databases in day to day life.
3. Gain a hands-on experience on the SQL-the language of databases.

Course Outcomes

On completion of this course, the students will be able to

CO1: Define the basic terminology used in databases.

CO2: Describe the concepts related to databases architecture.

CO3: Apply the knowledge of SQL in creating databases using DBMS software for a business organization.

CO4: Compare and contrast various types of keys used in database creation.

CO5: Review and assess the organization's data and network security aspects.

Modules	Blooms level*	Number of hours
Module I: Introduction to DBMS Definition of DBMS, Concept and Goals of DBMS, Data Independence, DBMS Architecture, Levels, Database Administrator, File System Approach Vs DBMS Approach, Advantages of Using a DBMS, Data Models, Schemas, and Instances, Database Languages, Database Users, Database Abstraction.	L1, L2	4
Module II: Relational Database & ER Model Relational Database: Relational System, Codd's Rule, Relational Model, Optimization, Tables and Views, Relational Data Integrity; Primary Key, Candidate Key, Foreign Key and their rules, ER Model: Entity Type, Entity Set, Relationship type, Relationship sets,	L2, L3, L4	4

Constraints: Cardinality Ratio and Participation Constraint, Keys, Mapping, Design of ER diagrams.		
Module III: SQL SQL Language, DDL,DML and DCL commands. Data definition, Data retrieval and update operations on MS ACCESS and SQL Server DBMS.	L2, L3, L4	4
Module IV: Transaction Management and Concurrency Control Transaction management: ACID properties, serializability and concurrency control, Lock based concurrency control (2PL, Deadlocks),Time stamping methods, optimistic methods, database recovery management.	L2, L3, L4	4

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation*

Text Books

1. Elmasari, Navathe (2015), "Database Systems", Pearson, ISBN 978-8131792476
2. Korth, Silbertz, Sudarshan (2013), "Database System Concepts". McGraw Hill. ISBN 978-9332901384

Reference Books

1. Majumdar & Bhattacharya, "Database Management System", Tata McGraw Hill.
2. Date C J." An Introduction to Database Systems", Addison Wesley.
3. *Database Systems: The Complete Book (2nd edition)* by Hector Garcia-Molina, Jeff Ullman, and Jennifer Widom (ISBN 978-0131873254, Pearson Prentice Hall, 2009)

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70

CPA: Case Discussion/Presentation/Analysis, TP: Project, Q/S:Quiz/Seminar

A: Attendance, ME: Mid Term Exam, EE: End Term Examination

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3	PSO4
CO1	1										1		
CO2	1										1		
CO3	2								1		1		
CO4								1	2		1		
CO5				1				2			1		

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MWP4323	E-COMMERCE FUNDAMENTALS	L	T	P	C
Version 1.1	Latest Approved	3	0	0	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

In this course the students will learn the fundamental concepts of e-commerce which includes various e-commerce business models, electronic data interchange, electronic payment systems and security issues related to computer systems. The aim of this course is to make the students familiar with the basic concepts of Information Technology and E-commerce.

Course Objectives

This course will expose students to:

1. To develop the techno managers with deep understanding of managerial aspects as to use Information Technology effectively and efficiently.
2. To help the students with a view to emulate, entrepreneurial ventures in e-commerce and m-commerce.
3. To prepare the students to cope with the ever changing IT- Industry and to use Information technology to gain competitive advantage in business.

Course Outcomes

On completion of this course, the students will be able to

CO1: State the strategic use of Information Technology in Business and differentiate between functional and cross functional information systems.

CO2: Describe the concepts related to databases and networking.

CO3: Apply the knowledge of Information Technology in managing the broad array of responsibilities in the business organization.

CO4: Design the e-commerce website for various e-business organization using e-commerce models.

CO5: Review and assess the organization's data and network security aspects.

Modules	Blooms level*	Number of hours
Module I: Electronic Commerce Systems Meaning, Definition, Concept, Features, Function of E-Commerce, E-Commerce Practices v/s Traditional Practices, Scope and basic models of E-Commerce, Limitations of E-Commerce, Precaution for secure E-Commerce, proxy services.	L1, L2	6
Module II: E-Commerce Business Models & EDI Concept of EDI, Difference between paper based Business and EDI	L1, L2	6

Based business, Advantages of EDI, Application areas for EDI, Action plan for Implementing EDI, Factors influencing the choice of EDI. Various business models in Ecommerce like B2C, B2B, C2C.		
Module III: E-Payment Systems and Security Management Transactions through Internet, Requirements of E-Payment system, Post paid payment system- Credit card solutions, Cyber cash Internet Cheques, Instant Paid payment system- Debit card, Direct Debit, Prepaid payment system- Electronic cash, Digicash, Netcash, Cybercash, Smart Cards. The Information Security, System Vulnerability and Abuse, Security Threats (Malicious Software, Hacking etc.) and counter measure. Definition of Cyber Crime and Types. Antivirus, Firewalls, Anti-Spyware, Security Audit, Discussion on Overview of IT-ACT 2000.	L1, L2	6
Module IV: E-Marketing and E-Finance Traditional Marketing V/S E-Marketing, impact of Ecommerce on markets, marketing issue in E-Marketing, promoting your E-Business, Direct marketing, one to one marketing Areas of E-Financing, E-Banking, traditional v/s E-Banking, operations in E-Banking; E-Trading- Stock marketing, trading v/s E-Trading, importance of E-Trading, advantages of E-trading, operational aspects of E-Trading.		

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation*

Text Books

1. Elias M Awad, Electronic Commerce from Vision to fulfilment, Third Edition, Pearson Education
2. Ravi Kalakota & Andrew B. Shinston, Electronic Commerce – A manager's Guide, Pearson Education.

Reference Books

3. Bhaskar Bharat, Electronic Commerce - Technologies & Applications, Tata McGraw Hill.
4. J. Christopher & T.H.K. Clerk, Global E-Commerce, University Press.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance



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CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3	PSO4
CO1	1										1		
CO2									1		1		
CO3	1										1		
CO4									1		1		

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MWP4326	PROGRAMMING FOR ANALYTICS USING R	L	T	P	C
Version 1.1	Date of Approval: Latest Approved	2	0	1	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

This course offers the specialization on R (powerful language used widely for data analysis and statistical computing). This course facilitates a good understanding on the process of data manipulation and visualization. The course provides ample working examples on statistical data analysis using R.

Course Objectives

The objective of this course is to:

1. Provide learning on how to program in R, how to use R for effective data analysis, how to install and configure software necessary for a statistical programming environment.
2. Provide applications on statistical computing which includes programming in R, reading data into R, accessing R packages, writing R functions, debugging, profiling R code, and organizing and commenting R code.
3. Facilitate hands on experience to various real world business problems using R.

Course Outcomes

On completion of this course, the students will be able to:

CO1: Analyze different datasets using R

CO2: Explore real time data at various levels using appropriate visualizations

CO3: Apply critical programming language concepts such as data types, iteration, control structures, functions, and boolean operators by writing R programs and through examples

Modules	Blooms level*	Number of hours
MODULE 1: Introducing to R , R Data Structures , Help functions in R , Vectors , Scalars , Declarations , recycling , Common Vector operations , Using all and any, Vectorized operations , NA and NULL values , Filtering , Vectorized if-then else , Vector Equality , Vector Element names.	L1, L2,L3	9
MODULE 2: Matrices, Arrays And Lists: Creating matrices , Matrix operations , Applying Functions to Matrix Rows and Columns , Adding and deleting rows and columns , Vector/Matrix Distinction , Avoiding Dimension Reduction , Higher Dimensional arrays , lists , Creating lists ,	L1, L2,L3	9

General list operations , Accessing list components and values , applying functions to lists , recursive lists.		
MODULE 3: Data Frames: Creating Data Frames , Matrix-like operations in frames , Merging Data Frames , Applying functions to Data frames , Factors and Tables , factors and levels , Common functions used with factors , Working with tables - Other factors and table related functions - Control statements , Arithmetic and Boolean operators and values , Default values for arguments - Returning Boolean values , functions are objects , Writing Upstairs - Recursion , Math and Simulations in R.	L1, L2,L3	9
MODULE 4: Input/ Output , accessing keyboard and monitor , reading and writing files , accessing the internet , String Manipulation , Graphics , Creating Graphs , Customizing Graphs , Saving graphs to files , Creating three-dimensional plots Interfacing R with Python , Basic Statistics , Regression Basic Idea, Linear Model , Generalized Linear models , Non-linear models , Time Series and Auto-correlation.	L1, L2,L3	9

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis;L6-Evaluation*

Text and Reference Books

1. Beginning R – The Statistical Programming Language by Mark Gardener, Wiley, 2013
2. Introductory R: A Beginner's Guide to Data Visualisation, Statistical Analysis and Programming in R by Robert Knell, Amazon Digital South Asia Services Inc, 2013.
3. “THE ART OF RPROGRAMMING “A Tour of Statistical Software Design By Norman Matloff, No Starch Press.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	IP	EE	EP
Weightage (%)	5	25	50	20

IP: Internal Practical, EE: End Semester Examination; EP: External Practical; A: Attendance

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3	PSO4
CO1	3	1	2	1	--	--	3	1	1	2	1	--	--
CO2	1	1	3	1	--	--	3	1	2	2	1	--	--
CO3	1	2	2	1	--	--	3	1	1	2	1	--	--

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MWP 4327	PROGRAMMING FOR ANALYTICS USING PYTHON	L	T	P	C
Version 1.1	Latest Approved	2	0	1	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

This course is designed in such a way that leads the students from the basics of writing and running Python scripts to more advanced features such as file operations, regular expressions, working with binary data, and using the extensive functionality of Python modules.

Course Objectives

The objective of this course is to:

1. Equip students with the concepts of the fundamental programming concepts including data structures, networked application program interfaces, and databases, using the Python programming language.
2. Provide applications on statistical, machine learning, information visualization, text analysis, and social network analysis techniques through popular python toolkits to gain insights into data analysis process.

Course Outcomes

On completion of this course, the students will be able to

CO1: Create applications for data retrieval and processing

CO2: Conduct an inferential statistical analysis of various business problems

CO3: Explain fundamental Python functionality and features used for data science

CO4: Apply techniques such as lambdas and manipulate csv files

Modules	Blooms level*	Number of hours
MODULE 1: Installing Python; basic syntax, interactive shell, editing, saving, and running a script, Concept of data types; variables, assignments; immutable variables; numerical types; arithmetic operators and expressions; comments in the program; understanding error messages Conditions, boolean logic, logical operators; ranges; Control statements: if-else, loops (for, while); short-circuit (lazy) evaluation.	L1, L2,L3	9
MODULE 2: Strings and text files; manipulating files and directories, os and sys modules; text files: reading/writing text and numbers from/to a file; creating and reading a formatted file (csv or tab-separated).String manipulations: subscript operator, indexing, slicing a string; strings and number system: converting strings to numbers and vice versa. Binary,	L1, L2,L3	9

octal, hexadecimal numbers.		
MODULE 3: Lists, tuples, and dictionaries; basic list operators, replacing, inserting, removing an element; searching and sorting lists; dictionary literals, adding and removing keys, accessing and replacing values; traversing dictionaries. Design with functions: arguments and return values; formal vs actual arguments, named arguments, Recursive functions.	L1, L2, L3	9
MODULE 4: Simple Graphics and Image Processing: digital images, image file formats, image processing Simple image manipulations with 'image' module (convert to bw, greyscale, blur, etc).Classes and OOP: classes, objects, attributes and methods; defining classes; design with classes, data modeling; persistent storage of objects OOP, continued: inheritance, polymorphism, abstract classes; exception handling, try block.Graphical user interfaces; event-driven programming paradigm; tkinter module, creating simple GUI; buttons, labels, entry fields, dialogs; widget attributes - sizes, fonts, colors layouts, nested frames.	L1, L2, L3	9

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis; L6-Evaluation*

Text and Reference Books

1. Core Python Programming by Wesley Chun, Prentice Hall
2. Fundamentals of Python: First Programs By Kenneth Lambert, Course Technology, Cengage Learning
3. Learning Python by David Ascher and Mark Lutz, Oreilly

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	IP	EE	EP
Weightage (%)	5	25	50	20

IP: Internal Practical, EE: End Semester Examination; EP: External Practical; A: Attendance

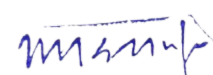
CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3	PSO4
CO1	3	1	2	1	--	--	3	1	1	2	1	--	--
CO2	1	1	3	2	--	--	3	1	2	2	1	--	--
CO3	1	2	2	1	--	--	3	1	1	2	1	--	--
CO4	2	1	3	2	--	--	3	1	2	2	1	--	--

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MWP4328	VISUAL ANALYTICS- TABLEAU /POWER BI	L	T	P	C
Version 1.1	Latest Approved	2	0	1	3
Pre-requisites/ Exposure					
Co-requisites					

Catalog Description

This course familiarizes the students on data visualization tools. This course is designed to provide a fundamental and strategic understanding on the concepts of Business Intelligence using Tableau.

Course Objectives

The objective of this course is to:

1. Equip students with the concepts of BIs and its types and how to connect to and import data, author reports using Power BI Desktop, and publish those reports to the Power BI service
2. Emphasize on how to create dashboards and share with business users—on the web and on mobile devices

Course Outcomes

On completion of this course, the students will be able to:

CO1: Connect, import, shape, and transform data for business intelligence (BI)

CO2: Visualize data, author reports, and schedule automated refresh of your reports

CO3: Create and share dashboards based on reports in Power BI desktop and Excel

CO4: Use natural language queries and create real-time dashboards

Modules	Blooms level*	Number of hours
MODULE 1: Tableau: Data visualization and its significance, Connecting Tableau to a Data File - CSV File, Navigating Tableau, creating calculated fields, adding colors, adding labels and formatting, exporting worksheet. Power BI: What is Power BI? Installing Power BI Desktop & Project Setup, Connecting Power BI Desktop to Source Files, Working in the Query Editor, Understanding the Data Model & Creating Visuals.	L1, L2,L3	8
MODULE 2: Tableau: working with data extracts, working with time series data, understanding aggregation, granularity and level of detail, creating an area chart and learning about highlighting, adding a filter and quick	L1, L2,L3	8

filter.		
Power BI: Understanding the Power BI Desktop Workflow, Exploring the Interface of the Data Model, Understanding the Query Editor Interface, Keeping & Removing Rows, Working with Filters, Removing Empty Rows, Working with Columns, Replacing Values, Formatting Data & Handling Formatting Errors.		
MODULE 3: Tableau: Relationships v/s joins, Joining data, blending data, data joining v/s data blending, dual axis chart. Power BI: Pivoting & Unpivoting Data, Splitting Columns, Creating Groups & Cleaning Up Project, The Star Schema, Query Duplicates vs References, Creating the DIM-Region Table & Removing Duplicates, Merging Queries, Understanding "Extract", Working with Conditional Columns, Understanding Basic Mathematical Operations, Performance Optimization	L1, L2,L3,L4	10
MODULE 4: Tableau: Creating a map, scatter plot, working with hierarchies, applying filters to multiple worksheets, create interactive dashboard, storytelling. Power BI: Understanding Relationships, Cross Filter Direction & Many-to-Many, Understanding the DAX Basics, Applying the DAX Basics, Creating Visuals in the Report View	L1, L2,L3,L4,L5	10

*Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis; L6-Evaluation

Text and Reference Books

1. Microsoft Business Intelligence Tools for Excel Analysts: Michael Alexander, Jared Decker, Bernard Wehbe, John Wiley & Sons, 2014
2. Introducing Microsoft Power BI: Alberto Ferrari and Marco Russo, Microsoft Press 2016
3. Getting started with Watson Analytics: IBM Corporation 2015
4. Tableau Your Data! Fast and Easy Visual Analysis with Tableau Software: Daniel G. Murray and the InterWorks BI Team, John Wiley & Sons 2013
5. Beginning Big Data with Power BI and Excel 2013: Neil Dunlop, Apress 2015

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	IP	EE	EP
Weightage (%)	5	25	50	20

IP: Internal Practical, EE: End Semester Examination; EP: External Practical; A: Attendance

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3	PSO4
CO1	3	1	2	1	--	--	3	1	1	2	1	--	--
CO2	1	1	3	2	--	--	3	1	2	2	1	--	--
CO3	1	2	2	1	--	--	3	1	1	2	1	--	--
CO4	2	1	3	2	--	--	3	1	2	2	1	--	--

1: strongly related, 2: moderately related and 3: weakly related



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MWP4411	ENVIRONMENTAL GOVERNANCE AND SUSTAINABILITY	L	T	P	C
Version 1.1	Latest Approved	3	0	0	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

Environmental problems and global environmental change are multifaceted, trans-boundary, multi-level and multi-sector issues, that need to be dealt with at all administrative levels and with an integrated approach across policy areas. By applying theories of governance, we will discuss what this may imply in practice for the policy-making and implementation of environmental politics at different levels. The course introduces key theoretical concepts useful for the understanding of environmental change as a policy problem. This course explores the crucial link between governance and sustainable development. Sustainable development has emerged as the global norm and dominant approach to reconcile the goals of economic development, environmental quality and social equity. Governance can be understood as the rules, mechanisms, processes and institutions through which important decisions are made and implemented. The course discusses the contested nature of both these concepts, and investigates how both are combined in local, national, regional and international policy-making about environment and development challenges such as poverty, global inequalities, loss of biodiversity, deterioration of global eco-systems, and the threat of climate change to human societies.

Course Objectives

The objectives of this course are to:

1. Provide the students exposure to environmental governance practices.
2. Enhance student's knowledge towards concepts of sustainable development and global institutional arrangements for the governance of different dimensions of environment
3. Familiarize students with contemporary environmental issues, including alternative sources of energy and climate change, as well as with the most important global and regional institutions that create the global environmental governance architecture.
4. Comprehend and critically discuss the contemporary sustainable development agenda.

Course Outcomes

On completion of this course, the students will be able to:

- CO1: Classify and compare different Environmental Governance practices employed by multiple factors across different levels.
- CO2: Describe the rationale behind regulatory, community-based, and market/incentive-based approaches to environmental governance, as well as newer approaches in integrated governance.
- CO3: Describe different initiatives and strategy for sustainable development and also able to analyze the implementation of the Sustainable Development Goals.
- CO4: Describe and understand the complexity of environmental problems, and drivers of and societal solutions to global environmental change.
- CO5: Conduct analyses of Environmental Governance practices.

Modules	Blooms Level*	Number of hours
Module 1: Introduction to the challenges and players in environmental governance: Overview of environmental governance, Contemporary Discourses on Governance in India, problem and prospects of environmental governance in India, Democracy, Development and Governance. Environmental Governance: Human–Environment Interaction, Green Governance: Sustainable Human Development. Global environmental change. Governance of ecological conflicts and disasters, global ecological governance in particular in regard to climate change.	L1, L2	10
Module 2: Good Governance Initiatives in India: Government, Governance and Public Service Delivery in India, E-Governance in India. Democratic Decentralization and Local Governance in India. People’s Participation in Governance, Citizen’s Charter and Right to Information in India Corporate Social Responsibility: the Indian Experience.	L1, L2, L3	8
Module-3: Sustainable Development: Issues and Challenges-I Introduction to Sustainable Development: Parameters of sustainable development, Approaches to the study of SD, Issues and challenges. Developmental issues: Natural resource exploitation, Patterns of Industrialization, Inequitable Growth, Global and Regional dimensions	L1, L2, L3	9
Module-4: Sustainable Development: Issues and Challenges-II Initiatives towards sustainable development: State Initiatives global initiatives, Civil Societies and Community Initiatives, Strategy for sustainable development: Community Knowledge, Harness Technology, Innovative Practices, Cooperation and Partnership. SDGs.	L1, L2, L3	9

***Bloom’s Level:**

L1-Knowledge; L2-Comprehension; L3-Application; L4-Analyis; L5-Synthesis; L6-Evaluation

Text Books

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- Environmental Governance in India by Dr. Devasish Sarkar and Ravi Ghosh. Global Vision Publishing House; 2nd edition.
- Environmental Governance in India: Issues and Challenges, by Prakash Chand Kandpal, Sage Publication.
- Governance: Issues and Challenges, by **Abhay Prasad Singh and, Krishna Murari**, Pearson Publication, 2018.
- Evans, J. P. (2011) Environmental Governance. Routledge, London.

Reference Books

- Adger, N. et al. (2003) Governance for sustainability: towards a 'thick' analysis of environmental decision making, Environment and Planning A 35, pp. 1095 – 1110
- Adger, W. N. and A. Jordan (2009). Governing Sustainability. Cambridge, Cambridge University Press.
- Biermann, F, Pattberg, P. and Zelli, F. (eds). (2010). Global Climate Governance Beyond 2012: Architecture, Agency and Adaptation, Cambridge University Press.
- Evans, J. P. (2011) Environmental Governance. Routledge, London
- Glasbergen, P., Bierman, F., Mol, A. (eds) (2007) Partnerships, Governance and Sustainable Development: Reflections on Theory and Practice Cheltenham, UK: Edward Elgar Publishing.
- Lange, P., Driessen, P.J., Sauer, A., Bornemann, B., Burger, P. (2013) Governing Towards Sustainability: Conceptualizing Modes of Governance, Journal of Environmental Policy and Planning 15(3), p403-425
- Meadowcroft, J., Langhelle, O., Ruud, A. (2012) Governance, Democracy and Sustainable Development: Moving Beyond the Impasse. Cheltenham, UK: Edward Elgar Publishing.
- Young, O. R. (2002). "Evaluating the success of international environmental regimes: where are we now?" Global Environmental Change 12(1): 73-77

Modes of Evaluation: Quiz/Assignment/Seminar/Written Examination Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance.

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3	PSO4
CO1	1	1	1	1	--	1	1	--	1	1	1	--	1
CO2	1	1	1	1	--	1	1	--	1	1	1	--	1
CO3	1	1	1	1	--	1	1	--	1	1	1	--	1
CO4	1	1	1	1	--	1	1	--	1	1	1	--	1
CO5	1	1	1	1	--	1	1	--	1	1	1	--	1

1: strongly related, 2: moderately related and 3: weakly related

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MWP4412	E-BUSINESS ESSENTIALS	L	T	P	C
Version 1.1	Latest Approved	2	1	0	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

The course aims to make the students understand the nuts and bolts of forming an e-business and prepares students to evaluate the requirements of an e-business and develop e –business plans. As business environment is witnessing so many changes every day, it gets vital for business organizations to recognize and learn to create their presence in cyber space.

Course Objectives

The objective of this course is to:

1. Introduce the students to the world of e-business, the openings and the risks and makes them learn the strategies of making businesses successful worldwide.
2. Make the students understand the nuts and bolts of forming an e-business and prepares students to evaluate the requirements of an e-business and develop e –business plans

Course Outcomes

On completion of this course, the students will be able to

CO1: Explain the digital technologies necessary for e-business.

CO2: Identify and use the database to improve business performance and decision making.

CO3: Create a web design for an e-business web portal.

CO4: Analyze the processes associated with e-payment systems, e-marketing, e-procurement and e-distribution.

Modules	Blooms level*	Number of hours
Module 1: Introduction to E-Business The impact of the electronic communications on traditional businesses, difference between e-commerce and e-business, E-business opportunities, Business adoption of digital technologies for e-commerce and e-business, E-business risks and barriers to business adoption, Management responses to e-commerce and e-business, Business models for e-commerce.	L2 ,L4	4
Module 2: E-Business Web Design Elements of site design, site navigation, site structure, page and content design, web accessibility. Components of a business model, classification of business webs, comparison and valuation of networks, price formation process. Internet, intranet and extranet, choosing an ISP and Internet terminology Acquiring e-business systems, development of	L2, L4	4

web based content and services, Software and services for web-site development and testing , testing process, environment, database creation and data migration, content management and maintenance		
Module 3: E-Marketing & E-Procurement E-Marketing: comparison of communication media, development model for online customers, online promotion strategies. E-procurement: strategic and operational procurement, information support for e-procurement, types, catalog management.	L2,L4,L5	4
Module 4: E-Payment Systems and E-Distribution E-payments: credit card based procedures, SSL, SET, paypal and very-sign, Secure e-commerce transactions, principles, approaches to develop secure systems, digital certificates, symmetric and asymmetric encryption, digital signatures, PKI's and CA's. E-Distribution: components and types, online, offline and hybrid types, SCM and ESD: architecture, functions and services, digital watermarks.	L2,L4	4

*Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books:

1. A. Meier, H. Stormer, 2009, *E-Business and E-commerce: Managing the Digital Value Chain*, Springer
2. D. Chaffey, 2009, *E-Business and e-commerce management*, 4thed, Pearson/Prentice Hall.

References Books:

1. In Lee, 2007, *E-business innovation and Process Managemen*, Cybertech Publishing
2. A. Cordella, A. Martin, M. Shaikh S. Smithson, 2011, *Management and innovation of e-business*, London School of Economics and Political Science
3. Kenneth C. Laudon, Jane p. Laudon 2012: *Management information System: Managing the Digital Firm*, 12thed, Pearson/Prentice Hall.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Components	CT	HA	C	V	A	EE
Weightage (%)	10	5	5	5	5	70

C- Case Discussion/Presentation; HA - Home Assignment; V- Viva; CT - Class Test; A - Attendance; EE - End Semester Examination

CO, PO and PSO mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3	PSO4
CO1	1	-	-	-	-	-	-		3		1	-	-
CO2	1	-	2	-	-	-	-		2		1	-	-
CO3	1	-	1	-	-	-	-		3		1		-
CO4	1	-	3	3	-	-	-		2		1		-

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MWP4437	PROJECT-II	L	T	P	C
Version 1.1	Latest Approved	2	1	0	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

Under this, it is usual to give the student some discretion in the choice of topic for the dissertation and the approach to be adopted. The dissertation topic is related to the field of specialization. Deciding this is often the most difficult part of the dissertation process, and requires thorough preparation and background research.

The aim of the dissertation is to provide the students with an opportunity to further their intellectual and personal development in their chosen field by undertaking a significant practical unit of activity, having an educational value at a level commensurate with the award of their degree.

Course Objectives

The objective of this course is to

1. Understand and apply theoretical frameworks to the chosen area of study.
2. Produce a coherent and logically argued piece of writing that demonstrates competence in research and the ability to operate independently.

Course Outcomes

On completion of Dissertation, the students will be able to

CO1: Describe a relevant area of career development, career coaching, coaching or work-related learning studies.

CO2: Identify research methods and state research questions.

CO3: Critically analyze and evaluate the knowledge and understanding in relation to the agreed area of study.

CO4: Integrate theory and practice for the development of responses on the basis of the evaluation and analysis undertaken.

CO5: Communicate in written form by integrating, analyzing and applying key texts and practices.

CO6: Demonstrate advanced critical research skills in relation to career development or work-related learning studies.

Planning the dissertation	Blooms level*	Number of hours
<ul style="list-style-type: none"> • Selecting a topic for investigation. • Establishing the precise focus of the study by deciding on the 	L1, L2 ,L3,L4,L5,L6	6hours a Week

<p>aims and objectives of the dissertation, or formulating questions to be investigated. Consider very carefully what is worth investigating and its feasibility.</p> <ul style="list-style-type: none"> • Drawing up initial dissertation outlines considering the aims and objectives of the dissertation. Workout various stages of dissertation • Devising a timetable to ensure that all stages of dissertation are completed in time. The timetable should include writing of the dissertation and regular meetings with your dissertation guide. 		
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**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis; L6-Evaluation*

Modes of Evaluation: Viva/ Report Examination

Examination Scheme:

Components	Content & Layout of Report	Conceptual Framework	Objectives & Methodology	Implications & Conclusions	Viva-Voce
Weightage	30	10	15	15	30

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3	PSO4
CO1	1	--	--	--	--	--	--	1	--	--	--	1	--
CO2	--	1	--	--	--	--	--	--	--	--	--	1	--
CO3	--	1	2	--	--	--	--	--	--	--	--	1	--
CO4	1	--	--	--	--	--	--	--	--	--	--	1	--
CO5	--	--	--	--	--	--	1	--	--	--	--	1	2
CO6	--	--	--	--	--	--	--	--	1	--	--	1	--

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MWP4426	DIGITAL MARKETING	L	T	P	C
Version 1.1	Latest Approved	3	0	0	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

The course examines digital marketing strategy, implementation and executional considerations for B-to-B and B-to-C brands and provides a detailed understanding of all digital marketing concepts. Students will learn the course with a comprehensive knowledge of and experience with how to develop an integrated digital marketing strategy, from formulation to implementation. Strong focus will be on developing student's business skills and growing real-world experience of the digital media sector to enhance their knowledge to cope with employability demand. The course is an initiative designed to educate students and practitioners in the area of Digital Marketing analytics and make them ready for jobs or prepare them to launch campaign for their own organisations.

Course Objectives

The objectives of this course are to:

1. To understand how and why to use digital marketing for multiple goals within a larger marketing and/or media strategy.
2. Understand the major digital marketing channels - online advertising: Digital display, video, mobile, search engine, and social media.
3. Learn to develop, evaluate, and execute a comprehensive digital marketing strategy and plan.
4. Learn how to measure digital marketing efforts and calculate ROI.
5. Explore the latest digital ad technologies.

Course Outcomes

On completion of this course, the students will be able to:

- CO1: Gain knowledge about digital marketing strategy and planning.
CO2: Create and/or improve a strategy for measuring and improving digital media effectiveness
CO3: Examine online advertising including ad networks and behavioral targeting.
CO4: Devise Emerging trends in digital marketing.
CO5: Analyze how to create search engine optimization strategy for own business.

Modules	Blooms Level*	Number of hours
Module 1: Introduction to Digital Marketing: Understanding Digital Marketing, Importance of Digital Marketing. Difference between traditional and digital marketing. Understanding Digital Marketing Process; Digital Marketing Planning and Strategy. Website Planning and Creation: Understanding websites; Understanding domain names & domain extensions; Web server & web hosting, Different types of web servers; Different types of websites; Planning & Conceptualizing a Website; Building website using CMS in Class.	L1, L2, L3	10
Module 2: Digital Advertising (PPC, Digital Display and YouTube): Creating Display Campaign; Types of display campaigns- All features, Mobile app, Remarketing, Engagement. Optimizing Display Campaign and Re-marketing. Concept of Online Advertising. Types of Online Advertising, Display Advertising, Contextual advertising, Payment models and bidding strategies for online advertising, Different Online advertising platforms. Pay per click advertising.	L1, L2, L3	9
Module 3: Search Engine Optimization (SEO): Introduction to Search Engine Optimization, History and Growth of SEO, Functions of search engines. Concept of search engine result page. Understanding keywords; On page optimization; Off Page optimization; Creating SEO Strategy for your business. Keywords, Google Adwords.	L1, L2, L3, L6	9
Module 4: Emerging trends in Digital Marketing: Affiliate Marketing; Email Marketing, Social Media Marketing- Face book marketing, LinkedIn Marketing, Twitter Marketing, Video Marketing and VIDEO & AUDIO (PODCASTING) marketing; and Mobile Web Marketing and Content Marketing.	L1, L2, L3, L4, L6	8

Bloom's Level*

L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis; L6-Evaluation

Text Book

- Marketing 4.0: Moving from Traditional to Digital by P. Kotler. Wiley Publication.

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Reference Books

1. The Essentials of E-Marketing, 4th edition by Quirk Education (E-Book)
2. The Beginner's Guide to Digital Marketing (2015). Digital Marketer. Pulizzi, J. (2014) Epic Content Marketing, McGraw Hill Education.
3. Understanding Digital Marketing: Marketing Strategies for Engaging the Digital Generation, by Damian Ryan and Calvin Jones. KoganPage Publication, 3rd edition.
4. Ryan, D. (2014). Understanding Digital Marketing: Marketing Strategies for Engaging the Digital Generation, Kogan Page Limited.
5. Digital Marketing, Vandana Ahuja, Oxford Publication.
6. Digital Marketing Insights 2017, Social Beat Digital Marketing LLP, Kindle Edition.
7. Social Media for Business – Stories of Indian Brands, By Sorav Jain
8. Total E-mail Marketing: Maximizing your results from Integrated E-marketing (E-marketing essentials): Dave Chaffey.

Modes of Evaluation: Quiz/Assignment/Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance.

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3	PSO4
CO1	1	--	--	1	1	--	1	1	--	1	1	--	--
CO2	1	--	--	1	1	--	1	1	--	1	1	--	--
CO3	1	--	--	1	1	--	1	1	--	1	1	--	--
CO4	1	--	--	1	1	--	1	1	--	1	1	--	--
CO5	1	--	--	1	1	--	1	1	--	1	1	--	--

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MWP4425	ERP FOR BUSINESSES	L	T	P	C
Version 1.1	Latest Approved	3	0	0	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

In the face of intense competition and other business pressures on organizations, quality initiatives and continuous, incremental process improvement, though still essential, will no longer be sufficient. Such radical levels of change require powerful information technology tools such as ERP to facilitate the fundamental redesign of work. Students learn about the state-of-the-art techniques used in support of business process redesign.

Course Objectives

The students will be able to:

1. Grasp the concepts of enterprise resource planning
2. Have a contemporary and forward-looking on the theory and practice of Enterprise Resource Planning Technology
3. Integrate the ERP concepts with the organization's IT system.
4. Understand the concepts of business process reengineering.
Develop the basic understanding of how ERP enriches the business organizations in achieving a multidimensional growth.

Course Outcomes

On completion of this course, the students will be able to:

CO1: List and define the concepts, vies and latest methodologies of business process design.

CO2: Explain key concepts in the design and utilization of best business practices embedded in an Enterprise Resource Planning System.

CO3: Analyze the strategic options for ERP identification and adoption

CO4: Summarize the activities carried out under Business Process Reengineering.

Modules	Blooms level*	Number of hours
Module I: Introduction to ERP Overview of ERP, its importance, Evolution, ERP Packages, Advantages of ERP, and its future Functional Modules of ERP, Risks & Benefits of ERP, ERP & related technologies Integration of ERP, SCM and CRM applications	L1, L2	6

Module II: ERP Implementation Introduction, Why ERP, Reasons for Implementing ERP, Implementation Challenges ERP Implementation Life Cycle, Success & Failure Factors of an ERP Implementation ERP Package Selection and Evaluation ERP Implementation Process	L2, L3	6
Module III: Present and Future ERP and eBusiness, ERP, Internet and WWW, Future Directions and Trends in ERP	L1, L2	6
Module IV: Business Engineering and marketing of ERP BPR, ERP & IT – their linkage Business Model of ERP Marketing Dynamics & Competitive Strategy	L1, L2, L4	6
Module V: Practical aspects of ERP Introduction to ERP packages – SAP, BAAN, PeopleSoft & Open Source ERP	L1, L2, L6	6

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation*

Text Book:

1. Enterprise Resource Planning: Alexis Leon, TMH, 2nd Edition

References Book:

1. Michael Hammer and James Champy, Harper Business
2. Process Mapping: How to Reengineer Your Business Process, V. Daniel Hunt, John Wiley & Sons
3. The Essence of Business Process Reengineering, Joe Peppard and Philip Rowland, Prentice-Hall
4. Redesigning Enterprise Processes for e-Business, Omar A. El Sawy, McGraw-Hill

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	P1	C1	CT1	EE
Weightage (%)	10	10	20	60

C – Case Discussion, HA – Home assignment, CT – Class Test, S – Seminar, A: Attendance , EE: End semester Examination

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3
CO1	1							1			1	
CO2	1	2						1			1	
CO3				1				1			1	
CO4	1							1			1	

1: strongly related, 2: moderately related and 3: weakly related

MWP4428	PREDICTIVE ANALYTICS-I MACHINE LEARNING USING R	L	T	P	C
Version 1.1	Latest Approved	2	0	2	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

This course offers fundamental and applied evidence based knowledge to improve professional practice of students. It provides a detailed understanding of both supervised and unsupervised learning as it is vital for a data scientist. This course offer insight on text mining using “tidytext.”

Course Objectives

The objective of this course is to:

1. Facilitate an introduction to machine learning techniques using several popular algorithms.
2. Internalize a core set of practical and effective machine learning methods and concepts, and apply them to solve some real world problems.

Course Outcomes

On completion of this course, the students will be able to:

CO1: Explain and apply a set of unsupervised learning concepts and methods, classification methods of increasing complexity (rules, trees, random forests), and associated optimization methods (gradient descent and variants)

CO2: Explain the common idioms of large-scale graph analytics, including structural query, traversals and recursive queries, PageRank, and community detection

CO3: Apply the popular algorithms of machine learning using R

CO4: Analyze and interpret the results using specific statistical tools and techniques in R.

Modules	Blooms level*	Number of hours
MODULE 1: Linear Methods for Regression and Classification: Overview of supervised learning, Linear regression models and least squares, Multiple regression, Multiple outputs, Subset selection, Ridge regression, Lasso regression , Linear Discriminant Analysis , Logistic regression, Perception learning algorithm.	L1, L2,L3,L4	9
MODULE 2: Model Assessment and Selection: Bias, Variance, and model complexity, Bias-variance trade off, Optimism of the training error rate, Estimate of In-sample prediction error, Effective number of parameters, Bayesian approach and BIC, Cross- validation, Boot strap methods, conditional or expected test error.	L1, L2,L3,L4	9
MODULE 3: Additive Models, Trees and Boosting: Generalized additive models, Regression and classification trees, Boosting methods-exponential loss and AdaBoost, Numerical Optimization via gradient	L1, L2,L3,L4	9

boosting.		
MODULE 4: Neural Networks (NN), Support Vector Machines (SVM), and K-nearest Neighbor: Fitting neural networks, Back propagation, Issues in training NN, SVM for classification, SVM for regression, K-nearest –Neighbour classifiers (Image Scene Classification) . Cross-validation and boot strap, Fitting classification and regression trees, K-nearest neighbours, Principal component analysis, K-means clustering, Web app development using R.	L1, L2,L3,L4	9

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis; L6-Evaluation*

Text and Reference Books

1. "Machine Learning Mastery with R", online Jason Brownee.
2. "Machine Learning with R, Expert techniques for predictive modeling", Brett Lantz, Pact Publication.
3. "Applied Supervised Learning with R", Karthik Ramasubramanian and Jojo Moolayil, Pact Publication.
4. Trevor Hastie, Robert Tibshirani, Jerome Friedman, *The Elements of Statistical Learning- Data Mining, Inference, and Prediction*, Second Edition, Springer Verlag, 2009.
5. G. James, D. Witten, T. Hastie, R. Tibshirani- *An introduction to statistical learning with applications in R*, Springer, 2013.
6. E. Alpaydin, *Introduction to Machine Learning*, Prentice Hall Of India, 2010

Modes of Evaluation: Quiz/Assignment/ Seminar/ Written Examination

Examination Scheme:

Components	A	IP	EE	EP
Weightage (%)	5	25	50	20

IP: Internal Practical, EE: End Semester Examination; EP: External Practical; A: Attendance

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3	PSO4
CO1	2	--	3	--	--	--	--	2	1	3	1	--	--
CO2	3	2	1	2	--	2	1	--	1	2	1	3	--
CO3	2	1	1	2	--	--	1	3	1	2	1	3	--
CO4	3	1	2	1	--	--	1	--	1	2	1	3	--

1: strongly related, 2: moderately related and 3: weakly related



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MWP4429	PREDICTIVE ANALYTICS-II MACHINE LEARNING USING PYTHON	L	T	P	C
Version 1.1	Latest Approved	2	0	2	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

This course offers the specialization of Python starting with data strategy. This course covers the two core paradigms that account for most business applications of predictive modeling: classification and prediction. It also covers the use of partitioning to divide the data into training data (data used to build a model), validation data (data used to assess the performance of different models, or, in some cases, to fine tune the model) and test data (data used to predict the performance of the final model).

Course Objectives

The objective of this course is to:

1. Facilitates a good learning to students on how to make meaningful predictions for a wide range of business purposes.
2. Provide provides a sufficient understanding on development of statistical models and how to devise data-driven workflows.

Course Outcomes

On completion of this course, the students will be able to:

CO1: Apply data science techniques to extract insights from a wide range of data sources and to provide an assessment basis for predictive models. Also, students shall be able to explain how ensemble models improve predictions

CO2: Visualize and explore data to better understand relationships among variables

CO3: Identify and implement appropriate performance measures for predictive models with popular algorithms



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Modules	Blooms level*	Number of hours
MODULE 1: Introduction to machine learning, ML python essentials: numpy, pandas, matplotlib. Data Cleaning: Reading the data – variations and examples, Data frames, Delimiters, Various methods of importing data in Python: csv method, open method in Python, reading data from a URL, reading .xls or .xlsx files, Reading from an .xls or .xlsx file, Writing to a CSV or Excel file. Handling missing values, Creating dummy variables, Visualizing a dataset by basic plotting, Scatter plots, Histograms, Boxplots.	L1, L2,L3,L4	9
MODULE 2: Data Wrangling: Subsetting a dataset, Selecting columns, Selecting rows, Selecting a combination of rows and columns, Creating new columns, Generating random numbers and their usage, Seeding a random number, Generating random numbers following probability distributions, Probability density function, Cumulative density function, Uniform distribution, Normal distribution, Generating a dummy data frame, Grouping the data: aggregation, filtering, and transformation.	L1, L2,L3	9
MODULE 3: Statistical Concepts for Predictive Modelling, Random sampling and the central limit theorem Hypothesis testing, Null versus alternate hypothesis, Linear Regression with Python: Understanding the math behind linear regression, Linear regression using simulated data, Fitting a linear regression model and checking its efficacy, Finding the optimum value of variable coefficients, Making sense of result parameters, p-values, Residual Standard Error, Implementing linear regression with Python, Linear regression using the stats model library, Multiple linear regression, Model validation, Training and testing data split, Handling categorical variables.	L1, L2,L3,L4	9
MODULE 4: Logistic Regression with Python, Linear regression versus logistic regression, Understanding the math behind logistic regression, Contingency tables, Conditional probability, Odds ratio, Estimation using the Maximum Likelihood Method, Likelihood function: Log likelihood function, Processing the data, Data exploration, Data visualization, Creating dummy variables for categorical variables, Feature selection, Implementing the model, Model validation and evaluation, Cross validation, Model validation, The ROC curve, Confusion matrix. Decision Tree and Ensemble Techniques: RandomForest, Bagging and Boosting, Adaboost in python. ML based Web app development.	L1, L2, L3,L4	9

*Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis; L6-Evaluation

Text Books

1. Pilgrim, Dive, "Introduction to Python", 3rd Edition, Apress, 2009.
2. Allen Downey, Jeffrey Elkner, Chris Meyers, "How to Think Like a Computer Scientist Learning with Python" 2nd Edition Green Tea Press, 2002.
3. Manaranjan Pradhan and U Dinesh Kumar, "Machine Learning using Python", Wiley Publication

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- Andreas C. Müller & Sarah Guido “Introduction to Machine Learning using python”, Oreilly Publications.

Reference Books

- John V. Guttag, “Introduction to Computation and Programming using Python”, Prentice Hall of India, 2014.
- Mark Lutz, “Learning Python: Powerful Object-Oriented Programming”, Fifth Edition, O’Reilly, Shroff Publishers and Distributors, 2013.
- Michale Bowles “Machine Learning in Python: Essential Techniques for Predictive Analysis” Wiley Publication.

Web Resources:

- Anaconda Scientific Python Distribution: <https://store.continuum.io/cshop/anaconda/>
- BLAS (Basic Linear Algebra Subprograms): <http://www.netlib.org/blas/>
- Graphviz - Graph Visualization Software: <http://www.graphviz.org>
- <https://github.com/rasbt/python-machine-learning-book/blob/master/docs/references.md>
- Installing Python: <https://docs.python.org/3/installing/index.html>
- IPython Notebook: <https://ipython.org/ipython-doc/3/notebook/index.html>
- Iris dataset: <https://archive.ics.uci.edu/ml/datasets/Iris>
- LAPACK — Linear Algebra PACKage: <http://www.netlib.org/lapack/>
- LIBLINEAR -- A Library for Large Linear Classification: <http://www.csie.ntu.edu.tw/~cjlin/liblinear/>
- LIBSVM -- A Library for Support Vector Machines <https://www.csie.ntu.edu.tw/~cjlin/libsvm/>
- Matplotlib Tutorial: <http://matplotlib.org/users/beginner.html>
- NumPy Tutorial: http://wiki.scipy.org/Tentative_NumPy_Tutorial
- Pandas Tutorial: <http://pandas.pydata.org/pandas-docs/stable/tutorials.html>
- Python: <https://www.python.org>
- scikit-learn: <http://scikit-learn.org/stable/>
- UCI Machine Learning Repository: <http://archive.ics.uci.edu/ml/>

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	IP	EE	EP
Weightage (%)	5	25	50	20

IP: Internal Practical, EE: End Semester Examination; EP: External Practical; A: Attendance

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3	PSO4
CO1	2	1	--	2	--	2	1	--	1	2	1	--	--
CO2	2	1	--	2	--	2	1	--	1	--	1	--	--
CO3	2	1	--	2	--	2	1	--	1	2	1	--	--

1: strongly related, 2: moderately related and 3: weakly related

Master of Business Administration

FLEXILEARN
-Freedom to design your degree



Curriculum & Scheme of Examination

2022

AMITY UNIVERSITY HARYANA

GURUGRAM

A handwritten signature in blue ink, appearing to read 'Anil', written over a light blue circular stamp.

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A handwritten signature in blue ink, appearing to read 'Manesar', written over a light blue circular stamp.

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Master of Business Administration

ACCOUNTING FOR MANAGEMENT

Course Code: MGT4102

Credit Units: 03

Course Objective:

Participants in this course will develop the essential ability of all managers, to use complex accounting information as a platform for decision-making. As the course unfolds, participants will build an increasingly sophisticated level of understanding of the language of accounting and its key concepts. In addition the course develops skills in interpreting earnings statements, balance sheets, and cash flow reports. This ability to analyze financial statements will enable participants to deal more effectively with strategic options for their businesses or business units.

Course Contents:

Module I: Introduction

The Financial Accounting Framework, Accounting Policies, Need of Accounting. Users of Accounting Information, Accounting Cycle, Accounting and Management Control. Balance sheet-Dual Aspect principle, Classification Items of Balance Sheet, Formats of Balance Sheet. Preparation of Balance Sheet. Income Statement- Realization vs. Accrual Principle, Format of Income Statement), Preparation of Income Statement (IAS, GAAP & IFRS) Depreciation Accounting.

Module II: Measuring and Reporting

Measuring and Reporting :Cost of sales and Inventories, Debentures, Investments, Shareholder Equity. Human Resource Accounting-Valuation of Human Resources, Recording and Disclosure in Financial Statements

Module III: Management Accounting

Contrast between Management Accounting and Financial Accounting and Reporting, Types of Management Accounting Information and their uses, General Observation on Management Accounting. Statement of Cash Flows-Profit versus Cash, Purpose and Use of Cash Flow Statement, Format of Cash Flow Statement (AS-3), Preparation of Cash Flow Statement (IAS, GAAP & IFRS).

Module IV: Analyzing and Interpreting Financial Statements

Financial Statement Analysis – Basic Relationship, Overall Measures, Profitability Ratios, Investment Utilization Ratios, Financial Condition Ratios, Making Comparisons. Du-pont analysis. Interpretations of calculated Ratios.

Module V: Cost Accounting: The behavior of cost- Relation of cost to volume, BEP & Profit graph- CVP analysis, Full cost and its uses. Techniques of costing. Standard costing. Strategic planning and budgeting.



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Examination Scheme:

Components	Assessment 1 Group Presentation	Assessment 2 In Class Quiz	Class Test/Mid Term Exam	Attendance	External
Weightage (%)	10	5	10	5	70

Core Text Book:

- Anthony, N.R; Hawkings, F. D; Merchant, A.K (2014), Accounting Text and Cases, 13th Edition, Mc Graw Hill.
- Ramachandran, N (2011), Financial Accounting for Management, 3rd Edition, Mc Graw Hill.

References Book:

- Bhattacharya, S.K. and Dearden, J, 3rd Edition, Accounting for Management, Text and Cases, Vikas Publishing house
- Narayanaswamy R (2014), Financial Accounting – A Managerial Perspective, 5th Edition, Prentice Hall of India.
- Maheshwari S N; Maheshwari SK and Maheshwari SK, 3rd Edition, A Text Book for Accounting for Management, Vikas Publishing House.
- M.N Arora 10th Edition, A Text Book of Cost and Management Accounting, Vikas Publishing House.



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QUANTITATIVE TECHNIQUES IN MANAGEMENT

Course Code: MGT4106

Credit Units: 03

Course Objective:

The aim of this course is to develop the understanding of various statistical tools used for decisions making and how each applies to and can be used in the business environment using contemporary software.

Course Contents:

Module I: Introduction

Application of Statistics in Business; Classification of Data; Interpretation of computer output of diagrammatic and graphical presentation of data, measures of central tendency, measures of dispersion and skewness.

Module II: Probability and Probability Distributions

Concepts of Probability, addition theorem, multiplication theorem, Baye's Theorem; continuous and discrete probability distribution: Binomial Probability Distribution, Poisson Probability Distribution and Normal Probability Distribution.

Module III: Sampling and Sampling Distribution

Sampling: Basic Concept, Types of Sampling, Errors and Precautions in sampling, size of sample, Parameter and Statistic, Sampling Distribution of the mean, Sampling distribution of proportion, Estimation – point estimation, Interval Estimation,

Module IV: Tests of Hypothesis

Null and Alternative hypothesis, One-Tailed and Two-Tailed tests of hypothesis, Type I and Type II error, rejection rule using p – Value and critical value approach. Hypothesis Testing to compare two populations: Test for one sample mean, Test for two population means (Independent Samples), Tests for two population means (Dependent Samples), Tests for two population proportions (Independent Samples), Tests for two population variances (Dependent Samples), F-test, Chi – Square Test

Module V: Forecasting Techniques

Correlation - Karl Person, Spearman's Rank methods, simple linear regression analysis – Estimated regression equation, least squares method, coefficient of determination, interpretation of computer output for Regression, Introduction to time series, trend analysis

Module VI: Introduction to SPSS, performing univariate and bivariate analysis on SPSS

Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70

Text & References:

- Anderson D.R; Sweeny D.J, Williams T.A (2002), Statistics for Business and Economics, Cengage learning.
- Kazinier L.J., & Pohl N.F. (2004), Basic Statistics for Business and Economics, New York: McGraw Hill.
- Levin Richard I. & Rubin David S. (1998), Statistics for Management, Pearson Education India
- Stephen .K.C. (2002), Applied Business Statistics: Text, Problems and Cases. New York: Harper and Row.
- Sharma, J.K. (2007), Business Statistics, Pearson Education India.


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INFORMATION TECHNOLOGY AND E-COMMERCE

Course Code: MGT4109

Credit Units: 02

Course Objective:

This course will expose students to developments in computer technology and understand the working of a computer system. It will introduce end-user computing and build skills in using IT and understanding various technologies like internet, telecom, DBMS concepts, e-commerce etc. The course will expose the students to the latest trends in e-business models, electronic payment systems and data & information security

Course Contents:

Module I: Modern Computer Systems

Evolution of Computer Systems, Input, output and storage technologies, Computer Assisted Control and Automation, (e.g. Delhi Metro , Digitally Controlled Car engines etc.), Computer Controlled Biometric/RFID based Access Control , Contemporary hardware and software platforms(Open Source, Web Software etc.), Storage of Data Resources

Module II: Data Resource Management

Introduction to DBMS, Benefits of DBMS over traditional file system, Types of DBMS, Application of DBMS using MS-ACCESS / ORACLE as a tool for understanding of DBMS concepts. SQL Query handling, Forms, Concept of Data Warehouses and Data Marts, Introduction to Data Centers. Storage Technologies and Architecture (DAT, NAS, SAN etc.). Live examples of storage strategies of companies like Google, Amazon Wal-Mart dealing with storage crisis

Module III: Telecommunications and Computer Networks

Networked Enterprise :- Components, Types of networks, Advantages of Network Environment, Business Uses of Internet, Intranet and Extranet, Network Topologies, Web 2.0/3.0, Distributed/Cloud/Grid Computing, GSM & CDMA, GPRS ,Features of 3G & 4G technologies, VOIP and IPTV.

Module IV: Electronic Commerce Systems

Meaning, Definition, Concept, Features, Function of E-Commerce, E-Commerce Practices v/s Traditional Practices, Scope and basic models of E-Commerce, Limitations of E-Commerce, Precaution for secure E-Commerce, proxy services.

Module V: E-Commerce Business Models & EDI

Concept of EDI, Difference between paper based Business and EDI Based business, Advantages of EDI, Application areas for EDI, Action plan for Implementing EDI, Factors influencing the choice of EDI. Various business models in Ecommerce like B2C, B2B, C2C.

Module VI: E-Payment Systems and Security Management

Transactions through Internet, Requirements of E-Payment system, Post paid payment system- Credit card solutions, Cyber cash Internet Cheques, Instant Paid payment system- Debit card, Direct Debit, Prepaid payment system- Electronic cash, Digicash, Netcash, Cybercash, Smart Cards.

The Information Security, System Vulnerability and Abuse, Security Threats (Malicious Software, Hacking etc.) and counter measure. Definition of Cyber Crime and Types. Antivirus, Firewalls, Anti-Spyware, Security Audit, Discussion on Overview of IT-ACT 2000.


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Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70

Text & References:

- Norton P (2010), Introduction to Computers, Tata McGraw-Hill
- Potter T (2010), Introduction to Computers, John Wiley & Sons (Asia) Pvt Ltd
- Morley D & Parker CS (2009), Understanding Computers – Today and Tomorrow, Thompson Press
- Elias M Awad, Electronic Commerce from Vision to fulfilment, Third Edition, Pearson Education
- Ravi Kalakota & Andrew B. Shinston, Electronic Commerce – A manager's Guide, Pearson Education.
- Bhaskar Bharat, Electronic Commerce - Technologies & Applications, Tata McGraw Hill.
- J. Christopher & T.H.K. Clerk, Global E-Commerce, University Press.



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BUSINESS RESEARCH METHODS

Course Code: MGT4203

Credit Units: 02

Course Objective:

The main objective of the course is to equip the students with the basic understanding of research methodology in changing business scenario. It will also provide them an insight into the application of dynamic analytical tools to face the stormy challenges aimed at fulfilling the purpose of business decision making.

Course Contents:

Module I: Introduction

Meaning of research, importance of scientific research in business decision making, types of research, complete research process, research methodology, criterion for good research, Identification of research problem and formulation of hypothesis, research designs, drafting a research proposal

Module II: Measurement and Data Collection

Primary data, secondary data, design of questionnaire, sampling fundamentals and sample designs, Qualitative and quantitative research, measurement and scaling techniques, measures of central tendency mean, median, mode; measures of dispersion, data processing

Module III: Data Analysis I

Cross tabulation, univariate analysis, bivariate analysis: Correlation, Karl Pearson's coefficient of correlation, Spearman's coefficient of correlation, hypothesis testing, t-test, Z test, F-test, Chi-square test, Analysis of variance, Non-parametric tests: Sign test, Run test, Krushall-Wallis test

Module IV: Data Analysis-II

Simple linear regression: coefficient of determination, significance tests, residual analysis, Multivariate techniques: multiple linear regression: Multiple coefficient of determination, interpretation of regression coefficients, heteroscedasticity, multicollinearity, outliers, auto regression, factor analysis, cluster analysis (concept)

Module V: Report Writing

Pre-Writing Considerations, structure of research report, common problems encountered while preparing the research report, presentation of research report, ethical issues while preparing a research report

Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70

Case study must be included in the discussion.

Text & References:

- Cooper, R.D., Schindler, S. P. and Sharma, J.K. (2015). Business Research Methods. New Delhi, India: McGraw Hill Education (India) Private Limited
- Zikmund, William C (1997). *Business Research Methods (5th Ed.)*. The Dryden Press, Harcourt Brace College Publishers

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- Kothari C R, (2014) Research Methodology: Methods & Techniques, Vikas Publishing House Pvt.Ltd
- Levin & Rubin (2004), Statistics for Management, 8th Ed, Prentice Hall of India
- Srivastava, Shenoy and Sharma (2002)., Quantitative Techniques for Business Decisions, 4th Ed , Allied Publishers
- Bajpai, Naval (2013). *Business Research Methods*. Pearson
- Shajahan, S. (2004) , Research Methods for Management 2nd Edition, Jaico Publishers
- Kumar, Ranjit (2005), Research Methodology, Pearson Education



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MANAGEMENT SCIENCE

Course Code:MGT4207

Credit Units: 03

Course Objective:

The main objective of the course is to provide the students the insight into structures and processes that management science can offer and the enormous practical utility of its various utility. The course is designed to introduce the fundamental tools of management science and their application to real life business problems. It will help students to take well informed decisions in their corporate life.

Course Contents:

Module I: Introduction

Management Science: uses, scope, applications in managerial decision making; assumptions of management science models, decision making environments: decisions under certainty, uncertainty and risk situation; decision tree approach and its applications.

Module II: Linear Programming Problems

Linear Programming Problems: Modeling and Solution Methods- graphical method, simplex methods, problems with maximization and minimization objects, duality and its managerial interpretation; Sensitivity analysis: meaning, Change in Objective Function Coefficients, Change in Right Hand Side Values, Change in Availability of resources and Addition of a new variable.

Module III: Transportation and Assignment Model

Transportation model: various methods of finding initial basic feasible solution and optimal solution, MODI method, degeneracy, unbalanced problems, prohibited route problems, maximization transportation problems

Assignment Model: Hungarian method for solution, unbalanced assignment problems, restrictions on assignments, travelling salesman problem.

Module IV: Game Theory

Two-Person Zero Sum Games, Pure Strategies: Games with Saddle Point, Mixed Strategies: Games without Saddle Point, Principle of Dominance, and Solution Methods for Games without saddle point – Algebraic Method, Arithmetic Method, Graphical Method.

Module V: Markov Chains

Markov Chains: introduction, characteristics, applications, state and transition probabilities, steady-state probability (equilibrium conditions), absorbing states and other applications of Markov Analysis.

Module VI: Simulation

Simulation: meaning, types of simulation, steps of simulation process, Monte Carlo simulation, applications of simulation

Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70


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Text & References:

- Anderson David R, Sweeny Dennis J, Williams Thomas A (2007), An Introduction to Management Science Quantitative Approaches to Decision Making, Cengage Learning.
- Render Berry, Stair Ralph M., Hanna Michel E.(2008), Quantitative Analysis for Management, Pearson Education
- Sharma J.K. (2010), Operations Research: Theory & Application, Mac Millan India Ltd.
- Taha H.A (1998), Operations Research: An Introduction, Prentice Hall of India.
- Vohra N.D.(1998), Quantitative Techniques in Management, Tata McGraw Hill



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BUSINESS ANALYTICS

Course Code: MGT4210

Credit Units: 02

Course Objective:

The course provides an introduction to data analytics to be used in business. The students will learn how data analysts describe, predict and make informed business decisions in various business domains like marketing, human resources, finance and operations. The aim of the course is to develop basic data literacy and an analytic mindset in students that will help them to make strategic decisions based on data.

Course Contents:

Module I: Introduction to Business Analytics

Importance and role of data driven decisions. Business Analytics – Definition, Market, Trends; Paradigm Shift from Data to Insight and from Business Intelligence to Business Analytics; Examples and Types of Business Analytics Analysis- Forecasting & Predictive Modeling; Descriptive, Prescriptive and Predictive Analytics. Data Summarization, Data visualization – Various visualization techniques, standardized reporting and Pivot Tables – Using Excel

Module II: Data Mining

Introduction to Data Mining; Crucial processes in data mining; Data Warehousing; Data Mining Techniques and Exploratory Data Analysis; Data Mining Tool – XL Miner.

Module III: Decision Making & Optimization

Decision making under uncertainty – Decision Trees and Risk Profiles; Sensitivity Analysis; Optimizing complex decisions – Optimization of a large number of decisions while accounting for different kinds of physical and business decisions. Introduction to Optimization Techniques –Linear Programming; Optimization – Use of Excel to solve business problems like marketing mix, capital budgeting and portfolio optimization.

Module IV: Big Data and Introduction to R

Introduction to Big Data, Big Data driven decisions in business organizations – Benefits and Security/Privacy concerns.

Building Business and Economic Models –Tools to leverage data for Prediction purposes; Logistic Regression.

Introduction to Machine Learning; Statistical Learning vs. Machine Learning; Major classes of Learning Algorithms –Supervised Vs Unsupervised Learning.

Introduction to R Programming

Module V: Simulation using R and Excel

Hands on Regression using R; Introduction to Simulation; Applications of Simulation and Building a Simulation Model. (Using Excel and R)

Capstone Project.

Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70


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Text & References:

- Aczel, D.A., Sounderpandian, J., Saravanan, P. and Joshi, R. (2012). *Complete Business Statistics (7th ed.)*. New Delhi, India: McGraw Hill Education (India) Private Limited
- Cooper, R.D., Schindler, S. P. and Sharma, J.K. (2015). *Business Research Methods*. New Delhi, India: McGraw Hill Education (India) Private Limited
- Gujrati, Damodar N and Sangeetha (2011). *Basic Econometrics (4th Ed.)*. New Delhi, India: McGraw Hill Education (India) Private Limited
- Beri, C. (2016). *Business Statistics*. New Delhi, India: McGraw Hill Education (India) Private Limited
- Kothari, C.R. (2009). *Research Methodology: Methods and Techniques (2nd revised ed.)*. New Delhi, India: New Age International Publisher
- Sharma, J.K. (2013). *Operation Research: Theory and Applications (5th ed.)*. New Delhi, India: Macmillan Publishers India limited
- Albright and Winston. *Business Analytics: Data Analysis and Decision Making*, 5th Edition.
- Stephen Powell and Ken Baker., “The Art of Modeling with Spreadsheet”
- Data, data everywhere, “Special report on managing information, Economist”, February 27th, 2010.
- Liberatore and Luo, “The Analytics Movement, Interfaces, Articles in Advance”, pp. 1–12, 2010.
- “Using R for Data Analysis and Graphics”. Introduction, Code and Commentary,



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EXCEL FOR MANAGERS

Course Code: MGT4211

Credit Units: 01

Course Objective:

Microsoft Excel is a very popular business productivity application for the management and manipulation of data. With the right training and understanding of Excel, businesses and individual users can unlock the world of opportunities that this powerful business application offers. This course will provide all the tools necessary to create and use basic and advanced spreadsheets. After completion of this course, students will be able to learn the various methods for entering and editing data and also learn the various ways to write simple formulas.

Course Contents:

Module-I: Getting Started with Excel

Introduction to Spreadsheets: Launching Excel, entering data in spreadsheet, widening rows and columns, applying basic formatting in spreadsheet, saving work in excel. Entering Data into cells: Using autofill, sort & filter feature, creating lists, inserting & deleting rows and columns. Wrapping & merging text and cells,

Module-II: Basics in excel

Protecting & sharing workbooks, freeze panes, understanding normal, page layout and page break preview in excel. Setting the page orientation and print area. Adding hyperlinks to cells, inserting images, objects, equations and symbols.

Module-III: Charts & Formulas in Excel

Understanding Charts: Inserting bar charts, pie charts, column charts and line charts in spreadsheets, formatting and resizing the chart. Using Basic functions- average, sum, min, max, product etc. date functions, time functions. Math Operators in Excel, combining mathematical operators.

Module-IV: Functions in Excel

Logical- using IF, AND, OR, NOT, TRUE, FALSE Functions. Textual- using TRIM, UPPER, LOWER, REPLACE Functions. Import data into excel, Look up functions with index and match. Rounding, sum product, conditional counts and conditional sums, Filtering data, pivot table, pivot charts, conditional formatting.

Module-V: Financial and Statistical Functions in Excel

Financial functions: Time value of money- Present value, Future value, PMT with beginning date, PMT with ending date, NPV, Goal seek, Scenario Manager, IRR. Statistical functions: Max, Min, Average, Large, Rank, Small, Var, Std Dev.

Examination Scheme:

Components	Written Test	Practical	V/P	File/Assignment	Attendance
Weightage (%)	20	30	30	15	5

Suggested Readings & Textbooks

- Business Analysis with Microsoft Excel by Conrad George Carlberg,, Que Publishing, second edition, ISBN 0974415626.
- Excel 2013 for Dummies by Greg Harvey, John Wiley & Sons , 2012, ISBN 9781118559703

Web Resources

- <https://spreadsheeto.com/>
- <https://www.tutorialspoint.com/excel/>

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CORPORATE FINANCIAL REPORTING & ANALYSIS

Course Code: FIN4201

Credit Units: 03

Course Objective:

The International Financial Reporting Standards (IFRS) issued by International Accounting Standards Board (IASB) are gaining recognition as Global Reporting Standards. While appreciating the emerging diversities and complexities in the world of accounting and the need for knowledge of IFRS in relation to the convergence of the Indian Accounting Standards. The objective of this Subject is to enhance the knowledge of IFRS issued by IASB as well as to provide practical framework to the student in the globalization scenario.

Course Content:

Module-I:

Brief overview of Indian Accounting Standard and different accounting standards at international level. Rational of Accounting Standards. IFRS Framework, Features of IFRS, Genesis of IFRS, Journey of IAS to IFRS, Advantage of adopting. IFRS. Challenges in Adopting IFRS. Difference between Indian GAAP and IFRS.

Module-II:

Concept of Fair Value Accounting Concept of Adoption and convergence. Significant Difference between Ind AS and IFRS. Problem of Carve Out. Timeline for Adoption for Ind- As, Concept of Fair Value Accounting Presentation of Financial Statement as per Ind-AS1, Statement of Change in Equity, Cash Flow Statement and Ind AS 7.

Module-III:

Treatment of Inventories as per Ind AS 2-; Property plant and equipment- Ind AS 16, recognition, measurement, cost model, revaluation model, depreciation and impairment of assets and related disclosures, Revenue recognition Ind AS 18- scope, revenue from sales of goods, Services, interest royalties and dividends and disclosures, Financial Instruments: Presentation, Recognition and Measurement (Ind AS 32 and 39), Ind AS 33 Earnings per Share .

Module-IV:

First time adoption of accounting standard: Recognition and measurement, Presentation and Disclosure

Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70

Recommended Text Book& Reference:

- Wiley IFRS: Practical Implementation Guide and Workbook; By Abbas, Graham, Liesel; Wiley publications, 3rd edition
- Faculty material will be provided
- International Financial Reporting Standards, Produced and printed on behalf of: The Institute of Chartered Accountants of India, website of Ministry of Corporate Affairs.
- International Financial Reporting Standards (IFRSs) - published by Taxmann Publications P Ltd.
- A Guide through International Financial Reporting Standards July 2008 -Published by IASB.
- IFRS : A Quick Reference Guide by Robert Kirk
- Wiley IFRS: Practical implementation guide and workbook by Abbas Ali Mirza, Graham J. Holt and Magnus Orrell5. Wiley IFRS 2008: Interpretation and application of International Accounting and Financial Reporting Standards 2008 by Eva K. Jermakowic

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FINANCIAL STATEMENT ANALYSIS

Course Code: FIN4203

Credit Units: 03

Course Objective:

This course is designed to prepare students to interpret and analyze financial statements for tasks such as credit and security analyses, lending and investment decisions, and other decisions that rely on financial data. This course explores in greater depth financial reporting from the perspective of financial statement users. Students develop a sufficient understanding of the concepts and recording procedures and therefore are able to interpret various disclosures in an informed manner. Students learn to compare companies financially, understand cash flow, and grasp basic profitability issues and risk analysis concepts. Ultimately, students who complete this course develop a more efficient and effective approach to researching, interpreting, and analyzing financial statements.

Course Contents:

Module-I: Introduction to Financial Statements

Income Statement- Introduction, Revenue Recognition, Expense recognition, Comprehensive income, Accrual concept, Balance Sheet-Introduction, Components, measurement base of Balance sheet, Cash Flow statement- Format, Analysis of Cash flow statement.

Module-II: Financial Ratios

Introduction, Financial Analysis tools and techniques, Internal liquidity ratios, operating profitability ratios, Return on investment ratios, financial risk ratios, growth potential ratios, Return on equity and du pont system, Basic earning per share, dilutive earning per share, uses and limitations of ratio analysis.

Module-III: Analysis of Assets

Investment securities, Inventory analysis- conversion of inventory methods, long term assets-capitalizing vs. expensing, depreciation accounting, capitalizing intangible assets, Asset Impairment, natural assets.

Module-IV: Analysis of Liabilities

Introduction, Income Tax- terminology, Deferred tax accounting, Long term bonds- total interest cost component, retirement or conversion of bonds, interest rate impact on bond value, Leases- operating vs. financing lease, determining the value of lease and lease assets.

Module-V: Red Flags

Introduction, Accounting shenanigans, causes of accounting shenanigans, finding shenanigans.

Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70

Required text:

- Prescribed Textbook:
- "The Analysis and use of Financial Statements", (3rd Ed.), Gerald I. White, Ashinpaal C. Sondhi and Dov Fired, Wiley-India.
- Financial Reporting and Analysis CFA level 1, latest edition



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WEB DESIGN USING HTML

Course Code: ECM4204

Credit Units: 03

Course Objective: To make the students understand the basics of web designing and to impart knowledge about the web page and website creation and making the students aware about the technologies available and their applications.

Course Contents:

Module I: Web Design Introduction

Basic principles involved in developing a web site, Planning process, Five Golden rules of web designing, Designing navigation bar, Page design, Home Page Layout, Design Concept, Brief History of Internet, What is World Wide Web. Why create a web site, Web Standards, Audience requirement.

Module II: HTML Basics

What is HTML, HTML Documents, Basic structure of an HTML document, creating an HTML document, Mark up Tags, Heading-Paragraphs, Line Breaks, HTML Tags.

Module III: Elements of HTML

Introduction to elements of HTML, Working with Text, Working with Lists, Tables and Frames, Working with Hyperlinks, Images and Multimedia, Working with Forms and controls. XML, Java Script

Module IV: CSS

CSS Introduction: CSS Syntax, CSS Id & Class, CSS How. **CSS Styling:** Styling Backgrounds, Styling Text, Styling Fonts, Styling Links, Styling Lists, Styling Tables. **CSS Box Model:** CSS Border, CSS Outline, CSS Margin, CSS Padding

Module V: CSS Advanced

CSS Grouping/Nesting, CSS Dimension, CSS Display, CSS Positioning, CSS Floating, CSS Align, CSS Pseudo-class, CSS Pseudo-element, CSS Navigation Bar, CSS Image Gallery, CSS Image Opacity, CSS Image Sprites. CSS Media Types, CSS Attribute Selectors

Module VI: Dreamweaver & Web Site

Dreamweaver Basics, Dreamweaver shortcuts, Dreamweaver panels, Dreamweaver toolbars, Dreamweaver automation, Source code formatting

Web Site: Creating the Web Site, Saving the site, working on the web site, Creating web site structure, Creating Titles for web pages, Themes-Publishing web sites.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

Text & References:

- .HTML 5 in simple steps, Kogent Learning Solutions Inc Dreamtech Press
- A beginner's guide to HTML NCSA
- Creating a Web Page and Web Site, Murray, Tom/Lynchburg
- HTML, XHTML, and CSS Bible, Steven M. Schafer, 5ed Wiley India
- Beginning HTML, XHTML, CSS, and JavaScript, John Duckett Wiley India
- Beginning CSS: Cascading Style Sheets for Web Design, Ian Pouncey, Richard York Wiley India
- Learning Web Technologies: HTML, Javascript, Kogent Wiley India

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SUMMER INTERNSHIP EVALUATION

Course Code: MGT4335

Credit Units: 06

There are certain phases of every Intern's professional development that cannot be effectively taught in the academic environment. These facets can only be learned through direct, on-the-job experience working with successful professionals and experts in the field. The internship programme can best be described as an attempt to institutionalize efforts to bridge the gap between the professional world and the academic institutions. Entire effort in internship is in terms of extending the program of education and evaluation beyond the classroom of a university or institution. The educational process in the internship course seeks out and focuses attention on many latent attributes, which do not surface in the normal class room situations. These attributes are intellectual ability, professional judgment and decision making ability, inter-disciplinary approach, skills for data handling, ability in written and oral presentation, sense of responsibility etc.

In order to achieve these objectives, each student will maintain and submit a file (**Internship File**) and a report (**Internship Report**)

INTERNSHIP FILE

The Internship File aims to encourage students to keep a personal record of their learning and achievements throughout the Programme. It can be used as the basis for lifelong learning and for job applications. **Items can be drawn from activities completed in the course modules and from the workplace to demonstrate learning and personal development.**

The File will assess the student's analytical skills and ability to present supportive evidence, whilst demonstrating understanding of their organization, its needs and his/her own personal contribution to the organization.

The File is essentially a comprehensive documentation of how one proceeds while working on the assignment and should be regularly checked by the faculty guide/ supervisor, issues discussed with the students, doubts if any clarified and signed as having done so. This will form the basis of **continuous evaluation** of the project.

The File will include **five sections** in the order described below.

1. **The Title Page** – An Internship Experience Report For (Your Name), name of internship organization, name of the Supervisor/Guide and his/her designation, date started and completed, and number of credits for which the report is submitted.
2. **Table of Content** – An outline of the contents of the file by topics and subtopics with the page number and location of each section.
3. **Introduction** – Short, but should include how and why you obtained the internship experience position and the relationship it has to your academic/professional and career goals.
4. **Main Body** – Should include a brief summary/ executive summary of the **Internship Project Report** that the student has worked on, an **analysis of the company/organization** in which the student is working, a **personal review** of the student's management skills and how they have been developed through the programme, the daily tasks performed, major projects contributed to, dates and hours spent on a task, observations and feelings, meetings attended and their purposes, listing of tools and materials and their suppliers, and photographs if possible of projects, buildings and co-workers.


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5. **Appendices** – Include pamphlets, forms, charts, brochures, technical and descriptive literature, graphs and other information related to your Internship experience.

INTERNSHIP REPORT

The **Internship Report** is the research report that the student has to prepare on the project assigned by the organization. (Incase a student is not assigned a specific research project in the organization, he has to select any one aspect of the organization and prepare a research report on it). The lay out of the report should be as per the standard layout prescribed by the organization wherein the student undertakes the Internship. In case, there is no layout prescribed by the organization the following components should be included in the report:

➤ **Title or Cover Page**

The title page should contain Project Title; Student's Name; Programme; Year and Semester and Name of the Faculty Guide.

➤ **Acknowledgements**

Acknowledgment to any advisory or financial assistance received in the course of work may be given. It is incomplete without student's signature.

➤ **Abstract**

A good "Abstract" should be straight to the point; not too descriptive but fully informative. First paragraph should state what was accomplished with regard to the objectives. The abstract does not have to be an entire summary of the project, but rather a concise summary of the scope and results of the project. It should not exceed more than 1000 words.

➤ **Table of Contents**

Titles and subtitles are to correspond exactly with those in the text.

➤ **Introduction**

Here a brief introduction to the problem that is central to the project and an outline of the structure of the rest of the report should be provided. The introduction should aim to catch the imagination of the reader, so excessive details should be avoided.

➤ **Materials and Methods**


This section should aim at experimental designs, materials used (wherever applicable). Methodology should be mentioned in details including modifications undertaken, if any. It includes organization site(s), sample, instruments used with its validation, procedures followed and precautions.

➤ **Results and Discussion**

Present results, discuss and compare these with those from other workers, etc. In writing this section, emphasis should be laid on what has been performed and achieved in the course of the work, rather than discuss in detail what is readily available in text books. Avoid abrupt changes in contents from section to section and maintain a lucid flow throughout the thesis. An opening and closing paragraph in every chapter could be included to aid in smooth flow.

Note that in writing the various sections, all figures and tables should as far as possible be next to the associated text, in the same orientation as the main text, numbered, and given appropriate titles or captions. All major equations should also be numbered and unless it is really necessary, do not write in "point" form.

While presenting the results, write at length about the the various statistical tools used in the data interpretation. The result interpretation should be simple but full of data and statistical analysis.


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This data interpretation should be in congruence with the written objectives and the inferences should be drawn on data and not on impression. Avoid writing straight forward conclusion rather, it should lead to generalization of data on the chosen sample.

Results and its discussion should be supporting/contradicting with the previous research work in the given area. Usually one should not use more than two researches in either case of supporting or contradicting the present case of research.

➤ **Conclusion(s) & Recommendations**

A conclusion should be the final section in which the outcome of the work is mentioned briefly. Check that your work answers the following questions:

- Did the research project meet its aims (check back to introduction for stated aims)?
- What are the main findings of the research?
- Are there any recommendations?
- Do you have any conclusion on the research process itself?

➤ **Implications for Future Research**

This should bring out further prospects for the study either thrown open by the present work or with the purpose of making it more comprehensive.

➤ **Appendices**

The Appendices contain material which is of interest to the reader but not an integral part of the thesis and any problem that have arisen that may be useful to document for future reference.

➤ **References**

References should include papers, books etc. referred to in the body of the report. These should be written in the alphabetical order of the author's surname. The titles of journals preferably should not be abbreviated; if they are, abbreviations must comply with an internationally recognised system.

Examples

For research article

Voravuthikunchai SP, Lortheeranuwat A, Ninrprom T, Popaya W, Pongpaichit S, Supawita T. (2002) Antibacterial activity of Thai medicinal plants against enterohaemorrhagic Escherichia coli O157: H7. Clin Microbiol Infect, 8(suppl 1): 116–117.


For book

Kowalski, M. (1976) Transduction of effectiveness in Rhizobium meliloti. SYMBIOTIC NITROGEN FIXATION PLANTS (editor P.S. Nutman IBP), 7: 63-67

The Layout Guidelines for the Internship File & Internship Report

- A4 size Paper
- Font: Arial (10 points) or Times New Roman (12 points)
- Line spacing: 1.5
- Top and bottom margins: 1 inch/ 2.5 cm; left and right margins: 1.25 inches/ 3 cm

Examination Scheme:

Continuous Evaluation by faculty guide	15%
Continuous evaluation by CRC	15%
Feedback from industry guide	35%
Report, Presentation & Viva Voce	35%
 TOTAL	100%

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BUSINESS VALUATION

Course Code: FIN4302

Credit Units: 03

Course Objective:

The objective of this course is to develop a detailed understanding of the tools used by market professionals and corporate managers to analyze the value of companies and stocks. The central theme of the course will be the pricing of equity securities using discounted cash flow and relative valuation techniques. Students will apply what they've learned to the valuation of a specific company, with the goal of becoming an expert on that firm. After completing this course, students should be able to: (i) Develop quantitative models for firm and equity valuation based on DCF and multiples. (ii) Identify and interpret accounting and non-accounting information necessary for valuation. (iii) Identify and interpret the key value drivers for a firm or industry. (iv) Critically analyze firm and equity valuation models and assumptions developed by others. (v) Present valuation analyses and assumptions in a professional manner.

Course Contents:

Module-I: Introduction to Valuation

Valuation vs. Pricing. A philosophical basis for Valuation, Misconceptions about Valuation, Biasness in Valuation, Uncertainties in Valuation. Approaches to Valuation, Understanding Financial Statements, Basics of Risk.

Module-II: Discounted Cash Flow Valuation

Discounted Cashflow Valuation: Basis for Approach, Going Concern versus Liquidation Valuation, Equity Valuation versus Firm Valuation, Three pathways to DCF value, Advantages & Disadvantages of DCF Valuation, Riskless Rates and Risk Premiums, Estimating Risk Parameters and Costs of Financing, Measuring Earnings, Earnings to Cash Flows, Estimating Growth, Closure in Valuation: Estimating Terminal Value, Free Cash flow to Equity Models,

Module-III: Relative Valuation

Fundamental Principles of Relative Valuation, Choices with multiples- Earnings Multiples, Book Value Multiples, Choosing the Comparable firm: Making the comparison, Revenue and Sector-Specific Multiples, Advantages & Disadvantages of Relative Valuation, DCF vs Relative valuation.

Module-IV: Applicability of Valuation (Cases and research papers); Valuing Financial Services firm, Valuing Firms with Negative Earnings, Valuing Young and Start-up Firms, Valuing Private Firms, valuing Acquisitions and Takeovers,

Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70

Required Textbook

- Investment Valuation: Tools and Techniques for Determining the Value of Any Asset, Second Edition, University Edition by Aswath Damodaran

Recommended other Textbook

- Krishna G. Palepu and Paul M. Healy: *Business Analysis & Valuation Using Financial Statements*, Text Only (PHB) 5th Edition, Cengage Learning 2012.
- Joshua Rosenbaum and Joshua Pearl: *Investment Banking: Valuation, Leveraged Buyouts, and Mergers and Acquisitions*, John Wiley & Sons; 2nd edition (2013), ISBN: 1118656210


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FINANCIAL MODELING WITH MS-EXCEL

Course Code:FIN4306

Credit Units: 03

Introduction

Modeling techniques for accurate financial forecasting are used in many areas of finance, such as derivatives, valuation, project evaluation, deal structuring, portfolio management and the like. In the course, the participants will learn the model building skills required to build powerful models in finance with the help of excel. There are many features of model building that are common irrespective of the final model that one intends to build. In the course we will also emphasize on the different model building skills that one should have irrespective of the final use that one is going to make of it.

By the end of the course the participants should be better able to:

- Understand the basic and advanced features of excel
- Understand how to build models in excel to suit one's purpose
- Building models in different areas of finance including investments, corporate finance and derivatives
- Identifying and controlling the key sensitivities with advanced spreadsheet simulation
- Understand how risk can be built into the model to enhance decision making process

Course Contents:

Module-I: Understanding the Basic Features of Excel : Introduction to Modeling, Introduction to Excel, Database Functions in Excel Creating Charts Using Forms and Control Toolbox Understanding Finance Functions present in Excel Creating Dynamic Models

Module-II: Simulation using Excel : Different Statistical Distributions used in Simulation Generating Random Numbers that follow a particular distribution Building Models in Finance using Simulation

Module-III: Excel in Capital Budgeting, valuation: Preparing common size statements directly from Trial Balance Forecasting Financial Statements using Excel Analysing Financial Statements by using Spreadsheet Model ; Determining Project Viability Risk Analysis in Project Appraisal Simulation in Project Appraisal; Determination of Value Drivers, DCF Valuation, Risk Analysis in Valuation; Determining Efficient Portfolio, Creating Dynamic Portfolios Portfolio Insurance Fixed Income Portfolio Management using Excel.

Module-IV: Understanding Subroutines and Functions and building simple financial models using subroutines and functions Recording and Editing Macros Subroutines and Functions Decision Rules Message Box and Input Box Debugging, **Designing Advanced Financial Models** using VBA User Forms Other Advanced Features Actual Model Building.

Examination Scheme:

Components	CT	HA	C	V	A	EE
Weightage (%)	10	5	5	5	5	70

(C - Case Discussion/ Presentation; HA - Home Assignment; Q – Quiz; V - Viva; CT - Class Test; A- Attendance; EE - End Semester Examination)

Text & References:

Text:

- Benninga, S., 2008, Financial Modeling, The MIT Press, Third Edition

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References:

- J & S: Jackson M. and Staunton M., 2001, Advanced Modelling in Finance using Excel and VBA, John Wiley and Sons Ltd
- B & M: Brealey R.A. and Myers S., 2003, Principles of Corporate Finance, Seventh Edition, McGraw Hill
- Financial Analysis and Modeling using Excel and VBA – Chandan Sengupta
- Building Financial Models, John Tjia



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TRAINING AND DEVELOPMENT

Course Code: HRM4305

Credit Units: 03

Course Objective:

This course is designed to provide in depth understanding and enable the students to manage training processes and system for developing human resource of the organization.

Course Contents:

Module I: Introduction to Training and Development

Training – concept, and rationale; training process: role of stakeholders in training programme; Organization and Management of training function; Training needs assessment – organizational analysis, operational analysis, person analysis; competency mapping; Learning theories, learning process.

Module II: Training Design

Designing the training programme: process of learning in training programme – attributes and factors influencing; learning process; learning styles; training climate and pedagogy; developing training modules; Training aids

Module III: Training Methods and Techniques

Training methods and techniques – role playing, business games, in basket exercises, laboratory training; incidents and cases; seminars, syndicates and group discussion; lecture, programmed instructions; inspirational techniques – brainstorming, mind mapping, creative problem solving; Management Development

Module IV: Evaluation of training

Evaluation of training – need for evaluation, principles of evaluation, criteria and approaches; return on investment in training, process of calculating ROI in training;

Module V: Emerging Trends in Training and Development

Emerging trends in training and development; new perspectives on training – cross cultural training, e-learning, knowledge management

Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70

Text & References:

Text:

- Noe, Raymond A, “Employee Training and Development” Tata McGraw Hill Education; 6th edition 2013

References:

- Agochia, Devendra, Every Trainer’s Handbook, New Delhi; Sage Publications
- De Simone, R.L. and Harris, D.M., Human Resource Development, Thomson Learning
- Sahu, R.K., Training for Development , Excel Books, New Delhi
- Blanchard, P Nick, and James W. Thacker, Effective Training – Systems, Strategies, and Practices, Pearson Education, New Delhi
- Goldstein, Training in Organization , Thomson Learning, Bombay
- McGrath, Training for Life and Leadership in Industry, Prentice Hall of India, New Delhi


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DATABASE MANAGEMENT SYSTEMS

Course Code: ITM4302

Credit Units: 03

Course Objectives

The course aims to make the students understand the basic and advanced concepts in databases and database management systems. Students will be able to understand the importance of databases in day to day life. The course will also provide the students, a hands-on experience on the SQL-the language of databases.

Course Contents:

Module I: Introduction to DBMS

Definition of DBMS, Concept and Goals of DBMS, Data Independence, DBMS Architecture, Levels, Database Administrator, File System Approach Vs DBMS Approach, Advantages of Using a DBMS, Data Models, Schemas, and Instances, Database Languages, Database Users, Database Abstraction.

Module II: Relational Database & ER Model

Relational Database: Relational System, Codd's Rule, Relational Model, Optimization, Tables and Views

ER Model: Entity Type, Entity Set, Relationship type, Relationship sets, Constraints: Cardinality Ratio and Participation Constraint, Keys, Mapping, Design of ER diagrams.

Module III: Relational Model Objects

Domains and Relations, Relations and predicates, Relational Data Integrity; Primary Key, Candidate Key, Foreign Key and their rules, Relational operators, Relational Algebra

Module IV: SQL

SQL Language, DDL,DML and DCL commands. Data definition, Data retrieval and update operations on MS ACCESS and SQL Server DBMS.

Module V: Database Applications and Types


Distributed Database, Object Oriented Database, Multimedia Database, Data Mining, Digital Libraries. Data Warehouse.

Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70

Text & References

- Elmasari, Navathe, "Fundamentals of Database Systems", Addison Wesley.
- Korth, Silbertz, Sudarshan, "Database Concepts". McGraw Hill.
- Majumdar & Bhattacharya, "Database Management System", Tata McGraw Hill.
- Date C J." An Introduction to Database Systems", Addison Wesley.


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DIGITAL MARKETING

Course Code: ITM4303

Credit Units: 03

Course Overview:

The course examines digital marketing strategy, implementation and executional considerations for B-to-B and B-to-C brands and provides a detailed understanding of all digital marketing concepts. Participants will complete the course with a comprehensive knowledge of and experience with how to develop an integrated digital marketing strategy, from formulation to implementation. Strong focus will be on developing student's business skills and growing real-world experience of the digital media sector to enhance their knowledge to cope with employability demand.

Course Objectives:

Digital Marketing Course is an initiative designed to educate students and practitioners in the area of Digital Marketing analytics and make them ready for jobs or prepare them to launch campaign for their own organisations.

- To Understand how and why to use digital marketing for multiple goals within a larger marketing and/or media strategy
- Understand the major digital marketing channels - online advertising: Digital display, video, mobile, search engine, and social media
- Learn to develop, evaluate, and execute a comprehensive digital marketing strategy and plan
- Learn how to measure digital marketing efforts and calculate ROI
- Explore the latest digital ad technologies

Course Contents:

Module-I: Digital Marketing Overview:

What is Digital Marketing? Understanding Marketing Process? Why Digital Marketing Wins Over traditional Marketing? Understanding Digital Marketing Process; Digital Marketing Planning and Strategy

Module-II: Website Planning and Creation:

Understanding Internet; Difference between Internet & web; Understanding websites; Understanding domain names & domain extensions; What is web server & web hosting? Different types of web servers; Different types of websites; Planning & Conceptualising a Website; Building website using CMS in Class.

Module-III: Digital Advertising (PPC, Digital Display and YouTube):

Google AdWords Overview; Understanding Adwords Algorithm; Creating Search Campaigns; Types of Search Campaigns - Standard, All features, dynamic search & product listing. Tracking Performance/Conversion: What is conversion tracking? Why is it important, how to set up conversion tracking. Optimizing Search Campaigns: How to optimize campaigns at the time of creation? Optimizing campaign via adgroups. Creating Display Campaign; Types of display campaigns- All features, Mobile app, Remarketing, Engagement. Optimizing Display Campaign and Re-marketing . What is Online Advertising? Types of Online Advertising, Display Advertising, Contextual advertising, what are Payment Modules? Different Online advertising platforms Creating Banner Ads Using Tools.

Module-IV: Emerging trends in Digital Marketing:

Affiliate Marketing- Affiliate marketing history, Affiliate marketing scenario in India, Different ways to do affiliate marketing. **Email Marketing-** What is email marketing and how it works? Types of email marketing- Opt-in & bulk emailing; Setting up email marketing account, creating a broadcast email. What are auto responders? Setting up auto responders; Tricks to land in inbox instead of spam folder; **Social Media Marketing-** Concept, How social media marketing is different than others Forms


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of Internet marketing, Understanding Facebook marketing, LinkedIn Marketing, Twitter Marketing, Video Marketing **and** VIDEO & AUDIO (PODCASTING) marketing; **and Mobile Web Marketing**-Understanding Mobile Devices, Mobile Marketing Measurement and Analytics; Fundamentals of Mobile Marketing, Creating mobile website through wordpress; Using tools to create mobile websites; Using tools to create mobile app Advertising on mobile (App & Web); Content Marketing on mobile. **Content Marketing**-Introduction to content marketing, Objective of content marketing, Content marketing 7 step strategy building process, How to write great compelling content, Optimizing content for search engines, How to increase opt-in email list with content marketing with examples.

Module-V: Search Engine Optimization (SEO):

What is SEO? Introduction to SERP, What are search engines? How search engines work? Major functions of a search engine; what are keywords? Different types of keywords ; Google keyword planner tool; Keywords research process; Understanding keywords; On page optimization; Off Page optimization; Top tools for SEO; Monitoring SEO process; Preparing SEO reports, How to create SEO Strategy for your business, What is link juice? Importance of domain and page authority?How to optimize exact keywords for your business. What is Google Panda Algorithm, Google Penguin and Google EMD Update. How to save your site from Google Panda, Penguin and EMD Update, How to recover your site from Panda, Penguin and EMD.

Module-VI: E-Commerce and Payment Gateway:

What is ecommerce? Top ecommerce websites around the world & it's scenario in India; Difference between E-Commerce software and Shopping Cart; software Payment Gateways, Merchant Accounts & Logistics for physical goods. Integrating Woo-commerce and setting up an ecommerce store on WordPress. Case studies on ecommerce websites. How to do Google Product Listing Ads (PLA) for ecommerce websites.How to do SEO for an ecommerce website.

Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70

Text & References:

- Marketing 4.0: Moving from Traditional to Digital by P. Kotler. Wiley Publication.
- The Essentials of E-Marketing, 4th edition by Quirk Education (E-Book)
- The Art of Digital Marketing by Ian Dodson.
- Understanding Digital Marketing: Marketing Strategies for Engaging the Digital Generation, by Damian Ryan and Calvin Jones. KoganPage Publication, 3rd edition.
- Digital Marketing, VandanaAhuja, Oxford Publication.
- Digital Marketing Insights 2017, Social Beat Digital Marketing LLP, Kindle Edition.
- Social Media for Business – Stories of Indian Brands, By Sorav Jain
- Total E-mail Marketing: Maximizing your results from Integrated E-marketing (E-marketing essentials): Dave Chaffey.

Websites:

SEOMoz.org ;mashable.com; <http://www.convinceandconvert.com>; ClickZ.com ; eMarketer forrester.com; contentmarketinginstitute.com ; adage.com; adweek.com

Final Project: Group Paper and Presentation

Students will work in instructor-selected groups of four or five to complete a 15-20 page digital marketing plan utilizing the concepts and frameworks covered in the course. Papers should be double-spaced using 12-point font and 1-inch margins, and submitted accordingly. All groups will be required to give a presentation in class highlighting the important points of their plan and submit their presentation slides for review. Presentations will take place in class via web conference on prescribed date. Students will need to ensure their audio is working well in order to present. All students will be required to complete evaluations of the group presentations given in class. 25% will be deducted per day for late papers and slides.

INTRODUCTION TO CLOUD COMPUTING

Course Code: ITM4304

Credit Units: 03

Course Objective:

This course gives students an insight into the basics of cloud computing along with virtualization, cloud computing is one of the fastest growing domain from a while now. It will provide the students basic understanding about cloud and virtualization along with it how one can migrate over it.

Course Contents:

Module-I: Cloud Computing Overview

Origins of Cloud computing – Cloud components - Essential characteristics – On-demand self-service, Broad network access, Location independent resource pooling ,Rapid elasticity , Measured service, Comparing cloud providers with traditional IT service providers, Roots of cloud computing.

Module-II: Cloud Insights

Architectural influences – High-performance computing, Utility and Enterprise grid computing, Cloud scenarios – Benefits: scalability ,simplicity ,vendors ,security, Limitations – Sensitive information - Application development- security level of third party - security benefits, Regularity issues: Government policies.

Module-III: Cloud Architecture- Layers and Models

Layers in cloud architecture, Software as a Service (SaaS), features of SaaS and benefits, Platform as a Service (PaaS), features of PaaS and benefits, Infrastructure as a Service (IaaS), features of IaaS and benefits, Service providers, challenges and risks in cloud adoption.Cloud deployment model: Public clouds – Private clouds – Community clouds - Hybrid clouds - Advantages of Cloud computing.

Module-IV: Cloud Simulators- CloudSim and GreenCloud

Introduction to Simulator, understanding CloudSim simulator, CloudSim Architecture, Understanding Working platform for CloudSim, Introduction to GreenCloud

Module-V: Introduction to VMWare Simulator

Basics of VMWare, virtualization, advantages of virtualization, using VMware workstation, creating virtual machines-understanding virtual machines, create a new virtual machine on local host, cloning virtual machines, virtualize a physical machine.

Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70

Text & References:

Text:

- Cloud computing a practical approach - Anthony T.Velte , Toby J. Velte Robert Elsenpeter, TATA McGraw- Hill , New Delhi – 2010
- Cloud Computing: Web-Based Applications That Change the Way You Work and Collaborate Online - Michael Miller - Que 2008

References:

- Cloud computing for dummies- Judith Hurwitz , Robin Bloor , Marcia Kaufman ,Fern Halper, Wiley Publishing, Inc, 2010
- Cloud Computing (Principles and Paradigms), Edited by Rajkumar Buyya, James Broberg, Andrzej Goscinski, John Wiley & Sons, Inc. 2011


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SYSTEM ANALYSIS AND DESIGN

Course Code: ITM4305

Credit Units: 03

Course Objective:

The course aims at preparing students conceptualize and define scope and domain of system analysis and design. It also focuses on system development life cycle using conventional and structural look.

Course Contents:

Module I: Systems Development Environment. (Information system development life cycle)

System & its parts, Types of Systems, Characteristics of a System, System Analyst in system Development, Developing Systems- SDLC, Approaches to System Development (Prototyping, Joint Application Design (JAD), Participatory Design (PD)), System Development Models (Waterfall model & Spiral Model), System Planning & Selection (Identifying, Selecting, Initiating & Planning System Development Project).

Module II: System Planning and Selection (Graphic technology modeling tool)

Identifying and Selecting Projects (Identifying potential development projects, classifying and ranking projects, and selecting projects for development), Methods for project identification and selection, Evaluation criteria for classifying and ranking projects, Initiating and Planning System Development Projects (Process & performed Activities, Deliverables & Outcomes), Assessing Project Feasibility (Economic, Operational, Technical, Schedule, Legal & Contractual, Political Feasibility)

Module III: System & Data Analysis (Data Analyzing Modeling)

Determining System Requirements (Traditional Methods, Modern & Radical Methods), Structuring System Requirements (Process Modeling – DFD, Logic Modeling – Structured English & Decision Tables, Conceptual Modeling – ER Model), Data Analysis & Techniques (Interpretive, Coding, Recursive Abstraction and Mechanical Technique), Types of Analysis (Descriptive, Exploratory, Confirmatory and Predictive), Modeling Methodologies (Bottom Up method & Top Down Method), Generic and Schematic Data Modeling.

Module IV: System Design

System Design (Design Objectives, Phases in Designing, Purpose of System Design), System Design Goals, Type of Design, Design Strategy, System Decomposition (Modeling, Connection and Coupling of a System), System Design Methodologies, Roles & Duties of System Administration. Succeeding as System Analyst, Interpersonal skills, Management skills, Analytical skills and Technical skills.

Module V: System Implementation & Operation (System Management)

Activities in implementing (Coding, Testing & Installation, Documentation, Training, Support, Maintenance), Types of testing, planning installation, approaches to installation, Documenting a system, Training and Supporting users, Types & Frequencies of Training Methods, Reasons of System Implementation Failures, Project Closedown, Conducting System Maintenance – Types of Maintenance (Corrective, Adaptive and Perfective Maintenance), effective maintenance, Evaluation of System's Success, System Enhancement, Quality Assurance in System Cycle.

Module VI: System Security and Auditing

System Security: Data Security, Backup & Recovery during System & Database failure, Ethical Issues in System Development, Threat and Risk Analysis, Audit, System Audit, System Audit Standards (Planning, Implantation and Reporting Standards), System Analysis and Programming (Overview, Role & Duties of System Experts as Analyst and Programmer).


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Examination Scheme:

Components	CT	HA	C	V	A	EE
Weightage (%)	10	5	5	5	5	70

C - Case Discussion/ Presentation; **HA** - Home Assignment; **P** - Project; **S** - Seminar; **V** - Viva; **Q** - Quiz; **CT** - Class Test; **A** - Attendance; **EE** - End Semester Examination

Text & References:**Text:**

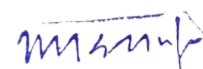
- Valacich George Hoffer, Essentials of System Analysis & Design, Second Edition, Prentice-Hall India.

References:

- James A. Senn, Analysis and Design of information systems.
- Kroeber, Donald W. and Watron, Hugh J., Computer Based Information Systems.
- E. M. Awad, Systems Analysis & Design.
- Dennis Wixom and Wiley, Systems Analysis and Design – An Applied Approach.



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DYNAMIC WEB DESIGN & DEVELOPMENT

Course Code: ITM4306

Credit Units: 03

Course Objective:

To develop applications in PHP using various concepts like arrays, user defined functions, Sessions which makes the students to understand and to establish the connectivity between PHP and database and develop programs to add records, retrieve records and delete records from a table.

Course Contents:

Module I: Introduction to Web Development & Cascading Style Sheets

Web pages, Static and Dynamic web pages, Client side VS Server side, Introduction to HTML, HTML Elements, HTML attributes, Styling and formatting HTML, Forms, Tables.

CSS Basics: CSS Introduction: CSS Syntax, CSS Id & Class, CSS How

CSS Styling: Styling Backgrounds, Styling Text, Styling Fonts, Styling Links, Styling Lists, Styling Tables. **CSS Box Model:** CSS Border, CSS Outline, CSS Margin, CSS Padding

Module II: CSS Advanced

CSS Grouping/Nesting, CSS Dimension, CSS Display, CSS Positioning, CSS Floating, CSS Align, CSS Pseudo-class, CSS Pseudo-element, CSS Navigation Bar, CSS Image Gallery, CSS Image Opacity, CSS Image Sprites. CSS Media Types, CSS Attribute Selectors

Module III: Introduction to PHP, Decisions, Loop & Functions

Evaluation of Php, Basic Syntax, Defining variable and constant, Php Data type, Operator and Expression, Making Decisions, Doing Repetitive task with looping, Mixing Decisions and looping with Html.

What is a function, Define a function, Call by value and Call by reference, Recursive function, String Creating and accessing, String Searching & Replacing String, Formatting String, String Related Library function, Anatomy of an Array, Creating index based and Associative array Accessing array, Element Looping with Index based array, Looping with associative array using each () and foreach(), Some useful Library function

Module IV: Handling HTML Forms using PHP, Working with Files and Directories

Capturing Form, Data Dealing with Multi-value filed, and Generating File uploaded form, redirecting a form after submission.

Understanding, file & directory, Opening and closing a file, Coping, renaming and deleting a file, working with directories, Creating and deleting folder, File Uploading & Downloading.

Module V: Session and Cookie, Database Connectivity with MySql, Exception Handling

Introduction to Session Control, Session Functionality What is a Cookie, Setting Cookies with PHP. Using Cookies with Sessions, Deleting Cookies, Registering Session variables, Destroying the variables and Session. Introduction to RDBMS, Connection with MySql Database, Performing basic database operation(DML) (Insert, Delete, Update, Select), Setting query parameter, Executing queryJoin (Cross joins, Inner joins, Outer Joins, Self joins.)

Understanding Exception and error, Try, catch, throw. Error tracking and debugging.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

Text & References:

Learning PHP, MySQL, books by 'O' riley Press

ADVERTISING AND SALES PROMOTION

Course Code: MKT4301

Credit Units: 03

Course Objective:

The main objective of this course is to familiarize the students with the role of advertising in the context of promoting products and services. Advertising is one of the most used promotional tools. It will help students to understand the advertising process and key decision areas for effective management of this function.

Course Contents:

Module-I: Introduction

Evolution of advertisement, Advertiser, Facilitating Institutions, advertising and society, advertising and regulations; **Advertising Planning and decision making:** Planning framework, Situation analysis, advertising plan, Communication and persuasion process.

Module-II: Objective Setting and Market Positioning

IMC: Role of advertising within marketing program and communication mix, sales promotion, public relations, publicity and integrating different elements; **Setting goals and objectives:** Behavioral dynamics, advertising response variables, DAGMAR. **How advertising works:** Low-Involvement learning, Central versus Peripheral routes to persuasion, ELM, Cognitive response model.

Module-III: Message Strategy

Attention and comprehension: Attention, Comprehension, Recall, Interpretation; **Understanding Benefit-based attitude:** Attitude levels, Means-Ends and Laddering Analysis, Multi-attribute models, Segmentation using attitude structure; **Associating feelings with brands:** Modeling the feelings response to advertising, transformational advertising, role of classical conditioning; brand personality associations; **WOM Advertising:** Informational influence and Normative influence.

Message Tactics-Creative approaches: Rational and emotional creative approaches, Using Endorser, Distraction Effect; **Copywriting:** Illustrating, layout, creative styles; **Copy testing:** Strategy, diagnostic copy tests; **Production and implementation:** Advertising production process, model of the creation and production process, Client-Agency relationship.

Module-IV: Media Strategy and tactics

Setting Media Budgets: Budget allocation, budgeting methods; **Media Tactics:** Media class decisions, media vehicle decisions, media option decisions, scheduling and timing decision, creativity in media planning.

Module-V: Sales Promotion

Introduction, Role & Scope, Consumer & Trade Promotions, Sales promotion Strategy, Promotional offers- coupons, price-offs, premiums, sweepstakes, refund and rebates, sampling, loyalty programmes, POP displays, Dealer loader, Celebrity Endorsements.

Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70

Suggested Readings


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- Arens, W. F. (2008). *Contemporary advertising*. New Delhi: Prentice Hall.
- Batra, R., Myers, J. G., & Aaker, D. A. (2006). *Advertising management*. New Delhi: Pearson Education.
- Guinn O', T. C., Allen, C. T., & Semenik, R. J. (2009). *Advertising management with integrated brand promotion*. New Delhi: Cengage Learning.
- Moriarty, S., Mitchell, N., & Wells, W. (2008). *Advertising principles and practice* (8th ed.). New Delhi: Pearson Education.
- Sandage, C. H., Fryburger, V., & Rotzoll, K. B. (1983). *Advertising theory and practice*. Homewood: Richard D Irvin.



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DIGITAL MARKETING

Course Code: MKT4303

Credit Units: 03

Course Overview

The course examines digital marketing strategy, implementation and executional considerations for B-to-B and B-to-C brands and provides a detailed understanding of all digital marketing concepts. Participants will complete the course with a comprehensive knowledge of and experience with how to develop an integrated digital marketing strategy, from formulation to implementation. Strong focus will be on developing student's business skills and growing real-world experience of the digital media sector to enhance their knowledge to cope with employability demand.

Course Objectives

Digital Marketing Course is an initiative designed to educate students and practitioners in the area of Digital Marketing analytics and make them ready for jobs or prepare them to launch campaign for their own organisations.

- To Understand how and why to use digital marketing for multiple goals within a larger marketing and/or media strategy
- Understand the major digital marketing channels - online advertising: Digital display, video, mobile, search engine, and social media
- Learn to develop, evaluate, and execute a comprehensive digital marketing strategy and plan
- Learn how to measure digital marketing efforts and calculate ROI
- Explore the latest digital ad technologies

Course Contents:

Module-I: Digital Marketing Overview:

What is Digital Marketing? Understanding Marketing Process? Why Digital Marketing Wins Over traditional Marketing? Understanding Digital Marketing Process; Digital Marketing Planning and Strategy

Module-II: Website Planning and Creation:

Understanding Internet; Difference between Internet & web; Understanding websites; Understanding domain names & domain extensions; What is web server & web hosting? Different types of web servers; Different types of websites; Planning & Conceptualising a Website; Building website using CMS in Class.

Module-III: Digital Advertising (PPC, Digital Display and YouTube):

Google AdWords Overview; Understanding Adwords Algorithm; Creating Search Campaigns; Types of Search Campaigns - Standard, All features, dynamic search & product listing. Tracking Performance/Conversion: What is conversion tracking? Why is it important, how to set up conversion tracking. Optimizing Search Campaigns: How to optimize campaigns at the time of creation? Optimizing campaign via adgroups. Creating Display Campaign; Types of display campaigns- All features, Mobile app, Remarketing, Engagement. Optimizing Display Campaign and Re-marketing . What is Online Advertising? Types of Online Advertising, Display Advertising, Contextual advertising, what are Payment Modules? Different Online advertising platforms Creating Banner Ads Using Tools.

Module-IV: Emerging trends in Digital Marketing:

Affiliate Marketing- Affiliate marketing history, Affiliate marketing scenario in India, Different ways to do affiliate marketing. **Email Marketing-** What is email marketing and how it works? Types of email marketing- Opt-in & bulk emailing; Setting up email marketing account, creating a broadcast email. What are auto responders? Setting up auto responders; Tricks to land in inbox instead of spam folder; **Social Media Marketing-** Concept, How social media marketing is different than others Forms

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of Internet marketing, Understanding Facebook marketing, LinkedIn Marketing, Twitter Marketing, Video Marketing **and** VIDEO & AUDIO (PODCASTING) marketing; **and Mobile Web Marketing**-Understanding Mobile Devices, Mobile Marketing Measurement and Analytics; Fundamentals of Mobile Marketing, Creating mobile website through wordpress; Using tools to create mobile websites; Using tools to create mobile app Advertising on mobile (App & Web); Content Marketing on mobile. **Content Marketing**-Introduction to content marketing, Objective of content marketing, Content marketing 7 step strategy building process, How to write great compelling content, Optimizing content for search engines, How to increase opt-in email list with content marketing with examples.

Module-V: Search Engine Optimization (SEO):

What is SEO? Introduction to SERP, What are search engines? How search engines work? Major functions of a search engine; what are keywords? Different types of keywords ; Google keyword planner tool; Keywords research process; Understanding keywords; On page optimization; Off Page optimization; Top tools for SEO; Monitoring SEO process; Preparing SEO reports, How to create SEO Strategy for your business, What is link juice? Importance of domain and page authority? How to optimize exact keywords for your business. What is Google Panda Algorithm, Google Penguin and Google EMD Update. How to save your site from Google Panda, Penguin and EMD Update, How to recover your site from Panda, Penguin and EMD.

Module-VI: E-Commerce and Payment Gateway:

What is ecommerce? Top ecommerce websites around the world & it's scenario in India; Difference between E-Commerce software and Shopping Cart; software Payment Gateways, Merchant Accounts & Logistics for physical goods. Integrating Woo-commerce and setting up an ecommerce store on WordPress. Case studies on ecommerce websites. How to do Google Product Listing Ads (PLA) for ecommerce websites. How to do SEO for an ecommerce website.

Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70

Text & References:

- Marketing 4.0: Moving from Traditional to Digital by P. Kotler. Wiley Publication.
- The Essentials of E-Marketing, 4th edition by Quirk Education (E-Book)
- The Art of Digital Marketing by Ian Dodson.
- Understanding Digital Marketing: Marketing Strategies for Engaging the Digital Generation, by Damian Ryan and Calvin Jones. KoganPage Publication, 3rd edition.
- Digital Marketing, VandanaAhuja, Oxford Publication.
- Digital Marketing Insights 2017, Social Beat Digital Marketing LLP, Kindle Edition.
- Social Media for Business – Stories of Indian Brands, By Sorav Jain
- Total E-mail Marketing: Maximizing your results from Integrated E-marketing (E-marketing essentials): Dave Chaffey.

Websites:

SEOMoz.org ;mashable.com; <http://www.convinceandconvert.com>; ClickZ.com ; eMarketer forrester.com; contentmarketinginstitute.com ; adage.com; adweek.com

Final Project: Group Paper and Presentation

Students will work in instructor-selected groups of four or five to complete a 15-20 page digital marketing plan utilizing the concepts and frameworks covered in the course. Papers should be double-spaced using 12-point font and 1-inch margins, and submitted accordingly. All groups will be required to give a presentation in class highlighting the important points of their plan and submit their presentation slides for review. Presentations will take place in class via web conference on prescribed date. Students will need to ensure their audio is working well in order to present. All students will be required to complete evaluations of the group presentations given in class. 25% will be deducted per day for late papers and slides.

DIRECT MARKETING

Course Code: MKT4305

Credit Units: 03

Course Objective:

Direct marketing is quickly becoming an integral part of the marketing strategies of general marketing as well as the method of operation of traditional direct marketers. The course focuses on the marketing perspectives and technologies that are distinctly direct marketing and with the interrelationship of direct marketing with the general marketing field.

Course Contents:

Module I: Conceptual Framework of Direct Marketing

Basics and scope of Direct Marketing, Objectives of Direct Marketing, Advantage & Disadvantage of Direct Marketing, Integrated Direct Marketing, Business, Strategic & Direct Marketing planning, Strengths & weakness of Social Media

Module II: Analyzing & Encashing Marketing opportunities for Direct Marketing

Research design for direct marketers, The Customer Database: Analysis and Application, Consumer & Business mailing list, offer, Media of direct marketing, Telemarketing, Internet E-communications, Managing Direct Sales Force.

Module III: Managing the Creativity Process in Direct Marketing

Introducing Creative Practices and techniques, Direct Marketing Creativity, Basic Steps of Managing catalogue & print advertising, Innovation through Creativity & testing The Strategic drivers of Creative Practices.

Module IV: Direct Marketing into Business

B to B Marketing, Making a lead generation programme, Overview of E-commerce. retaining and activating customers

Module V: Direct Marketing Implementation and Control

Marketing Intelligence- Modeling for business decision support, Mathematics tool for control in Direct marketing, Future of Direct Marketing.

Module VI: Emerging Trends

Integrating the concepts with other functions of Management

Live project to be undertaken starting with conception of idea to final execution.,

Case studies


Latest emerging trends and practices.

Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70

Text & References:

- Bob stone & Ron Jacobs, Successful Direct Marketing Methods, Tata McGraw Hill.
- Nash & Edward L, Direct Marketing Hand Book, Tata McGraw Hill


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RETAIL MANAGEMENT

Course Code: MKT4306

Credit Units: 03

Course Objective:

The primary objective of the course is to develop fundamental competencies in retail management. The course is designed to prepare students for positions in the FMCG/Pharmaceutical/Electronics/Consumer Durable/Fashion/Apparel retail businesses or positions in the real estate companies with additional interest in mall management. The course also benefit students interested in starting their own entrepreneurial retail operation. Additionally this course aims at familiarizing students with emergence of malls as a new format of market with emphasis on mall management principles and practices.

Course Contents:

Module-I: Introduction to Retailing

Introduction, Meaning of Retailing, Economic Significance of Retailing, Retailing Management Decision Process, Product Retailing vs. Service Retailing, Types of Retailers, Indian vs. Global Scenario, Difference between organized and unorganized retailing, Issues and challenges of retailing in India

Module-II: Store Planning, Design and Layout

Store Planning- Introduction, Types of Retail Stores Location, Factors Affecting Retail Location Decisions, Country/Region Analysis, Trade Area Analysis, Site Evaluation, Site Selection, Location Based Retail Strategies

Store Design- Atmospherics, Retailing Image Mix, Space mix

Store Layout- Effective retail space management based on Store Layout

Module-III: Retail Merchandise Management

Retail Merchandising: Introduction, Understanding Merchandising Management, Activities of a Merchandiser, Retail Merchandising Management Process

Private Branding in Retail- Introduction, Difference between a Store/Private Brand and a National Brand, Growth Drivers of Private Label, Advantages of Private Label, Disadvantages of Private Label

Module-IV: Store Operations

POS (Point of Sale) / Cash process, Customer service and accommodation, Retail selling process, Retail floor and shelf management, Retail accounting and cash management, Merchandise and category management. Visual merchandising and displays, Retail technology and retail automation, POS and Back-end Technologies.

Module-V: Mall Management

Introduction – Defining the shopping mall, Difference between Shopping Mall and other retail formats, **Shopping Centre / Mall Location:** Existing mall traffic, Clean environment, Designated parking area, Medium to high rental cost, Strengths and Weaknesses of the Mall format; Licenses and Permits for mall operations, **Positioning & Zoning of mall** – formulating the right tenant mix and its placement in a mall, **Facility management** – Infrastructure, Traffic and ambience management, Finance management, Lifestyle centers and their management, Indian scenario of mall management practices.

Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70


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Text & References:

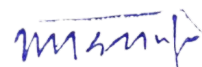
- Michael Levy, Barton A Weitz and Ajay Pandit, (2008), Retailing Management, Tata McGraw Hill
- R Vedamani&Gibbson, (2008), Retail Management: Functional Principals and Practices, Jaico publications
- Patrick M. Dunne & Robert F Lusch, (2002), Retail Management, Cengage Learning
- Berry Berman & Joel R. Evans, (2009), Retail Management – A Strategic Approach, Pearson Education

Learning Resources:

- Images Retail magazine
- Cygnus Report on Retail Sector
- CII Report on Retail Scenario in India
- Images Malls in India
- Images Year Book
- AT Kearney Report



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SALES MANAGEMENT

Course Code: MKT4307

Credit Units: 03

Course Objective:

This course has been designed to help students learn sales management concepts and how to apply them to solve business problems and to function as effective managers. It deals with all important back end management of sales and front end personal selling issues with a view to handle the situations professionally and improve the outcome with result orientation.

Course Contents:

Module I

Changing world of Sales Management and Professionalism in sales. Classification of Personal Selling approaches. Sales jobs, Qualification and skill required for success. Organizational buyer behavior and buying situations. Contrasting Transactional and Relationship Selling models, Sales Teams. Sales management Competencies for effective and outstanding results. Developing Sales Management Strategy / Objectives and Sales Force Roles. Buyer-Seller Daydic Relationship.

Module II

Recruitment planning process: Job analysis, description, qualifications, buyer's perspective and methods of locating prospective candidates. Selection: Application forms, Types of Interviews, Testing and Validating the hiring process.

Sales Training: Determining training needs, Training analysis, Methods of Evaluating sales Training and building a sales training program. Instructional methods used in training.

Module III

Motivation and the reasons for motivating sales people. Maslow's Hierarchy of Needs related to the sales force motivators and company's actions to fill needs. Methods of giving status to sales people to motivate them.

Sales force compensation. Components of compensation and their purpose. Comparison of various compensation plans. Optimizing sales compensation: Customer – Product Matrix and relating it to the appropriate compensation plans.

Module IV

Sales territory; Reasons for establishing or revising Sales Territories, Setting up and revising Sales Territories: Market build-up and Work load method; optimizing sales territory.

Sales quotas; Objectives in using Quotas, Types of Sales Quotas and Quota setting procedures. Reasons when not to use Quotas.

Module V

Personal Selling process: Prospecting: Developing a prospect base, Strategic prospecting, Sources of prospects, common causes of customer attrition, Preparing a prospect list and organizing information. Planning the initial sales call and approach: Pre call information on the Buyer and Organisation, Call Objectives, Planning the approach. Sales Presentation techniques: Types of presentation techniques, Presentation sequence, Adoptive Selling Model. Demonstrations: Demonstration plans, actions, custom fitting demonstrations, use of sales tools. Handling customer objections: types of objections, types of close, Trial Close. Closing the sales.

Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70


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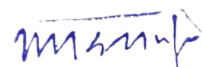

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Text & References:

- Still, Cundiff and Govoni. (2009), Sales Management, Decisions, Strategies and Cases, Prentice Hall of India Pvt. Ltd.
- Ingram, Laforge, Avila, Schwepker Jr., Williams.(2009), Analysis and Decision Making, Segment Books
- Douglas J. Dalrymple, Cron and Decarlo.(2003), Sales Management, John Wiley & Sons Inc.
- Charles M. Futrell (2010). Fundamentals of Selling. Tata McGraw Hill
- Gerald L Manning, Michael Ahearne and Barry L Reece (2011). Selling Today, Prentice Hall Pub.



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CONSUMER BEHAVIOUR

Course Code:MKT4308

Credit Units: 03

Course Objective:

The course will enable the students to define the concept of consumer behavior and reveal its importance in the context of marketing, to identify various factors that influence consumer behavior and also to examine the intricacies involved in the consumer decision-making process.

Course Contents:

Module-I: Introduction:

Introduction to CB, Model of Consumer buying Decision Making, Participants in buying process, Individual v/s org buying behavior, Concept of consumer Research, Consumer Research Process, Consumer Research Design, Identifying segments, Addressing the needs of market, Profitability of segmentation, Criteria of segmentation, Bayesian Analysis, Value of brand, Brand Loyalty, Seven R's of marketing mix, Inter-market segmentation, STP.

Module-II: Consumer as an Individual:

Consumer demographics: Analysis, Consumer life styles and lifestyle marketing VALS, LOV; **Motivation:** Types of Needs and Goals, Nature and role of motive, Classifying motives, Motive arousal, Motivation Research; **Personality:** Personality theories, Measuring Personality, How self concept develops, Consistency of Self; **Perception:** Active Search, Passive reception, concepts related to perception, Marketing Implications; **Learning:** Cues, Response, Reinforcement, Characteristics of Memory systems, Theories of learning; **Attitude:** Characteristics of attitude, Functions of attitude, Sources of attitude development. , Attitude theories and models, Strategies for changing attitude.

Module-III: Environmental influences on CB:

Group Dynamics: Importance of group dynamics in decision making, Characteristics of group, Types of groups; **Reference groups:** Types of reference groups, Application of reference group in CB; **Family:** Significance of family in CB, Family life cycle, Family purchasing decision; **Social Class:** Meaning of social class, Process of social stratification, Nature of social class, Social class measurement, Role of social class in segmenting markets, Social class and consumer behavior; **Culture:** What is culture, The content of culture, Culture as a process. **Sub-Culture:** Defining subculture, Analyzing subculture; **Personal Influence** : Nature and significance of personal influence, Who are opinion leaders, Why do opinion leader attempts to influence others, Why followers accept personal influence, The market maven,, Marketing Implications of Personal influence, Identifying and using opinion leaders directly, Creating opinion leaders, Simulating opinion leadership, Stifling opinion leadership, Identifying OL

Module-IV: Consumer Decision Making Process


Decision Process: Buying decision process, Nicosia Model, Howard Sheth Model, Engel –Kollat-Blackwell Model, Types of buying behavior, Steps in buying decision process, Impulse purchase and customer loyalty; **Diffusion of innovation:** What is an innovation, Types of Innovation, The Adoption process, The Diffusion process.

Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70

Suggested books:

- Schiffman, L.G., Wisenblit, J. & Kumar, S.R. (2016). *Consumer Behavior* (11th ed.). Noida, India: Pearson
- Loudon, D. L. & Bitta, A. J. (2002). *Consumer Behavior*. N. Delhi, India: Tata-McGraw-Hill
- Blackwell, R.D., Miniard, P.W. & Engel, J.F. (2007). *Consumer Behavior*. Kundli, India: Thomson's South-Western.
- Gupta, S.L. & Pal, S (2006). *Consumer Behavior*. N. Delhi, India: Sultan Chand & Sons.


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DIGITAL MARKETING

Course Code: ECM4301

Credit Units: 03

Course Overview

The course examines digital marketing strategy, implementation and executional considerations for B-to-B and B-to-C brands and provides a detailed understanding of all digital marketing concepts. Participants will complete the course with a comprehensive knowledge of and experience with how to develop an integrated digital marketing strategy, from formulation to implementation. Strong focus will be on developing student's business skills and growing real-world experience of the digital media sector to enhance their knowledge to cope with employability demand.

Course Objectives

Digital Marketing Course is an initiative designed to educate students and practitioners in the area of Digital Marketing analytics and make them ready for jobs or prepare them to launch campaign for their own organisations.

- To Understand how and why to use digital marketing for multiple goals within a larger marketing and/or media strategy
- Understand the major digital marketing channels - online advertising: Digital display, video, mobile, search engine, and social media
- Learn to develop, evaluate, and execute a comprehensive digital marketing strategy and plan
- Learn how to measure digital marketing efforts and calculate ROI
- Explore the latest digital ad technologies

Course Contents:

Module-I: Digital Marketing Overview:

What is Digital Marketing? Understanding Marketing Process? Why Digital Marketing Wins Over traditional Marketing? Understanding Digital Marketing Process; Digital Marketing Planning and Strategy

Module-II: Website Planning and Creation:

Understanding Internet; Difference between Internet & web; Understanding websites; Understanding domain names & domain extensions; What is web server & web hosting? Different types of web servers; Different types of websites; Planning & Conceptualising a Website; Building website using CMS in Class.

Module-III: Digital Advertising (PPC, Digital Display and YouTube):

Google AdWords Overview; Understanding Adwords Algorithm; Creating Search Campaigns; Types of Search Campaigns - Standard, All features, dynamic search & product listing. Tracking Performance/Conversion: What is conversion tracking? Why is it important, how to set up conversion tracking. Optimizing Search Campaigns: How to optimize campaigns at the time of creation? Optimizing campaign via adgroups. Creating Display Campaign; Types of display campaigns- All features, Mobile app, Remarketing, Engagement. Optimizing Display Campaign and Re-marketing . What is Online Advertising? Types of Online Advertising, Display Advertising, Contextual advertising, what are Payment Modules? Different Online advertising platforms Creating Banner Ads Using Tools.

Module-IV: Emerging trends in Digital Marketing:

Affiliate Marketing- Affiliate marketing history, Affiliate marketing scenario in India, Different ways to do affiliate marketing. **Email Marketing-** What is email marketing and how it works? Types of email marketing- Opt-in & bulk emailing; Setting up email marketing account, creating a broadcast email. What are auto responders? Setting up auto responders; Tricks to land in inbox instead of spam folder; **Social Media Marketing-** Concept, How social media marketing is different than others Forms of Internet marketing, Understanding Facebook marketing, LinkedIn Marketing, Twitter Marketing, Video Marketing **and VIDEO & AUDIO (PODCASTING) marketing; and Mobile Web Marketing-**

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Understanding Mobile Devices, Mobile Marketing Measurement and Analytics; Fundamentals of Mobile Marketing, Creating mobile website through wordpress; Using tools to create mobile websites; Using tools to create mobile app Advertising on mobile (App & Web); Content Marketing on mobile. **Content Marketing**-Introduction to content marketing, Objective of content marketing, Content marketing 7 step strategy building process, How to write great compelling content, Optimizing content for search engines, How to increase opt-in email list with content marketing with examples.

Module-V: Search Engine Optimization (SEO):

What is SEO? Introduction to SERP, What are search engines? How search engines work? Major functions of a search engine; what are keywords? Different types of keywords ; Google keyword planner tool; Keywords research process; Understanding keywords; On page optimization; Off Page optimization; Top tools for SEO; Monitoring SEO process; Preparing SEO reports, How to create SEO Strategy for your business, What is link juice? Importance of domain and page authority?How to optimize exact keywords for your business. What is Google Panda Algorithm, Google Penguin and Google EMD Update. How to save your site from Google Panda, Penguin and EMD Update, How to recover your site from Panda, Penguin and EMD.

Module-VI: E-Commerce and Payment Gateway:

What is ecommerce? Top ecommerce websites around the world & it's scenario in India; Difference between E-Commerce software and Shopping Cart; software Payment Gateways, Merchant Accounts & Logistics for physical goods. Integrating Woo-commerce and setting up an ecommerce store on WordPress. Case studies on ecommerce websites. How to do Google Product Listing Ads (PLA) for ecommerce websites.How to do SEO for an ecommerce website.

Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70

Text & References:

- Marketing 4.0: Moving from Traditional to Digital by P. Kotler. Wiley Publication.
- The Essentials of E-Marketing, 4th edition by Quirk Education (E-Book)
- The Art of Digital Marketing by Ian Dodson.
- Understanding Digital Marketing: Marketing Strategies for Engaging the Digital Generation, by Damian Ryan and Calvin Jones. KoganPage Publication, 3rd edition.
- Digital Marketing, VandanaAhuja, Oxford Publication.
- Digital Marketing Insights 2017, Social Beat Digital Marketing LLP, Kindle Edition.
- Social Media for Business – Stories of Indian Brands, By Sorav Jain
- Total E-mail Marketing: Maximizing your results from Integrated E-marketing (E-marketing essentials): Dave Chaffey.

Websites:

SEOMoz.org ;mashable.com; <http://www.convinceandconvert.com>; ClickZ.com ; eMarketer forrester.com; contentmarketinginstitute.com ; adage.com; adweek.com

Final Project: Group Paper and Presentation

Students will work in instructor-selected groups of four or five to complete a 15-20 page digital marketing plan utilizing the concepts and frameworks covered in the course. Papers should be double-spaced using 12-point font and 1-inch margins, and submitted accordingly. All groups will be required to give a presentation in class highlighting the important points of their plan and submit their presentation slides for review. Presentations will take place in class via web conference on prescribed date. Students will need to ensure their audio is working well in order to present. All students will be required to complete evaluations of the group presentations given in class. 25% will be deducted per day for late papers and slides.

DATABASE MANAGEMENT SYSTEMS

Course Code: ECM4302

Credit Units: 3

Course Objectives

The course aims to make the students understand the basic and advanced concepts in databases and database management systems. Students will be able to understand the importance of databases in day to day life. The course will also provide the students, a hands-on experience on the SQL-the language of databases.

Course Contents:

Module I: Introduction to DBMS

Definition of DBMS, Concept and Goals of DBMS, Data Independence, DBMS Architecture, Levels, Database Administrator, File System Approach Vs DBMS Approach, Advantages of Using a DBMS, Data Models, Schemas, and Instances, Database Languages, Database Users, Database Abstraction.

Module II: Relational Database & ER Model

Relational Database: Relational System, Codd's Rule, Relational Model, Optimization, Tables and Views

ER Model: Entity Type, Entity Set, Relationship type, Relationship sets, Constraints: Cardinality Ratio and Participation Constraint, Keys, Mapping, Design of ER diagrams.

Module III: Relational Model Objects

Domains and Relations, Relations and predicates, Relational Data Integrity; Primary Key, Candidate Key, Foreign Key and their rules, Relational operators, Relational Algebra

Module IV: SQL

SQL Language, DDL,DML and DCL commands. Data definition, Data retrieval and update operations on MS ACCESS and SQL Server DBMS.

Module V: Database Applications and Types

Distributed Database, Object Oriented Database, Multimedia Database, Data Mining, Digital Libraries. Data Warehouse.

Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70

Text & References

- Elmasari, Navathe, "Fundamentals of Database Systems", Addison Wesley.
- Korth, Silbertz, Sudarshan, "Database Concepts". McGraw Hill.
- Majumdar & Bhattacharya, "Database Management System", Tata McGraw Hill.
- Date C J." An Introduction to Database Systems", Addison Wesley.


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DYNAMIC WEB DESIGN & DEVELOPMENT

Course Code: ECM4307

Credit Units: 03

Course Objective:

To develop applications in PHP using various concepts like arrays, user defined functions, Sessions which makes the students to understand and to establish the connectivity between PHP and database and develop programs to add records, retrieve records and delete records from a table.

Course Contents:

Module I: Introduction to Web Development & Cascading Style Sheets

Web pages, Static and Dynamic web pages, Client side VS Server side, Introduction to HTML, HTML Elements, HTML attributes, Styling and formatting HTML, Forms, Tables.

CSS Basics: CSS Introduction: CSS Syntax, CSS Id & Class, CSS How

CSS Styling: Styling Backgrounds, Styling Text, Styling Fonts, Styling Links, Styling Lists, Styling Tables

CSS Box Model: CSS Border, CSS Outline, CSS Margin, CSS Padding

Module II: CSS Advanced

CSS Grouping/Nesting, CSS Dimension, CSS Display, CSS Positioning, CSS Floating, CSS Align, CSS Pseudo-class, CSS Pseudo-element, CSS Navigation Bar, CSS Image Gallery, CSS Image Opacity, CSS Image Sprites

CSS Media Types, CSS Attribute Selectors

Module III: Introduction to PHP, Decisions, Loop & Functions

Evaluation of Php, Basic Syntax, Defining variable and constant, Php Data type, Operator and Expression, Making Decisions, Doing Repetitive task with looping, Mixing Decisions and looping with Html.

What is a function, Define a function, Call by value and Call by reference, Recursive function, String Creating and accessing, String Searching & Replacing String, Formatting String, String Related Library function, Anatomy of an Array, Creating index based and Associative array Accessing array, Element Looping with Index based array, Looping with associative array using each () and foreach(), Some useful Library function

Module IV: Handling HTML Forms using PHP, Working with Files and Directories

Capturing Form, Data Dealing with Multi-value filed, and Generating File uploaded form, redirecting a form after submission.

Understanding, file & directory, Opening and closing a file, Coping, renaming and deleting a file, working with directories, Creating and deleting folder, File Uploading & Downloading.

Module V: Session and Cookie, Database Connectivity with MySQL, Exception Handling

Introduction to Session Control, Session Functionality What is a Cookie, Setting Cookies with PHP. Using Cookies with Sessions, Deleting Cookies, Registering Session variables, Destroying the variables and Session.

Introduction to RDBMS, Connection with MySQL Database, Performing basic database operation(DML) (Insert, Delete, Update, Select), Setting query parameter, Executing queryJoin (Cross joins, Inner joins, Outer Joins, Self joins.)

Understanding Exception and error, Try, catch, throw. Error tracking and debugging.



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Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70


CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

Text & References:

- . Learning PHP, MySQL, books by ‘ O’ riley Press



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ENTREPRENEURSHIP DEVELOPMENT

Course Code: MGT4429

Credit Units: 02

Course Contents:

Module I: Decision to Become an Entrepreneur

Introduction to Entrepreneurship: What Is Entrepreneurship? Why Become an Entrepreneur?, Characteristics of Successful Entrepreneurs, Common Myths About Entrepreneurs, Types of Start-Up Firms, Changing Demographics Of Entrepreneurs.

Entrepreneurship's Importance: Economic Impact of Entrepreneurial Firms, Entrepreneurial Firms' Impact on Society, and Entrepreneurial Firms' Impact on Larger Firms.

The Entrepreneurial Process: Decision to Become an Entrepreneur, Developing Successful Business Ideas Moving from an Idea to an Entrepreneurial Firm, Managing and Growing an Entrepreneurial Firm.

Module II: Developing Successful Business Ideas

Identifying And Recognizing Opportunities: Observing Trends, Solving a Problem, Finding Gaps In The Marketplace, Personal Characteristics of the Entrepreneur.

Techniques for Generating Ideas: Brainstorming, Focus Groups Library and Internet Research, Other Techniques.

Encouraging and Protecting New Ideas: Establishing a Focal Point for Ideas, Encouraging Creativity at the Firm Level, Protecting Ideas from Being Lost or Stolen, Find a mentor.

Feasibility Analysis: Product/Service Feasibility Analysis, Industry/Target Market Feasibility Analysis, organizational Feasibility Analysis, Financial Feasibility Analysis.

The Business Plan: Reasons for Writing a Business Plan, Who Reads the Business Plan—And What Are They Looking For? Guidelines for Writing a Business Plan, Outline Of the Business Plan and Exploring Each Section of the Plan Oral Presentation of a Business Plan, Questions and Feedback to Expect from Investors.

Industry and Competitor Analysis: Studying Industry Trends, The Five Forces Model, The Value of the Five Forces Model, Industry Types and the Opportunities They Offer, Identifying Competitors, Sources of Competitive Intelligence, Completing a Competitive Analysis Grid.

Business Models: The Importance and Diversity of Business Models, How Business Models Emerge, Potential Fatal Flaws of Business Models, Components of An Effective Business Model, Core Strategy, Strategic Resources, Partnership Network, customer interface.

Module III: Moving from an Idea to an reality

Initial Ethical and Legal Issues Facing a New Firm: Establishing a Strong Ethical Culture for a Firm, Choosing an Attorney for a Firm, Drafting a Founders' Agreement.

Obtaining Business Licenses and Permits: Business Licenses, Business Permits, Choosing a Form of Business Organization, Sole Proprietorship, Partnerships, Corporations, Limited Liability Company.

Introduction To Financial Management : Financial Objectives of a Firm, The Process of Financial Management, Financial Statements, Forecasts, Pro Forma Income Statement, Pro Forma Balance Sheet, Pro Forma Statement of Cash Flows, Ratio Analysis.

Building a New-Venture: Recruiting and Selecting Key Employees, Roles of the Board of Directors Board of Advisers, Lenders and Other Professionals.

Getting Financing or Funding: The Importance, Sources of Personal Financing, Preparing to Raise Debt or Equity Financing, business Angels, Venture Capital, Initial Public Offering, Commercial Banks, SBA Guaranteed Loans, Other Sources of Debt Financing, Leasing, Strategic Partners.


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Module IV: Managing and Growing the new venture

Marketing Issues: Segmenting the Market, Selecting a Target Market, Establishing a Unique Positioning, Branding, 4Ps/7Ps Of Marketing For New Ventures.

The Importance of Intellectual Property: Determining What Intellectual Property to Legally Protect, The Four Key Forms of Intellectual Property, Types of Patents, Who Can Apply for a Patent? The Process of Obtaining a Patent, Patent Infringement, The Four Types of Trademarks, What Is Protected Under Trademark Law? Exclusions from Trademark Protection, The Process of Obtaining a Trademark, What Is Protected by a Copyright? Exclusions from Copyright Protection, How to Obtain a Copyright , Copyright Infringement, Copyrights and the Internet , Conducting an Intellectual Property Audit, The Process of Conducting an Intellectual Property Audit.

Preparing for and Evaluating the Challenges of Growth :Appreciating the Nature of Business Growth ,Staying Committed to a Core Strategy ,Planning for Growth, Knowing and Managing the Stages of Growth , Challenges Of Growth , Strategies for Firm Growth (internal and external),Franchising.

Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70

Text & References:

- Alejandro Cremades (2016) , The Art of Startup Fundraising: Pitching Investors, Negotiating the Deal, and Everything Else Entrepreneurs Need to Know. Wiley, New York.
- Burton and Bragg (2006),Accounting and Finance for your Small Business. John Wiley and Sons, New York.
- Peter Drucker (2015), Innovation And Entrepreneurship. Harper Collins, India.
- Nandan H (2013), Fundamentals of Entrepreneurship. Prentice Hall India Learning Private Limited; Third edition: India.

DISSERTATION

Course Code: MGT4437

Credit Units: 06

The aim of the dissertation is to provide you with an opportunity to further your intellectual and personal development in your chosen field by undertaking a significant practical unit of activity, having an educational value at a level commensurate with the award of your degree

The dissertation can be defined as a scholarly inquiry into a problem or issues, involving a systematic approach to gathering and analysis of information / data, leading to production of a structured report.

Selecting the Dissertation Topic

It is usual to give you some discretion in the choice of topic for the dissertation and the approach to be adopted. You will need to ensure that your dissertation is related to your field of specialization.

Deciding this is often the most difficult part of the dissertation process, and perhaps, you have been thinking of a topic for some time.

It is important to distinguish here between 'dissertation topic' and 'dissertation title'. The topic is the specific area that you wish to investigate. The title may not be decided until the dissertation has been written so as to reflect its content properly.

Few restrictions are placed on the choice of the topic. Normally we would expect it to be:

- relevant to business, defined broadly;
- related to one or more of the subjects or areas of study within the core program and specialisation stream;
- clearly focused so as to facilitate an in-depth approach, subject to the availability of adequate sources of information and to your own knowledge;
- of value and interest to you and your personal and professional development.

Planning the Dissertation

This will entail following:


- Selecting a topic for investigation.
- Establishing the precise focus of your study by deciding on the aims and objectives of the dissertation, or formulating questions to be investigated. Consider very carefully what is worth investigating and its feasibility.
- Drawing up initial dissertation outlines considering the aims and objectives of the dissertation. Workout various stages of dissertation
- Devising a timetable to ensure that all stages of dissertation are completed in time. The timetable should include writing of the dissertation and regular meetings with your dissertation guide.

The Dissertation plan or outline

It is recommended that you should have a dissertation plan to guide you right from the outset. Essentially, the dissertation plan is an outline of what you intend to do, chapter wise and therefore should reflect the aims and objectives of your dissertation.

There are several reasons for having a dissertation plan

- It provides a focus to your thoughts.
- It provides your faculty-guide with an opportunity, at an early stage of your work, to make constructive comments and help guide the direction of your research.
- The writing of a plan is the first formal stage of the writing process, and therefore helps build up your confidence.
- In many ways, the plan encourages you to come to terms with the reading, thinking and writing in a systematic and integrated way, with plenty of time left for changes.


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- Finally, the dissertation plan generally provides a revision point in the development of your dissertation report in order to allow appropriate changes in the scope and even direction of your work as it progresses.

Keeping records

This includes the following:

- Making a note of everything you read; including those discarded.
- Ensuring that when recording sources, author's name and initials, date of publication, title, place of publication and publisher are included. (You may consider starting a card index or database from the outset). Making an accurate note of all quotations at the time you read them.
- Make clear what is a direct a direct quotation and what is your paraphrase.

Dissertation format

All students must follow the following rules in submitting their dissertation.

- Front page should provide title, author, Name of degree/diploma and the date of submission.
- Second page should be the table of contents giving page references for each chapter and section.
- The next page should be the table of appendices, graphs and tables giving titles and page references.
- Next to follow should be a synopsis or abstract of the dissertation (approximately 500 words) titled: **Executive Summary**
- Next is the 'acknowledgements'.
- Chapter I should be a general introduction, giving the background to the dissertation, the objectives of the dissertation, the rationale for the dissertation, the plan, methodological issues and problems. The limitations of the dissertation should also be hinted in this chapter.
- Other chapters will constitute the body of the dissertation. The number of chapters and their sequence will usually vary depending on, among others, on a critical review of the previous relevant work relating to your major findings, a discussion of their implications, and conclusions, possibly with a suggestion of the direction of future research on the area.
- After this concluding chapter, you should give a list of all the references you have used. These should be cross - references with your text. For articles from journals, the following details are required e.g.

Draper P and Pandyal K. 1991, The Investment Trust Discount Revisited, Journal of Business Finance and Accounting, Vol18, No6, Nov, pp 791-832.

For books, the following details are required:

Levi, M. 1996, International Financial Management, Prentice Hall, New York, 3rd Ed, 1996

- Finally, you should give any appendices. These should only include relevant statistical data or material that cannot be fitted into the above categories.

The Layout Guidelines for the Dissertation

- A4 size Paper
- Font: Arial (10 points) or Times New Roman (12 points)
- Line spacing: 1.5
- Top and bottom margins: 1 inch/ 2.5 cm; left and right margins: 1.25 inches/ 3 cm

Guidelines for the Assessment of the Dissertation

While evaluating the dissertation, faculty guide will consider the following aspects:

1. Has the student made a clear statement of the objective or objective(s).
2. If there is more than one objective, do these constitute parts of a whole?
3. Has the student developed an appropriate analytical framework for addressing the problem at hand.
4. Is this based on up-to-date developments in the topic area?

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5. Has the student collected information / data suitable to the frameworks?
6. Are the techniques employed by the student to analyse the data / information appropriate and relevant?
7. Has the student succeeded in drawing conclusion form the analysis?
8. Do the conclusions relate well to the objectives of the project?
9. Has the student been regular in his work?
10. Layout of the written report.

Examination Scheme:

Contents & Layout of the Report	30
Conceptual Framework	10
Objectives & Methodology	15
Implications & Conclusions	15
Viva/ Presentations	30
TOTAL	100



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PRIVATE EQUITY AND ENTREPRENEURIAL FINANCE

Course Code: FIN4405

Credit Units: 03

Description

Private equity is composed of funds and investors that directly invest in **private** companies, or that engage in buyouts of public companies, resulting in the delisting of public **equity**. In finance, **private equity** is a type of **equity** and one of the asset classes consisting of **equity** securities and debt in operating companies that are not publicly traded on a stock exchange. A **private equity** investment will generally be made by a **private equity** firm, a venture capital firm or an angel investor. With support of Private equity, the new entrepreneur will hope up to start a new firm for the benefit of economic development.

Objectives

- To understand the various types of activities that falls under the purview of Private equity. Corporate Restructuring
- To understand intricacies of raising of various methods of financing
- To deal with Issues involved in Private financing and entrepreneurial development activities.
- To examine key elements of understanding a business from a private equity investment perspective

Assessment

The subject would comprise of both theory and numerical solving. The assessment of the learner would be done through assignments, case discussion, articles on current research & issues, problem solving and simulation. The students would be expected to do a project, quiz and comprehend the application part of the concepts taught in the class.

Course Contents :

Module-I: Introduction: Over view of the Private Equity Industry, Development and Growth, terminology, and categories within the asset class, participants, anatomy of funds and partnership agreements, perspectives and negotiations and perspectives of companies

Module-II: The Fundamentals of Private Equity Investing: financing, structuring and negotiating - buyout and growth capital transactions, and managing the portfolio company over the life of the investment and including an exit and / or value realization transaction.

Module-III: Understanding and Evaluating Private Equity Firms in Financial Markets: We will consider how the financial community assesses firms and chooses which funds to invest in and how funds assemble portfolios of companies and how LP investors assemble their portfolios of LP interests. Other topics will include understanding and managing LP liquidity options; the rise and role of other alternative investment vehicles, most notably hedge funds and sovereign wealth funds; the publicly traded private equity firm; the impact of the financial crisis and current issues under discussion in the area of financial regulation

Module-IV: Private Equity in Secondary Markets – Key components of value creation- Relative value Matrix – Industry Value creation.

Module-V: Private Equity - corporate governance and ethics - Investments in developing markets - Sourcing of private equity - Deals and management of portfolio company - Expectations and Negotiation


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Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70


Reference books

- Jason A. Scharfman, Private Equity Operational Due Diligence: Tools to Evaluate Liquidity, Valuation, and Documentation, + Website , ISBN: 978-1-118-11390-5, March 2012
- Stowell D, An Introduction To Investment Banks, Hedge Funds, And Private Equity – 2011, Elsevir (2011), **ISBN : 978-9380931074**

Case studies published from various journals.



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COMPENSATION AND REWARD MANAGEMENT

Course Code: HRM4401

Credit Units: 03

Course Objective:

This course helps students to learn how compensation system operates to attract, retain and motivate competent work force.

Course Contents:

Module I: Introduction

Concept of Compensation, System of Compensating, Concept of Reward and Reward System, Economic Theory of Wages, Limitations of Economic Theories. Wage and Salary Administration at micro level, Wage concepts, Methods of Job Evaluation, Role of various parties – Employees, Employers, Unions & Government, Overview of Legislations affecting Compensation

Module II: Compensation Structure- Indian Practices

Salary Progression, Methods of Payment, Limitations of the Job Related Compensation, Competency based Compensations, Performance linked Compensations- Performance Appraisal

Module III: Elements of Compensation

Variable Compensation, Principles of Reward Strategy, Perquisites, Bonuses & Incentives Scope and Process, Ethical Considerations, Social Security, Sharing Productivity Gains with Employees, Gain Sharing, Team Based Pay, The Role of Compensation in Sales Force Success, Constructing pay structure

Module IV: Incentive Schemes / Payment by Results

Types of Incentive Schemes/ Systems and Plans, Merits and Demerits of Incentives

Module V: Benefits and Services

Concept of Benefit- Strategic Perspectives on Benefits, Type of Benefits, Factor Influencing Choice of Benefit Package, Administration of Benefits and Services

Module VI: Current Trends in Compensation and Reward Management

Elements of Managerial Compensation- A New Approach, VRS, Pay the Person, Rewarding Excellence, Individualizing the Pay System, Executive compensation, International Compensation

Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70

Text & References:

- Singh B.D. (2007). Compensation and Reward Management, Excel Books, New Delhi.
- Milkovich & Newman (2005), Compensation, McGraw-Hill
- Henderson Richard (2006), Compensation Management in a Knowledge - Based World, Prentice Hall India
- Armstrong Michael & Murlis Helen (2005), Reward Management A Handbook of Remuneration, Strategy and Practice, Kogan Page


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PSYCHOLOGICAL TESTING

Course Code: HRM4402

Credit Units: 03

Course Objective:

To develop an understanding of the concept of psychological testing by providing a theoretical background of psychological assessment of personality tests and their applications and the ethics of the usage of different types of psychological tests.

Course Contents:

Module I: Functions and Origins of Psychological Testing

Concept of Psychological Testing, Nature and Use of Psychological Tests, Historical Antecedents of Modern Testing

Module II: Technical and Methodological Principles

Norms and Meaning of Test Scores, Reliability and Validity

Module III: Personality Testing

Self-Report Inventories and Scales- MBTI and FIRO-B
Projective Techniques- TAT, Sentence Completion Test
Measures of Styles and Types
Situational Tests
Self-Concepts and Personal Constructs
Observer Reports

Module IV: Applications of testing

Educational Testing
Occupational Testing

Module V: Ethical and Social Considerations in Testing


Protection of Privacy and Confidentiality
Communicating Test Results

Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70

Text & References:

- Anastasi, A. and Urbina, S.,(2005) Psychological Testing, Pearson Education
- Freeman, Frank S (1962). Theory Practice of Psychological Testing. Oxford and IBH.
- Edward Hoffman (2004), Psychological Testing at work, Tata McGraw-Hill.
- Charles Jackson (2001), Understanding Psychological Testing, Jaico Publishing House.


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MANAGERIAL COUNSELLING

Course Code: HRM4406

Credit Units: 03

Course Objective:

To understand the concept and process so as to develop the professional counseling skills among the students.

Course Contents:

Module I: Introduction

Self-Development of Managers as Counselors, Barefoot Counseling, Assertiveness and Interpersonal Skills for Counselors, Counseling Relationship.

Module II: Approaches to Counseling

Development of Counseling Skill, Introduction to the Important Schools of Counseling, Psychoanalytic Foundations, Transactional Analysis, Gestalt Therapy, Rational Emotive Therapy, Person-Centered Approach to Counseling, An Integrated Model, Essentials of Skills, Nonverbal Clues.

Module III: Counseling Process

Counseling Interventions in Organizations, Empathy, Listening and Responding, Effective Feedback, Role conflict in counselling, Genuineness, Social Skills at workplace

Module IV: Counseling at Work

Performance Counseling, Counseling in Problem Situations, Interpersonal Conflicts, Midlife Blues, Integration and Action Plan.

Module V: Current Trends in Counselling

Modern trends in counselling, role of a counsellor, Importance of mindfulness, Counselling in Indian Industries.

Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70

Text & References:

- Welfel E.R. and Patterson Lewis E (2007), The Counselling Process, Thomson
- Singh Kavita (2010), Counselling Skills for Managers, Prentice Hall India
- Rao. S.N (2010), Counselling and Guidance, Tata McGraw Hill
- Felthman C. and Dryden W (2010), Brief Counselling- A Practical Integrative Approach, Tata McGraw Hill
- Mc. Grath E.H. Basic managerial skills for all, PHI, New Delhi
- Michael Reddy, The Managers guide to counselling at work, Universities, press
- Eric Parsloe, The Managers as coach & mentor, Universities, press
- David Fantoma, Social Skills at work, Universities, press


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INTERNATIONAL TRADE PROCEDURES AND DOCUMENTATION

Course Code: IBM4407

Credit Units: 03

Course Objective:

Learning the importance and procedural & documentation aspects of export-import of goods and services; impart knowledge of governments, departments, international institutions involved ; teach an Export Manager to develop a systematic methodology to handle exports ; understand the relevance and importance of various government policy measures for export as well as import.

Course Contents:

Module I: Introduction

Export documentation Framework – the need, entities & documents as per requirement of (a) the contract (b) Govt. of India (c) Importing country d) for claiming export assistance.

Module II: Documents for processing export order and legal implications

Processing of Product enquiry/quotation, Purchase/Export Order, Letter of intent, Payment Terms, International Transport Modes, INCOTERMS, advising & scrutiny of a Letter of Credit (L/C), seeking L/C amendments, International Chamber of Commerce's UCPDC articles.

Module III: Export/Import Documents

How to make Commercial, Financial, Transport, Title, Official, Insurance, Export assistance Documents & Certificates for Exports. Ensuring error-free export documentation as per L/C. How to open L/C, apply for license and make Customs/ Sales Tax documents for imports. International Transactions involving Documents Against Payment and Document Against Acceptance. Negotiation of Export Bills, Bank realization, late payment follow-up.

Module IV: Central Excise, Sales Tax, Customs and Port Clearances

Clearance of Export & Import Cargo, Role of Clearing and Forwarding Agents, Shipment of Export Cargo, Excise, Sales Tax & Customs Department regulation compliance. Port and Shipping clearance of Export and Import cargo.

Module V: EXIM Policy Framework

EPCG Scheme, Duty Exemption Pass Book Scheme, Export Oriented Units, Export houses, Trading houses, Export Processing Zones, Special Economic Zone, Bank, RBI, DGFT, Customs & FEMA regulatory compliances.

Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70

Text & References:

- Export Import Procedures, Documentation and Logistics: C. Rama Gopal, New Age International Publishers, New Delhi
- Nabhi (2011-12)1999, How to Export, Nabhi Publications
- RBI MuMGTi, Export Procedures and Documentation
- Handbook of Exim Procedures and Documentation – Govt. of India Publication Division
- Handbook of DGFT Publications – Ministry of Commerce, Govt. of India.


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DATA WAREHOUSING & DATA MINING

Course Code: ITM4401

Credit Units: 03

Course Contents:

Module-I: DATA WAREHOUSING

Data warehousing Components –Building a Data warehouse – Mapping the Data Warehouse to a Multiprocessor Architecture – DBMS Schemas for Decision Support – Data Extraction, Cleanup, and Transformation Tools –Metadata.

Module-II: BUSINESS ANALYSIS

Reporting and Query tools and Applications – Tool Categories – The Need for Applications – Cognos Impromptu – Online Analytical Processing (OLAP) – Need – Multidimensional Data Model – OLAP Guidelines – Multidimensional versus Multi relational OLAP – Categories of Tools – OLAP Tools and the Internet.

Module-III: DATA MINING AND TRENDS IN DATA MINING

Introduction – Data – Types of Data – Data Mining Functionalities – Interestingness of Patterns – Classification of Data Mining Systems – Data Mining Task Primitives – Integration of a Data Mining System with a Data Warehouse – Issues –Data Preprocessing, – Based Cluster Analysis – Outlier Analysis – Data Mining Applications.

Module-IV: CLUSTERING AND APPLICATIONS

Cluster Analysis - Types of Data – Categorization of Major Clustering Methods – K means – Partitioning Methods – Hierarchical Methods - Density-Based Methods –Grid Based Methods – Model-Based Clustering Methods – Clustering High Dimensional Data - Constraint

Module-V: ASSOCIATION RULE MINING AND CLASSIFICATION

Mining Frequent Patterns, Associations and Correlations – Mining Methods – Mining Various Kinds of Association Rules – Correlation Analysis – Constraint Based Association Mining – Classification and Prediction - Basic Concepts - Decision Tree Induction - Bayesian Classification – Rule Based Classification – Classification by Back propagation – Support Vector Machines – Associative Classification – Other Classification Methods – Prediction

Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70

TEXT BOOKS:

1. Alex Berson and Stephen J. Smith, “ Data Warehousing, Data Mining & OLAP”, Tata McGraw – Hill Edition, Tenth Reprint 2007.
2. Jiawei Han and Micheline Kamber, “Data Mining Concepts and Techniques”, Second Edition, Elsevier, 2007.

REFERENCES:

1. Pang-Ning Tan, Michael Steinbach and Vipin Kumar, “ Introduction To Data Mining”, Person Education, 2007.
2. K.P. Soman, Shyam Diwakar and V. Ajay “, Insight into Data mining Theory and Practice”, Easter Economy Edition, Prentice Hall of India, 2006.
3. G. K. Gupta, “ Introduction to Data Mining with Case Studies”, Easter Economy Edition, Prentice Hall of India
4. Daniel T.Larose, “Data Mining Methods and Models”, Wile-Interscience, 2006.


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SEARCH ENGINE OPTIMIZATION

Course Code: ITM4405

Credit Units: 3

Course Objective:

Course Contents:

Module-I: SEO Basics

Introduction about Domain, World Wide Web, Difference between Portal & Search Engine, Importance of Search Engine, Working of search engine, Difference between directories & search engine. Website performance monitor in search engine

Module-II:

Introduction to SEO, Web Traffic, Need of SEO, Working of SEO, Steps in SEO, Types of SEO techniques : Black Hat Techniques, White Hat Techniques,

Module-III: Keyword Research & Analysis

Introduction to Keyword research: Types of keywords, Keyword research methodology, keywords analysis tools, Preparing keyword list, localized keyword research, Keyword density, Keyword prominence, keyword stuffing

Module-IV: On Page Optimization

Basis of website designing, Essentials of good website designing, HTML Basics for SEO : Page Title, Meta Descriptions & Meta Keywords, Headings, Bod Text, Image & Alt tag, Invisible text, HTML Site Map Creation, Web Master Tools

Module-V: Off Page SEO Optimization


Page Rank, Link Popularity, Link Building, Types of Link Building, Book Marking, Article Submission Blog Marketing, Blog commenting, XML Site Ma submission, Customer review submission, press release submission, search engine submission

Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70

Text & References

- The Art of SEO: Mastering Search Engine Optimization 3rd Edition by Eric Enge, Stephan Spencer and Jessie Stricchiola, O Reilly Publication
- Search engine optimization 2017: Learn SEO with smart internet marketing strategies Paperbackby Adam Clarke,
- Search Engine Optimization All-in-One For Dummies 3rd Edition by Bruce Clay


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TOOLS FOR BUSINESS INTELLIGENCE

Course Code: ITM4406

Credit Units: 03

Course Objective:

This course provides an introduction to the concepts of business intelligence (BI) as components and functionality of information systems. The course aims at examining Business Intelligence (BI) as a broad category of applications and technologies for gathering, storing, analyzing, sharing and providing access to data to help enterprise users make better managerial decisions. Students will be able to learn the principles and best practices for how to use data in order to support fact-based decision making

Course Contents:

Module-I: Business Intelligence: An Introduction

Introduction, Definition, History and Evolution, Business Intelligence Segments, Difference between Information and Intelligence, Defining Business Intelligence Value Chain, Factors of Business Intelligence System, Real time Business Intelligence, Business Intelligence Applications.

Module-II: Business Intelligence Types:

Types of Business Intelligence, Business Intelligence Platform, Dynamic roles in Business Intelligence, Roles of Business Intelligence in Modern Business- Challenges of BI, Multiplicity of Business Intelligence Tools, Types of Business Intelligence Tools, Modern Business Intelligence, the Enterprise Business Intelligence, Information Workers

Module-III: Business Intelligence Life Cycle

Introduction, Business Intelligence Lifecycle, **Enterprise Performance Life Cycle (EPLC)** Framework Elements, Life Cycle Phases, Human Factors in BI Implementation, BI Strategy, Objectives and Deliverables, Transformation Roadmap, Building a transformation roadmap, BI Development Stages and Steps, Parallel Development Tracks, BI Framework

Module-IV: Introduction to Data Warehousing & Data Mining

Data Warehousing, Advantages and Disadvantages, Data Mart, Online Analytical Processing (OLAP), Characteristics, Tools, Difference between OLAP and OLTP, Multidimensional Data Model. Definition of Data Mining, Data mining parameters, How Data Mining works?, Types of relationships, Architecture of Data Mining, Kinds of Data which can be mined, Functionalities of Data Mining, Classification on Data Mining system, Various risks in Data Mining, Advantages and disadvantages of Data Mining

Module-V: Business Intelligence User Model

Introduction, Evolution of Business Intelligence, Business Intelligence Opportunity Analysis Overview, Content Management System, End User Segmentation, Basic Reporting and Querying, Online Analytical Processing, OLAP Techniques, OLAP Applications, Applying the OLAP to Data Warehousing, Benefits of using OLAP, Dashboard, Advanced/Emerging BI Technologies, Future of Business Intelligence

Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70

Text & References

- Business Intelligence and Analytics. Systems for Decision Support, 10th Edition. R. Sharda, D. Delen, & E. Turban; Pearson/Prentice Hall, © 2015. ISBN-13: 978-0-13-305090-5
- Business Intelligence: A Managerial Perspective on Analytics, R. Sharda, D. Delen, 3rd edition, Pearson Education **ISBN-13:** 978-0133051056


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SOCIAL MEDIA ANALYTICS

Course Code: ECM4401

Credit Units: 03

Course Objective:

Social media not only provides marketers with a means of communicating with their customers, but also a way to better understand their customers. This course will provide students with an advanced understanding of social media, marketing plans and social media analytics.

Course Contents:

Module-I: Introduction

Introduction to various social network platforms- Twitter, Facebook, Google+, LinkedIn and their features. Utilizing social media for Business. Promoting business on social media.

Module-II: Mining Twitter

Introduction to Twitter, Exploring Twitter's API and Terminology, exploring trending topics, searching for keywords, extracting tweet entities with frequency analysis, computing tweet diversity, examining patterns in retweets, visualizing frequency data with histograms.

Module-III: Mining Facebook & LinkedIn

Introduction, Understanding the Social Graph API, the Open Graph Protocol, Analyzing Social Graph Connections, analyzing facebook pages, examining friendships.

Introduction, Making LinkedIn API Requests, Data Clustering, normalizing data for analysis, measuring similarity, clustering algorithms.

Module-IV: Mining Google+

Introduction, Exploring the Google+ API, Term Frequency, Inverse Document Frequency, Querying Human Language Data with TF-IDF 1. Introducing the Natural Language Toolkit, Applying TF-IDF to Human Language, Finding Similar Documents , Analyzing Bigrams in Human Language Reflections on Analyzing Human Language Data

Module-V: Mining Web pages

Scraping, Parsing, and Crawling the Web, Breadth-First Search in Web Crawling, Discovering Semantics by Decoding Syntax. Natural Language Processing Illustrated Step-by-Step. Sentence Detection in Human Language Data. Document Summarization. Entity-Centric Analysis: A Paradigm Shift. Gisting Human Language Data. Quality of Analytics for Processing Human Language Data

Module-VI: Twitter Cookbook

Discovering the Trending Topics, Searching for Tweets, Collecting Time-Series Data, Extracting Tweet Entities Finding the Most Popular Tweets in a Collection of Tweets, Tabulating Frequency Analysis, Finding Users Who Have Retweeted a Status, Extracting a Retweet's Attribution, Making Robust Twitter Request, Resolving User Profile Information Extracting Tweet Entities from Arbitrary Text. Getting All Friends or Followers for a User, Analyzing a User's Friends and Followers Harvesting a User's Tweets. Crawling a Friendship Graph

Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70


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Text & References

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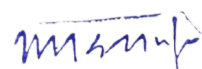
- “Mining the Social Web”. 2nd Edition. Matthew A. Russell, O'Reilly Media. 2013
- “Social Media Mining: An Introduction”, Reza Zafarani, Mohammad Ali Abbasi, and Huan Liu, Cambridge University Press, 2014

References:

- Hanneman, Robert and Mark Riddle. 2005. Introduction to Social Network Methods
- “Modern Information Retrieval: The Concepts and Technology behind Search (2nd Edition)”. Ricardo Baeza-Yates and Berthier Ribeiro-Neto ACM Press Books, 2011. ISBN-10: 0321416910, ISBN-13: 978-0321416919.
- Social Media Marketing, Tracy Tuten & Michael Solomon Pearson 2013 ISBN: 978013-2551793



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TOOLS FOR BUSINESS INTELLIGENCE

Course Code: ECM4404

Credit Units: 03

Course Objective:

This course provides an introduction to the concepts of business intelligence (BI) as components and functionality of information systems. The course aims at examining Business Intelligence (BI) as a broad category of applications and technologies for gathering, storing, analyzing, sharing and providing access to data to help enterprise users make better managerial decisions. Students will be able to learn the principles and best practices for how to use data in order to support fact-based decision making

Course Contents:

Module-I: Business Intelligence: An Introduction

Introduction, Definition, History and Evolution, Business Intelligence Segments, Difference between Information and Intelligence, Defining Business Intelligence Value Chain, Factors of Business Intelligence System, Real time Business Intelligence, Business Intelligence Applications.

Module-II: Business Intelligence Types:

Types of Business Intelligence, Business Intelligence Platform, Dynamic roles in Business Intelligence, Roles of Business Intelligence in Modern Business- Challenges of BI, Multiplicity of Business Intelligence Tools, Types of Business Intelligence Tools, Modern Business Intelligence, the Enterprise Business Intelligence, Information Workers

Module-III: Business Intelligence Life Cycle

Introduction, Business Intelligence Lifecycle, **Enterprise Performance Life Cycle (EPLC)** Framework Elements, Life Cycle Phases, Human Factors in BI Implementation, BI Strategy, Objectives and Deliverables, Transformation Roadmap, Building a transformation roadmap, BI Development Stages and Steps, Parallel Development Tracks, BI Framework

Module-IV: Introduction to Data Warehousing & Data Mining

Data Warehousing, Advantages and Disadvantages, Data Mart, Online Analytical Processing (OLAP), Characteristics, Tools, Difference between OLAP and OLTP, Multidimensional Data Model. Definition of Data Mining, Data mining parameters, How Data Mining works?, Types of relationships, Architecture of Data Mining, Kinds of Data which can be mined, Functionalities of Data Mining, Classification on Data Mining system, Various risks in Data Mining, Advantages and disadvantages of Data Mining

Module-V: Business Intelligence User Model

Introduction, Evolution of Business Intelligence, Business Intelligence Opportunity Analysis Overview, Content Management System, End User Segmentation, Basic Reporting and Querying, Online Analytical Processing, OLAP Techniques, OLAP Applications, Applying the OLAP to Data Warehousing, Benefits of using OLAP, Dashboard, Advanced/Emerging BI Technologies, Future of Business Intelligence

Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70

Text & References

- Business Intelligence and Analytics. Systems for Decision Support, 10th Edition. R. Sharda, D. Delen, & E. Turban; Pearson/Prentice Hall, © 2015. ISBN-13: 978-0-13-305090-5
- Business Intelligence: A Managerial Perspective on Analytics, R. Sharda, D. Delen, 3rd edition, Pearson Education **ISBN-13: 978-0133051056**


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SEARCH ENGINE OPTIMIZATION

Course Code: ECM4406

Credit Units: 03

Course Objective

The course will enable students the craft of optimizing websites for Search Engines. Students will learn about how the search engine works, the techniques for conducting SEO and keywords searching.

Course Contents:

Module-I: SEO Basics

Introduction about Domain, World Wide Web, Difference between Portal & Search Engine, Importance of Search Engine, Working of search engine, Difference between directories & search engine. Website performance monitor in search engine

Module-II:

Introduction to SEO, Web Traffic, Need of SEO, Working of SEO, Steps in SEO, Types of SEO techniques : Black Hat Techniques, White Hat Techniques,

Module-III: Keyword Research & Analysis

Introduction to Keyword research: Types of keywords, Keyword research methodology, keywords analysis tools, Preparing keyword list, localized keyword research, Keyword density, Keyword prominence, keyword stuffing

Module-IV: On Page Optimization

Basis of website designing, Essentials of good website designing, HTML Basics for SEO : Page Title, Meta Descriptions & Meta Keywords, Headings, Bod Text, Image & Alt tag, Invisible text, HTML Site Map Creation, Web Master Tools

Module-V: Off Page SEO Optimization


Page Rank, Link Popularity, Link Building, Types of Link Building, Book Marking, Article Submission Blog Marketing, Blog commenting, XML Site Ma submission, Customer review submission, press release submission, search engine submission

Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70

Text & References

- The Art of SEO: Mastering Search Engine Optimization 3rd Edition by Eric Enge, Stephan Spencer and Jessie Stricchiola, O Reilly Publication
- Search engine optimization 2017: Learn SEO with smart internet marketing strategies Paperbackby Adam Clarke,
- Search Engine Optimization All-in-One For Dummies 3rd Edition by Bruce Clay


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A handwritten signature in blue ink, appearing to read 'Manesar'.

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Master of Business Administration (Hospital & Healthcare Management)

Syllabus – First Semester

ACCOUNTING FOR MANAGEMENT

Course Code: HHM4102

Credits Units: 03

Course Objective: Participants in this course will develop the essential ability of all managers, to use complex accounting information as a platform for decision-making. As the course unfolds, participants will build an increasingly sophisticated level of understanding of the language of accounting and its key concepts. In addition the course develops skills in interpreting earnings statements, balance sheets, and cash flow reports. This ability to analyse financial statements will enable participants to deal more effectively with strategic options for their businesses or business units.

Course Contents:

Module I: Accounting Basics

Introduction, Foundations, Accounting policies, Accounting and management control, Branches of accounting, Recording of transactions and classification, Trial Balance & Errors, Cash book

Module II: Final Accounts

Preparation, Adjustments, Analysis, Depreciation Accounting, Reserves & Provisions. Form and contents of financial statements with reference to Indian Companies Act.

Module III: Financial Statement Analysis

Relation and Comparison of Accounting data and using financial statement information, Ratio Analysis, Cash flow analysis. Determination of Existing and future capital requirement.

Module IV: Cost Accounting

Elements of cost, Cost Classification and Allocation, Cost Sheet

Module V: Management Accounting


Emergence of Management Accounting, Marginal Costing and Cost Volume Profit Analysis, Budgeting & Variance Analysis.

Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70

Text & References:

- Bhattacharya, S.K. and Dearden, J (2006), Accounting for Management, Vikas Publishing House
- Narayanaswamy R (2005), Financial Accounting – A Managerial Perspective, Prentice Hall of India.
- Maheshwari S N and S K Maheshwari (2006), Accounting for Management, Vikas Pub. House.
- Tulsian, P.C (2006), Financial Accounting, Tata McGraw Hill.
- Banerjee, A (2005), Financial Accounting, Excel Books.


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BIOSTATISTICS

Course Code: HHM4104

Credit Units: 03

Course Objective:

The aim of this course is to develop the understanding of various statistical tools used for decisions making and how each applies to and can be used in the Hospital environment.

Course Contents:

Module I- Introduction to Statistics

Variables -Types of Variables ,Sampling-Sample size and Sampling techniques Data Collection – Types of data (Primary and Secondary Data) , Methods of Data Collection - Respondents, interviews, observation, questionnaire, survey, direct and indirect research techniques, Data Collection in Quantitative and Qualitative Research , Organizing the data.

Module II- Data Analysis

Data Analysis – techniques and tools, Manual and Computerized, Use of statistical software in data analysis - univariate, bivariate and multivariate analysis.

Module III- Data Presentation

Data Presentation - frequency distribution, charting of data – Bar Chart, Pie chart, Line Diagram, Tables, Histogram.

Module IV-Demography and Vital Statistics

Mortality and Morbidity Rates, Birth Rates, Specific Death Rates, Fertility Rates, Abortion Rates.

Module V-Hospital Statistics


Application of statistics in healthcare and hospital settings - utilization of the basic data, sources of health statistics, problems in collection of sickness data, measurement of sickness, vital statistics.

Examination Scheme:

Components	CP	V	A	ME	EE
Weightage (%)	5	5	5	15	70

Text & References:

- B.K. Mahajan. *Methods in Biostatistics*, Jaypee Brothers
- P.S.S. Sundar Rao. *An Introduction to Biostatistics: A manual for students in Health Sciences*, J.Richard Prentice Hall, 1996.
- Daniel, Wayne.W. *Bio-Statistics: A foundation for Analysis in the Health Sciences*, John Wiley and Sons Pub, 1991.
- K. Vishwas Rao. *Bio-Statistics: A Manual of statistical methods for use in the Health, Nutrition and Anthropology*, Jaypee Brothers Medical Pub, 1996.
- Verma B.L., Shukla G.D. *Bio-Statistics perspective in Health care research and practice*, C.B.S. Pub, 1993.
- Krishnaiah, P.K. Rao, C.R. (ed), *Handbook of Statistics*, Elsevier Science Pub, 1988.


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INFORMATION TECHNOLOGY & E-COMMERCE

Course Code: HHM4109

Credit Units: 02

Course Objective:

This course will expose students to developments in computer technology and understand the working of a computer system. It will introduce end-user computing and build skills in using IT and understanding various technologies like internet, telecom, DBMS concepts, e-commerce etc. The course will expose the students to the latest trends in computer.

Course Contents:

Module I: Modern Computer Systems

Evolution of Computer Systems, Input, output and storage technologies, Computer Assisted Control and Automation , (e.g. Delhi Metro , Digitally Controlled Car engines etc.) , Computer Controlled Biometric/RFID based Access Control , Contemporary hardware and software platforms(Open Source, Web Software etc.), Storage of Data Resources

Module II: Data Resource Management

Introduction to DBMS, Benefits of DBMS over traditional file system, Types of DBMS, Application of DBMS using MS-ACCESS / ORACLE as a tool for understanding of DBMS concepts. SQL Query handling , Forms, Concept of Data Warehouses and Data Marts, Introduction to Data Centers. Storage Technologies and Architecture (DAT, NAS, SAN etc.) . Live examples of storage strategies of companies like Google, Amazon Wal-Mart dealing with storage crisis

Module III: Telecommunications and Computer Networks

Networked Enterprise :- Components, Types of networks, Advantages of Network Environment, Business Uses of Internet, Intranet and Extranet, Web 2.0/3.0 , Distributed/Cloud/Grid Computing, GSM & CDMA, GPRS ,3G & 4G technologies, VOIP and IPTV.

Module IV: Electronic Commerce Systems

Introduction to e-Commerce and M-Commerce, Advantages and Disadvantages of each. Concept of B2B, B2C, C2C , with examples. Concept of Internet Banking and Online Shopping, Electronic Payment Systems. Project Discussion :- Development of e-commerce store (Web Site Development, Internet Publicity , Payment Gateway, Packaging & Delivery , After Sales Support) .

Module V: E-governance

Concept of e-governance , World Perspective , Indian Perspective , Technologies for e-governance , e-governance as an effective tool to manage the country's citizens and resources, Advantages and Disadvantage of E-governance, E-governance perspective in India. Discussion on MCA21 Project ,Bhoomi etc. .

Module VI: Security Management

The Information Security, System Vulnerability and Abuse, Security Threats (Malicious Software , Hacking etc.) and counter measure. Definition of Cyber Crime and Types. Antivirus, Firewalls, Anti-Spyware , Security Audit, Discussion on Overview of IT-ACT 2000.

Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70

Text &References:

- Norton P (2010), Introduction to Computers, Tata McGraw-Hill
- Potter T (2010), Introduction to Computers, John Wiley & Sons
- Morley D & Parker CS (2009), Understanding Computers – Today and Tomorrow, Thompson Press
- Jawadekar, WS (2009); Management Information System; Tata McGraw Hill
- Mclead R & Schell G (2009), Management Information Systems; Pearson Prentice Hall
- O'Brein, JA (2009); Introduction to Information Systems; Tata McGraw Hill

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Syllabus - Second Semester

RESEARCH METHODOLOGY

Course Code: HHM4203

CreditUnits: 03

Course Objective: To provide basic understanding towards research principles and methods. To introduce important analytical tools for research data analysis. To assist in the development of research proposals/reports

Course Contents:

Module I: Basics of Research

Definitions and designs, uses of research in healthcare, formulation of research problems, developing hypothesis, writing research questions

Module II

Sampling, Design, and development of interview schedule, questionnaire construction, pre-testing (reliability & validity), research ethics

Module III

- Data collection: field work, mapping and listing operations, selecting of respondents and MIS for major research projects
- Data Management: editing, entry and preparing data sets for analysis
- Data analysis: using SPSS/ epi.info/ use of matrices

Module IV: Qualitative Research

- Development of conceptual framework
- Qualitative methods: FGDs, in-depth interviews, biographics, participatory methods, participant observation etc.

Module V: Research Ethics

History of ethics in health research, Principles and Concepts in research ethics – confidentiality and privacy, informed consent, vulnerable subjects and special treatments, standards of care – principles, review processes etc.

Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70

Text & References

- Gummerrson, E. *Qualitative methods in Management Research*, Sage publications
- Verkevieser et al, *Designing and conducting Health Systems Research Projects* WHO and IDRC
- Grundy F and Reinke W A, *Health Practice Research and formalize Managerial Methods*, Geneva, WHO
- *Designing and conducting Health surveys*, Jossey Bass Publishers.


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HOSPITAL PLANNING

Course Code: HHM4205

Credit Units: 03

Course Objective

To expose the students to planning and operation of hospitals in a detailed manner which will include all facets of hospital planning activities covering every department that is involved both in clinical care as well as supportive services. A chapter on research in Hospital Services and Resources is also added to give impetus for research in this field.

Course Contents

Module I: Introduction to Hospital Planning

Conception of idea, formation of hospital planning team, market survey, feasibility study, selection of location, Financial planning of hospitals, Macro level planning.

Conception to commissioning- site development, architects brief working drawings and specifications, engineering drawing, equipment planning, bed distribution, space allocation, interior designing and construction of building - commissioning, shake down period

Module II

Planning for the out-patient services and emergency services, day care services

Planning for patient care units –Inpatient services and intensive care units

Planning for surgical suites.

Planning for labor and delivery suites-LDRP suites

Module III

Planning for laboratory service, blood banking and Radiological services.

Module IV

Conceptual planning for advanced facilities like Cardiac catheterization laboratory, various endoscopy units, Extra corporeal shock wave lithotripsy, radiotherapy unit, IVF unit and Dialysis unit

Module V


Planning for supportive services-medical gases, HVAC, House-keeping, CSSD, Food and beverages.

Examination Scheme:

Components	CP	V	A	ME	EE
Weightage (%)	5	5	5	15	70

Texts & References:

- *Hospitals: Facilities Planning and Management*, GD Kunders by Tata Mcgraw Hill
- *Modern Trends in Planning & Designing of Hospitals: Principles and Practice*: Shakti Kumar Gupta, Sunil Kant, R Chandrashekar, SidharthSatpathy, by Jaypee – 2007
- *Hospital Planning*: Charles Butler, Addison Erdman
- Dr Malhotra's series: *Step by Step – Hospital designing & Planning*, by Jaypee 2007


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HOSPITAL MATERIALS MANAGEMENT

Course Code: HHM4206

Credit Units: 03

Course Objective:

Hospitals carry a large inventory of drugs, sophisticated and highly costly equipment besides beds, furniture and linen. The student should be conversant with Inventory and various methods of control and Purchase management.

Course Contents:

Module I: The Materials Function

Definition, scope and importance of materials management, objectives of materials management, functional areas of materials management, documents used in materials function, material identification codes, role of computers in the materials management, special features of materials management applied to hospitals.

Module II: Stores Management

Responsibilities and functioning of stores, Types of stores in hospitals, Location and layout of stores, Stock verification techniques, Control of pilferages, Standardization and codification.

Module III: Inventory Management

Definition of inventory- Need of control, objectives of inventory control, scope & importance, categories of materials in hospital, hospital, Cost associated with inventories- Ordering cost, carrying cost, over stocking cost, under stocking cost, other costs associated with service level. Inventory control Techniques, Economic order quantity (EOQ), inventory models: safety stocks, fixation of re-order level,

Module IV: Purchase Management

Objectives and responsibilities of purchasing, Vendor evaluation techniques, Price and quality considerations, Tendering procedures, Types of purchasing.

Module V: Legal aspects

Letter of credit, Duty of customs, Types of hospital imports, import procedures & Documentation, government policy.

Module VI: Maintenance Management & Disposal


Maintenance of equipment, Inventory control of spares, Maintenance contracts, Disposal of Waste and Scrap

Examination Scheme:

Components	CP	V	A	ME	EE
Weightage (%)	5	5	5	15	70

Texts & References:

- *Procurement and Materials management for Hospitals*, Rex H Gregor, Harold C. Mickey
- *Material Management* by Dr. Pawan Arora, Global India Publication Pvt Ltd
- *Handbook of Materials Management*, P. Gopalkrishnan, Eastern Economy Edition.


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EXCEL FOR MANAGERS

Course Code: HHM4209

Credit Units: 01

Course Overview:

Microsoft Excel is a very popular business productivity application for the management and manipulation of data. With the right training and understanding of Excel, businesses and individual users can unlock the world of opportunities that this powerful business application offers. This course will provide all the tools necessary to create and use basic and advanced spreadsheets. After completion of this course, students will be able to learn the various methods for entering and editing data and also learn the various ways to write simple formulas.

Course Contents:

Module-I: Getting Started with Excel

Introduction to Spreadsheets: Launching Excel, entering data in spreadsheet, widening rows and columns, applying basic formatting in spreadsheet, saving work in excel. Entering Data into cells: Using autofill, sort & filter feature, creating lists, inserting & deleting rows and columns. Wrapping & merging text and cells,

Module-II: Basics in excel

Protecting & sharing workbooks, freeze panes, understanding normal, page layout and page break preview in excel. Setting the page orientation and print area. Adding hyperlinks to cells, inserting images, objects, equations and symbols.

Module-III: Charts & Formulas in Excel

Understanding Charts: Inserting bar charts, pie charts, column charts and line charts in spreadsheets, formatting and resizing the chart. Using Basic functions- average, sum, min, max, product etc. date functions, time functions. Math Operators in Excel, combining mathematical operators.

Module-IV: Functions in Excel

Logical- using IF, AND, OR, NOT, TRUE, FALSE Functions. Textual- using TRIM, UPPER, LOWER, REPLACE Functions. Import data into excel, Look up functions with index and match. Rounding, sum product, conditional counts and conditional sums, Filtering data, pivot table, pivot charts, conditional formatting.

Module-V: Financial and Statistical Functions in Excel

Financial functions: Time value of money- Present value, Future value, PMT with beginning date, PMT with ending date, NPV, Goal seek, Scenario Manager, IRR. Statistical functions: Max, Min, Average, Large, Rank, Small, Var, Std Dev.

Examination Scheme:

Components	Written Test	Practical	V/P	File/Assignment	Attendance
Weightage (%)	20	30	30	15	5

Suggested Readings & Textbooks

- Business Analysis with Microsoft Excel by Conrad George Carlberg,,Que Publishing, second edition, ISBN 0974415626.
- Excel 2013 for Dummies by Greg Harvey, John Wiley & Sons , 2012, ISBN 9781118559703

Web Resources

- <https://spreadsheeto.com/>
- <https://www.tutorialspoint.com/excel/>


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TERM PAPER

Course Code: HHM4231

Credit Units: 04

Course Objective:

The aim of the term paper is to provide the students with an opportunity to further enhance their knowledge by undertaking a **significant practical unit of examining and analyzing various aspects of healthcare management** at a level commensurate with the learning outcomes of the various courses taken upto them in the ongoing semester.

For students of the first semester, the required term paper is primarily a self- worded structured report written by the students after interpreting & analyzing various primary & secondary records of intelligent interviews/readings from several sources on a particular sector.

Conduct of Term Paper

The term paper will be executed & submitted by students individually.

- The students have to decide the topic of study / hospital of interest **within two weeks of the start of the semester**.
- A Faculty Mentor will be assigned to each group of students undertaking a Team Paper.
- Special Time slot to conduct the research will be included in the timetable.
- The Mentor will conduct weekly sessions to guide & follow up the students as well as to clarify any queries or problem faced by the students.
- Weekly review of the Work in Progress will be maintained by Faculty Mentor & will carry 20% weightage during the final evaluation.
- This will be substantiated through a proper economic diary maintained by the students documenting their daily objectives, plan of action, activities undertaken, documentation of reading & referencing material, analysis (if any) & learning outcomes.
- Students may use innovative tools & techniques to maintain this diary such as e-concepts, online blogs, charts, graphs etc.
- Students will be given some discretion in the choice of topic for the term paper and the approach to be adopted.
- The term paper has to be formulated with multi-disciplinary aspects explained in the section below.

Focus Areas of Study

1. Hospital organization & Management Process (HOMP)

Analysis of organisational process of 5 hospitals (include public and private hospitals) while maintaining a scrap book of the latest news & views.

2. Medical Records (MR)

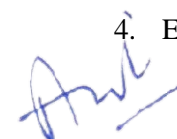
- Role of E-codes in injury prevention.
- Differentiation of roles and functions of medical record practitioners
- Bar code tracking system enhances record- and film-handling productivity
- Evaluation of use of bar coding in medical record processing
- Trends in utilization management: legal implications for health record administration

3. Management in Healthcare Systems (MEHS)

- a. A brief overview of the major management functions of health systems.
- b. Procurement Management in Healthcare Systems
- c. Cultural Variation in healthcare consumption in 5 Asian Countries including India: National and individual drivers in mild medical conditions

4. Epidemiology (ED)

- a. Epidemiology and RiskFactors for Isolation of Multi-Drug ResistantOrganisms in patients
- b. Overview of NutritionalEpidemiology
RiskAssessmentStudies : Epidemiology
Epidemiology of Endophthalmitis and Treatment trend in India


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e. Epidemiology of cause of death in Children with Acute Respiratory Distress Syndrome

5. Quality Management in Hospitals (QMH)

- a. Assessing the organizational characteristics influencing Quality Improvement implementation in Indian Hospitals
- b. Basic quality tools applied in Indian healthcare system
- c. Total Quality Management Approach to improve patient safety by preventing medication error incidences
- d. A Holistic Approach for Conceptualizing Hospital Service Quality

Needless to add, effective deployment of Self -Development, Interpersonal Skills & techniques of Business Communication is integral to all aspects of the term paper and will be evaluated accordingly.

General Guidelines

- All students must submit an *independently written* report of their term paper project.
- All contents need to be sourced from reliable primary & secondary sources; references for which **MUST** be maintained in proper format.
- At least one middle level or senior level person of a hospital from healthcare sector has to be interviewed face to face.
- Though the term paper is more a descriptive report covering the 'What, Why and How' aspects; participation in leg work or field research of a hospital (s) will add value to the study.
- The paper should utilise class room learning and industry exposure to evaluate issues on hand and suggest remedial/progressive measures that may be taken by a hospital(s).

Assessment & Evaluation:

The term paper will be in the form of an integrated report and assignment.

- A board consisting of all the faculty members who are teaching the students in the first semester will conduct the final evaluation.
- The faculty mentor assigned to the students will do the continuous evaluation.

All reports will be examined most strictly for plagiarism.

Components	Continuous Assessment & Economic Diary	Presentation	Content & Layout of Report	Analysis	Conclusion & Recommendations	Viva/ Defending Questions
Weightage (%)	20%	15%	20%	20%	10%	15%



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Syllabus - Third Semester

MANAGEMENT OF CLINICAL SERVICES

Course Code: HHM4303

Credit Units: 03

Course Objective:

To enable the students gain insights into various aspects like importance, functions, policies and procedures, equipping, controlling, co-ordination, communication, staffing, reporting and documentation of both clinical services in a hospital. To understand the processes and details related to effective patient care and to further increase the satisfaction level of patients

Course Contents:

Module I: Patient centric management

Concept of patient care, Patient-centric management, Organization of hospital departments, Roles of departments/managers in enhancing care, Patient counseling & Practical examples of patient centric management in hospitals. Patient safety and patient risk management.

Module II: Quality in patient care management

Defining quality, Systems approach towards quality, towards a quality framework, Key theories and concepts, Models for quality improvement & Variations in practice

Module III: Patient classification systems

Types of patient classification systems, ICD 9 (CM, PM), Casemix classification systems, DRG, HBG, ARDRG.

Module IV: Patient Medical Records

Policies & procedures for maintaining medical records. e-records, legal aspects of medical records, its safety, preservation and storage.

Module V: Overview

Hospital operations management, role and decisions, Difference of hospital operations from other service and manufacturing organizations.

Module VI: Out Patient Services

Overview of the department, day care, accident and emergency services, physical medicine and rehabilitation, occupational therapy unit, physiotherapy department

Module VII: In Patient Services

Ward design (general & specialized), critical care services – ICU, CCU, NICU, , medical services, surgical services – operation theater, nuclear medicine, burn unit, nursing services and administration.

Module VIII: Specialty Services

Pediatrics, Obs&Gynec, ENT, Ophthalmology, Orthopedic, Psychiatry, Anesthesia, Dental

Module IX: Super-specialty Services

Cardiology, Thoracic Surgery, Neurology, Neurosurgery, Nephrology- Dialysis Unit, Transplantation Services.

Examination Scheme:

Components	CP	V	A	ME	EE
Weightage (%)	5	5	5	15	70

Texts & References:

- *Management of Hospitals & Health services: Strategic issues and performance*, Rockwell Schulz, Alton C. Johnson
- Shakharkar B.M., *Principles of Hospital Administration and Planning*

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- *Hospital managerial services* Volume -4, S.L. Goel, R. Kumar
- *Hospital Core Services: Hospital administration in 21st century* Vol 1 Kumar R, S.L. Goel
- *Hospital Management*, Dr. A.K. Malhotra, Global India Publications Pvt Ltd, New Delhi
- *Hospital Management : A guide to departments*, Howard S. Roland, Beatrice L Rowland



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OPERATIONS RESEARCH

Course Code: HHM4305

CreditUnits: 03

Course Contents:

Module I: Introduction

The OR approach to problem-solving and decision-making, Scope and limitations of OR in managerial decision-making.

Module II: Introduction to OR Techniques

Linear Programming, Decision Tree Analysis, Queuing theory, PERT/CPM, Replacement models, Sensitivity analysis, Assignment models, Inventory control models, Forecasting.

Module III: Applications of OR in Hospitals and Health Agencies

Resource allocation, Health services planning, Deployment of health human power, Materials Management, Equipment replacement, Patient scheduling.

Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70

Text & References:

- *Operations Research in Hospitals: Diagnosis and Prognosis*, David H. Stimson, Ruth H. Stimson
- *Operations Research and Healthcare: A handbook of methods and Applications*, Margaret L. Brandeau, Francois Sainfort, William P. Pierskalla
- *Patients hospitals and Operational Research*, Taylor Francis
- *Operations Research* by P. Rama Murthy
- *Operations Research: Methods, Models and Applications*, Jay E. Aronson and Stanley Zionts



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MANAGEMENT OF SUPPORT & UTILITY SERVICES

Course Code: HHM4308

Credit Units: 03

Course Objective:

To enable the students gain insights into various aspects like importance, functions, policies and procedures, equipping, controlling, co-ordination, communication, staffing, reporting and documentation of non clinical services in a hospital.

To understand the processes and details related to effective patient care and to further increase the satisfaction level of patients

Course Contents:

Module-I: Support Services

Diagnostic-Radiology & Imaging Services, Hospital Laboratory etc, Blood Bank & Transfusion Services, Ambulance Services, Pharmacy, CSSD, Oxygen Manifold/Concentrator, Dietary Service, Hospital Laundry and Linen, Medical Social Worker, Marketing and Public Relations, Finance and Administrative Departments, Outsourcing.

Module-II: Utility Services

Housekeeping, Hospital Engineering and Maintenance, Biomedical Department, Medical Records-confidentiality of records, reception, enquiry, registration and admission, central billing and accounts, Cafeteria/canteen, Mortuary.

Module-III: Biomedical Waste Management and Hazards in Hospital

Definition of Biomedical Waste, BMW – Segregation, collection, transportation, disposal, Liquid BMW, Radioactive waste, Metals / Chemicals / Drug waste, BMW Management & methods of disinfection, Modern technology for handling BMW, Monitoring & controlling of cross infection (Protective devices), BMW from Administrative point (Budget, Health check-up, Insurance)

Module-IV: Other Hospital Functional Activities

Hospital Acquired Infection - Source and Control, Modern trends in Hospital Administration, Telemedicine.

Examination Scheme:

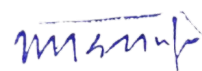
Components	CP	V	A	ME	EE
Weightage (%)	5	5	5	15	70

Texts & References:

- *Management of Hospitals & Health services: Strategic issues and performance*, Rockwell Schulz, Alton C. Johnson
- Shakharkar B.M., *Principles of Hospital Administration and Planning*
- *Hospital managerial services* Volume -4, S.L. Goel, R. Kumar
- *Hospital Core Services: Hospital administration in 21st century* Vol 1 Kumar R, S.L. Goel
- *Hospital Management*, Dr. A.K. Malhotra, Global India Publications Pvt ltd, New Delhi.
- *Hospital Management : A guide to departments*, Howard S. Roland, Beatrice L Rowland.



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SUMMER INTERNSHIP EVALUATION

Course Code: HHM4335

Credits Units: 06

Course Objective:

To provide on the job experience, as an understudy in a hospital, to help the student understand systems and procedures and learn to make decisions considering the Hospital as an integral unit.

Duration: 2 months

Objectives of Training:

- To collect the information about organization
- To learn about the different projects run by the organization
- To be familiar with communication procedure between health workers and community
- To identify practical things about project planning and implementation
- To discover the problems faced in implementing the project
- To learn about working of the information system
- To know about method and source of evaluation

Format for Report Writing

1. Title of the project
2. About the organization
3. Introduction and objectives of the project/ programme / organization
4. Funding agency—about the agency, how to get funding, Nature of funding agency
5. Staffing pattern of the project with their functions
6. Major activities going under project
7. Results achieved so far (target Vs achievement)
8. Role of the candidate in the project/programme / organization
9. Evaluation by the candidate

Guidelines for presentation-

- Powerpoint presentation
- Time for presentation: 20 minutes
- Time for discussion: 10 minutes

Examination Scheme:

Components	Presentation	Report submitted	Viva-voce
Weightage (%)	25	50	25



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Syllabus - Fourth Semester

HOSPITAL MANAGEMENT INFORMATION SYSTEM

Course Code: HHM4401

CreditUnits: 04

Course Objective:

To understand the various indicators of health and health information system and health management information system in hospitals.

Course Contents:

Module I: Introduction

Concept of information as a resource, Understanding the principles of information systems, Classification of information systems in hospitals.

Module II: Managing Hospital Information Systems

Setting strategic objectives for information systems, organizing an information systems department, Principles of systems development, Importance of security and confidentiality of data.

Module III: Role of Information Technology in Hospitals

Principles of information processing, Role of information technology in information processing, Role of database management systems, Role of communication in managing hospital information systems.

Module IV: Management Information System

Concept of Management Information System (MIS).Developing indicators, identifying data and developing tools of measurement. Use of MIS: monitoring progress and evaluation, hospital planning, monitoring employees, monitoring health development, decision making. Computerization of MIS: demonstration and critical analysis of different MIS software packages used in health projects in hospitals.

Examination Scheme:


Components	CP	V	A	CT 1	CT 2
Weightage (%)	20	15	5	30	30

Text & References

- *Management Information System (MIS) in Hospitals: A computer based approach for quality in hospital services and administration*, by Anil Kumar Saini
- S.C. Joshi & S.N. Mehta. *National Information System: Planning and Management*, Global vision publishing house.
- *Information Technology in health care: Socio technical approaches*, 2010. IOS Press BV



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ENTREPRENEURSHIP & CONSULTANCY IN HEALTHCARE

Course Code: HHM4406

Credit Units: 03

Course Objective:

To create interest in students to start a venture, learn the intricacies of starting an enterprise, identifying opportunities, inculcating enterprising values with orientation towards setting up own enterprises and equip the student to take up consultancy work in various facets of hospital management.

Course Contents:

Module I- Overview of Entrepreneurship

Overview: Definition and Meaning of Entrepreneurship Characteristics and Function of Entrepreneur Importance and Limitations of Entrepreneurship: Entrepreneurial Laboratory: Types of Entrepreneurs Entrepreneurship Games Innovation and Entrepreneurship.

Idea Generation: Brain Storming in terms for Project Ideas, Nominal Group Technique; Creativity. Lateral Thinking; Research & Development, Reverse Engineering IPR, Patenting ;Environment Scanning Opportunities in Health care ; NGO Collaboration.

Module II- Feasibility Study

Operational Feasibility, Technical Feasibility, Market Feasibility, Financial Feasibility, Economic Forecasting Project Report Writing; Support Systems for New Enterprise Creation, New Enterprise Identification and Selection Enterprise Establishment and Management.

Module III-Sources of Finance

Short Term Sources – Instruments – Long term Sources – Instruments – Sources – Commercial Banks, Development Agencies. Indian and International Funding Organizations Capital Market Venture and Startup Capital.

Module IV-Overview of Health care Consultancy

Consulting industry with specific reference to hospital and Health care Consulting Perspective. Professionalism & Ethics in Consulting Consultant – Client Relationship, Behavioral roles of consultants.

Module V-Consulting Process in Health care

Entry: Initial Contracts – Preliminary Problem Diagnosis – Terms and Reference – Assignment Strategy and Plan – Proposal to the Client – Consulting Contract.

Diagnosis: Conceptual Framework of Diagnosis – Diagnosing Purpose and Problem - Defining Necessary Facts – Sources and Ways of Obtaining Facts – Data Analysis – Feedback.

Action Planning: Possible Solutions – Evaluating Alternatives – Presentation of Action. Implementation & Termination: Consulting in Various Areas of Health care Management.

Examination Scheme:

Components	CP	V	A	ME	EE
Weightage (%)	5	5	5	15	70

Texts & References:

- J.B.Patel and D.G.Allampally ,Manual on how to Prepare a Project Report, Entrepreneurship development Institute Ahmadabad.
- J.B.Patel and S.S.Modi ,Manual on Business Opportunity identification & Selection, Entrepreneurship Development Institute Ahmadabad.
- Edward Bono ,Lateral Thinking, Penguin Books, London 1990
- Holt HG David ,Entrepreneurship, Prentice Hall India Publisher, New Delhi 2001.
- S.S.Khanka, Entrepreneurial Development S. Chand & Co New Delhi 2007.


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DISASTER MANAGEMENT

Course Code:HHM4408

CreditUnits: 02

Course Objective

To learn, identify and assess disasters in the community. To set-forth policies and procedures for disaster preparedness and to prepare disaster plan.

Course Contents

Module I: Basics of Disaster Management

Basics of disaster management and Mass casualties, Classification of disaster on the basis of origin, source, onset response; Disaster Phases, Disaster Process, Effects of Disasters, Disasters and Health Problems, Triage, Impact of Disasters on the Hospitals, Disaster Response – local, national & International, Disaster Management Act – 2005.

Module II: Disaster preparedness

Policies & procedures for general safety, fire safety procedure for evacuation, Components of Disaster Plan – Pre-hospital & Hospital, Hospital disaster plan formulation & implementation, crisis management.

Examination Scheme:


Components	CP	V	A	CT 1	CT 2
Weightage (%)	20	15	5	30	30

Text&References:

- *A guide to emergency health management after natural disasters*, American health organization scientific publication.
- *Emergency vector control after Natural disaster*, American health organization scientific publication.
- *District Health facilities*, WHO regional publication western pacific services.
- *Medical supply management after natural disaster*, American health organization scientific publication.



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DISSERTATION

Course Code: HHM4437

Credit Units: 06

The Aim of the Dissertation

The aim of the dissertation is to provide the students with an opportunity to further their intellectual and personal development in their chosen field by undertaking a significant practical unit of activity, having an educational value at a level commensurate with the award of their degree.

The dissertation can be defined as a scholarly inquiry into problem(s) or issues(s), involving a systematic approach to gathering and analysis of information / data and leading to production of a structured report.

The Dissertation Topic

It is usual to give the student some discretion in the choice of topic for the dissertation and the approach to be adopted. Kindly ensure that the dissertation is related to the field of specialization.

Deciding this is often the most difficult part of the dissertation process, and requires thorough preparation and background research.

It is important to distinguish here between 'dissertation topic' and 'dissertation title'. The topic is the specific area that the student wishes to investigate. The title may not be decided until the dissertation has been written so as to reflect its content properly.

Few restrictions are placed on the choice of the topic. Normally, it is expected that the topic is:

- Relevant to business, defined broadly;
- Related to one or more of the subjects or areas of study within the core program and specialization stream;
- Clearly focused so as to facilitate an in-depth approach, subject to the availability of adequate sources of information and to the student's knowledge;
- Of value and interest to the student's personal and professional development.

Planning the dissertation

This entails the following:


- Selecting a topic for investigation.
- Establishing the precise focus of the study by deciding on the aims and objectives of the dissertation, or formulating questions to be investigated. Consider very carefully what is worth investigating and its feasibility.
- Drawing up initial dissertation outlines considering the aims and objectives of the dissertation. Workout various stages of dissertation
- Devising a timetable to ensure that all stages of dissertation are completed in time. The timetable should include writing of the dissertation and regular meetings with your dissertation guide.

The dissertation plan/ outline or Synopsis

It is recommended that the students should have a synopsis/dissertation plan to guide them right from the outset. Essentially, the synopsis/dissertation plan is an outline of what the student intends to do, chapter wise and therefore should reflect the aims and objectives of the dissertation in detail along with detailed bibliography and critical review of literature.

There are several reasons for having a dissertation plan

- It provides the correct area of focus
- It provides the faculty-guide with an opportunity, at an early stage, to make constructive comments and help guide the direction of the research.
- The writing of a plan is the first formal stage of the writing process, and therefore helps build up confidence.
- In many ways, the plan encourages the student to come to terms with the reading, thinking and writing in a systematic and integrated way, with plenty of time left for changes.
- Finally, the dissertation plan generally provides a revision point in the development of the dissertation report in order to allow appropriate changes in the scope and even direction of work as it progresses.


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Keeping records

This includes the following:

- Making a note of everything read; including those discarded.
- Ensuring that when recording sources, author's name and initials, date of publication, title, place of publication and publisher are included. (Students may consider starting a card index or database from the outset).
- Making an accurate note of all quotations at the time they are read.
- Make clear what is a direct quotation and what is a paraphrase.

Dissertation format

All students must follow the following rules in submitting their dissertation.

- Front page should provide title, author, Name of degree/diploma and the date of submission.
- Second page should be the table of contents giving page references for each chapter and section.
- The next page should be the table of appendices, graphs and tables giving titles and page references.
- Next to follow should be a synopsis or abstract of the dissertation (approximately 500 words) titled: **Executive Summary**.
- Next is the 'acknowledgements'.
- Chapter I should be a general introduction, giving the background to the dissertation, the objectives of the dissertation, the rationale for the dissertation, the plan, methodological issues and problems. The limitations of the dissertation should also be hinted in this chapter.
- Other chapters will constitute the body of the dissertation. The number of chapters and their sequence will usually vary depending on, among others, on a critical review of the previous relevant work relating to the major findings, a discussion of their implications, and conclusions, possibly with a suggestion of the direction of future research on the area.
- After this concluding chapter, give a list of all the references used. These should be cross - references with the text. For articles from journals, the following details are required e.g.
Draper P and Pandyal K. 1991, The Investment Trust Discount Revisited, Journal of Business Finance and Accounting, Vol18, No6, Nov, pp 791-832.
For books, the following details are required:
Levi, M. 1996, International Financial Management, Prentice Hall, New York, 3rd Ed, 1996
- Finally, include appendices. These should only include relevant statistical data or material that cannot be fitted into the above categories.

Guidelines for the assessment of the dissertation

While evaluating the dissertation, faculty guide will consider the following aspects:

1. Has the student made a clear statement of the objective or objective(s)
2. If there is more than one objective, do these constitute parts of a whole?
3. Are the objectives and methodology of practical relevance to the business world/economy?
4. Has the student done sufficient background reading and reviewed the available literature critically?
5. Has the student developed an appropriate analytical framework for addressing the problem at hand?
6. Is this based on up-to-date developments in the topic area?
7. Has the student collected information / data suitable to the frameworks?
8. Are the techniques employed by the student to analyse the data / information appropriate and relevant?
9. Has the student succeeded in drawing conclusion from the analysis?
10. Do the conclusions relate well to the objectives of the project?
11. Has the student been regular in his work?
12. Layout of the written report.
13. Confidence and knowledge of the student while answering questions and giving the presentation.

Examination Scheme:

Contents & Layout of the Report	30
Conceptual Framework	10
Objectives & Methodology	15
Implications & Conclusions	15
Viva/ Presentations	30
TOTAL	100

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MILITARY TRAINING FOUNDATION

Programme Structure

SINGLE SEMESTER COURSE

Course Code	Course Title	Lecture (L) Hours Per	Tutorial (T) Hours Per Week	Practical (P) Hours Per	Total Credits
GEN2051	Military Training Foundation	-	-	-	3
	TOTAL				3



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MILITARY TRAINING FOUNDATION

Syllabus

MILITARY TRAINING FOUNDATION

Course Code: GEN2051

Credit Units: 03

SINGLE SEMESTER COURSE

Introduction

In accordance with the National Youth Policy which envisages that youth of the country should spend at least one fifth of their total time spent in an educational institution on outdoor activities. In furtherance of our National Youth Policy compulsory military training is being conducted for UG students at Amity University Gurgaon. A tented camp has been established at the sprawling campus at Amity University Gurgaon, surrounded by forest land and orchards within the campus, the camp gives a feeling of living in field conditions, in the wild.

Proposal

It is proposed to introduce military training (MTC) for under graduate students as an open elective, as part and parcel of the flexi credit system, wherein a student can design his own degree from a basket of courses.

Aim & Objectives

The aim of Military Training for UG students is :-

- To inculcate an essence of camaraderie and brotherhood amongst the students.
- To bring energy and team spirit amongst participants.
- To expose the students to the essentials of physical well-being and fitness.
- To give exposure to students regarding adventure training.
- To inculcate leadership qualities in students.
- To expose students to subjects of general awareness such as role of armed forces in nation building, map reading and fire fighting.

Methodology

MTC is organized as a combined camp for both boys and girls, however, separate infrastructure for boys and girls have been created at AUG.

Assessment


Assessment of a student is based on the following :-

- (a) Participating in all activities and successfully completing the course.
- (b) Performance in the assimilation exercise held at the end of the course.
- (c) Participation in debate and class participation.
- (d) Exhibiting leadership qualities i.e. leading drill contingents.

Maximum of three credit will be given to participants.

Three modules have been designed to fulfill the aim and objectives of this Military Training Foundation Course as under :-

- | | | |
|----------------|---|----------------------------|
| (a) Module I | - | Military Training. |
| (b) Module II | - | Leadership and Motivation. |
| (c) Module III | - | Adventure training. |


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MODULES: MILITARY TRAINING CAMAPS (MTC)

Module-I: Military Training

Part-A

- 1.1 Introduction of Basic principles of Camping.
- 1.2 Drill aspect of discipline.
- 1.3 Camp Layout.
- 1.4 Hygiene and sanitation of camp.
- 1.5 Introduction to Armed Forces.
- 1.6 Role of Armed force in Nation building.

Part-B

- I. Conducting drill.
- II. Camp setting.
- III. General fitness exercises.
- IV. Obstacle crossing.
- V. Weapon firing.

Module-II: Leadership and Motivation

Part-A

- 2.1 National character and values
- 2.2 Role and importance of Leadership
- 2.3 Law of Armed Conflict
- 2.4 Team play and group cohesion

Part-B

- I. Tug of war
- II. Task assignment and conduct
- III. Group Discussion
- IV. Games
- V. Fire safety drills
- VI. March past

Module-III: Adventure Training

Part-B

- I. Trekking
- II. Rappelling
- III. Rope Climbing



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Bachelor of Commerce (Honors)

FLEXILEARN
-Freedom to design your degree



Curriculum & Scheme of Examination

2022

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GURUGRAM

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Registrar
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Bachelor of Commerce (Honors)

FINANCIAL ACCOUNTING-I

Course Code: COM2151

Credit Units: 03

Course Objective:

To develop conceptual understanding of the fundamentals of financial accounting system which processes transactions and other events through a book-keeping mechanism to prepare financial statements, and also to impart skills in accounting for recording various kinds of business transactions.

Course Contents:

Module I: Introduction

Financial Accounting Concepts, importance and scope, Single entry vs Double entry system of accounting. Journal, Ledger, Trial Balance, Errors and their rectification, Cash Book, Bank reconciliation statement.

Module II: Accounting Standards & IFRS, GAAP

Meaning of Accounting Standards, Types of Accounting Standards, Meaning of IFRS, Types of IFRS, Difference between IFRS & Indian GAAP,

Module III: Depreciation Accounting-(AS 6) & bill of exchange

Depreciation accounting and its methods, Inventory valuation and its methods. Bill of Exchange – Meaning, Parties of Bills of Exchange, Journal Entry in the books of drawer & drawee in different cases, Dishonor of bill & renewal of bill, Insolvency of drawee.

Module IV: Final Account of Sole Proprietor & Incomplete Record

Final accounts – Meaning Preparation of trading, Profitable Loss Account and Balance Sheet with adjustment, Non Profit organization – Meaning, Preparation of receipts and payments, income and expenditure accounts & balance sheet.

Module V: Royalties & Voyage Account

Meaning of Royalties, Short working, Short working recaptured, Journal entry in the books of landlord & lessee, Preparation of Ledger Accounts. Voyage account – Meaning, Preparation of voyage account in case of complete & Incomplete voyage account.

Examination Scheme:

Components	A	P	HA	CT	EE
Weightage (%)	5	5	5	15	70

A-Attendance; P-Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination

Text & References:

- Dr. S.N. Maheswari, Financial Accounting
- BS Raman, Financial Accounting
- Grewal and Gupta, Advanced Accounting
- Radhaswamy and R.L. Gupta, Advanced Accounting
- S.Kr. Paul, Advanced Accounting
- P.C. Tulasian, Pearson Editions, Introduction to Accounting
- Jain & Narang, Financial Accounting
- Sehgal, A and Sehgal, D “Advanced Accounting”, Part – 1, Taxmann Applied services, New Delhi

E-COMMERCE

Course Code: COM2103

Credit Units: 03

Course Objective:

The subject will provide students with the knowledge to cover wide-ranging aspects of conducting business on the Internet.

Course Contents:

Module I: E-Commerce Concept

Meaning, definition, concept, features, function of E-Commerce, E-Commerce practices v/s traditional practices, scope and basic models of E-Commerce, limitations of E-Commerce, precaution for secure E-Commerce, proxy services. Concept of EDI, difference between paper based Business and EDI Based business, Advantages of EDI, Application areas for EDI, Action plan for Implementing EDI, Factors influencing the choice of EDI, Software Concept of Electronic Signature, Access Control.

Module II: Types of E-Commerce

Meaning of B2C, B2B, C2C, P2P. Applications in B2C- E-Banking, E-Trading. E-Auction - Introduction and overview of these concepts. Application of B2B- E-distributor, B2B service provider, benefits of B2B on Procurement, Just in time delivery. Consumer to consumer and peer to peer business model Introduction and basic concepts.

Module III: E-Marketing

Traditional Marketing V/S E-Marketing, Impact of Ecommerce on markets, Marketing issue in E-Marketing, Promoting your E-Business. Direct marketing, one to one marketing, Marketing Strategies

Module IV: E-Finance

Areas of E-Financing, E-Banking, traditional v/s E-Banking, operations in E-Banking. E-Trading- Stock marketing, trading v/s E-Trading, Importance of E-Trading, Advantages of E-trading, operational aspects of E-Trading.

Module V: E-Payment

Transactions through Internet, Requirements of E-Payment system, Post paid payment system- Credit card solutions, cyber cash Internet cheques. Instant Paid payment system- Debit card, direct debit. Prepaid payment system- Electronic cash, digicash, Netcash, cybercash, smart cards.

Module VI: E-Security

How sites are hacked security on the internet, Firewall, Network & Website Security, Benefits of Internet Firewall.

Examination Scheme:

Components	A	P	HA	CT	EE
Weightage (%)	5	5	5	15	70

A-Attendance; P -Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination

Text & References:

- Computer Today, S. Bansundara
- E-Commerce: The Cutting Edge of Business, Kamblesh Bajaj and Debjani Nag, McGraw Hill
- E-Commerce, S. Jaiswal


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READINGS IN MANAGEMENT

Course Code: COM2130

Credit Units: 02

Objectives

The objective of this concentration elective is to inculcate reading habit alongwith value addition to the existing understanding of the subject. The book would be a kind of knowledge enhancer that would envision the student about some current thoughts related to the discipline. The book reading and its critical analysis would help broaden the intellectual horizon of the student. A contemporary and relevant book will be selected by the concerned department.

Guidelines

The student is expected to thoroughly go through the discipline related prescribed book with the objective of critically reviewing each aspect and character of the book. The student is supposed to have a detailed insight into the following:

1. Content
2. Writing style
3. Information/learning
4. Content handling
5. Characters(if any)
6. Thematic Clarity

The report is to be submitted in about 3000 words on A4 size sheets, Font 12pt., Times New Roman, 1.5 spacing. Headings in Font Size16.

Evaluation Scheme

Report on the Book in 3000 words	Written Test
50 marks	50 marks


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TERM PAPER

Course Code: COM2131

Credit Units: 02

Objectives

The objective of this course is to judge the understanding as well as application of the knowledge gained by the students. The aim of the term paper is to provide the students with an opportunity to further enhance their knowledge in a sector of their choice by undertaking a significant practical unit of examining and analyzing various aspects of business management at a level commensurate with the learning outcomes of the various courses taken up by them in the ongoing semester.

A term paper is primarily a record of intelligent reading in several sources on a particular subject. The students will choose the topic at the beginning of the session in consultation with the faculty assigned. At least one middle level or senior level person of a company from the chosen sector may be interviewed face to face.

Guidelines:

1. The term paper will be related to the contemporary business issue and the topic will be given by the department.
2. The presentation of the term paper is scheduled to be held before the commencement of Semester examinations.
3. The paper will carry 100 marks that will be marked on the basis of understanding and organization of content based on the literature review. The Bibliography shall form an important part of the paper.
4. **Examples of a few broad areas for Term Paper (List is indicative, not exhaustive)**

- Credit rating
- Risk management
- Subprime meltdown and its after effect with case study from Indian industry
- Corporate frauds
- Micro finance institutions in India
- Carbon Trading
- IFRS
- Celebrity Endorsement in real estate
- Social media marketing
- Green marketing
- Sustainable branding practices
- Relationship management
- CSR
- Balanced Score Card
- Corporate Governance
- Employee retention
- NGOs.

Evaluation Scheme

Organisation and relevance of content	Literature Review	Bibliography	Total
40	40	20	100


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PROJECT

Course Code: COM2132

Credit Units: 03

Objectives:

The aim of the project is to provide the students with an opportunity to further their intellectual and personal development in the chosen field by undertaking a significant practical unit of activity. The project can be defined as a scholarly inquiry into a problem or issues, involving a systematic approach to gathering and analysis of information / data, leading to production of a structured report.

Chapter Scheme and distribution of marks:

Chapter 1: Introduction – 10 marks

Chapter 2: Conceptual Framework/ National/International Scenario – 25 marks

Chapter 3: Presentation, Analysis & Findings -- 25 marks

Chapter 4: Conclusion & Recommendations -- 10 marks

Chapter 5: Bibliography -- 05 marks

Project Report	Power Point Presentation & Viva
75 marks	25 marks

Components of a Project Report

The outcome of Project Work is the Project Report. A project report should have the following components:

1) Cover Page: This should contain the title of the project proposal, to whom it is submitted, for which degree, the name of the author, name of the supervisor, year of submission of the project work, name of the University.

2) Acknowledgement: Various organizations and individuals who might have provided assistance /co-operation during the process of carrying out the study.

3) Table of Content: Page-wise listing of the main contents in the report, i.e., different Chapters and its main Sections along with their page numbers.

4) Body of the Report: The body of the report should have these four logical divisions

a) **Introduction:** This will cover the background, rationale/ need / justification, brief review of literature, objectives, methodology (the area of the study, sample, type of study, tools for data collection, and method of analysis), Limitations of the Study, and Chapter Planning.

b) **Conceptual Framework / National and International Scenario:** (relating to the topic of the Project).

c) **Presentation of Data, Analysis and Findings:** (using the tools and techniques mentioned in the methodology).

d) **Conclusion and Recommendations:** In this section, the concluding observations based on the main findings and suggestions are to be provided.

5) Bibliography or References: This section will include the list of books and articles which have been used in the project work, and in writing a project report.

6) Annexures: Questionnaires (if any), relevant reports, etc.

(The main text of the Project should normally be in the range of 5000 words. However, there may be annexure in addition to the main text)

The Steps of a Project Report

Step I : Selection of the topic for the project by taking following points into consideration:

- Suitability of the topic.
- Relevance of the topic
- Time available at the disposal.
- Feasibility of data collection within the given time limit.

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- Challenges involved in the data collection (time & cost involved in the data collection, possibility of getting responses, etc.)

Step II : Finalisation of the Topic and preparation of Project Proposal in consultation with the Supervisor.

Step III : Collection of information and data relating to the topic and analysis of the same.

Step IV : Writing the report dividing it into suitable chapters, viz.,

Chapter 1: Introduction,

Chapter 2: Conceptual Framework / National & International Scenario,

Chapter 3: Analysis & Findings

Chapter 4: Conclusion and Recommendations.

Step V : The following documents are to be attached with the Final Project Report.

1) Approval letter from the supervisor (Annexure-IA)

2) Student's declaration (Annexure-IB)

3) Certificate from the Competent Authority of the Organisation / Institution, if the student undertakes the Project Work in any Organisation / Institution.

Guidelines for Evaluation:

- Each of the students has to undertake a Project individually under the supervision of a teacher and to submit the same following the guidelines stated below.
- Language of Project Report and Viva-Voce Examination may be English. The Project Report must be typed and hard bound.
- Failure to submit the Project Report or failure to appear at the Viva-voce Examination will be treated as "Absent" in the Examination. He /she has to submit the Project Report and appear at the Viva-Voce Examination in the subsequent years (within the time period as per University Rules).
- No marks will be allotted on the Project Report unless a candidate appears at the Viva-Voce Examination. Similarly, no marks will be allotted on Viva-Voce Examination unless a candidate submits his/her Project Report.
- Evaluation of the Project Work to be done jointly by one internal expert and one external expert with equal weightage, i.e., average marks of the internal and external experts will be allotted to the candidate.



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WORKSHOP

Course Code: COM2133

Credit Units: 01

Objectives

A workshop is primarily an activity based academic event that is organized to provide the students a one to one and hands on experience on any aspect of their learning. The communication in a workshop has to be necessarily two way. The trainer has to make sure that the aspect covered are practically practiced by the participants. The student will choose the option of workshop from amongst their concentration electives. The evaluation will be done by Board of examiners comprising of the faculties.

Major Themes for Workshop

The workshop may be conducted on any of the following major themes:

Accounting

Finance

Human Resources

Marketing

Economics

Operations

Supply Chain Management

These themes are merely indicative and other recent and relevant topics of study may be included.

Guidelines for Workshop

The procedure for earning credits from workshop consists of the following steps:

1. Relevant study material and references will be provided by the trainer in advance.
2. The participants are expected to explore the topic in advance and take active part in the discussions held
3. Attending and Participating in all activities of the workshop
4. Group Activities have to be undertaken by students as guided by the trainer.
5. Evaluation of workshop activities would be done through test and quiz at the end of the workshop.
6. Submitting a write up of atleast 500 words about the learning outcome from the workshop.

Methodology

The methodology followed at the workshop could be based on any one or more of the following methods:

Case Study

Business Game

Simulation

Group Activity

Role Play

Business Planning

Quiz

Evaluation Scheme:

Attendance	Active Participation	Multiple Choice Questions/ Quiz	Solving the case/ Assignment/ Write up	Total
10	30	30	30	100


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FINANCIAL ACCOUNTING-II

Course Code: COM2251

Credit Units: 03

Course Objective:

To develop conceptual understanding of the fundamentals of financial accounting system which processes transactions and other events through a book-keeping mechanism to prepare financial statements, and also to impart skills in accounting for recording various kinds of business transactions.

Course Contents:

Module I: Partnership

Admission of a partner: partnership deed, goodwill valuation and treatment. Sacrificing ratio.

Retirement and death of a partner: gaining ratio, goodwill treatment

Dissolution of partnership: revaluation of assets and liabilities. Legal Position, Accounting for simple dissolution,

Applications of rule in case of Garner Vs. Murray in case of insolvency of partner(s) (excluding piecemeal distribution and sale of a firm to a company).

Module II: Branch & Departmental Accounting

Branch & Departmental Accounting – Meaning, Types of Branch, Methods of Recording, Journal Entries in case of dependent branch, ascertainment of profit by debtors method and stock and debtors method. Departmental Account – Meaning, Methods of Recording, Transaction in case of departments

Module III: Consignment and Joint Venture Accounts

(i) **Consignments:** Features, Accounting treatment in the books of the consignor and consignee.

(ii) **Joint Ventures:** Accounting procedures: Joint Bank Account, Records Maintained by Co- venturer of (a) all transactions (b) only his own transactions. (Memorandum joint venture account).

Module IV: Hire purchase and Installment Payment System

Hire purchase - Meaning, Accounting for Hire Purchase Transactions, Journal entries and ledger accounts in the books of Hire Vendors and Hire purchaser. Instalment payment system, difference between hire purchase system & instalment payment system - Journal entries and ledger accounts in the books of Hire Vendors and Hire purchaser

Examination Scheme:

Components	A	P	HA	CT	EE
Weightage (%)	5	5	5	15	70

A-Attendance; P -Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination

Text & References:

- Dr. S.N. Maheswari, Financial Accounting
- BS Raman, Financial Accounting
- Grewal and Gupta, Advanced Accounting
- Radhaswamy and R.L. Gupta, Advanced Accounting
- S.Kr. Paul, Advanced Accounting
- P.C. Tulasian, Pearson Editions, Introduction to Accounting
- Jain & Narang, Financial Accounting
- Sehgal, A and Sehgal, D “Advanced Accounting”, Part – 1, Taxmann Applied services, New Delhi

ADVERTISING MANAGEMENT

Course Code: COM2205

Credit Units: 03

Course Objectives: To develop an in -depth understanding of the modern concepts and latest techniques of advertising and personal selling and sales force management which constitute a fast - growing area of marketing.

Course Contents:

Module I: Advertising Management

Communication Basics: Communication and marketing; Communication process; Communication response hierarchy models; Cognitive processing of communication; EKB model; Marketing communication mix; Integrated marketing communication – an introduction; Advertising - Its importance and nature; Advertising and publicity; Advertising management process; Advertising objectives; DAGMAR Approach; Determination of Target Audience and positioning; Advertising budget – factors influencing budget decision and methods.

Module II: Advertising Message and Media Decisions

Creativity and advertising; Creative process; Creative appeals and execution styles; Developing advertising copy for print ad - headline, body copy, logo, illustration and layout. Media Decisions – Types of media, Advertising through Internet and interactive media; Developing media plan; media selection and scheduling.

Module III: Organization and Evaluation of Advertising Efforts

Centralized and decentralized systems; Inhouse agency arrangements; Advertising agencies – selection, compensation and appraisal of advertising agency; managing advertising agency relations; IMC services; Reasons for evaluating Advertising Effectiveness; Advertising testing process - Before and after advertising tests and techniques.

Module IV: Advertising in India

Social and regulatory aspects of advertising in India. Recent developments and issues in advertising. Section B: Sales Management


Examination Scheme:

Components	A	P	HA	CT	EE
Weightage (%)	5	5	5	15	70

A-Attendance; P -Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination

Text & References:

- Aaker, David A., Rajeev Batra and John G. Mayers, Advertising Management, Prentice Hall of India.
- Belch. George and Michael Belch, Advertising and Promotion: An Integrated Marketing Communications Perspective, McGraw Hill Education.
- Still, Richard R., Sales Management: Decisions, Strategies and Cases, Pearson Education India
- Anderson B. Robert, Professional Selling, Universe.
- Johnston, Mark W. and Greg W. Marshall, Sales Force Management: Leadership, Innovation, Technology, Routledge.
- Spiro, Rosann, William J. Stanton and Gregory A. Rich, Management of a Sales Force, McGraw Hill Education.
- Hair, Sales Management, Cengage Learning.
- Johnston, mark W. and Greg W. Marshall, Contemporary Selling: Building Relationships and Creating Value, Routledge.
- Sharma, Kavita, Advertising: Planning and Decision Making, Taxmann.


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COMPUTER APPLICATIONS IN BUSINESS

Course Code: COM2204

Credit Units: 03

Course Objective:

To provide computer skills and knowledge for commerce students, and to make them complacent with the use of new tools of IT.

Course Contents:

Module I

General features of a Computer. Generation of computers. Personal Computer, Workstation, Mainframe Computer and super Computers. Computer applications – data processing, information processing, Application areas of computer.

Module II

Computer organization. Central processing module. Computer memory- primary memory and secondary memory. Secondary storage devices – magnetic and optical media. Input and output modules. OMR, OCR, MICR, scanner, mouse, Modem.

Module III

Computer hardware and software. Machine language and high level language. Application software. Computer program. Operating system. Computer virus, Antivirus and Computer security, Windows OS and its features.

Computer arithmetic. Binary, octal and hexadecimal number systems. Algorithm and flowcharts. Illustrations. Elements of database and its applications.

Module IV

Introduction to MS office Packages- Ms-Word – Editing a Document – Move and Copy text – Formatting text and paragraph – Finding and Replacing text and spelling checking – Using tabs, Tables, and other features, Enhancing document – using mail merge and other features.

Introduction to Worksheet- Getting started with excel – Editing Cells and using commands and functions – Moving And Coping, Inserting and Deleting Rows and Columns – Getting help and formatting a worksheet – Printing the worksheet – Creating Charts – using formulae and functions in excel. Introduction to Power Point Presentation

Module V

Computer Networks & Internet Technology

Introduction to Computer Networks, Networking components, Classification and types of Networks, Network Topologies – Overview with Advantages and Disadvantages, Communication Channels, Client Sever Architecture, LAN concepts.

Introduction to internet intranet and Extranet, Myths about the Internet, Basic concepts of internet, Domain Name Service, Internet Protocols and Addressing, Services of internet, Internet and support Technologies, Censorship and Privacy issues

Examination Scheme:

Components	A	P	HA	CT	EE
Weightage (%)	5	5	5	15	70

A-Attendance; P -Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination


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Text & References:

- Craig Stinson “Running Microsoft Windows-98” – Microsoft press.
- Joshua C. Nossiter. “ Using Excel – 5 for Windows”
- “Working with Word” – Aptech Computer Education
- “Power Point Presentation” – Aptech Computer Education.
- Malhotra, Computer Applications in Business
- Rajaraman V, Analysis and Design of Information System, Prentice Hall of India, New Delhi
- Murdick, RG and Ross, JE Information Systems for Modern Management
- Kanter, J, Management Oriented MIS, Prentice Hall of India
- Bhattacharya SK, Management Planning and Information Systems



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INNOVATION & CREATIVITY MANAGEMENT

Course Code: COM2207

Credit Units: 03

Course Objective:

To develop an appreciation for new ideas and out of the box thinking so that students can successfully imbibe the habit of innovative and creative thinking in situations is demanding such an approach.

Course Contents:

Module I:

Innovation Management- Introduction, characteristics, Components, Types, Models of Innovation process, Innovation Environment-Originators of Innovation, Key Drivers of Innovation, Factors influencing innovation, Nurturing innovation in e-business.

Module II:

Organizing for Innovation- Organizational theories and structures, traits of innovative organizations, current trends, factors influencing organizational design and size decisions, Need & Characteristics for creative organization, 7S framework, creativity crushers, fostering innovation climate and culture, The creativity Hit List.

Module III:

Research and Development management- Significance, Prerequisites, Process, Technology development approaches, management of R &D, In source to open source environment, R&D in small industry, Managing Creative employees, significance and challenges of managing creative employees, Traits of a creative person, motivation to creativity, strategies for unblocking creativity, factors influencing group creativity, Promoting group creativity, Left and right thinking, Linear and non-linear thinking process, creative thinking, Tradition vs creative thinking.

Module IV:

Individual creativity techniques- Inner and Directed creativity techniques, Group Creativity Techniques-creativity methods, writing techniques, techniques based on pictures, maps and networks, Product innovation-types of new products, Target markets for Disruptive Innovation, Technology strategies for innovation, new product development, packaging and positioning innovations, beyond product innovation, New product failures.

Module V:

Innovation Diffusion- Concept of diffusion and adaptation, diffusion types, Innovation diffusion theory, Innovation adoption by organizations, Innovation adoption across countries, Marketing strategy and the diffusion process.

Module VI:

Legal aspects of innovation- IPR, Indian Patents Act, trademark, Copyrights, Trade secrets, Towards Innovative Society-Innovation for social development, Spirit of innovation in India, Favourable and Unfavourable factors.

Examination Scheme:

Components	A	P	HA	CT	EE
Weightage (%)	5	5	5	15	70

A-Attendance; P -Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination


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Text & References:

Text:

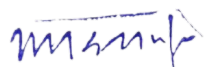
- Krishnamarcharyulu and Lalitha, *Innovation Management*, Himalaya Publishing House, New Delhi- 2007

References:

- Plsek, *Creativity, Innovation and Quality*, Prentice Hall of India, New Delhi-2003



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HUMAN VALUES AND PROFESSIONAL ETHICS

Course Code: COM2208

Credit Units: 03

Course Objective:

The aim of this course is to facilitate the development of a holistic perspective among students towards life, profession and happiness, based on a correct understanding of the Human reality and the rest of Existence. Such a holistic perspective forms the basis of value based living in a natural way. Recognize the need for lifelong learning and have the knowledge and skills that prepare them to identify the Moral issues involved in Management areas and to provide an understanding of the interface between Social, Technological and Natural environments.

Course Contents:

Module I: Human Values

Morals, Values, Types of values, evolution of human values, Ethics – Integrity – Work Ethic – Honesty – Courage –Empathy – Self-Confidence – Character, Challenges at Work place

Module II: Values in Management

Relevance of values in Management, need for values in global change, values for managers, holistic approach for managers in decision making, problems related to stress in corporate management

Module III:

Workplace Rights and Responsibilities: Organizational complaint procedures. Government agencies. Resolving Employee concerns. Limits on acceptable behavior in large corporation. Work environment: Ethical and legal considerations, Organizational responses to offensive behavior and harassment. Ethics in a Global Context.

Module IV: Industrial Integrity

The epitome of industrial success, Integrity and organization, Exploring learning process of integrity, Consequences of lack of integrity.

Examination Scheme:

Components	A	P	HA	CT	EE
Weightage (%)	5	5	5	15	70

A-Attendance; P -Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination

Text &References:

Text

- R R Gaur, R Sangal, G P Bagaria, 2010, *A Foundation Course in Human Values and Professional Ethics*, Excel Books

References:

- Ivan Illich, 1974, *Energy & Equity*, The Trinity Press, Worcester, and HarperCollins, USA
- E.F. Schumacher, 1973, *Small is Beautiful: a study of economics as if people mattered*, Blond & Briggs, Britain.
- A Nagaraj, 1998, *Jeevan Vidya ek Parichay*, Divya Path Sansthan, Amarkantak.
- Sussan George, 1976, *How the Other Half Dies*, Penguin Press. Reprinted 1986, 1991
- PL Dhar, RR Gaur, 1990, *Science and Humanism*, Commonwealth Purblishers.
- A.N. Tripathy, 2003, *Human Values*, New Age International Publishers.
- Donella H. Meadows, Dennis L. Meadows, Jorgen Randers, William W. Behrens III, 1972, *Limits to Growth – Club of Rome's report*, Universe Books.

READINGS IN MANAGEMENT

Course Code: COM2230

Credit Units: 02

Objectives

The objective of this concentration elective is to inculcate reading habit alongwith value addition to the existing understanding of the subject. The book would be a kind of knowledge enhancer that would envision the student about some current thoughts related to the discipline. The book reading and its critical analysis would help broaden the intellectual horizon of the student. A contemporary and relevant book will be selected by the concerned department.

Guidelines

The student is expected to thoroughly go through the discipline related prescribed book with the objective of critically reviewing each aspect and character of the book. The student is supposed to have a detailed insight into the following:

1. Content
2. Writing style
3. Information/learning
4. Content handling
5. Characters(if any)
6. Thematic Clarity

The report is to be submitted in about 3000 words on A4 size sheets, Font 12pt., Times New Roman, 1.5 spacing. Headings in Font Size16.

Evaluation Scheme

Report on the Book in 3000 words	Written Test
50 marks	50 marks


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TERM PAPER

Course Code: COM2231

Credit Units: 02

Objectives

The objective of this course is to judge the understanding as well as application of the knowledge gained by the students. The aim of the term paper is to provide the students with an opportunity to further enhance their knowledge in a sector of their choice by undertaking a significant practical unit of examining and analyzing various aspects of business management at a level commensurate with the learning outcomes of the various courses taken up by them in the ongoing semester.

A term paper is primarily a record of intelligent reading in several sources on a particular subject. The students will choose the topic at the beginning of the session in consultation with the faculty assigned. At least one middle level or senior level person of a company from the chosen sector may be interviewed face to face.

Guidelines:

1. The term paper will be related to the contemporary business issue and the topic will be given by the department.
2. The presentation of the term paper is scheduled to be held before the commencement of Semester examinations.
3. The paper will carry 100 marks that will be marked on the basis of understanding and organization of content based on the literature review. The Bibliography shall form an important part of the paper.
4. **Examples of a few broad areas for Term Paper (List is indicative, not exhaustive)**

- Credit rating
- Risk management
- Subprime meltdown and its after effect with case study from Indian industry
- Corporate frauds
- Micro finance institutions in India
- Carbon Trading
- IFRS
- Celebrity Endorsement in real estate
- Social media marketing
- Green marketing
- Sustainable branding practices
- Relationship management
- CSR
- Balanced Score Card
- Corporate Governance
- Employee retention
- NGOs.

Evaluation Scheme

Organisation and relevance of content	Literature Review	Bibliography	Total
40	40	20	100


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PROJECT

Course Code: COM2232

Credit Units: 03

Objectives:

The aim of the project is to provide the students with an opportunity to further their intellectual and personal development in the chosen field by undertaking a significant practical unit of activity. The project can be defined as a scholarly inquiry into a problem or issues, involving a systematic approach to gathering and analysis of information / data, leading to production of a structured report.

Chapter Scheme and distribution of marks:

Chapter 1: Introduction – 10 marks

Chapter 2: Conceptual Framework/ National/International Scenario – 25 marks

Chapter 3: Presentation, Analysis & Findings -- 25 marks

Chapter 4: Conclusion & Recommendations -- 10 marks

Chapter 5: Bibliography -- 05 marks

Project Report	Power Point Presentation & Viva
75 marks	25 marks

Components of a Project Report

The outcome of Project Work is the Project Report. A project report should have the following components:

1) Cover Page: This should contain the title of the project proposal, to whom it is submitted, for which degree, the name of the author, name of the supervisor, year of submission of the project work, name of the University.

2) Acknowledgement: Various organizations and individuals who might have provided assistance /co-operation during the process of carrying out the study.

3) Table of Content: Page-wise listing of the main contents in the report, i.e., different Chapters and its main Sections along with their page numbers.

4) Body of the Report: The body of the report should have these four logical divisions

a) **Introduction:** This will cover the background, rationale/ need / justification, brief review of literature, objectives, methodology (the area of the study, sample, type of study, tools for data collection, and method of analysis), Limitations of the Study, and Chapter Planning.

b) **Conceptual Framework / National and International Scenario:** (relating to the topic of the Project).

c) **Presentation of Data, Analysis and Findings:** (using the tools and techniques mentioned in the methodology).

d) **Conclusion and Recommendations:** In this section, the concluding observations based on the main findings and suggestions are to be provided.

5) Bibliography or References: This section will include the list of books and articles which have been used in the project work, and in writing a project report.

6) Annexures: Questionnaires (if any), relevant reports, etc.

(The main text of the Project should normally be in the range of 5000 words. However, there may be annexure in addition to the main text)

The Steps of a Project Report

Step I : Selection of the topic for the project by taking following points into consideration:

- Suitability of the topic.
- Relevance of the topic
- Time available at the disposal.
- Feasibility of data collection within the given time limit.
- Challenges involved in the data collection (time & cost involved in the data collection, possibility of getting responses, etc.)

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Step II : Finalisation of the Topic and preparation of Project Proposal in consultation with the Supervisor.

Step III : Collection of information and data relating to the topic and analysis of the same.

Step IV : Writing the report dividing it into suitable chapters, viz.,

Chapter 1: Introduction,

Chapter 2: Conceptual Framework / National & International Scenario,

Chapter 3: Analysis & Findings

Chapter 4: Conclusion and Recommendations.

Step V : The following documents are to be attached with the Final Project Report.

1) Approval letter from the supervisor (Annexure-IA)

2) Student's declaration (Annexure-IB)

3) Certificate from the Competent Authority of the Organisation / Institution, if the student undertakes the Project Work in any Organisation / Institution.

Guidelines for Evaluation:

- Each of the students has to undertake a Project individually under the supervision of a teacher and to submit the same following the guidelines stated below.
- Language of Project Report and Viva-Voce Examination may be English. The Project Report must be typed and hard bound.
- Failure to submit the Project Report or failure to appear at the Viva-voce Examination will be treated as "Absent" in the Examination. He /she has to submit the Project Report and appear at the Viva-Voce Examination in the subsequent years (within the time period as per University Rules).
- No marks will be allotted on the Project Report unless a candidate appears at the Viva-Voce Examination. Similarly, no marks will be allotted on Viva-Voce Examination unless a candidate submits his/her Project Report.
- Evaluation of the Project Work to be done jointly by one internal expert and one external expert with equal weightage, i.e., average marks of the internal and external experts will be allotted to the candidate.



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WORKSHOP

Course Code: COM2233

Credit Units: 01

Objectives

A workshop is primarily an activity based academic event that is organized to provide the students a one to one and hands on experience on any aspect of their learning. The communication in a workshop has to be necessarily two way. The trainer has to make sure that the aspect covered are practically practiced by the participants. The student will choose the option of workshop from amongst their concentration electives. The evaluation will be done by Board of examiners comprising of the faculties.

Major Themes for Workshop

The workshop may be conducted on any of the following major themes:

Accounting

Finance

Human Resources

Marketing

Economics

Operations

Supply Chain Management

These themes are merely indicative and other recent and relevant topics of study may be included.

Guidelines for Workshop \

The procedure for earning credits from workshop consists of the following steps:

1. Relevant study material and references will be provided by the trainer in advance.
2. The participants are expected to explore the topic in advance and take active part in the discussions held
3. Attending and Participating in all activities of the workshop
4. Group Activities have to be undertaken by students as guided by the trainer.
5. Evaluation of workshop activities would be done through test and quiz at the end of the workshop.
6. Submitting a write up of atleast 500 words about the learning outcome from the workshop.

Methodology

The methodology followed at the workshop could be based on any one or more of the following methods:

Case Study

Business Game

Simulation

Group Activity

Role Play

Business Planning

Quiz

Evaluation Scheme:

Attendance	Active Participation	Multiple Choice Questions/ Quiz	Solving the case/ Assignment/ Write up	Total
10	30	30	30	100


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CORPORATE ACCOUNTING

Course Code: COM2351

Credit Units: 03

Course Objective:

This course enables the students to develop awareness about Corporate Accounting in conformity with the Provision of Companies' Act and latest amendments thereto with adoption of Accounting Standards that are likely to be introduced from time to time.

Course Contents:

Module I- Accounting for Share Capital

Statutory records to be maintained by a company; Accounting for share capital transactions- issue of shares at par, at premium forfeiture and re-issue of shares; buy-back of equity shares; redemption of preference shares - statutory requirements, disclosure in balance sheet; rights issue, bonus shares.

Module II: Accounting For Debentures

Issue & Redemption of debentures - accounting treatment and procedures; conversion of debentures into shares

Module III: Valuation of Goodwill and shares

Good will- Meaning, definition, elements, types and methods of valuation of Goodwill, Methods of share valuation (Equity & preference shares).

Module IV: Amalgamation

Accounting treatment for amalgamation with reference to As-14 (excluding intercompany transactions & holdings), absorption and reconstruction of companies; internal & external reconstruction

Examination Scheme:

Components	A	P	HA	CT	EE
Weightage (%)	5	5	5	15	70

A-Attendance; P -Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination

Text & References:

- S.N. Maheswari, Financial Accounting
- Narayanaswamy, Financial Accounting
- SP Iyengar, Advanced Accountancy
- RL Gupta, Advanced Accountancy
- Jain and Narang, Corporate Accounting
- Tulsian, Advanced Accounting


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STATISTICAL METHODS IN RESEARCH-I

Course Code: COM2301

Credit Units: 03

Course Objectives:

To provide basic understanding of quantitative tools and their elementary application to business problems.

Course Contents:

Module I- Introduction to Statistics

Basic Concepts, Primary & Secondary data, classification of data, Graphical representation of data, frequency distribution.

Module II- Central Tendency and Dispersion

Measures of central tendency; Mean, Median, Mode, Geometric mean and Harmonic mean; Measures of dispersion; Range, Mean Deviation, Standard Deviation, Coefficient of variation, Quartile Deviation, Skewness and Kurtosis; Difference between these measures and their interpretation.

Module III- Correlation & Regression

Correlation- Concepts and importance, Positive & Negative correlation, Karl-Pearson's coefficient of correlation, Rank correlation coefficient, Spurious correlation, Coefficient of determination.

Regression- Concept, Difference between correlation & regression.

Module IV- Time Series and Index numbers

Time Series- Introduction, components of a time series, Multiplicative and additive models, Semi Average & Moving Average method;

Index Numbers- Concept, price relative, quantity relative, value relative, Laspeyre's, Passche's and Fisher's index numbers, Family Budget method, problems in construction and limitations of index numbers Tests for adequacy of index numbers.

Examination Scheme:

Components	A	P	HA	CT	EE
Weightage (%)	5	5	5	15	70

A-Attendance; P -Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination

Text & References:

Text:

- Fundamentals of Applied Statistics, V.K.Kapoor & S.C.Gupta, S. Chand & Sons, New Delhi.
- Theory and Problems of Statistics, M.R. Theory, McGraw-Hill Book, London.

References:

- Essential Mathematics for Economics, J. Black & J.F. Bradley, John Wiley and Sons.
- Fundamental Method of Mathematical Economics, Chiang, McGraw-Hill New Delhi.
- Applied General Statistics. F.E. Croxton & D.J. Cowden, Prentice Hall, New Delhi.

CORPORATE LAW

Course Code: COM2302

Credit Units: 03

Course Objective:

To develop an understanding of the regulation of registered companies and to provide thorough understanding of the various provisions of the Indian Company Law

Course Contents:

Module I-

Brief History of Company Law : Definition and Characteristics, Lifting of Corporate Veil, Kinds of Companies, Exemptions and Privileges to Private Companies; Promoters' Liability, Pre- incorporation Contracts, Formation of Company. Memorandum and Articles of Association; Doctrine of Ultra-virus; Doctrine of Indoor Management.

Module II-

Prospectus: Meaning and contents, Deemed Prospectus; Shares and Debentures: Meaning, Types and their Allotment, Reduction of Share Capital, Buy-Back of Shares Borrowing Powers: Debentures-issue, floating and Fixed Charge; Registration of Mortgage and Charges, Disposal of Profits-Dividends, Issue of Bonus Shares.

Module III-

Directors, Managing Directors and Manager: Appointment, Retirement Removal, Duties and Rights, Company Management, Prevention of Mismanagement and Oppressions.

Module IV-

Role and Importance of Corporate Governance. Investigation, Winding up of Companies and Legal Provisions under the Indian Companies Act, 2013

Module V-

Company Secretary : Appointment, Position, Rights, Duties and Liabilities Meeting : Types, Requisites of a Valid Meeting, Members' Meeting : Statutory, Annual General Meeting, Extraordinary General Meeting. Regulatory Powers of SEBI and RBI with reference to Issue of Shares, Listing of Shares and borrowing powers.

Examination Scheme:

Components	A	P	HA	CT	EE
Weightage (%)	5	5	5	15	70

A-Attendance; P -Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination

Text & References:

- M.C. Shukla & Gulshan: Principles of Company Law.
- N.D. Kapoor: Company Law and Secretarial Practice.
- M.C. Bhandari: Guide to Company Law Procedures.
- Tuteja: Company Administration and Meetings.
- S.C. Kuchehal: Company Law and Secretarial Practice.
- Dr. P.N. Reddy and H.R. Appanaiah: Essentials of Company Law and Secretarial Practice, Himalaya Publishers.


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MERGERS AND ACQUISITIONS

Course Code: COM2305

Credit Units: 03

Course Objective:

The main objective of this course is to familiarize the students with the basic aspects of mergers and acquisitions.

Course Contents:

Module I: Mergers and Acquisitions – Overview

Introduction – Forms of Corporate Restructuring – Expansion – Mergers and Acquisitions – Tender Offers – Joint Ventures – Sell Offs – Spin Offs – Split Offs – Split Ups – Divestitures – Equity Carve outs - Corporate Control – Premium Buy Backs – Standstill Agreements – Anti- Takeover Amendments – Proxy Contests - Changes in Ownership Structures - Share Repurchases – Exchange Offers – Leveraged Buy – out – Going Private – Issue Raised by Restructuring – History of Merger Movements.

Module II: Mergers and Acquisitions

Economic Rationale for Major Types of Mergers - Horizontal Mergers – Vertical Mergers – Conglomerate Mergers - Concentric Mergers.

Module III: Theories of Mergers

Efficiency Theories – Differential Efficiency - Inefficient Management – Operating Synergy – Pure Diversification - Financial Synergy – Strategic Realignment to Changing Environments – Undervaluation – Information and Signaling – Agency Problems and Managerialism - Takeovers as a Solution to Agency Problems

Module IV: Divestment of Public Sector Undertakings and Leveraged Buy-outs

General Economic and Financial Factors illustration of an LBO Takeover Defenses
Anti-Takeover Amendments, Any case study

Examination Scheme:

Components	A	P	HA	CT	EE
Weightage (%)	5	5	5	15	70

A-Attendance; P -Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination

Text & References:

Text:

- The Complete Guide to Mergers and Acquisitions : Process Tools to Support M & A Integration at Every Level – Timothy J Galpin and Mark Herndon, 2007
- Mergers – What Can Go Wrong and How to Prevent it – Patrick A Gaughan (Wiley Finance)

References:

- Mergers and Acquisitions – Fred Weston
- M & A and Corporate Restructuring - Patrick A Gaughan (Wiley Finance Series)

TERM PAPER

Course Code: COM2331

Credit Units: 02

Objectives

The objective of this course is to judge the understanding as well as application of the knowledge gained by the students. The aim of the term paper is to provide the students with an opportunity to further enhance their knowledge in a sector of their choice by undertaking a significant practical unit of examining and analyzing various aspects of business management at a level commensurate with the learning outcomes of the various courses taken up by them in the ongoing semester.

A term paper is primarily a record of intelligent reading in several sources on a particular subject. The students will choose the topic at the beginning of the session in consultation with the faculty assigned. At least one middle level or senior level person of a company from the chosen sector may be interviewed face to face.

Guidelines:

1. The term paper will be related to the contemporary business issue and the topic will be given by the department.
2. The presentation of the term paper is scheduled to be held before the commencement of Semester examinations.
3. The paper will carry 100 marks that will be marked on the basis of understanding and organization of content based on the literature review. The Bibliography shall form an important part of the paper.
4. **Examples of a few broad areas for Term Paper (List is indicative, not exhaustive)**

- Credit rating
- Risk management
- Subprime meltdown and its after effect with case study from Indian industry
- Corporate frauds
- Micro finance institutions in India
- Carbon Trading
- IFRS
- Celebrity Endorsement in real estate
- Social media marketing
- Green marketing
- Sustainable branding practices
- Relationship management
- CSR
- Balanced Score Card
- Corporate Governance
- Employee retention
- NGOs.

Evaluation Scheme

Organisation and relevance of content	Literature Review	Bibliography	Total
40	40	20	100


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PROJECT

Course Code: COM2332

Credit Units: 02

Objectives:

The aim of the project is to provide the students with an opportunity to further their intellectual and personal development in the chosen field by undertaking a significant practical unit of activity. The project can be defined as a scholarly inquiry into a problem or issues, involving a systematic approach to gathering and analysis of information / data, leading to production of a structured report.

Chapter Scheme and distribution of marks:

Chapter 1: Introduction – 10 marks

Chapter 2: Conceptual Framework/ National/International Scenario – 25 marks

Chapter 3: Presentation, Analysis & Findings -- 25 marks

Chapter 4: Conclusion & Recommendations -- 10 marks

Chapter 5: Bibliography -- 05 marks

Project Report	Power Point Presentation & Viva
75 marks	25 marks

Components of a Project Report

The outcome of Project Work is the Project Report. A project report should have the following components:

1) Cover Page: This should contain the title of the project proposal, to whom it is submitted, for which degree, the name of the author, name of the supervisor, year of submission of the project work, name of the University.

2) Acknowledgement: Various organizations and individuals who might have provided assistance /co-operation during the process of carrying out the study.

3) Table of Content: Page-wise listing of the main contents in the report, i.e., different Chapters and its main Sections along with their page numbers.

4) Body of the Report: The body of the report should have these four logical divisions

a) **Introduction:** This will cover the background, rationale/ need / justification, brief review of literature, objectives, methodology (the area of the study, sample, type of study, tools for data collection, and method of analysis), Limitations of the Study, and Chapter Planning.

b) **Conceptual Framework / National and International Scenario:** (relating to the topic of the Project).

c) **Presentation of Data, Analysis and Findings:** (using the tools and techniques mentioned in the methodology).

d) **Conclusion and Recommendations:** In this section, the concluding observations based on the main findings and suggestions are to be provided.

5) Bibliography or References: This section will include the list of books and articles which have been used in the project work, and in writing a project report.

6) Annexures: Questionnaires (if any), relevant reports, etc.

(The main text of the Project should normally be in the range of 5000 words. However, there may be annexure in addition to the main text)

The Steps of a Project Report

Step I : Selection of the topic for the project by taking following points into consideration:

- Suitability of the topic.
- Relevance of the topic
- Time available at the disposal.
- Feasibility of data collection within the given time limit.
- Challenges involved in the data collection (time & cost involved in the data collection, possibility of getting responses, etc.)

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Step II : Finalisation of the Topic and preparation of Project Proposal in consultation with the Supervisor.

Step III : Collection of information and data relating to the topic and analysis of the same.

Step IV : Writing the report dividing it into suitable chapters, viz.,

Chapter 1: Introduction,

Chapter 2: Conceptual Framework / National & International Scenario,

Chapter 3: Analysis & Findings

Chapter 4: Conclusion and Recommendations.

Step V : The following documents are to be attached with the Final Project Report.

1) Approval letter from the supervisor (Annexure-IA)

2) Student's declaration (Annexure-IB)

3) Certificate from the Competent Authority of the Organisation / Institution, if the student undertakes the Project Work in any Organisation / Institution.

Guidelines for Evaluation:

- Each of the students has to undertake a Project individually under the supervision of a teacher and to submit the same following the guidelines stated below.
- Language of Project Report and Viva-Voce Examination may be English. The Project Report must be typed and hard bound.
- Failure to submit the Project Report or failure to appear at the Viva-voce Examination will be treated as "Absent" in the Examination. He /she has to submit the Project Report and appear at the Viva-Voce Examination in the subsequent years (within the time period as per University Rules).
- No marks will be allotted on the Project Report unless a candidate appears at the Viva-Voce Examination. Similarly, no marks will be allotted on Viva-Voce Examination unless a candidate submits his/her Project Report.
- Evaluation of the Project Work to be done jointly by one internal expert and one external expert with equal weightage, i.e., average marks of the internal and external experts will be allotted to the candidate.



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WORKSHOP

Course Code: COM2333

Credit Units: 01

Objectives

A workshop is primarily an activity based academic event that is organized to provide the students a one to one and hands on experience on any aspect of their learning. The communication in a workshop has to be necessarily two way. The trainer has to make sure that the aspect covered are practically practiced by the participants. The student will choose the option of workshop from amongst their concentration electives. The evaluation will be done by Board of examiners comprising of the faculties.

Major Themes for Workshop

The workshop may be conducted on any of the following major themes:

Accounting

Finance

Human Resources

Marketing

Economics

Operations

Supply Chain Management

These themes are merely indicative and other recent and relevant topics of study may be included.

Guidelines for Workshop

The procedure for earning credits from workshop consists of the following steps:

1. Relevant study material and references will be provided by the trainer in advance.
2. The participants are expected to explore the topic in advance and take active part in the discussions held
3. Attending and Participating in all activities of the workshop
4. Group Activities have to be undertaken by students as guided by the trainer.
5. Evaluation of workshop activities would be done through test and quiz at the end of the workshop.
6. Submitting a write up of atleast 500 words about the learning outcome from the workshop.

Methodology

The methodology followed at the workshop could be based on any one or more of the following methods:

Case Study

Business Game

Simulation

Group Activity

Role Play

Business Planning

Quiz

Evaluation Scheme:

Attendance	Active Participation	Multiple Choice Questions/ Quiz	Solving the case/ Assignment/ Write up	Total
10	30	30	30	100


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FINANCIAL MANAGEMENT

Course Code: COM2451

Credit Units: 03

Course Objective:

To give insight into financial decision making and composition of different securities in the total Capital structure.

Course Contents:

Module I

Nature, Scope & Objectives of Financial Management, Goals of Financial Management, Time value of money, Concept of risk & return (including capital asset pricing model).

Module II

Financing Decisions: Operating & Financial leverage, Capital structure theories; NI, NOI and MM & Traditional Approach, Factors determining capital structure. Concept & measurement of cost of capital, weighed Average cost of capital.

Module III

Capital Budgeting Decisions: Capital budgeting process; estimation of relevant cash flows, Non-discounted & discounted cash flows techniques- pay back, ARR, NPV, IRR, and profitability index;

Module IV

Dividend Decisions – dividend policy – determinants of dividend policy – types of dividend policy – forms of dividend. Different Schools of thought on dividend policy (Gordon, Walter, MM).

Module V

Working Capital Management – meaning – importance of adequate working capital- excess or Inadequate working capital – determinants of working capital requirement – cash management, Receivable management and inventory management – sources of working capital.

Examination Scheme:

Components	A	P	HA	CT	EE
Weightage (%)	5	5	5	15	70

A-Attendance; P -Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination

Text & References:

- S N Maheshwari, Financial Management.
- Khan and Jain, Financial Management.
- Dorai Raj. S.N, Financial Management.
- Sharma and Sashi Gupta, Financial Management.
- I M Pandey, Financial Management.
- James C Vanhorne, Financial Management.
- Prasanna Chandra, Financial Management.
- PN Reddy & Appanaiah, Financial Management.


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AUDITING

Course Code: COM2401

Credit Units: 03

Course Objective:

To provide knowledge of auditing principles, procedures and techniques in accordance with the professional standards and requirements.

Course Contents:

Module I

Introduction to auditing Introduction – meaning - definition – difference between accountancy and auditing – types of audit - advantages of auditing – preparation before commencement of new audit

Module II

Internal check Meaning and objects of internal check – internal control-meaning definition-fundamental Principles-internal check as regards wages, cash sales, cash purchases - internal check in a departmental stores-internal audit – meaning-importance – advantage and disadvantages.

Module III

Verification and valuation of assets and liabilities: Meaning and objectives – position of an auditor as regards to the valuation of assets – verification and valuation of different items – assets –fixed assets - goodwill – stock in trade – investments – liabilities – capital – debentures – bills payable sundry creditors – contingent liabilities –

Module IV

Audit of different organizations drafting of audit program or trading and non-trading organization in a tabular form. Preparation of clean and qualified audit report with special reference to manufacturing and other Companies Audit Report 1975

Examination Scheme:

Components	A	P	HA	CT	EE
Weightage (%)	5	5	5	15	70

A-Attendance; P -Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination

Text & References:

- TR Sharma, Auditing.
- BN Tandon, Practical Auditing.
- MS Ramaswamy, Principles and Practice of Auditing.
- Dinakar Pagare, Practice of Auditing.
- Kamal Gupta, Practical Auditing.
- P N Reddy & Appannaiah, Auditing.
- Shekar, Auditing.
- Pradeep Kumar, Auditing.
- Jagadeesh Prakash, Auditing

STATISTICAL METHODS IN RESEARCH-II

Course Code: COM2402

Credit Units: 03

Course Objectives:

To provide basic understanding of quantitative tools and their elementary application to business problems.

Course Contents:

Module I- Probability Theory

Independent, Dependent, Mutually Exclusive, Favourable, Exhaustive & Complementary events, Addition theorem, Conditional Probability, multiplication Theorem, Bayer's Theory.

Module II- Statistical Methods

Random Variable- Continuous & discrete; Discrete distribution- Binomial & Poisson, Bernoulli's trials; Continuous Distribution- Normal distribution, Properties of normal curve, importance & application

Module III- Tests of Hypothesis

Significance test: concepts and applications, acceptance and critical regions, null and alternative hypothesis, judgemental errors, level of significance. Power of a test, z test for testing of mean, proportion and equality of means, t- test, Chi square Test.

Module IV- Decision Tree

Decision Theory: Decision making, under certainty, uncertainty & risk, Bayersian Analysis, Decision tree.

Examination Scheme:

Components	A	P	HA	CT	EE
Weightage (%)	5	5	5	15	70

A-Attendance; P -Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination


Texts and References:

Text:

- Fundamentals of Applied Statistics, V.K.Kapoor & S.C.Gupta, S. Chand & Sons, New Delhi.
- Theory and Problems of Statistics, M.R. Theory, McGraw-Hill Book, London.

References:

- Business Statistics, J.K. Sharma, Pearson Education.
- Statistical Methods, S.P.Gupta, S. Chand and Sons, New Delhi.
- Applied General Statistics. F.E. Croxton & D.J. Cowden, Prentice Hall, New Delhi.



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INCOME TAX LAW AND PRACTICE

Course Code: COM2403

Credit Units: 03

Course Objective:

To prepare the students with the concepts and theory of income tax accounting and to give a practical exposure to them

Course Contents:

Module-I: Introduction

Brief History of Income Tax, Legal Frame work, Cannons of Taxation – Finance Bill – Scheme of Income Tax. Definition: Assessee, Person, assessment year, previous year, income, Gross Total Income, Total Income, Agricultural Income (including integration of Agricultural Income with Non-Agriculture Income), Revenue and Capital (a) Receipts (b) Expenditure (c) Loss. Residential Status and Incidence of Tax.

Module II : Income from Salary

Income from Salary – Features of Salary Income – Basic Salary – Allowance, Perquisites section 89(1) – Tax Rebate U/S 88 – Problems.

Module III : Income from House Property

Income from House Property – Introduction – Annual value under different situations – deductions– problems.

Module IV : Profits from Business & Profession

Profits & Gains of Business & Profession – Introduction, Basic Principles, Basic Principles, Computation of Taxable profits of Business & Profession, deductions, problems.

Module V : Income from Capital Gains

Income from Capital Gains:- Introduction, Meaning & types of capital assets, Computation of Capital Gains, Problems.

Module VI : Income from Other Sources

Income from Other Sources:- Meaning, examples of income, Computation of income, Problems.

Module VII: Computation of Individual Tax Liability

Deductions from GTI: Rebates and reliefs, Clubbing provisions; set off and carry forward of losses. Assessment of an Individual

Examination Scheme:

Components	A	P	C	CT	EE
Weightage (%)	5	10	5	10	70

A-Attendance; P-Project/Seminar/Quiz/Viva/Home Assignment; C-Case Discussion CT-Class Test; EE-End Semester Examination

Text & References:

- Dr. Vinod K. Singhania: Direct Taxes – Law and Practice, Taxmann publication.
- B.B. Lal: Direct Taxes, Konark Publisher (P) Ltd.
- Bhagwathi Prasad: Direct Taxes – Law and Practice, Wishwa Prakashana.
- Dr. Mehrotra and Dr. Goyal: Direct Taxes – Law and Practice, Sahitya Bhavan Publication.
- Dinakar Pagare: Law and Practice of Income Tax, Sultan Chand and sons.
- Gaur & Narang: Income Tax.

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BUSINESS INFORMATION AND DATABASE SYSTEM

Course Code: COM2404

Credit Units: 03

Course Objective:

The aim of this course is to introduce the students to the managerial issues relating to information systems, its role in organization and how information technology can be leveraged to provide business value.

Course Contents:

Module I:

MIS need and concepts, characteristics, Typology of MIS, Structure of MIS. Planning for MIS, System Development Methodologies, Conceptual and detailed designs of MIS, System Implementation strategies and process, System Evaluation and Maintenance.

Module II:

Introduction to data base management system- Data versus information, record, file; data dictionary, database administrator, functions and responsibilities, file-oriented system versus databases system.

Module III:

Advanced Concepts in Information Systems: Enterprise Resource Planning, Supply Chain Management, Customer Relationship Management, Data, Warehousing and Data Mining.

Module IV:

Database system architecture- Introduction, schemas, sub schemas and instances; data base architecture, data independence, mapping, data models, types of database systems.

Module V:

Data base security- Threats and security issues, firewalls and database recovery; techniques of data base security; distributed data base.

Examination Scheme:

Components	A	P	HA	CT	EE
Weightage (%)	5	5	5	15	70

A-Attendance; P -Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination

Text & References:

Texts:

- James, A. O'Brien, *Introduction to Information Systems*, Tata McGraw-Hill Publishing Co. Ltd., New Delhi, 2005.
- Kenneth C. Laudon and Jane P. Laudon, *Management Information Systems*, Prentice-Hall of India, New Delhi, 9th Edition, 2006.

References:

- Navathe, *Data Base System Concepts* 3rd, McGraw Hill.
- Date, C.J., *An Introduction to Data Base System* 7ed, Addison Wesley.
- Singh, C.S., *Data Base System*, New Age Publications, New Delhi.


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TERM PAPER

Course Code: COM2431

Credit Units: 02

Objectives

The objective of this course is to judge the understanding as well as application of the knowledge gained by the students. The aim of the term paper is to provide the students with an opportunity to further enhance their knowledge in a sector of their choice by undertaking a significant practical unit of examining and analyzing various aspects of business management at a level commensurate with the learning outcomes of the various courses taken up by them in the ongoing semester.

A term paper is primarily a record of intelligent reading in several sources on a particular subject. The students will choose the topic at the beginning of the session in consultation with the faculty assigned. At least one middle level or senior level person of a company from the chosen sector may be interviewed face to face.

Guidelines:

1. The term paper will be related to the contemporary business issue and the topic will be given by the department.
2. The presentation of the term paper is scheduled to be held before the commencement of Semester examinations.
3. The paper will carry 100 marks that will be marked on the basis of understanding and organization of content based on the literature review. The Bibliography shall form an important part of the paper.
4. **Examples of a few broad areas for Term Paper (List is indicative, not exhaustive)**

- Credit rating
- Risk management
- Subprime meltdown and its after effect with case study from Indian industry
- Corporate frauds
- Micro finance institutions in India
- Carbon Trading
- IFRS
- Celebrity Endorsement in real estate
- Social media marketing
- Green marketing
- Sustainable branding practices
- Relationship management
- CSR
- Balanced Score Card
- Corporate Governance
- Employee retention
- NGOs.

Evaluation Scheme

Organisation and relevance of content	Literature Review	Bibliography	Total
40	40	20	100


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PROJECT

Course Code: COM2432

Credit Units: 03

Objectives:

The aim of the project is to provide the students with an opportunity to further their intellectual and personal development in the chosen field by undertaking a significant practical unit of activity. The project can be defined as a scholarly inquiry into a problem or issues, involving a systematic approach to gathering and analysis of information / data, leading to production of a structured report.

Chapter Scheme and distribution of marks:

Chapter 1: Introduction – 10 marks

Chapter 2: Conceptual Framework/ National/International Scenario – 25 marks

Chapter 3: Presentation, Analysis & Findings -- 25 marks

Chapter 4: Conclusion & Recommendations -- 10 marks

Chapter 5: Bibliography -- 05 marks

Project Report	Power Point Presentation & Viva
75 marks	25 marks

Components of a Project Report

The outcome of Project Work is the Project Report. A project report should have the following components:

1) Cover Page: This should contain the title of the project proposal, to whom it is submitted, for which degree, the name of the author, name of the supervisor, year of submission of the project work, name of the University.

2) Acknowledgement: Various organizations and individuals who might have provided assistance /co-operation during the process of carrying out the study.

3) Table of Content: Page-wise listing of the main contents in the report, i.e., different Chapters and its main Sections along with their page numbers.

4) Body of the Report: The body of the report should have these four logical divisions

a) **Introduction:** This will cover the background, rationale/ need / justification, brief review of literature, objectives, methodology (the area of the study, sample, type of study, tools for data collection, and method of analysis), Limitations of the Study, and Chapter Planning.

b) **Conceptual Framework / National and International Scenario:** (relating to the topic of the Project).

c) **Presentation of Data, Analysis and Findings:** (using the tools and techniques mentioned in the methodology).

d) **Conclusion and Recommendations:** In this section, the concluding observations based on the main findings and suggestions are to be provided.

5) Bibliography or References: This section will include the list of books and articles which have been used in the project work, and in writing a project report.

6) Annexures: Questionnaires (if any), relevant reports, etc.

(The main text of the Project should normally be in the range of 5000 words. However, there may be annexure in addition to the main text)

The Steps of a Project Report

Step I : Selection of the topic for the project by taking following points into consideration:

- Suitability of the topic.
- Relevance of the topic
- Time available at the disposal.
- Feasibility of data collection within the given time limit.
- Challenges involved in the data collection (time & cost involved in the data collection, possibility of getting responses, etc.)

Step II : Finalisation of the Topic and preparation of Project Proposal in consultation with the Supervisor.

Step III : Collection of information and data relating to the topic and analysis of the same.

Step IV : Writing the report dividing it into suitable chapters, viz.,

Chapter 1: Introduction,

Chapter 2: Conceptual Framework / National & International Scenario,

Chapter 3: Analysis & Findings

Chapter 4: Conclusion and Recommendations.

Step V : The following documents are to be attached with the Final Project Report.


- 1) Approval letter from the supervisor (Annexure-IA)
- 2) Student's declaration (Annexure-IB)
- 3) Certificate from the Competent Authority of the Organisation / Institution, if the student undertakes the Project Work in any Organisation / Institution.

Guidelines for Evaluation:

- Each of the students has to undertake a Project individually under the supervision of a teacher and to submit the same following the guidelines stated below.
- Language of Project Report and Viva-Voce Examination may be English. The Project Report must be typed and hard bound.
- Failure to submit the Project Report or failure to appear at the Viva-voce Examination will be treated as "Absent" in the Examination. He /she has to submit the Project Report and appear at the Viva-Voce Examination in the subsequent years (within the time period as per University Rules).
- No marks will be allotted on the Project Report unless a candidate appears at the Viva-Voce Examination. Similarly, no marks will be allotted on Viva-Voce Examination unless a candidate submits his/her Project Report.
- Evaluation of the Project Work to be done jointly by one internal expert and one external expert with equal weightage, i.e., average marks of the internal and external experts will be allotted to the candidate.



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WORKSHOP

Course Code: COM2433

Credit Units: 01

Objectives

A workshop is primarily an activity based academic event that is organized to provide the students a one to one and hands on experience on any aspect of their learning. The communication in a workshop has to be necessarily two way. The trainer has to make sure that the aspect covered are practically practiced by the participants. The student will choose the option of workshop from amongst their concentration electives. The evaluation will be done by Board of examiners comprising of the faculties.

Major Themes for Workshop

The workshop may be conducted on any of the following major themes:

Accounting

Finance

Human Resources

Marketing

Economics

Operations

Supply Chain Management

These themes are merely indicative and other recent and relevant topics of study may be included.

Guidelines for Workshop

The procedure for earning credits from workshop consists of the following steps:

1. Relevant study material and references will be provided by the trainer in advance.
2. The participants are expected to explore the topic in advance and take active part in the discussions held
3. Attending and Participating in all activities of the workshop
4. Group Activities have to be undertaken by students as guided by the trainer.
5. Evaluation of workshop activities would be done through test and quiz at the end of the workshop.
6. Submitting a write up of atleast 500 words about the learning outcome from the workshop.

Methodology

The methodology followed at the workshop could be based on any one or more of the following methods:

Case Study

Business Game

Simulation

Group Activity

Role Play

Business Planning

Quiz

Evaluation Scheme:

Attendance	Active Participation	Multiple Choice Questions/ Quiz	Solving the case/ Assignment/ Write up	Total
10	30	30	30	100


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COST ACCOUNTING

Course Code: COM2551

Credit Units: 03

Course Objective:

To get an expert knowledge in the area of cost management and cost control to enable effective management decisions.

Course Contents:

Module I: Cost Accounting

Introduction – Meaning of Cost, costing and Cost Accounting – Comparison between Financial Accounts and Cost Accounts –Cost concepts and Classification of Costs – Cost Module – Cost Center, cost object –Preparation of cost sheet

Module II: Material Costing

Issue of materials, Methods of pricing of material issues- LIFO, FIFO- Weighed Average Method, Simple Average Method; Inventory Control- Concept & techniques like fixing of stock levels, EOQ, ABC analysis, perpetual & periodic inventory systems, material losses & their treatment.

Module III: Labour Costing

Control of labour cost – Labour Turn Turnover – Causes and effects of labour turnover – Meaning of Time and Motion Study, Merit Rating, Job Analysis, Time keeping and Time booking – Idle time, causes and treatment – Overtime – Methods of Wage Payment, Time rate and Piece Rate – Incentive Schemes – Halsey Premium Plan – Rowan Bonus Plan – Taylor's and Merrick's differential piece rate systems – Problems.

Module IV: Overhead Costing

Definition, Classification, allocation, apportionment & absorption of overhead, treatment of over & under absorption

Module V: Costing Methods Introduction

Unit Costing, Tender Costing Job Costing – Batch Costing – Contract Costing. Process Costing – principles – distinction between Process and Job – Preparation of process accounts – treatment of normal loss – abnormal loss – abnormal gain – Joint and By-products.

Examination Scheme:

Components	A	P	HA	CT	EE
Weightage (%)	5	5	5	15	70

A-Attendance; **P** -Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination

Text & References:

- N.K. Prasad: Cost Accounting
- Nigam & Sharma: Cost Accounting
- Khanna Pandey & Ahuja: Practical Costing
- M.L. Agarwal: Cost Accounting
- Jain & Narang: Cost Accounting
- S.P. Iyengar: Cost Accounting
- S.N. Maheshwari: Cost Accounting
- Horngren: Cost Accounting: A Managerial Emphasis
- M. N. Arora: Cost Accounting
- Dutta: Cost Accounting


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SUMMER INTERNSHIP EVALUATION

Course code: COM2535

Credit Units: 06

Objective:

The basic objective of a Summer Internship is to refine the practical exposure of the corporate functioning. This summer training will provide an opportunity to the students to apply their theoretical understanding while working on the concerned project in the industry. Thus this summer internship programme is an attempt to bridge the gap between theory and practice. This will also enhance the students' intellectual ability and attributes related to data handling, decision making, report writing, oral presentation and imbibing an interdisciplinary approach.

General Guidelines:

Every student of B.Com (Hons.) shall be required to undergo a practical training in an corporate organization approved by the Institute for eight weeks, normally in the Summer Vacation, after the end of the fourth semester examinations. The candidates shall be required to undergo training in the various areas of the organization concerned. The organization may assign a specific project to the candidate, which will be completed by him/her during the period of training. The work done by the candidate during the training period shall be submitted in form of a training report.

The last date for the receipt of training report in the department shall be one month after the date of completion of training, i.e. at the beginning of the fifth semester.

Chapter Scheme

Chapter I: Introduction 20 marks

Chapter II: Conceptual Framework/National/International Scenario 5 marks

Chapter III: Presentation, Analysis and Findings 35 marks

Chapter IV: Conclusion and Recommendations 15 marks

The report has to be type written in font Times New Roman, 12 points, 1.5 line spacing on both sides of the paper, Spiral Bound. The report should comprise of a maximum of 80 to 100 pages and has to be submitted in two copies.

Evaluation Scheme:

SIP Report	Power Point Presentation & Viva
75 marks	25 marks

Components of the Report

The outcome of Summer Internship is the Project Report. A project report should have the following components:

- 1) Cover Page:** This should contain the title of the project proposal, to whom it is submitted, for which degree, the name of the author, name of the supervisor, year of submission of the project work, name of the University.
- 2) Acknowledgement:** Various organizations and individuals who might have provided assistance /co-operation during the process of carrying out the study.
- 3) Table of Content:** Page-wise listing of the main contents in the report, i.e., different Chapters and its main Sections along with their page numbers.
- 4) Body of the Report:** The body of the report should have these four logical divisions
 - a) Introduction:** This will cover the background, rationale/ need / justification, brief review of literature, objectives, methodology (the area of the study, sample, type of study, tools for data collection, and method of analysis), Limitations of the Study, and Chapter Planning.
 - b) Conceptual Framework / National and International Scenario:** (relating to the topic of the Project).
 - c) Presentation of Data, Analysis and Findings:** (using the tools and techniques mentioned in the methodology).
 - d) Conclusion and Recommendations:** In this section, the concluding observations based on the main findings and suggestions are to be provided.
- 5) Bibliography or References:** This section will include the list of books and articles which have been used in the project work, and in writing a project report.
- 6) Annexures:** Questionnaires (if any), relevant reports, etc.

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ADVANCED CORPORATE ACCOUNTING

Course Code: COM2503

Credit Units: 04

Course Objectives: This course enables the students to develop advanced and thorough understanding of Corporate Accounting in conformity with the Provision of Companies' Act and latest amendments thereto with adoption of Accounting Standards that are likely to be introduced from time to time.

Course Contents:

Module I:

Advanced problems on final Accounts of Companies

Module II:

Problems of Amalgamation, (AS-14) and Reconstruction, Aspects Of Corporate Reconstructuring.

Module III:

Consolidated Accounts of Holding and Group Companies.

Module IV:

Preparation of Final Accounts of Banking Companies and Insurance Companies.

Module V:

Preparation of Final Accounts of electricity Companies and Double Account System.

Examination Scheme:

Components	A	P	HA	CT	EE
Weightage (%)	5	5	5	15	70

A-Attendance; P -Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination


Texts and References:

Texts:

- Advanced Accounts, Batliboi
- Advanced Accounts, R.R. Gupta

References:

- Advanced Accounts, Shukla & Grewal
- Advanced Accounts, S.N. Maheswari
- Accountancy, W. Pickles
- Advanced Accountancy, R.L. Gupta


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CORPORATE TAX LAW AND PRACTICE

Course Code: COM2504

Credit Units: 04

Course Objectives: To prepare the students with the concepts and theory of corporate tax law and practices and to give a practical exposure to them.

Course Contents

Module I

Computation of total income in case of companies including non-residents, Co-operative Society

Module II

Procedure for assessment: Section 139 to 148 (Return of Income) PAN, Assessments, Methods of Accounting, Accounting standards, Time limit for completion of Assessment, Rectification of mistake etc. Special procedure for assessment of search cases.

Module III

Liability in Special Cases: Legal representatives, Representative assesses: provisions applicable to firms, AOP & BOI, executors succession, shipping companies. Recovery of tax in respect of non-resident, persons leaving India, person trying to alienate their property, discontinuation of business & profession

Module IV

Collection and Recovery of tax, TDS, Advance payment of income tax, Interest u/s 234, Refunds and settlement of cases

Module V

Appeals & Revision, Acquisition of Immovable properties, provisions to counter evasion of tax, Penalties, Offences and Prosecutions, Authorized representation and miscellaneous provisions.

Examination Scheme:

Components	A	P	HA	CT	EE
Weightage (%)	5	5	5	15	70

A-Attendance; P -Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination

Texts & References:

Texts:

- Income Tax Act, Taxmann, New Delhi
- Income Tax Rules, Taxmann, New Delhi

References:

- Direct taxes, V.K. Singhania, Taxmann, New Delhi
- Circulars and Notification issued by CBDT



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BUSINESS TAXATION

Course Code: COM2505

Credit Units: 04

Course Objectives: The aim of this paper is to give a detailed knowledge and exposure to the various business taxes prevailing in the country.

Course Contents:

Module I-

C.S.T.: Constitutional History, Definitions, principle for determining different sales, Registration of Dealer, Rate of Tax.

C.S.T.: Determination of Taxable turn-over, Computation of Tax, Liability, Different forms used under C.S.T.

Module II-

Value Added Tax Act: Definitions, incidence and levy of tax, Computation Registration of Dealer, Exemptions Determination of taxable turn-over, computation of tax liability.

Module III-

C.S.T./V.A.T. : Tax authorities, filling of returns, assessments, payment and recovery of tax, appeal, revision and rectification.

Module IV-

Wealth Tax Act : Definitions, incidence of tax, deemed assets. exempted assets, computation of net wealth, Valuation of assets, assessment, appeals, penalties.

Module V-

Indian Tax System: Central and State Powers of taxation, Distribution of revenue between Centre and State. Finance Commission constitution, functions and recommendations.

Examination Scheme:

Components	A	P	HA	CT	EE
Weightage (%)	5	5	5	15	70

A-Attendance; P -Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination

Texts & References:


Texts:

- Indirect Taxes, V.K. Singhania, Taxmann , New Delhi
- Central Sales Tax Act 1956

References:

- Bare Act of Value Added tax
- Central Sales tax Rules
- An Introduction to Rajasthan and Central Sales Tax Act, B.L.Gupta

Wealth Tax Rules, Taxmann, New Delhi


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MANAGEMENT ACCOUNTING

Course Code: COM2651

Credit Units: 03

Course Objective:

To provide the students knowledge about the use of costing data for planning, control and decision making.

Course Contents:

Module I: Management Accounting

Nature & Scope: Meaning and Definition - Objectives of Management Accounting - Management Accounting and Financial Accounting - Management Accounting and Cost Accounting - Utility of Management Accounting - Limitations of Management Accounting - Position of Management Accountant in the Organisation.

Module II: Analysis and Interpretation of Financial Statements - I

Concept of Financial Statements and their Nature - Limitations of Financial Statements - Analysis and Interpretation - Tools - Comparative Financial Statements - Common size Statements - Trend Percentages

Ratio Analysis - Nature and Interpretation - Utility and Limitations of Ratios - Short-term Financial Ratios - Long-term Financial Ratios - Profitability Ratios - Proprietary and Yield Ratios - Turnover Ratios - DUPONT Control Chart

Module III: Cash Flow Analysis & Fund Flow Analysis

Distinction of cash from funds-utility of cash flow statement construction of cash flow statement

Module IV: Responsibility Accounting and Standard Costing

Concept of Responsibility Accounting - Cost Centers and Profit Centers - Contribution by Segments, Standard Costing

Module V: Budgets and Budgetary Control

Concept of Budgets and Budgetary Control - Nature and Objectives of Budgetary Control - Advantages and Limitations of Budgetary Control - Establishing a system of Budgetary Control - Preparation of Sales Budget, Selling and Distribution Cost Budget, Production Budget, Purchase Budget, Cash Budget etc. - Flexible Budgets and Master Budgets

Examination Scheme:

Components	A	P	HA	CT	EE
Weightage (%)	5	5	5	15	70

A-Attendance; P -Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination

Text & References:

- Dr. S.N. Maheswari , Management Accounting
- Sexana, Management Accounting
- Made Gowda, Management Accounting
- Dr. S.N. Goyal and Manmohan, Management Accounting
- B.S. Raman, Management Accounting
- R.S.N. Pillai and Bagavathi, Management Accounting
- Sharma and Gupta, Management Accounting
- J. Batty, Management Accounting
- Foster, Financial Statement Analysis, Pearson.
- PN Reddy & Appanaiah, Essentials of Management Accounting

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DISSERTATION

Course Code: COM2637

Credit Units: 09

Objectives:

The aim of the dissertation is to provide you with an opportunity to further your intellectual and personal development in your chosen field by undertaking a significant practical unit of activity, having an educational value at a level commensurate with the award of your degree. The dissertation can be defined as a scholarly inquiry into a problem or issues, involving a systematic approach to gathering and analysis of information / data, leading to production of a structured report.

Chapter Scheme and distribution of marks:

Chapter 1: Introduction – 10 marks

Chapter 2: Conceptual Framework/ National/International Scenario – 25 marks

Chapter 3: Presentation, Analysis & Findings -- 25 marks

Chapter 4: Conclusion & Recommendations -- 10 marks

Bibliography: 5 marks

Dissertation	Power Point Presentation & Viva
75 marks	25 marks

The Components of a Dissertation

A Dissertation should have the following components:

1) Cover Page: This should contain the title of the, to whom it is submitted, for which degree, the name of the author, name of the supervisor, year of submission of the work and name of the University.

2) Acknowledgement: Various organizations and individuals who might have provided assistance /co-operation during the process of carrying out the study.

3) Table of Content: Page-wise listing of the main contents in the report, i.e., different Chapters and its main Sections along with their page numbers.

4) Body of the Report: The body of the report should have these four logical divisions

a) **Introduction:** This will cover the background, rationale/ need / justification, brief review of literature, objectives, methodology (the area of the study, sample, type of study, tools for data collection, and method of analysis), Limitations of the Study, and Chapter Planning.

b) **Conceptual Framework / National and International Scenario:** (relating to the topic of the Dissertation).

c) **Presentation of Data, Analysis and Findings:** (using the tools and techniques mentioned in the methodology).

d) **Conclusion and Recommendations:** In this section, the concluding observations based on the main findings and suggestions are to be provided.

5) Bibliography or References: This section will include the list of books and articles which have been used in the work, and in writing the report.

6) Annexures: Questionnaires (if any), relevant reports, etc.

(The main text of the Dissertation should normally be in the range of 5000 words. However, there may be annexure in addition to the main text)

Steps of the Dissertation Work

Step I: Selection of the topic should be made keeping the following points into consideration:

- Suitability of the topic.
- Relevance of the topic
- Time available at the disposal.
- Feasibility of data collection within the given time limit.
- Challenges involved in the data collection (time & cost involved in the data collection, possibility of getting responses, etc.)

Step II: Finalisation of the Topic and preparation of Dissertation Proposal in consultation with the Supervisor.

Step III: Collection of information and data relating to the topic and analysis of the same.

Step IV: Writing the report dividing it into suitable chapters, viz.,

Chapter 1: Introduction,

Chapter 2: Conceptual Framework / National & International Scenario,

Chapter 3: Analysis & Findings

Chapter 4: Conclusion and Recommendations.

Step V: The following documents are to be attached with the Dissertation:

1) Approval letter from the supervisor (Annexure-IA)

2) Student's declaration (Annexure-IB)

3) Certificate from the Competent Authority of the Organisation / Institution, if the student undertakes the Dissertation Work in any Organisation / Institution.

Annexures,

References / Bibliography

Guidelines for Evaluation:

- Each of the students has to undertake a topic individually under the supervision of a teacher and to submit the same following the guidelines stated below.
- Language of Dissertation and Viva-Voce Examination has to be English. The Dissertation must be typed and hard bound.
- Failure to submit the Dissertation or failure to appear at the Viva-voce Examination will be treated as "Absent" in the Examination. He /she has to submit the Dissertation and appear at the Viva-Voce Examination in the subsequent years (within the time period as per University Rules).
- No marks will be allotted on the Dissertation unless a candidate appears at the Viva-Voce Examination. Similarly, no marks will be allotted on Viva-Voce Examination unless a candidate submits his/her Dissertation.
- Evaluation of the Dissertation to be done jointly by one internal expert and one external expert with equal weightage, i.e., average marks of the internal and external experts will be allotted to the candidate.
- A candidate has to qualify in the Dissertation separately, obtaining a minimum marks of 40 (Dissertation and Viva-Voce taken together) in paper 3.5.
- Marking Scheme for Dissertation and Viva-Voce Examination:



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Cover Page / Title page

**Project Report on
Title of the Project**

XXXXXXXXXXXXXXXXXXXX

**(Submitted for the partial fulfilment for the award of Degree of B.Com. Honours in
Accounting / Taxation/**

To

Amity College of Commerce

Submitted by

Name of the Candidate :.....

Registration No.

Name of the College

College Roll No.

Supervised by

Name of the Supervisor:

Designation

Month & Year of Submission

University Logo and Name


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Student's Declaration

I hereby declare that the Project Work with the title (in block letters)

.....
submitted by me for the partial fulfilment of the degree of B.Com. Honours in Accounting & Finance / Marketing / Taxation / Computer Applications in Business is my original work and has not been submitted earlier to any other University /Institution for the fulfilment of the requirement for any course of study.

I also declare that no chapter of this manuscript in whole or in part has been incorporated in this report from any earlier work done by others or by me. However, extracts of any literature which has been used for this report has been duly acknowledged providing details of such literature in the references.

Signature of supervisor:

Signature

Name of the candidate:


Registration No.

Place:

Date:

Examples of a few broad areas for Dissertation (List is indicative, not exhaustive)

- Any topic concerning local economic /entrepreneurial issues / **New Business Proposal**
- IFRS and Indian Accounting Standard – Opportunities & Challenges
- Revised Schedule VI
- Credit Rating
- Risk Management
- Credit Risk Management in Banks: Opportunities & Challenges.
- Subprime Meltdown and its after effect with case study from Indian Industry.
- Corporate Frauds/ White Collar Frauds
- Financial Inclusion
- Micro-finance Institutions in India.
- Carbon Credit
- Direct Tax Code (DTC)
- Goods and Service Tax (GST)
- Role of MSMEs in the Indian Economic Development
- Public Sector Undertakings and Indian Economic Development
- Business & Government
- Corporate Social Responsibilities
- Corporate Governance
- Financial Sector Reforms
- On-line Banking
- NPA Management
- Business Process Outsourcing
- Capital Market
- Environmental Accounting
- Environmental Management
- Financial Statement Analysis
- Performance Analysis
- Working Capital Management
- Cash Management
- Debtors Management
- Inventory Management


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- Mergers & Acquisitions
- e-Commerce
- Study on Aviation Sector in India.
- Venture Capital
- Equity Linked Savings Scheme
- Insurance Industry in India
- Analysis of Mutual Funds
- Study of Non-Performing Assets
- Risk and Return Analysis
- Commercialization of Sports in India.
- The Sub-Prime Crisis.
- Rural and Agricultural Banking
- Marketing Strategy of different companies for their different products and Promotional Strategies
- Market Research
- Study on the Market Awareness of Intellectual Property
- Preservation & Storage of Agricultural Products
- Marketing Strategy of Ball/ Gel Pens
- Brand Repositioning
- Customer Relationship Management
- Sales & Distribution Management
- Customer Awareness
- Industrial Marketing Vs. Consumer
- Study of Consumer Behaviour
- “ Is attractive packaging really a necessity or an eyewash?” A study on packaging of some selected companies-
- Consumer Behaviour
- After Sales Service and Customer Satisfaction
- Effectiveness of Advertising
- Direct Marketing & Networking



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ADVANCED ACCOUNTS

Course Code: COM2602

Credit Units: 04

Course Objectives:

Course Contents:

Module I-

Valuation of Assets: Inventories, Goodwill, Shares and Business, (AS-26).

Module II-

Investment Accounts: Accounting Standard 13, Accounting for Financial asset and Instrument.

Module III-

Agricultural Farm Accounting, Hotel Accounting, Accounting for inflation.

Module IV-

Fund Based Accounting, Introduction to Government Accounting, Corporate Social Accounting and Environmental Accounting.

Module V-

Value Added Statement, Economic Value Added (EVA) Statement, Human Resource Accounting.

Examination Scheme:

Components	A	P	HA	CT	EE
Weightage (%)	5	5	5	15	70

A-Attendance; P- Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination

Texts & References:

Texts:

- Advanced Accounting, Batliboi
- Advanced Accounts, M.C. Shukla & T.S. Grewal
- Advanced Accountancy, R.L.Gupta

References:

- Advanced Accountancy, Jain & Narang
- Advanced Accountancy, H. Chakraborty
- Advanced Accountancy, M.C.K. Nambiar



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ADVANCED COST ACCOUNTING

Course Code: COM2603

Credit Units: 04

Course Objectives:

Course Contents:

Module I: Cost Book-Keeping

Non-integrated Accounting system, Accounting Ledgers And Control Accounts, Integrated Accounting, Reconciliation of Cost & Financial Accounts.

Module II: Process Costing

Basic Concept, Joint products and By-products, work-in-progress, (Equivalent production), inter-Process profits, Uniform Costing and inter firm comparisons.

Module III: Activity Based Costing

Problems of Traditional Costing, Cost analysis under ABC, Institution of ABC, Benefits and Weaknesses, Life Cycle Costing; Target Costing.

Module IV: Cost Management System

Total Quality Management, Benchmark, Back-flush Costing, Reengineering, Cost Reduction and value Analysis: Concept and Techniques.

Module V:

Service Costing, Marginal Costing, Standard Costing, Decision Making, Make or buy, Add or Drop, Operate/Shutdown, Sell/Process.

Examination Scheme:

Components	A	P	HA	CTT	EE
Weightage (%)	5	5	5	15	70

A-Attendance; P -Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination

Text & References:

Text:

- Principles and Practice of Cost Accounting, N. K. Prasad
- Cost Accounting, C.D. Vashisht & V. K. Saxena, Sultan Chand & Sons, New Delhi.

References:

- Principles & Practice of Cost Accounting, Asish K Bhattacharyya, Wheller Publishing, N. Delhi
- Management Accounting, J. Batty
- Advanced Cost Accounting & Cost System, M. Kishore Ravi
- Accounting For Management, Guru Prasad Murthy
- Decisional Phenomena And Management Accountants, Backer and Jacobson



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INDIRECT TAXES INCLUDING GST

Course Code: COM2604

Credit Units: 04

Course Objectives: To provide students with adequate theoretical and working knowledge about GST and its practical application in unification of indirect tax system in India. The course intends to make students aware of the latest developments and changes being incorporated in GST at the systemic level and its implications in the process of economic and financial integration.

Course Contents:

Module I-

Origin of GST – Evolution of GST concept, How GST came into existence, GST Laws, Constitutional Perspectives – Cooperative Federalism in economic system, Application of GST in tax sharing – CGST/SGST/IGST, Classification of goods and services in GST assessment, Exemption from Tax, Composition levy.

Module II-

Basic Framework of GST – Unification of indirect tax system, GST Council – composition, objectives, functions and significance, Tax sharing and disbursement mechanism between the Centre and states, Responsibilities of various stakeholders – government, firms, traders, consumers, Registration, Tax invoice, Returns.

Module III-

Administration of GST – GST Network, Registration, Tax Invoice, Credit & Debit Notes, Electronic way bill for interstate movement of goods, Computation of GST Liability, Input Tax Credit, Concept of times value of supply, Filing of Returns, Payment of Tax, Search, Seizure & arrest, Demand & Recovery, Offences & Penalties.

Module IV-

Safeguard Measures – Anti-profiteering clause, Reverse charge mechanism, Assessment & Audit, Inspection – Concept of HSN and SAC, Advance Ruling, Appeals & Revision, Implications on Tax terrorism, corruption, tax evasion and black money

Module V-

Comparative analysis between GST in India and other countries such as Canada, France, Australia and China, Advantages and Disadvantages.

Examination Scheme:

Components	A	P	HA	CT	EE
Weightage (%)	5	5	5	15	70

A-Attendance; P -Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination

Text & References:

Text:

- GST Council, Government of India, Publications.
- Singh, Awdhesh (2018), *GST Made Simple: A Complete Guide to Goods and Services Tax in India*, Centax Publications.

References:

- Bhattacharjee Govind and Debasis Bhattacharya (2018), *GST and Its Aftermath – Is Consumer Really the King?* SAGE Publications.
- Garg, Rakesh (2016), *Handbook of GST in India: Concepts and Procedures*, Bloomsbury.


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ACCOUNTING

Programme Structure

Course Code	Course Title	Lecture (L) Hours Per Week	Tutorial (T) Hours Per Week	Practical (P) Hours Per Week	Total Credits
COM2151	Financial Accounting-I	3	-	-	3
COM2251	Financial Accounting-II	3	-	-	3
COM2351	Corporate Accounting	3	-	-	3
COM2451	Financial Management	3	-	-	3
COM2551	Cost Accounting	3	-	-	3
COM2651	Management Accounting	3	-	-	3
	TOTAL				18



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ACCOUNTING

Syllabus - Semester First

FINANCIAL ACCOUNTING-I

Course Code: COM2151

Credit Units: 03

Course Objective:

To develop conceptual understanding of the fundamentals of financial accounting system which processes transactions and other events through a book-keeping mechanism to prepare financial statements, and also to impart skills in accounting for recording various kinds of business transactions.

Course Contents:

Module I

Financial Accounting Concepts, importance and scope, Single entry vs Double entry system of accounting. Journal, Ledger, Trial Balance, Errors and their rectification, Cash Book, Bank reconciliation statement.

Module II

Final accounts, receipts and payments, income and expenditure accounts, balance sheet.

Module III

Depreciation accounting and its methods, Inventory valuation and its methods. Accounting for Hire Purchase Transactions, Journal entries and ledger accounts in the books of Hire Vendors and Hire purchaser

Module IV

Inland Branches: Dependent branches only and ascertainment of profit by debtors method and stock and debtors method.

Examination Scheme:

Components	A	P	HA	CT	EE
Weightage (%)	5	5	5	15	70

A-Attendance; P-Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination

Text & References:

- Dr. S.N. Maheswari, Financial Accounting
- BS Raman, Financial Accounting
- Grewal and Gupta, Advanced Accounting
- Radhaswamy and R.L. Gupta, Advanced Accounting
- S.Kr. Paul, Advanced Accounting
- P.C. Tulasian, Pearson Editions, Introduction to Accounting
- Jain & Narang, Financial Accounting
- Sehgal, A and Sehgal, D "Advanced Accounting", Part – 1, Taxmann Applied services, New Delhi

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Syllabus - Semester Second

FINANCIAL ACCOUNTING-II

Course Code: COM2251

Credit Units: 03

Course Objective:

To develop conceptual understanding of the fundamentals of financial accounting system which processes transactions and other events through a book-keeping mechanism to prepare financial statements, and also to impart skills in accounting for recording various kinds of business transactions.

Course Contents:

Module I

Consignment and Joint Venture Accounts:

- (i) **Consignments:** Features, Accounting treatment in the books of the consignor and consignee.
- (ii) **Joint Ventures:** Accounting procedures: Joint Bank Account, Records Maintained by Co-venturer of (a) all transactions (b) only his own transactions. (Memorandum joint venture account).

Module II

Accounting for bills of exchange - bills receivable and payable, acceptance, endorsement, discounting, dishonour and renewal of bills, accommodation bills.

Module III

Partnership

Admission of a partner: partnership deed, goodwill valuation and treatment. Sacrificing ratio.
Retirement and death of a partner: gaining ratio, goodwill treatment
Dissolution of partnership: revaluation of assets and liabilities. Legal Position, Accounting for simple dissolution,
Applications of rule in case of Garner Vs. Murray in case of insolvency of partner(s)
(excluding piecemeal distribution and sale of a firm to a company).

Examination Scheme:

Components	A	P	HA	CT	EE
Weightage (%)	5	5	5	15	70

A-Attendance; P -Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination

Text & References:

- Dr. S.N. Maheswari, Financial Accounting
- BS Raman, Financial Accounting
- Grewal and Gupta, Advanced Accounting
- Radhaswamy and R.L. Gupta, Advanced Accounting
- S.Kr. Paul, Advanced Accounting
- P.C. Tulasian, Pearson Editions, Introduction to Accounting
- Jain & Narang, Financial Accounting

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Syllabus - Semester Third

CORPORATE ACCOUNTING

Course Code: COM2351

Credit Units: 03

Course Objective:

This course enables the students to develop awareness about Corporate Accounting in conformity with the Provision of Companies' Act and latest amendments thereto with adoption of Accounting Standards that are likely to be introduced from time to time.

Course Contents:

Module I- Introduction to Corporate Accounts

Statutory records to be maintained by a company; Accounting for share capital transactions- issue of shares at par, at premium and at discount; forfeiture and re-issue of shares; buy-back of equity shares; redemption of preference shares - statutory requirements, disclosure in balance sheet; rights issue.

Module II

Issue & Redemption of debentures - accounting treatment and procedures; conversion of debentures into shares; Final accounts of Limited liability companies; Preparation of Profit & Loss account, Profit & Loss appropriation & Balance Sheet account in accordance with the provisions of existing companies act(excluding managerial remuneration).

Module III

Holding and subsidiary companies - accounting treatment and disclosures; consolidation of accounts.

Module IV

Valuation of Goodwill and shares

Good will- Meaning, definition, elements, types and methods of valuation of Goodwill, Methods of share valuation (Equity & preference shares).

Module V

Accounting treatment for amalgamation with reference to As-14 (excluding intercompany transactions & holdings), absorption and reconstruction of companies; internal & external reconstruction, Liquidation – Preparation of Liquidator's Statement of affairs, deficiency /surplus statement, calculation of pro rata treatment of uncalled capital.

Examination Scheme:

Components	A	P	HA	CT	EE
Weightage (%)	5	5	5	15	70

A-Attendance; P -Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination

Text & References:

- S.N. Maheswari, Financial Accounting
- Narayanaswamy, Financial Accounting
- SP Iyengar, Advanced Accountancy
- RL Gupta, Advanced Accountancy
- Jain and Narang, Corporate Accounting

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Syllabus - Semester Fourth

FINANCIAL MANAGEMENT

Course Code: COM2451

Credit Units: 03

Course Objective:

To give insight into financial decision making and composition of different securities in the total Capital structure.

Course Contents:

Module I

Nature, Scope & Objectives of Financial Management, Goals of Financial Management, Time value of money, Concept of risk & return (including capital asset pricing model).

Module II

Financing Decisions: Operating & Financial leverage, Capital structure theories; NI, NOI and MM & Traditional Approach, Factors determining capital structure. Concept & measurement of cost of capital, weighed Average cost of capital.

Module III

Capital Budgeting Decisions: Capital budgeting process; estimation of relevant cash flows, Non-discounted & discounted cash flows techniques- pay back, ARR, NPV, IRR, and profitability index;

Module IV

Investment Decisions – capital budgeting – significance – techniques of evaluation of investment Proposals- payback method – return on investment method, net present value method – Case Studies

Module IV

Dividend Decisions – dividend policy – determinants of dividend policy – types of dividend policy – forms of dividend. Different Schools of thought on dividend policy (Gordon, Walter, MM).

Module V

Working Capital Management – meaning – importance of adequate working capital- excess or Inadequate working capital – determinants of working capital requirement – cash management, Receivable management and inventory management – sources of working capital.

Examination Scheme:

Components	A	P	HA	CT	EE
Weightage (%)	5	5	5	15	70

A-Attendance; P -Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination

Text & References:

- S N Maheshwari, Financial Management.
- Khan and Jain, Financial Management.
- Dorai Raj. S.N, Financial Management.
- Sharma and Sashi Gupta, Financial Management.
- I M Pandey, Financial Management.
- James C Vanhorne, Financial Management.
- Prasanna Chandra, Financial Management.
- PN Reddy & Appanaiah, Financial Management.

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Syllabus - Semester Fifth

COST ACCOUNTING

Course Code: COM2551

Credit Units: 03

Course Objective:

To get an expert knowledge in the area of cost management and cost control to enable effective management decisions.

Course Contents:

Module I: Cost Accounting

Introduction – Meaning of Cost, costing and Cost Accounting – Comparison between Financial Accounts and Cost Accounts – Cost concepts and Classification of Costs – Cost Module – Cost Center, cost object – Preparation of cost sheet

Module II: Material Costing

Issue of materials, Methods of pricing of material issues- LIFO, FIFO- Weighed Average Method, Simple Average Method; Inventory Control- Concept & techniques like fixing of stock levels, EOQ, ABC analysis, perpetual & periodic inventory systems, material losses & their treatment.

Module III: Labour Costing

Control of labour cost – Labour Turn Turnover – Causes and effects of labour turnover – Meaning of Time and Motion Study, Merit Rating, Job Analysis, Time keeping and Time booking – Idle time, causes and treatment – Overtime – Methods of Wage Payment, Time rate and Piece Rate – Incentive Schemes – Halsey Premium Plan – Rowan Bonus Plan – Taylor's and Merrick's differential piece rate systems – Problems.

Module IV: Overhead Costing

Definition, Classification, allocation, apportionment & absorption of overhead, treatment of over & under absorption

Module V:

Costing Methods Introduction - Job Costing – Batch Costing – Contract Costing- Process Costing – principles – distinction between Process and Job – Preparation of process accounts – treatment of normal loss – abnormal loss – abnormal gain – Joint and By-products. Service costing. Marginal costing- introduction, contribution, PVR, BEP Chart and Margin of safety.

Module VI:

Reconciliation of Cost and Financial Accounts - Need for reconciliation – Reasons for difference in profits – Problems on preparation of Reconciliation statements including Memorandum Reconciliation account.

Examination Scheme:

Components	A	P	HA	CT	EE
Weightage (%)	5	5	5	15	70

A-Attendance; P -Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination

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Text & References:

- N.K. Prasad: Cost Accounting
- Nigam & Sharma: Cost Accounting
- Khanna Pandey & Ahuja: Practical Costing
- M.L. Agarwal: Cost Accounting
- Jain & Narang: Cost Accounting
- S.P. Iyengar: Cost Accounting
- S.N. Maheshwari: Cost Accounting
- Horngren: Cost Accounting: A Managerial Emphasis
- M. N. Arora: Cost Accounting
- Dutta: Cost Accounting



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Syllabus - Semester Sixth

MANAGEMENT ACCOUNTING

Course Code: COM2651

Credit Units: 03

Course Objective:

To provide the students knowledge about the use of costing data for planning, control and decision making.

Course Contents:

Module I: Management Accounting

Nature & Scope: Meaning and Definition - Objectives of Management Accounting - Management Accounting and Financial Accounting - Management Accounting and Cost Accounting - Utility of Management Accounting - Limitations of Management Accounting - Position of Management Accountant in the Organisation.

Module II: Analysis and Interpretation of Financial Statements - I

Concept of Financial Statements and their Nature - Limitations of Financial Statements - Analysis and Interpretation - Tools - Comparative Financial Statements - Common size Statements - Trend Percentages Ratio Analysis - Nature and Interpretation - Utility and Limitations of Ratios - Short-term Financial Ratios - Long-term Financial Ratios - Profitability Ratios - Proprietary and Yield Ratios - Turnover Ratios - DUPONT Control Chart

Module III: Cash Flow Analysis

Distinction of cash from funds-utility of cash flow statement construction of cash flow statement

Module IV: Responsibility Accounting and Standard Costing

Concept of Responsibility Accounting - Cost Centers and Profit Centers - Contribution by Segments

Module V: Budgets and Budgetary Control

Concept of Budgets and Budgetary Control - Nature and Objectives of Budgetary Control - Advantages and Limitations of Budgetary Control - Establishing a system of Budgetary Control - Preparation of Sales Budget, Selling and Distribution Cost Budget, Production Budget, Purchase Budget, Cash Budget etc. - Flexible Budgets and Master Budgets

Examination Scheme:

Components	A	P	HA	CT	EE
Weightage (%)	5	5	5	15	70

A-Attendance; P -Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination



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Text & References:

- Dr. S.N. Maheswari , Management Accounting
- Sexana, Management Accounting
- Made Gowda, Management Accounting
- Dr. S.N. Goyal and Manmohan, Management Accounting
- B.S. Raman, Management Accounting
- R.S.N. Pillai and Bagavathi, Management Accounting
- Sharma and Gupta, Management Accounting
- J. Batty, Management Accounting
- Foster, Financial Statement Analysis, Pearson.
- PN Reddy & Appanaiah, Essentials of Management Accounting



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Master of Commerce

QUANTITATIVE TECHNIQUES FOR BUSINESS DECISIONS

Course Code: COM4102

Credit Units: 03

Course Objective:

The objective of the course is to acquaint the students with the use of quantitative models in decision making.

Course Contents:

Module-I : Introduction

Introduction: Quantitative approach to management decision making. Linear Programming: Mathematical formulation of linear programming problems and their solution using graphic approach and simplex algorithm. Duality Sensitivity analysis. Big M Method

Module-II : Transportation

Transportation: Solving the problem, testing optimality MODI method. Cases of unbalanced problems, degeneracy, maximization objective, multiple solutions and prohibited routes.

Module-III

Assignment: Solving the problem. Cases of unbalanced problems, multiple optimum solutions, maximization objective and unacceptable assignments. Integer Programming: problem Formulation and solution.

Module-IV

Game Theory: Games of pure strategy. Games of mixed strategy. Dominance. Queuing Theory: Elements of a queuing system. Models with Poisson arrival and services rates, single server and infinite and finite population.

Module-V: Sequencing

Sequencing: n-jobs to be processed on two machines in the same order of machines. N-jobs to be processed on m machines in the same order of machines – by converting it into a two – n machine case. Two jobs to be processed on machines in the different orders of machines.

(The emphasis should be on concepts and application of concepts)

Examination Scheme:

Components	A	P	C	CT	EE
Weightage (%)	5	10	5	10	70

A-Attendance; P-Project/Seminar/Quiz/Viva/Home Assignment; C-Case Discussion CT-Class Test; EE-End Semester Examination

Suggested Readings:

- Levin, R.I., D.S. Rubin and J.P. Stinson, “*Quantitative Approaches to Management*”, 1986, McGraw - Hill.
- Vohra N.D., “*Quantitative Techniques in Management*”, 3rd Edition, The McGraw Hill companies, 2006.
- Bierman H. Jr, C.P. Bonini and W.H. Hausman, “*Quantitative Analysis for Business Decisions*”, 7th Edition, Homewood, Ill., Irwin 1983
- Taha, Hamdy A., “*Operations Research: An Introduction*”, 8 th Edition, Prentice – Hall of India.


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AUDITING

Course Code: COM4105

Credit Units: 03

Course Objective:

To provide knowledge of auditing principles, procedures and techniques in accordance with the professional standards and requirements.

Course Contents:

Module-I: Introduction

Introduction to auditing Introduction – meaning- definition – difference between accountancy and auditing – types of audit—advantages of auditing – preparation before commencement of new audit

Module-II: Internal Check & Control

Internal check - Meaning and objects of internal check – internal control-meaning definition-fundamental Principles-internal check as regards wages, cash sales, cash purchases - internal check in a departmental stores-internal audit – meaning-importance – advantage and disadvantages. Duties and Responsibilities of an auditor.

Module-III: Valuation & Verification of Assets & Liabilities

Verification and valuation of assets and liabilities: Meaning and objectives – position of an auditor as regards to the valuation of assets – verification and valuation of different items – assets –fixed assets - goodwill – stock in trade – investments – liabilities – capital – debentures – bills payable sundry creditors – contingent liabilities –

Module-IV

Audit of different organizations drafting of audit program or trading and non-trading organization in a tabular form. Preparation of clean and qualified audit report with special reference to manufacturing and other Companies Audit Report 1975

Module-V

Visit an audit firm, write about the procedure followed by them in Auditing the books of accounts of a firm. Record the verification procedure with respect to any one fixed asset.

Prepare a qualified or clean audit report for a given situation.

Audit Program, Draft an audit program.

Examination Scheme:

Components	A	P	C	CT	EE
Weightage (%)	5	10	5	10	70

A-Attendance; P-Project/Seminar/Quiz/Viva/Home Assignment; C-Case Discussion CT-Class Test; EE-End Semester Examination

Text & References:

- TR Sharma, Auditing.
- BN Tandon, Practical Auditing.
- MS Ramaswamy, Principles and Practice of Auditing.
- Dinakar Pagare, Practice of Auditing.
- Kamal Gupta, Practical Auditing.
- P N Reddy & Appannaiah, Auditing.
- Shekar, Auditing.
- Pradeep Kumar, Auditing.
- Jagadeesh Prakash, Auditing


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COMPUTER APPLICATIONS IN BUSINESS

Course Code: COM4106

Credit Units: 03

Course Objective:

The purpose of this course is to equip the students with fundamental aspects of computers and communication and their application in Commerce.

Course Contents:

Module-I: Introduction

Introduction to Data Information, and knowledge and IT. Changing decision making scenario; Quality of information role of IT in information generation and value addition.

Module-II: Computer Hardware & Software

Computer Hardware and Software: Types of computer systems – micro, mini, mainframe, super. Personal Database Management System: Concept of Database Management System, database Design - Physical and Logical. Data computers –its main component and configuration. Operating system, Application Software. Programming Language.

Module-III : Introduction to Internet

Internet and World Wide Web: History and future of Internet. Web client and Web-Server. Web page and Website. Domain Name System. WWW as a marketplace. Client side programming and server - side programming.

Module-IV

Desktop Application: Important features of Word processing, Presentation, Graphics and Spreadsheet Application Software. Statistical Packages: for Analysis of Variance Multi-variate analysis, Factor, Cluster Discriminant and Regression Analysis.

Module-V : Database Management system

Databases Management System: Concept of Database Management System. Database Design – Physical and Logical. Data bases and tables Forms, Queries and Reports. SQL. Client server Architecture, Distributed Databases.

Module-VI : Networking

Fundamentals of Networking and Communication: LAN, MAN, WAN, Networking Topologies Data communication. Broad Band Communication, Wireless Mobile Communication.

Module-VII: Management Information System

Management information system: Transaction processing system (TPS) Traditional v/s contemporary TPS. Decision support system (DSS). Expert system. Recent developments in Computer Application.

Examination Scheme:

Components	A	P	C	CT	EE
Weightage (%)	5	10	5	10	70

A-Attendance; P-Project/Seminar/Quiz/Viva/Home Assignment; C-Case Discussion CT-Class Test; EE-End Semester Examination

Suggested Readings:

1. Comer, Douglas E. (2007), the Internet Book, New Delhi : PHI Learning Private Limited).
2. Morley, Deborah and Charles S. parker (2007) Fundamentals of Computers (New Delhi : Learning India Pvt. Ltd.)
3. Leon a. and Leon M., (2002) Fundamental of Information Technology, Vikas Software Manuals.
4. Laudon, Kenneth C. and Jane P. Laudon, (2003), Management Information Systems (New Delhi: Prentice Hall of India).

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MANAGERIAL ACCOUNTING

Course Code: COM4201

Credit Units: 03

Course Objective:

The objective of the course is to enable students to acquire sound Knowledge of concepts, methods and techniques of management accounting and to make the students develop competence with their usage in managerial decision making and control.

Course Contents:

Module-I: Introduction

Management Accounting – Nature and Functions; Financial vs. Management Accounting; Cost vs. Management Accounting; Role of Management Accountant, Cost Concepts and Classifications.

Module-II: Cost-Volume-Profit Analysis

Cost-Volume-Profit (CVP) Analysis – Contribution Margin; Break – Even Analysis; Profit Volume (P/V) Analysis; Multiple -Product Analysis; Optimal use of Limited Resources, Relevant Information and Short -Run Managerial Decisions – Managerial Decision Making; Decision Making Process; Differential Analysis; Types of Managerial Decisions – Make/Buy, Add/Drop, Sell/ Process Further, Operate/Shutdown, Special Order, Product-Mix, Pricing Decisions.

Module-III: Budgeting

Budgeting – Nature and functions; Preparation of Different Types of Budgets, Fixed Versus Flexible Budgeting.

Module-IV: Marginal and Standard Costing

Variable and Absorption Costing – Concept, Comparison, Applications of Variable Costing, Preparation of Income Statements. Standard Costing – Concept, Advantages; Types of Standards; Variance Analysis; Materials, Labour, Overhead; Managerial Uses of Variances.

Module-V: Responsibility Accounting

Responsibility Accounting and Divisional Performance Measurement – Advantages and Disadvantages of Divisionalisation; Concept of Responsibility Accounting; Responsibility Centres – Cost Centre, Revenue Centre, Profit Centre, Investment Centre, Responsibility Performance Reporting, Divisional Performance Measurement – Measures of Performance; Return on Investment (ROI) Versus Residual Income (RI); Non- Financial Performance Measures; Transfer Pricing Methods.

Examination Scheme:

Components	A	P	C	CT	EE
Weightage (%)	5	10	5	10	70

A-Attendance; P-Project/Seminar/Quiz/Viva/Home Assignment; C-Case Discussion CT-Class Test; EE-End Semester Examination

Suggested Readings:

- Atkinson Anthony A., Rajiv D. Banker, Robert Kaplan and S. Mark Young, *Management Accounting*, Prentice Hall, 2001.

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- Horngreen Charles T., and Gary L. Sundem and William O. Stratton, *Introduction to Management Accounting*, Prentice Hall of India, 2006.
- Drury Colin, *Management and Cost Accounting*, Thomson Learning, 2001. 4. Garison R.H. and E.W. Noreeb, *Managerial Accounting*, McGraw Hill, 2000.
- Ronald W. Hilton, *Managerial Accounting*, McGraw Hill Education, 2006.
- Jawahar Lal, *Advanced Management Accounting, Text, Problems and Cases*, S. Chand & Co., New Delhi, 2009



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CORPORATE ACCOUNTING

Course Code: COM4203

Credit Units: 03

Course Objective:

This course enables the students to develop awareness about Corporate Accounting in conformity with the Provision of Companies' Act and latest amendments thereto with adoption of Accounting Standards that are likely to be introduced from time to time.

Course Contents:

Module-I: Accounting for Shares and Debentures

Accounting for share capital transactions - issue of shares at par, at premium and at discount; forfeiture and re-issue of shares; buy-back of shares; redemption of preference shares - statutory requirements, disclosure in balance sheet; rights issue, with advanced problems. Issue of debentures - accounting treatment and procedures; redemption of debentures; conversion of debentures into shares, different methods for redemption of debentures.

Module-II: Final Accounts of Company

Preparation and presentation of final accounts of joint stock companies as per company law requirements; provisions and reserves; determination of managerial remuneration; appropriation out of profits; transfer of profits to reserves; payment of dividend, transfer of unpaid dividend to Investor Education and Protection Fund; bonus shares and payment of interest out of capital.

Module-III

Accounting treatment for amalgamation, absorption and reconstruction of companies; internal and external reconstruction, Advanced Problems.

Module-IV: Holding & Subsidiary Company

Holding and subsidiary companies - accounting treatment and disclosures; consolidation of accounts.

Module-V: Valuation of Goodwill & Shares

Valuation of Goodwill and Shares

Goodwill - Meaning – Definition – Elements of goodwill – Types of Goodwill – Purchased Goodwill – Nonpurchased or inherent Goodwill – Valuation of Non-purchased Goodwill – Average Profit Method – Super Profit Method – Capitalization of Average Profit Method – Capitalization of Super Profit Method – annuity method Shares - Meaning – need for valuation – factors affecting valuation – methods of valuation – Asset Backing or Intrinsic Value Method –Yield Valuation Method – Dividend Yield –Fair Value method – value of right shares – valuation of preference shares.

Module-VI: Liquidation Accounts

Voluntary Liquidation – Preparation of Liquidator's Statement of affairs – order of payment - Calculation of commission on Assets Realized – payment to unsecured creditors – payment to Unsecured creditors other than preferential creditors – calculation of pro rata- treatment of uncalled Capital – liability of contributors.

Examination Scheme:

Components	A	P	C	CT	EE
Weightage (%)	5	10	5	10	70

A-Attendance; P-Project/Seminar/Quiz/Viva/Home Assignment; C-Case Discussion CT-Class Test; EE-End Semester Examination

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Text & References:

- S.N. Maheswari, Financial Accounting
- Narayanaswamy, Financial Accounting
- SP Iyengar, Advanced Accountancy
- RL Gupta, Advanced Accountancy
- Jain and Narang, Corporate Accounting
- Tulsian, Advanced Accounting



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E-COMMERCE

Course Code: COM4205

Credit Units: 03

Course Objective:

The purpose of this course is to develop understanding of Web - based Commerce and equip them to assess e-commerce requirements of a business and develop e-business plans and to interact with various IT professionals who may be developing e-commerce applications.

Course Contents:

Module-I: Introduction

Introduction to Electronic Commerce: Meaning, nature and scope; Business application of e-commerce; Global trading environment and adopting of e-commerce, evolution of World Wide Web, future of Web.

Module-II

Web-site Design: Web sites as market place; Role of web site in B2C e-commerce; Web site strategies; Web site design principles; push and pull approaches; Alternative methods of customer communication such as e-mail, BBA; E-mail etiquette and e-mail security.

Module-III

Business Models of E-Commerce; B2B, B2C, B2G and other models of e-commerce; Applications of e-commerce to supply chain management; Product and service digitisation; Remote servicing, procurement and online marketing and advertising; Applications to Customer Relationship Management. Business to Consumer E-Commerce Applications: Cataloging, Order planning and order generation; Cost estimation and pricing; Order receipt and accounting; Order selection and prioritization; Order scheduling, fulfilling and delivery, Order billing, Post sales services.

Module-IV

Business to Business E-Commerce: Need and alternative models of B2B e-commerce; Using public and private computer networks for B2B trading; EDI and paperless trading; characteristic features of EDI service arrangement; Internet based EDI; EDI architecture and standards; Vans; Costs of EDI infrastructure; Reasons for slow acceptability of EDI for trading; E-marketing-Traditional web promotion; Web counters; Web advertisements. XML, XML-EDI and its application.

Module-V: E-Payment System

Electronic Payment System: Types of payment systems –e-cash and currency servers, e-cheques, credit cards, smart cards; electronic purses and debit cards; Operational, credit and legal risk of e-payment, Risk management options for epayment systems, Set standards.

Module-VI

Security Issues in E-Commerce: Risks of e-commerce –Types and sources of threats, Protecting electronic commerce assets and intellectual property; Firewalls; Client server network security; Data and message security; Security tools; Digital identity and electronic signature; Encryption and concepts of public and private key infrastructure; Risk management approach to e-commerce security.

Module-VII : Environment of E-commerce

Environment of E-Commerce: Issues regarding language, culture and infrastructure, Legal environment-borders and jurisdiction, contracting and contract enforcement; 58 International cyber laws – cyber laws – Aims and salient Provisions; Cyber laws in India and their limitations; Taxation and e-commerce, Ethical Issues in e-commerce.


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Examination Scheme:

Components	A	P	C	CT	EE
Weightage (%)	5	10	5	10	70

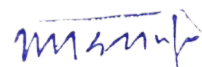
A-Attendance; P-Project/Seminar/Quiz/Viva/Home Assignment; C-Case Discussion CT-Class Test; EE-End Semester Examination

Suggested Readings:

- Laudon, Kenneth C. and Carol Guercio Traver (2002) E -commerce: business, technology, society. (New Delhi : Pearson Education).
- Awad, Elias M. (2007), Electronic Commerce: From Vision to Fulfillment (New Delhi : Pearson Education).
- Kalakota, Ravi and Marcia Robinson (2001). Business 2.0: Roadmap for Success (New Delhi : Pearson Education).
- Smith, P.R. and Dave Chaffey (2005), eMarketing eXcellence; The Heart of eBusiness (UK : Elsevier Ltd.)



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CORPORATE LAW

Course Code: COM4301

Credit Units: 03

Course Objectives:

The objective of the course is to familiarize the students with the nature of legal regulatory environment of corporate enterprises in India.

Course Contents:

Module-I

Provisions of the Companies Act, 2013 and case law relating to Managerial remuneration, Accounts and audit. The Companies Amendment Act, 2015 (Their Main Provisions).

Module-II

Prevention & Money Laundry Act, 2002 – Definition, Punishment for the offence of Money Laundry, Obligation of Banking Companies, Appellate Tribunal, Special Court, Fines & Penalties.

Module-III

SEBI Act, 1992 – Functions of SEBI. Powers of SEBI in relation to securities markets. Guidelines for Securities issues.

Module-IV

Consumer Protection Act, 1986 – Objectives. Rights of consumers. Mechanism of Redressal of Consumer grievances.

Module-V

Environment Protection Act, 1986 – Objectives. Powers of the Central Government, Major Provisions.

Module-VI

Foreign Exchange Management Act (FEMA). Emerging issues in Corporate Laws and Governance. Introduction, Definition, Regulation & Management of Foreign Exchange, Contravention & Penalties, Miscellaneous Provision in Brief.

Examination Scheme:

Components	A	P	C	CT	EE
Weightage (%)	5	10	5	10	70

A-Attendance; P-Project/Seminar/Quiz/Viva/Home Assignment; C-Case Discussion CT-Class Test; EE-End Semester Examination

Suggested Readings:

- Mayson, French & Ryan, *Company Law*, 25th edn, 2009, Oxford University Press.
- Brenda Hannigan, *Company Law*, 2009 edn, LexisNexis, UK.
- Ramaiya A, Guide to *Company Law*, 2009 edn, Wadhwa Nagpur.
- The Institute of Company Secretaries of India, *Company Law, Course Study Material*, 2009
- Puliani Ravi & Mahesh Puliani, *Manual of Companies Act & Corporate Laws including SEBI Rules, Regulations, Etc*, Vol 1 & 2, 2009 edn, Bharat Law House Pvt.Ltd, New Delhi.
- Jain D. K, *Company Law Ready Reckoner*, 2009 edn, Bharat Law House Pvt. Ltd, New Delhi.
- Bindal C. M, Mittal P. K, *Frequently Asked Questions on Company Law (Problems & Solutions)*, 2006 edn, Bharat Law House Pvt. Ltd, New Delhi.


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COST ACCOUNTING

Course Code: COM4302

Credit Units: 03

Course Objective:

To get an expert knowledge in the area of cost management and cost control to enable effective management decisions.

Course Contents:

Module I: Cost Accounting

Introduction – Meaning of Cost, costing and Cost Accounting – Comparison between Financial Accounts and Cost Accounts – Application of Cost Accounting – Designing and installing a Cost Accounting system – Cost concepts and Classification of Costs – Cost Module – Cost Center – Elements of Cost – Preparation of cost sheet – Tenders and Quotations – Problems.

Module II: Labour Costing

Control of labour cost – Labour Turn Turnover – Causes and effects of labour turnover – Meaning of Time and Motion Study, Merit Rating, Job Analysis, Time keeping and Time booking – Idle time, causes and treatment – Overtime – Methods of Wage Payment, Time rate and Piece Rate – Incentive Schemes – Halsey Premium Plan – Rowan Bonus Plan – Taylor's and Merrick's differential piece rate systems – Problems.

Module III: Overhead Costing

Definition – Classification of overheads – Procedure for accounting and control of overheads – Allocation of overheads – Apportionment of overheads – Apportionment of Service department costs to production departments – Repeated Distribution method – Simultaneous equation method – absorption of OH's – Methods of Absorption – Percentage of direct material cost – Direct Labour Cost – Prime Cost, Direct Labour hour rate and Machine Hour Rate – Problems.

Module IV: Costing Methods

Costing Methods Introduction - Job Costing – Batch Costing – Contract Costing- Process Costing – principles – distinction between Process and Job – Preparation of process accounts – treatment of normal loss – abnormal loss – abnormal gain – Joint and By-products. Service costing. Unit, Output and Operating Costing,


Module V:

Reconciliation of Cost and Financial Accounts - Need for reconciliation – Reasons for difference in profits – Problems on preparation of Reconciliation statements including Memorandum Reconciliation account,

Examination Scheme:

Components	A	P	C	CT	EE
Weightage (%)	5	10	5	10	70

A-Attendance; P-Project/Seminar/Quiz/Viva/Home Assignment; C-Case Discussion CT-Class Test; EE-End Semester Examination


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Text & References:

- N.K. Prasad : Cost Accounting
- Nigam & Sharma : Cost Accounting
- Khanna Pandey & Ahuja : Practical Costing
- M.L. Agarwal : Cost Accounting
- Jain & Narang : Cost Accounting
- S.P. Iyengar : Cost Accounting
- S.N. Maheshwari : Cost Accounting
- Horngren : Cost Accounting : A Managerial Emphasis
- M. N. Arora : Cost Accounting
- Dutta : Cost Accounting
- Khan & Jain : Cost Accounting



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ADVANCE BUSINESS STATISTICS AND RESEARCH METHODOLOGY

Course Code: COM4303

Credit Units: 03

Course Objective:

The objective of the course is to acquaint students with some of the important statistical techniques for managerial decision making. The emphasis will be on their applications to business and economic situations.

Course Contents:

Module-I: Probability and Expectation

Probability and Expectation: Approaches to probability. Addition, multiplication and Bayes Theorem, Mathematical Expectation. Probability Distribution: Binomial, Poisson, Exponential, Beta and Normal Distributions.

Module-II: Statistical Decision Theory

Statistical Decision Theory: Risk and uncertainty, Expected value approach, Marginal analysis, Decision tree.

Module-III: Sampling and Sampling Distributions

Sampling and Sampling Distributions: Methods of sampling, Sampling distribution of a statistic and its standard error. Point Estimation and interval estimation, Properties of an estimator.

Module-IV: Hypothesis Testing

Hypothesis Testing; Power of a test, Large sample tests for proportions, means and standard deviations. Small sample tests –t and F tests. Design of Experiments and analysis of variance. Non-Parametric Tests: Chi-square test, Sign test, Median test and Rank correlation test.

Module-V: Inventory Control

Inventory Control: Techniques of selective control, Economic order quantity (EOQ) models- classical, gradual replenishment without shortages, price breaks and planned stock outs, Deciding optimum safety stock and reorder level. PERT/CPM: Networking with one estimate of time. Networks with three estimates of time. Time-cost trade-off. PERT/cost. Resource allocation and resource leveling.

Module-VI: Regression Analysis

Regression Analysis: Simple and linear regression analysis up to three variables. Statistical Quality Control: Control charts for variables and attributes, Acceptance sampling.

Case Studies: Application of statistics to some cases of business enterprise are required to be discussed.

Examination Scheme:

Components	A	P	C	CT	EE
Weightage (%)	5	10	5	10	70

A-Attendance; P-Project/Seminar/Quiz/Viva/Home Assignment; C-Case Discussion CT-Class Test; EE-End Semester Examination

Suggested Readings:

- Levin, R.I. and D.S. Rubin, *Statistics for Management*, Prentice-Hall of India.
- Spiegel, M.R. *Theory and Problems of Statistics*, Schaum Publishing Company.
- Aczel, Amir D., *Complete Business Statistics*, McGraw Hill, 1999.
- Kazmeir Leonard J., Norval F. Pohl, *Basic Statistics for Business and Economics*, McGraw Hill International (2nd ed.)


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INCOME TAX LAW AND PRACTICE

Course Code: COM4304

Credit Units: 03

Course Objective:

To prepare the students with the concepts and theory of income tax accounting and to give a practical exposure to them

Course Contents:

Module I:

- (a) Conceptual Frame-work: Definitions: Residential status and incidence of tax.
- (b) Exemptions and exclusions: Exempted income and incomes not included in total income

Module II:

Heads of Income (1): (i) Salaries (ii) Income from House Property

Module III:

Head of Income (2): Profits and gains of Business or Profession; depreciation allowance, capital gains and income from other sources

Module IV:

Deductions from GTI: Rebates and reliefs, Clubbing provisions; set off and carry forward of losses. Assessment of an Individual

Module V:

Assessment of H.U.F./Firm/A.O.P.

Examination Scheme:

Components	A	P	HA	CT	EE
Weightage (%)	5	5	5	15	70

A-Attendance; P -Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination

Texts & References:

Texts:

- Income Tax, Kanga & Palkiwala, N.M. Tripathi & Sons Ltd., Bombay
- India Income Tax Law, Sampat Ayenger

References:

- Income Tax Law and Accounts, R.R. Gupta Agra Book Store
- Income Tax Law and Accounts for M.Com., H.C. Mehrotra, Sahitya Bhawan, Agra
- Income Tax Manual, Government of India publication
- Student's Guide to Income Tax, Singhania, Vinod K. & Monika, Taxma


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TAX PLANNING & TAX MANAGEMENT

Course Code: COM4305

Credit Units: 03

Course Objectives:

To Provide an in depth knowledge of tax-laws and their impact on management decisions. The course will help the students to understand the intricacies of tax planning and management.

Course Contents:

Module-I: Recognised Methods of Tax Planning, Problems of Tax Planning and Tax Management

Module-II: Tax Planning for Individuals and H.U.F.

Module-III: Tax Planning For Non-corporate entities: Partnership firms and Association of person

Module-IV: Corporate Tax Planning

Tax Planning for Corporate entities, Public and Private Companies, Tax incentives, Tax incentives for Industrial growth, tax holidays and other reliefs and rebates

Module-V: Assessment of Charitable Trust, Assessment of Non-Resident, Special procedure for assessment of search cases, Application of Computer technique in Tax Management


Examination Scheme:

Components	A	P	C	CT	EE
Weightage (%)	5	10	5	10	70

A-Attendance; P-Project/Seminar/Quiz/Viva/Home Assignment; C-Case Discussion CT-Class Test; EE-End Semester Examination

Suggested Readings

- Singhanian, V.K. : Direct Taxes Law and Practice, Taxman Publications (Pvt.) Ltd., Delhi
- Sukumar Bhattacharya : Indian Income Tax Law and Practice, Wadhwa & Co., Agra Nagpur
- Srinivas, E.A.: Corporate Tax Planning, Tata McGraw Hill Publishing Co. Ltd.
- Palkiwala, N.A. and Palkiwala, B.A.: Law and Practice of Income Tax, N M. Tripathi Bombay
- Iyengar Sampat, A.C.: Law of Income Tax, Bharat Publishing House Allied Publishers
- Shah, D.D. : A Treatise on Tax Planning N.M. Tripathi , Bombay
- Lakhotia, R.U. : How to Save Income Tax by Tax Planning , Asia Pub. House, Calcutta
- Raina, H.P. : Corporate Taxation A Hand Book , Orient Law House , New Delhi/ Allahabad
- Lakhotia , R.N. : Tax Management , A Pitmans Publication, Calcutta
- Study Material of the Institute of Company Secretaries of India


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ADVERTISING AND SALES MANAGEMENT

Course Code: COM4310

Credit Units: 03

Course Objective:

The course aims at enabling the students to develop an in -depth understanding of the modern concepts and latest techniques of advertising and personal selling and sales force management which constitute a fast -growing area of marketing.

Course Contents:

1. Section A

Advertising:

Module-I: Introduction to Communication

Communication Basics: Role of communication; Communication process and flows; Planning the promotion mix; Advertising: Nature and importance; Advertising and the economy; Advertising and publicity; Advertising management process – an overview; Determining target audience; Advertising objectives and positioning decisions; Advertising budget decisions.

Module-II: Message Decision

Message Decision: Determining advertising message; Developing advertising copy – Headline main copy, logo, illustration, appeal, layout, creativity in advertising. Media Planning: Types of media and their merits and limitations; Advertising through the internet; Media selection; Media scheduling.

Module-III: Organization of Advertising Operations

Organization of Advertising Operations : In -house vs. advertising agency arrangements; Managing advertising agency relations ; Evaluation of advertisement and campaign effectiveness – Before - and – after advertising tests and techniques.

Module-IV: Advertising in India

Advertising in India; Social and regulatory aspects of advertising. Recent developments and issues in advertising.

2. Section B

Sales Management:

Module-V: Fundamentals of Personal Selling


Fundamentals of Personal Selling: Nature and importance of selling; Types of selling; Personal selling, salesmanship and sales management; Process of effective selling; Strategic Sales management.

Module-VI: Sales Planning

Sales Planning: Setting personal selling objective; Market analysis and sales forecasting; Sales budget; Sales territory; Sales quota. Sales Organization: Organization structure; relationship of sales department with other departments; Distribution networks relationship.

Module-VII: Sales Force Management

Sales Force Management: Recruitment and selection; training and development; motivating, supervising and compensating sales personnel; Controlling the sales effort; Evaluation of sales personnel; Sales and cost analysis. Ethical and legal aspects of selling.


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Examination Scheme:

Components	A	P	C	CT	EE
Weightage (%)	5	10	5	10	70

A-Attendance; P-Project/Seminar/Quiz/Viva/Home Assignment; C-Case Discussion CT-Class Test; EE-End Semester Examination

Suggested Readings:

- Aaker, David A., Rajeev Batra and John G. Mayers, *Advertising Management*, Prentice Hall of India, New Delhi.
- Belch. George and Michael Belch, *Advertising and Promotion : An Integrated Marketing Communications Perspective* 6 th Ed., McGraw Hill, 2004.
- Mandell, Maurice, *Advertising* , Prentice- Hall of India, New Delhi.
- Still, Richard R. Edward W. Cundiff and Norman A.P.Govoni, *Sales Management:Decisions, Strategies and cases*, Prentice Hall of India, New Delhi.
- Anderson B. Robert, *Professional Selling*, Prentice-Hall Inc.
- Spiro, Rosann, William J. Stanton and Greg Richo, *Management of a Sales Force*, McGraw Hill/Irwin, 2007.
- Pederson Carlton A/, Miburn D. Wright, Barton A, Weitz, *Selling Principles and Methods*, Richard D. Irwin, Illinois.



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SUMMER INTERNSHIP EVALUATION

Course Code: COM4335

Credit Units: 06

GUIDELINES FOR INTERNSHIP FILE

There are certain phases of every Intern's professional development that cannot be effectively taught in the academic environment. These facets can only be learned through direct, on-the-job experience working with successful professionals and experts in the field. The internship program can best be described as an attempt to institutionalise efforts to bridge the gap between the professional world and the academic institutions. Entire effort in internship is in terms of extending the program of education and evaluation beyond the classroom of a university or institution. The educational process in the internship course seeks out and focuses attention on many latent attributes, which do not surface in the normal class room situations. These attributes are intellectual ability, professional judgment and decision making ability, inter-disciplinary approach, skills for data handling, ability in written and oral presentation, sense of responsibility etc.

In order to achieve these objectives, each student will maintain a file (Internship File). The Internship File aims to encourage students to keep a personal record of their learning and achievement throughout the Programme. It can be used as the basis for lifelong learning and for job applications. Items can be drawn from activities completed in the course modules and from the workplace to demonstrate learning and personal development.

The File will assess the student's analytical skills and ability to present supportive evidence, whilst demonstrating understanding of their organization, its needs and their own personal contribution to the organization.

The layout guidelines for the Internship File

- A4 size Paper
 - font: Arial (10 points) or Times New Roman (12 points)
 - line spacing: 1.5
 - top and bottom margins: 1 inch/ 2.5 cm; left and right margins: 1.25 inches/ 3 cm

The File will include *five sections* in the order described below. The content and comprehensiveness of the main body and appendices of the report should include the following:

1. The Title Page--Title - An Internship Experience Report for (Your Name), name of internship organization, name of the Supervisor/Guide and his/her designation, date started and completed, and number of credits for which the report is submitted.
2. Table of Content--an outline of the contents by topics and subtopics with the page number and location of each section.
3. Introduction--short, but should include how and why you obtained the internship experience position and the relationship it has to your professional and career goals.
4. Main Body--should include but not be limited to daily tasks performed. Major projects contributed to, dates, hours on task, observations and feelings, meetings attended and their purposes, listing of tools and materials and their suppliers, and photographs if possible of projects, buildings and co-workers.
5. Appendices--include pamphlets, forms, charts, brochures, technical and descriptive literature, graphs and other information related to your Internship experience.

The Main Body will have three sections and will include the following items which will be evaluated for the final assessment:-


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An analysis of the company/organization in which the student is working

A personal review of the student's management skills and how they have been developed through the programme.

The research report that the student has prepared on the project assigned to him by the organization.


(Incase a student is not assigned a specific research project in the organization, he has to select any one aspect of the organization and prepare a research report on it).

ASSESSMENT OF THE INTERNSHIP FILE

The student will be provided with the Student Assessment Record (SAR) to be placed in front of the Internship File. Each item in the SAR is ticked off when it is completed successfully. The faculty will also assess each item as it is completed. The SAR will be signed by the student and by the faculty to indicate that the File is the student's own work. It will also ensure regularity and meeting the deadlines.

STUDENT ASSESSMENT RECORD (SAR)

Management File Item	Criteria for successful completion of the item
1. Analysis of organization (1500- 2000 words)	<ul style="list-style-type: none">• Clear presentation of ideas and analysis• Provides an organizational diagram, following organization presentation conventions• Analysis covers the organization's:<ul style="list-style-type: none">➤ Business strategy and mission➤ Structure➤ Resources and assets➤ Current financial performance➤ Leadership/decision-making style➤ Staffing and skill base➤ Products/services and customers
2. Personal review of Management skills development (1000-1500 words)	<ul style="list-style-type: none">• Clear presentation of ideas and analysis• Demonstrate awareness of own management skills• Presents critical analysis of own management effectiveness, supported with examples• Provides evidence of development of specific management skills e.g. strategic, financial, leadership• Explains how new skills and learning have benefited the organization and self
3. Design of Research Project (1500- 2000 words)	<ul style="list-style-type: none">• Clear presentation of ideas and analysis• Justifies the choice of subject for the research project and why this might be beneficial to the organization• Selects and justifies appropriate research methods for the project• Demonstrate understanding of the key stages in undertaking a research project• Indicates which analytical/statistical tools would be most appropriate and why• The design plan takes account of the resourcing implications of carrying out the research e.g. staffing and other costs


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Examination Scheme:

Report by Student (Internship File)

- a. Organization & Presentation/Language and clarity /substance
of Contents covered and Comprehensiveness

20%

- b. Research Report

30%

Industry Feedback (continuous)

20%

Presentation & Viva (At the end)


30%

Total

100%



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CORPORATE TAX PLANNING

Course Code: COM4402

Credit Units: 03

Course Objective:

The aim of this course is to familiarize the student with major latest provisions of the Indian tax laws and related judicial pronouncements pertaining to corporate enterprises having implications for various aspects of Corporate planning with a view to derive maximum possible tax benefits admissible under the law.

Course Contents:

Module-I: Introduction

Meaning of tax planning and management, tax evasion and tax avoidance; Nature and scope of tax planning and management in the corporate sector; Justification of corporate tax planning and management.

Module-II: Computation of corporate tax

Computation of corporate tax: Carry forward and set off of losses in the case of certain companies under Sec. 79 of Income -tax Act, 1961; Computation of taxable income of companies; Computation of the amount of corporate tax liability; Minimum Alternate Tax; Tax on distributed profits of domestic companies; Tax on income distributed to unit holders.

Module-III

Implications of Tax concessions and incentives for corporate decisions in respect of setting up a new business, location of business and nature of business.

Module-IV: Tax Planning

Tax planning with reference to financial management decisions: Capital structure decisions; Dividend Policy; Bonus Share; Investments and Capital Gains. Tax planning with reference to managerial decisions: Owning or leasing of an asset; purchasing of assets by installment system or Hire System; Purchasing of an asset out of own funds or out of borrowed capital; manufacturing or buying; Repairing, replacing, renewing or renovating an asset; Sale of assets used for scientific research; Shutting down or continuing operations.

Module-V

Foreign collaborations and incidence of taxation on domestic companies ; provisions for relief in respect of double taxation; important Double Taxation Avoidance Agreements with different countries like USA, UK, Germany, France, etc.

Examination Scheme:

Components	A	P	C	CT	EE
Weightage (%)	5	10	5	10	70

A-Attendance; P-Project/Seminar/Quiz/Viva/Home Assignment; C-Case Discussion CT-Class Test; EE-End Semester Examination

Suggested Readings:

- E.A. Srinivas, *Corporate Tax Planning*, Tata McGraw Hill.
- Vinod K. Singhania, *Taxmann's Direct Taxes Planning and Management*.
- V.S. Sundaram, *Commentaries on the Law of Income- Tax in India*, Law Publishers, Allahabad.
- A.C. Sampath Iyengar, *Law of Income Tax*, Bharat Publishing House, Allahabad.
- Taxman, *The Tax and Corporate Law Weekly*.
- Bhagmati Prasad, *Direct Taxes Laws Practice*, Wishwa Prakashan.


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INDUSTRIAL LAW

Course Code: COM4404

Credit Units: 03

Course Objective:

The course is designed to provide an understanding of certain industrial legislations in the context of the Indian Socio – economic conditions.

Course Contents:

Module-I: The factories Act, 1948

The factories Act, 1948 : Objects, provisions relating to hazardous process, health, safety, welfare, working hours, leave etc. of workers, approval, licensing and registration of factories , manager and occupier – their obligations, power of the authorities under the Act, penal provisions.

Module-II: The payment of Bonus Act, 1965

The payment of Bonus Act, 1965: Object, Scope and Application, Definitions, Calculation of amount payable as Bonus, Eligibility for Bonus, Disqualification for Bonus; Minimum & maximum Bonus, Set on & Set off of Allocable Surplus, Application of Act in Establishment in Public Sector, Bonus linked with Production or Productivity.

Module-III: The Employees State Insurance Act, 1948

The Employees State Insurance Act, 1948: Objects, Definitions, Application, Employees State Insurance Scheme, Employees' State Insurance corporation, Constitution-Powers and Duties of the Corporation, Wings of the Corporation, Employees' State Insurance Fund, Contribution, Benefits.

Module-IV: The Industrial Disputes Act, 1947

The Industrial Disputes Act, 1947: Objects, authorities for settlement of industrial disputes, reference of industrial disputes, procedure, powers and duties of authorities, settlements and awards, strikes , lock-outs, lay-off, retrenchment, transfer and closure, unfair labour practices, miscellaneous provision.

Module-V: The Trade Unions Act, 1926

The Trade Unions Act, 1926: Objects, registration of trade unions, rights and liabilities of registered trade unions -procedure, penalties. The Workmen's compensation Act, 1923: Objects, Employer's liability for compensation, amount of compensation, distribution of compensation, notice and claims, remedies of employers against stranger, commissioners for workmen's compensation.

Module-VI: The Employees' Provident Funds & Miscellaneous provision Act, 1952

The Employees' Provident Funds & Miscellaneous provision Act, 1952: Objects, Schemes under the Act. Employees' Provident Fund Scheme, Employees' pension Scheme, 1995, Employees' Deposit linked Insurance Scheme, Determination and Recovery of Money due from and by employers, protection against attachment.

Module-VII: Wage Act, 1936

The payment of Wage Act, 1936: Objects, Application, responsibility for payment of wages, wage periods, time-limits, Deduction from wages , remedy available to worker for delay or unauthorized education.

Module-VIII: Payment of Gratuity Act, 1972

The Payment of Gratuity Act, 1972: Object, continuous service, controlling authority, payment of Gratuity, Compulsory insurance, Nomination, Recovery of Gratuity, Protection of Gratuity.


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Examination Scheme:

Components	A	P	C	CT	EE
Weightage (%)	5	10	5	10	70

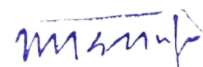
A-Attendance; P-Project/Seminar/Quiz/Viva/Home Assignment; C-Case Discussion CT-Class Test; EE-End Semester Examination

Suggested Readings:

- Malik P. L, *Labour and Industrial Law*, 9th edn, 2009, Eastern Book Company, Lucknow.
- Sharma J. P, *Simplified Approach to Labour Laws* 3rd edn, 2009, Bharat Law House Pvt. Ltd, New Delhi.
- Kumar H. L, *Digest of Labour Cases-1990 –2009*, Universal Law Publishing Co Pvt Ltd, Delhi.
- Singh Avtar, *Introduction to Labour & Industrial Law*, 2009 edn, Wadhwa and Company, Nagpur.
- Sharma J. P, *Employees' Provident Funds and Miscellaneous Provisions Act, 1952 with frequently Raised Queries including Schemes & Rules*, 2nd edn, 2009, Bharat Law House Pvt. Ltd, New Delhi
- Sharma J. P, *Employees' State Insurance Act, 1948 with Frequently Raised Queries*, 2nd edn, 2009, Bharat Law House Pvt. Ltd, New Delhi
- Sharma J. P, *Factories Act, 1948 with Frequently Raised Queries* , 2nd edn, 2009, Bharat Law House Pvt. Ltd, New Delhi



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INTERNATIONAL ACCOUNTING

Course Code: COM4405

Credit Units: 03

Course Objective:

The objective of this course is to develop some conceptual knowledge and understanding of international accounting issues among students. In addition, this course makes students capable of tackling issues in prevailing regulatory environments.

Course Contents:

Module-I: Introduction

International Dimensions of accounting and control: Multinational enterprise, Inter-nationalisation of capital markets, Internationalization of accounting profession. Operational and conceptual issue.

Module-II

Foreign currency translations, methods and practices, & their applications. Specific Reporting Issues: Regulatory Disclosure Requirements; Foreign Operations Disclosure; Social Responsibility Disclosures.

Module-III: Managerial Accounting Issues

Managerial Accounting Issues: Strategic Planning; Management Control Systems; Performance Evaluation of foreign operations.

Module-IV: International Standards and Organization

International Standards and Organization: Advantages, supporting and deterring forces; International and Regional Efforts in Standard Setting; International Standards setting process, Harmonisation; International Accounting Standards Board; Accounting and Auditing Standards.

Module-V: Financial Statement Analysis of companies

Financial Statement Analysis of companies and countries differences in accounting principles, foreign currency statements and Ratio Analysis.

Module-VI: Transfer Pricing

Transfer pricing, methods, objectives, strategies. Emerging issues in International Accounting.

Examination Scheme:

Components	A	P	C	CT	EE
Weightage (%)	5	10	5	10	70

A-Attendance; P-Project/Seminar/Quiz/Viva/Home Assignment; C-Case Discussion CT-Class Test; EE-End Semester Examination

Suggested Readings:

- Radebaugh L. H. and S.J. Gray, *International Accounting*, and Multinational Enterprises, John Wiley & Sons, 2002 .
- Sandagaran S.M., *International Accounting*, South Western, 2001.
- Gray, S.J., *International Accounting and Transnational Decisions* , Butterworth, London, U.K.,
- Holzer H. Peter, *International Accounting*, Horper and Row Publishers, New York.
- Frederick D.S. Choi and Gary K. Meek, *International Accounting*, Pearson Education, 2005
- Shirin Rathore, *International Accounting* Prentice Hall of India, 2008.


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PRINCIPLES & PRACTICE OF TAXATION & INDIAN TAX SYSTEM

Course Code: COM4406

Credit Units: 03

Course Objective:

The purpose of this course is to familiarize and update the students with the basic principles of taxation and the actual operation of income tax in the Indian economy.

Course Contents:

Module I

International comparison of taxes; Tax-GDP ratios; Direct and indirect taxes –inflation adjustment schemes in selected countries. The problems of international double taxation – The assignment rules: source versus residence – methods to alleviate international tax duplication: Tax credit relief; Double tax treaties: OECD Models; United Nations Model – International tax avoidance and evasion; transfer pricing; Tax havens – Anti-avoidance measures.

Module II

Tax bases and tax policy – Determinants of tax yield – Classification of taxes: Direct and indirect taxes; OECD classification; Progressive, proportional and regressive taxes; Ad-valorem and specific taxes. Taxes and inflation; Taxes and savings; Taxes and Labour supply – Tax equity : Benefit principle of Taxation; Ability-to-pay principle of taxation.

Module III

Incidence of Taxation: Factors determining extent of tax shifting – Taxation and efficiency: Excess burden of taxation; Administrative costs; Compliance costs – Tax incentives: Various forms; Rationale; Problems created by tax incentives. Tax avoidance and tax evasion – Tax ratio, taxable capacity and tax effort. Trends in tax- GDP ratio – relative roles of direct and indirect taxes;

Module IV

Distribution of tax burden – Buoyancy and elasticity of tax revenue – Tax evasion. Distribution of taxation powers between the Center and the States in the constitution of India; Restrictions on the taxation powers of the States; sharing of Central taxes; Rationale for constitutional arrangements.

Module V


Residential status and income tax liability – incomes exempt from tax – tax holiday schemes. Set off and carry forward of losses – Rebates – tax incentives for savings. Tax treatment of capital gains – Main features of company taxation – Taxation of partnership firms – Taxation of small traders (presumptive tax) – Tax amnesties.

Case Studies : Some case studies involving the learning from the course.

Examination Scheme:

Components	A	P	C	CT	EE
Weightage (%)	5	10	5	10	70

A-Attendance; P-Project/Seminar/Quiz/Viva/Home Assignment; C-Case Discussion CT-Class Test; EE-End Semester Examination


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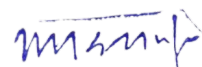

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Suggested Readings:

- Richard Musgrave and Peggy Musgrave, Public Finance in Theory and Practice (New York: McGraw Hill Book Company, 5th Edition, 1989).38
- Richard Goode, Government Finance in Developing Countries (New Delhi. TataMcGraw Hill Publishing Company Ltd., 1986)
- Government of India, Ministry of Finance, Report of the Indirect Taxation Enquiry Committee (Chairman, L.K.Jha), Part I (November 1977) and Part II (January 1978).
- Government of India , Ministry of Finance, Speeches of Union Finance Ministers, 1947-48 to 1984-85 (New Delhi, 1984).
- Vinod K. Singhania, Direct Taxes: Law and Practice (Delhi :Taxmann Publications (P) Ltd.,) Latest edition.



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INTERNATIONAL FINANCIAL MANAGEMENT

Course Code: COM4408

Credit Units: 03

Course Objective:

The objective of the course is to acquaint the students with financial management problems of multinational corporations and prepare them to tackle these problems.

Course Contents:

Module I

International Monetary System: Developments in the international monetary system, gold standard, Bretton Woods system of exchange rate, exchange rate regime since mid-1970s. IMF and international Liquidity. System of exchanging currencies. Exchange rate quotation and determination: direct and indirect quotes, bid and ask quote, spot and forward quote, cross rates. Determination of exchange rate in spot and forward market. PPP theory, IRP theory, Monetary theories of exchange rate determination, Overshooting models.

Module II

Foreign exchange market – spot and forward. Participants in foreign exchange market – arbitraging, hedging and speculation, covered interest rate arbitrage. Borrowing and investing markets. Tax consideration and investment. Exchange rate risk: translation, transaction and real operating exposure – their measurement and management. Investment decisions of multinational corporations (MNCs): International capital budgeting – estimation of cash flows, the cost of capital. Portfolio consideration of a multinational corporation.

Module III

International Financial markets: Multilateral development banks, Euro-currency markets, Euro-banking, Market for international securities – international bonds, Euro notes and Euro-commercial papers, Medium-term Euro-notes. Market for derivatives, currency futures, options and synthetics, currency risk management, financial swaps and interest – rate risk management. Assessment and management of political risk.

Module IV

International working capital management: Cash management. Management of receivables and inventory. Financing of foreign trade: Foreign trade documents, modes of payment, Pre-shipment, post-shipment and medium-term credit, Forfeiting. International accounting: Consolidation and harmonisation of accounts. Transfer pricing.

Module V

Case Studies: Some case studies involving the conceptual learning from the course are required to be discussed.

Examination Scheme:

Components	A	P	C	CT	EE
Weightage (%)	5	10	5	10	70

A-Attendance; P-Project/Seminar/Quiz/Viva/Home Assignment; C-Case Discussion CT-Class Test; EE-End Semester Examination


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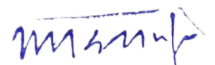

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Suggested Readings:

- Levi, Maurice, International Finance, New York, McGraw Hill Inc., 1996.
- Eiteman, David K., Arthur Stonehill and Michael H. Moffett, Multinational Business Finance, Reading mass., Addison – Wesley Publishing company, 1998.
- Shapiro, Allen C., Multinational Financial Management, New Delhi, Prentice Hall India Pvt. Ltd., 1995.
- Apte P.G., Multinational Financial Management, New Delhi, Tata McGraw Hill, 1998
- 5.Seth A.K., International Financial Management, New Delhi, Galgotia Publishing



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MARKETING RESEARCH

Course Code: COM4409

Credit Units: 03

Course Objective:

The course aims at exposing the students to the concept, tools and techniques of marketing research and developing their skills to be able to apply research techniques to aid marketing decision making.

Course Contents:

Module I

Introduction : Meaning, nature and importance of marketing research; Marketing research and scientific method; Research reliability and validity; Problems in conducting marketing research; Marketing information system (MIS); Ways of conducting marketing research; Syndicated research.

Module II

Marketing Research Process : Steps involved in conducting marketing research; Problem identification; Determining information needs; Developing marketing research proposal.

Module III

Research Design : Meaning and importance; Types of research designs – explorative, descriptive and conclusive researches; Secondary data – sources, uses and limitations; Primary data collection methods – questioning techniques and observation methods; Online data sources and research; Questionnaire preparation.

Module IV

Sample Design and Field Work : Defining universe and sampling unit; Determining sampling frame; Probability and non-probability sampling methods; Sample size determination; Field work and data collection – sampling and non-sampling errors.
Data Analysis and Report Preparation: Data editing, coding tabulation and graphical presentation; Univariate and multivariate data analyses techniques and their applications in marketing research; Report preparation, presentation and follow-up.

Module V

Marketing Research Applications : Consumer research – behaviour and motivation research, attitude measurement and scaling techniques; Product research; Advertising research; Marketing and sales forecasting; Sales analysis. Marketing Research in India : Status, organization and developments; Ethical issues in marketing research.

Examination Scheme:

Components	A	P	C	CT	EE
Weightage (%)	5	10	5	10	70

A-Attendance; P-Project/Seminar/Quiz/Viva/Home Assignment; C-Case Discussion CT-Class Test; EE-End Semester Examination

Suggested Readings :

- Harper W. Boyd, Ralph Westfall and Stanley F. Stasch, Marketing research: Text and Cases, 2005.
- Malhotra, Naresh K., Marketing Research, 5th Ed., Prentice Hall of India.
- Cooper, Donald R. and Pamela S. Schindler, Marketing Research, Tata McGraw Hill, 2005.
- Paul E. Green, et.al., Research for Marketing Decisions, Prentice-Hall of India Pvt. Ltd, New Delhi.
- Donald S. Tull and Del I. Hawkins, Marketing Research: Measurement and Methods, Prentice-Hall of India Pvt. Ltd. New Delhi, 1998

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DISSERTATION

Course Code: COM4437

Credit Units: 06

The Aims of the Dissertation

The aim of the dissertation is to provide you with an opportunity to further your intellectual and personal development in your chosen field by undertaking a significant practical unit of activity, having an educational value at a level commensurate with the award of your degree

The dissertation can be defined as a scholarly inquiry into a problem or issues, involving a systematic approach to gathering and analysis of information / data, leading to production of a structured report.

The Dissertation Topic

It is usual to give you some discretion in the choice of topic for the dissertation and the approach to be adopted. You will need to ensure that your dissertation is related to your field of specialisation.

Deciding this is often the most difficult part of the dissertation process, and perhaps, you have been thinking of a topic for some time.

It is important to distinguish here between ‘dissertation topic’ and ‘dissertation title’. The topic is the specific area that you wish to investigate. The title may not be decided until the dissertation has been written so as to reflect its content properly.

Few restrictions are placed on the choice of the topic. Normally we would expect it to be:

- relevant to business, defined broadly;
- related to one or more of the subjects or areas of study within the core program and specialisation stream;
- clearly focused so as to facilitate an in-depth approach, subject to the availability of adequate sources of information and to your own knowledge;
- of value and interest to you and your personal and professional development.

Planning your dissertation

This will entail following:

- Selecting a topic for investigation.
- Establishing the precise focus of your study by deciding on the aims and objectives of the dissertation, or formulating questions to be investigated. Consider very carefully what is worth investigating and its feasibility.
- Drawing up initial dissertation outlines considering the aims and objectives of the dissertation. Workout various stages of dissertation
- Devising a timetable to ensure that all stages of dissertation are completed in time. The timetable should include writing of the dissertation and regular meetings with your dissertation guide.

The dissertation plan or outline

It is recommended that you should have a dissertation plan to guide you right from the outset. Essentially, the dissertation plan is an outline of what you intend to do, chapter wise and therefore should reflect the aims and objectives of your dissertation.

There are several reasons for having a dissertation plan

- It provides a focus to your thoughts.
- It provides your faculty-guide with an opportunity, at an early stage of your work, to make constructive comments and help guide the direction of your research.


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- The writing of a plan is the first formal stage of the writing process, and therefore helps build up your confidence.
- In many ways, the plan encourages you to come to terms with the reading, thinking and writing in a systematic and integrated way, with plenty of time left for changes.
- Finally, the dissertation plan generally provides a revision point in the development of your dissertation report in order to allow appropriate changes in the scope and even direction of your work as it progresses.

Keeping records

This includes the following:

- Making a note of everything you read; including those discarded.
- Ensuring that when recording sources, author's name and initials, date of publication, title, place of publication and publisher are included. (You may consider starting a card index or database from the outset). Making an accurate note of all quotations at the time you read them.
- Make clear what is a direct quotation and what is your paraphrase.

Dissertation format

All students must follow the following rules in submitting their dissertation.

- Front page should provide title, author, Name of degree/diploma and the date of submission.
- Second page should be the table of contents giving page references for each chapter and section.
- The next page should be the table of appendices, graphs and tables giving titles and page references.
- Next to follow should be a synopsis or abstract of the dissertation (approximately 500 words) titled: **Executive Summary**
- Next is the 'acknowledgements'.
- Chapter I should be a general introduction, giving the background to the dissertation, the objectives of the dissertation, the rationale for the dissertation, the plan, methodological issues and problems. The limitations of the dissertation should also be hinted in this chapter.
- Other chapters will constitute the body of the dissertation. The number of chapters and their sequence will usually vary depending on, among others, on a critical review of the previous relevant work relating to your major findings, a discussion of their implications, and conclusions, possibly with a suggestion of the direction of future research on the area.
- After this concluding chapter, you should give a list of all the references you have used. These should be cross - references with your text. For articles from journals, the following details are required e.g.
Draper P and Pandyal K. 1991, The Investment Trust Discount Revisited, Journal of Business Finance and Accounting, Vol18, No6, Nov, pp 791-832.
For books, the following details are required:
Levi, M. 1996, International Financial Management, Prentice Hall, New York, 3rd Ed, 1996
- Finally, you should give any appendices. These should only include relevant statistical data or material that cannot be fitted into the above categories.

Guidelines for the assessment of the dissertation

While evaluating the dissertation, faculty guide will consider the following aspects:

1. Has the student made a clear statement of the objective or objective(s).
2. If there is more than one objective, do these constitute parts of a whole?
3. Has the student developed an appropriate analytical framework for addressing the problem at hand.
4. Is this based on up-to-date developments in the topic area?
5. Has the student collected information / data suitable to the frameworks?
6. Are the techniques employed by the student to analyse the data / information appropriate and relevant?
7. Has the student succeeded in drawing conclusion from the analysis?
8. Do the conclusions relate well to the objectives of the project?

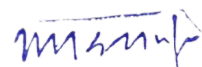
9. Has the student been regular in his work?
10. Layout of the written report.

Examination Scheme:

Dissertation:	75
Viva Voce:	25
Total:	100



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Bachelor of Arts - Applied Psychology (Honors)

FLEXILEARN
-Freedom to design your degree



Curriculum & Scheme of Examination 2022

AMITY UNIVERSITY HARYANA
GURUGRAM

A handwritten signature in blue ink, appearing to read 'Anil'.

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A handwritten signature in blue ink, appearing to read 'Manesar'.

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Bachelor of Arts - Applied Psychology (Honors)

ELEMENTARY STATISTICS

Course Code: PSY2101

Credit Units: 03

Course Objective:

The paper on Statistics introduces quantification of psychological data and gives primary research orientation to the students. Understanding Statistics and basic logic of Statistics is crucial to being able to read Psychology research article. Further by mastering the basic logic and ways of thinking about Statistics, students will be unusually well prepared for the advanced courses.

Course Contents:

Module I:

Meaning, Definition, Importance and Limitations of Statistics in Psychology
Population and Sample: Types of Sampling

Module II:

Primary and Secondary Data
Classification and Tabulation of Data,
Frequency Distribution

Module III:

Graphical presentation of Data: Histograms, Frequency polygon, Frequency Curve, Cumulative Frequency Curve (Ogive), Cumulative Percentage Curve

Module IV:

Measures of Central Tendency: Meaning, Application and Computation of Mean, Median and Mode

Module V:

Measures of Variability: Range and Variation; Average deviation, Quartile deviation and Standard deviation

Examination Scheme:

Components	CT	CT / H / P / V / Q	CT	A	EE
Weightage (%)	10	10	5	5	70

CT-Class Test; H-Home Assignment; P-Presentation; V-Viva; Q-Quiz; A-Attendance; EE-End Session Exam

Text & References:

Text:

- Garrett, H. E.: Statistics in Psychology and Education, Vakils, Feffer and Simons Ltd. Bombay
- Aron/Aron&Coups: Statistics for Psychology (5th Ed). Pearson Education
- Howitt, D. &: Introduction to Statistics in Psychology (5th Ed). Cramer, D. England: Pearson Education Limited.
- Sprinthall, R.C. : Basic Statistical Analysis. Prentice Hall College Div
- Downie, N. M.: Basic Statistical Methods. Harper & Row Publishers, New York
- Colman, A. M.: Psychological Research Methods and Statistics. London and New York: Longman.
- Gupta, S. C.: Fundamentals of Statistics. N. Delhi: Himalaya
- Siegel, S.: (1956), Non Parametric Statistics, New York, McGraw Hill
- Broota, S.: (1992), Experimental Design in Behaviour Research, New Delhi
- Mohsin, S. M.: Fundamental Statistics for the Behavioural Sciences. Motilal Banarasis, Patna

References:

- Agrawal, B. L.: Basic Statistics. New Age International
- Guilford, J.P.: Fundamental Statistics in Psychology and Education. McGraw Hill Kogakusha Ltd.
- Minimum, E. W., King, H. M. & Bear G., (1993), Statistical Reasoning in Psychology & Education, 3rd Edition, New York: John Wiley & Sons
- Freeman: Statistics in Psychology



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PSYCHOLOGICAL PRACTICAL- I

Course Code: PSY2103

Credit Units: 03

Course Objective:

1. To give practical experience to the students in administering and scoring psychological tests and interpreting the scores.
2. To acquaint the students with the basic procedure and design of psychology experiments.
3. To familiarize the students with the use of elementary statistical techniques
4. To encourage and guide the students to undertake a small-scale research project.

Note: Total 5 practicals will be conducted in the first semester among the list of following practicals out of which first three practicals are compulsory.

Course Content:

1	Alexander Pass-a-long Test of Intelligence	Intelligence
2	Muller Lyre Apparatus with stand	Perception Illusion
3	Division of Attention Board with reset 6 digit Impulse counter	Attention
4	Leadership Style Scale	Leadership
5	Depth Perception	Perception
6	Marital Coping Scale	Relationship

Examination Scheme:

Components	A	File Demonstration	Viva	EE
Weightage (%)	5	35	35	25

Text & References:

- Mohsin, S. M.: Experiments in Psychology. Motilal Banarasi Das
- Woodworth, R.S.: Experimental Psychology. Oxford & IBH & Schlosberg, H. Publishing
- Postman, L. & Egan, J. P.: Experimental Psychology: An Introduction. Harper and Row



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HUMAN RIGHTS, VALUES AND ETHICS

Course Code: PSY2105

Credit Units: 03

Course Objective:

The course will address the evolution of international human rights and of the legal instruments designed for their protection. It will study the theoretical foundations of the idea of human rights in India.

Course Contents:

Module I: Introduction to Human Rights

Historical Perspective of Human rights
Meaning and Evolution of Human rights
Theories of Human Rights
Universalization of Human Rights
General Conditions Underlying the idea of human rights

Module II: Human Rights in Indian Context

Indian constitution and Human rights
Implementation of human rights in India
Personal and family rights
Group rights and right to equality

Module III: Human Rights Education

History and Determinants of Human Right Education
Principles of Human Rights Education
Awareness of Human Rights in Children
Protection of Human Rights in School
Global Need of Human Right Education

Module IV: Human and Civil Rights

Property Rights - Copyright - Intellectual Property
Crime and Social Deviance: Anomie
Ethics
Police — Law Enforcement: International Law Enforcement Agencies and National Law Enforcement Agencies

Module V: Values and ethics In India

Human Rights: Values and Ethics
Indian and Western Values and Ethics

Examination Scheme:

Components	CT	CT / H / P / V / Q	CT	A	EE
Weightage (%)	10	10	5	5	70

CT-Class Test; H-Home Assignment; P-Presentation; V-Viva; Q-Quiz; A-Attendance; EE-End Session Exam

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Text & References:

Text:

- Shelley, Wright (2001): International Human Rights, Decolonisation and Globalization: Becoming Human. London: Routledge.
- Anthony J. Langlois. (2001): The Politics of Justice and Human Rights: Southeast Asia and Universalist Theory. Cambridge: Cambridge University Press.

References:

- Parish, Steven M. (1994): Moral Knowing in a Hindu Sacred City. N.Y.: Columbia University Press.



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READINGS IN PSYCHOLOGY

Course Code: PSY2130

Credit Units: 02

Course Objective:

The objective of this concentration elective is to inculcate reading habit along with value addition to the existing understanding of the subject. The book would be a kind of knowledge enhancer that would envision the student about some current thoughts related to the discipline. The book reading and its critical analysis would help broaden the intellectual horizon of the student. A contemporary and relevant book will be selected by the concerned department.

Guidelines:

The student is expected to thoroughly go through the discipline related prescribed book with the objective of critically reviewing each aspect and character of the book. The student is supposed to have a detailed insight into the following:

1. Content
2. Writing style
3. Information/learning
4. Content handling
5. Characters(if any)
6. Thematic Clarity

The report is to be submitted in about 3000 words on A4 size sheets, Font 12pt., Times New Roman, 1.5 spacing. Headings in Font Size 16.

Evaluation Scheme:

Report on the Book in 3000 words	Written Test
50 marks	50 marks



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PROJECT (WITH PRESENTATION & EVALUATION)

Course code: PSY2132

Credit Units:03

Course Objective:

The aim of the project is to provide the students with an opportunity to further their intellectual and personal development in the chosen field by undertaking a significant practical unit of activity. The project can be defined as a scholarly inquiry into a problem or issues, involving a systematic approach to gathering and analysis of information / data, leading to production of a structured report.

Chapter Scheme and distribution of marks:

Chapter 1: Introduction – 10 marks

Chapter 2: Conceptual Framework/ National/International Scenario – 25 marks

Chapter 3: Presentation, Analysis & Findings -- 25 marks

Chapter 4: Conclusion & Recommendations -- 10 marks

Chapter 5: Bibliography -- 05 marks

Project Report	Power Point Presentation & Viva
75 marks	25 marks

Components of a Project Report

The outcome of Project Work is the Project Report. A project report should have the following components:

1) Cover Page: This should contain the title of the project proposal, to whom it is submitted, for which degree, the name of the author, name of the supervisor, year of submission of the project work, name of the University.

2) Acknowledgement: Various organizations and individuals who might have provided assistance /co-operation during the process of carrying out the study.

3) Table of Content: Page-wise listing of the main contents in the report, i.e., different Chapters and its main Sections along with their page numbers.

4)Body of the Report: The body of the report should have these four logical divisions

a) **Introduction:** This will cover the background, rationale/ need / justification, brief review of literature, objectives, methodology (the area of the study, sample, type of study, tools for data collection, and method of analysis), Limitations of the Study, and Chapter Planning.

b) **Conceptual Framework / National and International Scenario:** (relating to the topic of the Project).

c) **Presentation of Data, Analysis and Findings:** (using the tools and techniques mentioned in the methodology).

d) **Conclusion and Recommendations:** In this section, the concluding observations based on the main findings and suggestions are to be provided.

5) Bibliography or References: This section will include the list of books and articles which have been used in the project work, and in writing a project report.

6) Annexures: Questionnaires (if any), relevant reports, etc.

(The main text of the Project should normally be in the range of 5000 words. However, there may be annexure in addition to the main text)

The Steps of a Project Report

Step I : Selection of the topic for the project by taking following points into consideration:

- Suitability of the topic.
- Relevance of the topic
- Time available at the disposal.
- Feasibility of data collection within the given time limit.
- Challenges involved in the data collection (time & cost involved in the data collection, possibility of getting responses, etc.)

Step II: Finalisation of the Topic and preparation of Project Proposal in consultation with the Supervisor.

Step III: Collection of information and data relating to the topic and analysis of the same.

Step IV: Writing the report dividing it into suitable chapters, viz.,

Chapter 1: Introduction,

Chapter 2: Conceptual Framework / National & International Scenario,

Chapter 3: Analysis & Findings

Chapter 4: Conclusion and Recommendations.

Step V: The following documents are to be attached with the Final Project Report.

- 1) Approval letter from the supervisor(Annexure-IA)
- 2) Student's declaration (Annexure-IB)
- 3) Certificate from the Competent Authority of the Organisation / Institution, if the student undertakes the Project Work in any Organisation / Institution.

Guidelines for evaluation:

- Each of the students has to undertake a Project individually under the supervision of a teacher and to submit the same following the guidelines stated below.
- Language of Project Report and Viva-Voce Examination may be English. The Project Report must be typed and hard bound.
- Failure to submit the Project Report or failure to appear at the Viva-voce Examination will be treated as "Absent" in the Examination. He /she has to submit the Project Report and appear at the Viva-Voce Examination in the subsequent years (within the time period as per University Rules).
- No marks will be allotted on the Project Report unless a candidate appears at the Viva-Voce Examination. Similarly, no marks will be allotted on Viva-Voce Examination unless a candidate submits his/her Project Report.
- Evaluation of the Project Work to be done jointly by one internal expert and one external expert with equal weightage, i.e., average marks of the internal and external experts will be allotted to the candidate.



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ARTICLE/ FEATURE WRITING

Course Code: PSY2136

Credit Units: 01

Course Objective:

The objective of this course is to judge the understanding as well as application of the knowledge gained by the students. The aim of an article is to provide the students an opportunity to further enhance their knowledge in an area of their choice by undertaking different **aspects of human behavior and analyzing it** at a level commensurate with the learning outcomes of the various courses taken up by them in the ongoing semester.

The purpose of the article is for the students to draw upon their interest in currently published research literature with the aim of furthering theoretical work in the field of interest.

Guidelines:

1. The article will be related to the contemporary Psychological issue and the topic will be given by the department. The article will be written in around 3000 words.
2. The presentation of the article is scheduled to be held before the commencement of Semester examinations.
3. The article will carry 100 marks that will be marked on the basis of selection of topic, article writing and viva.
4. There are a number of types of articles that are published in psychological journals, including reports of empirical studies (psychological reports), review articles, case studies and theoretical articles. Students may critically assess existing theories, identifying flaws or arguing for the superiority of one theory over another. This is often done through examining a theory's internal consistency and evaluating the level of empirical support for the theory (i.e. studies/experiments). This type of theoretical analysis is what we are expecting from students at undergraduate level.

Examples of a few broad areas for articles (List is indicative, not exhaustive)

- Personality theories
- Emotional Intelligence
- Positive thinking
- Learning
- Self concept
- motivation
- Emotion
- Cognitive process
- Cross cultural Psychology
- Memory enhancement

EVALUATION

Selection of topic & its significance	Article writing		Viva	Total
	Content	References(studies quoted)		
10	30	20	40	100


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ABNORMAL PSYCHOLOGY

Course Code: PSY2251

Credit Units: 03

Course Objective:

Abnormal psychology is a branch of psychology that deals with psychopathology and abnormal behavior that causes suffering to the individual and others around him or her, and interferes with functioning in a significant way. The term covers a broad range of disorders, from depression to obsession-compulsion to sexual deviation and many more. The study of abnormal psychology also includes learning about the factors, situations, and conditions that cause mental disorders and how they may be best treated.

Course Content:

Module I: Introduction

Concept of abnormality: Criteria and Perspectives

Classification: DSM IV-R, conceptual and operational evaluation.

Casual factors in Psychopathological Behaviour

(a) Biological determinants

(b) Psychological determinants

(c) Socio-cultural determinants

Module II: Neurosis and Psychosis

Concept and Difference between both the two

Module III: Neurotic Disorder

Generalized anxiety disorders

Obsessive-Compulsive disorders

Phobic Disorders

Eating Disorder

Module IV: Mood Disorders

Depression

Bipolar Disorder

Module V: Psychotic Disorder

Bipolar disorders: Manic, Depressive, Mixed

Psychotic depression

Delusional Disorder

Schizophrenia

Module VI: Mental Retardation and Development Disorders

Levels of mental retardation, Organic factors in mental retardation.

Autism: Clinical picture and casual factors.

Childhood Disorder

Module VII: Substance Abuse Disorders

Alcoholism

Drug Addition

Module VIII:

Psychosomatic Disorder

Somatoform Disorders
Personality Disorders

Examination Scheme:

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	10	10	5	5	70

CT-Class Test; **H**-Home Assignment; **P**-Presentation; **V**-Viva; **Q**-Quiz; **A**-Attendance; **EE**-End Session Exam

Text & References:

Text:

- Page, J.D.: Abnormal Psychology. New Delhi: Tata McGraw Hill Publishing Company Limited
- Shanmugam, T.E.: Abnormal Psychology. New Delhi: Tata McGraw Hill Publishing Company Limited
- Coleman, J.C.: Abnormal Psychology and Modern Life. Bombay: D.B. Taraporewala Sons.&OCLtd.
- Davison G.C.& Neale, J. M.: Abnormal Psychology. New York: John Willey&Sons.
- Carson, R.C., Butcher, J.N. & Mineka, S.: Abnormal Psychology and Modern Life. Delhi: & Person Education, 2000
- Sarason, I. G. & Sarason, B. R.: Abnormal Psychology: The Problem of Maladaptive Behaviour, 11th Ed. Prentice-Hall
- Mangal, S. K.: Abnormal Psychology. New Delhi: Sterling Publishers Pvt Ltd

References:

- Comer, R. J.: Abnormal Psychology, 5th Ed. Worth Publishers
- Kumar, V.: Abnormal Psychology: Causes and Treatment. AadiPublications
- Kaur, R.: Abnormal Psychology: New Trends and Innovations Delhi: Deep & Deep Publications (P) Ltd.



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ADVANCED STATISTICS

Course Code: PSY2201

Credit Units: 03

Course Objective:

The paper on statistics introduces quantification of psychological data and gives primary research orientation to the students.

Course Contents:

Module I: The Normal Curve

Characteristics and Problems in Normal Probability Curve (NPC), The Standard Normal Curve.

Module II: Significance of mean

Computation of the standard error of mean, application and interpretation, Z-test, The 't' distribution, Degrees of freedom, Levels of significance, Standard error of difference between two independent means (t-test: Large & small samples), Type I and Type II errors

Module III: Chi-Square Test (Non-Parametric Method)

Meaning, Test of Hypothesis with equal probability, Chi-Square with 2*2 table

Module IV: Analysis of Variance

Hypothesis testing with the help of One way ANOVA (f-test)

Module V: Parametric Vs Non-parametric Stats

Introduction, Assumptions, basic differences, uses of parametric and Non-parametric tests

Examination Scheme:

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	10	10	5	5	70

CT-Class Test; H-Home Assignment; P-Presentation; V-Viva; Q-Quiz; A-Attendance; EE-End Session Exam

Text & References:

Text:

- Garrett, H. E.: Statistics in Psychology and Education, Vakils, Feffer and Simons Ltd. Bombay
- Aron/Aron&Coups: Statistics for Psychology (5th Ed). Pearson Education
- Howitt, D. &: Introduction to Statistics in Psychology (5th Ed). Cramer, D. England: Pearson Education Limited.
- Sprinthall, R.C. : Basic Statistical Analysis. Prentice Hall College Div
- Downie, N. M.: Basic Statistical Methods. Harper & Row Publishers, New York
- Colman, A. M.: Psychological Research Methods and Statistics. London and New York: Longman.
- Gupta, S. C.: Fundamentals of Statistics. N. Delhi: Himalaya
- Siegel, S.: (1956), Non Parametric Statistics, New York, McGraw Hill
- Broota, S.: (1992), Experimental Design in Behaviour Research, New Delhi
- Mohsin, S. M.: Fundamental Statistics for the Behavioural Sciences. Motilal Banarasisdas, Patna

References:

- Agrawal, B. L.:Basic Statistics. New Age International
- Guilford, J.P.:Fundamental Statistics in Psychology and Education. McGraw Hill Kogakusha Ltd.
- Minimum, E. W., King, H. M. & Bear G., (1993), Statistical Reasoning in Psychology & Education, 3rd Edition, New York: John Willey & Sons
- Freeman: Statistics in Psychology



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PSYCHOLOGICAL PRACTICAL- II

Course Code: PSY2203

Credit Units: 03

Course Objective:

- To give practical experience to the students in administering and scoring psychological tests and interpreting the scores.
- To acquaint the students with the basic procedure and design of psychology experiments.
- To familiarize the students with the use of elementary statistical techniques
- To encourage and guide the students to undertake a small-scale research project.

Note: Total 5 practicals will be conducted in the second semester among the list of following practicals out of which first three practicals are compulsory.

Course Content:

1	Mirror Drawing	Motor Learning
2	Rey Auditory Verbal Learning Test	Verbal Learning
3	Emotions & Expressions	Emotion
4	Coopersmith Self Esteem Inventory	Self Esteem
5	Emotional Intelligence Test	Intelligence
6	Quality Of Marital Relationship scale	Relationship

Examination Scheme:

Components	A	File Demonstration	Viva	EE
Weightage (%)	5	35	35	25

Text & References:

- Mohsin, S. M.: Experiments in Psychology. Motilal Banarasi Das
- Woodworth, R.S.: Experimental Psychology. Oxford & IBH & Schlosberg, H. Publishing
- Postman, L. & Egan, J. P.: Experimental Psychology: An Introduction. Harper and Row


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ORGANIZATIONAL BEHAVIOUR

Course Code: PSY2205

Credit Units: 03

Course Objective:

To learn how the findings of psychology are applied to the problems involving human behavior in the workplace for providing optimum solutions.

Course Contents:

Module I: Nature and Scope of Organizational Psychology

Organizational Psychology: Meaning, subject matter and functions of Organizational Psychology
Development, Current status and Future of Organizational Psychology

Module II: Work Motivation

Theories

Job Design: Job enlargement, Job enrichment and Job characteristics models

Module III: Organizational Attitude and Behaviour

Job Satisfaction, Job Involvement, Organizational Commitment: Concepts, Determinants and Consequences.

Module IV: Influence, Power and Politics in Organization

Introduction: Individual bases of Power, Group or Subunit power

Structural determinants, Organizational Politics and its ethical implication

Module V: Organizational Culture

Nature, Formation and maintenance of organizational culture

Consequences of organizational culture

Work culture in the Indian context

Examination Scheme:

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	10	10	5	5	70

CT-Class Test; H-Home Assignment; P-Presentation; V-Viva; Q-Quiz; A-Attendance; EE-End Session Exam

Text & References:

Text:

- Robbin's S.P. (1993). Organizational Behaviour: Concepts Controversies and Applications; (6th Ed.) New Delhi: Prentice Hall.
- Bass, B.H. & Berrett, G.V. (1981). People, Work, and Organizations an Introduction to Industrial and Organizational Psychology; Boston: Allyn and Bacon, INC.
- Feldman, D.C. & Aenold, H.J. (1985). Managing Individual and Group Behaviour in Organizations; New York: McGraw-Hill.
- Smith, R.D., (1988). Organizational Behaviour; New York: McGraw-Hill.
- Luthans, F. (1998). Organizational Behaviour; New York: McGraw-Hill

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References:

- Davis, K. & Newstroms, J.W. (1989). Human Behaviour at Work: Organizational Behaviour; New York: McGraw-Hill
- Sekaran, U. (1989). Organizational Behaviour: Text and Cases; New Delhi: Tata Mcdraw Hill
- Cascio, W. (1993). Applied Psychology in Personal Management; New York: Prentice Hall



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READINGS IN PSYCHOLOGY

Course Code: PSY2230

Credit Units: 02

Objectives:

The objective of this concentration elective is to inculcate reading habit along with value addition to the existing understanding of the subject. The book would be a kind of knowledge enhancer that would envision the student about some current thoughts related to the discipline. The book reading and its critical analysis would help broaden the intellectual horizon of the student. A contemporary and relevant book will be selected by the concerned department.

Guidelines:

The student is expected to thoroughly go through the discipline related prescribed book with the objective of critically reviewing each aspect and character of the book. The student is supposed to have a detailed insight into the following:

1. Content
2. Writing style
3. Information/learning
4. Content handling
5. Characters(if any)
6. Thematic Clarity

The report is to be submitted in about 3000 words on A4 size sheets, Font 12pt., Times New Roman, 1.5 spacing. Headings in Font Size 16.

Evaluation Scheme:

Report on the Book in 3000 words	Written Test
50 marks	50 marks



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PROJECT (WITH PRESENTATION & EVALUATION)

Course code: PSY2232

Credit Units: 03

Course Objective:

The aim of the project is to provide the students with an opportunity to further their intellectual and personal development in the chosen field by undertaking a significant practical unit of activity. The project can be defined as a scholarly inquiry into a problem or issues, involving a systematic approach to gathering and analysis of information / data, leading to production of a structured report.

Chapter Scheme and distribution of marks:

Chapter 1: Introduction – 10 marks

Chapter 2: Conceptual Framework/ National/International Scenario – 25 marks

Chapter 3: Presentation, Analysis & Findings -- 25 marks

Chapter 4: Conclusion & Recommendations -- 10 marks

Chapter 5: Bibliography -- 05 marks

Project Report	Power Point Presentation & Viva
75 marks	25 marks

Components of a Project Report

The outcome of Project Work is the Project Report. A project report should have the following components:

1) Cover Page: This should contain the title of the project proposal, to whom it is submitted, for which degree, the name of the author, name of the supervisor, year of submission of the project work, name of the University.

2) Acknowledgement: Various organizations and individuals who might have provided assistance /co-operation during the process of carrying out the study.

3) Table of Content: Page-wise listing of the main contents in the report, i.e., different Chapters and its main Sections along with their page numbers.

4)Body of the Report: The body of the report should have these four logical divisions

a) **Introduction:** This will cover the background, rationale/ need / justification, brief review of literature, objectives, methodology (the area of the study, sample, type of study, tools for data collection, and method of analysis), Limitations of the Study, and Chapter Planning.

b) **Conceptual Framework / National and International Scenario:** (relating to the topic of the Project).

c) **Presentation of Data, Analysis and Findings:**(using the tools and techniques mentioned in the methodology).

d) **Conclusion and Recommendations:** In this section, the concluding observations based on the main findings and suggestions are to be provided.

5) Bibliography or References: This section will include the list of books and articles which have been used in the project work, and in writing a project report.

6) Annexures: Questionnaires (if any), relevant reports, etc.

(The main text of the Project should normally be in the range of 5000 words. However, there may be annexure in addition to the main text)

The Steps of a Project Report

Step I : Selection of the topic for the project by taking following points into consideration:

- Suitability of the topic.
- Relevance of the topic
- Time available at the disposal.
- Feasibility of data collection within the given time limit.
- Challenges involved in the data collection (time & cost involved in the data collection, possibility of getting responses, etc.)

Step II: Finalisation of the Topic and preparation of Project Proposal in consultation with the Supervisor.

Step III: Collection of information and data relating to the topic and analysis of the same.

Step IV: Writing the report dividing it into suitable chapters, viz.,

Chapter 1: Introduction,

Chapter 2: Conceptual Framework / National & International Scenario,

Chapter 3: Analysis & Findings

Chapter 4: Conclusion and Recommendations.

Step V: The following documents are to be attached with the Final Project Report.

- 1) Approval letter from the supervisor (Annexure-IA)
- 2) Student's declaration (Annexure-IB)
- 3) Certificate from the Competent Authority of the Organisation / Institution, if the student undertakes the Project Work in any Organisation / Institution.

Guidelines for evaluation:

- Each of the students has to undertake a Project individually under the supervision of a teacher and to submit the same following the guidelines stated below.
- Language of Project Report and Viva-Voce Examination may be English. The Project Report must be typed and hard bound.
- Failure to submit the Project Report or failure to appear at the Viva-voce Examination will be treated as "Absent" in the Examination. He /she has to submit the Project Report and appear at the Viva-Voce Examination in the subsequent years (within the time period as per University Rules).
- No marks will be allotted on the Project Report unless a candidate appears at the Viva-Voce Examination. Similarly, no marks will be allotted on Viva-Voce Examination unless a candidate submits his/her Project Report.
- Evaluation of the Project Work to be done jointly by one internal expert and one external expert with equal weightage, i.e., average marks of the internal and external experts will be allotted to the candidate.



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ARTICLE/ FEATURE WRITING

Course Code: PSY2236

Credit Units: 01

Course Objective:

The objective of this course is to judge the understanding as well as application of the knowledge gained by the students. The aim of an article is to provide the students with an opportunity to further enhance their knowledge in an area of their choice by undertaking different **aspects of human behavior and analyzing it** at a level commensurate with the learning outcomes of the various courses taken up by them in the ongoing semester.

The purpose of the article is for the students to draw upon their interest in currently published research literature with the aim of furthering theoretical work in the field of interest.

Guidelines:

1. The article will be related to the contemporary Psychological issue and the topic will be given by the department. The article will be written in around 3000 words.
2. The presentation of the article is scheduled to be held before the commencement of Semester examinations.
3. The article will carry 100 marks that will be marked on the basis of selection of topic, article writing and viva.
4. There are a number of types of articles that are published in psychological journals, including reports of empirical studies (psychological reports), review articles, case studies and theoretical articles. Students may critically assess existing theories, identifying flaws or arguing for the superiority of one theory over another. This is often done through examining a theory's internal consistency and evaluating the level of empirical support for the theory (i.e. studies/experiments). This type of theoretical analysis is what we are expecting from students at undergraduate level.

Examples of a few broad areas for articles (List is indicative, not exhaustive)

- Personality theories
- Emotional Intelligence
- Positive thinking
- Learning
- Self concept
- motivation
- Emotion
- Cognitive process
- Cross cultural Psychology
- Memory enhancement

EVALUATION

Selection of topic & its significance	Article writing		Viva	Total
	Content	References(studies quoted)		
10	30	20	40	100

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PSYCHOLOGICAL PRACTICAL- III

Course Code: PSY2302

Credit Units: 03

Course Objective:

- To give practical experience to the students in administering and scoring psychological tests and interpreting the scores.
- To acquaint the students with the basic procedure and design of psychology experiments.
- To familiarize the students with the use of elementary statistical techniques
- To encourage and guide the students to undertake a small-scale research project.

Note: Total 5 practicals will be conducted in the third semester among the list of following practicals out of which first three practicals are compulsory.

Course Content:

1	Aggression Questionnaire	Aggression
2	Draw A Person Intellectual Ability Test	Intelligence
3	Multidimensional Self Concept Scale	Self-Concept
4	Swaroop Mehta Test Of Thinking Strategy	Thinking
5	Critical Thinking For Activities of Daily Living and Communication	Thinking
6	Marital Compatibility Index	Relationship

Text & References:

- Mohsin, S. M.: Experiments in Psychology. Motilal Banarasi Das
- Woodworth, R.S.: Experimental Psychology. Oxford & IBH & Schlosberg, H. Publishing
- Postman, L. & Egan, J. P.: Experimental Psychology: An Introduction. Harper and Row

Examination Scheme:

Components	A	File Demonstration	Viva	EE
Weightage (%)	5	35	35	25



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SUMMER PROJECT EVALUATION-I

Course Code: PSY2335

Credit Units: 03

Course Objective:

To enable the students with the practical exposure in their core area of interest (Corporate Sector, NGOs, Hospitals etc.), which in turn will be the pathway to their personal and professional training. It will also help students to develop report writing skills.

Duration: Two Months (June- July)

Methodology:

Students get opportunity in diversified Institutes e.g. Corporate Sector, Schools, NGOs and Hospitals. They will be guided by an internal and external supervisor from their respective Institute. Students will submit their summer project reports with their supervised daily reporting. Immediately after returning from their summer vacations. This would require primary data collection.

Examination Scheme:

Internal Faculty Interaction	20 Marks
Feedback from External Supervisor	20 Marks
Viva Voce	30 Marks
Report Writing	30 Marks
Total	100 Marks



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READINGS IN PSYCHOLOGY

Course Code: PSY2330

Credit Units: 02

Course Objective:

The objective of this concentration elective is to inculcate reading habit along with value addition to the existing understanding of the subject. The book would be a kind of knowledge enhancer that would envision the student about some current thoughts related to the discipline. The book reading and its critical analysis would help broaden the intellectual horizon of the student. A contemporary and relevant book will be selected by the concerned department.

Guidelines:

The student is expected to thoroughly go through the discipline related prescribed book with the objective of critically reviewing each aspect and character of the book. The student is supposed to have a detailed insight into the following:

1. Content
2. Writing style
3. Information/learning
4. Content handling
5. Characters(if any)
6. Thematic Clarity

The report is to be submitted in about 3000 words on A4 size sheets, Font 12pt., Times New Roman, 1.5 spacing. Headings in Font Size 16.

Evaluation Scheme:

Report on the Book in 3000 words	Written Test
50 marks	50 marks



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TERM PAPER

Course Code: PSY2331

Credit Units: 02

Course Objective:

The rationale behind introducing the term paper for BA (H) Students is to enhance the reading and writing habits of the students and to make them aware about the process of carrying out a research work. This helps them to develop insight into the course they are studying which creates an academic interest among the students. Presentation of the term paper plays an important role as it facilitates knowledge sharing and improvement in presentation skills which will further enhance the confidence of the students. The overall objective of this term paper is to develop research orientations in students and to make them understand and enhance skills in Research Methodology.

Guidelines for Term Paper:

1. Topic
2. Introduction
3. Review Research
4. Key Learning: minimum 5 pgs handwritten
5. Conclusion
6. References
7. No. of pages in the compilation of the paper 25-30 (minimum 25 pages)

Examination Scheme:

Compilation of Term Paper	50 Marks
Viva Voce	25 Marks
Presentation of Term Paper	25 Marks
Total	100 Marks



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PROJECT (WITH PRESENTATION & EVALUATION)

Course code: PSY2332

Credit Units: 03

Course Objective:

The aim of the project is to provide the students with an opportunity to further their intellectual and personal development in the chosen field by undertaking a significant practical unit of activity. The project can be defined as a scholarly inquiry into a problem or issues, involving a systematic approach to gathering and analysis of information / data, leading to production of a structured report.

Chapter Scheme and distribution of marks:

Chapter 1: Introduction – 10 marks

Chapter 2: Conceptual Framework/ National/International Scenario – 25 marks

Chapter 3: Presentation, Analysis & Findings -- 25 marks

Chapter 4: Conclusion & Recommendations -- 10 marks

Chapter 5: Bibliography -- 05 marks

Project Report	Power Point Presentation & Viva
75 marks	25 marks

Components of a Project Report

The outcome of Project Work is the Project Report. A project report should have the following components:

1) Cover Page: This should contain the title of the project proposal, to whom it is submitted, for which degree, the name of the author, name of the supervisor, year of submission of the project work, name of the University.

2) Acknowledgement: Various organizations and individuals who might have provided assistance /co-operation during the process of carrying out the study.

3) Table of Content: Page-wise listing of the main contents in the report, i.e., different Chapters and its main Sections along with their page numbers.

4) Body of the Report: The body of the report should have these four logical divisions

a) **Introduction:** This will cover the background, rationale/ need / justification, brief review of literature, objectives, methodology (the area of the study, sample, type of study, tools for data collection, and method of analysis), Limitations of the Study, and Chapter Planning.

b) **Conceptual Framework / National and International Scenario:** (relating to the topic of the Project).

c) **Presentation of Data, Analysis and Findings:** (using the tools and techniques mentioned in the methodology).

d) **Conclusion and Recommendations:** In this section, the concluding observations based on the main findings and suggestions are to be provided.

5) Bibliography or References: This section will include the list of books and articles which have been used in the project work, and in writing a project report.

6) Annexures: Questionnaires (if any), relevant reports, etc.

(The main text of the Project should normally be in the range of 5000 words. However, there may be annexure in addition to the main text)

The Steps of a Project Report

Step I : Selection of the topic for the project by taking following points into consideration:

- Suitability of the topic.
- Relevance of the topic
- Time available at the disposal.
- Feasibility of data collection within the given time limit.
- Challenges involved in the data collection (time & cost involved in the data collection, possibility of getting responses, etc.)

Step II: Finalisation of the Topic and preparation of Project Proposal in consultation with the Supervisor.

Step III: Collection of information and data relating to the topic and analysis of the same.

Step IV: Writing the report dividing it into suitable chapters, viz.,

Chapter 1: Introduction,

Chapter 2: Conceptual Framework / National & International Scenario,

Chapter 3: Analysis & Findings

Chapter 4: Conclusion and Recommendations.

Step V: The following documents are to be attached with the Final Project Report.

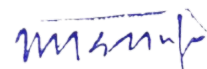
- 1) Approval letter from the supervisor (Annexure-IA)
- 2) Student's declaration (Annexure-IB)
- 3) Certificate from the Competent Authority of the Organisation / Institution, if the student undertakes the Project Work in any Organisation / Institution.

Guidelines for Evaluation:

- Each of the students has to undertake a Project individually under the supervision of a teacher and to submit the same following the guidelines stated below.
- Language of Project Report and Viva-Voce Examination may be English. The Project Report must be typed and hard bound.
- Failure to submit the Project Report or failure to appear at the Viva-voce Examination will be treated as "Absent" in the Examination. He /she has to submit the Project Report and appear at the Viva-Voce Examination in the subsequent years (within the time period as per University Rules).
- No marks will be allotted on the Project Report unless a candidate appears at the Viva-Voce Examination. Similarly, no marks will be allotted on Viva-Voce Examination unless a candidate submits his/her Project Report.
- Evaluation of the Project Work to be done jointly by one internal expert and one external expert with equal weightage, i.e., average marks of the internal and external experts will be allotted to the candidate.



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WORKSHOP/CERTIFICATION

Course Code: PSY2333

Credit Units: 01

Course Objective

A workshop is primarily an activity based academic event that is organized to provide the students a one to one and hands on experience on any aspect of their learning. The communication in a workshop has to be necessarily two way. The trainer has to make sure that the aspects covered are practically practiced by the participants. The student will choose the option of workshop from amongst their concentration electives. The evaluation will be done by Board of examiners comprising of the faculties.

Major Themes for Workshop

The workshop may be conducted on any of the following major themes:

- Experimental Psychology
- Health Psychology
- Industrial Psychology
- Organizational Behaviour
- Sports Psychology
- Social Psychology
- Cognitive Psychology

These themes are merely indicative and other recent and relevant topics of study may be included.

Guidelines for Workshop

The procedure for earning credits from workshop consists of the following steps:

1. Relevant study material and references will be provided by the trainer in advance.
2. The participants are expected to explore the topic in advance and take active part in the discussions held
3. Attending and participating in all activities of the workshop
4. Group Activities have to be undertaken by students as guided by the trainer.
5. Evaluation of workshop activities would be done through test and quiz at the end of the workshop.
6. Submitting a write up of atleast 500 words about the learning outcome from the workshop.

Methodology

The methodology followed at the workshop could be based on any one or more of the following methods:

Case Study

Group Activity

Role Play

Quiz

Evaluation Scheme:

Attendance	Active Participation	Multiple Choice Questions/ Quiz	Solving the case/ Assignment/ Write up	Total
10	30	30	30	100

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ARTICLE/ FEATURE WRITING

Course Code: PSY2336

Credit Units: 01

Course Objective:

The objective of this course is to judge the understanding as well as application of the knowledge gained by the students. The aim of an article is to provide the students an opportunity to further enhance their knowledge in an area of their choice by undertaking different **aspects of human behavior and analyzing it** at a level commensurate with the learning outcomes of the various courses taken up by them in the ongoing semester.

The purpose of the article is for the students to draw upon their interest in currently published research literature with the aim of furthering theoretical work in the field of interest.

Guidelines:

1. The article will be related to the contemporary Psychological issue and the topic will be given by the department. The article will be written in around 3000 words.
2. The presentation of the article is scheduled to be held before the commencement of Semester examinations.
3. The article will carry 100 marks that will be marked on the basis of selection of topic, article writing and viva.
4. There are a number of types of articles that are published in psychological journals, including reports of empirical studies (psychological reports), review articles, case studies and theoretical articles.

Students may critically assess existing theories, identifying flaws or arguing for the superiority of one theory over another. This is often done through examining a theory's internal consistency and evaluating the level of empirical support for the theory (i.e. studies/experiments). This type of theoretical analysis is what we are expecting from students at undergraduate level.

Examples of a few broad areas for articles (List is indicative, not exhaustive)

- Personality theories
- Emotional Intelligence
- Positive thinking
- Learning
- Self concept
- motivation
- Emotion
- Cognitive process
- Cross cultural Psychology
- Memory enhancement

EVALUATION

Selection of topic & its significance	Article writing		Viva	Total
	Content	References(studies quoted)		
10	30	20	40	100

PSYCHOLOGICAL PRACTICAL- IV

Course Code: PSY2402

Credit Units: 03

Course Objective:

- To give practical experience to the students in administering and scoring psychological tests and interpreting the scores.
- To acquaint the students with the basic procedure and design of psychology experiments.
- To familiarize the students with the use of elementary statistical techniques
- To encourage and guide the students to undertake a small-scale research project.

Note: Total 5 practicals will be conducted in the Fourth semester among the list of following practicals out of which first three practicals are compulsory.

Course Content:

1	Developmental Screening Test	Development
2	Memory Drum Apparatus	Memory
3	Vocational Preference Inventory	Personality-Non Projective
4	Students Stress Scale	Stress
5	Authentic Leadership Questionnaire	Leadership
6	Thematic Apperception Test	Personality-Projective

Examination Scheme:

Components	A	File Demonstration	Viva	EE
Weightage (%)	5	35	35	25

Text & References:

- Mohsin, S. M.:Experiments in Psychology. MotilalBanarasidas
- Woodworth, R.S.:Experimental Psychology. Oxford & IBH & Schlosberg, H. Publishing
- Postman, L. &Egan, J. P.: Experimental Psychology: An Introduction.Harper and Row



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APPLIED SOCIAL PSYCHOLOGY

Course Code: PSY2406

Credit Units: 03

Course Objective:

Social Psychology is the study of social interaction and social influence. As such, it remains one of the most comprehensive and personally relevant areas within the field of psychology. This course has following objectives.

- To expand your knowledge about social psychology and human behavior.
- To foster respect for human diversity, particularly with regard to matters of gender, race and ethnicity.
- To enable students to (a) understand the forces that create group differences in patterns of social behavior, (b) understand and tolerate the behavior of other people, particularly that of members of the diverse array of groups and social categories to which they do not belong, (c) recognize the limits in generalizing psychological research to all cultural/gender/ethnic/age groups, and (d) understand the dynamics of intergroup relationships, conflict, and cooperation.

Course Contents:

Module I: Introduction

Social Psychology in the workplace, Social Psychology in the clinic, Social Psychology of poverty and deprivation. Psychology of collective behaviour.

Module II: Group Process

Group Structure: Nature and Function

Task Performance: Social Interaction, Social facilitation, Social Loafing

Conformity: Factors affecting Conformity

Coordination in Groups and Group Cohesiveness

Module III: Attitude

Nature and Determinants of Attitude

Formation, Change and Measurement of Attitudes: Likert Scale, Thurstone Scale, Bogardus Scale

Module IV: Prejudices, Discrimination and Stereotypes

Nature and Components of Prejudice, Discrimination and Stereotypes

Acquisition and techniques of Reduction.

Module V: Leadership

Definition, Nature and Function of Leadership

Types, Qualities and Theories of Leadership: Trait Approach, Situational Approach, Interactional Approach

Examination Scheme:

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	10	10	5	5	70

CT-Class Test; H-Home Assignment; P-Presentation; V-Viva; Q-Quiz; A- Attendance; EE-End Session Exam

Text & References:

Text:

- Myers, D. G.: Social Psychology (10th Ed). New York: McGraw Hill
- Feldman, R. S.: Social Psychology: Theories, Research and Application. New York: McGraw Hill
- Secord, P.F. & Backman, C. N.: Social Psychology. USA: McGraw-Hill
- Baran, R.A. & Byrne, D.: Social Psychology. Boston, MA: Pearson Allyn and Bacon.
- Aronson, E., Wilson, T. D.: Social Psychology (7th ed.). Upper Saddle & Akert, R. M. River, NJ: Prentice Hall.
- Wrightsman, L. S.: Social Psychology. Brooks/Cole Pub. Co.
- Alcock, J. E.; Carment, D. W.; Sadava, S. W.; Collins, J. E. & Green, J. M.: A textbook of Social Psychology (6th Ed) Scarborough, Ontario: Prentice Hall / Allin & Bacon
- Sharma, R. K. & Sharma, R.: Social Psychology. New Delhi: Atlantic Publishers and Distributors

References:

- Krutchfield, R. S.: Theories and Problems of Social Psychology
- Baumeister, R. F. & Belmont, C.A.: Social Psychology and Human Nature (2nd Bushman, B. J. ed). Thomson/Wadsworth
- Kuppaswamy: Introduction to Social Psychology



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READINGS IN PSYCHOLOGY

Course Code: PSY2430

Credit Units: 02

Course Objective:

The objective of this concentration elective is to inculcate reading habit along with value addition to the existing understanding of the subject. The book would be a kind of knowledge enhancer that would envision the student about some current thoughts related to the discipline. The book reading and its critical analysis would help broaden the intellectual horizon of the student. A contemporary and relevant book will be selected by the concerned department.

Guidelines:

The student is expected to thoroughly go through the discipline related prescribed book with the objective of critically reviewing each aspect and character of the book. The student is supposed to have a detailed insight into the following:

1. Content
2. Writing style
3. Information/learning
4. Content handling
5. Characters(if any)
6. Thematic Clarity

The report is to be submitted in about 3000 words on A4 size sheets, Font 12pt., Times New Roman, 1.5 spacing. Headings in Font Size 16

Evaluation Scheme:

Report on the Book in 3000 words	Written Test
50 marks	50 marks



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TERM PAPER

Course Code: PSY2431

Credit Units: 02

Course Objective:

The rationale behind introducing the term paper for BA Students is to enhance the reading and writing habits of the students and to make them aware about the process of carrying out a research work. This helps them to develop insight into the course they are studying which creates an academic interest among the students. Presentation of the term paper plays an important role as it facilitates knowledge sharing and improvement in presentation skills which will further enhance the confidence of the students. The overall objective of this term paper is to develop research orientations in students and to make them understand and enhance skills in Research Methodology.

Guidelines for Term Paper:

1. Topic
2. Introduction
3. Review Research
4. Key Learning: minimum 5 pgs handwritten
5. Conclusion
6. References
7. No. of pages in the compilation of the paper 25-30 (minimum 25 pages)

Examination Scheme:

Compilation of Term Paper	50 Marks
Viva Voce	25 Marks
Presentation of Term Paper	25 Marks
Total	100 Marks



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PROJECT (WITH PRESENTATION & EVALUATION)

Course code: PSY2432

Credit Units: 03

Course Objective:

The aim of the project is to provide the students with an opportunity to further their intellectual and personal development in the chosen field by undertaking a significant practical unit of activity. The project can be defined as a scholarly inquiry into a problem or issues, involving a systematic approach to gathering and analysis of information / data, leading to production of a structured report.

Chapter Scheme and distribution of marks:

Chapter 1: Introduction – 10 marks

Chapter 2: Conceptual Framework/ National/International Scenario – 25 marks

Chapter 3: Presentation, Analysis & Findings -- 25 marks

Chapter 4: Conclusion & Recommendations -- 10 marks

Chapter 5: Bibliography -- 05 marks

Project Report	Power Point Presentation & Viva
75 marks	25 marks

Components of a Project Report

The outcome of Project Work is the Project Report. A project report should have the following components:

1) Cover Page: This should contain the title of the project proposal, to whom it is submitted, for which degree, the name of the author, name of the supervisor, year of submission of the project work, name of the University.

2) Acknowledgement: Various organizations and individuals who might have provided assistance /co-operation during the process of carrying out the study.

3) Table of Content: Page-wise listing of the main contents in the report, i.e., different Chapters and its main Sections along with their page numbers.

4)Body of the Report: The body of the report should have these four logical divisions

a) **Introduction:** This will cover the background, rationale/ need / justification, brief review of literature, objectives, methodology (the area of the study, sample, type of study, tools for data collection, and method of analysis), Limitations of the Study, and Chapter Planning.

b) **Conceptual Framework / National and International Scenario:** (relating to the topic of the Project).

c) **Presentation of Data, Analysis and Findings:** (using the tools and techniques mentioned in the methodology).

d) **Conclusion and Recommendations:** In this section, the concluding observations based on the main findings and suggestions are to be provided.

5) Bibliography or References: This section will include the list of books and articles which have been used in the project work, and in writing a project report.

6) Annexures: Questionnaires (if any), relevant reports, etc.

(The main text of the Project should normally be in the range of 5000 words. However, there may be annexure in addition to the main text)

The Steps of a Project Report

Step I : Selection of the topic for the project by taking following points into consideration:

- Suitability of the topic.
- Relevance of the topic
- Time available at the disposal.
- Feasibility of data collection within the given time limit.
- Challenges involved in the data collection (time & cost involved in the data collection, possibility of getting responses, etc.)

Step II: Finalisation of the Topic and preparation of Project Proposal in consultation with the Supervisor.

Step III: Collection of information and data relating to the topic and analysis of the same.

Step IV: Writing the report dividing it into suitable chapters, viz.,

Chapter 1: Introduction,

Chapter 2: Conceptual Framework / National & International Scenario,

Chapter 3: Analysis & Findings

Chapter 4: Conclusion and Recommendations.

Step V: The following documents are to be attached with the Final Project Report.

- 1) Approval letter from the supervisor (Annexure-IA)
- 2) Student's declaration (Annexure-IB)
- 3) Certificate from the Competent Authority of the Organisation / Institution, if the student undertakes the Project Work in any Organisation / Institution.

Guidelines for Evaluation:

- Each of the students has to undertake a Project individually under the supervision of a teacher and to submit the same following the guidelines stated below.
- Language of Project Report and Viva-Voce Examination may be English. The Project Report must be typed and hard bound.
- Failure to submit the Project Report or failure to appear at the Viva-voce Examination will be treated as "Absent" in the Examination. He /she has to submit the Project Report and appear at the Viva-Voce Examination in the subsequent years (within the time period as per University Rules).
- No marks will be allotted on the Project Report unless a candidate appears at the Viva-Voce Examination. Similarly, no marks will be allotted on Viva-Voce Examination unless a candidate submits his/her Project Report.
- Evaluation of the Project Work to be done jointly by one internal expert and one external expert with equal weightage, i.e., average marks of the internal and external experts will be allotted to the candidate.



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WORKSHOP/CERTIFICATION

Course Code: PSY2433

Credit Units: 01

Course Objectives:

A workshop is primarily an activity based academic event that is organized to provide the students a one to one and hands on experience on any aspect of their learning. The communication in a workshop has to be necessarily two way. The trainer has to make sure that the aspects covered are practically practiced by the participants. The student will choose the option of workshop from amongst their concentration electives. The evaluation will be done by Board of examiners comprising of the faculties.

Major Themes for Workshop

The workshop may be conducted on any of the following major themes:

- Experimental Psychology
- Health Psychology
- Industrial Psychology
- Organizational Behaviour
- Sports Psychology
- Social Psychology
- Cognitive Psychology

These themes are merely indicative and other recent and relevant topics of study may be included.

Guidelines for Workshop

The procedure for earning credits from workshop consists of the following steps:

1. Relevant study material and references will be provided by the trainer in advance.
2. The participants are expected to explore the topic in advance and take active part in the discussions held
3. Attending and participating in all activities of the workshop
4. Group Activities have to be undertaken by students as guided by the trainer.
5. Evaluation of workshop activities would be done through test and quiz at the end of the workshop.
6. Submitting a write up of atleast 500 words about the learning outcome from the workshop.

Methodology

The methodology followed at the workshop could be based on any one or more of the following methods:

Case Study

Group Activity

Role Play

Quiz

Evaluation Scheme:

Attendance	Active Participation	Multiple Choice Questions/ Quiz	Solving the case/ Assignment/ Write up	Total
10	30	30	30	100


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ARTICLE/FEATURE WRITING

Course Code: PSY2436

Credit Units: 01

Course Objective:

The objective of this course is to judge the understanding as well as application of the knowledge gained by the students. The aim of an article is to provide the students an opportunity to further enhance their knowledge in an area of their choice by undertaking different **aspects of human behavior and analyzing it** at a level commensurate with the learning outcomes of the various courses taken up by them in the ongoing semester.

The purpose of the article is for the students to draw upon their interest in currently published research literature with the aim of furthering theoretical work in the field of interest.

Guidelines:

1. The article will be related to the contemporary Psychological issue and the topic will be given by the department. The article will be written in around 3000 words.
2. The presentation of the article is scheduled to be held before the commencement of Semester examinations.
3. The article will carry 100 marks that will be marked on the basis of selection of topic, article writing and viva.
4. There are a number of types of articles that are published in psychological journals, including reports of empirical studies (psychological reports), review articles, case studies and theoretical articles. Students may critically assess existing theories, identifying flaws or arguing for the superiority of one theory over another. This is often done through examining a theory's internal consistency and evaluating the level of empirical support for the theory (i.e. studies/experiments). This type of theoretical analysis is what we are expecting from students at undergraduate level.

Examples of a few broad areas for articles (List is indicative, not exhaustive)

- Personality theories
- Emotional Intelligence
- Positive thinking
- Learning
- Self concept
- motivation
- Emotion
- Cognitive process
- Cross cultural Psychology
- Memory enhancement

EVALUATION

Selection of topic & its significance	Article writing		Viva	Total
	Content	References(studies quoted)		
10	30	20	40	100


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PSYCHOMETRIC TESTING

Course Code: PSY2551

Credit Units: 03

Course Objective:

Psychological assessment is a process of testing that uses a combination of techniques to help arrive at some hypotheses about a person and their behavior, personality and capabilities. Psychological assessment is also referred to as psychological testing, or performing a psychological battery on a person. A psychological assessment is the attempt of a skilled professional, usually a psychologist, to use the techniques and tools of psychology to learn either general or specific facts about another person, either to inform others of how they function now, or to predict their behavior and functioning in the future. Psychologists are the only profession that is expertly trained to perform and interpret psychological tests. Below are the objectives of studying this particular paper of Psychology:

- To train the students in various psychological assessment techniques.
- To impart skills necessary for selecting and applying different tests for different purposes such as evaluation, training and rehabilitation.

Course Content:

Module 1: Introduction

History of Psychological Testing
Meaning, Definition and Types of Psychological Testing
Ethical issues in Psychological Testing

Module 2: Measurement

Nature and significance of Measurement
Distinction between assessment and measurement
Levels of measurement
Techniques of Attitude Measurement

Module 3: Construction of Test

Steps of constructing a Psychological Test
Reliability: Meaning, types and factors affecting reliability
Validity: Meaning, types and factors affecting Validity
Characteristics of a good Psychological Test

Module 4: Assessment of General and Special Abilities

Aptitude: Multidimensional aptitude Battery-II
Creativity: Creativity Assessment Packet (CAP)
Learning: Human Maze learning

Module 5: Application of Testing

Assessment in Educational and Occupational Set-up: Achievement Test
Assessment in Clinical Set-up and in Counselling



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Examination Scheme:

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	10	10	5	5	70

CT-Class Test; H-Home Assignment; P-Presentation; V-Viva; Q-Quiz; A-Attendance; EE-End Session Exam

Text & References:**Text:**

- Anastasi, A. & Urbina, S.: Psychological Testing. U.S.A.: Prentice Hall International Inc.
- Graham, J. R. & Lilly, R. S.: Psychological Testing. New Jersey: Prentice Hall Inc.
- Kaplan, R. K. & Sacuzzo, D. P.: Psychological Testing- Principles, Applications and Issues. New Delhi: Cengage Learning India Pvt. Ltd
- Aiken, L.R. & Groth-Marnat, G.: Psychological Testing and Assessment (12th Ed.) Pearson Education
- Freeman, F. S.: Psychological Testing. Oxford University Press

References:

- Hasan, Q.: Personality Assessment: A fresh Psychological Look. New Delhi: Gyan Publishing House
- Kline, T. J. B.: Psychological Testing – A Practical Approach to Design and Evaluation. New Delhi: Vistaar Publication



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PSYCHOLOGICAL PRACTICAL- V

Course Code: PSY2501

Credit Units: 03

Course Objective:

- To give practical experience to the students in administering and scoring psychological tests and interpreting the scores.
- To acquaint the students with the basic procedure and design of psychology experiments.
- To familiarize the students with the use of elementary statistical techniques
- To encourage and guide the students to undertake a small-scale research project.

Note: Total 5 practicals will be conducted in the Fifth semester among the list of following practicals out of which first three practicals are compulsory.

Course Content:

1	Multidimensional aptitude Battery-II (MAB-II)	Aptitude
2	Human Maze Learning	Learning
3	Creativity Assessment Packet	Creativity
4	Childrens Inventory of Anger(CHIA)	Aggression
5	Constructive Thinking Inventory(CTI)	Thinking
6	D2 Test of Attention	Attention

Text & References:

- Mohsin, S. M.:Experiments in Psychology. MotilalBanarasidas
- Woodworth, R.S.:Experimental Psychology. Oxford & IBH & Schlosberg, H. Publishing
- Postman, L. &Egan, J. P.: Experimental Psychology: An Introduction.Harper and Row

Examination Scheme:

Components	A	File Demonstration	Viva	EE
Weightage (%)	5	35	35	25



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SUMMER PROJECT EVALUATION-II

Course Code: PSY2535

Credit Units: 06

Course Objective:

To enable the students with the practical exposure in their core area of interest (Corporate Sector, NGOs, Hospitals etc.), which in turn will be the pathway to their personal and professional training. It will also help students to develop report writing skills.

Duration: Two Months (June- July)

Methodology:

Students get opportunity in diversified Institutes e.g. Corporate Sector, Schools, NGOs and Hospitals. They will be guided by an internal and external supervisor from their respective Institute. Students will submit their summer project reports with their supervised daily reporting. Immediately after returning from their summer vacations. This would require primary data collection.

Examination Scheme:

Internal Faculty Interaction	20 Marks
Feedback from External Supervisor	20 Marks
Viva Voce	30 Marks
Report Writing	30 Marks
Total	100 Marks



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CLINICAL PSYCHOLOGY

Course Code: PSY2502

Credit Units: 03

Course Objective:

Clinical Psychology is an integration of science, theory and clinical knowledge for the purpose of understanding, preventing, and relieving psychologically-based distress or dysfunction and to promote subjective well-being and personal development. In many countries, clinical psychology is a regulated mental health profession. Keeping pace with the disciplinary advances and with the goal of acquiring specialized knowledge, the paper would allow students to nurture their academic interest in clinical and other research domains of psychology, along with personal growth and citizenship. The faculty is expected to perform the following functions so that the objective of the concerned programme can be obtained:

- Integrate the course contents with the clinical viewpoint in a service setting.
- To train them into skills and competencies which are required for practice as a psychologist.
- To sensitize them to the ethics of profession.
- To impart knowledge and skills required for diagnosis of psychopathological conditions.
- To prepare students in specific areas in which professional psychological services can be rendered.
- To develop self-reflective skills.

Course Content:

Module I: Foundation of Clinical Psychology

Introduction to Clinical Psychology: Meaning and nature of discipline,
Historical Development of Clinical Psychology

Module II: Contemporary Issues

Professional Activities of Clinical Psychologist
Subspecialties of Clinical Psychology
Organizations in Clinical Psychology
Ethical and Legal Issues in Clinical Psychology

Module III: Diagnosis and Assessment

Nature and Purpose of Clinical Diagnosis and Assessment
Stages in the Assessment Process
Clinical Assessment Techniques

Module IV: Psychotherapy

Definition, Goals and Stages of Psychotherapy
Essential Process in Psychotherapy
Models of Psychotherapy: Individual Therapy, Group Therapy, Couples Therapy, Family Therapy

Module V: Approaches to Psychotherapy

Psychodynamic Psychotherapy
Behavioural Psychotherapy
Cognitive Psychotherapy
Humanistic Psychotherapy

Examination Scheme:

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	10	10	5	5	70

CT-Class Test; H-Home Assignment; P-Presentation; V-Viva; Q-Quiz; A-Attendance; EE-End Session Exam

Text & References:**Text:**

- Plante, T. G.: Contemporary Clinical Psychology. New York: John Willey & Sons, Inc.
- Bellack, A. S. & Hersen, M.: Introduction to Clinical Psychology. New York: Oxford University Press
- Korchin, S. J.: Modern Clinical Psychology. Delhi CRR Publishers and Distributors
- Ray, S. D.: The Practice of Psychotherapy. New Delhi: New Age International
- Hecker, J. E. & Thorpe, G. L: Introduction to Clinical Psychology. Delhi: Pearson Education
- Herbert, M.: Clinical Child Psychology: Social Learning, Development and Behaviour. New York: John Willey & Sons, Inc.
- Field, A. P. & Field: Clinical Psychology. Learning Matters
- Hatton, C. Bromley, J., & Craine, A.: Clinical Psychology. New York: John Willey & Sons, Inc

References:

- Pomerantz, A. M.: Clinical Psychology- Science, Practice and Culture. New Delhi: Sage Publications
- Matthews, J. R.: Introduction to Clinical Psychology. New York: Oxford Anton, B. S. University Press
- Kumar, A.: Clinical Psychology. Anmol Publications



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SCIENTIFIC RESEARCH PAPER-I

Course Code: PSY2505

Credit Units: 03

Course Objective:

The scientific research papers for Graduate Students is to enhance the reading and writing habits of the students and to make them aware about the process of carrying out a research work. This helps them to develop insight into the course they are studying which creates an academic interest among the students. Presentation of the research paper plays an important role as it facilitates knowledge sharing and improvement in presentation skills which will further enhance the confidence of the students. The overall objective of this research paper is to develop research orientations in students and to make them understand and enhance skills in Research Methodology.

Guidelines for Scientific Research Papers:

- Topic :-
- Introduction :-
- Review Research :-
- Objective
- Methodology
- Analysis
- Discussion
- Conclusion :-
- References & Bibliography:-

No. of pages in the compilation of the paper 20-30 (minimum 20 pages)

Examination Scheme:

Components	Compilation	Viva	Presentation
Weightage (%)	50	25	25



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PROJECT (WITH PRESENTATION & EVALUATION)

Course code: PSY2532

Credit Units: 03

Course Objective:

The aim of the project is to provide the students with an opportunity to further their intellectual and personal development in the chosen field by undertaking a significant practical unit of activity. The project can be defined as a scholarly inquiry into a problem or issues, involving a systematic approach to gathering and analysis of information / data, leading to production of a structured report.

Chapter Scheme and distribution of marks:

Chapter 1: Introduction – 10 marks

Chapter 2: Conceptual Framework/ National/International Scenario – 25 marks

Chapter 3: Presentation, Analysis & Findings -- 25 marks

Chapter 4: Conclusion & Recommendations -- 10 marks

Chapter 5: Bibliography -- 05 marks

Project Report	Power Point Presentation & Viva
75 marks	25 marks

Components of a Project Report

The outcome of Project Work is the Project Report. A project report should have the following components:

1) Cover Page: This should contain the title of the project proposal, to whom it is submitted, for which degree, the name of the author, name of the supervisor, year of submission of the project work, name of the University.

2) Acknowledgement: Various organizations and individuals who might have provided assistance /co-operation during the process of carrying out the study.

3) Table of Content: Page-wise listing of the main contents in the report, i.e., different Chapters and its main Sections along with their page numbers.

4) Body of the Report: The body of the report should have these four logical divisions

a) **Introduction:** This will cover the background, rationale/ need / justification, brief review of literature, objectives, methodology (the area of the study, sample, type of study, tools for data collection, and method of analysis), Limitations of the Study, and Chapter Planning.

b) **Conceptual Framework / National and International Scenario:** (relating to the topic of the Project).

c) **Presentation of Data, Analysis and Findings:** (using the tools and techniques mentioned in the methodology).

d) **Conclusion and Recommendations:** In this section, the concluding observations based on the main findings and suggestions are to be provided.

5) Bibliography or References: This section will include the list of books and articles which have been used in the project work, and in writing a project report.

6) Annexures: Questionnaires (if any), relevant reports, etc.

(The main text of the Project should normally be in the range of 5000 words. However, there may be annexure in addition to the main text)

The Steps of a Project Report

Step I: Selection of the topic for the project by taking following points into consideration:

- Suitability of the topic.
- Relevance of the topic
- Time available at the disposal.
- Feasibility of data collection within the given time limit.
- Challenges involved in the data collection (time & cost involved in the data collection, possibility of getting responses, etc.)

Step II: Finalisation of the Topic and preparation of Project Proposal in consultation with the Supervisor.

Step III: Collection of information and data relating to the topic and analysis of the same.

Step IV: Writing the report dividing it into suitable chapters, viz.,

Chapter 1: Introduction,

Chapter 2: Conceptual Framework / National & International Scenario,

Chapter 3: Analysis & Findings

Chapter 4: Conclusion and Recommendations.

Step V: The following documents are to be attached with the Final Project Report.

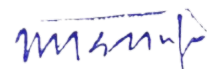
- 1) Approval letter from the supervisor (Annexure-IA)
- 2) Student's declaration (Annexure-IB)
- 3) Certificate from the Competent Authority of the Organisation / Institution, if the student undertakes the Project Work in any Organisation / Institution.

Guidelines for Evaluation:

- Each of the students has to undertake a Project individually under the supervision of a teacher and to submit the same following the guidelines stated below.
- Language of Project Report and Viva-Voce Examination may be English. The Project Report must be typed and hard bound.
- Failure to submit the Project Report or failure to appear at the Viva-voce Examination will be treated as "Absent" in the Examination. He /she has to submit the Project Report and appear at the Viva-Voce Examination in the subsequent years (within the time period as per University Rules).
- No marks will be allotted on the Project Report unless a candidate appears at the Viva-Voce Examination. Similarly, no marks will be allotted on Viva-Voce Examination unless a candidate submits his/her Project Report.
- Evaluation of the Project Work to be done jointly by one internal expert and one external expert with equal weightage, i.e., average marks of the internal and external experts will be allotted to the candidate.



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COUNSELLING PSYCHOLOGY

Course Code: PSY2651

Credit Units: 03

Course Objective:

The paper of Counselling Psychology covers its history, theories, activities, specialties and trends. It concentrates on the importance of the personhood of counselors and of the multicultural, ethical and legal environments in which counselors operate. This paper focuses on the context and process of counseling to provide a range of high quality and responsive counseling skills and its applications to help oneself and others.

Course Contents:

Module I: Introduction

Meaning, Definitions and Goals of counselling
Role of Counsellor in different Setting
Characteristics of a good counsellor

Module II: Counselling Process

Building Counselling Relationship
Working in a Counselling Relationship
Termination of Counselling Relationship

Module III: Counselling Approaches

Insight-Oriented Counselling: Client-Centred
Action-Oriented Counselling: Behavioural
Testing, Assessment and Diagnosis in Counselling

Module IV: Counselling Applications

Child Counselling and Counselling in School
Adolescent Counselling and Counselling in College
Career Counselling: Theories of Career Development
Group Counselling and Family Counselling
Addiction Counselling

Module V: Theories and Techniques of Counselling

Psychodynamic Approaches
Humanistic Approach
Cognitive Approach
Behavioural Approaches

Module VI: Current Issues in Counselling

Ethical and Legal Issues
Mental Health Counselling
Counselling in a Multicultural Society
Counselling with Diverse Population



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Examination Scheme:

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	10	10	5	5	70

CT-Class Test; H-Home Assignment; P-Presentation; V-Viva; Q-Quiz; A-Attendance; EE-End Session Exam

Text & References:**Text:**

- Rao, S. N.: Counselling and Guidance (2nd Ed.). Tata McGraw Hill
- Belkin, G.S.: Introduction to Counselling. W.C.: Brown Publishers
- Nelson, J.: The Theory and Practice of Counselling Psychology. New York: Holt Rinehart & Winston
- Gibson, R. L. & Mitchell, M. H.: Introduction to Counselling and Guidance (7th). New Delhi Prentice-Hall of India Pvt. Ltd
- Gladding, S. T.: Counselling: A Comprehensive Profession (6th Ed.). Dorling Kindersley India Pvt. Ltd.
- Hansen, J. H. & Rosberg, R.H: Counselling: Theory and Process (5th Ed.). Allyn & Bacon
- Pal, O. B.: Guidance and Counselling. New Delhi: Motilal Banarsidas Publishers Private Ltd.
- Milner, J., Byrne, P. O. & Campling, J.: Assessment in Counselling: Theory, Process and Decision-Making. Palgrave MacMillan
- Patterson, L.E.: The Counselling Process. Wadsworth Publishing

References:

- Welfel, E.R., & Patterson, L.E: The Counselling Process: A Multi-theoretical Integrative Approach. Thomson Brooks / Cole



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SCHOOL COUNSELLING

Course Code: PSY2601

Credit Units: 02

Course Objective:

This is to enable the students to develop an understanding of counseling within school setup, which is collaborative work of counselor and other school staff.

Course Contents:

Module I: Introduction

Guidance & Counseling

Need and importance of guidance and counseling in school

Module II: Counselor in Educational Setting

Elementary School, Middle School, Secondary School & Higher Secondary

Counseling & Curriculum

Counseling & Family

Module III: Role of Personal Guidance

Principal, Teacher, Counselor, Career Counselor, Parents & other Specialists

Importance of holistic approach in counseling

Module IV: Mental Health of Students

Typical difficulties of students

Supportive Services

Self Help Material

Role of Faith & Spirituality in Students mental Health

Students' perspective of Mental Health

Module V: Experience of Transition

Concept of Change, Adjustment & Transition

Transition & Students' experiences

Module VI: Indian Education System: The Changing Perspective

Examination Scheme:

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	10	10	5	5	70

CT-Class Test; **H**-Home Assignment; **P**-Presentation; **V**-Viva; **Q**-Quiz; **A**- Attendance; **EE**-End Session Exam



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Text & References:

Text:

- Belkin, G.S. (1998). Introduction to Counselling; W.C.: Brown Publishers
- Nelson, J. (1982). The Theory and Practice of Counselling Psychology; New York: Holt Rinehart & Winston.
- Ben, N. Ard, Jr. (Ed.) (1997). Counselling and Psychotherapy: Classics on Theories and Issues; Science and Behaviour Books Co.
- Brammer, L.M. & Shostrom, E.L. (1977). Therapeutic psychology: Fundamentals of Counselling Psychotherapy (3rd Ed.). Englewood Cliffs: Prentice Hall

References:

- Udupa, K.N. (1985). Stress and its Management by Yoga; Delhi: MotiLalBansari Das.
- Windy, D. (1988) (ed.). Counselling in Action; New York: Sage Publication.



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PSYCHOLOGICAL PRACTICAL-VI

Course Code: PSY2602

Credit Units: 03

Course Objective:

- To give practical experience to the students in administering and scoring psychological tests and interpreting the scores.
- To acquaint the students with the basic procedure and design of psychology experiments.
- To familiarize the students with the use of elementary statistical techniques
- To encourage and guide the students to undertake a small-scale research project.

Note: Total 5 practicals will be conducted in the sixth semester among the list of following practicals out of which first three practicals are compulsory.

Course Content:

1	Multidimensional Anxiety Questionnaire(MAQ)	Anxiety
2	College Adjustment Scale(CAS)	Adjustment
3	Career Attitude And Strategies Inventory(CASI)	Career Attitude
4	Educational Assessment Checklist For Children With Intellectual Disability(EACCID)	Child Disability
5	Sensory Processing Measure(SPM)	Sensation
6	Self Esteem Index(SEI)	Self Esteem

Examination Scheme:

Components	A	File Demonstration	Viva	EE
Weightage (%)	5	35	35	25

Text & References:

- Mohsin, S. M.:Experiments in Psychology. MotilalBanarasidas
- Woodworth, R.S.:Experimental Psychology. Oxford & IBH & Schlosberg, H. Publishing
- Postman, L. &Egan, J. P.: Experimental Psychology: An Introduction.Harper and Row



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DISSERTATION (BASED ON APPLIED PSYCHOLOGY)

Course Code: PSY2637

Credit Units: 09

Course Objective:

- To enable the students with the practical exposure in their core area of interest (Corporate Sector, NGOs, Hospitals etc.), which in turn will be the pathway to their personal and professional training.
- It will also help students to develop report writing skills.

Duration: Four Months (Jan. - April)

Methodology:

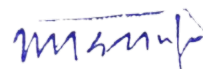
Students get opportunity in diversified Institutes e.g. Corporate Sector, Schools, NGOs and Hospitals. They will be guided by an internal and external supervisor. Students will submit their reports after **90 Hrs of Fieldwork (15 days* 6hrs per day)**, with their supervised daily reporting, at the end of the academic year. **The days for fieldwork are two days in a week including Saturday.** The student will submit the Log Sheet to their internal supervisor on every Monday.

Examination Scheme:

Internal Faculty Interaction	20 Marks
Feedback from External Supervisor	20 Marks
Viva Voce	30 Marks
Report Writing	30 Marks
Total	100 Marks



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SCIENTIFIC RESEARCH PAPER-II

Course Code: PSY2605

Credit Units: 03

Course Objective:

The research article or scientific papers for Masters Students is to enhance the reading and writing habits of the students and to make them aware about the process of carrying out a research work. This helps them to develop insight into the course they are studying which creates an academic interest among the students. Presentation of the term paper plays an important role as it facilitates knowledge sharing and improvement in presentation skills which will further enhance the confidence of the students. The overall objective of this term paper is to develop research orientations in students and to make them understand and enhance skills in Research Methodology.

Guidelines for Research Article or Scientific Papers:

- Topic :-
- Introduction :-
- Review Research :-
- Objective
- Methodology
- Discussion
- Conclusion :-
- References & Bibliography:-

No. of pages in the compilation of the paper 25-30 (minimum 25 pages)

Examination Scheme:

Components	Compilation	Viva	Presentation
Weightage (%)	50	25	25



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POSITIVE PSYCHOLOGY

Course Code: PSY2606

Credit Units: 03

Course Objective:

To enable students to understand the theory and research related to positive psychology and equip students to develop and apply positive psychology for enhancement of their self and others.

Course Contents:

Module I: Introduction to Positive Psychology

Introductory & Historical Overview

Positive Psychology, Prevention & Positive Therapy

Module II: Positive Emotional States and Processes

Broaden & Build Theory of Positive Emotions

Positive Emotions: Hope & Optimism, Love, Empathy

The Positive Psychology of Emotional Intelligence

Module III: Positive Psychology and Relationship to Goals

Importance of Goals

Values in actions

Developing Positive Personality

Module IV: Strengths & Virtues & Positive Institutions

Tyranny of Wisdom

Character Strengths and Virtues

Resilience in the phase of challenge & Loss

Module V: Applications of Positive Psychology

Going Positive

Understanding & Changing Human Behaviour

Examination Scheme:

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	10	10	5	5	70

CT-Class Test; H-Home Assignment; P-Presentation; V-Viva; Q-Quiz; A- Attendance; EE-End Session Exam

Text & References:

- C. R. Snyder, Shane J. Lopez. The Handbook of Positive Psychology
- C. R. Snyder, Shane J. Lopez. Positive Psychology: The Scientific and Practical Explorations of Human Strengths
- Rich Gilman, Michael Furlong, E. Scott Huebner. A Handbook of Positive Psychology in Schools
- Snyder, C.R., Lopez, S.J. & Pedrotti, J.T. (2011): Positive Psychology: The Scientific and Practical Explorations Of Human Strengths (2nd Ed). Sage Publication, Inc.

References:

- Goleman, Daniel: Emotional Intelligence
- Ilona Boniwell. Positive Psychology in a Nutshell

PROJECT (WITH PRESENTATION & EVALUATION)

Course code: PSY2632

Credit Units: 03

Objectives:

The aim of the project is to provide the students with an opportunity to further their intellectual and personal development in the chosen field by undertaking a significant practical unit of activity. The project can be defined as a scholarly inquiry into a problem or issues, involving a systematic approach to gathering and analysis of information / data, leading to production of a structured report.

Chapter Scheme and distribution of marks:

Chapter 1: Introduction – 10 marks

Chapter 2: Conceptual Framework/ National/International Scenario – 25 marks

Chapter 3: Presentation, Analysis & Findings -- 25 marks

Chapter 4: Conclusion & Recommendations -- 10 marks

Chapter 5: Bibliography -- 05 marks

Project Report	Power Point Presentation & Viva
75 marks	25 marks

Components of a Project Report

The outcome of Project Work is the Project Report. A project report should have the following components:

1) Cover Page: This should contain the title of the project proposal, to whom it is submitted, for which degree, the name of the author, name of the supervisor, year of submission of the project work, name of the University.

2) Acknowledgement: Various organizations and individuals who might have provided assistance /co-operation during the process of carrying out the study.

3) Table of Content: Page-wise listing of the main contents in the report, i.e., different Chapters and its main Sections along with their page numbers.

4) Body of the Report: The body of the report should have these four logical divisions

a) **Introduction:** This will cover the background, rationale/ need / justification, brief review of literature, objectives, methodology (the area of the study, sample, type of study, tools for data collection, and method of analysis), Limitations of the Study, and Chapter Planning.

b) **Conceptual Framework / National and International Scenario:** (relating to the topic of the Project).

c) **Presentation of Data, Analysis and Findings:**(using the tools and techniques mentioned in the methodology).

d) **Conclusion and Recommendations:** In this section, the concluding observations based on the main findings and suggestions are to be provided.

5) Bibliography or References: This section will include the list of books and articles which have been used in the project work, and in writing a project report.

6) Annexure: Questionnaires (if any), relevant reports, etc.

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(The main text of the Project should normally be in the range of 5000 words. However, there may be annexure in addition to the main text)

The Steps of a Project Report

Step I : Selection of the topic for the project by taking following points into consideration:

- Suitability of the topic.
- Relevance of the topic
- Time available at the disposal.
- Feasibility of data collection within the given time limit.
- Challenges involved in the data collection (time & cost involved in the data collection, possibility of getting responses, etc.)

Step II: Finalisation of the Topic and preparation of Project Proposal in consultation with the Supervisor.

Step III: Collection of information and data relating to the topic and analysis of the same.

Step IV: Writing the report dividing it into suitable chapters, viz.,

Chapter 1: Introduction,

Chapter 2: Conceptual Framework / National & International Scenario,

Chapter 3: Analysis & Findings

Chapter 4: Conclusion and Recommendations.

Step V: The following documents are to be attached with the Final Project Report.

1) Approval letter from the supervisor (Annexure-IA)

2) Student's declaration (Annexure-IB)

3) Certificate from the Competent Authority of the Organisation / Institution, if the student undertakes the Project Work in any Organisation / Institution.

Guidelines for Evaluation:

- Each of the students has to undertake a Project individually under the supervision of a teacher and to submit the same following the guidelines stated below.
- Language of Project Report and Viva-Voce Examination may be English. The Project Report must be typed and hard bound.
- Failure to submit the Project Report or failure to appear at the Viva-voce Examination will be treated as "Absent" in the Examination. He /she has to submit the Project Report and appear at the Viva-Voce Examination in the subsequent years (within the time period as per University Rules).
- No marks will be allotted on the Project Report unless a candidate appears at the Viva-Voce Examination. Similarly, no marks will be allotted on Viva-Voce Examination unless a candidate submits his/her Project Report.
- Evaluation of the Project Work to be done jointly by one internal expert and one external expert with equal weightage, i.e., average marks of the internal and external experts will be allotted to the candidate.



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Bachelor of Science - Clinical Psychology

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Curriculum & Scheme of Examination 2022

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A handwritten signature in blue ink, appearing to read 'Anil'.

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Bachelor of Science - Clinical Psychology

ELEMENTARY STATISTICS

Course Code: PSY2101

Credit Units: 03

Course Objective:

The paper on Statistics introduces quantification of psychological data and gives primary research orientation to the students. Understanding Statistics and basic logic of Statistics is crucial to being able to read Psychology research article. Further by mastering the basic logic and ways of thinking about Statistics, students will be unusually well prepared for the advanced courses.

Course Contents:

Module I:

Meaning, Definition, Importance and Limitations of Statistics in Psychology
Population and Sample: Types of Sampling

Module II:

Primary and Secondary Data
Classification and Tabulation of Data,
Frequency Distribution

Module III:

Graphical presentation of Data: Histograms, Frequency polygon, Frequency Curve, Cumulative Frequency Curve (Ogive), Cumulative Percentage Curve

Module IV:

Measures of Central Tendency: Meaning, Application and Computation of Mean, Median and Mode

Module V:

Measures of Variability: Range and Variation; Average deviation, Quartile deviation and Standard deviation

Examination Scheme:

Components	CT	CT / H / P / V / Q	CT	A	EE
Weightage (%)	10	10	5	5	70

CT-Class Test; H-Home Assignment; P-Presentation; V-Viva; Q-Quiz; A-Attendance; EE-End Session Exam

Text & References:

Text:

- Garrettt, H. E.:Statistics in Psychology and Education, Vakils, Feffer and Simons Ltd. Bombay
- Aron/Aron&Coups:Statistics for Psychology(5th Ed).Pearson Education

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- Howitt, D. & Introduction to Statistics in Psychology (5th Ed). Cramer, D. England: Pearson Education Limited.
- Sprinthall, R.C. :Basic Statistical Analysis. Prentice Hall College Div
- Downie, N. M.:Basic Statistical Methods. Harper & Row Publishers, New York
- Colman, A. M.:Psychological Research Methods and Statistics. London and New York: Longman.
- Gupta, S. C.:Fundamentals of Statistics. N. Delhi: Himalaya
- Siegel, S.: (1956), Non Parametric Statistics, New York, McGraw Hill
- Broota, S.: (1992), Experimental Design in Behaviour Research, New Delhi
- Mohsin, S. M.:Fundamental Statistics for the Behavioural Sciences. Motilal Banarasi Das, Patna

References:

- Agrawal, B. L.:Basic Statistics. New Age International
- Guilford, J.P.:Fundamental Statistics in Psychology and Education. McGraw Hill Kogakusha Ltd.
- Minimum, E. W., King, H. M. & Bear G., (1993), Statistical Reasoning in Psychology & Education, 3rd Edition, New York: John Wiley & Sons
- Freeman: Statistics in Psychology



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PSYCHOLOGICAL PRACTICAL-I

Course Code: PSY2103

Credit Units: 03

Course Objective:

1. To give practical experience to the students in administering and scoring psychological tests and interpreting the scores.
2. To acquaint the students with the basic procedure and design of psychology experiments.
3. To familiarize the students with the use of elementary statistical techniques
4. To encourage and guide the students to undertake a small-scale research project.

Note: Total 5practicals will be conducted in the first semesteramongthe list of following practicals out of which first three practicals are compulsory.

Course Content:

1	Alexander Pass-a-long Test of Intelligence	Intelligence
2	Muller Lyre Apparatus with stand	Perception Illusion
3	Division of Attention Board with reset 6 digit Impulse counter	Attention
4	Leadership Style Scale	Leadership
5	Depth Perception	Perception
6	Marital Coping Scale	Relationship

Examination Scheme:

Components	A	File Demonstration	Viva	EE
Weightage (%)	5	35	35	25

Text & References:

- Mohsin, S. M.:Experiments in Psychology. MotilalBanarasidas
- Woodworth, R.S.:Experimental Psychology. Oxford & IBH & Schlosberg, H. Publishing
- Postman, L. &Egan, J. P.: Experimental Psychology: An Introduction.Harper and Row



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HUMAN RIGHTS, VALUES AND ETHICS

Course Code: PSY2105

Credit Units: 03

Course Objective:

The course will address the evolution of international human rights and of the legal instruments designed for their protection. It will study the theoretical foundations of the idea of human rights in India.

Course Contents:

Module I: Introduction to Human Rights

Historical Perspective of Human rights
Meaning and Evolution of Human rights
Theories of Human Rights
Universalization of Human Rights
General Conditions Underlying the idea of human rights

Module II: Human Rights in Indian Context

Indian constitution and Human rights
Implementation of human rights in India
Personal and family rights
Group rights and right to equality

Module III: Human Rights Education

History and Determinants of Human Right Education
Principles of Human Rights Education
Awareness of Human Rights in Children
Protection of Human Rights in School
Global Need of Human Right Education

Module IV: Human and Civil Rights

Property Rights - Copyright - Intellectual Property
Crime and Social Deviance: Anomie
Ethics
Police — Law Enforcement: International Law Enforcement Agencies and National Law Enforcement Agencies

Module V: Values and ethics In India

Human Rights: Values and Ethics
Indian and Western Values and Ethics

Examination Scheme:

Components	CT	CT / H / P / V / Q	CT	A	EE
Weightage (%)	10	10	5	5	70

CT-Class Test; H-Home Assignment; P-Presentation; V-Viva; Q-Quiz; A-Attendance; EE-End Session Exam

Text & References:

Text:

- Shelley, Wright (2001): International Human Rights, Decolonisation and Globalization: Becoming Human. London: Routledge.
- Anthony J. Langlois. (2001): The Politics of Justice and Human Rights: Southeast Asia and Universalist Theory. Cambridge: Cambridge University Press.

References:

- Parish, Steven M. (1994): Moral Knowing in a Hindu Sacred City. N.Y.: Columbia University Press.



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READINGS IN PSYCHOLOGY

Course Code: PSY2130

Credit Units: 02

Course Objective:

The objective of this concentration elective is to inculcate reading habit along with value addition to the existing understanding of the subject. The book would be a kind of knowledge enhancer that would envision the student about some current thoughts related to the discipline. The book reading and its critical analysis would help broaden the intellectual horizon of the student. A contemporary and relevant book will be selected by the concerned department.

Guidelines:

The student is expected to thoroughly go through the discipline related prescribed book with the objective of critically reviewing each aspect and character of the book. The student is supposed to have a detailed insight into the following:

1. Content
2. Writing style
3. Information/learning
4. Content handling
5. Characters(if any)
6. Thematic Clarity

The report is to be submitted in about 3000 words on A4 size sheets, Font 12pt., Times New Roman, 1.5 spacing. Headings in Font Size 16.

Evaluation Scheme:

Report on the Book in 3000 words	Written Test
50 marks	50 marks



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PROJECT (WITH PRESENTATION & EVALUATION)

Course code: PSY2132

Credit Units: 03

Course Objective:

The aim of the project is to provide the students with an opportunity to further their intellectual and personal development in the chosen field by undertaking a significant practical unit of activity. The project can be defined as a scholarly inquiry into a problem or issues, involving a systematic approach to gathering and analysis of information / data, leading to production of a structured report.

Chapter Scheme and distribution of marks:

Chapter 1: Introduction – 10 marks

Chapter 2: Conceptual Framework/ National/International Scenario – 25 marks

Chapter 3: Presentation, Analysis & Findings -- 25 marks

Chapter 4: Conclusion & Recommendations -- 10 marks

Chapter 5: Bibliography -- 05 marks

Project Report	Power Point Presentation & Viva
75 marks	25 marks

Components of a Project Report

The outcome of Project Work is the Project Report. A project report should have the following components:

1) Cover Page: This should contain the title of the project proposal, to whom it is submitted, for which degree, the name of the author, name of the supervisor, year of submission of the project work, name of the University.

2) Acknowledgement: Various organizations and individuals who might have provided assistance /co-operation during the process of carrying out the study.

3) Table of Content: Page-wise listing of the main contents in the report, i.e., different Chapters and its main Sections along with their page numbers.

4) Body of the Report: The body of the report should have these four logical divisions

a) **Introduction:** This will cover the background, rationale/ need / justification, brief review of literature, objectives, methodology (the area of the study, sample, type of study, tools for data collection, and method of analysis), Limitations of the Study, and Chapter Planning.

b) **Conceptual Framework / National and International Scenario:** (relating to the topic of the Project).

c) **Presentation of Data, Analysis and Findings:**(using the tools and techniques mentioned in the methodology).

d) **Conclusion and Recommendations:** In this section, the concluding observations based on the main findings and suggestions are to be provided.

5) Bibliography or References: This section will include the list of books and articles which have been used in the project work, and in writing a project report.

6) Annexures: Questionnaires (if any), relevant reports, etc.

(The main text of the Project should normally be in the range of 5000 words. However, there may be annexure in addition to the main text)

The Steps of a Project Report

Step I : Selection of the topic for the project by taking following points into consideration:

- Suitability of the topic.
- Relevance of the topic
- Time available at the disposal.
- Feasibility of data collection within the given time limit.
- Challenges involved in the data collection (time & cost involved in the data collection, possibility of getting responses, etc.)

Step II: Finalisation of the Topic and preparation of Project Proposal in consultation with the Supervisor.

Step III: Collection of information and data relating to the topic and analysis of the same.

Step IV: Writing the report dividing it into suitable chapters, viz.,

Chapter 1: Introduction,

Chapter 2: Conceptual Framework / National & International Scenario,

Chapter 3: Analysis & Findings

Chapter 4: Conclusion and Recommendations.

Step V: The following documents are to be attached with the Final Project Report.

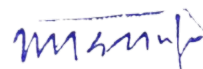
- 1) Approval letter from the supervisor(Annexure-IA)
- 2) Student's declaration (Annexure-IB)
- 3) Certificate from the Competent Authority of the Organisation / Institution, if the student undertakes the Project Work in any Organisation / Institution.

Guidelines for Evaluation:

- Each of the students has to undertake a Project individually under the supervision of a teacher and to submit the same following the guidelines stated below.
- Language of Project Report and Viva-Voce Examination may be English. The Project Report must be typed and hard bound.
- Failure to submit the Project Report or failure to appear at the Viva-voce Examination will be treated as "Absent" in the Examination. He /she has to submit the Project Report and appear at the Viva-Voce Examination in the subsequent years (within the time period as per University Rules).
- No marks will be allotted on the Project Report unless a candidate appears at the Viva-Voce Examination. Similarly, no marks will be allotted on Viva-Voce Examination unless a candidate submits his/her Project Report.
- Evaluation of the Project Work to be done jointly by one internal expert and one external expert with equal weightage, i.e., average marks of the internal and external experts will be allotted to the candidate.



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ARTICLE/ FEATURE WRITING

Course Code: PSY2136

Credit Units: 01

Course Objective:

The objective of this course is to judge the understanding as well as application of the knowledge gained by the students. The aim of an article is to provide the students an opportunity to further enhance their knowledge in an area of their choice by undertaking different **aspects of human behavior and analyzing it** at a level commensurate with the learning outcomes of the various courses taken up by them in the ongoing semester.

The purpose of the article is for the students to draw upon their interest in currently published research literature with the aim of furthering theoretical work in the field of interest.

Guidelines:

1. The article will be related to the contemporary Psychological issue and the topic will be given by the department. The article will be written in around 3000 words.
2. The presentation of the article is scheduled to be held before the commencement of Semester examinations.
3. The article will carry 100 marks that will be marked on the basis of selection of topic, article writing and viva.
4. There are a number of types of articles that are published in psychological journals, including reports of empirical studies (psychological reports), review articles, case studies and theoretical articles. Students may critically assess existing theories, identifying flaws or arguing for the superiority of one theory over another. This is often done through examining a theory's internal consistency and evaluating the level of empirical support for the theory (i.e. studies/experiments). This type of theoretical analysis is what we are expecting from students at undergraduate level.

Examples of a few broad areas for articles (List is indicative, not exhaustive)

- Personality theories
- Emotional Intelligence
- Positive thinking
- Learning
- Self concept
- motivation
- Emotion
- Cognitive process
- Cross cultural Psychology
- Memory enhancement

EVALUATION

Selection of topic & its significance	Article writing		Viva	Total
	Content	References(studies quoted)		
10	30	20	40	100


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ABNORMAL PSYCHOLOGY

Course Code: PSY2251

Credit Units: 03

Course Objective:

Abnormal psychology is a branch of psychology that deals with psychopathology and abnormal behavior that causes suffering to the individual and others around him or her, and interferes with functioning in a significant way. The term covers a broad range of disorders, from depression to obsession-compulsion to sexual deviation and many more. The study of abnormal psychology also includes learning about the factors, situations, and conditions that cause mental disorders and how they may be best treated.

Course Content:

Module I: Introduction

Concept of abnormality: Criteria and Perspectives

Classification: DSM IV-R, conceptual and operational evaluation.

Casual factors in Psychopathological Behaviour

(a) Biological determinants

(b) Psychological determinants

(c) Socio-cultural determinants

Module II: Neurosis and Psychosis

Concept and Difference between both the two

Module III: Neurotic Disorder

Generalized anxiety disorders

Obsessive-Compulsive disorders

Phobic Disorders

Eating Disorder

Module IV: Mood Disorders

Depression

Bipolar Disorder

Module V: Psychotic Disorder

Bipolar disorders: Manic, Depressive, Mixed

Psychotic depression

Delusional Disorder

Schizophrenia

Module VI: Mental Retardation and Development Disorders

Levels of mental retardation, Organic factors in mental retardation.

Autism: Clinical picture and casual factors.

Childhood Disorder

Module VII: Substance Abuse Disorders

Alcoholism

Drug Addition

Module VIII:

Psychosomatic Disorder

Somatoform Disorders

Personality Disorders

Examination Scheme:

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	10	10	5	5	70

CT-Class Test; H-Home Assignment; P-Presentation; V-Viva; Q-Quiz; A-Attendance; EE-End Session Exam

Text & References:

Text:

- Page, J.D.: Abnormal Psychology. New Delhi: Tata McGraw Hill Publishing Company Limited
- Shanmugam, T.E.: Abnormal Psychology. New Delhi: Tata McGraw Hill Publishing Company Limited
- Coleman, J.C.: Abnormal Psychology and Modern Life. Bombay: D.B. Taraporewala Sons.&OCLtd.
- Davison G.C.& Neale, J. M.: Abnormal Psychology. New York: John Willey&Sons.
- Carson, R.C., Butcher, J.N. & Mineka, S.: Abnormal Psychology and Modern Life. Delhi: & Person Education, 2000
- Sarason, I. G. & Sarason, B. R.: Abnormal Psychology: The Problem of Maladaptive Behaviour, 11th Ed. Prentice-Hall
- Mangal, S. K.: Abnormal Psychology. New Delhi: Sterling Publishers Pvt Ltd

References:

- Comer, R. J.: Abnormal Psychology, 5th Ed. Worth Publishers
- Kumar, V.: Abnormal Psychology: Causes and Treatment. AadiPublications
- Kaur, R.: Abnormal Psychology: New Trends and Innovations Delhi: Deep & Deep Publications (P) Ltd.



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ADVANCED STATISTICS

Course Code: PSY2201

Credit Units: 03

Course Objective:

The paper on statistics introduces quantification of psychological data and gives primary research orientation to the students.

Course Contents:

Module I: The Normal Curve

Characteristics and Problems in Normal Probability Curve (NPC), The Standard Normal Curve.

Module II: Significance of mean

Computation of the standard error of mean, application and interpretation, Z-test, The 't' distribution, Degrees of freedom, Levels of significance, Standard error of difference between two independent means (t-test: Large & small samples), Type I and Type II errors

Module III: Chi-Square Test (Non-Parametric Method)

Meaning, Test of Hypothesis with equal probability, Chi-Square with 2*2 table

Module IV: Analysis of Variance

Hypothesis testing with the help of One way ANOVA (f-test)

Module V: Parametric Vs Non-parametric Statistics

Introduction, Assumptions, basic differences, uses of parametric and Non-parametric tests

Examination Scheme:

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	10	10	5	5	70

CT-Class Test; H-Home Assignment; P-Presentation; V-Viva; Q-Quiz; A-Attendance; EE-End Session Exam

Text & References:

Text:

- Garrett, H. E.: Statistics in Psychology and Education, Vakils, Feffer and Simons Ltd. Bombay
- Aron/Aron&Coups: Statistics for Psychology (5th Ed). Pearson Education
- Howitt, D. &: Introduction to Statistics in Psychology (5th Ed). Cramer, D. England: Pearson Education Limited.
- Sprinthall, R.C. : Basic Statistical Analysis. Prentice Hall College Div
- Downie, N. M.: Basic Statistical Methods. Harper & Row Publishers, New York
- Colman, A. M.: Psychological Research Methods and Statistics. London and New York: Longman.
- Gupta, S. C.: Fundamentals of Statistics. N. Delhi: Himalaya
- Siegel, S.: (1956), Non Parametric Statistics, New York, McGraw Hill
- Broota, S.: (1992), Experimental Design in Behaviour Research, New Delhi
- Mohsin, S. M.: Fundamental Statistics for the Behavioural Sciences. Motilal Banarasi Das, Patna

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References:

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- Minimum, E. W., King, H. M. & Bear G., (1993), Statistical Reasoning in Psychology & Education, 3rd Edition, New York: John Willey & Sons
- Freeman: Statistics in Psychology



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PSYCHOLOGICAL PRACTICAL- II

Course Code: PSY2203

Credit Units: 03

Course Objective:

- To give practical experience to the students in administering and scoring psychological tests and interpreting the scores.
- To acquaint the students with the basic procedure and design of psychology experiments.
- To familiarize the students with the use of elementary statistical techniques
- To encourage and guide the students to undertake a small-scale research project.

Note: Total 5 practicals will be conducted in the second semester among the list of following practicals out of which first three practicals are compulsory.

Course Content:

1	Mirror Drawing	Motor Learning
2	Rey Auditory Verbal Learning Test	Verbal Learning
3	Emotions & Expressions	Emotion
4	Coopersmith Self Esteem Inventory	Self Esteem
5	Emotional Intelligence Test	Intelligence
6	Quality Of Marital Relationship scale	Relationship

Examination Scheme:

Components	A	File Demonstration	Viva	EE
Weightage (%)	5	35	35	25

Text & References:

- Mohsin, S. M.:Experiments in Psychology. MotilalBanarasidas
- Woodworth, R.S.:Experimental Psychology. Oxford & IBH & Schlosberg, H. Publishing
- Postman, L. &Egan, J. P.: Experimental Psychology: An Introduction.Harper and Row



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READINGS IN PSYCHOLOGY

Course Code: PSY2230

Credit Units: 02

Objectives:

The objective of this concentration elective is to inculcate reading habit along with value addition to the existing understanding of the subject. The book would be a kind of knowledge enhancer that would envision the student about some current thoughts related to the discipline. The book reading and its critical analysis would help broaden the intellectual horizon of the student. A contemporary and relevant book will be selected by the concerned department.

Guidelines:

The student is expected to thoroughly go through the discipline related prescribed book with the objective of critically reviewing each aspect and character of the book. The student is supposed to have a detailed insight into the following:

1. Content
2. Writing style
3. Information/learning
4. Content handling
5. Characters(if any)
6. Thematic Clarity

The report is to be submitted in about 3000 words on A4 size sheets, Font 12pt., Times New Roman, 1.5 spacing. Headings in Font Size 16

Evaluation Scheme:

Report on the Book in 3000 words	Written Test
50 marks	50 marks



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PROJECT (WITH PRESENTATION & EVALUATION)

Course code: PSY2232

Credit Units: 03

Course Objective:

The aim of the project is to provide the students with an opportunity to further their intellectual and personal development in the chosen field by undertaking a significant practical unit of activity. The project can be defined as a scholarly inquiry into a problem or issues, involving a systematic approach to gathering and analysis of information / data, leading to production of a structured report.

Chapter Scheme and distribution of marks:

Chapter 1: Introduction – 10 marks

Chapter 2: Conceptual Framework/ National/International Scenario – 25 marks

Chapter 3: Presentation, Analysis & Findings -- 25 marks

Chapter 4: Conclusion & Recommendations -- 10 marks

Chapter 5: Bibliography -- 05 marks

Project Report	Power Point Presentation & Viva
75 marks	25 marks

Components of a Project Report

The outcome of Project Work is the Project Report. A project report should have the following components:

1) Cover Page: This should contain the title of the project proposal, to whom it is submitted, for which degree, the name of the author, name of the supervisor, year of submission of the project work, name of the University.

2) Acknowledgement: Various organizations and individuals who might have provided assistance /co-operation during the process of carrying out the study.

3) Table of Content: Page-wise listing of the main contents in the report, i.e., different Chapters and its main Sections along with their page numbers.

4) Body of the Report: The body of the report should have these four logical divisions

a) **Introduction:** This will cover the background, rationale/ need / justification, brief review of literature, objectives, methodology (the area of the study, sample, type of study, tools for data collection, and method of analysis), Limitations of the Study, and Chapter Planning.

b) **Conceptual Framework / National and International Scenario:** (relating to the topic of the Project).

c) **Presentation of Data, Analysis and Findings:**(using the tools and techniques mentioned in the methodology).

d) **Conclusion and Recommendations:** In this section, the concluding observations based on the main findings and suggestions are to be provided.

5) Bibliography or References: This section will include the list of books and articles which have been used in the project work, and in writing a project report.

6) Annexures: Questionnaires (if any), relevant reports, etc.

(The main text of the Project should normally be in the range of 5000 words. However, there may be annexure in addition to the main text)

The Steps of a Project Report

Step I : Selection of the topic for the project by taking following points into consideration:

- Suitability of the topic.
- Relevance of the topic
- Time available at the disposal.
- Feasibility of data collection within the given time limit.
- Challenges involved in the data collection (time & cost involved in the data collection, possibility of getting responses, etc.)

Step II: Finalisation of the Topic and preparation of Project Proposal in consultation with the Supervisor.

Step III: Collection of information and data relating to the topic and analysis of the same.

Step IV: Writing the report dividing it into suitable chapters, viz.,

Chapter 1: Introduction,

Chapter 2: Conceptual Framework / National & International Scenario,

Chapter 3: Analysis & Findings

Chapter 4: Conclusion and Recommendations.

Step V: The following documents are to be attached with the Final Project Report.

- 1) Approval letter from the supervisor (Annexure-IA)
- 2) Student's declaration (Annexure-IB)
- 3) Certificate from the Competent Authority of the Organisation / Institution, if the student undertakes the Project Work in any Organisation / Institution.

Guidelines for Evaluation:

- Each of the students has to undertake a Project individually under the supervision of a teacher and to submit the same following the guidelines stated below.
- Language of Project Report and Viva-Voce Examination may be English. The Project Report must be typed and hard bound.
- Failure to submit the Project Report or failure to appear at the Viva-voce Examination will be treated as "Absent" in the Examination. He /she has to submit the Project Report and appear at the Viva-Voce Examination in the subsequent years (within the time period as per University Rules).
- No marks will be allotted on the Project Report unless a candidate appears at the Viva-Voce Examination. Similarly, no marks will be allotted on Viva-Voce Examination unless a candidate submits his/her Project Report.
- Evaluation of the Project Work to be done jointly by one internal expert and one external expert with equal weightage, i.e., average marks of the internal and external experts will be allotted to the candidate.



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ARTICLE/FEATURE WRITING

Course Code: PSY2236

Credit Units: 01

Course Objective:

The objective of this course is to judge the understanding as well as application of the knowledge gained by the students. The aim of an article is to provide the students with an opportunity to further enhance their knowledge in an area of their choice by undertaking different **aspects of human behavior and analyzing it** at a level commensurate with the learning outcomes of the various courses taken up by them in the ongoing semester.

The purpose of the article is for the students to draw upon their interest in currently published research literature with the aim of furthering theoretical work in the field of interest.

Guidelines:

1. The article will be related to the contemporary Psychological issue and the topic will be given by the department. The article will be written in around 3000 words.
2. The presentation of the article is scheduled to be held before the commencement of Semester examinations.
3. The article will carry 100 marks that will be marked on the basis of selection of topic, article writing and viva.
4. There are a number of types of articles that are published in psychological journals, including reports of empirical studies (psychological reports), review articles, case studies and theoretical articles. Students may critically assess existing theories, identifying flaws or arguing for the superiority of one theory over another. This is often done through examining a theory's internal consistency and evaluating the level of empirical support for the theory (i.e. studies/experiments). This type of theoretical analysis is what we are expecting from students at undergraduate level.

Examples of a few broad areas for articles (List is indicative, not exhaustive)

- Personality theories
- Emotional Intelligence
- Positive thinking
- Learning
- Self concept
- motivation
- Emotion
- Cognitive process
- Cross cultural Psychology
- Memory enhancement

EVALUATION

Selection of topic & its significance	Article writing		Viva	Total
	Content	References(studies quoted)		
10	30	20	40	100

PSYCHOLOGICAL PRACTICAL-III

Course Code: PSY2302

Credit Units: 03

Course Objective:

- To give practical experience to the students in administering and scoring psychological tests and interpreting the scores.
- To acquaint the students with the basic procedure and design of psychology experiments.
- To familiarize the students with the use of elementary statistical techniques
- To encourage and guide the students to undertake a small-scale research project.

Note: Total 5 practicals will be conducted in the third semester among the list of following practicals out of which first three practicals are compulsory.

Course Content:

1	Aggression Questionnaire	Aggression
2	Draw A Person Intellectual Ability Test	Intelligence
3	Multidimensional Self Concept Scale	Self-Concept
4	Swaroop Mehta Test Of Thinking Strategy	Thinking
5	Critical Thinking For Activities of Daily Living and Communication	Thinking
6	Marital Compatibility Index	Relationship

Examination Scheme:

Components	A	File Demonstration	Viva	EE
Weightage (%)	5	35	35	25

Text & References:

- Mohsin, S. M.:Experiments in Psychology. MotilalBanarasidas
- Woodworth, R.S.:Experimental Psychology. Oxford & IBH & Schlosberg, H. Publishing
- Postman, L. &Egan, J. P.: Experimental Psychology: An Introduction.Harper and Row



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SUMMER PROJECT EVALUATION-I

Course Code: PSY2335

Credit Units: 03

Course Objective:

To enable the students with the practical exposure in their core area of interest (Corporate Sector, NGOs, Hospitals etc.), which in turn will be the pathway to their personal and professional training. It will also help students to develop report writing skills.

Duration: Two Months (June- July)

Methodology:

Students get opportunity in diversified Institutes e.g. Corporate Sector, Schools, NGOs and Hospitals. They will be guided by an internal and external supervisor from their respective Institute. Students will submit their summer project reports with their supervised daily reporting. Immediately after returning from their summer vacations. This would require primary data collection.

Examination Scheme:

Internal Faculty Interaction	20 Marks
Feedback from External Supervisor	20 Marks
Viva Voce	30 Marks
Report Writing	30 Marks
Total	100 Marks



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SPORTS PSYCHOLOGY

Course Code: PSY2304

Credit Units: 03

Course Objectives:

- To trace the development of sports psychology as an independent discipline with its multidimensional perspectives;
- to identify the relationship of personality and situational factors with performance on individual and team events; and
- to apply the psychological interventions in sports

Course Contents:

Module I:

Nature, Historical & recent perspectives on sports psychology

Module II:

The role of stress, arousal, anxiety and attention in the performance of individual and team sports

Module III:

Motivation, skills and performance, personality profiles of successful sports persons

Module IV:

Cognitive and social psychological dimensions of individual & team sports

Module V:

Training/Coaching techniques, cognitive and behavioral interventions, the role of Sports Psychologists

Examination Scheme:

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	10	10	5	5	70

CT-Class Test; H-Home Assignment; P-Presentation; V-Viva; Q-Quiz; A-Attendance; EE-End Session Exam

Text & References:

Text:

- Jarvis, M.: Sport Psychology. Routledge Publication
- Sejwal, S. M. (2011): Sport Psychology. Pacific Publication.

References:

- Thatcher: Sports and Exercise Psychology

READINGS IN PSYCHOLOGY

Course Code: PSY2330

Credit Units: 02

Course Objective:

The objective of this concentration elective is to inculcate reading habit along with value addition to the existing understanding of the subject. The book would be a kind of knowledge enhancer that would envision the student about some current thoughts related to the discipline. The book reading and its critical analysis would help broaden the intellectual horizon of the student. A contemporary and relevant book will be selected by the concerned department.

Guidelines:

The student is expected to thoroughly go through the discipline related prescribed book with the objective of critically reviewing each aspect and character of the book. The student is supposed to have a detailed insight into the following:

1. Content
2. Writing style
3. Information/learning
4. Content handling
5. Characters(if any)
6. Thematic Clarity

The report is to be submitted in about 3000 words on A4 size sheets, Font 12pt., Times New Roman, 1.5 spacing. Headings in Font Size 16.

Evaluation Scheme:

Report on the Book in 3000 words	Written Test
50 marks	50 marks



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TERM PAPER

Course Code: PSY2331

Credit Units: 02

Course Objective:

The rationale behind introducing the term paper for BA (H) Students is to enhance the reading and writing habits of the students and to make them aware about the process of carrying out a research work. This helps them to develop insight into the course they are studying which creates an academic interest among the students. Presentation of the term paper plays an important role as it facilitates knowledge sharing and improvement in presentation skills which will further enhance the confidence of the students. The overall objective of this term paper is to develop research orientations in students and to make them understand and enhance skills in Research Methodology.

Guidelines for Term Paper:

1. Topic
2. Introduction
3. Review Research
4. Key Learning: minimum 5 pgs handwritten
5. Conclusion
6. References
7. No. of pages in the compilation of the paper 25-30 (minimum 25 pages)

Examination Scheme:

Compilation of Term Paper	50 Marks
Viva Voce	25 Marks
Presentation of Term Paper	25 Marks
Total	100 Marks



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PROJECT (WITH PRESENTATION & EVALUATION)

Course code: PSY2332

Credit Units: 03

Course Objective:

The aim of the project is to provide the students with an opportunity to further their intellectual and personal development in the chosen field by undertaking a significant practical unit of activity. The project can be defined as a scholarly inquiry into a problem or issues, involving a systematic approach to gathering and analysis of information / data, leading to production of a structured report.

Chapter Scheme and distribution of marks:

Chapter 1: Introduction – 10 marks

Chapter 2: Conceptual Framework/ National/International Scenario – 25 marks

Chapter 3: Presentation, Analysis & Findings -- 25 marks

Chapter 4: Conclusion & Recommendations -- 10 marks

Chapter 5: Bibliography -- 05 marks

Project Report	Power Point Presentation & Viva
75 marks	25 marks

Components of a Project Report

The outcome of Project Work is the Project Report. A project report should have the following components:

1) Cover Page: This should contain the title of the project proposal, to whom it is submitted, for which degree, the name of the author, name of the supervisor, year of submission of the project work, name of the University.

2) Acknowledgement: Various organizations and individuals who might have provided assistance /co-operation during the process of carrying out the study.

3) Table of Content: Page-wise listing of the main contents in the report, i.e., different Chapters and its main Sections along with their page numbers.

4) Body of the Report: The body of the report should have these four logical divisions

a) **Introduction:** This will cover the background, rationale/ need / justification, brief review of literature, objectives, methodology (the area of the study, sample, type of study, tools for data collection, and method of analysis), Limitations of the Study, and Chapter Planning.

b) **Conceptual Framework / National and International Scenario:** (relating to the topic of the Project).

c) **Presentation of Data, Analysis and Findings:**(using the tools and techniques mentioned in the methodology).

d) **Conclusion and Recommendations:** In this section, the concluding observations based on the main findings and suggestions are to be provided.

5) Bibliography or References: This section will include the list of books and articles which have been used in the project work, and in writing a project report.

6) Annexures: Questionnaires (if any), relevant reports, etc.

(The main text of the Project should normally be in the range of 5000 words. However, there may be annexure in addition to the main text)

The Steps of a Project Report

Step I : Selection of the topic for the project by taking following points into consideration:

- Suitability of the topic.
- Relevance of the topic
- Time available at the disposal.
- Feasibility of data collection within the given time limit.
- Challenges involved in the data collection (time & cost involved in the data collection, possibility of getting responses, etc.)

Step II: Finalisation of the Topic and preparation of Project Proposal in consultation with the Supervisor.

Step III: Collection of information and data relating to the topic and analysis of the same.

Step IV: Writing the report dividing it into suitable chapters, viz.,

Chapter 1: Introduction,

Chapter 2: Conceptual Framework / National & International Scenario,

Chapter 3: Analysis & Findings

Chapter 4: Conclusion and Recommendations.

Step V: The following documents are to be attached with the Final Project Report.

- 1) Approval letter from the supervisor (Annexure-IA)
- 2) Student's declaration (Annexure-IB)
- 3) Certificate from the Competent Authority of the Organisation / Institution, if the student undertakes the Project Work in any Organisation / Institution.

Guidelines for Evaluation:

- Each of the students has to undertake a Project individually under the supervision of a teacher and to submit the same following the guidelines stated below.
- Language of Project Report and Viva-Voce Examination may be English. The Project Report must be typed and hard bound.
- Failure to submit the Project Report or failure to appear at the Viva-voce Examination will be treated as "Absent" in the Examination. He /she has to submit the Project Report and appear at the Viva-Voce Examination in the subsequent years (within the time period as per University Rules).
- No marks will be allotted on the Project Report unless a candidate appears at the Viva-Voce Examination. Similarly, no marks will be allotted on Viva-Voce Examination unless a candidate submits his/her Project Report.
- Evaluation of the Project Work to be done jointly by one internal expert and one external expert with equal weightage, i.e., average marks of the internal and external experts will be allotted to the candidate.



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WORKSHOP/ CERTIFICATION

Course Code: PSY2333

Credit Units: 01

Course Objective

A workshop is primarily an activity based academic event that is organized to provide the students a one to one and hands on experience on any aspect of their learning. The communication in a workshop has to be necessarily two way. The trainer has to make sure that the aspects covered are practically practiced by the participants. The student will choose the option of workshop from amongst their concentration electives. The evaluation will be done by Board of examiners comprising of the faculties.

Major Themes for Workshop

The workshop may be conducted on any of the following major themes:

- Experimental Psychology
- Health Psychology
- Industrial Psychology
- Organizational Behaviour
- Sports Psychology
- Social Psychology
- Cognitive Psychology

These themes are merely indicative and other recent and relevant topics of study may be included.

Guidelines for Workshop

The procedure for earning credits from workshop consists of the following steps:

1. Relevant study material and references will be provided by the trainer in advance.
2. The participants are expected to explore the topic in advance and take active part in the discussions held
3. Attending and participating in all activities of the workshop
4. Group Activities have to be undertaken by students as guided by the trainer.
5. Evaluation of workshop activities would be done through test and quiz at the end of the workshop.
6. Submitting a write up of atleast 500 words about the learning outcome from the workshop.

Methodology

The methodology followed at the workshop could be based on any one or more of the following methods:

Case Study

Group Activity

Role Play

Quiz

Evaluation Scheme:

Attendance	Active Participation	Multiple Choice Questions/ Quiz	Solving the case/ Assignment/ Write up	Total
10	30	30	30	100

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ARTICLE/ FEATURE WRITING

Course Code: PSY2336

Credit Units: 01

Course Objective:

The objective of this course is to judge the understanding as well as application of the knowledge gained by the students. The aim of an article is to provide the students an opportunity to further enhance their knowledge in an area of their choice by undertaking different **aspects of human behavior and analyzing it** at a level commensurate with the learning outcomes of the various courses taken up by them in the ongoing semester.

The purpose of the article is for the students to draw upon their interest in currently published research literature with the aim of furthering theoretical work in the field of interest.

Guidelines:

1. The article will be related to the contemporary Psychological issue and the topic will be given by the department. The article will be written in around 3000 words.
2. The presentation of the article is scheduled to be held before the commencement of Semester examinations.
3. The article will carry 100 marks that will be marked on the basis of selection of topic, article writing and viva.
4. There are a number of types of articles that are published in psychological journals, including reports of empirical studies (psychological reports), review articles, case studies and theoretical articles.

Students may critically assess existing theories, identifying flaws or arguing for the superiority of one theory over another. This is often done through examining a theory's internal consistency and evaluating the level of empirical support for the theory (i.e. studies/experiments). This type of theoretical analysis is what we are expecting from students at undergraduate level.

Examples of a few broad areas for articles (List is indicative, not exhaustive)

- Personality theories
- Emotional Intelligence
- Positive thinking
- Learning
- Self concept
- motivation
- Emotion
- Cognitive process
- Cross cultural Psychology
- Memory enhancement

EVALUATION

Selection of topic & its significance	Article writing		Viva	Total
	Content	References(studies quoted)		
10	30	20	40	100

PSYCHOLOGICAL PRACTICAL- IV

Course Code: PSY2402

Credit Units: 03

Course Objective:

- To give practical experience to the students in administering and scoring psychological tests and interpreting the scores.
- To acquaint the students with the basic procedure and design of psychology experiments.
- To familiarize the students with the use of elementary statistical techniques
- To encourage and guide the students to undertake a small-scale research project.

Note: Total 5 practicals will be conducted in the Fourth semester among the list of following practicals out of which first three practicals are compulsory.

Course Content:

1	Developmental Screening Test	Development
2	Memory Drum Apparatus	Memory
3	Vocational Preference Inventory	Personality-Non Projective
4	Students Stress Scale	Stress
5	Authentic Leadership Questionnaire	Leadership
6	Thematic Apperception Test	Personality-Projective

Examination Scheme:

Components	A	File Demonstration	Viva	EE
Weightage (%)	5	35	35	25

Text & References:

- Mohsin, S. M.:Experiments in Psychology. MotilalBanarasidas
- Woodworth, R.S.:Experimental Psychology. Oxford & IBH & Schlosberg, H. Publishing
- Postman, L. &Egan, J. P.: Experimental Psychology: An Introduction.Harper and Row



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APPLIED SOCIAL PSYCHOLOGY

Course Code: PSY2406

Credit Units: 03

Course Objective:

Social Psychology is the study of social interaction and social influence. As such, it remains one of the most comprehensive and personally relevant areas within the field of psychology. This course has following objectives.

- To expand your knowledge about social psychology and human behavior.
- To foster respect for human diversity, particularly with regard to matters of gender, race and ethnicity.
- To enable students to (a) understand the forces that create group differences in patterns of social behavior, (b) understand and tolerate the behavior of other people, particularly that of members of the diverse array of groups and social categories to which they do not belong, (c) recognize the limits in generalizing psychological research to all cultural/gender/ethnic/age groups, and (d) understand the dynamics of intergroup relationships, conflict, and cooperation.

Course Contents:

Module I: Introduction

Social Psychology in the workplace, Social Psychology in the clinic,
Social Psychology of poverty and deprivation, Psychology of collective behaviour

Module II: Group Process

Group Structure: Nature and Function

Task Performance: Social Interaction, Social facilitation, Social Loafing

Conformity: Factors affecting Conformity

Coordination in Groups and Group Cohesiveness

Module III: Attitude

Nature and Determinants of Attitude

Formation, Change and Measurement of Attitudes: Likert Scale, Thurstone Scale, Bogardus Scale

Module IV: Prejudices, Discrimination and Stereotypes

Nature and Components of Prejudice, Discrimination and Stereotypes

Acquisition and techniques of Reduction

Module V: Leadership

Definition, Nature and Function of Leadership

Types, Qualities and Theories of Leadership: Trait Approach, Situational Approach, Interactional Approach

Examination Scheme:

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	10	10	5	5	70

CT-Class Test; H-Home Assignment; P-Presentation; V-Viva; Q-Quiz; A- Attendance; EE-End Session Exam

Text & References:

Text:

- Myers, D. G.: Social Psychology (10th Ed). New York: McGraw Hill
- Feldman, R. S.: Social Psychology: Theories, Research and Application. New York: McGraw Hill
- Secord, P.F. & Backman, C. N.: Social Psychology. USA: McGraw-Hill
- Baran, R.A. & Byrne, D.: Social Psychology. Boston, MA: Pearson Allyn and Bacon.
- Aronson, E., Wilson, T. D.: Social Psychology (7th ed.). Upper Saddle & Akert, R. M. River, NJ: Prentice Hall.
- Wrightsman, L. S.: Social Psychology. Brooks/Cole Pub. Co.
- Alcock, J. E.; Carment, D. W.; Sadava, S. W.; Collins, J. E. & Green, J. M.: A textbook of Social Psychology (6th Ed) Scarborough, Ontario: Prentice Hall / Allin & Bacon
- Sharma, R. K. & Sharma, R.: Social Psychology. New Delhi: Atlantic Publishers and Distributors

References:

- Krutchfield, R. S.: Theories and Problems of Social Psychology
- Baumeister, R. F. & Belmont, C.A.: Social Psychology and Human Nature (2nd Bushman, B. J. ed). Thomson/Wadsworth
- Kuppaswamy: Introduction to Social Psychology



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READINGS IN PSYCHOLOGY

Course Code: PSY2430

Credit Units: 02

Course Objective:

The objective of this concentration elective is to inculcate reading habit along with value addition to the existing understanding of the subject. The book would be a kind of knowledge enhancer that would envision the student about some current thoughts related to the discipline. The book reading and its critical analysis would help broaden the intellectual horizon of the student. A contemporary and relevant book will be selected by the concerned department.

Guidelines:

The student is expected to thoroughly go through the discipline related prescribed book with the objective of critically reviewing each aspect and character of the book. The student is supposed to have a detailed insight into the following:

1. Content
2. Writing style
3. Information/learning
4. Content handling
5. Characters(if any)
6. Thematic Clarity

The report is to be submitted in about 3000 words on A4 size sheets, Font 12pt., Times New Roman, 1.5 spacing. Headings in Font Size 16

Evaluation Scheme:

Report on the Book in 3000 words	Written Test
50 marks	50 marks



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TERM PAPER

Course Code: PSY2431

Credit Units: 02

Course Objective:

The rationale behind introducing the term paper for BA Students is to enhance the reading and writing habits of the students and to make them aware about the process of carrying out a research work. This helps them to develop insight into the course they are studying which creates an academic interest among the students. Presentation of the term paper plays an important role as it facilitates knowledge sharing and improvement in presentation skills which will further enhance the confidence of the students. The overall objective of this term paper is to develop research orientations in students and to make them understand and enhance skills in Research Methodology.

Guidelines for Term Paper:

1. Topic
2. Introduction
3. Review Research
4. Key Learning: minimum 5 pgs handwritten
5. Conclusion
6. References
7. No. of pages in the compilation of the paper 25-30 (minimum 25 pages)

Examination Scheme:

Compilation of Term Paper	50 Marks
Viva Voce	25 Marks
Presentation of Term Paper	25 Marks
Total	100 Marks



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PROJECT (WITH PRESENTATION & EVALUATION)

Course code: PSY2432

Credit Units: 03

Course Objective:

The aim of the project is to provide the students with an opportunity to further their intellectual and personal development in the chosen field by undertaking a significant practical unit of activity. The project can be defined as a scholarly inquiry into a problem or issues, involving a systematic approach to gathering and analysis of information / data, leading to production of a structured report.

Chapter Scheme and distribution of marks:

Chapter 1: Introduction – 10 marks

Chapter 2: Conceptual Framework/ National/International Scenario – 25 marks

Chapter 3: Presentation, Analysis & Findings -- 25 marks

Chapter 4: Conclusion & Recommendations -- 10 marks

Chapter 5: Bibliography -- 05 marks

Project Report	Power Point Presentation & Viva
75 marks	25 marks

Components of a Project Report

The outcome of Project Work is the Project Report. A project report should have the following components:

1) Cover Page: This should contain the title of the project proposal, to whom it is submitted, for which degree, the name of the author, name of the supervisor, year of submission of the project work, name of the University.

2) Acknowledgement: Various organizations and individuals who might have provided assistance /co-operation during the process of carrying out the study.

3) Table of Content: Page-wise listing of the main contents in the report, i.e., different Chapters and its main Sections along with their page numbers.

4) Body of the Report: The body of the report should have these four logical divisions

a) **Introduction:** This will cover the background, rationale/ need / justification, brief review of literature, objectives, methodology (the area of the study, sample, type of study, tools for data collection, and method of analysis), Limitations of the Study, and Chapter Planning.

b) **Conceptual Framework / National and International Scenario:** (relating to the topic of the Project).

c) **Presentation of Data, Analysis and Findings:** (using the tools and techniques mentioned in the methodology).

d) **Conclusion and Recommendations:** In this section, the concluding observations based on the main findings and suggestions are to be provided.

5) Bibliography or References: This section will include the list of books and articles which have been used in the project work, and in writing a project report.

6) Annexures: Questionnaires (if any), relevant reports, etc.

(The main text of the Project should normally be in the range of 5000 words. However, there may be annexure in addition to the main text)

The Steps of a Project Report

Step I : Selection of the topic for the project by taking following points into consideration:

- Suitability of the topic.
- Relevance of the topic
- Time available at the disposal.
- Feasibility of data collection within the given time limit.
- Challenges involved in the data collection (time & cost involved in the data collection, possibility of getting responses, etc.)

Step II: Finalisation of the Topic and preparation of Project Proposal in consultation with the Supervisor.

Step III: Collection of information and data relating to the topic and analysis of the same.

Step IV: Writing the report dividing it into suitable chapters, viz.,

Chapter 1: Introduction,

Chapter 2: Conceptual Framework / National & International Scenario,

Chapter 3: Analysis & Findings

Chapter 4: Conclusion and Recommendations.

Step V: The following documents are to be attached with the Final Project Report.

- 1) Approval letter from the supervisor (Annexure-IA)
- 2) Student's declaration (Annexure-IB)
- 3) Certificate from the Competent Authority of the Organisation / Institution, if the student undertakes the Project Work in any Organisation / Institution.

Guidelines for Evaluation:

- Each of the students has to undertake a Project individually under the supervision of a teacher and to submit the same following the guidelines stated below.
- Language of Project Report and Viva-Voce Examination may be English. The Project Report must be typed and hard bound.
- Failure to submit the Project Report or failure to appear at the Viva-voce Examination will be treated as "Absent" in the Examination. He /she has to submit the Project Report and appear at the Viva-Voce Examination in the subsequent years (within the time period as per University Rules).
- No marks will be allotted on the Project Report unless a candidate appears at the Viva-Voce Examination. Similarly, no marks will be allotted on Viva-Voce Examination unless a candidate submits his/her Project Report.
- Evaluation of the Project Work to be done jointly by one internal expert and one external expert with equal weightage, i.e., average marks of the internal and external experts will be allotted to the candidate.



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WORKSHOP/ CERTIFICATION

Course Code: PSY2433

Credit Units: 01

Course Objectives:

A workshop is primarily an activity based academic event that is organized to provide the students a one to one and hands on experience on any aspect of their learning. The communication in a workshop has to be necessarily two way. The trainer has to make sure that the aspects covered are practically practiced by the participants. The student will choose the option of workshop from amongst their concentration electives. The evaluation will be done by Board of examiners comprising of the faculties.

Major Themes for Workshop

The workshop may be conducted on any of the following major themes:

- Experimental Psychology
- Health Psychology
- Industrial Psychology
- Organizational Behaviour
- Sports Psychology
- Social Psychology
- Cognitive Psychology

These themes are merely indicative and other recent and relevant topics of study may be included.

Guidelines for Workshop

The procedure for earning credits from workshop consists of the following steps:

1. Relevant study material and references will be provided by the trainer in advance.
2. The participants are expected to explore the topic in advance and take active part in the discussions held
3. Attending and participating in all activities of the workshop
4. Group Activities have to be undertaken by students as guided by the trainer.
5. Evaluation of workshop activities would be done through test and quiz at the end of the workshop.
6. Submitting a write up of atleast 500 words about the learning outcome from the workshop.

Methodology

The methodology followed at the workshop could be based on any one or more of the following methods:

Case Study

Group Activity

Role Play

Quiz

Evaluation Scheme:

Attendance	Active Participation	Multiple Choice Questions/ Quiz	Solving the case/ Assignment/ Write up	Total
10	30	30	30	100

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ARTICLE/FEATURE WRITING

Course Code: PSY2436

Credit Units: 01

Course Objective:

The objective of this course is to judge the understanding as well as application of the knowledge gained by the students. The aim of an article is to provide the students an opportunity to further enhance their knowledge in an area of their choice by undertaking different **aspects of human behavior and analyzing it** at a level commensurate with the learning outcomes of the various courses taken up by them in the ongoing semester.

The purpose of the article is for the students to draw upon their interest in currently published research literature with the aim of furthering theoretical work in the field of interest.

Guidelines:

1. The article will be related to the contemporary Psychological issue and the topic will be given by the department. The article will be written in around 3000 words.
2. The presentation of the article is scheduled to be held before the commencement of Semester examinations.
3. The article will carry 100 marks that will be marked on the basis of selection of topic, article writing and viva.
4. There are a number of types of articles that are published in psychological journals, including reports of empirical studies (psychological reports), review articles, case studies and theoretical articles. Students may critically assess existing theories, identifying flaws or arguing for the superiority of one theory over another. This is often done through examining a theory's internal consistency and evaluating the level of empirical support for the theory (i.e. studies/experiments). This type of theoretical analysis is what we are expecting from students at undergraduate level.

Examples of a few broad areas for articles (List is indicative, not exhaustive)

- Personality theories
- Emotional Intelligence
- Positive thinking
- Learning
- Self concept
- motivation
- Emotion
- Cognitive process
- Cross cultural Psychology
- Memory enhancement

EVALUATION

Selection of topic & its significance	Article writing		Viva	Total
	Content	References(studies quoted)		
10	30	20	40	100

PSYCHOMETRIC TESTING

Course Code: PSY2551

Credit Units: 03

Course Objective:

Psychological assessment is a process of testing that uses a combination of techniques to help arrive at some hypotheses about a person and their behavior, personality and capabilities. Psychological assessment is also referred to as psychological testing, or performing a psychological battery on a person. A psychological assessment is the attempt of a skilled professional, usually a psychologist, to use the techniques and tools of psychology to learn either general or specific facts about another person, either to inform others of how they function now, or to predict their behavior and functioning in the future. Psychologists are the only profession that is expertly trained to perform and interpret psychological tests. Below are the objectives of studying this particular paper of Psychology:

- To train the students in various psychological assessment techniques.
- To impart skills necessary for selecting and applying different tests for different purposes such as evaluation, training and rehabilitation.

Course Content:

Module 1: Introduction

History of Psychological Testing
Meaning, Definition and Types of Psychological Testing
Ethical issues in Psychological Testing

Module 2: Measurement

Nature and significance of Measurement
Distinction between assessment and measurement
Levels of measurement
Techniques of Attitude Measurement

Module 3: Construction of Test

Steps of constructing a Psychological Test
Reliability: Meaning, types and factors affecting reliability
Validity: Meaning, types and factors affecting Validity
Characteristics of a good Psychological Test

Module 4: Assessment of General and Special Abilities

Aptitude: Multidimensional aptitude Battery-II
Creativity: Creativity Assessment Packet (CAP)
Learning: Human Maze learning

Module 5: Application of Testing

Assessment in Educational and Occupational Set-up: Achievement Test
Assessment in Clinical Set-up and in Counselling



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Examination Scheme:

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	10	10	5	5	70

CT-Class Test; H-Home Assignment; P-Presentation; V-Viva; Q-Quiz; A-Attendance; EE-End Session Exam

Text & References:**Text:**

- Anastasi, A. & Urbina, S.: Psychological Testing. U.S.A.: Prentice Hall International Inc.
- Graham, J. R. & Lilly, R. S.: Psychological Testing. New Jersey: Prentice Hall Inc.
- Kaplan, R. K. & Sacuzzo, D. P.: Psychological Testing- Principles, Applications and Issues. New Delhi: Cengage Learning India Pvt. Ltd
- Aiken, L.R. & Groth-Marnat, G.: Psychological Testing and Assessment (12th Ed.) Pearson Education
- Freeman, F. S.: Psychological Testing. Oxford University Press

References:

- Hasan, Q.: Personality Assessment: A fresh Psychological Look. New Delhi: Gyan Publishing House
- Kline, T. J. B.: Psychological Testing – A Practical Approach to Design and Evaluation. New Delhi: Vistaar Publication



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PSYCHOLOGICAL PRACTICAL- V

Course Code: PSY2501

Credit Units: 03

Course Objective:

- To give practical experience to the students in administering and scoring psychological tests and interpreting the scores.
- To acquaint the students with the basic procedure and design of psychology experiments.
- To familiarize the students with the use of elementary statistical techniques
- To encourage and guide the students to undertake a small-scale research project.

Note: Total 5 practicals will be conducted in the Fifth semester among the list of following practicals out of which first three practicals are compulsory.

Course Content:

1	Multidimensional aptitude Battery-II (MAB-II)	Aptitude
2	Human Maze Learning	Learning
3	Creativity Assessment Packet	Creativity
4	Childrens Inventory of Anger(CHIA)	Aggression
5	Constructive Thinking Inventory(CTI)	Thinking
6	D2 Test of Attention	Attention

Examination Scheme:

Components	A	File Demonstration	Viva	EE
Weightage (%)	5	35	35	25

Text & References:

- Mohsin, S. M.:Experiments in Psychology. MotilalBanarasidas
- Woodworth, R.S.:Experimental Psychology. Oxford & IBH & Schlosberg, H. Publishing
- Postman, L. &Egan, J. P.: Experimental Psychology: An Introduction.Harper and Row



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CLINICAL PSYCHOLOGY

Course Code: PSY2502

Credit Units: 03

Course Objective:

Clinical Psychology is an integration of science, theory and clinical knowledge for the purpose of understanding, preventing, and relieving psychologically-based distress or dysfunction and to promote subjective well-being and personal development. In many countries, clinical psychology is a regulated mental health profession. Keeping pace with the disciplinary advances and with the goal of acquiring specialized knowledge, the paper would allow students to nurture their academic interest in clinical and other research domains of psychology, along with personal growth and citizenship. The faculty is expected to perform the following functions so that the objective of the concerned programme can be obtained:

- Integrate the course contents with the clinical viewpoint in a service setting.
- To train them into skills and competencies which are required for practice as a psychologist.
- To sensitize them to the ethics of profession.
- To impart knowledge and skills required for diagnosis of psychopathological conditions.
- To prepare students in specific areas in which professional psychological services can be rendered.
- To develop self-reflective skills.

Course Content:

Module I: Foundation of Clinical Psychology

Introduction to Clinical Psychology: Meaning and nature of discipline,
Historical Development of Clinical Psychology

Module II: Contemporary Issues

Professional Activities of Clinical Psychologist
Subspecialties of Clinical Psychology
Organizations in Clinical Psychology
Ethical and Legal Issues in Clinical Psychology

Module III: Diagnosis and Assessment

Nature and Purpose of Clinical Diagnosis and Assessment
Stages in the Assessment Process
Clinical Assessment Techniques

Module IV: Psychotherapy

Definition, Goals and Stages of Psychotherapy
Essential Process in Psychotherapy
Models of Psychotherapy: Individual Therapy, Group Therapy, Couples Therapy, Family Therapy

Module V: Approaches to Psychotherapy

Psychodynamic Psychotherapy
Behavioural Psychotherapy
Cognitive Psychotherapy
Humanistic Psychotherapy

Examination Scheme:

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	10	10	5	5	70

CT-Class Test; **H**-Home Assignment; **P**-Presentation; **V**-Viva; **Q**-Quiz; **A**-Attendance; **EE**-End Session Exam

Text & References:**Text:**

- Plante, T. G.: Contemporary Clinical Psychology. New York: John Willey & Sons, Inc.
- Bellack, A. S. & Hersen, M.: Introduction to Clinical Psychology. New York: Oxford University Press
- Korchin, S. J.: Modern Clinical Psychology. Delhi CRR Publishers and Distributors
- Ray, S. D.: The Practice of Psychotherapy. New Delhi: New Age International
- Hecker, J. E. & Thorpe, G. L.: Introduction to Clinical Psychology. Delhi: Pearson Education
- Herbert, M.: Clinical Child Psychology: Social Learning, Development and Behaviour. New York: John Willey & Sons, Inc.
- Field, A. P. & Field: Clinical Psychology. Learning Matters
- Hatton, C. Bromley, J., & Craine, A.: Clinical Psychology. New York: John Willey & Sons, Inc

References:

- Pomerantz, A. M.: Clinical Psychology- Science, Practice and Culture. New Delhi: Sage Publications
- Matthews, J. R.: Introduction to Clinical Psychology. New York: Oxford Anton, B. S. University Press
- Kumar, A.: Clinical Psychology. Anmol Publications



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SUMMER PROJECT EVALUATION - II

Course Code: PSY2535

Credit Units: 06

Course Objective:

To enable the students with the practical exposure in their core area of interest (Corporate Sector, NGOs, Hospitals etc.), which in turn will be the pathway to their personal and professional training. It will also help students to develop report writing skills.

Duration: Two Months (June- July)

Methodology:

Students get opportunity in diversified Institutes e.g. Corporate Sector, Schools, NGOs and Hospitals. They will be guided by an internal and external supervisor from their respective Institute. Students will submit their summer project reports with their supervised daily reporting. Immediately after returning from their summer vacations. This would require primary data collection.

Examination Scheme:

Internal Faculty Interaction	20 Marks
Feedback from External Supervisor	20 Marks
Viva Voce	30 Marks
Report Writing	30 Marks
Total	100 Marks



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SCIENTIFIC RESEARCH PAPER-I

Course Code: PSY2505

Credit Units: 03

Course Objective:

The scientific research papers for Graduate Students is to enhance the reading and writing habits of the students and to make them aware about the process of carrying out a research work. This helps them to develop insight into the course they are studying which creates an academic interest among the students. Presentation of the research paper plays an important role as it facilitates knowledge sharing and improvement in presentation skills which will further enhance the confidence of the students. The overall objective of this research paper is to develop research orientations in students and to make them understand and enhance skills in Research Methodology.

Guidelines for Scientific Research Papers:

- Topic :-
- Introduction :-
- Review Research :-
- Objective
- Methodology
- Analysis
- Discussion
- Conclusion :-
- References & Bibliography:-

No. of pages in the compilation of the paper 20-30 (minimum 20 pages)

Examination Scheme:

Components	Compilation	Viva	Presentation
Weightage (%)	50	25	25



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PROJECT (WITH PRESENTATION & EVALUATION)

Course code: PSY2532

Credit Units: 03

Course Objective:

The aim of the project is to provide the students with an opportunity to further their intellectual and personal development in the chosen field by undertaking a significant practical unit of activity. The project can be defined as a scholarly inquiry into a problem or issues, involving a systematic approach to gathering and analysis of information / data, leading to production of a structured report.

Chapter Scheme and distribution of marks:

Chapter 1: Introduction – 10 marks

Chapter 2: Conceptual Framework/ National/International Scenario – 25 marks

Chapter 3: Presentation, Analysis & Findings -- 25 marks

Chapter 4: Conclusion & Recommendations -- 10 marks

Chapter 5: Bibliography -- 05 marks

Project Report	Power Point Presentation & Viva
75 marks	25 marks

Components of a Project Report

The outcome of Project Work is the Project Report. A project report should have the following components:

1) Cover Page: This should contain the title of the project proposal, to whom it is submitted, for which degree, the name of the author, name of the supervisor, year of submission of the project work, name of the University.

2) Acknowledgement: Various organizations and individuals who might have provided assistance /co-operation during the process of carrying out the study.

3) Table of Content: Page-wise listing of the main contents in the report, i.e., different Chapters and its main Sections along with their page numbers.

4) Body of the Report: The body of the report should have these four logical divisions

a) **Introduction:** This will cover the background, rationale/ need / justification, brief review of literature, objectives, methodology (the area of the study, sample, type of study, tools for data collection, and method of analysis), Limitations of the Study, and Chapter Planning.

b) **Conceptual Framework / National and International Scenario:** (relating to the topic of the Project).

c) **Presentation of Data, Analysis and Findings:**(using the tools and techniques mentioned in the methodology).

d) **Conclusion and Recommendations:** In this section, the concluding observations based on the main findings and suggestions are to be provided.

5) Bibliography or References: This section will include the list of books and articles which have been used in the project work, and in writing a project report.

6) Annexures: Questionnaires (if any), relevant reports, etc.

(The main text of the Project should normally be in the range of 5000 words. However, there may be annexure in addition to the main text)

The Steps of a Project Report

Step I: Selection of the topic for the project by taking following points into consideration:

- Suitability of the topic.
- Relevance of the topic
- Time available at the disposal.
- Feasibility of data collection within the given time limit.
- Challenges involved in the data collection (time & cost involved in the data collection, possibility of getting responses, etc.)

Step II: Finalisation of the Topic and preparation of Project Proposal in consultation with the Supervisor.

Step III: Collection of information and data relating to the topic and analysis of the same.

Step IV: Writing the report dividing it into suitable chapters, viz.,

Chapter 1: Introduction,

Chapter 2: Conceptual Framework / National & International Scenario,

Chapter 3: Analysis & Findings

Chapter 4: Conclusion and Recommendations.

Step V: The following documents are to be attached with the Final Project Report.

- 1) Approval letter from the supervisor (Annexure-IA)
- 2) Student's declaration (Annexure-IB)
- 3) Certificate from the Competent Authority of the Organisation / Institution, if the student undertakes the Project Work in any Organisation / Institution.

Guidelines for Evaluation:

- Each of the students has to undertake a Project individually under the supervision of a teacher and to submit the same following the guidelines stated below.
- Language of Project Report and Viva-Voce Examination may be English. The Project Report must be typed and hard bound.
- Failure to submit the Project Report or failure to appear at the Viva-voce Examination will be treated as "Absent" in the Examination. He /she has to submit the Project Report and appear at the Viva-Voce Examination in the subsequent years (within the time period as per University Rules).
- No marks will be allotted on the Project Report unless a candidate appears at the Viva-Voce Examination. Similarly, no marks will be allotted on Viva-Voce Examination unless a candidate submits his/her Project Report.
- Evaluation of the Project Work to be done jointly by one internal expert and one external expert with equal weightage, i.e., average marks of the internal and external experts will be allotted to the candidate.



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COUNSELLING PSYCHOLOGY

Course Code: PSY2651

Credit Units: 03

Course Objective:

The paper of Counselling Psychology covers its history, theories, activities, specialties and trends. It concentrates on the importance of the personhood of counselors and of the multicultural, ethical and legal environments in which counselors operate. This paper focuses on the context and process of counseling to provide a range of high quality and responsive counseling skills and its applications to help oneself and others.

Course Contents:

Module I: Introduction

Meaning, Definitions and Goals of counselling
Role of Counsellor in different Setting
Characteristics of a good counsellor

Module II: Counselling Process

Building Counselling Relationship
Working in a Counselling Relationship
Termination of Counselling Relationship

Module III: Counselling Approaches

Insight-Oriented Counselling: Client-Centred
Action-Oriented Counselling: Behavioural
Testing, Assessment and Diagnosis in Counselling

Module IV: Counselling Applications

Child Counselling and Counselling in School
Adolescent Counselling and Counselling in College
Career Counselling: Theories of Career Development
Group Counselling and Family Counselling
Addiction Counselling

Module V: Theories and Techniques of Counselling

Psychodynamic Approaches
Humanistic Approach
Cognitive Approach
Behavioural Approaches

Module VI: Current Issues in Counselling

Ethical and Legal Issues
Mental Health Counselling
Counselling in a Multicultural Society
Counselling with Diverse Population



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Examination Scheme:

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	10	10	5	5	70

CT-Class Test; H-Home Assignment; P-Presentation; V-Viva; Q-Quiz; A-Attendance; EE-End Session Exam

Text & References:**Text:**

- Rao, S. N.: Counselling and Guidance (2nd Ed.). Tata McGraw Hill
- Belkin, G.S.: Introduction to Counselling. W.C.: Brown Publishers
- Nelson, J.: The Theory and Practice of Counselling Psychology. New York: Holt Rinehart & Winston
- Gibson, R. L. & Mitchell, M. H.: Introduction to Counselling and Guidance (7th). New Delhi: Prentice-Hall of India Pvt. Ltd
- Gladding, S. T.: Counselling: A Comprehensive Profession (6th Ed.). Dorling Kindersley India Pvt. Ltd.
- Hansen, J. H. & Rosberg, R.H: Counselling: Theory and Process (5th Ed.). Allyn & Bacon
- Pal, O. B.: Guidance and Counselling. New Delhi: Motilal Banarsidas Publishers Private Ltd.
- Milner, J., Byrne, P. O. & Campling, J.: Assessment in Counselling: Theory, Process and Decision-Making. Palgrave MacMillan
- Patterson, L.E.: The Counselling Process. Wadsworth Publishing

References:

- Welfel, E.R., & Patterson, L.E: The Counselling Process: A Multi-theoretical Integrative Approach. Thomson Brooks / Cole



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SCHOOL COUNSELLING

Course Code: PSY2601

Credit Units: 02

Course Objective:

This is to enable the students to develop an understanding of counseling within school setup, which is collaborative work of counselor and other school staff.

Course Contents:

Module I: Introduction

Guidance & Counseling

Need and importance of guidance and counseling in school

Module II: Counselor in Educational Setting

Elementary School, Middle School, Secondary School & Higher Secondary

Counseling & Curriculum

Counseling & Family

Module III: Role of Personal Guidance

Principal, Teacher, Counselor, Career Counselor, Parents & other Specialists

Importance of holistic approach in counseling

Module IV: Mental Health of Students

Typical difficulties of students

Supportive Services

Self Help Material

Role of Faith & Spirituality in Students mental Health

Students' perspective of Mental Health

Module V: Experience of Transition

Concept of Change, Adjustment & Transition

Transition & Students' experiences

Module VI: Indian Education System: The Changing Perspective

Examination Scheme:

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	10	10	5	5	70

CT-Class Test; **H**-Home Assignment; **P**-Presentation; **V**-Viva; **Q**-Quiz; **A**- Attendance; **EE**-End Session Exam



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Text & References:

Text:

- Belkin, G.S. (1998). Introduction to Counselling; W.C.: Brown Publishers
- Nelson, J. (1982). The Theory and Practice of Counselling Psychology; New York: Holt Rinehart & Winston.
- Ben, N. Ard, Jr. (Ed.) (1997). Counselling and Psychotherapy: Classics on Theories and Issues; Science and Behaviour Books Co.
- Brammer, L.M. & Shostrom, E.L. (1977). Therapeutic psychology: Fundamentals of Counselling Psychotherapy (3rd Ed.). Englewood Cliffs: Prentice Hall

References:

- Udupa, K.N. (1985). Stress and its Management by Yoga; Delhi: MotiLalBansari Das.
- Windy, D. (1988) (ed.). Counselling in Action; New York: Sage Publication.



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PSYCHOLOGICAL PRACTICAL-VI

Course Code: PSY2602

Credit Units: 03

Course Objective:

- To give practical experience to the students in administering and scoring psychological tests and interpreting the scores.
- To acquaint the students with the basic procedure and design of psychology experiments.
- To familiarize the students with the use of elementary statistical techniques
- To encourage and guide the students to undertake a small-scale research project.

Note: Total 5 practicals will be conducted in the sixth semester among the list of following practicals out of which first three practicals are compulsory.

Course Content:

1	Multidimensional Anxiety Questionnaire(MAQ)	Anxiety
2	College Adjustment Scale(CAS)	Adjustment
3	Career Attitude And Strategies Inventory(CASI)	Career Attitude
4	Educational Assessment Checklist For Children With Intellectual Disability(EACCID)	Child Disability
5	Sensory Processing Measure(SPM)	Sensation
6	Self Esteem Index(SEI)	Self Esteem

Examination Scheme:

Components	A	File Demonstration	Viva	EE
Weightage (%)	5	35	35	25

Text & References:

- Mohsin, S. M.:Experiments in Psychology. MotilalBanarasidas
- Woodworth, R.S.:Experimental Psychology. Oxford & IBH & Schlosberg, H. Publishing
- Postman, L. &Egan, J. P.: Experimental Psychology: An Introduction.Harper and Row



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DISSERTATION (BASED ON CLINICAL PSYCHOLOGY)

Course Code: PSY2637

Credit Units: 09

Course Objective:

- To enable the students with the practical exposure in their core area of interest (Corporate Sector, NGOs, Hospitals etc.), which in turn will be the pathway to their personal and professional training.
- It will also help students to develop report writing skills.

Duration: Four Months (Jan. - April)

Methodology:

Students get opportunity in diversified Institutes e.g. Corporate Sector, Schools, NGOs and Hospitals. They will be guided by an internal and external supervisor. Students will submit their reports after **90 Hrs of Fieldwork (15 days* 6hrs per day)**, with their supervised daily reporting, at the end of the academic year. **The days for fieldwork are two days in a week including Saturday.** The student will submit the Log Sheet to their internal supervisor on every Monday.

Examination Scheme:

Internal Faculty Interaction	20 Marks
Feedback from External Supervisor	20 Marks
Viva Voce	30 Marks
Report Writing	30 Marks
Total	100 Marks



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PSYCHOLOGY OF CHILDREN WITH SPECIAL NEEDS

Course Code: PSY2603

Credit Units: 03

Course Objective:

To enable students to understand and apply concepts of psychology to the development of education of challenged and gifted students

Course Contents:

Module I: Children with mild differences in behavior & learning

Children with Speech & Learning Disabilities
Children with Learning Disabilities
Children with Intellectual Disabilities
Children and youth with behavior disorders
Children who are Gifted, Creative and Talented

Module II: Children with Sensory Impairments

Children and youth with Hearing Impairments
Children with Visual Impairments

Module III: Children with Low Incidence Disabilities

Children with Special Health Care Needs
Children with Neurological Disabilities
Children with Pervasive Developmental Disorders
Children with Severe & Multiple Disabilities

Module IV: Interventions with Infants, Preschoolers, young adults and families

Module V: Special Education across the Life Span

Early Childhood Special Education
Transitioning to Adulthood

Module VI: Special Education- Curriculum for the Handicapped

Special Education
Individualized Education Program (IEP)
Integrated Education- Models of Integration
Inclusive Education
Community based instruction (Ecological)
Action Research- Meaning and Nature

Examination Scheme:

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	10	10	5	5	70

CT-Class Test; H-Home Assignment; P-Presentation; V-Viva; Q-Quiz; A-Attendance; EE-End Session Exam

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Text & References:

Text:

- Panda K.C., Education of Exceptional Children
- Pillai M.G., Exceptional Children- Causes & Assessment
- Prasad S.B., Special Education

References:

- Horn, John Louis: The Education of Exceptional Children
 - Robert T. Brown; Cecil R. Reynolds. Psychological perspectives on childhood exceptionality: a handbook (Edition: 99)



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PSYCHOLOGY OF EXCEPTIONAL AND GIFTED CHILDREN

Course Code: PSY2604

Credit Units: 03

Course Objective:

The major goal of this course is for the student to gain an awareness, knowledge and understanding of the complexity of the exceptional child.

Course Contents:

Module I: Foundations of Special Education

Introduction to children who are exceptional

Issues and trends in special education

Risk factors & children at risk

Collaborating with parents & families

Module II: Special Education- Curriculum for the Gifted

Approaches to curriculum

Differentiated curriculum

Enrichment approaches

- Interdisciplinary instruction
- Independent Study
- Mentorship Programs
- Internship
- Enrichment triad/revolving door model
- Curriculum compacting programs

Acceleration approach

- Advanced placement
- Ability grouping
- Individualized instruction

Module III: Identify and discuss Individualized Educational Plans

Developing, Implementation & Assessment, Implications for curriculum development

Module IV: Critical Attitudes towards Special Children & Youth prior to 20th century

Legislation & litigation concerning the Education of Special Children

Disability Act, 1995

An overview of different organizations working for Exceptional Children

Categories of Exceptionality and the effects of labeling

Module V: Attitudes, Expectations and Alternative Approaches in teaching Special Children

Mainstreaming, Integration, Inclusion, Special Services

Dealing with teachers, parents, Special students & Non-handicapped Students

Module VI: Instructional Planning for each of the Exceptionality

Developing appropriate instructional strategies for use with each of the Exceptionalities

Modification of given instructional units to meet the needs of students with each of the Exceptionalities

Development of a management plan for working with Special students within the regular classroom

Examination Scheme:

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	10	10	5	5	70

CT-Class Test; **H**-Home Assignment; **P**-Presentation-Viva; **Q**-Quiz; **A**- Attendance; **EE**-End Session Exam

Text & References**Text:**

- Panda K.C. Education of Exceptional Children
- Pillai M.G. Exceptional Children- Causes & Assessment
- Prasad S.B. Special Education

References:

- Horn, John Louis: The Education of Exceptional Children
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SCIENTIFIC RESEARCH PAPER-II

Course Code: PSY2605

Credit Units: 03

Course Objective:

The research article or scientific papers for Masters Students is to enhance the reading and writing habits of the students and to make them aware about the process of carrying out a research work. This helps them to develop insight into the course they are studying which creates an academic interest among the students. Presentation of the term paper plays an important role as it facilitates knowledge sharing and improvement in presentation skills which will further enhance the confidence of the students. The overall objective of this term paper is to develop research orientations in students and to make them understand and enhance skills in Research Methodology.

Guidelines for Research Article or Scientific Papers:

- Topic :-
- Introduction :-
- Review Research :-
- Objective
- Methodology
- Discussion
- Conclusion :-
- References & Bibliography:-

No. of pages in the compilation of the paper 25-30 (minimum 25 pages)

Examination Scheme:

Components	Compilation	Viva	Presentation
Weightage (%)	50	25	25



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PROJECT (WITH PRESENTATION & EVALUATION)

Course code: PSY2632

Credit Units: 03

Objectives:

The aim of the project is to provide the students with an opportunity to further their intellectual and personal development in the chosen field by undertaking a significant practical unit of activity. The project can be defined as a scholarly inquiry into a problem or issues, involving a systematic approach to gathering and analysis of information / data, leading to production of a structured report.

Chapter Scheme and distribution of marks:

Chapter 1: Introduction – 10 marks

Chapter 2: Conceptual Framework/ National/International Scenario – 25 marks

Chapter 3: Presentation, Analysis & Findings -- 25 marks

Chapter 4: Conclusion & Recommendations -- 10 marks

Chapter 5: Bibliography -- 05 marks

Project Report	Power Point Presentation & Viva
75 marks	25 marks

Components of a Project Report

The outcome of Project Work is the Project Report. A project report should have the following components:

1) Cover Page: This should contain the title of the project proposal, to whom it is submitted, for which degree, the name of the author, name of the supervisor, year of submission of the project work, name of the University.

2) Acknowledgement: Various organizations and individuals who might have provided assistance /co-operation during the process of carrying out the study.

3) Table of Content: Page-wise listing of the main contents in the report, i.e., different Chapters and its main Sections along with their page numbers.

4) Body of the Report: The body of the report should have these four logical divisions

a) **Introduction:** This will cover the background, rationale/ need / justification, brief review of literature, objectives, methodology (the area of the study, sample, type of study, tools for data collection, and method of analysis), Limitations of the Study, and Chapter Planning.

b) **Conceptual Framework / National and International Scenario:** (relating to the topic of the Project).

c) **Presentation of Data, Analysis and Findings:**(using the tools and techniques mentioned in the methodology).

d) **Conclusion and Recommendations:** In this section, the concluding observations based on the main findings and suggestions are to be provided.

5) Bibliography or References: This section will include the list of books and articles which have been used in the project work, and in writing a project report.

6) Annexure: Questionnaires (if any), relevant reports, etc.

(The main text of the Project should normally be in the range of 5000 words. However, there may be annexure in addition to the main text)

The Steps of a Project Report

Step I : Selection of the topic for the project by taking following points into consideration:

- Suitability of the topic.
- Relevance of the topic
- Time available at the disposal.
- Feasibility of data collection within the given time limit.
- Challenges involved in the data collection (time & cost involved in the data collection, possibility of getting responses, etc.)

Step II: Finalisation of the Topic and preparation of Project Proposal in consultation with the Supervisor.

Step III: Collection of information and data relating to the topic and analysis of the same.

Step IV: Writing the report dividing it into suitable chapters, viz.,

Chapter 1: Introduction,

Chapter 2: Conceptual Framework / National & International Scenario,

Chapter 3: Analysis & Findings

Chapter 4: Conclusion and Recommendations.

Step V: The following documents are to be attached with the Final Project Report.

- 1) Approval letter from the supervisor (Annexure-IA)
- 2) Student's declaration (Annexure-IB)
- 3) Certificate from the Competent Authority of the Organisation / Institution, if the student undertakes the Project Work in any Organisation / Institution.

Guidelines for Evaluation:

- Each of the students has to undertake a Project individually under the supervision of a teacher and to submit the same following the guidelines stated below.
- Language of Project Report and Viva-Voce Examination may be English. The Project Report must be typed and hard bound.
- Failure to submit the Project Report or failure to appear at the Viva-voce Examination will be treated as "Absent" in the Examination. He /she has to submit the Project Report and appear at the Viva-Voce Examination in the subsequent years (within the time period as per University Rules).
- No marks will be allotted on the Project Report unless a candidate appears at the Viva-Voce Examination. Similarly, no marks will be allotted on Viva-Voce Examination unless a candidate submits his/her Project Report.
- Evaluation of the Project Work to be done jointly by one internal expert and one external expert with equal weightage, i.e., average marks of the internal and external experts will be allotted to the candidate.



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BEHAVIOURAL SCIENCE - COURSES BEING OFFERED IN VARIOUS PROGRAMMES



Achieving Academic Excellence

Programme Structure Curriculum & Scheme of Examination



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PROGRAMME STRUCTURE OF BEHAVIOURAL SCIENCE COURSES BEING OFFERED IN VARIOUS PROGRAMMES

UNDERGRADUATE -4 YEAR PROGRAMMES AND UNDERGRADUATE –INTEGRATED LAW PROGRAMMES (BA LLB, B.COM LLB & BBA LLB)

Semester	Course Code	Course Title	Lectures (L) Hours per week	Tutorial (T) Hours per week	Practical (P) Hours per week	Total Credits
1	BEH2151	Understanding Self for Effectiveness	1	-	-	1
2	BEH2251	Problem Solving and Creative Thinking	1	-	-	1
3	BEH2351	Group Dynamics and Team Building	1	-	-	1
4	BEH2451	Stress and Coping Strategies	1	-	-	1
5	BEH2552	Personality, Nationalism and Human Values	1	-	-	1
6	BEH2652	Interpersonal Communication	1	-	-	1
7	BEH2751	Relationship Management	1	-	-	1
8	BEH2851	Personal & Professional Excellence	1	-	-	1

UNDERGRADUATE -3YEAR PROGRAMMES

Semester	Course Code	Course Title	Lectures (L) Hours per week	Tutorial (T) Hours per week	Practical (P) Hours per week	Total Credits
1	BEH2151	Understanding Self for Effectiveness	1	-	-	1
2	BEH2251	Problem Solving and Creative Thinking	1	-	-	1
3	BEH2351	Group Dynamics and Team Building	1	-	-	1
4	BEH2451	Stress and Coping Strategies	1	-	-	1
5	BEH2551	Individual, Society and Nations	1	-	-	1
6	BEH2651	Interpersonal Communication and Relationship Management	1	-	-	1

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POSTGRADUATE PROGRAMMES


Semester	Course Code	Course Title	Lectures (L) Hours per week	Tutorial (T) Hours per week	Practical (P) Hours per week	Total Credits
1	BEH4151	Self-Development and Interpersonal Skills	1	-	-	1
2	BEH4251	Behavioural Communication and Relationship Management	1	-	-	1
3	BEH4351	Leading Through Teams	1	-	-	1
4	BEH4451	Professional Excellence	1	-	-	1

INTEGRATED PROGRAMMES (UNDERGRADUATE-POSTGRADUATE)

Semester	Course Code	Course Title	Lectures (L) Hours per week	Tutorial (T) Hours per week	Practical (P) Hours per week	Total Credits
1	BEH2151	Understanding Self for Effectiveness	1	-	-	1
2	BEH2251	Problem Solving and Creative Thinking	1	-	-	1
3	BEH2351	Group Dynamics and Team Building	1	-	-	1
4	BEH2451	Stress and Coping Strategies	1	-	-	1
5	BEH2551	Individual, Society and Nations	1	-	-	1
6	BEH2651	Interpersonal Communication and Relationship Management	1	-	-	1
7	BEH4151	Self-Development and Interpersonal Skills	1	-	-	1
8	BEH4451	Professional Excellence	1	-	-	1
9	BEH4351	Leading Through Teams	1	-	-	1



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SYLLABUS-UNDERGRADUATE-4 YEAR PROGRAMMES & UNDERGRADUATE- INTEGRATED LAW PROGRAMMES (BA LLB, B.COM LLB & BBA LLB)

Syllabus - First Semester

UNDERSTANDING SELF FOR EFFECTIVENESS

Course Code: BEH2151

Credit Units: 01

Course Objective:

This course aims at imparting:

- Understanding self & process of self exploration
- Learning strategies for development of a healthy self esteem
- Importance of attitudes and its effective on personality
- Building Emotional Competence

Course Contents:

Module I: Self: Core Competency

Understanding of Self

Components of Self – Self identity

Self concept

Self confidence

Self image

Module II: Techniques of Self Awareness

Exploration through Johari Window

Mapping the key characteristics of self

Framing a charter for self

Stages – self awareness, self acceptance and self realization

Module III: Self Esteem & Effectiveness

Meaning and Importance

Components of self esteem

High and low self esteem

Measuring your self esteem

Module IV: Building Positive Attitude

Meaning and nature of attitude

Components and Types of attitude

Importance and relevance of attitude

Module V: Building Emotional Competence

Emotional Intelligence – Meaning, components, Importance and Relevance

Positive and Negative emotions

Healthy and Unhealthy expression of emotions

Module VI: End-of-Semester Appraisal

Viva based on personal journal

Assessment of Behavioural change as a result of training

Exit Level Rating by Self and Observer

Examination Scheme: Total Internal (100)

Components	SAP	Journal for Success (JOS)	A	Mid Term Test / CT / Assignment	VIVA / Presentation
Weightage (%)	25	10	5	30	30

SAP: Social Awareness Programme, A: Attendance, CT: Class Test

Text & References:

- Organizational Behaviour, Davis, K.
- Hoover, Judhith D. Effective Small Group and Team Communication, 2002, Harcourt College Publishers
- Dick, McCann & Margerison, Charles: Team Management, 1992 Edition, viva books
- Bates, A. P. and Julian, J.: Sociology - Understanding Social Behaviour
- Dressler, David and Cans, Donald: The Study of Human Interaction
- Lapiere, Richard. T – Social Change
- Lindzey, G. and Borgatta, E: Sociometric Measurement in the Handbook of Social Psychology, Addison – Welsley, US.
- Rose, G.: Oxford Textbook of Public Health, Vol.4, 1985.
- LaFasto and Larson: When Teams Work Best, 2001, Response Books (Sage), New Delhi
- J William Pfeiffer (ed.) Theories and Models in Applied Behavioural Science, Vol 2, Group (1996); Pfeiffer & Company
- Smither Robert D.; The Psychology of Work and Human Performance, 1994, Harper Collins College Publishers



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Syllabus – Second Semester

PROBLEM SOLVING AND CREATIVE THINKING

Course Code: BEH2251

Credit Units: 01

Course Objective:

To enable the students:

- Understand the process of problem solving and creative thinking.
- Facilitation and enhancement of skills required for decision-making.

Course Contents:

Module I: Thinking as a tool for Problem Solving

What is thinking: The Mind/Brain/Behaviour

Critical Thinking and Learning:

- Making Predictions and Reasoning
- Memory and Critical Thinking
- Emotions and Critical Thinking

Thinking skills

Module II: Hindrances to Problem Solving Process

Perception

Expression

Emotion

Intellect

Work environment

Module III: Problem Solving Process

Recognizing and Defining a problem

Analyzing the problem (potential causes)

Developing possible alternatives

Evaluating Solutions

Resolution of problem

Implementation

Barriers to problem solving:

- Perception
- Expression
- Emotion
- Intellect
- Work environment

Module IV: Plan of Action

Construction of POA

Monitoring

Reviewing and analyzing the outcome

Module V: Creative Thinking

Definition and meaning of creativity

The nature of creative thinking

- Convergent and Divergent thinking

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- Idea generation and evaluation (Brain Storming)
- Image generation and evaluation
- Debating

The six-phase model of Creative Thinking: ICEDIP model

Module VI: End-of-Semester Appraisal

Viva based on personal journal

Assessment of Behavioural change as a result of training

Exit Level Rating by Self and Observer

Examination Scheme: Total Internal (100)

Components	SAP	Journal for Success (JOS)	A	Mid Term Test / CT / Assignment	VIVA / Presentation
Weightage (%)	25	10	5	30	30

SAP: Social Awareness Programme, A: Attendance, CT: Class Test

Text & References:

- Michael Steven: How to be a better problem solver, Kogan Page, New Delhi, 1999
- Geoff Petty: How to be better at creativity; Kogan Page, New Delhi, 1999
- Richard Y. Chang and P. Keith, Kelly: Wheeler Publishing, New Delhi, 1998.
- Phil Lowe Koge Page: Creativity and Problem Solving, New Delhi, 1996
- J William Pfeiffer (ed.) Theories and Models in Applied Behavioural Science, Vol 3, Management (1996); Pfeiffer & Company
- Bensley, Alan D.: Critical Thinking in Psychology – A Unified Skills Approach, (1998), Brooks/Cole Publishing Company.



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Syllabus – Third Semester

GROUP DYNAMICS AND TEAM BUILDING

Course Code: BEH2351

Credit Units: 01

Course Objective:

To inculcate in the students an elementary level of understanding of group/team functions.
To develop team spirit and to know the importance of working in teams.

Course Contents:

Module I: Group formation

Definition and Characteristics
Importance of groups
Classification of groups
Stages of group formation
Benefits of group formation

Module II: Group Functions

External Conditions affecting group functioning: Authority, Structure, Org. Resources, Organizational policies etc.
Internal conditions affecting group functioning: Roles, Norms, Conformity, Status, Cohesiveness, Size, Inter group conflict.
Group Cohesiveness and Group Conflict
Adjustment in Groups

Module III: Teams

Meaning and nature of teams
External and internal factors effecting team
Building Effective Teams
Consensus Building
Collaboration

Module IV: Leadership

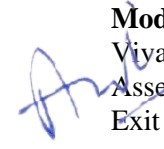
Meaning, Nature and Functions
Self leadership
Leadership styles in organization
Leadership in Teams

Module V: Power to empower: Individual and Teams

Meaning and Nature
Types of power
Relevance in organization and Society

Module VI: End-of-Semester Appraisal

Viva based on personal journal
Assessment of Behavioural change as a result of training
Exit Level Rating by Self and Observer


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Examination Scheme: Total Internal (100)

Components	SAP	Journal for Success (JOS)	A	Mid Term Test / CT / Assignment	VIVA / Presentation
Weightage (%)	25	10	5	30	30

SAP: Social Awareness Programme, A: Attendance, CT: Class Test

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- Organizational Behaviour, Davis, K.
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- Dick, McCann & Margerison, Charles: Team Management, 1992 Edition, viva books.
- Bates, A. P. and Julian, J.: Sociology - Understanding Social Behaviour.
- Dressers, David and Cans, Donald: The Study of Human Interaction.
- Lapiere, Richard. T – Social Change.
- Lindzey, G. and Borgatta, E: Sociometric Measurement in the Handbook of Social Psychology, Addison – Welsley, US.
- Rose, G.: Oxford Textbook of Public Health, Vol.4, 1985.
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Syllabus - Fourth Semester

STRESS AND COPING STRATEGIES

Course Code: BEH2451

Credit Units: 01

Course Objective:

To develop an understanding the concept of stress its causes, symptoms and consequences.

To develop an understanding the consequences of the stress on one's wellness, health, and work performance.

Course Contents:

Module I: Stress

Meaning & Nature

Characteristics

Types of stress

Module II: Stages and Models of Stress

Stages of stress

The physiology of stress

Stimulus-oriented approach.

Response-oriented approach.

The transactional and interactional model

Pressure – environment fit model of stress

Module III: Causes and symptoms of stress

Personal

Organizational

Environmental

Module IV: Consequences of stress

Effect on behaviour and personality

Effect of stress on performance

Individual and Organizational consequences with special focus on health

Module V: Strategies for stress management

Importance of stress management

Healthy and Unhealthy strategies

Peer group and social support

Happiness and well-being

Module VI: End-of-Semester Appraisal

Viva based on personal journal

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Exit Level Rating by Self and Observer


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Examination Scheme: Total Internal (100)

Components	SAP	Journal for Success (JOS)	A	Mid Term Test / CT / Assignment	VIVA / Presentation
Weightage (%)	25	10	5	30	30

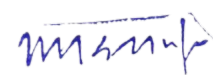
SAP: Social Awareness Programme, A: Attendance, CT: Class Test

Text & References:

- Blonna, Richard; Coping with Stress in a Changing World: Second edition
- Pestonjee, D.M, Pareek, Udai, Agarwal Rita; Studies in Stress And its Management
- Pestonjee, D.M.; Stress and Coping: The Indian Experience
- Clegg, Brian; Instant Stress Management – Bring calm to your life now



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Syllabus – Fifth Semester

PERSONALITY, NATIONALISM AND HUMAN VALUES

Course Code: BEH2552

Credit Units: 01

Course Objective:

This course aims at enabling students towards:

Understand the importance of individual differences

Better understanding of self in relation to society and nation

Facilitation for a meaningful existence and adjustment in society

Inculcating patriotism and national pride

Course Contents:

Module I: Individual differences & Personality

Personality: Definition & Relevance

Importance of nature & nurture in Personality Development

Importance and Recognition of Individual differences in Personality

Accepting and Managing Individual differences (adjustment mechanisms)

Intuition, Judgement, Perception & Sensation (MBTI)

BIG5 Factors

Module II: Managing Diversity

Defining Diversity

Affirmation Action and Managing Diversity

Increasing Diversity in Work Force

Barriers and Challenges in Managing Diversity

Module III: Socialization

Nature of Socialization

Social Interaction

Interaction of Socialization Process

Contributions to Society and Nation

Module IV: Patriotism and National Pride

Sense of pride and patriotism

Importance of discipline and hard work

Integrity and accountability

Module V: Human Rights, Values and Ethics

Meaning and Importance of human rights

Human rights awareness

Values and Ethics- Learning based on project work on Scriptures like- Ramayana, Mahabharata, Gita etc.

Module VI: End-of-Semester Appraisal

Viya based on personal journal

Assessment of Behavioural change as a result of training

Exit Level Rating by Self and Observer

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Examination Scheme: Total Internal (100)

Components	SAP	Journal for Success (JOS)	A	Mid Term Test / CT / Assignment	VIVA / Presentation
Weightage (%)	25	10	5	30	30

SAP: Social Awareness Programme, A: Attendance, CT: Class Test

Text & References:

- Davis, K. Organizational Behaviour,
- Bates, A. P. and Julian, J.: Sociology - Understanding Social Behaviour
- Dressler, David and Cans, Donald: The Study of Human Interaction
- Lapiere, Richard. T – Social Change
- Lindzey, G. and Borgatta, E: Sociometric Measurement in the Handbook of Social Psychology, Addison – Welsley, US.
- Rose, G.: Oxford Textbook of Public Health, Vol.4, 1985.
- Robbins O.B.Stephen;. Organizational Behaviour



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Syllabus – Sixth Semester

INTERPERSONAL COMMUNICATION

Course Code: BEH2652

Credit Units: 01

Course Objective:

This course provides practical guidance on

- Enhancing personal effectiveness and performance through effective interpersonal communication
- Enhancing their conflict management and negotiation skills

Course Contents:

Module I: Interpersonal Communication: An Introduction

Importance of Interpersonal Communication

Types – Self and Other Oriented

Rapport Building – NLP, Communication Mode

Steps to improve Interpersonal Communication

Module II: Behavioural Communication

Meaning and Nature of behavioural communication

Persuasion, Influence, Listening and Questioning

Guidelines for developing Human Communication skills

Relevance of Behavioural Communication for personal and professional development

Module III: Interpersonal Styles

Transactional Analysis

Life Position/Script Analysis

Games Analysis

Interactional and Transactional Styles

Module IV: Conflict Management

Meaning and nature of conflicts

Styles and techniques of conflict management

Conflict management and interpersonal communication

Module V: Negotiation Skills

Meaning and Negotiation approaches (Traditional and Contemporary)

Process and strategies of negotiations

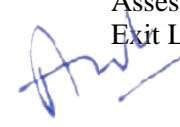
Negotiation and interpersonal communication

Module VI: End-of-Semester Appraisal

Viva based on personal journal

Assessment of Behavioural change as a result of training

Exit Level Rating by Self and Observer


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Examination Scheme: Total Internal (100)

Components	SAP	Journal for Success (JOS)	A	Mid Term Test / CT / Assignment	VIVA / Presentation
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Syllabus – Seventh Semester

RELATIONSHIP MANAGEMENT

Course Code: BEH2751

Credit Units: 01

Course Objective:

- To understand the basis of interpersonal relationship
- To understand various communication style
- To learn the strategies for effective interpersonal relationship

Course Contents:

Module I: Understanding Relationships

- Importance of relationships
- Role and relationships
- Maintaining healthy relationships

Module II: Bridging Individual Differences

- Understanding individual differences
- Bridging differences in Interpersonal Relationship – TA
- Communication Styles

Module III: Interpersonal Relationship Development

- Importance of Interpersonal Relationships
- Interpersonal Relationships Skills
- Types of Interpersonal Relationships

Module IV: Theories of Interpersonal Relationships

- Theories: Social Exchange, Uncertainty Reduction Theory
- Factors Affecting Interpersonal Relationships
- Improving Interpersonal Relationships

Module V: Impression Management

- Meaning & Components of Impression Management
- Impression Management Techniques (Influencing Skills)
- Impression Management Training-Self help and Formal approaches

Module VI: End-of-Semester Appraisal

- Viva based on personal journal
- Assessment of Behavioural change as a result of training
- Exit Level Rating by Self and Observer



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Syllabus – Eighth Semester

PERSONAL AND PROFESSIONAL EXCELLENCE

Course Code: BEH2851

Credit Units: 01

Course Objective:

Importance of Personal and Professional excellence
Inculcating the components of excellence

Course Contents:

Module I: Components of Excellence

Personal Excellence:

Identifying long-term choices and goals

Uncovering the talent, strength & style

Analyzing choke points in your personal processes by analysis in area of placements, events, seminars, conference, extracurricular activities, projects etc.

Module II: Managing Personal Effectiveness

Setting goals to maintain focus

Dimensions of personal effectiveness (self disclosure, openness to feedback and perceptiveness)

Integration of personal and organizational vision for effectiveness

A healthy balance of work and play

Managing Stress creatively and productively

Module III: Personal Success Strategy

Time management

Handling criticism and interruptions

Dealing with difficult people

Mapping and evaluating the situations

Identifying long-term goals

Module IV: Positive Personal Growth

Understanding & Developing positive emotions

Positive approach towards future

Resilience during loss and challenge

Module V: Professional Success

Building independence & interdependence

Reducing resistance to change

Continued reflection (Placements, events, seminars, conferences, projects extracurricular Activities etc.)

Module VI: End-of-Semester Appraisal

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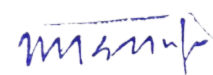
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Text & References:

- Dr. Michael J. Provitera: Mastering Self-Motivation: Preparing Yourself for Personal Excellence
- George Leonard: Mastery: The keys to success and long-term fulfillment.
- Arlene R. Barro: Win Without Competing! Career Success the Right Fit Way



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SYLLABUS - UNDERGRADUATE-3 YEAR PROGRAMMES

Syllabus - First Semester

UNDERSTANDING SELF FOR EFFECTIVENESS

Course Code: BEH2151

Credit Units: 01

Course Objective:

This course aims at imparting:

- Understanding self & process of self exploration
- Learning strategies for development of a healthy self esteem
- Importance of attitudes and its effective on personality
- Building Emotional Competence

Course Contents:

Module I: Self: Core Competency

Understanding of Self

Components of Self – Self identity

Self concept

Self confidence

Self image

Module II: Techniques of Self Awareness

Exploration through Johari Window

Mapping the key characteristics of self

Framing a charter for self

Stages – self awareness, self acceptance and self realization

Module III: Self Esteem & Effectiveness

Meaning and Importance

Components of self esteem

High and low self esteem

Measuring your self esteem

Module IV: Building Positive Attitude

Meaning and nature of attitude

Components and Types of attitude

Importance and relevance of attitude

Module V: Building Emotional Competence

Emotional Intelligence – Meaning, components, Importance and Relevance

Positive and Negative emotions

Healthy and Unhealthy expression of emotions

Module VI: End-of-Semester Appraisal

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- Lapiere, Richard. T – Social Change
- Lindzey, G. and Borgatta, E: Sociometric Measurement in the Handbook of Social Psychology, Addison – Welsley, US.
- Rose, G.: Oxford Textbook of Public Health, Vol.4, 1985.
- LaFasto and Larson: When Teams Work Best, 2001, Response Books (Sage), New Delhi
- J William Pfeiffer (ed.) Theories and Models in Applied Behavioural Science, Vol 2, Group (1996); Pfeiffer & Company
- Smither Robert D.; The Psychology of Work and Human Performance, 1994, Harper Collins College Publishers



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Syllabus – Second Semester

PROBLEM SOLVING AND CREATIVE THINKING

Course Code: BEH2251

Credit Units: 01

Course Objective:

To enable the students:

- Understand the process of problem solving and creative thinking.
- Facilitation and enhancement of skills required for decision-making.

Course Contents:

Module I: Thinking as a tool for Problem Solving

What is thinking: The Mind/Brain/Behaviour

Critical Thinking and Learning:

- Making Predictions and Reasoning
- Memory and Critical Thinking
- Emotions and Critical Thinking

Thinking skills

Module II: Hindrances to Problem Solving Process

Perception

Expression

Emotion

Intellect

Work environment

Module III: Problem Solving Process

Recognizing and Defining a problem

Analyzing the problem (potential causes)

Developing possible alternatives

Evaluating Solutions

Resolution of problem

Implementation

Barriers to problem solving:

- Perception
- Expression
- Emotion
- Intellect
- Work environment

Module IV: Plan of Action

Construction of POA

Monitoring

Reviewing and analyzing the outcome

Module V: Creative Thinking

Definition and meaning of creativity

The nature of creative thinking

- Convergent and Divergent thinking

- Idea generation and evaluation (Brain Storming)
- Image generation and evaluation
- Debating

The six-phase model of Creative Thinking: ICEDIP model

Module VI: End-of-Semester Appraisal

Viva based on personal journal

Assessment of Behavioural change as a result of training

Exit Level Rating by Self and Observer

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Text & References:

- Michael Steven: How to be a better problem solver, Kogan Page, New Delhi, 1999
- Geoff Petty: How to be better at creativity; Kogan Page, New Delhi, 1999
- Richard Y. Chang and P. Keith, Kelly: Wheeler Publishing, New Delhi, 1998.
- Phil Lowe Koge Page: Creativity and Problem Solving, New Delhi, 1996
- J William Pfeiffer (ed.) Theories and Models in Applied Behavioural Science, Vol 3, Management (1996); Pfeiffer & Company
- Bensley, Alan D.: Critical Thinking in Psychology – A Unified Skills Approach, (1998), Brooks/Cole Publishing Company.



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Syllabus – Third Semester

GROUP DYNAMICS AND TEAM BUILDING

Course Code: BEH2351

Credit Units: 1

Course Objective:

To inculcate in the students an elementary level of understanding of group/team functions.
To develop team spirit and to know the importance of working in teams.

Course Contents:

Module I: Group formation

Definition and Characteristics
Importance of groups
Classification of groups
Stages of group formation
Benefits of group formation

Module II: Group Functions

External Conditions affecting group functioning: Authority, Structure, Org. Resources, Organizational policies etc.
Internal conditions affecting group functioning: Roles, Norms, Conformity, Status, Cohesiveness, Size, Inter group conflict.
Group Cohesiveness and Group Conflict
Adjustment in Groups

Module III: Teams

Meaning and nature of teams
External and internal factors effecting team
Building Effective Teams
Consensus Building
Collaboration

Module IV: Leadership

Meaning, Nature and Functions
Self leadership
Leadership styles in organization
Leadership in Teams

Module V: Power to empower: Individual and Teams

Meaning and Nature
Types of power
Relevance in organization and Society

Module VI: End-of-Semester Appraisal

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Syllabus – Fourth Semester

STRESS AND COPING STRATEGIES

Course Code: BEH2451

Credit Units: 01

Course Objective:

To develop an understanding the concept of stress its causes, symptoms and consequences.

To develop an understanding the consequences of the stress on one's wellness, health, and work performance.

Course Contents:

Module I: Stress

Meaning & Nature

Characteristics

Types of stress

Module II: Stages and Models of Stress

Stages of stress

The physiology of stress

Stimulus-oriented approach.

Response-oriented approach.

The transactional and interact ional model.

Pressure – environment fit model of stress.

Module III: Causes and symptoms of stress

Personal

Organizational

Environmental

Module IV: Consequences of stress

Effect on behaviour and personality

Effect of stress on performance

Individual and Organizational consequences with special focus on health

Module V: Strategies for stress management

Importance of stress management

Healthy and Unhealthy strategies

Peer group and social support

Happiness and well-being

Module VI: End-of-Semester Appraisal

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Examination Scheme: Total Internal (100)

Components	SAP	Journal for Success (JOS)	A	Mid Term Test / CT / Assignment	VIVA / Presentation
Weightage (%)	25	10	5	30	30

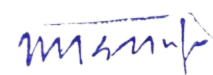
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Text & References:

- Blonna, Richard; Coping with Stress in a Changing World: Second edition
- Pestonjee, D.M, Pareek, Udai, Agarwal Rita; Studies in Stress And its Management
- Pestonjee, D.M.; Stress and Coping: The Indian Experience
- Clegg, Brian; Instant Stress Management – Bring calm to your life now



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Syllabus – Fifth Semester

INDIVIDUAL, SOCIETY AND NATIONS

Course Code: BEH2551

Credit Units: 01

Course Objective:

This course aims at enabling students towards:

- Understand the importance of individual differences
- Better understanding of self in relation to society and nation
- Facilitation for a meaningful existence and adjustment in society
- To inculcate patriotism and National pride.
- To enhance personal and professional excellence

Course Contents:

Module I: Individual differences& Personality

Personality: Definition& Relevance

Importance of nature & nurture in Personality Development

Importance and Recognition of Individual differences in Personality

Accepting and Managing Individual differences (Adjustment Mechanisms)

Intuition, Judgment, Perception & Sensation (MBTI)

BIG5 Factors

Module II: Socialization

Nature of Socialization

Social Interaction

Interaction of Socialization Process

Contributions to Society & Nation

Module III: Patriotism and National Pride

Sense of Pride and Patriotism

Importance of Discipline and hard work

Integrity and accountability

Module IV: Human Rights, Values and Ethics

Meaning of Human Rights

Human Rights Awareness

Importance of human rights

Values and Ethics- Learning based on project work on Scriptures like Ramayana, Mahabharata, Gitaetc

Module V: Personal and Professional Excellence

Personal excellence:

- Identifying Long-term choices and goals
- Uncovering talent, strength and style

Alan P. Rossiter's eight aspects of Professional Excellence

Resilience during challenge and loss

Continued Reflection (Placements, Events, Seminars, Conferences, Projects, Extracurricular Activities, etc.)

Module VI: End-of-Semester Appraisal

Viva based on personal journal

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Exit Level Rating by Self and Observer

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- Rose, G.: Oxford Textbook of Public Health, Vol.4, 1985.
- Robbins O.B.Stephen;. Organizational Behaviour

Syllabus – Sixth Semester

INTERPERSONAL COMMUNICATION & RELATIONSHIP MANAGEMENT

Course Code: BEH2651

Credit Units: 01

Course Objective:

This course aims at imparting an understanding of:
Interpersonal communication and relationship
Strategies for healthy interpersonal relationship
Effective management of emotions
Building interpersonal competence

Course Contents:

Module I: Interpersonal Communication

Importance of Behavioural/ Interpersonal Communication
Types – Self and Other Oriented
Rapport Building – NLP, Communication Mode
Steps to improve Interpersonal Communication

Module II: Interpersonal Styles

Transactional Analysis
Life Position/Script Analysis
Games Analysis
Interactional and Transactional Styles
Bridging differences in Interpersonal Relationship through TA
Communication Styles

Module III: Conflict Management and Negotiation

Meaning and Nature of conflicts
Styles and techniques of conflict management
Meaning of Negotiation
Process and Strategies of Negotiation
Interpersonal Communication: Conflict Management and Negotiation

Module IV: Interpersonal Relationship Development

Importance of Interpersonal Relationships
Interpersonal Relationship Skills
Types of Interpersonal Relationships
Relevance of Interpersonal Communication in Relationship Development

Module V: Impression Management

Meaning & Components of Impression Management
Impression Management Techniques
Impression Management Training-Self help and Formal approaches

Module VI: End-of-Semester Appraisal

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SYLLABUS – POSTGRADUATE PROGRAMMES

Syllabus – First Semester

SELF-DEVELOPMENT AND INTERPERSONAL SKILLS

Course Code: BEH4151

Credit Units: 01

Course Objective:

This course aims at imparting an understanding of:

Self and the process of self exploration

Learning strategies for development of a healthy self esteem

Importance of attitudes and their effect on work behaviour

Effective management of emotions and building interpersonal competence.

Course Contents:

Module I: Understanding Self

Formation of self concept

Dimension of Self

Components of self

Self Competency

Module II: Self-Esteem: Sense of Worth

Meaning and Nature of Self Esteem

Characteristics of High and Low Self Esteem

Importance & need of Self Esteem

Self esteem at work

Steps to enhance Self Esteem

Module III: Emotional Intelligence: Brain Power

Introduction to EI

Difference between IQ, EQ and SQ

Relevance of EI at workplace

Self assessment, analysis and action plan

Module IV: Managing Emotions and Building Interpersonal Competence

Need and importance of Emotions

Healthy and Unhealthy expression of emotions

Anger: Conceptualization and Cycle

Developing emotional and interpersonal competence

Self assessment, analysis and action plan

Module V: Leading Through Positive Attitude

Understanding Attitudes

Formation of Attitudes

Types of Attitudes

Effects of Attitude on
Behaviour
Perception
Motivation
Stress
Adjustment
Time Management
Effective Performance
Building Positive Attitude

Module VI: End-of-Semester Appraisal

Viva based on personal journal
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Syllabus – Second Semester

BEHAVIOURAL COMMUNICATION AND RELATIONSHIP MANAGEMENT

Course Code: BEH4251

Credit Units: 01

Course Objective:

This course aims at imparting an understanding of:

Process of Behavioural communication

Aspects of interpersonal communication and relationship

Management of individual differences as important dimension of IPR

Course Contents:

Module I: Behavioural Communication

Scope of Behavioural Communication

Process – Personal, Impersonal and Interpersonal Communication

Guidelines for developing Human Communication skills

Relevance of Behavioural Communication in relationship management

Module II: Managing Individual Differences in Relationships

Principles

Types of issues

Approaches

Understanding and importance of self disclosure

Guidelines for effective communication during conflicts

Module III: Communication Climate: Foundation of Interpersonal Relationships

Elements of satisfying relationships

Conforming and Disconfirming Communication

Culturally Relevant Communication

Guideline for Creating and Sustaining Healthy Climate

Module IV: Interpersonal Communication

Imperatives for Interpersonal Communication

Models – Linear, Interaction and Transaction

Patterns – Complementary, Symmetrical and Parallel

Types – Self and Other Oriented

Steps to improve Interpersonal Communication

Module V: Interpersonal Relationship Development

Relationship circle – Peer/ Colleague, Superior and Subordinate

Initiating and establishing IPR

Escalating, maintaining and terminating IPR

Direct and indirect strategies of terminating relationship

Model of ending relationship

Module VI: End-of-Semester Appraisal

Viva based on personal journal

Assessment of Behavioural change as a result of training

Exit Level Rating by Self and Observer

Examination Scheme: Total Internal (100)

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Syllabus – Third Semester

LEADING THROUGH TEAMS

Course Code: BEH4351

Credit Units: 01

Course Objective:

This course aims to enable students to:
Understand the concept and building of teams
Manage conflict and stress within team
Facilitate better team management and organizational effectiveness through universal human values.

Course Contents:

Module I: Teams: An Overview

Team Design Features: team vs. group
Effective Team Mission and Vision
Life Cycle of a Project Team
Rationale of a Team, Goal Analysis and Team Roles

Module II: Team & Sociometry

Patterns of Interaction in a Team
Sociometry: Method of studying attractions and repulsions in groups
Construction of sociogram for studying interpersonal relations in a Team

Module III: Team Building

Types and Development of Team Building
Stages of team growth
Team performance curve
Profiling your Team: Internal & External Dynamics
Team Strategies for organizational vision
Team communication

Module IV: Team Leadership & Conflict Management

Leadership styles in organizations
Self Authorized team leadership
Causes of team conflict
Conflict management strategies
Stress and Coping in teams

Module V: Global Teams and Universal Values

Management by values
Pragmatic spirituality in life and organization
Building global teams through universal human values
Learning based on project work on Scriptures like Ramayana, Mahabharata, Gita etc.

Module VI: End-of-Semester Appraisal

Viva based on personal journal

Assessment of Behavioural change as a result of training

Exit Level Rating by Self and Observer

Examination Scheme: Total Internal (100)

Components	SAP	Journal for Success (JOS)	A	Mid Term Test / CT / Assignment	VIVA / Presentation
Weightage (%)	25	10	5	30	30

SAP: Social Awareness Programme, A: Attendance, CT: Class Test

Text & References:

- Organizational Behaviour, Davis, K.
- Hoover, Judith D. Effective Small Group and Team Communication, 2002, Harcourt College Publishers
- LaFasto and Larson: When Teams Work Best, 2001, Response Books (Sage), New Delhi
- Dick, McCann & Magerison, Charles: Team Management, 1992 Edition, viva books
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Syllabus – Fourth Semester

PROFESSIONAL EXCELLENCE

Course Code: BEH4451

Credit Units: 01

Course Objective:

This course aims at imparting an understanding of:

Build and leverage your professional reputation

Maintain focus in pressure situations

Make a balanced choice between professional and personal commitments

Course Contents:

Module I: Individual, Society and Nation

Individual Differences and Dimensions of Personality

Socialization Process

Relating to the Nation: Values, Culture, Religion

Sense of pride and Patriotism

Managing Diversity

Module II: Components of Excellence

Personal Excellence:

Identifying long-term choices and goals

Uncovering the talent, strength & style

Analyzing choke points in your personal processes by analysis in area of placements, events, seminars, conference, extracurricular activities, projects etc.

Developing professional power: Goal-setting, time management, handling criticism, interruptions and time wasters

Module III: Career Planning

Knowing one's Interest and Aptitude

Identifying available Resources

Setting goals to maintain focus:

Developing Positive attributes in personality

Self-reliance and Employability skills

Module IV: Stress Management for Healthy Living

Meaning and Nature of Stress

Stages of stress

Causes and Consequences of stress: Personal, Organizational and Environmental

Personal Styles and strategies of coping

Module V: Professional Success

Building independence & interdependence

Reducing resistance to change

Continued reflection (Placements, events, seminars, conferences, projects extracurricular Activities etc.)


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Module VI: End-of-Semester Appraisal

Viva based on personal journal

Assessment of Behavioural change as a result of training

Exit Level Rating by Self and Observer

Examination Scheme: Total Internal (100)

Components	SAP	Journal for Success (JOS)	A	Mid Term Test / CT / Assignment	VIVA / Presentation
Weightage (%)	25	10	5	30	30

SAP: Social Awareness Programme, A: Attendance, CT: Class Test

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- Smither Robert D.; The Psychology of Work and Human Performance, 1994, Harper Collins College Publishers
- Raman, A.T. (2003) Knowledge Management: A Resource Book. Excel Books, Delhi.
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SYLLABUS - INTEGRATED PROGRAMMES (UNDERGRADUATE-POSTGRADUATE)

Syllabus – First Semester

UNDERSTANDING SELF FOR EFFECTIVENESS

Course Code: BEH2151

Credit Units: 01

Course Objective:

This course aims at imparting:

- Understanding self & process of self exploration
- Learning strategies for development of a healthy self esteem
- Importance of attitudes and its effective on personality
- Building Emotional Competence

Course Contents:

Module I: Self: Core Competency

Understanding of Self

Components of Self – Self identity

Self concept

Self confidence

Self image

Module II: Techniques of Self Awareness

Exploration through Johari Window

Mapping the key characteristics of self

Framing a charter for self

Stages – self awareness, self acceptance and self realization

Module III: Self Esteem & Effectiveness

Meaning and Importance

Components of self esteem

High and low self esteem

Measuring your self esteem

Module IV: Building Positive Attitude

Meaning and nature of attitude

Components and Types of attitude

Importance and relevance of attitude

Module V: Building Emotional Competence

Emotional Intelligence – Meaning, components, Importance and Relevance

Positive and Negative emotions

Healthy and Unhealthy expression of emotions

Module VI: End-of-Semester Appraisal

Viva based on personal journal

Assessment of Behavioural change as a result of training

Exit Level Rating by Self and Observer

Examination Scheme: Total Internal (100)

Components	SAP	Journal for Success (JOS)	A	Mid Term Test / CT / Assignment	VIVA / Presentation
Weightage (%)	25	10	5	30	30

SAP: Social Awareness Programme, A: Attendance, CT: Class Test

Text & References:

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- Dick, McCann & Margerison, Charles: Team Management, 1992 Edition, viva books
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- Dressler, David and Cans, Donald: The Study of Human Interaction
- Lapiere, Richard. T – Social Change
- Lindzey, G. and Borgatta, E: Sociometric Measurement in the Handbook of Social Psychology, Addison – Welsley, US.
- Rose, G.: Oxford Textbook of Public Health, Vol.4, 1985.
- LaFasto and Larson: When Teams Work Best, 2001, Response Books (Sage), New Delhi
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Syllabus - Second Semester

PROBLEM SOLVING AND CREATIVE THINKING

Course Code: BEH2251

Credit Units: 01

Course Objective:

To enable the students:

- Understand the process of problem solving and creative thinking.
- Facilitation and enhancement of skills required for decision-making.

Course Contents:

Module I: Thinking as a tool for Problem Solving

What is thinking: The Mind/Brain/Behaviour

Critical Thinking and Learning:

- Making Predictions and Reasoning
- Memory and Critical Thinking
- Emotions and Critical Thinking

Thinking skills

Module II: Hindrances to Problem Solving Process

Perception

Expression

Emotion

Intellect

Work environment

Module III: Problem Solving Process

Recognizing and Defining a problem

Analyzing the problem (potential causes)

Developing possible alternatives

Evaluating Solutions

Resolution of problem

Implementation

Barriers to problem solving:

- Perception
- Expression
- Emotion
- Intellect
- Work environment

Module IV: Plan of Action

Construction of POA

Monitoring

Reviewing and analyzing the outcome

Module V: Creative Thinking

Definition and meaning of creativity

The nature of creative thinking

- Convergent and Divergent thinking
- Idea generation and evaluation (Brain Storming)
- Image generation and evaluation
- Debating

The six-phase model of Creative Thinking: ICEDIP model

Module VI: End-of-Semester Appraisal

Viva based on personal journal

Assessment of Behavioural change as a result of training

Exit Level Rating by Self and Observer

Examination Scheme: Total Internal (100)

Components	SAP	Journal for Success (JOS)	A	Mid Term Test / CT / Assignment	VIVA / Presentation
Weightage (%)	25	10	5	30	30

SAP: Social Awareness Programme, A: Attendance, CT: Class Test

Text & References:

- Michael Steven: How to be a better problem solver, Kogan Page, New Delhi, 1999
- Geoff Petty: How to be better at creativity; Kogan Page, New Delhi, 1999
- Richard Y. Chang and P. Keith, Kelly: Wheeler Publishing, New Delhi, 1998.
- Phil Lowe Koge Page: Creativity and Problem Solving, New Delhi, 1996
- J William Pfeiffer (ed.) Theories and Models in Applied Behavioural Science, Vol 3, Management (1996); Pfeiffer & Company
- Bensley, Alan D.: Critical Thinking in Psychology – A Unified Skills Approach, (1998), Brooks/Cole Publishing Company.



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Syllabus – Third Semester

GROUP DYNAMICS AND TEAM BUILDING

Course Code: BEH2351

Credit Units: 01

Course Objective:

To inculcate in the students an elementary level of understanding of group/team functions.
To develop team spirit and to know the importance of working in teams.

Course Contents:

Module I: Group formation

Definition and Characteristics
Importance of groups
Classification of groups
Stages of group formation
Benefits of group formation

Module II: Group Functions

External Conditions affecting group functioning: Authority, Structure, Org. Resources, Organizational policies etc.
Internal conditions affecting group functioning: Roles, Norms, Conformity, Status, Cohesiveness, Size, Inter group conflict.
Group Cohesiveness and Group Conflict
Adjustment in Groups

Module III: Teams

Meaning and nature of teams
External and internal factors effecting team
Building Effective Teams
Consensus Building
Collaboration

Module IV: Leadership

Meaning, Nature and Functions
Self leadership
Leadership styles in organization
Leadership in Teams

Module V: Power to empower: Individual and Teams

Meaning and Nature
Types of power
Relevance in organization and Society

Module VI: End-of-Semester Appraisal

Viva based on personal journal
Assessment of Behavioural change as a result of training
Exit Level Rating by Self and Observer

Examination Scheme: Total Internal (100)

Components	SAP	Journal for Success (JOS)	A	Mid Term Test / CT / Assignment	VIVA / Presentation
Weightage (%)	25	10	5	30	30

SAP: Social Awareness Programme, A: Attendance, CT: Class Test

Text & References:

- Organizational Behaviour, Davis, K.
- Hoover, Judhith D. Effective Small Group and Team Communication, 2002, Harcourt College Publishers.
- Dick, McCann & Margerison, Charles: Team Management, 1992 Edition, viva books.
- Bates, A. P. and Julian, J.: Sociology - Understanding Social Behaviour.
- Dressers, David and Cans, Donald: The Study of Human Interaction.
- Lapiere, Richard. T – Social Change.
- Lindzey, G. and Borgatta, E: Sociometric Measurement in the Handbook of Social Psychology, Addison – Welsley, US.
- Rose, G.: Oxford Textbook of Public Health, Vol.4, 1985.
- LaFasto and Larson: When Teams Work Best, 2001, Response Books (Sage), New Delhi
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Syllabus – Fourth Semester

STRESS AND COPING STRATEGIES

Course Code: BEH2451

Credit Units: 01

Course Objective:

To develop an understanding the concept of stress its causes, symptoms and consequences.

To develop an understanding the consequences of the stress on one's wellness, health, and work performance.

Course Contents:

Module I: Stress

Meaning & Nature

Characteristics

Types of stress

Module II: Stages and Models of Stress

Stages of stress

The physiology of stress

Stimulus-oriented approach.

Response-oriented approach.

The transactional and interactional model.

Pressure – environment fit model of stress.

Module III: Causes and symptoms of stress

Personal

Organizational

Environmental

Module IV: Consequences of stress

Effect on behaviour and personality

Effect of stress on performance

Individual and Organizational consequences with special focus on health

Module V: Strategies for stress management

Importance of stress management

Healthy and Unhealthy strategies

Peer group and social support

Happiness and well-being

Module VI: End-of-Semester Appraisal

Viva based on personal journal

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Exit Level Rating by Self and Observer


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Examination Scheme: Total Internal (100)

Components	SAP	Journal for Success (JOS)	A	Mid Term Test / CT / Assignment	VIVA / Presentation
Weightage (%)	25	10	5	30	30

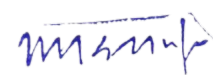
SAP: Social Awareness Programme, A: Attendance, CT: Class Test

Text & References:

- Blonna, Richard; Coping with Stress in a Changing World: Second edition
- Pestonjee, D.M, Pareek, Udai, Agarwal Rita; Studies in Stress And its Management
- Pestonjee, D.M.; Stress and Coping: The Indian Experience
- Clegg, Brian; Instant Stress Management – Bring calm to your life now



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Syllabus – Fifth Semester

INDIVIDUAL, SOCIETY AND NATIONS

Course Code: BEH2551

Credit Units: 01

Course Objective:

This course aims at enabling students towards:

- Understand the importance of individual differences
- Better understanding of self in relation to society and nation
- Facilitation for a meaningful existence and adjustment in society
- To inculcate patriotism and National pride.
- To enhance personal and professional excellence

Course Contents:

Module I: Individual differences & Personality

Personality: Definition & Relevance

Importance of nature & nurture in Personality Development

Importance and Recognition of Individual differences in Personality

Accepting and Managing Individual differences (Adjustment Mechanisms)

Intuition, Judgment, Perception & Sensation (MBTI)

BIG5 Factors

Module II: Socialization

Nature of Socialization

Social Interaction

Interaction of Socialization Process

Contributions to Society & Nation

Module III: Patriotism and National Pride

Sense of Pride and Patriotism

Importance of Discipline and hard work

Integrity and accountability

Module IV: Human Rights, Values and Ethics

Meaning of Human Rights

Human Rights Awareness

Importance of human rights

Values and Ethics- Learning based on project work on Scriptures like Ramayana, Mahabharata, Gita etc

Module V: Personal and Professional Excellence

Personal excellence:

- Identifying Long-term choices and goals
- Uncovering talent, strength and style

Alan P. Rossiter's eight aspects of Professional Excellence

Resilience during challenge and loss

Continued Reflection (Placements, Events, Seminars, Conferences, Projects, Extracurricular Activities, etc.)

Module VI: End-of-Semester Appraisal

Viva based on personal journal

Assessment of Behavioural change as a result of training

Exit Level Rating by Self and Observer

Examination Scheme: Total Internal (100)

Components	SAP	Journal for Success (JOS)	A	Mid Term Test / CT / Assignment	VIVA / Presentation
Weightage (%)	25	10	5	30	30

SAP: Social Awareness Programme, A: Attendance, CT: Class Test

Text & References:

- Bates, A. P. and Julian, J.: Sociology - Understanding Social Behaviour
- Dressler, David and Cans, Donald: The Study of Human Interaction
- Lapiere, Richard. T – Social Change
- Rose, G.: Oxford Textbook of Public Health, Vol.4, 1985.
- Robbins O.B.Stephen;. Organizational Behaviour



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Syllabus – Sixth Semester

INTERPERSONAL COMMUNICATION AND RELATIONSHIP MANAGEMENT

Course Code: BEH2651

Credit Units: 01

Course Objective:

This course aims at imparting an understanding of:
Interpersonal communication and relationship.
Strategies for healthy interpersonal relationship
Effective management of emotions.
Building interpersonal competence.

Course Contents:

Module I: Interpersonal Communication

Importance of Behavioural/ Interpersonal Communication
Types – Self and Other Oriented
Rapport Building – NLP, Communication Mode
Steps to improve Interpersonal Communication

Module II: Interpersonal Styles

Transactional Analysis
Life Position/Script Analysis
Games Analysis
Interactional and Transactional Styles
Bridging differences in Interpersonal Relationship through TA
Communication Styles

Module III: Conflict Management and Negotiation

Meaning and Nature of conflicts
Styles and techniques of conflict management
Meaning of Negotiation
Process and Strategies of Negotiation
Interpersonal Communication: Conflict Management and Negotiation

Module IV: Interpersonal Relationship Development

Importance of Interpersonal Relationships
Interpersonal Relationship Skills
Types of Interpersonal Relationships
Relevance of Interpersonal Communication in Relationship Development

Module V: Impression Management

Meaning & Components of Impression Management
Impression Management Techniques
Impression Management Training-Self help and Formal approaches

Module VI: End-of-Semester Appraisal

Viva based on personal journal

Assessment of Behavioural change as a result of training

Exit Level Rating by Self and Observer

Examination Scheme: Total Internal (100)

Components	SAP	Journal for Success (JOS)	A	Mid Term Test / CT / Assignment	VIVA / Presentation
Weightage (%)	25	10	5	30	30

SAP: Social Awareness Programme, A: Attendance, CT: Class Test

Text & References:

- Vangelist L. Anita, Mark N. Knapp, Inter Personal Communication and Human Relationships: Third Edition, Allyn and Bacon
- Julia T. Wood. Interpersonal Communication everyday encounter
- Beebe, Beebe and Redmond; Interpersonal Communication, 1996; Allyn and Bacon Publishers.
- Rosenfeld, P., Giacalone, R.A. and Catherine, A.R. (2003). Impression Management: Building and Enhancing Reputations at Work. Thomson Learning, Singapore.



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Syllabus – Seventh Semester

SELF-DEVELOPMENT AND INTERPERSONAL SKILLS

Course Code: BEH4151

Credit Units: 01

Course Objective:

This course aims at imparting an understanding of:

Self and the process of self exploration

Learning strategies for development of a healthy self esteem

Importance of attitudes and their effect on work behaviour

Effective management of emotions and building interpersonal competence.

Course Contents:

Module I: Understanding Self

Formation of self concept

Dimension of Self

Components of self

Self Competency

Module II: Self-Esteem: Sense of Worth

Meaning and Nature of Self Esteem

Characteristics of High and Low Self Esteem

Importance & need of Self Esteem

Self esteem at work

Steps to enhance Self Esteem

Module III: Emotional Intelligence: Brain Power

Introduction to EI

Difference between IQ, EQ and SQ

Relevance of EI at workplace

Self assessment, analysis and action plan

Module IV: Managing Emotions and Building Interpersonal Competence

Need and importance of Emotions

Healthy and Unhealthy expression of emotions

Anger: Conceptualization and Cycle

Developing emotional and interpersonal competence

Self assessment, analysis and action plan

Module V: Leading Through Positive Attitude

Understanding Attitudes

Formation of Attitudes

Types of Attitudes

Effects of Attitude on

Behaviour

Perception

Motivation

Stress
Adjustment
Time Management
Effective Performance
Building Positive Attitude

Module VI: End-of-Semester Appraisal

Viva based on personal journal
Assessment of Behavioural change as a result of training
Exit Level Rating by Self and Observer

Examination Scheme: Total Internal (100)

Components	SAP	Journal for Success (JOS)	A	Mid Term Test / CT / Assignment	VIVA / Presentation
Weightage (%)	25	10	5	30	30

SAP: Social Awareness Programme, A: Attendance, CT: Class Test

Text & References:

- Towers, Marc: Self Esteem, 1st Edition 1997, American Media
- Pedler Mike, Burgoyne John, Boydell Tom, A Manager's Guide to Self-Development: Second edition, McGraw-Hill Book Company.
- Covey, R. Stephen: Seven habits of Highly Effective People, 1992 Edition, Simon & Schuster Ltd.
- Khera Shiv: You Can Win, 1st Edition, 1999, Macmillan
- Gegax Tom, Winning in the Game of Life: 1st Edition, Harmony Books
- ChatterjeeDebashish, Leading Consciously: 1998 1st Edition, Viva Books Pvt Ltd.
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- Singh, Dalip, 2002, Emotional Intelligence at work; First Edition, Sage Publications.
- Goleman, Daniel: Emotional Intelligence, 1995 Edition, Bantam Books
- Goleman, Daniel: Working with E.I., 1998 Edition, Bantam Books.



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Syllabus – Eighth Semester

PROFESSIONAL EXCELLENCE

Course Code: BEH4451

Credit Units: 01

Course Objective:

This course aims at imparting an understanding of:

Build and leverage your professional reputation

Maintain focus in pressure situations

Make a balanced choice between professional and personal commitments

Course Contents:

Module I: Individual, Society and Nation

Individual Differences and Dimensions of Personality

Socialization Process

Relating to the Nation: Values, Culture, Religion

Sense of pride and Patriotism

Managing Diversity

Module II: Components of Excellence

Personal Excellence:

Identifying long-term choices and goals

Uncovering the talent, strength & style

Analyzing choke points in your personal processes by analysis in area of placements, events, seminars, conference, extracurricular activities, projects etc.

Developing professional power: Goal-setting, time management, handling criticism, interruptions and time wasters

Module III: Career Planning

Knowing one's Interest and Aptitude

Identifying available Resources

Setting goals to maintain focus:

Developing Positive attributes in personality

Self-reliance and Employability skills

Module IV: Stress Management for Healthy Living

Meaning and Nature of Stress

Stages of stress

Causes and Consequences of stress: Personal, Organizational and Environmental

Personal Styles and strategies of coping

Module V: Professional Success

Building independence & interdependence

Reducing resistance to change

Continued reflection (Placements, events, seminars, conferences, projects extracurricular Activities etc.)

Module VI: End-of-Semester Appraisal

Viva based on personal journal

Assessment of Behavioural change as a result of training

Exit Level Rating by Self and Observer

Examination Scheme: Total Internal (100)

Components	SAP	Journal for Success (JOS)	A	Mid Term Test / CT / Assignment	VIVA / Presentation
Weightage (%)	25	10	5	30	30

SAP: Social Awareness Programme, A: Attendance, CT: Class Test

Text & References:

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Syllabus – Ninth Semester

LEADING THROUGH TEAMS

Course Code: BEH4351

Credit Units: 01

Course Objective:

This course aims to enable students to:
Understand the concept and building of teams
Manage conflict and stress within team
Facilitate better team management and organizational effectiveness through universal human values.

Course Contents:

Module I: Teams: An Overview

Team Design Features: team vs. group
Effective Team Mission and Vision
Life Cycle of a Project Team
Rationale of a Team, Goal Analysis and Team Roles

Module II: Team & Sociometry

Patterns of Interaction in a Team
Sociometry: Method of studying attractions and repulsions in groups
Construction of sociogram for studying interpersonal relations in a Team

Module III: Team Building

Types and Development of Team Building
Stages of team growth
Team performance curve
Profiling your Team: Internal & External Dynamics
Team Strategies for organizational vision
Team communication

Module IV: Team Leadership & Conflict Management

Leadership styles in organizations
Self Authorized team leadership
Causes of team conflict
Conflict management strategies
Stress and Coping in teams

Module V: Global Teams and Universal Values

Management by values
Pragmatic spirituality in life and organization
Building global teams through universal human values
Learning based on project work on Scriptures like Ramayana, Mahabharata, Gita etc.

Module VI: End-of-Semester Appraisal

Viva based on personal journal
Assessment of Behavioural change as a result of training

Exit Level Rating by Self and Observer

Examination Scheme: Total Internal (100)

Components	SAP	Journal for Success (JOS)	A	Mid Term Test / CT / Assignment	VIVA / Presentation
Weightage (%)	25	10	5	30	30

SAP: Social Awareness Programme, A: Attendance, CT: Class Test

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- Hoover, Judhith D. Effective Small Group and Team Communication, 2002, Harcourt College Publishers
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- Dick, McCann & Margerison, Charles: Team Management, 1992 Edition, viva books
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Curriculum & Scheme of Examination

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Master of Arts - Applied Psychology

PARAMETRIC STATISTICAL METHOD

Course Code: PSY4105

Credit Units: 03

Course Objective

The Present paper focuses on providing knowledge about the basics of statistics. It will give clear understanding to the students about application of parametric statistical methods. Parametric tests are generally more powerful in that the likelihood (probability) of a test reaching the correct conclusion is greater. Besides this, a module is added in last so to make students aware of parametric statistics in SPSS. Thereby they can understand the procedures and applications of parametric statistics using SPSS.

Course Contents

Module I: Basics

Nature, Meaning and importance of statistics

Concept of Reasoning, population, sample and probability theory in statistical inferences

Categories of statistics: Descriptive and Inferential

Variables and their types

Scales of Measurement: Nominal, Ordinal, Interval, Ratio

Module II: Statistical conjecture

Sampling and its kinds: Probability sampling method and Non-Probability sampling method.

Difference between Objectives and Hypothesis

Hypothesis testing: One-tailed and Two-tailed tests, Type I and Type II errors

Module III: Statistics and Test of Significance

Meaning, concept and importance of determining reliability of statistics in data analysis

Standard error of mean, standard deviations, percentages and correlation coefficients

Significance of difference between means-critical ratio and t-test calculation (large and small sample) assumption & uses

One-Way and Two Way ANOVA.

Module IV: Correlation and Regression

Correlation: concept, types, assumption and Utility of Cor-relational Analysis in Psychological Research

Bi-serial Correlation, Point Bi-serial Correlation, Partial Correlation, Tetra-choric Correlation

Simple and Multiple linear regression, its uses, concepts and assumptions

Difference between Simple linear and multiple regressions

Module V: Introduction to SPSS and parametric statistics in SPSS

Introduction to SPSS, its usage and functioning

Understanding the concepts of Parametric tests in SPSS

Learning data entry

Examination Scheme

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	7	10	8	5	70

CT: Class Test, H: Home Assignment, P/V/Q: Presentation/Viva/Quiz, A: Attendance,

EE: End Semester Examination

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Text & References:

Text:

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- Edward, A.E.: Experimental Design in Psychological Research (3rd Ed.), New Delhi: American Publishing Co. 1971
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PRACTICUM-I

Course Code: PSY4106

Credit Units: 03

Course Objective

Present course give practical experience to the students in administering and scoring psychological tests and interpreting the scores to acquaint the students with the basic procedure and design of psychology experiments. Course will also encourage and guide the students to undertake a small-scale research project to apply the general concepts of psychology through experimentation and testing

Note: Total 5 practical will be conducted in the first semester among the list of following practical

Course Content

1	Memory
2	Language
3	Personality
4	Self-Concept
5	Perception
6	Memory and Learning

Examination Scheme

Components	A	File Demonstration	Viva	EE
Weightage (%)	5	35	35	25

Text & References

- Mohsin, S. M.: Experiments in Psychology. Motilal Banarasidas
- Woodworth, R.S.: Experimental Psychology. Oxford & IBH & Schlosberg, H. Publishing
- Postman, L. & Egan, J. P.: Experimental Psychology: An Introduction. Harper and Row



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FIELD PRACTICE-I

Course Code: PSY4107

Credit Units: 04

Course Objective

To develop student's skills of observation, collection and documentation of data for conducting theoretically correct and practically relevant research

Methodology

Each student will engage themselves in interaction and observation of psychological processes in a subject/ field of their choice.

Student will then present their findings in the form of a paper for seminar discussions.

Similarly, field work will be done by students in their area of interest and present their practical observations, as a report with analysis and suggestions.

Examination Scheme

Field/Seminar Report	: 40 marks
Viva-Voce	: 30 marks
Internal Faculty and Interaction	: 10 marks
Presentation/Daily Diary Report	: 20 marks



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PSYCHOPATHOLOGY

Course Code: PSY4201

Credit Units: 03

Course Objective

To acquaint the students with various manifestations of psychopathology for imparting knowledge and skills required for diagnosis of psychological conditions. To introduce them to different perspectives and models of etiology and also to develop skills required for psychopathological formulation. This course will also enable students to the study and prediction of adaptive and maladaptive behaviours and its processes across lifespan. It also enables students to understand different diagnostic and educational models of psychopathology.

Course Content

Module I: Classification and Theoretical Models

Systems of Classification, basic features; DSM-IV TR, ICD-10, similarities and differences

Major Theoretical Models of Psychopathology: The medical model, Psychoanalytic model, Behaviouristic model, Humanistic-existential models, Interpersonal approach, Systems approach.

Module II: Diagnosis and Prognosis

Problems and methods of diagnosis: physiological examination, observation, case-history, interview method, psycho-diagnostic tests, measures of bodily functions, computer assisted diagnosis.

Module III: Mood and Anxiety Disorder

Bipolar disorders: Manic, Depressive, Mixed

Depressive disorder: Major depression and dysthymia, Suicide

Anxiety Disorders: Generalized anxiety disorder, phobia, panic disorder, post traumatic stress disorder and obsessive compulsive disorder

Module IV: Major Clinical Disorders

Schizophrenia

Other psychotic disorders: Bipolar, Delusional, psychotic depression

Module V: Somatoform Disorders

Conversion disorder, Somatization disorder, Hypochondriasis, Body dysmorphic disorder, Pain disorder

Module VI: Disorders of Infancy, Childhood and Adolescence

Developmental disorder: PDD, Rett Disorder, Asperger Disorder,

Behavioral Disorder: Conduct Disorder, Hyperactivity Disorder, ADHD,

Genetic Disorders: Down Syndrome

Module VII: Personality Disorder

Personality Disorder: Narcissistic Personality, Histrionic Personality, Antisocial (Psychopathic)

Personality, Borderline Personality, Paranoid Personality, and Schizotypal Personality

Module VIII: Sexual Dysfunctions and Paraphilias

Dysfunctions of Desire, Arousal, Orgasm and Pain

Paraphilias, Paedophilia and Rape

Gender identity disorders

Impotence and frigidity

Causes, preventing suicide


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Examination Scheme

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	7	10	8	5	70

CT: Class Test, H: Home Assignment, P/V/Q: Presentation/Viva/Quiz, A: Attendance, EE: End Semester Examination

Text & References

Text:

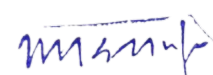
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- Hamilton, Max, (1994). Fish's: Clinical Psychopathology; Verghese Publishing House, Bombay
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- Coleman, J.C. : Abnormal Psychology & Modern Life
- Lazarus and Folkman: Stress, appraisal and coping



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PSYCHOLOGICAL ASSESSMENT AND DIAGNOSIS

Course Code: PSY4202

Credit Units: 03

Course Objective

The course teaches the students about the characteristics, objectives and wide ranging effects of psychological testing. It further describes the various testing methodologies and outlines capabilities and limitations of these methods.

Course Contents

Module I: Introduction

Purpose of testing, types of test used, Bias & Fairness

Ethical Issues in Psychological Testing

Overview of Tests

Norms, Scoring Interpretation and Report Writings

Issues in measurement

Emerging trends of online testing

Module II: Cognitive functions and their assessment

Concept of Attention, Gestalt Theory, Memory and Forgetting, PGI Memory Scale

Theories of Intelligence

Intelligence Tests: Slosson Intelligence Test – Revised For Children and Adults (SIT-3/R)

Bhatia Battery, Weschler's Adult Performance Intelligence Scale (WAPIS) BinetKamat Test

Weschler's Intelligence Scale for Children – Revised (WISC) Wide Range Intelligence Test (WRIT) Alexander Pass-a-long Test of Intelligence

Draw-A-person Intellectual Ability Test for Children, Adolescents and Adults (DAP:IQ)

Raven's Progressive Matrices (Colour Progressive Matrices, Standard Progressive Matrices and Advanced Progressive Matrices)

Module III: Achievement Test

Wechsler Individual Achievement Test (WIAT)

Diagnostic Achievement Test For Adolescents – Second Edition (DATA-2)

Kaufman Test of Educational Achievement (KTEA)

Woodcock-Johnson Tests of Achievement (WJ)

Module IV: Assessment of Personality: Non-Projective Test

Cattell's 16 Personality Factor Inventory (16 PF)

California Q-Sort Tests

Myers Briggs Type Indicator (MBTI)

Minnesota Multiphasic Personality Inventory (MMPI)

Personality Inventory for Children

OMNI Personality Inventory (OMNI)

Bell's Adjustment Inventory

Eysenck's Personality Questionnaire

NEO™ Personality Inventory-3 (NEO™-PI-3) Adult / Adolescent

Module V: Assessment of Personality: Projective Tests

Introduction of Projective Techniques

Difference between Projective & Non-Projective Techniques

Thematic Apperception Test

Rorschach Inkblot Test

House-Tree-Person (H-T-P), Sentence Completion Test

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Module VI: Developmental Scales

Developmental Screening Test

Vineland's Social Maturity Scale

Measures of Psychosocial Development (MPD)

Gesells' Developmental Schedule

Examination Scheme

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	7	10	8	5	70

CT: Class Test, H: Home Assignment, P/V/Q: Presentation/Viva/Quiz, A: Attendance,

EE: End Semester Examination

Text & References

Text:

- Freeman, F. S.,(1965), Theory and Practice of Psychological Testing; New Delhi: Oxford &IBTT

References:

- Jackson C.,(1998), Understanding Psychological Testing; Jaico Publishing House
- Anastasi&Urbina S.(2000), Psychological Testing ,7th Edition; Person Education (Singapore) Pte. Ltd.,
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NON-PARAMETRIC STATISTICAL METHOD

Course Code: PSY4204

Credit Units: 03

Course Objective

The Present paper focuses on providing knowledge about the basics of nonparametric statistics. It will give clear understanding about differences between Parametric & Nonparametric Test Procedures. Paper will also explain commonly used Nonparametric Test Procedures and Perform Hypothesis Tests Using Nonparametric Procedures to teach student how to use SPSS with non-parametric statistics.

Course Contents

Module I: Basics

What is Non-Parametric statistics: Nature, Meaning and Concept strengths and limitations of non-parametric procedures

Parametric VS Non- Parametric Statistics

Four Levels of Measurement and Non-parametric statistics

Module II: Tests of differences between Groups and Variables

The Friedman Two-way analysis of variance by ranks-Basic concepts, uses and computations

Test of differences between groups (Independent samples): Mann-Whitney U test computations, Kolmogorov-Smirnov test, uses

Test of differences between variables (Dependent samples): Kruskal-Wallis ANOVA analysis of ranks, K-Sample Median test, uses and concepts

Module III: Nominal Measures of Correlations

Concept definition assumptions of Nominal Measures of Correlations

The Phi-Coefficient, Contingency coefficient concepts uses and calculations

Tetrachoric: Its uses, computation and comparison

Module IV: Chi-Square

Concept and Definition, its assumptions and use

Chi-Square Goodness of Fit (One-Sample Test)

Chi-Square Test of Independence

Module V: Introduction to SPSS and Non-parametric statistics in SPSS

Introduction to SPSS, its usage and functioning

Understanding the concepts of Non-Parametric tests in SPSS

Learning data entry

Examination Scheme

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	7	10	8	5	70

CT: Class Test, H: Home Assignment, P/V/Q: Presentation/Viva/Quiz, A: Attendance,

EE: End Semester Examination


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Text & References

Text:

- Dowine, N.M.: Basic Statistical methods, Harper and Publishes New York.
- Gupta S.P. Statistical methods, Sultan and Sons, New Delhi.
- Broota, K.D.: Experimental design in correlational research, New Delhi: Wiley Eastern 1989.
- Salkind, N & Green, S.:SPSS Quick Starts.
- Howitt, D & Cramer, D.: Introduction to SPSS statistics in psychology.
- McNemarQ.: Psychological Statistics, 3rd Ed. New York, John Wiley 1962.
- Edward, A. E: Experimental Design in Psychological research (3rd Ed) New Delhi: American publishing.

Reference

- Higgins. J.J: Introduction to Modern Nonparametric Statistics.
- Siegal.S: Nonparametric statistics for the behavioral sciences.
- Castellan, J.N. and Siegal. S: Non-parametric statistics for behavioural sciences.
- Daniel, W. Wayne: Applied non-parametric statistics.



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PRACTICUM-II

Course Code: PSY4207

Credit Units: 03

Course Objective

1. To give practical experience to the students in administering and scoring psychological tests and interpreting the scores.
2. To acquaint the students with the basic procedure and design of psychology experiments.
3. To encourage and guide the students to undertake a small-scale research project.
4. To apply the general concepts of psychology through experimentation and testing

Note: Total 5 practicals will be conducted in the second semester among the list of following practicals

Course Content

1	Intelligence
2	Achievement
3	Personality: Projective
4	Personality: Projective
5	Personality:
6	Personality:

Examination Scheme:

Components	A	File Demonstration	Viva	EE
Weightage (%)	5	35	35	25

Text & References:

- Mohsin, S. M.: Experiments in Psychology. Motilal Banarasidas
- Woodworth, R.S.: Experimental Psychology. Oxford & IBH & Schlosberg, H. Publishing
- Postman, L. & Egan, J. P.: Experimental Psychology: An Introduction. Harper and Row



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FIELD PRACTICE-II

Course Code: PSY4208

Credit Units: 04

Course Objective

To develop, in students the skills of observation, collection and documentation of data for conducting theoretically correct and practically relevant research

Methodology

Each student will engage themselves in interaction and observation of psychological processes in a subject/ field of their choice.

Student will then present their findings in the form of a paper for seminar discussions.

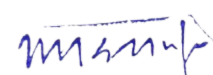
Similarly, field work will be done by students in their area of interest and present their practical observations, as a report with analysis and suggestions.

Examination Scheme

Field/Seminar Report	: 40 marks
Viva-Voce	: 30 marks
Internal Faculty and Interaction	: 10 marks
Presentation/Daily Diary Report	: 20 marks



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SCIENTIFIC RESEARCH PAPER

Course Code: PSY4209

Credit Units: 01

Course Objective

The scientific research papers for Masters Students is to enhance the reading and writing habits of the students and to make them aware about the process of carrying out a research work. This helps them to develop insight into the course they are studying which creates an academic interest among the students. Presentation of the term paper plays an important role as it facilitates knowledge sharing and improvement in presentation skills which will further enhance the confidence of the students. The overall objective of this term paper is to develop research orientations in students and to make them understand and enhance skills in Research Methodology.

Guidelines for Research Article or Scientific Papers

Topic
Introduction
Review Research
Objective
Methodology
Discussion
Conclusion
References & Bibliography

No. of pages in the compilation of the paper 25-30 (minimum 25 pages)

Examination Scheme

Components	Compilation	Viva	Presentation
Weightage (%)	50	25	25



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APPLIED PSYCHOTHERAPY

Course Code: PSY4310

Credit Units: 03

Course Objectives

To provide knowledge and skills to students about counseling and psychotherapy and also to train them in using therapeutic and counseling techniques for effectively practicing

Course Contents

Module I: Basic Counseling and Psychotherapeutic Skills

Basic Skills: Empathy, Genuineness, unconditional positive regard, congruence, Listening, Para-phrasing, reflecting, summarizing

Advanced Skills: interpretation, insight, transference interpretation, exploring projections, identifying failure of therapy, identifying working with burnout, self-supervision, confrontation

Characteristics of effective counselor/ therapists

Challenges faced by novice

therapists: Dealing with anxiety, being oneself, self-disclosure, avoiding perfectionism, honesty with limitations, understanding silence, demands from clients; Understanding one's own self and Psychotherapy with self

Module II: Therapeutic assessment and counseling session initiation

Therapeutic assessment, History taking, and Formulation, setting goals

Contracting and its implications: Contracting for therapy and socialization, communicating ethical and professional rights responsibilities, violations of contract, Initial session, crisis and support, Counseling session's opening and closing skills, Effective conduction of counseling sessions

Module III: Counseling and Psychotherapy Process

Initial phase: Psych- education, Supportive psychotherapy. Selecting techniques

Ice-breaking, exploration, Loss framework.

Dealing with Resistance: Techniques and applications

Transference and counter-transference

Module IV: Termination, Follow-up and Documentation

Termination: Evaluating and sharing progress, Issues in termination and resolution Follow-up: Systems and techniques, sustained changes

Documentation: Therapists documentation, Communication with other professionals and referrals

Legal implications: Legal communication, documentation, Legal issues in psychotherapy and counselling.

Module V: Therapeutic Case formulation and Demonstration

Two Hypothetical case formulation and demonstration by using

Role play (video recorded), evaluation of basic and advanced skills for simulated cases, Two Hypothetical case formulation and demonstration by using

Role play (video recorded) for contracting and skills for opening and closing,



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Examination Scheme

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	7	10	8	5	70

CT: Class Test, H: Home Assignment, P/V/Q: Presentation/Viva/Quiz, A: Attendance, EE: End Semester Examination

References

- Archer, J., & McCarthy, C. J. (2008). Theories of Counseling and Psychotherapy: Contemporary. Applications. Upper Saddle River, New Jersey: Merrill Prentice Hall.
- Faiver, C., Eisengart, S., Colonna, S. (2003), The counselor intern's handbook. Brooks/Cole Publishing Company, Pacific Grove, California.
- Martin, D. G. (2011). Counseling and Therapy Skills . NY D.
- Morrison, J. (2007) The First Interview, Third Edition . Moursund, J., and Kenny, M. C. (2002). The Process of Counseling and Therapy (4th edition). Upper Saddle River, New Jersey: Prentice Hall.

Books

- Corey G. (2012). Theory and Practice of Counseling and Psychotherapy.
- Daniel Keeran. (2009). Effective Counseling Skills: the practical wording of therapeutic statements and processes.
- Edward S. Neukrug (2010). Counseling Theory and Practice.
- D. Hutchinson D. R. (2011). The Counseling Skills Practice Manual
- John Sommers-Flanagan and Rita Sommers-Flanagan (2012). Counseling and Psychotherapy Theories in Context and Practice: Skills, Strategies, and Techniques.
- Wayne Perry .Basic Counseling Techniques:: A Beginning Therapist's Tool Kit (Second Edition)
- Wolberg, L. R. (2005). The Technique of Psychotherapy Part I and II. NJ: Jason Aronson Inc.



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RESEARCH METHODS IN APPLIED PSYCHOLOGY

Course Code: PSY4311

Credit Unit: 02

Course Objective

Research Methodology is a way to find out the result of a given problem on a specific matter or problem that is also referred as research problem. In Methodology, researcher uses different criteria for solving/searching the given research problem. Different sources use different type of methods for solving the problem. So this course will enable the student to understand and apply basic research methods in psychology including research design, data analysis and report findings research conclusion apparently based on the parameters of particular research methods.

Course Contents

Module I: Introduction to Research

Meaning of Scientific Research
Objectives and Steps in Scientific Research
Defining research problem
Defining variables
Developing hypothesis

Module II: Evaluating Measures and Hypothesis

Need For Evaluating Measures
Reliability and Validity
Hypothesis testing: Type I and Type 2
Going beyond hypothesis testing: Effect size and Power

Module III: Validity of Experimental Researches and Threats to them

Statistical Conclusion validity
Construct validity and External Validity
Establishing the cause and Effect
Single Group threat, Multiple Group threats, Social threats

Module IV: Experimental Designs-I

Two-Group experimental designs Within-subject Design
Between-subject design
General Linear Model

Module V: Experimental Designs-II

Factorial designs
Randomized Block designs
Hybrid Experimental Designs: Solomon four group designs Mixed designs

Examination Scheme

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	7	10	8	5	70

CT: Class Test, H: Home Assignment, P/V/Q: Presentation/Viva/Quiz, A: Attendance,
EE: End Semester Examination

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Text & References

Text:

- Shuttleworth, Martyn (2008). "Definition of Research". Experiment Resources. Experiment-Research.com. Retrieved 14 August 2011.
- Creswell, J. W. (2008). Educational Research: Planning, conducting, and evaluating quantitative and qualitative research (3rd ed.). Upper Saddle River: Pearson.
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- Review of Foundations for research: Methods of inquiry in education and the social sciences, by Kathleen B. deMarrais and Stephen D. Lapan. 2004. Reference & Research Book News 19:1.
- Denscombe, Martyn. 2007. The good research guide for small-scale social research projects. 3rd ed. Maidenhead, UK: Open University Press. 360 pages. ISBN: 0335220223. \$48.50 (pbk).
- Baker, Lynda M. 2001. Review of Understanding Research Methods: An Overview of the Essentials, 2nd ed., by Mildred L. Patten. The Library Quarterly 71:96.
- Ellingson, L. L. 2007. Review of Qualitative research methods for the social sciences, 6th ed, by B. L. Berg. Communication Research Trends 26.1: 24.



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INTERVIEWING AND COUNSELLING SKILLS

Course Code: PSY4312

Credit Unit: 02

Course Objective

This course enables students to gather knowledge about interview techniques and cultivate Advanced Counselling Skills. It is further designed to equip students with skills to practice as a Counselling Psychologist.

Course Contents

Module I: Counsellor as a person

Personal characteristics: A composite model of human effectiveness, role of self awareness in counselling.

Role and Function of the Counsellor: Definition of Role, Generic roles, organizing roles & functions

Module II: Communication Skills-I

Basic Communication Skills: Attending skills, Listening skills, Integrating Listening Skills.

Exploration Skills: Probe, Immediacy, Self-disclosure, Interpretation, Confrontation.

Action Skills: Information giving, Advice giving, Goal setting, Reinforcement, Directives

Self-disclosure by counsellor – when and how

Helping clients develop and work on preferred scenarios, negotiating homework.

Managing resistance and other obstacles in counselling

Skills of closure and terminating

Module III: Techniques of Helping and working with emotions

Self monitoring of Thought, Feeling and Action, Facilitating problem solving

Understanding and Improving Self talk, rules and thinking patterns.

Behavioural Methods

Module IV: Counseling Applications

Pediatric Counseling: Dynamics and process

Adolescent Counselling: Concept and Issues

Group Counselling: Concept & Process.

Academic Counselling: Definition and Scope.

Marital and Family Counselling: Concept & Process.

Addiction counseling: Principles & Prevention

Geriatric Counselling: Concept and Scope.

Rehabilitation Counseling, And Crisis Intervention & Trauma Counseling

Module V: Assessment in psychology

The purpose of assessment in counselling, Assessment principles

Intelligence and general ability testing

Measuring Achievement and aptitude

Appraisal of personality

Spiritual assessment strategies

Applications of assessment: Treatment planning, evaluation and accountability.

Examination Scheme

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	7	10	8	5	70

CT: Class Test, H: Home Assignment, P/V/Q: Presentation/Viva/Quiz, A: Attendance,

EE: End Semester Examination

Text & References

Text:

- Patri, V., & Anthors R.(2001), Counselling Psychology, Press, New Delhi

References:

- Nelson R. Jones ,(2003), Basic Counselling Skills; Sage Publication, London
- Gerald C. (2001), Case Approach to Counselling Psychology; Brooks/Cole, Australia
- Crouch a. (1997), Inside Counselling ; Sage Publication, London
- Ivey A.E. & Ivey M. B. (1999), Intentional Interviewing & Counselling, 4th Edition.
- Woolfe R. & Dryden W. (2001) Handbook of Counselling Psychology; Sage Publication, London



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PRACTICUM-III

Course Code: PSY4308

Credit Units: 03

Course Objective

To give practical experience to the students in administering and scoring psychological tests and interpreting the scores and to acquaint the students with the basic procedure and design of psychology experiments and also to encourage and guide the students to undertake a small-scale research project to apply the general concepts of psychology through experimentation and testing

Note: Total 5 Practical will be conducted in the third semester among the list of following Practical

Course Content

1	Psychosocial Development
2	Self Esteem
3	State Trait Anger
4	Personality
5	Family and Interpersonal Relationship
6	Intelligence

Examination Scheme

Components	A	File Demonstration	Viva	EE
Weightage (%)	5	35	35	25

Text & References

- Mohsin, S. M.: Experiments in Psychology. Motilal Banarasi Das.
- Woodworth, R.S.: Experimental Psychology. Oxford & IBH & Postman, L. Schlosberg, H. Publishing
- Postman, L. & Egan, J. P.: Experimental Psychology: An Introduction. Harper and Row



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FIELD PRACTICE-III

Course Code: PSY4309

Credit Units: 04

Course Objective

To cultivate the observation skills and techniques among students to gather and collect information from clients and documentation of data for conducting theoretically correct and practically relevant research

Methodology

Each student will engage themselves in interaction and observation of psychological processes in a subject/ field of their choice.

Student will then present their findings in the form of a paper for seminar discussions.

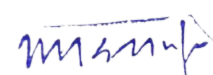
Similarly, field work will be done by students in their area of interest and present their practical observations, as a report with analysis and suggestions.

Examination Scheme

Field/Seminar Report	: 40 marks
Viva-Voce	: 30 marks
Internal Faculty and Interaction	: 10 marks
Presentation/Daily Diary Report :	: 20 marks



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SUMMER INTERNSHIP EVALUATION

Course Code: PSY4335

Credit Units: 06

GUIDELINES FOR INTERNSHIP FILE AND INTERNSHIP REPORT

(These guidelines will be useful for undertaking an internship programme during the summer or at any other time wherein the student/ researcher works full time with a company/organisation)

There are certain phases of every Intern's professional development that cannot be effectively taught in the academic environment. These facets can only be learned through direct, on-the-job experience working with successful professionals and experts in the field. The internship programme can best be described as an attempt to institutionalize efforts to bridge the gap between the professional world and the academic institutions. Entire effort in internship is in terms of extending the program of education and evaluation beyond the classroom of a university or institution. The educational process in the internship course seeks out and focuses attention on many latent attributes, which do not surface in the normal class room situations. These attributes are intellectual ability, professional judgment and decision making ability, inter-disciplinary approach, skills for data handling, ability in written and oral presentation, sense of responsibility etc.

In order to achieve these objectives, each student will maintain and submit a file (**Internship File**) and a report (**Internship Report**).

INTERNSHIP FILE

The Internship File aims to encourage students to keep a personal record of their learning and achievements throughout the Programme. It can be used as the basis for lifelong learning and for job applications. **Items can be drawn from activities completed in the course modules and from the workplace to demonstrate learning and personal development.**

The File will assess the student's analytical skills and ability to present supportive evidence, whilst demonstrating understanding of their organization, its needs and his/her own personal contribution to the organization.

The File is essentially a comprehensive documentation of how one proceeds while working on the assignment and should be regularly checked by the faculty guide/ supervisor, issues discussed with the students, doubts if any clarified and signed as having done so. This will form the basis of continuous evaluation of the project.

The File will include five sections in the order described below.

1. The Title Page – An Internship Experience Report For (Your Name), name of internship organization, name of the Supervisor/Guide and his/her designation, date started and completed, and number of credits for which the report is submitted.
2. Table of Content – An outline of the contents of the file by topics and subtopics with the page number and location of each section.
3. Introduction – Short, but should include how and why you obtained the internship experience position and the relationship it has to your academic/professional and career goals.
4. Main Body – Should include a brief summary/ executive summary of the Internship Project Report that the student has worked on, an analysis of the company/organization in which the student is working, a personal review of the student's management skills and how they have been developed through the programme, the daily tasks performed, major projects contributed to, dates and hours spent on a task, observations and feelings, meetings attended and their purposes, listing of tools and materials and their suppliers, and photographs if possible of projects, buildings and co-workers.
5. Appendices – Include pamphlets, forms, charts, brochures, technical and descriptive literature, graphs and other information related to your Internship experience.

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INTERNSHIP REPORT

The **Internship Report** is the research report that the student has to prepare on the project assigned by the organization. (In case a student is not assigned a specific research project in the organization, he has to select any one aspect of the organization and prepare a research report on it). The layout of the report should be as per the standard layout prescribed by the organization wherein the student undertakes the Internship. In case, there is no layout prescribed by the organization the following components should be included in the report:

- Title or Cover Page. The title page should contain Project Title; Student's Name; Programme; Year and Semester and Name of the Faculty Guide.
- Acknowledgements Acknowledgment to any advisory or financial assistance received in the course of work may be given. It is incomplete without student's signature.
- Abstract A good "Abstract" should be straight to the point; not too descriptive but fully informative. First paragraph should state what was accomplished with regard to the objectives. The abstract does not have to be an entire summary of the project, but rather a concise summary of the scope and results of the project. It should not exceed more than 1000 words.
- Table of Contents Titles and subtitles are to correspond exactly with those in the text.
- Introduction Here a brief introduction to the problem that is central to the project and an outline of the structure of the rest of the report should be provided. The introduction should aim to catch the imagination of the reader, so excessive details should be avoided.
- Materials and Methods This section should aim at experimental designs, materials used (wherever applicable). Methodology should be mentioned in details including modifications undertaken, if any. It includes organization site(s), sample, instruments used with its validation, procedures followed and precautions.
- Results and Discussion Present results, discuss and compare these with those from other workers, etc. In writing this section, emphasis should be laid on what has been performed and achieved in the course of the work, rather than discuss in detail what is readily available in text books. Avoid abrupt changes in contents from section to section and maintain a lucid flow throughout the thesis. An opening and closing paragraph in every chapter could be included to aid in smooth flow.

Note that in writing the various sections, all figures and tables should as far as possible be next to the associated text, in the same orientation as the main text, numbered, and given appropriate titles or captions. All major equations should also be numbered and unless it is really necessary, do not write in "point" form.

While presenting the results, write at length about the various statistical tools used in the data interpretation. The result interpretation should be simple but full of data and statistical analysis. This data interpretation should be in congruence with the written objectives and the inferences should be drawn on data and not on impression. Avoid writing straight forward conclusion rather, it should lead to generalization of data on the chosen sample.

Results and its discussion should be supporting/contradicting with the previous research work in the given area. Usually one should not use more than two researches in either case of supporting or contradicting the present case of research.

Conclusion(s) & Recommendations

A conclusion should be the final section in which the outcome of the work is mentioned briefly. Check that your work answers the following questions:

- Did the research project meet its aims (check back to introduction for stated aims)?
- What are the main findings of the research?
- Are there any recommendations?

Do you have any conclusion on the research process itself?


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Implications for Future Research

This should bring out further prospects for the study either thrown open by the present work or with the purpose of making it more comprehensive.

➤ **Appendices**

The Appendices contain material which is of interest to the reader but not an integral part of the thesis and any problem that have arisen that may be useful to document for future reference. □

➤ **References**

References should include papers, books etc. referred to in the body of the report. These should be written in the alphabetical order of the author's surname. The titles of journals preferably should not be abbreviated; if they are, abbreviations must comply with an internationally recognised system.

The Layout Guidelines for the Internship File & Internship Report:

- A4 size Paper
- Font: Arial (10 points) or Times New Roman (12 points)
- Line spacing: 1.5
- Top and bottom margins: 1 inch/ 2.5 cm; left and right margins: 1.25 inches/ 3 cm

Assessment Scheme:

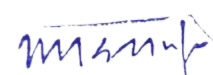
Continuous Evaluation: 30%
(based on Internship File and the observations of the faculty guide/ supervisor)

Feedback from Company/ Organization: 10%

Final Evaluation: 60%
(Based on Internship Report, Viva/ Presentation)



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APPLIED PSYCHOPHYSIOLOGY AND BIOFEEDBACK

Course Code: PSY4313

Credit Units: 03

Course Objectives

To familiarize the students with various approaches, techniques and skills of counselling and psychotherapy in mental health problems To prepare the students to conduct different types of counselling and psychotherapies with different clinical and sub-clinical population To help them in identifying the processes of therapy and therapeutic change in the client and to enable them to conduct research in psychotherapy and report the findings

Course Contents

Module I: Introduction

Conceptual Issues, Client Variables in Counseling and Psychotherapy, Processes and Techniques of Psychotherapy

Module II: Modalities of Psychotherapy

Gestalt Therapy; Experiential and Transpersonal Psychotherapies, Art Therapy, Play Therapy, Family Therapy, Yoga and Other Indegenious therapies, Research Designs, Issues and Evaluation.

Module- III: Applied Research

Research in Psychotherapy: Experimental and Quasi-experimental designs. Ethical Issues in Psychotherapy

Module IV: Institutional visit

Supervised Practicum: Students will be provided demonstrations in the laboratory setting and visit institutions providing specialized services and produce at least 2 case records. 10 Hrs.

Examination Scheme

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	7	10	8	5	70

CT: Class Test, H: Home Assignment, P/V/Q: Presentation/Viva/Quiz, A: Attendance, EE: End Semester Examination

References:

- Bergin, A. E., & Garfield, S. L. (Eds.) (1994) Handbook of Psychotherapy and Behaviour Change, (4th Ed.). New York: Wiley.
- Finx, B.(2007) Fundamentals of Psychoanalytic Techniques. New York: Norton.
- Rama, S., Ballentine, R. & Ajaya, S. (1976) Yoga Psychotherapy. Pennsylvania: HIP.



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HUMAN FACTORS PSYCHOLOGY AND ERGONOMICS

Course Code: PSY4314

Credit Units: 03

Course Objective

To gain an understanding of human strengths and limitations by studying human perception, cognition, memory, attention, biomechanics, and motor control/learning and also to gain an understanding of guidelines for displays, controls, anthropometry, office ergonomics, work physiology, and manual material handling.

Course contents

Module I: Introduction to Human Factor Psychology

Introduction to Human Factor Psychology and Ergonomics, Historical foundations, Biological basis of psychology and sensation, Human Information Processing

Module II: Visual system and Auditory and tactile systems

Visual system: sensation vs. perception (depth perception, motion perception, and pattern recognition), color vision, visual search, perceptual speed, perceptual organization, visual display. Auditory and tactile systems: audition and touch, RSI (Repetitive Strain Injury), designing for hearing and touch, haptic/tactile interfaces.

Module III: Memory and attention

Memory and attention: theories of attention, selective/divided attention, Multiple Resource Theory, reasoning, decision making, designing for memory.

Module IV: Performance measurement

Performance measurement: Psychometric tests (Simple/Choice Reaction Time tests, digit/word span, other visuo-spatial and cognitive tests, etc), Fitts' Law, Hicks' Law, quantitative and qualitative methods. Workload management: mental workload, stress, fatigue and coping.

Module V: Ergonomics science in a glance

Ergonomics science in a glance: introduction to anthropometry, work physiology and biomechanics.

Examination Scheme

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	7	10	8	5	70

CT: Class Test, H: Home Assignment, P/V/Q: Presentation/Viva/Quiz, A: Attendance, EE: End Semester Examination

References:

- Wickens, C. D., Lee, J. D. Liu, Y. & Becker, S. E. G., Second Ed. (2004).
- Introduction to human factors engineering. NY: Longman. Note. Used Wickens et al. text must be Second Edition. Casey, S. (1998).
- Set phasers on stun and other true tales of design, technology, and human error. Santa Barbara, CA: Aegean Publishing Co. Task description methods. Chapter 3. (pp. 81-145).
- In B. Kirwan & L. K. Ainsworth (eds.) (1992.) A guide to task analysis. London: Taylor & Francis. (Handout). Norman, D. (2002). Design of everyday things. NY: Basic Books. Paperback


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FORENSIC AND LEGAL PSYCHOLOGY

Course Code: PSY4315

Credit Units: 03

Course Objectives

To introduce the students with knowledge and techniques of forensic psychology and further providing training in identification of criminals and forensic verification by using psychological methods

Course Contents

Module I: Introduction to forensic Psychology

Forensic Psychology: Introduction and overview, Historical Perspective, Fields of Forensic Psychology, Education and Training.

Module II: Criminal and Investigative Psychology

Criminal and Investigative Psychology: Police Psychology, Mental and Aptitude testing, Personality assessment. Occupational stress in Police and investigation, Hostage taking Police interrogation and false confession Criminal of Psychological autopsy, Geographical profiling and mental manpower, Criminal Identification

Module III: Violence and sexual offences

Psychological impacts of violence and sexual offences, Post-traumatic stress disorder, Family violence and victimization, Psychology of the bystanders 1

Module IV: Correctional Psychology

Correctional Psychology: Legal rights of inmates: Rights to treatment, Right to refuse treatment, Inmates with mental disorders, Solitary confinement, Psychological assessment in correction, Psychological methods of correction, Treatment of sexual offenders, Community-based correction, Group homes, Family preservation model, Substance abuse model, Prevention of violence.


Examination Scheme

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	7	10	8	5	70

CT: Class Test, H: Home Assignment, P/V/Q: Presentation/Viva/Quiz, A: Attendance, EE: End Semester Examination

References:

- Bartol, C. R. & Bartol, A. M. (2004) Introduction to forensic psychology. New Delhi: Sage.
- Blackburn, R., (1993) The psychology of criminal conduct: Theory research and practice. Chichester: Wiley & Sons.
- Dhanda, A. (2000) Legal order and mental disorder. New Delhi: Sage.
- Harari, L. (1981) Forensic psychology. London: Batsford Academic.


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COMMUNITY PSYCHOLOGY

Course Code: PSY4316

Credit Units: 03

Course Objectives

To acquaint the students about the history & present status of community mental health services and also to develop a community based orientation towards mental health.

Course Contents

Module I: Introduction to Community Psychology

Historical and social contexts of community psychology: concept, evolution, scope and nature of community mental health.

Module II: Mental Health Models

Models of mental health services: mental, social, organizational and ecological

Module III: Community mental health intervention and rehabilitation

Community mental health intervention and community based rehabilitation (CBR): Issues, principles and programmes; evaluation of CBR; training the para-professional and non-professionals.

Module IV:

Community mental health in India: Prospects, Issues & challenges, Legal issues in mental health, role of NGO, Govt. and hospitals in mental health in India

Examination Scheme

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	7	10	8	5	70


CT: Class Test, H: Home Assignment, P/V/Q: Presentation/Viva/Quiz, A: Attendance, EE: End Semester Examination

References

- Bloom, B. (1973). Community Mental Health—A critical analysis. New Jersey: General Learning Press
- Koch, C.H.(ed.) (1986). Community Clinical Psychology. London: Croon Helm.
- Mann, P.A. (1978). Community Psychology: Concepts and Application. New York: The Free Press.
- Rappaport, J. (1977). Community Psychology: Values, Research and Action. New York: Holt, Reindhart and Wingston.



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PSYCHOLOGICAL PRACTICE IN PERSONNEL AND HUMAN RESOURCE MANAGEMENT

Course Code: PSY4317

Credit Units: 03

Course Objective

To enable students to understand the concepts of psychology as applied in various aspects of human resources in organizations and equip them to develop modules in accordance with the optimum use of the same.

Course Contents

Module I: The Human Resource Management

Structure of Human Resource Management, Role and Responsibilities of the Human Resource Manager; Human Resource Policies - Formulation and Essentials of Sound HR Policies

Module II: Challenges of Personnel Management: Individual and Competitiveness, balancing organizational demands and employees concerns-metaphors used to manage people.

Module III: Development of Human Resources

Learning, Training, Training and Development, Evaluation and Performance Appraisal

Module IV: Meeting HR requirements

Job Analysis and job Descriptions, diversity and empowered employees, career management and developing diverse talent pool, competency assessment- Perspective and Techniques

Module V: Employment Testing

Testing abilities, Testing personality, Testing skills and achievements, Using and not using tests.

Module VI: Contemporary Issues in HR

Strategic Human Resource Management, International Human Resource Management Creating High Performing HR Systems: Wellness Programs and Work Life Balance and Green HRM

Examination Scheme

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	7	10	8	5	70

CT: Class Test, H: Home Assignment, P/V/Q: Presentation/Viva/Quiz, A: Attendance,

EE: End Semester Examination

Text & References

Text:

- Cascio (1998) Managing Human Resources. Delhi: Tata McGraw Hill.
- Cascio W.F. & Aguinis H. (2008), Applied Psychology in Human Resource Management, 6th Edition, Printice-Hall, USA
- Robert A. Baron and Donn Byrne, "Social Psychology: Understanding Human Interactions", New Delhi, Prentice Hall of India, 7th Ed., 1995.
- John B. Miner, "Industrial - Organizational Psychology", Singapore, McGraw-Hill, 1992.

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References:

- Snell & Bohlander (2007) Human Resource Management, Thomson South Western.
- David S. Decenzo and Stephen P. Robbins, Personnel/Human Resource Management, Prentice Hall, New Delhi.
- William B. Werther Jr. and Keith Davis, Human Resources and Personnel Management, McGraw Hill, Singapore, 4th Ed., 1993.
- Arun Monappa and Mirza S. Saiyadain, Personnel Management, Tata Mc-Graw Hill, New Delhi 1995.
- P Subba Rao, Essentials of Human Resource Management and Industrial Relations: Text, Cases and Games, Himalaya, Mumbai, 2000.
- Biswajeet Patanayak, Human Resource Management, Prentice Hall India, New Delhi 2001.



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REHABILITATION PSYCHOLOGY

Course Code: PSY4404

Credit Units: 03

Course Objective

Objective of this course is to learn profession of Rehabilitation Psychology, Psychological Assessment of persons with disabilities, Psychological Interventions and dealing with families

Course Contents

Module I: Introduction

Overview of the profession of Rehabilitation Psychology and practice, history, growth and scope, Role of Psychologist in Rehabilitation

Module II: Psychological Assessment

Psychological Assessment- Assessment of Cognition, aptitudes, psychopathology, work/vocational and daily functioning

Module III: Health Behavior

Health behavior: Theories of health behavior change, interventions strategies for individuals and families of disabled

Behaviour Modification and Cognitive Therapies in Rehabilitation

Module IV: Families and disability

Dealing with Families- Family's reactions to disabilities, coping styles, family counseling, Coordination with Multidisciplinary team

Module V: Community Based Rehabilitation

Community Based Rehabilitation – Goals of CBR, components of CBR, Role of Professionals, role of Community, Ethical Issues

Examination Scheme

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	7	10	8	5	70

CT: Class Test, H: Home Assignment, P/V/Q: Presentation/Viva/Quiz, A: Attendance, EE: End Semester Examination

Text & References

Text:

- NIMH (1989) Mental Retardation : A Manual for Psychologist, Secundrabad
- Mohapatra C.S. (2004) Disability Management, NIMH, Secundrabad
- Robert G. Frank Timothy R.Elliott (2000). Handbook of Rehabilitation Psychology, APA Washington.
- Michael Brnes Anthony Ward (2009) Oxford Handbook of Rehabilitation Medicine


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References:


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- Peshawaria R. and Venkatesan (1992) Behavioural Approach in Teaching Mentally Retarded Children, NIMH, Secundrabad
- WHO (2004) Community Based Rehabilitation
- Tally A.B, Sivaraman K.P and Murali T(1998)Neurorehabilitaion Principles &practice, NIMHANS Bangalore India



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PSYCHOMETRICS

Course Code: PSY4415

Credit Units: 02

Course Objectives

To acquaint students with advanced topics in psychometrics by supporting them in using the advanced psychometric models with psychometric data and also train students in writing report of the psychometric techniques

Course Contents

Module I: Psychometrics

Psychometrics: Concepts, Classical Test Theory and Practicing Psychometrics, Scaling, statistical concepts, Reliability: Conceptual basis and empirical estimation
Validity: Conceptual basis and empirical estimation, factor analysis and test dimensionality
Classical test theory: assumptions, ramification and practice
Threats to psychometric quality: Test bias, response bias. Special problems in CCT

Module II: Modern test Theory and Practice

Item Response Theory (IRT): basic concepts, models and estimations; Item and Item information; Models for Nominal and graded responses, Nonparametric and Bayesian approach
Other IRT models and applications to non standard testing conditions

Module III: Generalizability Theory

Concepts, Generalizability and variance component G studies and D studies
Conducting and Interpreting Generalizability: One Facet design, two facet design, other designs.

Module IV: Applications

Psychometric Assessment in Occupational Settings.
Psychometric Clinical Assessment
Psychometrics in Educational Settings
Developing publication quality instrument and manual

Module V: Presentations

Multidimensional scaling, Profile analysis, Discriminant analysis, Software applications: R in particular; Dominance (preference) scaling, Categorical modeling, Binary classifications; Non-geometric and non Euclidian model, Confirmatory Factor analysis

Examination Scheme

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	7	10	8	5	70

CT: Class Test, H: Home Assignment, P/V/Q: Presentation/Viva/Quiz, A: Attendance, EE: End Semester Examination



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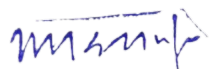
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Reference

- Borsboom, D. (2005). Measuring the mind: Conceptual issues in contemporary psychometrics .Cambridge , UK : Cambridge University Press .
- C.R. Rao (Editor), Sandip Sinharay (Editor). Handbook of Statistics, Volume 26: Psychometrics.
- John Rust and Susan Golombok (2009) Modern Psychometrics: The Science of Psychological Assessment, Third Edition.
- Jum Nunnally and Ira Bernstein. (1994). Psychometric Theory.
- Lord, F. M., & Novick, M. R. (1968). Statistical theories of mental test scores. Reading , MA : Addison-Wesley.
- PB , John Rust, Susan Golombok. (2008). Modern Psychometrics (3rd Revised edition). Taylor & Francis Ltd: UK
- R. Michael Furr and Verne R. Bacharach (2013). Psychometrics: An Introduction



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PRACTICUM-IV

Course Code: PSY4412

Credit Units: 03

Course Objective

To give practical experience to the students in administering and scoring psychological tests and interpreting the scores Also to acquaint the students with the basic procedure and design of psychology experiments Course will also encourage and guide the students to undertake a small-scale research project to apply the general concepts of psychology through experimentation and testing

Note: Total 5practicals will be conducted in the fourth semester among the list of following practicals

Course Content

1	Personality
2	Intelligence
3	Attention
4	Learning
5	Intelligence
6	Health

Examination Scheme

Components	A	File Demonstration	Viva	EE
Weightage (%)	5	35	35	25

Text & References

- Mohsin, S. M.:Experiments in Psychology. MotilalBanarasidas
- Woodworth, R.S.:Experimental Psychology. Oxford & IBH & Schlosberg, H. Publishing
- Postman, L. &Egan, J. P.: Experimental Psychology: An Introduction.Harper and Row



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FIELD PRACTICE-IV

Course Code: PSY4413

Credit Units: 04

Course Objective

To develop, in students the skills of observation, collection and documentation of data for conducting theoretically correct and practically relevant research

Methodology

Each student will engage themselves in interaction and observation of psychological processes in a subject/ field of their choice.

Student will then present their findings in the form of a paper for seminar discussions.

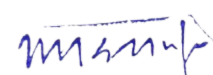
Similarly, field work will be done by students in their area of interest and present their practical observations, as a report with analysis and suggestions.

Examination Scheme

Field/Seminar Report	: 40 marks
Viva-Voce	: 30 marks
Internal Faculty and Interaction	: 10 marks
Presentation/Daily Diary Report	: 20 marks



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DISSERTATION

Course Code: PSY4437

Credit Units: 06

GUIDELINES FOR DISSERTATION

The aim of the dissertation is to provide you with an opportunity to further your intellectual and personal development in your chosen field by undertaking a significant practical unit of activity, having an educational value at a level commensurate with the award of your degree

The dissertation can be defined as a scholarly inquiry into a problem or issues, involving a systematic approach to gathering and analysis of information / data, leading to production of a structured report.

Selecting the Dissertation Topic

It is usual to give you some discretion in the choice of topic for the dissertation and the approach to be adopted. You will need to ensure that your dissertation is related to your field of specialization.

Deciding this is often the most difficult part of the dissertation process, and perhaps, you have been thinking of a topic for some time.

It is important to distinguish here between ‘dissertation topic’ and ‘dissertation title’. The topic is the specific area that you wish to investigate. The title may not be decided until the dissertation has been written so as to reflect its content properly.

Few restrictions are placed on the choice of the topic. Normally we would expect it to be:

- relevant to business, defined broadly;
- related to one or more of the subjects or areas of study within the core program and specialisation stream;
- clearly focused so as to facilitate an in-depth approach, subject to the availability of adequate sources of information and to your own knowledge;
- of value and interest to you and your personal and professional development.

Planning the Dissertation

This will entail following:

- Selecting a topic for investigation.
- Establishing the precise focus of your study by deciding on the aims and objectives of the dissertation, or formulating questions to be investigated. Consider very carefully what is worth investigating and its feasibility.
- Drawing up initial dissertation outlines considering the aims and objectives of the dissertation. Workout various stages of dissertation
- Devising a timetable to ensure that all stages of dissertation are completed in time. The timetable should include writing of the dissertation and regular meetings with your dissertation guide.

The Dissertation plan or outline

It is recommended that you should have a dissertation plan to guide you right from the outset. Essentially, the dissertation plan is an outline of what you intend to do, chapter wise and therefore should reflect the aims and objectives of your dissertation.

There are several reasons for having a dissertation plan

- It provides a focus to your thoughts.
- It provides your faculty-guide with an opportunity, at an early stage of your work, to make constructive comments and help guide the direction of your research.

- The writing of a plan is the first formal stage of the writing process, and therefore helps build up your confidence.
- In many ways, the plan encourages you to come to terms with the reading, thinking and writing in a systematic and integrated way, with plenty of time left for changes.
- Finally, the dissertation plan generally provides a revision point in the development of your dissertation report in order to allow appropriate changes in the scope and even direction of your work as it progresses.

Keeping records

This includes the following:

- Making a note of everything you read; including those discarded.
- Ensuring that when recording sources, author's name and initials, date of publication, title, place of publication and publisher are included. (You may consider starting a card index or database from the outset). Making an accurate note of all quotations at the time you read them.
- Make clear what is a direct quotation and what is your paraphrase.

Dissertation format

All students must follow the following rules in submitting their dissertation.

- Front page should provide title, author, Name of degree/diploma and the date of submission.
- Second page should be the table of contents giving page references for each chapter and section.
- The next page should be the table of appendices, graphs and tables giving titles and page references.
- Next to follow should be a synopsis or abstract of the dissertation (approximately 500 words) titled: **Executive Summary.**
- Next is the 'acknowledgements'.
- Chapter I should be a general introduction, giving the background to the dissertation, the objectives of the dissertation, the rationale for the dissertation, the plan, methodological issues and problems. The limitations of the dissertation should also be hinted in this chapter.
- Other chapters will constitute the body of the dissertation. The number of chapters and their sequence will usually vary depending on, among others, on a critical review of the previous relevant work relating to your major findings, a discussion of their implications, and conclusions, possibly with a suggestion of the direction of future research on the area.
- After this concluding chapter, you should give a list of all the references you have used. These should be cross - references with your text. For articles from journals, the following details are required e.g.

Draper P and Pandyal K. 1991, The Investment Trust Discount Revisited, Journal of Business Finance and Accounting, Vol18, No6, Nov, pp 791-832.

For books, the following details are required:

Levi, M. 1996, International Financial Management, Prentice Hall, New York, 3rd Ed, 1996

- Finally, you should give any appendices. These should only include relevant statistical data or material that cannot be fitted into the above categories.

The Layout Guidelines for the Dissertation:

- A4 size Paper
- Font: Arial (10 points) or Times New Roman (12 points)
- Line spacing: 1.5
- Top and bottom margins: 1 inch/ 2.5 cm; left and right margins: 1.25 inches/ 3 cm

Guidelines for the Assessment of the Dissertation

While evaluating the dissertation, faculty guide will consider the following aspects:

1. Has the student made a clear statement of the objective or objective(s).
2. If there is more than one objective, do these constitute parts of a whole?
3. Has the student developed an appropriate analytical framework for addressing the problem at hand.
4. Is this based on up-to-date developments in the topic area?
5. Has the student collected information / data suitable to the frameworks?
6. Are the techniques employed by the student to analyse the data / information appropriate and relevant?
7. Has the student succeeded in drawing conclusion from the analysis?
8. Do the conclusions relate well to the objectives of the project?
9. Has the student been regular in his work?
10. Layout of the written report.

Assessment Scheme:

Continuous Evaluation: 40%
(Based on Abstract, Regularity,
Adherence to initial plan, Records etc.)

Final Evaluation: Based on, 60%
Contents & Layout of the Report, 25
Conceptual Framework, 10
Objectives & Methodology and 10
Implications & Conclusions 15



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EMPLOYEE COUNSELLING AND EMPOWERMENT

Course Code: PSY4409

Credit Units: 3

Course Objective

To enable students to understand the diversity in organizations and equip them with skills to handle, manage and adjust to a culturally and socially diverse work environment.

Course Contents

Module I: Mentoring Career

Improving various Professionally & Psychologically Skills, Performance & Capacity Development, Career Planning, Setting Goals, Interview Techniques, and Negotiation Skills

Module II: Work Life Counseling

Managing work life: key to perform well; remain stress free, happy & successful at work.

Dealing with Boss, Colleagues & Juniors

Stress Management, Time Management, Crisis Management

Enhancing Performance & Will Power

Work-Life Balance, Motivation & Performance

Meeting Challenges of Workplace Harassment, Discrimination

Module III: Personal Life Counseling

Personality Development and Behavioural Management

Understanding, Improving & Balancing Habits and Behavior

Identifying Power within self

Developing EQ & Emotional Intelligence, Developing Positive Psychology

Utilizing Multiple Intelligence, Confidence Building

Handling & Eradicating Stress & Phobia, Handling Frustration & Unhappiness

Handling Ego/ Self Respect, Handling & eradicating Depression & Loneliness

Module IV: Introduction to Employee Counselling

Meaning, Nature & Scope

Types and functions of Employee Counselling

Coaching, Mentoring and Counselling

Module V: Differences and power

Concepts of prejudice, discrimination and oppression

Cultural and ethnicity as dimensions of differences

Race and racism in organizations

Gender and sexism in organization

Sexual orientation, physical ability, age, social class and other differences in workplace

Module VI: Conflict and Negotiation viz Employee Counselling

Concept of Conflict and Negotiation

Importance and relevance of Conflict and Negotiation in Employee Counselling

Module VII: Employee Empowerment and leadership

Change Management, Employee Involvement for Effective Change Management, Leadership Management, Motivation / Recognition / Retention.

Essentials of Leadership Quality

Self-leadership leads to Empowerment

Relevance of Empowerment in Employee Counselling

Examination Scheme

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	7	10	8	5	70

CT: Class Test, H: Home Assignment, P/V/Q: Presentation/Viva/Quiz, A: Attendance, EE: End Semester Examination

Text & References

Text

- Luthans, F. Organizational Behaviour, McGraw – Hill International, 1998.
- Lashley, C (2001) Empowerment : HR strategies for service excellence Oxford,
- Lashley C (1997) Empowering Service Excellence: beyond the quick fix, London,
- Harold Koontz, O'Donnel and Weihrich, Management, Tata McGraw Hill, New Delhi, 1992.
- MonirH.Tayeb(2005). International Human Resource Management-, Oxford Publications.
- <http://www.newdirectionscounseling.com/defcoun.html>

References:

- Stephen P. Robbins, Organizational Behaviour: Concepts, Controversies, Applications, Prentice Hall, New Delhi, 2000.
- Hyman, J. and Mason, B. (1995) Managing employee involvement and participation.
- Ashkenas, Ulrich, The boundryless Organizations, Jossey- Bass.
- Dalton, Ernst Christ, Success for the Global managers, Jossey- Bass.
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PSYCHOLOGY OF SELLING, MARKETING AND ADVERTISING

Course Code: PSY4416

Credit Units: 03

Course Objectives

To impart the basic knowledge of main psychological theories that is relevant within the field of market psychology among students. How does psychology apply to marketing? Clearly, psychology and marketing are closely related. As a marketing strategist, you need be looking less at what your product has to offer per se and more to the psychology of the consumers to whom you want to sell it.

Course contents

Module I: Introduction

Understanding selling, marketing, advertising Psychology, Nature, scope and need , marketing, advertising Psychology of application of psychology principles in selling, marketing and advertising, The Monkey Business Illusion

Module II: Cognitive Skills: Disciplinary & Cultural Knowledge

Field of psychology complements the field of marketing Identify, main psychological theories and consumer behaviour, Judgment heuristics, rules of perception and marketing psychology, Role of personality, emotions, and motivation in consumer behaviour, Host-city manifestations of the influence of psychology on local consumer

Module III: Analytical Skills: Critical Thinking in Oral & Written Work

Marketing techniques in psychology, Importance of emotions in advertising campaigns, Work of locus of control in your own self-control

Module IV: Affective Skills: Attitudinal & Intrapersonal

Develop and convey empathy for the host peoples' attitudes towards consumption, Curiosity and Interface between marketing and psychology, Respond to psychology of marketing on critical-analytical levels and develop an open mind regarding local consumer habits

Module V: Behavioral Skills: Cultural Engagement & Interpersonal

Knowledge of psychology to become a more aware and self-directed consumer, Use course-related criteria when purchasing you consumer good in the host country, Knowledge of marketing psychology to engage positively with host people & culture

Examination Scheme


Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	7	10	8	5	70

CT: Class Test, H: Home Assignment, P/V/Q: Presentation/Viva/Quiz, A: Attendance,

EE: End Semester Examination



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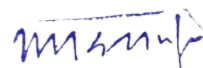
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Reference

- Raab, Gerhard; Goddard, G. Jason; Ajami, Riad A. The Psychology of Marketing: Cross-Cultural Perspectives. Farnham, Surrey, GB: Ashgate Publishing Group, 2010. p. 414.
- Bakir, Aysen; Palan, Kay M. "How Are Children's Attitudes Toward Ads and Brands Affected by GenderRelated Content in Advertising?" Journal of Advertising. Vol. 39 Issue 1. (Spring2010):35-48.
- Bawa, Anupam; Kansal, Purva. "Cognitive Dissonance and the Marketing of Services: Some Issues". Journal of Services Research. Vol. 8 Issue 2. (Oct2008): 31-51.
- Bhattacharjee, Amit. "Constraints and Consequences: Psychological Reactance in Consumption Contexts". Advances in Consumer Research - North American Conference Proceedings. Vol. 37. (2010):53-56.
- Bitektine, Alex. "Toward a Theory of Social Judgments of Organizations: The Case of Legitimacy, Reputation, and Status". Academy of Management Review. Vol. 36 Issue 1. (2011): 151-179.
- Bradley, Nigel. "Graphology: A Tool for Marketing". Marketing Review. Vol. 11 Issue 2 (Summer 2011):103- 115.
- Briñol, Pablo; Petty, Richard E.; Tormala, Zakary. "Self-Validation of Cognitive Responses to Advertisements". The Journal of Consumer Research. Vol. 30, Issue 4. (Mar2004):559-573.



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PSYCHOLOGY OF CRIMINAL BEHAVIOUR AND CRIMINAL PROFILING

Course Code: PSY4417

Credit Units: 03

Course Objectives

To familiarize students with the emerging importance of psychology of criminal behaviour and criminal profiling and also to build awareness regarding the role of the psychologist in Forensic evaluations.

Course Contents

Module I: Bases of criminal behavior

Biological and psychological basis of criminal behavior
Theoretical models in Forensic psychology
Place of psychology in forensic science
Ethical principles and professional competencies

Module II: Forensic assessment

Empirical profiling of psychopathy
Detection of Malingering and Deception
Use of Brain Electrical Oscillation Signature (BEOS)
Psychology and law : custody issues, testimony, documentation

Module III: Civil forensic procedures

Eye witness memory
Jury selection
Child custody
Evaluation of child trauma

Module IV: Criminal Forensic procedures

Forensic evaluation of delinquency and criminal responsibility
Child sexual abuse evaluations
Violence risk assessment
Competence to stand trial


Examination Scheme

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	7	10	8	5	70

CT: Class Test, H: Home Assignment, P/V/Q: Presentation/Viva/Quiz, A: Attendance,
EE: End Semester Examination

Reference

- Bull, R. (ed) 2011) Four volume set Forensic Psychology. LA: Sage publications
- Scott, Adrian (2010) Forensic psychology. NY: Palgrave MacMillan.


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Books for reference

- Donohue, W.T. and Levensky, T.R. (2004)Handbook of Forensic Psychology. NY: Elsevier.
- Goldstein, A. M. Volume ed. Weiner, I.B. Series ed. (2003) Handbook of Psychology: Volume 11 Forensic psychology. NJ: J. Wiley and Sons.
- Heilbrun, K, Marczyk, G.R. and DeMatteo D. (2002) Forensic Mental Health Assessment : A Casebook. UK:OUP.
- McCaffrey, R.J. , Williams, A.D., Fisher, J.M. , Laing, L.C. (1997) The practice of forensic neuropsychology. NY: Plenum press.
- Weiner, I.B. and Hess, A.K. Ed. (2006) Handbook of Forensic Psychology. NJ: J.Wiley and Sons.



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GUIDANCE AND COUNSELLING

Course Code: PSY4419

Credit Units: 03

Course Objectives

This course enables students to gather knowledge about techniques of guidance and Counselling. It is further designed to equip students to practice these learned skills in their day to day life.

Module I: Introduction

Concept of Guidance and Counseling Meaning, Nature, Goals and Principles; Need and Relevance Emergence and Growth of Guidance and Counseling Psychology; Guidance and counseling Movement in India Ethical and legal considerations

Module II: Organization of Programme

Organizing a Guidance Programme Principles of organizing an effective guidance program; Guidance activities at Elementary, Secondary and Senior Secondary level Meaning & Importance of Counseling Skills & Strategies; Stages of Counseling

Module III: Educational Guidance

Educational Guidance Nature, Pupil Personnel work, Pupil Appraisal information, School Curriculum and Guidance. Vocational Guidance Nature, Study of Occupations- Collecting and Disseminating occupational information; Theories of occupation choice Role of counselor in education and vocational guidance

Module IV: Counseling skills

Developing Empathy, rapport establishment, respect and genuineness Skills of Counselor Selection, implementation, evaluation, Observation, listening, silence, attending behaviour, use of questions & termination of counselling.

Module V: Approaches of Counseling

Approaches of Counseling: Directive, Non-directive and Eclectic. Guidance Personnel in organizing Guidance Programmes, Theories of multicultural counseling: identity development, and social justice, Theories and models of individual, cultural, couple, family, and community resilience.

Examination Scheme

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	7	10	8	5	70

CT: Class Test, H: Home Assignment, P/V/Q: Presentation/Viva/Quiz, A: Attendance, EE: End Semester Examination



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References:

- Arther J. J., (1971). Principles of Guidance Delhi : Tata McGraw Hill. - Bhatnagar, A., & Gupta N. (1999). Guidance & Counselling : Practical (Vol I & II) New Delhi: Vikas Publishing House.
- Bernard, H., & Fullmer, D.W. (1977) . Principles of Guidance , New York : Harper & Row. - Chauhan, V., & Jain., (2004). Nireshan Evam Prammarsh. Udaipur: Ankur Prakashan. - Gelso, C., & Fretz, B. (2001). Counselling Psychology. USA: Harcourt College.
- George, R.L., & Cristiani, T.S. (1995). Counselling Theory & Practice. Boston: Allyn & Bacon. - Nelson – Jones, R. (1994). The Theory and Practice of Counselling Psychology. London: Cassell.
- Gupta, S.K. (1985). Guidance and Counselling. Delhi: Mittal. - Kochhar, S.K. (1984). Educational and Vocational Guidance in Secondary Schools. New Delhi: Sterling.
- Palmer, S., & Mc Mohan, G. (1997). Handbook of Counselling Psychology. London: British association for counselling. - Pietrofessa, J.J., Bernstein, B., Minor, J., & Stanford, S. (1980). Guidance: An Introduction. Chicago: Ranel McNally College.



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Master of Arts - Counselling Psychology

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Curriculum & Scheme of Examination 2022

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A handwritten signature in blue ink, appearing to read 'Anil'.

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A handwritten signature in blue ink, appearing to read 'Manesar'.

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Master of Arts - Counselling Psychology

COGNITIVE PSYCHOLOGY

Course Code: PSY4102

Credit Units: 02

Course Objective:

The course deals with the understanding of higher mental processes and its relevance in daily living. The study of normal processes is essential to enable the understanding of neurological or abnormal dysfunctions. The objective of this course is (a) to provide an understanding of normal mental processes and their relationship to brain, mind and behavior, and (b) to study the concept of cognition and its application in cognitive psychology. This will facilitate the students develop the cognitive skills in themselves and others.

Course Contents:

Module I: Historical Background

Psychophysical approach
Information processing approach
Ecological Approach
Contemporary Cognitive Psychology

Module II: Attention and Perception

Theories of Attention and current developments: Broadbent's filter theory, Treisman's attenuation theory, automatic and controlled processing, switching attention.
Perceptual learning and development
Perception of shape, space and movement
Implicit perception and sensory integration theory
Cognitive – Attentional Theory: Information Processor, Cognitive Timer

Module III: Learning

General Phenomenon of Learning: Learning vs Maturation, Native Response Tendencies Theoretical issues of learning: Classical conditioning, Instrumental conditioning Verbal learning: Stimulus material, Trigram Methods-Serial Learning, Paired Associate Learning Discrimination Learning: Nature, Theories-Algebraic Summation Theory, Relational Theory, Transposition Effect

Module IV: Memory & Forgetting

Sensory memory, STM, LTM, Working memory
Metamemory: Semantic & Episodic Memory
Models of Semantic knowledge
Theories of forgetting
Mnemonics

Module V: Thinking and Language Formation

Concept formation and categorization
Judgment and Decision-making
Reasoning & Problem solving: Stages – Preparation, Production, Judgment and Incubation
Structure of language, its acquisition and Formation
Language and Thinking: Linguistic Determinism, language and Cognition

Module VI: Learning and Language Disorder

Reading Disorder/Developmental Dyslexia

Disorder of written expression / Dysphasia / Aphasia

Math Disability / Dyscalculia

Auditory Processing Disorder

Speech and Language pathology

Specific language Impairment

Examination Scheme:

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	7	10	8	5	70

Text & References:

Text:

- Solso, R.L., (2004). Cognitive Psychology, 6th ed.; Delhi: Pearson Education
- Matlin M W (2005). Cognition, Wiley & Sons, Inc.
- Haberlandt, K. Cognitive Psychology. Allyn and Bacon, Boston.
- Anderson, J.R. Cognitive Psychology and its implications. 5th Edi.: Worth Publishers
- Smity, E. E. & Kosslyn, S (2007). Cognitive Psychology: Mind and Brain. Prentice Hall.
- Sen, A.K. & Pande, P. (Eds.) (1998). Current issues in cognitive psychology, Delhi Campus
- Posner, M. (Ed.) (1989). Foundations of cognitive science. London: MIT Press

References:

- Ittyearh, M., & Broota, K.D. (1983). Inter and Intra Model Processing of Sensory-Specific Information. Perceptual and Motor Skills 56. 507-517
- John A & Proctor R (2004). Attention: Theory and Practice. Sage.
- Rock, I. (1995). Perception; NY: Scientific American
- Demjber, & Warm, J.S. (1979). Psychology of perception; NY: Holt
- Wilhit, S.C., & Payne, D.E. (1992). Learning and Memory: The Basis of Behaviours; Needham Heights, Mass: Allyn and Bacon
- Kintsch, W. (1970). Learning, Memory and conceptual process. John Wiley & Son, New York
- Houston, J.P. Fundamentals of Learning and Memory (3rd Ed.). harcourt brace Jovanovich, Inc, New York.
- Newell, A., & Simon H. (1972). Human Problem solving; NJ: Prentice Hall.



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PARAMETRIC STATISTICAL METHOD

Course Code: PSY4105

Credit Units: 03

Course Objective:

The Present paper focuses on providing knowledge about the basics of statistics. It will give clear understanding to the students about application of parametric statistical methods. Parametric tests are generally more powerful in that the likelihood (probability) of a test reaching the correct conclusion is greater. Besides this, a module is added in last so to make students aware of parametric statistics in SPSS. Thereby they can understand the procedures and applications of parametric statistics using SPSS.

Course Contents:

Module I: Basics

Nature, Meaning and importance of statistics Concept of Reasoning, population, sample and probability theory in statistical inferences Categories of statistics: Descriptive and Inferential Variables and their types Scales of Measurement: Nominal, Ordinal, Interval, Ratio.

Module II: Statistical conjecture

Sampling and its kinds: Probability sampling method and Non-Probability sampling method.

Difference between Objectives and Hypothesis

Hypothesis testing: One-tailed and Two-tailed tests, Type I and Type II errors

Module III: Statistics and Test of Significance

Meaning, concept and importance of determining reliability of statistics in data analysis Standard error of mean, standard deviations, percentages and correlation coefficients Significance of difference between means-critical ratio and t-test calculation (large and small sample) assumption & uses One-Way and Two Way ANOVA.

Module IV: Correlation and Regression

Correlation: concept, types, assumption and Utility of Cor-relational Analysis in Psychological Research Bi-serial Correlation, Point Bi-serial Correlation, Partial Correlation, Tetra-choric Correlation Simple and Multiple linear regression, its uses, concepts and assumptions Difference between Simple linear and multiple regressions

Module V: Introduction to SPSS and parametric statistics in SPSS

Introduction to SPSS, its usage and functioning

Understanding the concepts of Parametric tests in SPSS

Learning data entry

Examination Scheme:

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	8	10	7	5	70

Text & References:

Text:

- Minium E.W. King, H.M & Bear G, 1993. Statistical Reasoning in Psychology and Education (3rd Ed.) N Y: John Willey and Sons
- Garrett, H.E., (2004), Statistics in Psychology and Education (11th ed.); New Delhi: Paragon International
- Gupta S.P.: Statistical methods, Sultan and Sons, New Delhi.
- Broota, K.D.: Experimental design in Correlational Research, New Delhi: Wiley Eastern 1989.
- Downie, N.M.: Basic Statistical Methods. New York: Harper and Publishers
- Howitt, D & Cramer, D: Introduction to SPSS statistics in psychology
- James K. Lindsey : Parametric Statistical Inference, Oxford science Publication.
- Cox, D.R.: Principles of statistical inferences.

References:

- Edward, A.E.: Experimental Design in Psychological Research (3rd Ed.), New Delhi: American Publishing Co. 1971
- Berger. R.L.: Statistical Inferences, Cole Pub. Co.
- Wesley O. J & Geisser. S: Modes of Parametric Statistical Inference. Wiley-Interscience
- Rice, J.A: Mathematical Statistics & Data Analysis, South western.
- Salkind, N & Green, S: SPSS Quick Starts.



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PRACTICUM- I

Course Code: PSY4106

Credit Units: 03

Course Objective:

1. To give practical experience to the students in administering and scoring psychological tests and interpreting the scores.
2. To acquaint the students with the basic procedure and design of psychology experiments.
3. To encourage and guide the students to undertake a small-scale research project.
4. To apply the general concepts of psychology through experimentation and testing

Note: Total 5 practicals will be conducted in the first semester among the list of following practicals

Course Content:

1	Continuous Visual Memory Test (CVMT)	Memory
2	Illinois Test of Psycholinguistic Abilities – Third Edition (ITPA-3)	Language
3	16 PF Questionnaire - Fifth Edition with Hand scoring	Personality
4	Tennessee Self-Concept Scale - Second Edition (TSCS:2)	Self-Concept
5	Developmental Test of Visual Perception – Adolescence and Adult	Perception
6	Test of Memory and Learning – Second Ed. (TOMAL-2)	Memory and Learning

Examination Scheme:

Components	A	File Demonstration	Viva	EE
Weightage (%)	5	35	35	25

Text & References:

- Mohsin, S. M.: Experiments in Psychology. Motilal Banarasidas
- Woodworth, R.S.: Experimental Psychology. Oxford & IBH & Schlosberg, H. Publishing
- Postman, L. & Egan, J. P.: Experimental Psychology: An Introduction. Harper and Row



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FIELD PRACTICE-I

Course Code: PSY4107

Credit Units: 04

Course Objective:

To develop, in students the skills of observation, collection and documentation of data for conducting theoretically correct and practically relevant research

Methodology

Each student will engage themselves in interaction and observation of psychological processes in a subject/ field of their choice.

Student will then present their findings in the form of a paper for seminar discussions.

Similarly, field work will be done by students in their area of interest and present their practical observations, as a report with analysis and suggestions.

Examination Scheme:

Field/Seminar Report	: 40 marks
Viva-Voce	: 30 marks
Internal Faculty and Interaction	: 10 marks
Presentation/Daily Diary Report	: 20 marks



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PSYCHOPATHOLOGY

Course Code: PSY4201

Credit Units: 03

Course Objective:

- To acquaint students with various manifestations of psychopathology
- To impart knowledge and skills required for diagnosis of psychological conditions.
- To introduce them to different perspectives and models of etiology.
- To develop skills required for psychopathological formulation.

This course enables students to the study and prediction of adaptive and maladaptive behaviours and its processes across lifespan. It also enables students to understand different diagnostic and educational models of psychopathology.

Course Content:

Module I: Classification and Theoretical Models

Systems of Classification, basic features; DSM-IV TR, ICD-10, similarities and differences Major Theoretical Models of Psychopathology: The medical model, Psychoanalytic model, Behaviouristic model, Humanistic-existential models, Interpersonal approach, Systems approach.

Module II: Diagnosis and Prognosis

Problems and methods of diagnosis: physiological examination, observation, case-history, interview method, psycho-diagnostic tests, measures of bodily functions, computer assisted diagnosis.

Module III: Mood and Anxiety Disorder

Bipolar disorders: Manic, Depressive, Mixed Depressive disorder: Major depression and dysthymia, Suicide Anxiety Disorders: Generalized anxiety disorder, phobia, panic disorder, post traumatic stress disorder and obsessive compulsive disorder

Module IV: Major Clinical Disorders

Schizophrenia

Other psychotic disorders: Bipolar, Delusional, psychotic depression

Module V: Somatoform Disorders

Conversion disorder, Somatization disorder, Hypochondriasis, Body dysmorphic disorder, Pain disorder

Module VI: Disorders of Infancy, Childhood and Adolescence

Developmental disorder: PDD, Rett Disorder, Asperger Disorder, Behavioral Disorder: Conduct Disorder, Hyperactivity Disorder, ADHD, Genetic Disorders: Down Syndrome

Module VII: Personality Disorder

Personality Disorder: Narcissistic Personality, Histrionic Personality, Antisocial (Psychopathic) Personality, Borderline Personality, Paranoid Personality, and Schizotypal Personality

Module VIII: Sexual Dysfunctions and Paraphilias

Dysfunctions of Desire, Arousal, Orgasm and Pain

Paraphilias, Paedophilia and Rape

Gender identity disorders

Impotence and frigidity

Causes, preventing suicide

Examination Scheme:

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	8	10	7	5	70

Text & References:**Text:**

- Davison, G.C. & Neale, J.M. (1990): Abnormal Psychology. New York: John Wiley & Sons
- Carson, R.C. & Butcher, J.N. (1992): Abnormal Psychology and Modern Life (9th Ed.). New York: Harper & Collins.
- Hamilton, Max, (1994). Fish's: Clinical Psychopathology; Verghese Publishing House, Bombay
- Ahuja N (2002). A short text book of Psychiatry (5th edition). New Delhi. Jaypee Brothers.
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References:

- Sarason & Sarason (2002), Abnormal Psychology; Pearson Education, Delhi
- Bennett, P. (2010). Abnormal and Clinical Psychology: An Introductory Textbook. New Delhi: Tata McGraw Hill Education pvt. Ltd.
- Sadock, B.J. & Sadock, V.A. (2003). Kaplan & Sadock's Synopsis of psychiatry: Behavioral sciences/clinical psychiatry (9th. Ed.). Philadelphia: Lippincott Williams & Wilkins
- Coleman, J.C. : Abnormal Psychology & Modern Life
- Lazarus and Folkman: Stress, appraisal and coping.



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PSYCHOLOGICAL ASSESSMENT AND DIAGNOSIS

Course Code: PSY4202

Credit Units: 03

Course Objective:

The course teaches the students about the characteristics, objectives and wide ranging effects of psychological testing. It further describes the various testing methodologies and outlines capabilities and limitations of these methods.

Course Contents:

Module I: Introduction

Purpose of testing, types of test used, Bias & Fairness
Ethical Issues in Psychological Testing
Overview of Tests
Norms, Scoring Interpretation and Report Writings
Issues in measurement
Emerging trends of online testing

Module II: Cognitive functions and their assessment

Concept of Attention, Gestalt Theory, Memory and Forgetting, PGI Memory Scale
Theories of Intelligence
Intelligence Tests:

Slosson Intelligence Test – Revised For Children and Adults (SIT-3/R)

Bhatia Battery Weschler's Adult Performance Intelligence Scale (WAPIS)

Raven's Progressive Matrices (Colour Progressive Matrices, Standard Progressive Matrices and Advanced Progressive Matrices)

Binet Kamat Test

Weschler's Intelligence Scale for Children – Revised (WISC)

Wide Range Intelligence Test (WRIT)

Alexander Pass-a-long Test of Intelligence

Draw-A-person Intellectual Ability Test for Children, Adolescents and Adults (DAP:IQ)

Module III: Achievement Test

Wechsler Individual Achievement Test (WIAT)

Diagnostic Achievement Test For Adolescents – Second Edition (DATA-2)

Kaufman Test of Educational Achievement (KTEA)

Woodcock-Johnson Tests of Achievement (WJ)

Module IV: Assessment of Personality: Non-Projective Test

Cattell's 16 Personality Factor Inventory (16 PF)

California Q-Sort Tests

Myers Briggs Type Indicator (MBTI)

Minnesota Multiphasic Personality Inventory (MMPI)

Personality Inventory for Children

OMNI Personality Inventory (OMNI)

Bell's Adjustment Inventory

Eysenck's Personality Questionnaire

NEO™ Personality Inventory-3 (NEO™-PI-3) Adult / Adolescent


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Module V: Assessment of Personality: Projective Tests

Introduction of Projective Techniques
Difference between Projective & Non-Projective Techniques
Thematic Apperception Test
Rorschach Inkblot Test
House-Tree-Person (H-T-P)
Sentence Completion Test

Module VI: Developmental Scales

Developmental Screening Test
Vineland's Social Maturity Scale
Measures of Psychosocial Development (MPD)
Gesells' Developmental Schedule

Examination Scheme:

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	8	10	7	5	70

Text & References:**Text:**

- Freeman, F. S.,(1965), Theory and Practice of Psychological Testing; New Delhi: Oxford & IBTT

References:

- Jackson C.,(1998), Understanding Psychological Testing; Jaico Publishing House
- Anastasi&Urbina S.(2000), Psychological Testing ,7th Edition; Person Education (Singapore) Pte. Ltd.,
- Guilford J.P.: Psychometric Methods



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NON-PARAMETRIC STATISTICAL METHOD

Course Code: PSY4204

Credit Units: 03

Course Objective: The Present paper focuses on providing knowledge about the basics of nonparametric statistics. It will give clear understanding about differences between Parametric & Nonparametric Test Procedures. This paper will

1. Explain commonly used Nonparametric Test Procedures.
2. Perform Hypothesis Tests Using Nonparametric Procedures.
3. Going to teach student how to use SPSS with non-parametric statistics.

Course Contents:

Module I: Basics

What is Non-Parametric statistics: Nature, Meaning and Concept strengths and limitations of non-parametric procedures Parametric VS Non- Parametric Statistics
Four Levels of Measurement and Non-parametric statistics

Module 2: Tests of differences between Groups and Variables

The Friedman Two-way analysis of variance by ranks-Basic concepts, uses and computations
Test of differences between groups (Independent samples): Mann-Whitney U test computations, Kolmogorov-Smirnov test, uses Test of differences between variables (Dependent samples): Kruskal-Wallis ANOVA analysis of ranks, K-Sample Median test, uses and concepts

Module 3: Nominal Measures of Correlations

Concept definition assumptions of Nominal Measures of Correlations
The Phi-Coefficient, Contingency coefficient concepts uses and calculations
Tetrachoric: Its uses, computation and comparison

Module 4: Chi-Square

Concept and Definition, its assumptions and use
Chi-Square Goodness of Fit (One-Sample Test)
Chi-Square Test of Independence

Module 5: Introduction to SPSS and Non-parametric statistics in SPSS

Introduction to SPSS, its usage and functioning
Understanding the concepts of Non-Parametric tests in SPSS
Learning data entry

Examination Scheme:

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	8	10	7	5	70

Text & References:

Text:

- Dowine, N.M.: Basic Statistical methods, Harper and Publishes New York.
- Gupta S.P. Statistical methods, Sultan and Sons, New Delhi.
- Broota, K.D.: Experimental design in correlational research, New Delhi: Wiley Eastern 1989.

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- Salkind, N & Green, S.:SPSS Quick Starts.
- Howitt, D & Cramer, D.:Introduction to SPSS statistics in psychology.
- McNemar Q.:Psychological Statistics, 3rd Ed. New York, John Wiley 1962.
- Edward, A. E: Experimental Design in Psychological research (3rd Ed) New Delhi: American publishing.

Reference

- Higgins. J.J: Introduction to Modern Nonparametric Statistics.
- Siegal.S: Nonparametric statistics for the behavioral sciences.
- Castellan, J.N. and Siegal. S: Non-parametric statistics for behavioural sciences.
- Daniel, W. Wayne: Applied non-parametric statistics.ADVANCED COUNSELLING SKILLS



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POSITIVE PSYCHOLOGY

Course Code: PSY4206

Credit Units: 02

Course Objective: To enable students to understand the theories and research related to positive psychology and equip students to develop and apply positive psychology for enhancement of self and others.

- To trace the development of positive psychology as an independent discipline with its multidimensional perspective.
- To study the relationship of personality and situational variables with positive psychology.
- To discuss strategies to enhance positive affect.

Course Contents:

Module I: Introduction to Positive Psychology

Positive Psychology: Concept, History, Nature and Scope

Art of Well Being

Defense Mechanism & Coping Strategies

Module II: Interpersonal Perspectives & Emotional Intelligence

Empathy Compassion, Love, Social relations

Hope & Optimism

Theory of Emotions

Emotional Intelligence & its importance

Module III: Strengths and Virtues

Tyranny of Wisdom

Character Strengths and Virtues

Resiliency in the phase of challenge & Loss

Module IV: Happiness

Theories, measures and Positive correlates of happiness

Traits associated with Subjective Happiness

Cross-cultural differences

Module V: Psychology of Positivisms

Positive Emotional States and Well Being with special emphasis on Forgiveness and Gratitude

Positive Institutions: Families, Religion, Spirituality and Well being.

Specific issues: Aging Well

Module VI: Positive Thinking and Applications of Positive Psychology

Examination Scheme:

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	8	10	7	5	70

Text & References:

Text:

- Crompton, W.C. (2005), An Introduction to Positive Psychology, Singapore : Thomson.
- Snyder, C.R. and Lopez, S.J. (2005), Handbook of Positive Psychology, New York Oxford University Press.
- Carr, A. (2004), Positive Psychology: The Science of Happiness and Human Strengths, New York: Brunner – Routledge.
- Linley, P.A. and Joseph, S. (2004), Positive Psychology in Practice, New York : John Wiley and Sons.
- Peterson, C. (2006), Positive Psychology, New York: Oxford University Press.

References:

- Goleman & Daniel, Emotional Intelligence
- C. R. Snyder, Shane J. Lopez, The Handbook of Positive Psychology
- C. R. Snyder, Shane J. Lopez, Positive Psychology: The Scientific and Practical Explorations of Human Strengths
- Rich Gilman, Michael Furlong, E. Scott Huebner, A Handbook of Positive Psychology in Schools
- Ilona Boniwell, Positive Psychology in a Nutshell



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PRACTICUM- II

Course Code: PSY4207

Credit Units: 03

Course Objective:

1. To give practical experience to the students in administering and scoring psychological tests and interpreting the scores.
2. To acquaint the students with the basic procedure and design of psychology experiments.
3. To encourage and guide the students to undertake a small-scale research project.
4. To apply the general concepts of psychology through experimentation and testing

Note: Total 5 practicals will be conducted in the second semester among the list of following practicals

Course Content:

1	Slosson Intelligence Test – Revised For Children and Adults (SIT-3/R)	Intelligence
2	Diagnostic Achievement Test For Adolescents – Second Edition (DATA-2)	Achievement
3	House-Tree-Person (H-T-P)	Personality: Projective
4	Rorschach Ink Blot Test	Personality: Projective
5	Personality Inventory for Children scoring kit	Personality:
6	OMNI Personality Inventory (OMNI) Introductory Kit	Personality:

Examination Scheme:

Components	A	File Demonstration	Viva	EE
Weightage (%)	5	35	35	25

Text & References:

- Mohsin, S. M.: Experiments in Psychology. Motilal Banarasidas
- Woodworth, R.S.: Experimental Psychology. Oxford & IBH & Schlosberg, H. Publishing
- Postman, L. & Egan, J. P.: Experimental Psychology: An Introduction. Harper and Row



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FIELD PRACTICE-II

Course Code: PSY4208

Credit Units: 04

Course Objective:

To develop, in students the skills of observation, collection and documentation of data for conducting theoretically correct and practically relevant research

Methodology

Each student will engage themselves in interaction and observation of psychological processes in a subject/ field of their choice.

Student will then present their findings in the form of a paper for seminar discussions.

Similarly, field work will be done by students in their area of interest and present their practical observations, as a report with analysis and suggestions.

Examination Scheme:

Field/Seminar Report	: 40 marks
Viva-Voce	: 30 marks
Internal Faculty and Interaction	: 10 marks
Presentation/Daily Diary Report	: 20 marks



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SCIENTIFIC RESEARCH PAPER

Course Code: PSY4209

Credit Units: 01

Course Objective:

The scientific research papers for Masters Students is to enhance the reading and writing habits of the students and to make them aware about the process of carrying out a research work. This helps them to develop insight into the course they are studying which creates an academic interest among the students. Presentation of the term paper plays an important role as it facilitates knowledge sharing and improvement in presentation skills which will further enhance the confidence of the students. The overall objective of this term paper is to develop research orientations in students and to make them understand and enhance skills in Research Methodology.

Guidelines for Research Article or Scientific Papers:

Topic
Introduction
Review Research
Objective
Methodology
Discussion
Conclusion
References & Bibliography

No. of pages in the compilation of the paper 25-30 (minimum 25 pages)

Examination Scheme:

Components	Compilation	Viva	Presentation
Weightage (%)	50	25	25



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RESEARCH METHODS: EXPERIMENTAL DESIGN

Course Code: PSY4301

Credit Unit: 02

Course Objective:

Research Methodology is a way to find out the result of a given problem on a specific matter or problem that is also referred as research problem. In Methodology, researcher uses different criteria for solving/searching the given research problem. Different sources use different type of methods for solving the problem. So this course will enable the student to understand and apply basic research methods in psychology including research design, data analysis and report findings research conclusion apparently based on the parameters of particular research methods.

Course Contents:

Module I: Introduction to Research

Meaning of Scientific Research
Objectives and Steps in Scientific Research
Defining research problem
Defining variables
Developing hypothesis

Module II: Evaluating Measures and Hypothesis

Need For Evaluating Measures
Reliability and Validity
Hypothesis testing: Type1 and Type 2
Going beyond hypothesis testing: Effect size and Power

Module III: Validity of Experimental Researches and Threats to them

Statistical Conclusion validity
Construct validity and External Validity
Establishing the cause and Effect
Single Group threat, Multiple Group threats, Social threats

Module IV: Experimental Designs-I

Two-Group experimental designs
 Within-subject Design
 Between-subject design
 General Linear Model

Module V: Experimental Designs-II

Factorial designs
Randomized Block designs
Hybrid Experimental Designs: Solomon four group designs
Mixed designs



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Examination Scheme:

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	8	10	7	5	70

Text & References:**Text:**

- Shuttleworth, Martyn (2008). "Definition of Research". *Experiment Resources*. Experiment-Research.com. Retrieved 14 August 2011.
- Creswell, J. W. (2008). *Educational Research: Planning, conducting, and evaluating quantitative and qualitative research* (3rd ed.). Upper Saddle River: Pearson.
- Trochim, W.M.K, (2006). *Research Methods Knowledge Base*.
- Montgomery, Douglas (2013). *Design and analysis of experiments* (8th ed.). Hoboken, NJ: John Wiley & Sons, Inc.

Reference

- Review of Foundations for research: Methods of inquiry in education and the social sciences, by Kathleen B. deMarrais and Stephen D. Lapan. 2004. *Reference & Research Book News* 19:1.
- Denscombe, Martyn. 2007. *The good research guide for small-scale social research projects*. 3rd ed. Maidenhead, UK: Open University Press. 360 pages. ISBN: 0335220223. \$48.50 (pbk).
- Baker, Lynda M. 2001. Review of *Understanding Research Methods: An Overview of the Essentials*, 2nd ed., by Mildred L. Patten. *The Library Quarterly* 71:96.
- Ellingson, L. L. 2007. Review of *Qualitative research methods for the social sciences*, 6th ed, by B. L. Berg. *Communication Research Trends* 26.1: 24.



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PSYCHOTHERAPY

Course Code: PSY4302

Credit Units: 03

Course Objective:

The course enables students to learn various therapies and their applications in counselling field. The course aims to enable participants to acquire the development and therapies in counselling which can be used in a variety of settings, and also to understand the importance of the development of personal awareness in the effective application of counseling skills.

Course Contents:

Module I: Introduction

Psychotherapy: Meaning, Nature & Scope

Variables affecting Psychotherapy: Specific Variables: Client Variable, Therapist Variable, Process variables, Social & Environmental Variable

Non-Specific Variables: Spontaneous cure, Placebo Effect

Currents and Future Trends of Psychotherapy

Module II: Psychotherapy in India

Psychotherapy in the Indian context

Spirituality and psychotherapy

Yoga and Meditation

Module III: Varieties of Psychotherapy

Supportive therapy

Re-educative Therapy

Re-constructive therapy

Counselling vs. Psychotherapy

Module IV: Psychoanalytic Therapies

Freud's Psycho-analytic Therapy, Adlerian Psychotherapy, Brief Dynamic Therapies

Module V: Humanistic Therapies

Client-Centered Therapy, Existential Therapy and Gestalt Therapy

Module VI: Behavioral and Cognitive Behavior Therapy

Behavioral therapy, Cognitive Behavior therapy, Rational Emotive Behavior Therapy (Ellis)

Module VII: Few more Important Therapies

Family, Marital and Interpersonal Therapy

Therapies with Children and Adolescents

Group Therapy

Module VIII: Therapeutic Guidelines while working with

Women, Older clients, Clients with personality disorder

Grief and loss

Self-harm

Persons from disadvantaged context

Examination Scheme:

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	8	10	7	5	70

Text & References:**Text:**

- Golfried, H. R. & Davison, G. C.: Clinical Behaviour Therapy
- Sharf R., Theories of Psychotherapy & Counselling – Concepts and Cases; 2nd Edition.
- The Top 10: The Most Influential Therapists of the Past Quarter-Century. Psychotherapy Networker.: 2007, March/April (retrieved 7 Oct 2010)
- Henrik, R. (ed) *The Psychotherapy Handbook. The A-Z handbook to more than 250 psychotherapies as used today* (1980) New American Library.

References:

- Kirt S.H. & Clark: Cognitive Behaviour Therapy for Psychiatric Problems.
- Gurman & Kniskern: Handbook of Family Therapy.
- Kahn M.: Between Therapist and Client- The New Relationship- Revised Edition
- Bryant, R.A.; Moulds, M.L.; Guthrie, R.M.; Nixon, R.D.V. (2005). "The Additive Benefit of Hypnosis and Cognitive-Behavioral Therapy in Treating Acute Stress Disorder"



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COUNSELLING PSYCHOLOGY

Course Code: PSY4304

Credit Unit: 03

Course Objective: To produce graduates with a well-developed professional identity as counseling psychologists, including awareness and appreciation of context, development, and strength-based interventions. Thus, we seek to develop the professional skills of our students such that each is able to:

- Demonstrate understanding of the impact of multiple contexts on human behavior
- Demonstrate understanding of theories and techniques of developmentally-based health promotion and intervention for individuals, systems, and communities
- Appreciate the role of individual and cultural differences and diversity in human development and behavior

Course Contents:

Module I: Introduction

Meaning, Definition & Goals

Historical Background: Origin of Counseling within Philosophy and Medicine,

Influence from Psychology, Mental health development, the guidance movement and other influences

Difference between Counseling and other associated helping professions (psychotherapy, psychiatry, social work, guidance etc.)

Module II: Counseling Process

Settings for counseling

Steps in counseling

Therapeutic relationship: The importance of relationship, components of relationship, Facilitative conditions for the counseling relationship

Module III: Counseling Approach: Insight oriented

Psychodynamic Approach: Psychoanalytic, Adlerian

Humanistic Approach: Existential, Client-centered, Gestalt

Module IV: Counselling Approach: Action oriented & other approaches

Behavioural Approach: Operant-Conditioning, Classical-Conditioning.

Cognitive Approach: Cognitive Therapy, Rational emotive therapy.

Other Approaches: Narrative Therapy, Expressive Therapy, and Biofeedback.

Module V: Current Issues in Counseling:

Ethical Issues: Professional Codes, Our divided loyalties, Areas of ethical difficulty, recent trends

Legal Issues: Advice for the passionately committed counseling student

Mental Health Counseling

Counseling diverse population: Gender bias, Counseling the aged, the ethnic minorities, and the physically challenged

Examination Scheme:

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	8	10	7	5	70

Text & References:

Text:

- Williams, E.N., Hayes, J.A., & Fauth, J. (2008). Therapist self-awareness: Interdisciplinary connections and future directions. In S. Brown & R. Lent (Eds.), *Handbook of Counseling Psychology* (4th ed) (pp. 267–283). NY: Wiley.
- Levy, K. N., &Scala, J. (2012). Transference, transference interpretations, and transference-focused psychotherapies. *Psychotherapy*, 49(3), 391-403. doi:10.1037/a0029371
- Ladany, N. & Inman, A. (2008) *Handbook of Counseling Psychology*, (4th ed.). John Wiley & Sons: New York.

References:

- Society of Counseling Psychologists. (n.d.). About counseling psychologists. Found online at <http://www.apa.org/ed/accreditation/doctoral.html>
- Brems, C. & Johnson, M. E. (1997). Comparison of recent graduates of clinical versus counseling psychology programs. *Journal of Psychology*, 131, 91-99.
- Disner SG, Beevers CG, Haigh EA, Beck AT. (2011) "Neural mechanisms of the cognitive model of depression". *Nat Rev Neurosci*. 2011 Jul 6;12 (8):467-77.
- Whyte, C (1978) "Effective Counseling Methods for High-Risk College Freshmen". *Measurement and Evaluation in Guidance*. January. 6. (4).198-2000



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PRACTICUM- III

Course Code: PSY4308

Credit Units: 03

Course Objective:

1. To give practical experience to the students in administering and scoring psychological tests and interpreting the scores.
2. To acquaint the students with the basic procedure and design of psychology experiments.
3. To encourage and guide the students to undertake a small-scale research project.
4. To apply the general concepts of psychology through experimentation and testing

Note: Total 5 practicals will be conducted in the third semester among the list of following practicals

Course Content:

1	Measures of Psychosocial Development (MPD)	Development
2	Culture Free Self-Esteem Inventories, 3 rd Edition	Self-Esteem
3	State-Trait Anger Expression Inventory-2 TM (STAXI-2)	Anger
4	Personality Inventory for Youth	Personality
5	Family Relations Test: Children's Version	Interpersonal Relationship
6	Wide Range Intelligence Test (WRIT)	Intelligence

Examination Scheme:

Components	A	File Demonstration	Viva	EE
Weightage (%)	5	35	35	25

Text & References:

- Mohsin, S. M.: Experiments in Psychology. Motilal Banarasidas
- Woodworth, R.S.: Experimental Psychology. Oxford & IBH & Schlosberg, H. Publishing
- Postman, L. & Egan, J. P.: Experimental Psychology: An Introduction. Harper and Row



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FIELD PRACTICE-III

Course Code: PSY4309

Credit Units: 04

Course Objective:

To develop, in students the skills of observation, collection and documentation of data for conducting theoretically correct and practically relevant research

Methodology

Each student will engage themselves in interaction and observation of psychological processes in a subject/ field of their choice.

Student will then present their findings in the form of a paper for seminar discussions.

Similarly, field work will be done by students in their area of interest and present their practical observations, as a report with analysis and suggestions.

Examination Scheme:

Field/Seminar Report	: 40 marks
Viva-Voce	: 30 marks
Internal Faculty and Interaction	: 10 marks
Presentation/Daily Diary Report	: 20 marks



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SUMMER INTERNSHIP EVALUATION

Course Code: PSY4335

Credit Units: 06

GUIDELINES FOR INTERNSHIP FILE AND INTERNSHIP REPORT

(These guidelines will be useful for undertaking an internship programme during the summer or at any other time wherein the student/ researcher works full time with a company/organisation)

There are certain phases of every Intern's professional development that cannot be effectively taught in the academic environment. These facets can only be learned through direct, on-the-job experience working with successful professionals and experts in the field. The internship programme can best be described as an attempt to institutionalize efforts to bridge the gap between the professional world and the academic institutions. Entire effort in internship is in terms of extending the program of education and evaluation beyond the classroom of a university or institution. The educational process in the internship course seeks out and focuses attention on many latent attributes, which do not surface in the normal class room situations. These attributes are intellectual ability, professional judgment and decision making ability, inter-disciplinary approach, skills for data handling, ability in written and oral presentation, sense of responsibility etc.

In order to achieve these objectives, each student will maintain and submit a file (**Internship File**) and a report (**Internship Report**).

INTERNSHIP FILE

The Internship File aims to encourage students to keep a personal record of their learning and achievements throughout the Programme. It can be used as the basis for lifelong learning and for job applications. *Items can be drawn from activities completed in the course modules and from the workplace to demonstrate learning and personal development.*

The File will assess the student's analytical skills and ability to present supportive evidence, whilst demonstrating understanding of their organization, its needs and his/her own personal contribution to the organization.

The File is essentially a comprehensive documentation of how one proceeds while working on the assignment and should be regularly checked by the faculty guide/ supervisor, issues discussed with the students, doubts if any clarified and signed as having done so. This will form the basis of **continuous evaluation** of the project.

The File will include *five sections* in the order described below.

1. **The Title Page** – An Internship Experience Report For (Your Name), name of internship organization, name of the Supervisor/Guide and his/her designation, date started and completed, and number of credits for which the report is submitted.
2. **Table of Content** – An outline of the contents of the file by topics and subtopics with the page number and location of each section.
3. **Introduction** – Short, but should include how and why you obtained the internship experience position and the relationship it has to your academic/professional and career goals.
4. **Main Body** – Should include a brief summary/ executive summary of the **Internship Project Report** that the student has worked on, an **analysis of the company/organization** in which the student is working, a **personal review** of the student's management skills and how they have been developed

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through the programme, the daily tasks performed, major projects contributed to, dates and hours spent on a task, observations and feelings, meetings attended and their purposes, listing of tools and materials and their suppliers, and photographs if possible of projects, buildings and co-workers.

5. **Appendices** – Include pamphlets, forms, charts, brochures, technical and descriptive literature, graphs and other information related to your Internship experience.

INTERNSHIP REPORT

The **Internship Report** is the research report that the student has to prepare on the project assigned by the organization. (In case a student is not assigned a specific research project in the organization, he has to select any one aspect of the organization and prepare a research report on it). The lay out of the report should be as per the standard layout prescribed by the organization wherein the student undertakes the Internship. In case, there is no layout prescribed by the organization the following components should be included in the report:

➤ **Title or Cover Page.**

The title page should contain Project Title; Student's Name; Programme; Year and Semester and Name of the Faculty Guide.

➤ **Acknowledgements**

Acknowledgment to any advisory or financial assistance received in the course of work may be given. It is incomplete without student's signature.

➤ **Abstract**

A good "Abstract" should be straight to the point; not too descriptive but fully informative. First paragraph should state what was accomplished with regard to the objectives. The abstract does not have to be an entire summary of the project, but rather a concise summary of the scope and results of the project. It should not exceed more than 1000 words.

➤ **Table of Contents**

Titles and subtitles are to correspond exactly with those in the text.

➤ **Introduction**

Here a brief introduction to the problem that is central to the project and an outline of the structure of the rest of the report should be provided. The introduction should aim to catch the imagination of the reader, so excessive details should be avoided.

➤ **Materials and Methods**

This section should aim at experimental designs, materials used (wherever applicable). Methodology should be mentioned in details including modifications undertaken, if any. It includes organization site(s), sample, instruments used with its validation, procedures followed and precautions.

➤ **Results and Discussion**

Present results, discuss and compare these with those from other workers, etc. In writing this section, emphasis should be laid on what has been performed and achieved in the course of the work, rather than discuss in detail what is readily available in text books. Avoid abrupt changes in contents from section to section and maintain a lucid flow throughout the thesis. An opening and closing paragraph in every chapter could be included to aid in smooth flow.

Note that in writing the various sections, all figures and tables should as far as possible be next to the associated text, in the same orientation as the main text, numbered, and given appropriate titles or

captions. All major equations should also be numbered and unless it is really necessary, do not write in “point” form.

While presenting the results, write at length about the the various statistical tools used in the data interpretation. The result interpretation should be simple but full of data and statistical analysis. This data interpretation should be in congruence with the written objectives and the inferences should be drawn on data and not on impression. Avoid writing straight forward conclusion rather, it should lead to generalization of data on the chosen sample.

Results and its discussion should be supporting/contradicting with the previous research work in the given area. Usually one should not use more than two researches in either case of supporting or contradicting the present case of research.

➤ **Conclusion(s) & Recommendations**

A conclusion should be the final section in which the outcome of the work is mentioned briefly. Check that your work answers the following questions:

- Did the research project meet its aims (check back to introduction for stated aims)?
- What are the main findings of the research?
- Are there any recommendations?
- Do you have any conclusion on the research process itself?

➤ **Implications for Future Research**

This should bring out further prospects for the study either thrown open by the present work or with the purpose of making it more comprehensive.

➤ **Appendices**

The Appendices contain material which is of interest to the reader but not an integral part of the thesis and any problem that have arisen that may be useful to document for future reference.

➤ **References**

References should include papers, books etc. referred to in the body of the report. These should be written in the alphabetical order of the author's surname. The titles of journals preferably should not be abbreviated; if they are, abbreviations must comply with an internationally recognised system.

The Layout Guidelines for the Internship File & Internship Report:

- A4 size Paper
- Font: Arial (10 points) or Times New Roman (12 points)
- Line spacing: 1.5
- Top and bottom margins: 1 inch/ 2.5 cm; left and right margins: 1.25 inches/ 3 cm

Assessment Scheme:

Continuous Evaluation: 30%
(based on Internship File and the observations of the faculty guide/ supervisor)

Feedback from Company/ Organization: 10%

Final Evaluation: 60%
(Based on Internship Report, Viva/ Presentation)

CLINICAL PSYCHOLOGY

Course Code: PSY4303

Credit Units: 03

Course objective:

Clinical psychology is the branch of psychology concerned with the assessment and treatment of mental illness, abnormal behavior and psychiatric problems. This field integrates the science of psychology with the treatment of complex human problems, making it an exciting career choice for people who are looking for a challenging and rewarding field.

Course Contents:

Module I: Introduction

Meaning and Nature of Clinical Psychology

Background of Clinical Psychology: First Fifty years of Clinical Psychology (Establishment of Psychological Clinics and Influence of World War I)

Clinical Psychology: between World War I and II; From World War II to Present

Module II: Foundation of Clinical Psychology

Historical origin, the Psychometric tradition, the influence of health and child guidance movement, the influence of Sigmund Freud & the American Psychologist's in America.

The influence of World War II on development of Clinical Psychology

Roots of Clinical Psychology in India: the pre-independence phase, post independence to the present scenario.

Module III: Development of clinical Psychology as a profession.

Activities of Clinical Psychologist: psychological assessment, Psychotherapy, research, community mental health programme, teaching, consultation, administration.

Differences & similarities with other mental health professions

Subspecialties of clinical Psychology: Clinical health Psychology, Forensic Psychology, Geropsychology, Clinical Neuropsychology, and child clinical psychology.

Professional identity, responsibilities

Module IV: Diagnosis and assessment.

Nature and purpose of Clinical diagnosis & assessment

Stages in the Assessment Process

Clinical Assessment Techniques: observation, interview, case-study, Psychological tests.

Module V:

Employment Setting for Clinical Psychologist

Subspecialties of Clinical Psychology

Organizations in Clinical Psychology

Ethical and Legal Issues in Clinical Psychology

Cultural issues, current scenario & future prospects.

Examination Scheme:

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	8	10	7	5	70

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Text & References

Text

- Anastasi, A.: Psychological Testing, New York: MacMillan Publishing company.
- Bellack, A. S.: Introduction to Clinical Psychology. New York: Oxford & Hersen, M. University Press
- Karliger, F.N.: Foundations of Behavioural Research, New York: Holt Rinehart Winston.
- Korchin, S. J.: Modern Clinical Psychology. Delhi CRR Publishers and Distributors
- Ray, S. D.: The Practice of Psychotherapy. New Delhi: New Age International
- Plante, T. G.: Contemporary Clinical Psychology. New York: John Wiley & Sons, Inc.
- Pomerantz, A. M. : Clinical Psychology- Science, Practice and Culture. New Delhi: Sage Publications
- Hecker, J. E.: Introduction to Clinical Psychology. Delhi: Pearson Thorpe, G. L. Education
- Matthews, J. R.: Introduction to Clinical Psychology. New York: Oxford Anton, B. S. University Press
- Herbert, M.: Clinical Child Psychology: Social Learning, Development And Behaviour. New York: John Wiley & Sons, Inc.
- Kumar, A.: Clinical Psychology. Anmol Publications
- Field, A. P.: Clinical Psychology. Learning Matters & Field
- Hatton, C.: Clinical Psychology. New York: John Wiley & Sons, Inc.

References:

- Barlow et al. (2010): Oxford Handbook of clinical psychology. 1st Edition.
- Gross and Hersen., (2007): Handbook of clinical Psychology .Volume 1



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DEVELOPMENTAL PSYCHOLOGY

Course Code: PSY4305

Credit Units: 03

Course objective:

To develop the understanding as to how developmental psychology focuses on the development of individuals across their lifespan within the context of family, peer groups, child-care and after-school programs, schools, neighborhoods, and larger communities and society. It considers the well-being of children, youth, and adults, vis-a-vis the cognitive, emotional, social, academic, and health domains

Course Contents

Module 1: Background of Developmental Psychology

Historical Background

Meaning, Nature and scope

Obstacles in studying Life-Span Development and its effect

Module2: Stages of Development

General Patterns of Development

Stages of Development- Physical, Cognitive, Emotional, Social and Moral

Module 3: Theoretical perspective on Development

Psychodynamic Theories: Freud, Erikson

Social Learning Theory: Albert Bandura

Cognitive Theory: Piaget

Attachment Theory: Bowlby

Socio Cultural Theory: Konrad-Lorens & Niko Tinbergen, Lev Vygotsky

Ecological Theory: Urie Bronfen Brenner

Ethology & Evolutionary Theory

Module 4: Development Related Disorders (DSM-IVTR and I.C.D-10)

Pervasive Developmental Disorder: Autism

Specific Developmental Disorder of Speech and Language

Specific Learning Disabilities-Reading, Spelling, and Arithmetical Disorder

Behavioral Disorders: Attention Deficit Hyperkinetic Disorder, Conduct Disorder, Oppositional defiant Disorder

Module 5: Adjustment Related Issues.

Adolescence: Psychological Hazards, Effects of Immaturity, and happiness in adolescence. Early

Adulthood: Social Mobility, Sex-Role Adjustments, Personal & Social Hazards. Middle Age: Adjustment to Physical and mental changes, Vocational and marital hazards. Old Age: Changes in motor and mental abilities, Hazards to Personal and Social Adjustment.

Examination Scheme:

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	8	10	7	5	70

Text & References:

Text:

- Hurlock, E. B.: Developmental Psychology. McGraw-Hill
- Papalia, D. E.; Olds, S. W. & Feldman, R.D: Human Development (10th Ed.).New York: McGraw-Hill.
- Feldman, R. S.: Discovering the Life Span (2nd Ed.). Prentice Hall
- Berk, L.E.: Child Development. New Delhi: Pearson Education.
- Heatherington, E.M. & Parke, R.D.: Child Psychology: A Contemporary Viewpoint New York: McGraw-Hill
- Kail R. V.: Children and their development. Prentice Hall Inc.
- Bee, H. & Boyd, D.: Life Span Development, Boston, M.A.: Allyn and Bacon.
- Crain, W.: Theories of Development. Englewood Cliffs, New Jersey: Prentice Hall.
- Newman, B.M. & Newman, P.R.: Development Through Life: A Psychosocial Approach. New York: Wadsworth Publishing Company.

References:

- Brodzinsky, D.M.; Gormly, A.V. & Anibron, S.R.: Life Span Human Development; New Delhi: CBS Publication
- Santrock, J.W.: A Topical Approach to Life Span Development. New Delhi: Tata McGraw Hill.
- Bukatko, D. & Daehler, M.W.:Child Development: A Thematic Approach. New York: Houghton Mifflin Company.



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RESEARCH METHODS: NON-EXPERIMENTAL DESIGN

Course Code: PSY4401

Credit Unit: 02

Course Objective:

Research Methodology is a way to find out the result of a given problem on a specific matter or problem that is also referred as research problem. In Methodology, researcher uses different criteria for solving/searching the given research problem. Different sources use different type of methods for solving the problem. So this course will enable the student to understand and apply basic research methods in psychology including research design, data analysis and report findings research conclusion apparently based on the parameters of particular research methods.

Course Contents:

Module I: Introduction

Nature and Purpose of Non-Experimental Research Designs and their importance

Advantages and Disadvantages of Non-experimental Research Designs

Differences between Experimental and Non-Experimental Research Designs

Types of Non-experimental Designs: Pure Descriptive design, Correlational Descriptive Design and Other type

Module II: Quasi- Experimental designs

Quasi- experimental research designs: their uses and importance

One-Group Designs

Non-equivalent control group designs

Pretest-Posttest Control Group Design

Module III: Non-Experimental Designs

Quantitative Non-Experimental Designs, Causal Comparative

Qualitative and Quantitative perspectives: Collecting qualitative data: Case study, interview,

Observational method. Discourse Analysis, Grand narrative analysis, Ethnographic methodology.

Time series Designs

Module IV: Correlational Designs

Correlational research design: Its Basic nature and uses

Kinds of Correlational designs: Panel Design, Cross-Sectional Design and Longitudinal Designs

Concept and application of Multiple Regression Analysis (linear and stepwise)

Factor analysis and Its Implications

Examination Scheme:

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	8	10	7	5	70

Text & References:

Text:

- Shuttleworth, Martyn (2008). "Definition of Research". Experiment Resources. Experiment-Research.com. Retrieved 14 August 2011.
- Creswell, J. W. (2008). Educational Research: Planning, conducting, and evaluating quantitative and qualitative research (3rd ed). Upper Saddle River: Pearson.
- Trochim, W.M.K, (2006). Research Methods Knowledge Base.
- Montgomery, Douglas (2013). Design and analysis of experiments (8th ed). Hoboken, NJ: John Wiley & Sons, Inc. ISBN 9781118146927.

Reference:

- Kothari, C.R (2004), Research Methodology: Methods and Techniques.
- Kumar, R (2005), Research Methodology: A step-by-step beginners.
- Melville and Goddard (2004), Research Methodology: An introduction.
- Khan, J.A(2011), Research Methodology.



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ADVANCE AND APPLIED COUNSELLING SKILLS

Course Code: PSY4403

Credit Unit: 02

Course Objective:

This course enables students to gather knowledge about theories of Advanced Counselling Skills. It is further designed to equip students with skills to practice as a Counselling Psychologist.

Course Contents:

Module I: Counsellor as a person

Personal characteristics: A composite model of human effectiveness, role of self awareness in counselling.

Role and Function of the Counsellor: Definition of Role, Generic roles, organizing roles & functions

Module II: Communication Skills – I

Basic Communication Skills: Attending skills, Listening skills, Integrating Listening Skills.

Exploration Skills: Probe, Immediacy, Self-disclosure, Interpretation, Confrontation.

Action Skills: Information giving, Advice giving, Goal setting, Reinforcement, Directives

Self-disclosure by counsellor – when and how

Helping clients develop and work on preferred scenarios, negotiating homework.

Managing resistance and other obstacles in counselling

Skills of closure and terminating

Module III: Techniques of Helping and working with emotions

Self monitoring of Thought, Feeling and Action, Facilitating problem solving

Understanding and Improving Self talk, rules and thinking patterns.

Behavioural Methods

Module IV: Counseling Applications

Pediatric Counseling: Dynamics and process

Adolescent Counselling: Concept and Issues

Group Counselling: Concept & Process.

Academic Counselling: Definition and Scope.

Marital and Family Counselling: Concept & Process.

Addiction counseling: Principles & Prevention

Geriatric Counselling: Concept and Scope.

Rehabilitation Counseling, And Crisis Intervention & Trauma Counseling

Module V: Assessment in psychology

The purpose of assessment in counselling, Assessment principles

Intelligence and general ability testing

Measuring Achievement and aptitude

Appraisal of personality

Spiritual assessment strategies

Applications of assessment: Treatment planning, evaluation and accountability.

Examination Scheme:

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	8	10	7	5	70

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Text & References:

Text:

- Patri, V., & Anthors R.(2001), Counselling Psychology, Press, New Delhi

References:

- Nelson R Jones ,(2003), Basic Counselling Skills; Sage Publication, London
- Gerald C. (2001), Case Approach to Counselling Psycology; Brooks/Cole, Australia
- Crouch a. (1997), Inside Counselling ; Sage Publication, London
- Ivey A.E. & Ivey M. B. (1999), Intentional Interviewing & Counselling, 4th Edition.
- Woolfe R. & Dryden W. (2001)Handbook of Counselling Psychology; Sage Publication, London



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PRACTICUM- IV

Course Code: PSY4412

Credit Units: 03

Course Objective:

1. To give practical experience to the students in administering and scoring psychological tests and interpreting the scores.
2. To acquaint the students with the basic procedure and design of psychology experiments.
3. To encourage and guide the students to undertake a small-scale research project.
4. To apply the general concepts of psychology through experimentation and testing

Note: Total 5 practicals will be conducted in the fourth semester among the list of following practicals

Course Content:

1	NEO-4™ - Comprehensive Kit	Personality
2	Comprehensive Test of Non-verbal Intelligence-Second Edition (CTONI-2)	Intelligence
3	Neuropsychological Assessment Battery® (NAB®) Attention Module Kit	Attention
4	Detroit Tests of Learning Aptitude - Fourth Edition (DTLA-4)	Learning
5	Reynolds Intellectual Assessment Scales (RIAS)	Intelligence
6	General Health Questionnaire (GHQ)	Health

Examination Scheme:

Components	A	File Demonstration	Viva	EE
Weightage (%)	5	35	35	25

Text & References:

- Mohsin, S. M.: Experiments in Psychology. Motilal Banarasidas
- Woodworth, R.S.: Experimental Psychology. Oxford & IBH & Schlosberg, H. Publishing
- Postman, L. & Egan, J. P.: Experimental Psychology: An Introduction. Harper and Row



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FIELD PRACTICE-IV

Course Code: PSY4413

Credit Units: 04

Course Objective:

To develop, in students the skills of observation, collection and documentation of data for conducting theoretically correct and practically relevant research

Methodology

Each student will engage themselves in interaction and observation of psychological processes in a subject/ field of their choice.

Student will then present their findings in the form of a paper for seminar discussions.

Similarly, field work will be done by students in their area of interest and present their practical observations, as a report with analysis and suggestions.

Examination Scheme:

Field/Seminar Report	: 40 marks
Viva-Voce	: 30 marks
Internal Faculty and Interaction	: 10 marks
Presentation/Daily Diary Report	: 20 marks



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DISSERTATION

Course Code: PSY4437

Credit Units: 06

GUIDELINES FOR DISSERTATION

The aim of the dissertation is to provide you with an opportunity to further your intellectual and personal development in your chosen field by undertaking a significant practical unit of activity, having an educational value at a level commensurate with the award of your degree

The dissertation can be defined as a scholarly inquiry into a problem or issues, involving a systematic approach to gathering and analysis of information / data, leading to production of a structured report.

Selecting the Dissertation Topic

It is usual to give you some discretion in the choice of topic for the dissertation and the approach to be adopted. You will need to ensure that your dissertation is related to your field of specialization.

Deciding this is often the most difficult part of the dissertation process, and perhaps, you have been thinking of a topic for some time.

It is important to distinguish here between 'dissertation topic' and 'dissertation title'. The topic is the specific area that you wish to investigate. The title may not be decided until the dissertation has been written so as to reflect its content properly.

Few restrictions are placed on the choice of the topic. Normally we would expect it to be:

- relevant to business, defined broadly;
- related to one or more of the subjects or areas of study within the core program and specialisation stream;
- clearly focused so as to facilitate an in-depth approach, subject to the availability of adequate sources of information and to your own knowledge;
- of value and interest to you and your personal and professional development.

Planning the Dissertation

This will entail following:

- Selecting a topic for investigation.
- Establishing the precise focus of your study by deciding on the aims and objectives of the dissertation, or formulating questions to be investigated. Consider very carefully what is worth investigating and its feasibility.
- Drawing up initial dissertation outlines considering the aims and objectives of the dissertation. Workout various stages of dissertation
- Devising a timetable to ensure that all stages of dissertation are completed in time. The timetable should include writing of the dissertation and regular meetings with your dissertation guide.

The Dissertation plan or outline

It is recommended that you should have a dissertation plan to guide you right from the outset. Essentially, the dissertation plan is an outline of what you intend to do, chapter wise and therefore should reflect the aims and objectives of your dissertation.

There are several reasons for having a dissertation plan

- It provides a focus to your thoughts.

- It provides your faculty-guide with an opportunity, at an early stage of your work, to make constructive comments and help guide the direction of your research.
- The writing of a plan is the first formal stage of the writing process, and therefore helps build up your confidence.
- In many ways, the plan encourages you to come to terms with the reading, thinking and writing in a systematic and integrated way, with plenty of time left for changes.
- Finally, the dissertation plan generally provides a revision point in the development of your dissertation report in order to allow appropriate changes in the scope and even direction of your work as it progresses.

Keeping records

This includes the following:

- Making a note of everything you read; including those discarded.
- Ensuring that when recording sources, author's name and initials, date of publication, title, place of publication and publisher are included. (You may consider starting a card index or database from the outset). Making an accurate note of all quotations at the time you read them.
- Make clear what is a direct quotation and what is your paraphrase.

Dissertation format

All students must follow the following rules in submitting their dissertation.

- Front page should provide title, author, Name of degree/diploma and the date of submission.
- Second page should be the table of contents giving page references for each chapter and section.
- The next page should be the table of appendices, graphs and tables giving titles and page references.
- Next to follow should be a synopsis or abstract of the dissertation (approximately 500 words) titled: **Executive Summary.**
- Next is the 'acknowledgements'.
- Chapter I should be a general introduction, giving the background to the dissertation, the objectives of the dissertation, the rationale for the dissertation, the plan, methodological issues and problems. The limitations of the dissertation should also be hinted in this chapter.
- Other chapters will constitute the body of the dissertation. The number of chapters and their sequence will usually vary depending on, among others, on a critical review of the previous relevant work relating to your major findings, a discussion of their implications, and conclusions, possibly with a suggestion of the direction of future research on the area.
- After this concluding chapter, you should give a list of all the references you have used. These should be cross - references with your text. For articles from journals, the following details are required e.g.

Draper P and Pandyal K. 1991, The Investment Trust Discount Revisited, Journal of Business Finance and Accounting, Vol18, No6, Nov, pp 791-832.

For books, the following details are required:

Levi, M. 1996, International Financial Management, Prentice Hall, New York, 3rd Ed, 1996

- Finally, you should give any appendices. These should only include relevant statistical data or material that cannot be fitted into the above categories.

The Layout Guidelines for the Dissertation:

- A4 size Paper
- Font: Arial (10 points) or Times New Roman (12 points)
- Line spacing: 1.5

- Top and bottom margins: 1 inch/ 2.5 cm; left and right margins: 1.25 inches/ 3 cm

Guidelines for the Assessment of the Dissertation

While evaluating the dissertation, faculty guide will consider the following aspects:

1. Has the student made a clear statement of the objective or objective(s).
2. If there is more than one objective, do these constitute parts of a whole?
3. Has the student developed an appropriate analytical framework for addressing the problem at hand.
4. Is this based on up-to-date developments in the topic area?
5. Has the student collected information / data suitable to the frameworks?
6. Are the techniques employed by the student to analyse the data / information appropriate and relevant?
7. Has the student succeeded in drawing conclusion from the analysis?
8. Do the conclusions relate well to the objectives of the project?
9. Has the student been regular in his work?
10. Layout of the written report.

Assessment Scheme:

Continuous Evaluation: 40%

(Based on Abstract, Regularity,
Adherence to initial plan, Records etc.)

Final Evaluation: Based on, 60%

Contents & Layout of the Report, 25

Conceptual Framework, 10

Objectives & Methodology and 10

Implications & Conclusions 15



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MENTAL RETARDATION

Course Code: PSY4402

Credit Unit: 03

Course Objective:

The paper on Mental Retardation introduces nature of mental retardation, its classification, assessment and intervention programs.

Course Contents:

Module I:

Mental Retardation: Definition of mental retardation, Classification-Psychological Classification Medical and Educational Classification, Causes and Prevention

Module II:

Mental Retardation: Psycho-educational Assessment, Intelligence Tests, FACP, BASIC-MR, BASAL-MR

Module III:

Mental Retardation: Enhancing Skills- CTC, IEP, Prompting, Task Analysis, Channing, Shaping, Modeling, Reinforcement

Module IV:

Mental Retardation: Reducing maladaptive behaviours- Assessment of maladaptive behaviours, plan of behavior modification, techniques for decreasing problem behavior.

Module V:

Vocational Training and Empowering families having child with Mental Retardation, Special Sports, Acts and Policies

Examination Scheme:

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	8	10	7	5	70

Text & References:

Text:

- NIMH (1989) Mental Retardation : A Manual for Psychologist, Secundrabad
- Peshawaria R. and Venkatesan (1992) Behavioural Approach in Teaching Mentally Retarded Children, NIMH, Secundrabad
- Thressiakutty A.T. and Govindrao L. (2001) Transition of Persons with Mental Retardation from School to Work, NIMH Secundrabad

References:

- Rao, T.A.S. (1992) Manual on Developing Communication Skills in Mentally Retarded Persons, NIMH, Secundrabad
- Hallahan D.P. and Kauffman J.M. (1980) Exceptional Children, Prentice Hall
- National Trust, Govt. of India, Handbook for Teachers

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CHILDHOOD PATHOLOGY AND EXCEPTIONAL CHILDREN

Course Code: PSY4405

Credit Unit: 03

Course Objective:

Objective of this course is to learn various categories of exceptionality, early identification, special and mainstream education

Course Contents:

Module I:

Developmental Disorders- Autism Spectrum Disorders, attention deficit hyperactivity disorder, Mental Retardation, Learning Disabilities, Hearing Impairment, Disability of Locomotion

Module II:

Bipolar disorder in children, conduct disorder, emotional disorders, eating disorders, enuresis
Psychological Assessment of Childhood disorders

Module III:

Special Education: Special Schools and Rehabilitation centres

Mainstreaming: assistive devices, adaptation, barrier free environment

Mainstreaming: Attitudinal change- teachers, non disabled students, Parents and Community

Module IV:

National Institutes in the field of disability: NIMH, NIVH, NIOH, AYJNIHH, NIEPMD, SVNIRTAR, Alimbco.

NGOs, Parent Organizations, Advocacy organization

Module V:

Legislative framework: Mental Health Act, RCI Act, Persons with Disability Act, National Trust Act, UNCRPD

Examination Scheme:

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	8	10	7	5	70

Text & References:

Text:

- Hallahan D.P. and Kauffman J.M. (1980) Exceptional Children, Prentice Hall
- Cratty B.J. and Goldman R.L. (1995) Learning Disabilities: Contemporary Viewpoints, Harwood Academic Publishers
- Cruschank, W.M. (1975). Psychology of Exceptional Children and Youth, Englewood Cliffs N.J.: Prentice Hall

References:

- Rao, T.A.S. (1992) Manual on Developing Communication Skills in Mentally Retarded Persons, NIMH, Secundrabad
- National Trust, Govt. of India, Handbook for Teachers
- NIMH (1989) Mental Retardation : A Manual for Psychologist, Secundrabad
- Peshawaria R. and Venkatesan (1992) Behavioural Approach in Teaching Mentally Retarded Children, NIMH, Secundrabad

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EMPLOYEE COUNSELING AND EMPOWERMENT

Course Code: PSY4409

Credit Units: 3

Course Objective:

To enable students to understand the diversity in organizations and equip them with skills to handle, manage and adjust to a culturally and socially diverse work environment.

Course Contents:

Module I: Mentoring Career

Improving various Professionally & Psychologically Skills, Performance & Capacity Development, Career Planning, Setting Goals, Interview Techniques, and Negotiation Skills

Module II: Work Life Counseling:

Managing work life: key to perform well; remain stress free, happy & successful at work.

- Dealing with Boss, Colleagues & Juniors
- Stress Management, Time Management, Crisis Management
- Enhancing Performance & Will Power
- Work-Life Balance, Motivation & Performance
- Meeting Challenges of Workplace Harassment, Discrimination

Module III: Personal Life Counseling:

Personality Development and Behavioural Management

- Understanding, Improving & Balancing Habits and Behavior
- Identifying Power within self
- Developing EQ & Emotional Intelligence, Developing Positive Psychology
- Utilizing Multiple Intelligence, Confidence Building
- Handling & Eradicating Stress & Phobia, Handling Frustration & Unhappiness
- Handling Ego/ Self Respect, Handling & eradicating Depression & Loneliness

Module IV: Introduction to Employee Counselling

Meaning, Nature & Scope

Types and functions of Employee Counselling

Coaching, Mentoring and Counselling

Module V: Differences and power

Concepts of prejudice, discrimination and oppression

Cultural and ethnicity as dimensions of differences

Race and racism in organizations

Gender and sexism in organization

Sexual orientation, physical ability, age, social class and other differences in workplace

Module VI: Conflict and Negotiation viz Employee Counselling

Concept of Conflict and Negotiation

Importance and relevance of Conflict and Negotiation in Employee Counselling

Module VII: Employee Empowerment and leadership

Change Management, Employee Involvement for Effective Change Management, Leadership

Management, Motivation / Recognition / Retention.

Essentials of Leadership Quality

Self-leadership leads to Empowerment
Relevance of Empowerment in Employee Counselling

Examination Scheme:

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	8	10	7	5	70

Text & References:

Text

- Luthans, F. Organizational Behaviour, McGraw – Hill International, 1998.
- Lashley, C (2001) Empowerment : HR strategies for service excellence Oxford,
- Lashley C (1997) Empowering Service Excellence: beyond the quick fix, London,
- Harold Koontz, O'Donnel and Weihrich, Management, Tata McGraw Hill, New Delhi, 1992.
- MonirH.Tayeb(2005). International Human Resource Management-, Oxford Publications.
- <http://www.newdirectionscounseling.com/defcoun.html>

References:

- Stephen P. Robbins, Organizational Behaviour: Concepts, Controversies, Applications, Prentice Hall, New Delhi, 2000.
- Hyman, J. and Mason, B. (1995) Managing employee involvement and participation.
- Ashkenas, Ulrich, The boundryless Organizations, Jossey- Bass.
- Dalton, Ernst Christ, Success for the Global managers, Jossey- Bass.
- Dhar&Ravishankar, Global Managers, Himalayan Publishing House.



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ORGANIZATIONAL BEHAVIOR AND INDUSTRIAL RELATIONS

Course Code: PSY4410

Credit Units: 03

Course Objective:

To equip students with the basic knowledge of psychological processes in the organizations and skills for using the same for organizational development and to aims at orienting the students to the functions of Industrial relations with relevance to the Indian context.

Course Contents:

Module I: Evolution of management Thought

Organizational Behavior: Definition, goals, fundamental concepts

Concept, Determinants and Models

Historical development of industrial organizational psychology

Module II: Job analysis and selection

Job analysis – Definition and methods – Questionnaire method, checklist method, individual interview method, observation interview method, group method, technical conference method, diary method, work participation method and critical incident method

Selection – Application blank, psychological tests used in selection – Intelligence tests, personality tests, interest tests and aptitude tests (mention two tests in each area). Interview, guided interview, unguided interview, stress interview, group interview.

Module III:

Individual Behavior: Foundation of Individual Behaviour, Personality, Learning, Perception and Attribution, Values and Attitudes, motivation and job performance. Management's assumptions about people.

Group Behavior: Foundation of group behavior, Group Dynamics, Leadership: theories and styles. Conflict: Sources, Patterns, Levels and Resolution. Organizational Power and Politics.

Module IV:

Industrial Relation: Origin, Definition, Scope, Determinant, Socio-Economic, Technical, Political factors affecting IR in changing Environment, Approaches to the study of IR –Psychological, Human Relation, Socio,Gandhinian approach &It's Effect on Management

Module V:

1. Present day industrial worker - comparison with predecessor Industrial disputes: meaning-causes. Importance of good labour management relations-causes of industrial unrest
2. Directive principles of State policy-creating and adopting labour policy.
3. Role of ILO in industrial relations.

Examination Scheme:

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	8	10	7	5	70

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Text & References:

Text:

- Blum & Naylor, Industrial Psychology, CBS Publishers & Distributors.
- Robbins, Stephen P., Organizational Behaviour, Prentice -Hall, New Delhi, 9th ed., 2000.
- B.D.Singh (2007). Compensation and Reward Management, Excel Books, New Delhi.
- Luthans, F. Organizational Behaviour, McGraw – Hill International, 1998.
- Personnel Management and Industrial Relations –P.C.ShejwalkarandS.B.Malegaonkar.

References:

- Kaji H. Hona, Syndrome in workers occupationally exposed, Journal of Hard Surgery.
- Kadefore. R., Ergonomic model for workplace assessment, Human Factors Association of Canada.
- Malik P.L., Industrial Law Eastern, Lucknow, 1991.
- Muchinsky. M. Paul, Psychology Applied to Work – Wadsworth.
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PSYCHOLOGICAL PRACTICE IN PERSONNEL AND HUMAN RESOURCE MANAGEMENT

Course Code: PSY4411

Credit Units: 03

Course Objective:

To enable students to understand the concepts of psychology as applied in various aspects of human resources in organizations and equip them to develop modules in accordance with the optimum use of the same.

Course Contents:

Module I: The Human Resource Management

Structure of Human Resource Management, Role and Responsibilities of the Human Resource Manager; Human Resource Policies - Formulation and Essentials of Sound HR Policies

Module II: Challenges of Personnel Management: Individual and Competitiveness, balancing organizational demands and employees concerns-metaphors used to manage people.

Module III: Development of Human Resources

Learning, Training, Training and Development, Evaluation and Performance Appraisal

Module IV: Meeting HR requirements

Job Analysis and job Descriptions, diversity and empowered employees, career management and developing diverse talent pool, competency assessment- Perspective and Techniques

Module V: Employment Testing

Testing abilities, Testing personality, Testing skills and achievements, Using and not using tests.

Module VI: Contemporary Issues in HR

Strategic Human Resource Management, International Human Resource Management Creating High Performing HR Systems: Wellness Programs and Work Life Balance and Green HRM

Examination Scheme:

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	8	10	7	5	70

Text & References:

Text:

- Cascio (1998) Managing Human Resources. Delhi: Tata McGraw Hill.
- Cascio W.F. & Aguinis H. (2008), Applied Psychology in Human Resource Management, 6th Edition, Printice-Hall, USA
- Robert A. Baron and Donn Byrne, "Social Psychology: Understanding Human Interactions", New Delhi, Prentice Hall of India, 7th Ed., 1995.
- John B. Miner, "Industrial - Organizational Psychology", Singapore, McGraw-Hill, 1992.

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References:

- Snell & Bohlander (2007) Human Resource Management, Thomson South Western.
- David S. Decenzo and Stephen P. Robbins, Personnel/Human Resource Management, Prentice Hall, New Delhi.
- William B. Werther Jr. and Keith Davis, Human Resources and Personnel Management, McGraw Hill, Singapore, 4th Ed., 1993.
- Arun Monappa and Mirza S. Saiyadain, Personnel Management, Tata Mc-Graw Hill, New Delhi 1995.
- P Subba Rao, Essentials of Human Resource Management and Industrial Relations: Text, Cases and Games, Himalaya, Mumbai, 2000.
- Biswajeet Patanayak, Human Resource Management, Prentice Hall India, New Delhi 2001.



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Master of Science - Clinical Psychology

PARAMETRIC STATISTICAL METHOD

Course Code: PSY4105

Credit Units: 03

Course Objective:

The Present paper focuses on providing knowledge about the basics of statistics. It will give clear understanding to the students about application of parametric statistical methods. Parametric tests are generally more powerful in that the likelihood (probability) of a test reaching the correct conclusion is greater. Besides this, a module is added in last so to make students aware of parametric statistics in SPSS. Thereby they can understand the procedures and applications of parametric statistics using SPSS.

Course Contents:

Module I: Basics

Nature, Meaning and importance of statistics

Concept of Reasoning, population, sample and probability theory in statistical inferences

Categories of statistics: Descriptive and Inferential

Variables and their types

Scales of Measurement: Nominal, Ordinal, Interval, Ratio

Module II: Statistical conjecture

Sampling and its kinds: Probability sampling method and Non-Probability sampling method.

Difference between Objectives and Hypothesis

Hypothesis testing: One-tailed and Two-tailed tests, Type I and Type II errors

Module III: Statistics and Test of Significance

Meaning, concept and importance of determining reliability of statistics in data analysis

Standard error of mean, standard deviations, percentages and correlation coefficients

Significance of difference between means-critical ratio and t-test calculation (large and small sample) assumption & uses

One-Way and Two Way ANOVA.

Module IV: Correlation and Regression

Correlation: concept, types, assumption and Utility of Cor-relational Analysis in Psychological Research

Bi-serial Correlation, Point Bi-serial Correlation, Partial Correlation, Tetra-choric Correlation

Simple and Multiple linear regression, its uses, concepts and assumptions

Difference between Simple linear and multiple regressions

Module V: Introduction to SPSS and parametric statistics in SPSS

Introduction to SPSS, its usage and functioning

Understanding the concepts of Parametric tests in SPSS

Learning data entry

Examination Scheme:

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	8	10	7	5	70

Text & References:

Text:

- Minium E.W. King, H.M & Bear G, 1993. Statistical Reasoning in Psychology and Education (3rd Ed.) N Y: John Willey and Sons
- Garrett, H.E., (2004), Statistics in Psychology and Education (11th ed.); New Delhi: Paragon International
- Gupta S.P.: Statistical methods, Sultan and Sons, New Delhi.
- Broota, K.D.: Experimental design in Correlational Research, New Delhi: Wiley Eastern 1989.
- Downie, N.M.: Basic Statistical Methods. New York: Harper and Publishers
- Howitt, D & Cramer, D: Introduction to SPSS statistics in psychology
- James K. Lindsey : Parametric Statistical Inference, Oxford science Publication.
- Cox, D.R.: Principles of statistical inferences.

References:

- Edward, A.E.: Experimental Design in Psychological Research (3rd Ed.), New Delhi: American Publishing Co. 1971
- Berger. R.L: Statistical Inferences, Cole Pub. Co.
- Wesley O. J & Geisser. S: Modes of Parametric Statistical Inference. Wiley-Interscience
- Rice, J.A: Mathematical Statistics & Data Analysis, South western.
- Salkind, N & Green, S: SPSS Quick Starts.



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PRACTICUM- I

Course Code: PSY4106

Credit Units: 03

Course Objective:

- To give practical experience to the students in administering and scoring psychological tests and interpreting the scores.
- To acquaint the students with the basic procedure and design of psychology experiments.
- To encourage and guide the students to undertake a small-scale research project.
- To apply the general concepts of psychology through experimentation and testing

Note: Total 5 practicals will be conducted in the first semester among the list of following practicals

Course Content:

1	Continuous Visual Memory Test (CVMT)	Memory
2	Illinois Test of Psycholinguistic Abilities – Third Edition (ITPA-3)	Language
3	16 PF Questionnaire - Fifth Edition with Hand scoring	Personality
4	Tennessee Self-Concept Scale - Second Edition (TSCS:2)	Self-Concept
5	Developmental Test of Visual Perception – Adolescence and Adult	Perception
6	Test of Memory and Learning – Second Ed. (TOMAL-2)	Memory and Learning

Examination Scheme:

Components	A	File Demonstration	Viva	EE
Weightage (%)	5	35	35	25

Text & References:

- Mohsin, S. M.: Experiments in Psychology. Motilal Banarasidas
- Woodworth, R.S.: Experimental Psychology. Oxford & IBH & Schlosberg, H. Publishing
- Postman, L. & Egan, J. P.: Experimental Psychology: An Introduction. Harper and Row



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FIELD PRACTICE-I

Course Code: PSY4107

Credit Units: 04

Course Objective:

To develop, in students the skills of observation, collection and documentation of data for conducting theoretically correct and practically relevant research

Methodology

Each student will engage themselves in interaction and observation of psychological processes in a subject/ field of their choice.

Student will then present their findings in the form of a paper for seminar discussions.

Similarly, field work will be done by students in their area of interest and present their practical observations, as a report with analysis and suggestions.

Examination Scheme:

Field/Seminar Report	: 40 marks
Viva-Voce	: 30 marks
Internal Faculty and Interaction	: 10 marks
Presentation/Daily Diary Report	: 20 marks



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PSYCHOPATHOLOGY

Course Code: PSY4201

Credit Units: 03

Course Objective:

- To acquaint students with various manifestations of psychopathology
- To impart knowledge and skills required for diagnosis of psychological conditions.
- To introduce them to different perspectives and models of etiology.
- To develop skills required for psychopathological formulation.

This course enables students to the study and prediction of adaptive and maladaptive behaviours and its processes across lifespan. It also enables students to understand different diagnostic and educational models of psychopathology.

Course Content:

Module I: Classification and Theoretical Models

Systems of Classification, basic features; DSM-IV TR, ICD-10, similarities and differences

Major Theoretical Models of Psychopathology: The medical model, Psychoanalytic model, Behaviouristic model, Humanistic-existential models, Interpersonal approach, Systems approach.

Module II: Diagnosis and Prognosis

Problems and methods of diagnosis: physiological examination, observation, case-history, interview method, psycho-diagnostic tests, measures of bodily functions, computer assisted diagnosis.

Module III: Mood and Anxiety Disorder

Bipolar disorders: Manic, Depressive, Mixed

Depressive disorder: Major depression and dysthymia, Suicide

Anxiety Disorders: Generalized anxiety disorder, phobia, panic disorder, post traumatic stress disorder and obsessive compulsive disorder

Module IV: Major Clinical Disorders

Schizophrenia

Other psychotic disorders: Bipolar, Delusional, psychotic depression

Module V: Somatoform Disorders

Conversion disorder, Somatization disorder, Hypochondriasis, Body dysmorphic disorder, Pain disorder

Module VI: Disorders of Infancy, Childhood and Adolescence

Developmental disorder: PDD, Rett Disorder, Asperger Disorder,

Behavioral Disorder: Conduct Disorder, Hyperactivity Disorder, ADHD,

Genetic Disorders: Down Syndrome

Module VII: Personality Disorder

Personality Disorder: Narcissistic Personality, Histrionic Personality, Antisocial (Psychopathic)

Personality, Borderline Personality, Paranoid Personality, and Schizotypal Personality

Module VIII: Sexual Dysfunctions and Paraphilias

Dysfunctions of Desire, Arousal, Orgasm and Pain

Paraphilias, Paedophilia and Rape

Gender identity disorders
Impotence and frigidity
Causes, preventing suicide

Examination Scheme:

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	8	10	7	5	70

Text & References:

Text:

- Davison, G.C. & Neale, J.M. (1990): Abnormal Psychology. New York: John Wiley & Sons
- Carson, R.C. & Butcher, J.N. (1992): Abnormal Psychology and Modern Life (9th Ed.). New York: Harper & Collins.
- Hamilton, Max, (1994). Fish's: Clinical Psychopathology; Verghese Publishing House, Bombay
- Ahuja N (2002). A short text book of Psychiatry (5th edition). New Delhi. Jaypee Brothers.
- Sarason & Sarason (1998). Abnormal Psychology. New Delhi: Prentice Hall of India

References:

- Sarason & Sarason (2002), Abnormal Psychology; Pearson Education, Delhi
- Bennett, P. (2010). Abnormal and Clinical Psychology: An Introductory Textbook. New Delhi: Tata McGraw Hill Education pvt. Ltd.
- Sadock, B.J. & Sadock, V.A. (2003). Kaplan & Sadock's Synopsis of psychiatry: Behavioral sciences/clinical psychiatry (9th. Ed.). Philadelphia: Lippincott Williams & Wilkins
- Coleman, J.C. : Abnormal Psychology & Modern Life
- Lazarus and Folkman: Stress, appraisal and coping



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PSYCHOLOGICAL ASSESSMENT AND DIAGNOSIS

Course Code: PSY4202

Credit Units: 03

Course Objective:

The course teaches the students about the characteristics, objectives and wide ranging effects of psychological testing. It further describes the various testing methodologies and outlines capabilities and limitations of these methods.

Course Contents:

Module I: Introduction

Purpose of testing, types of test used, Bias & Fairness
Ethical Issues in Psychological Testing
Overview of Tests
Norms, Scoring Interpretation and Report Writings
Issues in measurement
Emerging trends of online testing

Module II: Cognitive functions and their assessment

Concept of Attention, Gestalt Theory, Memory and Forgetting, PGI Memory Scale
Theories of Intelligence
Intelligence Tests:

Slosson Intelligence Test – Revised For Children and Adults (SIT-3/R)
Bhatia Battery
Wechsler's Adult Performance Intelligence Scale (WAPIS)
Raven's Progressive Matrices (Colour Progressive Matrices, Standard Progressive Matrices and Advanced Progressive Matrices)
Binet Kamat Test
Wechsler's Intelligence Scale for Children – Revised (WISC)
Wide Range Intelligence Test (WRIT)
Alexander Pass-a-long Test of Intelligence
Draw-A-person Intellectual Ability Test for Children, Adolescents and Adults (DAP:IQ)

Module III: Achievement Test

Wechsler Individual Achievement Test (WIAT)
Diagnostic Achievement Test For Adolescents – Second Edition (DATA-2)
Kaufman Test of Educational Achievement (KTEA)
Woodcock-Johnson Tests of Achievement (WJ)

Module IV: Assessment of Personality: Non-Projective Test

Cattell's 16 Personality Factor Inventory (16 PF)
California Q-Sort Tests
Myers Briggs Type Indicator (MBTI)
Minnesota Multiphasic Personality Inventory (MMPI)
Personality Inventory for Children
OMNI Personality Inventory (OMNI)
Bell's Adjustment Inventory
Eysenck's Personality Questionnaire
NEO™ Personality Inventory-3 (NEO™-PI-3) Adult / Adolescent


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Module V: Assessment of Personality: Projective Tests

Introduction of Projective Techniques

Difference between Projective & Non-Projective Techniques

Thematic Apperception Test

Rorschach Inkblot Test

House-Tree-Person (H-T-P)

Sentence Completion Test

Module VI: Developmental Scales

Developmental Screening Test

Vineland's Social Maturity Scale

Measures of Psychosocial Development (MPD)

Gesells' Developmental Schedule

Examination Scheme:

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	8	10	7	5	70

Text & References:

Text:

- Freeman, F. S.,(1965), Theory and Practice of Psychological Testing; New Delhi: Oxford & IBTT

References:

- Jackson C.,(1998), Understanding Psychological Testing; Jaico Publishing House
- Anastasi&Urbina S.(2000), Psychological Testing ,7th Edition; Person Education (Singapore) Pte. Ltd.,
- Guilford J.P.: Psychometric Methods



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NON-PARAMETRIC STATISTICAL METHOD

Course Code: PSY4204

Credit Units: 03

Course Objective: The Present paper focuses on providing knowledge about the basics of nonparametric statistics. It will give clear understanding about differences between Parametric & Nonparametric Test Procedures. This paper will

1. Explain commonly used Nonparametric Test Procedures.
2. Perform Hypothesis Tests Using Nonparametric Procedures.
3. Going to teach student how to use SPSS with non-parametric statistics.

Course Contents:

Module 1: Basics

What is Non-Parametric statistics: Nature, Meaning and Concept strengths and limitations of non-parametric procedures

Parametric VS Non- Parametric Statistics

Four Levels of Measurement and Non-parametric statistics

Module 2: Tests of differences between Groups and Variables

The Friedman Two-way analysis of variance by ranks-Basic concepts, uses and computations

Test of differences between groups (Independent samples): Mann-Whitney U test computations, Kolmogorov-Smirnov test, uses

Test of differences between variables (Dependent samples): Kruskal-Wallis ANOVA analysis of ranks, K-Sample Median test, uses and concepts

Module 3: Nominal Measures of Correlations

Concept definition assumptions of Nominal Measures of Correlations

The Phi-Coefficient, Contingency coefficient concepts uses and calculations

Tetrachoric: Its uses, computation and comparison

Module 4: Chi-Square

Concept and Definition, its assumptions and use

Chi-Square Goodness of Fit (One-Sample Test)

Chi-Square Test of Independence

Module 5: Introduction to SPSS and Non-parametric statistics in SPSS

Introduction to SPSS, its usage and functioning

Understanding the concepts of Non-Parametric tests in SPSS

Learning data entry

Examination Scheme:

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	8	10	7	5	70

Text & References:

Text:

- Dowine, N.M.: Basic Statistical methods, Harper and Publishes New York.
- Gupta S.P. Statistical methods, Sultan and Sons, New Delhi.
- Broota, K.D.: Experimental design in correlational research, New Delhi: Wiley Eastern 1989.
- Salkind, N & Green, S.:SPSS Quick Starts.
- Howitt, D & Cramer, D.:Introduction to SPSS statistics in psychology.
- McNemar Q.:Psychological Statistics, 3rd Ed. New York, John Wiley 1962.
- Edward, A. E: Experimental Design in Psychological research (3rd Ed) New Delhi: American publishing

Reference

- Higgins. J.J: Introduction to Modern Nonparametric Statistics.
- Siegal.S: Nonparametric statistics for the behavioral sciences.
- Castellan, J.N. and Siegal. S: Non-parametric statistics for behavioural sciences.
- Daniel, W. Wayne: Applied non-parametric statistics.



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HEALTH PSYCHOLOGY

Course Code: PSY4205

Credit Units: 02

Course Objective:

- To give a better understanding of the concept of health and it's various functions to understand its role in human behaviour.
- To acquaint the students with nature and significance of emerging areas of health psychology.
- To highlight the role of social, psychological and behavioural risk factors in health promotion and disease prevention.
- To introduce the students to types of stressors, their consequences, cognitive behavioural interventions for managing stress.
- To impart knowledge about causes and intervention for some prevalent stress related disorders / addictions.

Course Content:

Module I: Introduction to Health

Historical background; Aims and Objectives of Health Psychology, Challenges for the future
Significance of Health Behaviour, Theory of Planned Behaviour: Attributive Theory, Health Locus of Control

Module II: Social Support & Health

Factors for Personality & Health Link, Types of Social Support, Link between social support & Health, Cross Cultural Images of Health

Module III: Life Style Disorder

CAD, CHD, Hypertension, Stroke, Obesity, peptic ulcer, Migraine, Asthma, and Diabetes: Overview, Implications & Management.

Module IV: Health Enhancing Behaviour

Stress: Meaning, Dimensions and Coping Strategies.
Improving Health & Well Being, Enhancing Support
Maintenance of Health: Diet and Nutrition, Relaxation Techniques: Jacobson Progressive Relaxation, Brotha's Relaxation Response

Module V: Health Behaviour Modification

Cognitive Behavioural approach, Relapse Prevention, Attitude & Health-Belief Model
Models of Mental Health: Clinical, Community and Social Action Model

Examination Scheme:

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	8	10	7	5	70



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Text & References:

Text:

- Ogden, J. (1996): Health Psychology: A textbook Open University Press, Buckingham
- Shelly E. Taylor (2006): Health Psychology (6th Ed.). New Delhi: Tata McGraw-Hill
- Pitts, M. & Phillips, K. (1991): Psychology of Health: An Introduction. London: Routledge press
- Khatoon, N. (2012). Ed. Health Psychology. Pearson Education Inc. India
- Taylor, S.E. (1986): Health Psychology. New York: Random House

References:

- Lhermitte, F. (1986) Human Autonomy and the Frontal Lobes. Part II: Patient Behaviour in complex and social situation: The “Environmental Dependency Syndrome”. *Annals of Neurology*, 19, 335- 343.
- Strub and Black “Neuro-behavioural Disorder”
- Luria, A.R. (1966), Higher cortical functions in man, New York, basic books.
- Hecaen, H. and Albert, M.L. (1978), Human Neuropsychology, New York, John Wiley and Sons.



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PRACTICUM- II

Course Code: PSY4207

Credit Units: 03

Course Objective:

1. To give practical experience to the students in administering and scoring psychological tests and interpreting the scores.
2. To acquaint the students with the basic procedure and design of psychology experiments.
3. To encourage and guide the students to undertake a small-scale research project.
4. To apply the general concepts of psychology through experimentation and testing

Note: Total 5 practicals will be conducted in the second semester among the list of following practicals

Course Content:

1	Slosson Intelligence Test – Revised For Children and Adults (SIT-3/R)	Intelligence
2	Diagnostic Achievement Test For Adolescents – Second Edition (DATA-2)	Achievement
3	House-Tree-Person (H-T-P)	Personality: Projective
4	Rorschach Ink Blot Test	Personality: Projective
5	Personality Inventory for Children scoring kit	Personality:
6	OMNI Personality Inventory (OMNI) Introductory Kit	Personality:

Text & References:

- Mohsin, S. M.: Experiments in Psychology. Motilal Banarasidas
- Woodworth, R.S.: Experimental Psychology. Oxford & IBH & Schlosberg, H. Publishing
- Postman, L. & Egan, J. P.: Experimental Psychology: An Introduction. Harper and Row

Examination Scheme:

Components	A	File Demonstration	Viva	EE
Weightage (%)	5	35	35	25



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FIELD PRACTICE-II

Course Code: PSY4208

Credit Units: 04

Course Objective:

To develop, in students the skills of observation, collection and documentation of data for conducting theoretically correct and practically relevant research

Methodology

Each student will engage themselves in interaction and observation of psychological processes in a subject/ field of their choice.

Student will then present their findings in the form of a paper for seminar discussions.

Similarly, field work will be done by students in their area of interest and present their practical observations, as a report with analysis and suggestions.

Examination Scheme:

Field/Seminar Report	: 40 marks
Viva-Voce	: 30 marks
Internal Faculty and Interaction	: 10 marks
Presentation/Daily Diary Report	: 20 marks



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SCIENTIFIC RESEARCH PAPER

Course Code: PSY4209

Credit Units: 01

Course Objective:

The scientific research papers for Masters Students is to enhance the reading and writing habits of the students and to make them aware about the process of carrying out a research work. This helps them to develop insight into the course they are studying which creates an academic interest among the students. Presentation of the term paper plays an important role as it facilitates knowledge sharing and improvement in presentation skills which will further enhance the confidence of the students. The overall objective of this term paper is to develop research orientations in students and to make them understand and enhance skills in Research Methodology.

Guidelines for Research Article or Scientific Papers:

Topic
Introduction
Review Research
Objective
Methodology
Discussion
Conclusion
References & Bibliography

No. of pages in the compilation of the paper 25-30 (minimum 25 pages)

Examination Scheme:

Components	Compilation	Viva	Presentation
Weightage (%)	50	25	25



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RESEARCH METHODS: EXPERIMENTAL DESIGN

Course Code: PSY4301

Credit Unit: 02

Course Objective:

Research Methodology is a way to find out the result of a given problem on a specific matter or problem that is also referred as research problem. In Methodology, researcher uses different criteria for solving/searching the given research problem. Different sources use different type of methods for solving the problem. So this course will enable the student to understand and apply basic research methods in psychology including research design, data analysis and report findings research conclusion apparently based on the parameters of particular research methods.

Course Contents:

Module I: Introduction to Research

Meaning of Scientific Research
Objectives and Steps in Scientific Research
Defining research problem
Defining variables
Developing hypothesis

Module II: Evaluating Measures and Hypothesis

Need For Evaluating Measures
Reliability and Validity
Hypothesis testing: Type1 and Type 2
Going beyond hypothesis testing: Effect size and Power

Module III: Validity of Experimental Researches and Threats to them

Statistical Conclusion validity
Construct validity and External Validity
Establishing the cause and Effect
Single Group threat, Multiple Group threats, Social threats

Module IV: Experimental Designs-I

Two-Group experimental designs
 Within-subject Design
 Between-subject design
 General Linear Model

Module V: Experimental Designs-II

Factorial designs
Randomized Block designs
Hybrid Experimental Designs: Solomon four group designs
Mixed designs



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Examination Scheme:

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	8	10	7	5	70

Text & References:**Text:**

- Shuttleworth, Martyn (2008). "Definition of Research". *Experiment Resources*. Experiment-Research.com. Retrieved 14 August 2011.
- Creswell, J. W. (2008). *Educational Research: Planning, conducting, and evaluating quantitative and qualitative research* (3rd ed.). Upper Saddle River: Pearson.
- Trochim, W.M.K. (2006). *Research Methods Knowledge Base*.
- Montgomery, Douglas (2013). *Design and analysis of experiments* (8th ed.). Hoboken, NJ: John Wiley & Sons, Inc.

Reference

- Review of Foundations for research: Methods of inquiry in education and the social sciences, by Kathleen B. deMarrais and Stephen D. Lapan. 2004. *Reference & Research Book News* 19:1.
- Denscombe, Martyn. 2007. *The good research guide for small-scale social research projects*. 3rd ed. Maidenhead, UK: Open University Press. 360 pages. ISBN: 0335220223. \$48.50 (pbk).
- Baker, Lynda M. 2001. Review of *Understanding Research Methods: An Overview of the Essentials*, 2nd ed., by Mildred L. Patten. *The Library Quarterly* 71:96.
- Ellingson, L. L. 2007. Review of *Qualitative research methods for the social sciences*, 6th ed, by B. L. Berg. *Communication Research Trends* 26.1: 24.



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PSYCHOTHERAPY

Course Code: PSY4302

Credit Units: 03

Course Objective:

The course enables students to learn various therapies and their applications in counselling field. The course aims to enable participants to acquire the development and therapies in counselling which can be used in a variety of settings, and also to understand the importance of the development of personal awareness in the effective application of counseling skills.

Course Contents:

Module I: Introduction

Psychotherapy: Meaning, Nature & Scope

Variables affecting Psychotherapy: Specific Variables: Client Variable, Therapist Variable, Process variables, Social & Environmental Variable

Non-Specific Variables: Spontaneous cure, Placebo Effect

Currents and Future Trends of Psychotherapy

Module II: Psychotherapy in India

Psychotherapy in the Indian context

Spirituality and psychotherapy

Yoga and Meditation

Module III: Varieties of Psychotherapy

Supportive therapy

Re-educative Therapy

Re-constructive therapy

Counselling vs. Psychotherapy

Module IV: Psychoanalytic Therapies

Freud's Psycho-analytic Therapy, Adlerian Psychotherapy, Brief Dynamic Therapies

Module V: Humanistic Therapies

Client-Centered Therapy, Existential Therapy and Gestalt Therapy

Module VI: Behavioral and Cognitive Behavior Therapy

Behavioral therapy, Cognitive Behavior therapy, Rational Emotive Behavior Therapy (Ellis)

Module VII: Few more Important Therapies

Family, Marital and Interpersonal Therapy

Therapies with Children and Adolescents

Group Therapy

Module VIII: Therapeutic Guidelines while working with

Women, Older clients, Clients with personality disorder

Grief and loss

Self-harm

Persons from disadvantaged context

Examination Scheme:

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	8	10	7	5	70

Text & References:**Text:**

- Golfried, H. R. & Davison, G. C.: Clinical Behaviour Therapy
- Sharf R., Theories of Psychotherapy & Counselling – Concepts and Cases; 2nd Edition.
- The Top 10: The Most Influential Therapists of the Past Quarter-Century. Psychotherapy Networker.: 2007, March/April (retrieved 7 Oct 2010)
- Henrik, R. (ed) *The Psychotherapy Handbook. The A-Z handbook to more than 250 psychotherapies as used today* (1980) New American Library.

References:

- Kirt S.H. & Clark: Cognitive Behaviour Therapy for Psychiatric Problems.
- Gurman & Kniskern: Handbook of Family Therapy.
- Kahn M.,: Between Therapist and Client- The New Relationship- Revised Edition
- Bryant, R.A.; Moulds, M.L.; Guthrie, R.M.; Nixon, R.D.V. (2005). "The Additive Benefit of Hypnosis and Cognitive-Behavioral Therapy in Treating Acute Stress Disorder"



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CLINICAL PSYCHOLOGY

Course Code: PSY4303

Credit Units: 03

Course objective:

Clinical psychology is the branch of psychology concerned with the assessment and treatment of mental illness, abnormal behavior and psychiatric problems. This field integrates the science of psychology with the treatment of complex human problems, making it an exciting career choice for people who are looking for a challenging and rewarding field.

Course Contents:

Module I: Introduction

Meaning and Nature of Clinical Psychology

Background of Clinical Psychology: First Fifty years of Clinical Psychology (Establishment of Psychological Clinics and Influence of World War I)

Clinical Psychology: between World War I and II; From World War II to Present

Module II: Foundation of Clinical Psychology

Historical origin, the Psychometric tradition, the influence of health and child guidance movement, the influence of Sigmund Freud & the American Psychologist's in America.

The influence of World War II on development of Clinical Psychology

Roots of Clinical Psychology in India: the pre-independence phase, post independence to the present scenario.

Module III: Development of clinical Psychology as a profession.

Activities of Clinical Psychologist: psychological assessment, Psychotherapy, research, community mental health programme, teaching, consultation, administration.

Differences & similarities with other mental health professions

Subspecialties of clinical Psychology: Clinical health Psychology, Forensic Psychology, Geropsychology, Clinical Neuropsychology, and child clinical psychology.

Professional identity, responsibilities

Module IV: Diagnosis and assessment.

Nature and purpose of Clinical diagnosis & assessment

Stages in the Assessment Process

Clinical Assessment Techniques: observation, interview, case-study, Psychological tests.

Module V:

Employment Setting for Clinical Psychologist

Subspecialties of Clinical Psychology

Organizations in Clinical Psychology

Ethical and Legal Issues in Clinical Psychology

Cultural issues, current scenario & future prospects.

Examination Scheme:

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	8	10	7	5	70

Text & References

Text

- Anastasi, A.: Psychological Testing, New York: MacMillan Publishing company.
- Bellack, A. S.: Introduction to Clinical Psychology. New York: Oxford & Hersen, M. University Press
- Karliger, F.N.: Foundations of Behavioural Research, New York: Holt Rinehart Winston.
- Korchin, S. J.: Modern Clinical Psychology. Delhi CRR Publishers and Distributors
- Ray, S. D.: The Practice of Psychotherapy. New Delhi: New Age International
- Plante, T. G.: Contemporary Clinical Psychology. New York: John Wiley & Sons, Inc.
- Pomerantz, A. M. : Clinical Psychology- Science, Practice and Culture. New Delhi: Sage Publications
- Hecker, J. E.: Introduction to Clinical Psychology. Delhi: Pearson Thorpe, G. L. Education
- Matthews, J. R.: Introduction to Clinical Psychology. New York: Oxford Anton, B. S. University Press
- Herbert, M.: Clinical Child Psychology: Social Learning, Development And Behaviour. New York: John Wiley & Sons, Inc.
- Kumar, A.: Clinical Psychology. Anmol Publications
- Field, A. P.: Clinical Psychology. Learning Matters & Field
- Hatton, C.: Clinical Psychology. New York: John Wiley & Sons, Inc.

References:

- Barlow et al. (2010): Oxford Handbook of clinical psychology. 1st Edition.
- Gross and Hersen., (2007): Handbook of clinical Psychology .Volume 1



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PRACTICUM- III

Course Code: PSY4308

Credit Units: 03

Course Objective:

1. To give practical experience to the students in administering and scoring psychological tests and interpreting the scores.
2. To acquaint the students with the basic procedure and design of psychology experiments.
3. To encourage and guide the students to undertake a small-scale research project.
4. To apply the general concepts of psychology through experimentation and testing

Note: Total 5 practicals will be conducted in the third semester among the list of following practicals

Course Content:

1	Measures of Psychosocial Development (MPD)	Development
2	Culture Free Self-Esteem Inventories, 3 rd Edition	Self-Esteem
3	State-Trait Anger Expression Inventory-2 TM (STAXI-2)	Anger
4	Personality Inventory for Youth	Personality
5	Family Relations Test: Children's Version	Interpersonal Relationship
6	Wide Range Intelligence Test (WRIT)	Intelligence

Text & References:

- Mohsin, S. M.: Experiments in Psychology. Motilal Banarasidas
- Woodworth, R.S.: Experimental Psychology. Oxford & IBH & Schlosberg, H. Publishing
- Postman, L. & Egan, J. P.: Experimental Psychology: An Introduction. Harper and Row

Examination Scheme:

Components	A	File Demonstration	Viva	EE
Weightage (%)	5	35	35	25



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FIELD PRACTICE-III

Course Code: PSY4309

Credit Units: 04

Course Objective:

To develop, in students the skills of observation, collection and documentation of data for conducting theoretically correct and practically relevant research

Methodology

Each student will engage themselves in interaction and observation of psychological processes in a subject/ field of their choice.

Student will then present their findings in the form of a paper for seminar discussions.

Similarly, field work will be done by students in their area of interest and present their practical observations, as a report with analysis and suggestions.

Examination Scheme:

Field/Seminar Report	: 40 marks
Viva-Voce	: 30 marks
Internal Faculty and Interaction	: 10 marks
Presentation/Daily Diary Report	: 20 marks



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SUMMER INTERNSHIP EVALUATION

Course Code: PSY4335

Credit Units: 06

GUIDELINES FOR INTERNSHIP FILE AND INTERNSHIP REPORT

(These guidelines will be useful for undertaking an internship programme during the summer or at any other time wherein the student/ researcher works full time with a company/organisation)

There are certain phases of every Intern's professional development that cannot be effectively taught in the academic environment. These facets can only be learned through direct, on-the-job experience working with successful professionals and experts in the field. The internship programme can best be described as an attempt to institutionalize efforts to bridge the gap between the professional world and the academic institutions. Entire effort in internship is in terms of extending the program of education and evaluation beyond the classroom of a university or institution. The educational process in the internship course seeks out and focuses attention on many latent attributes, which do not surface in the normal class room situations. These attributes are intellectual ability, professional judgment and decision making ability, inter-disciplinary approach, skills for data handling, ability in written and oral presentation, sense of responsibility etc.

In order to achieve these objectives, each student will maintain and submit a file (**Internship File**) and a report (**Internship Report**).

INTERNSHIP FILE

The Internship File aims to encourage students to keep a personal record of their learning and achievements throughout the Programme. It can be used as the basis for lifelong learning and for job applications. *Items can be drawn from activities completed in the course modules and from the workplace to demonstrate learning and personal development.*

The File will assess the student's analytical skills and ability to present supportive evidence, whilst demonstrating understanding of their organization, its needs and his/her own personal contribution to the organization.

The File is essentially a comprehensive documentation of how one proceeds while working on the assignment and should be regularly checked by the faculty guide/ supervisor, issues discussed with the students, doubts if any clarified and signed as having done so. This will form the basis of **continuous evaluation** of the project.

The File will include *five sections* in the order described below.

1. **The Title Page** – An Internship Experience Report For (Your Name), name of internship organization, name of the Supervisor/Guide and his/her designation, date started and completed, and number of credits for which the report is submitted.
2. **Table of Content** – An outline of the contents of the file by topics and subtopics with the page number and location of each section.
3. **Introduction** – Short, but should include how and why you obtained the internship experience position and the relationship it has to your academic/professional and career goals.
4. **Main Body** – Should include a brief summary/ executive summary of the **Internship Project Report** that the student has worked on, an **analysis of the company/organization** in which the student is working, a **personal review** of the student's management skills and how they have been developed

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through the programme, the daily tasks performed, major projects contributed to, dates and hours spent on a task, observations and feelings, meetings attended and their purposes, listing of tools and materials and their suppliers, and photographs if possible of projects, buildings and co-workers.

5. **Appendices** – Include pamphlets, forms, charts, brochures, technical and descriptive literature, graphs and other information related to your Internship experience.

INTERNSHIP REPORT

The **Internship Report** is the research report that the student has to prepare on the project assigned by the organization. (In case a student is not assigned a specific research project in the organization, he has to select any one aspect of the organization and prepare a research report on it). The lay out of the report should be as per the standard layout prescribed by the organization wherein the student undertakes the Internship. In case, there is no layout prescribed by the organization the following components should be included in the report:

➤ **Title or Cover Page.**

The title page should contain Project Title; Student's Name; Programme; Year and Semester and Name of the Faculty Guide.

➤ **Acknowledgements**

Acknowledgment to any advisory or financial assistance received in the course of work may be given. It is incomplete without student's signature.

➤ **Abstract**

A good "Abstract" should be straight to the point; not too descriptive but fully informative. First paragraph should state what was accomplished with regard to the objectives. The abstract does not have to be an entire summary of the project, but rather a concise summary of the scope and results of the project. It should not exceed more than 1000 words.

➤ **Table of Contents**

Titles and subtitles are to correspond exactly with those in the text.

➤ **Introduction**

Here a brief introduction to the problem that is central to the project and an outline of the structure of the rest of the report should be provided. The introduction should aim to catch the imagination of the reader, so excessive details should be avoided.

➤ **Materials and Methods**

This section should aim at experimental designs, materials used (wherever applicable). Methodology should be mentioned in details including modifications undertaken, if any. It includes organization site(s), sample, instruments used with its validation, procedures followed and precautions.

➤ **Results and Discussion**

Present results, discuss and compare these with those from other workers, etc. In writing this section, emphasis should be laid on what has been performed and achieved in the course of the work, rather than discuss in detail what is readily available in text books. Avoid abrupt changes in contents from section to section and maintain a lucid flow throughout the thesis. An opening and closing paragraph in every chapter could be included to aid in smooth flow.

Note that in writing the various sections, all figures and tables should as far as possible be next to the associated text, in the same orientation as the main text, numbered, and given appropriate titles or

captions. All major equations should also be numbered and unless it is really necessary, do not write in “point” form.

While presenting the results, write at length about the the various statistical tools used in the data interpretation. The result interpretation should be simple but full of data and statistical analysis. This data interpretation should be in congruence with the written objectives and the inferences should be drawn on data and not on impression. Avoid writing straight forward conclusion rather, it should lead to generalization of data on the chosen sample.

Results and its discussion should be supporting/contradicting with the previous research work in the given area. Usually one should not use more than two researches in either case of supporting or contradicting the present case of research.

➤ **Conclusion(s) & Recommendations**

A conclusion should be the final section in which the outcome of the work is mentioned briefly. Check that your work answers the following questions:

- Did the research project meet its aims (check back to introduction for stated aims)?
- What are the main findings of the research?
- Are there any recommendations?
- Do you have any conclusion on the research process itself?

➤ **Implications for Future Research**

This should bring out further prospects for the study either thrown open by the present work or with the purpose of making it more comprehensive.

➤ **Appendices**

The Appendices contain material which is of interest to the reader but not an integral part of the thesis and any problem that have arisen that may be useful to document for future reference.

➤ **References**

References should include papers, books etc. referred to in the body of the report. These should be written in the alphabetical order of the author's surname. The titles of journals preferably should not be abbreviated; if they are, abbreviations must comply with an internationally recognised system.

The Layout Guidelines for the Internship File & Internship Report:

- A4 size Paper
- Font: Arial (10 points) or Times New Roman (12 points)
- Line spacing: 1.5
- Top and bottom margins: 1 inch/ 2.5 cm; left and right margins: 1.25 inches/ 3 cm

Assessment Scheme:

Continuous Evaluation: 30%
(based on Internship File and the observations of the faculty guide/ supervisor)

Feedback from Company/ Organization: 10%

Final Evaluation: 60%
(Based on Internship Report, Viva/ Presentation)

COUNSELLING PSYCHOLOGY

Course Code: PSY4304

Credit Unit: 03

Course Objective: To produce graduates with a well-developed professional identity as counseling psychologists, including awareness and appreciation of context, development, and strength-based interventions. Thus, we seek to develop the professional skills of our students such that each is able to:

- Demonstrate understanding of the impact of multiple contexts on human behavior
- Demonstrate understanding of theories and techniques of developmentally-based health promotion and intervention for individuals, systems, and communities
- Appreciate the role of individual and cultural differences and diversity in human development and behavior

Course Contents:

Module I: Introduction

Meaning, Definition & Goals

Historical Background: Origin of Counseling within Philosophy and Medicine,

Influence from Psychology, Mental health development, the guidance movement and other influences

Difference between Counseling and other associated helping professions (psychotherapy, psychiatry, social work, guidance etc.)

Module II: Counseling Process

Settings for counseling

Steps in counseling

Therapeutic relationship: The importance of relationship, components of relationship, Facilitative conditions for the counseling relationship

Module III: Counseling Approach: Insight oriented

Psychodynamic Approach: Psychoanalytic, Adlerian

Humanistic Approach: Existential, Client-centered, Gestalt

Module IV: Counselling Approach: Action oriented & other approaches

Behavioural Approach: Operant-Conditioning, Classical-Conditioning.

Cognitive Approach: Cognitive Therapy, Rational emotive therapy.

Other Approaches: Narrative Therapy, Expressive Therapy, and Biofeedback.

Module V: Current Issues in Counseling:

Ethical Issues: Professional Codes, Our divided loyalties, Areas of ethical difficulty, recent trends

Legal Issues: Advice for the passionately committed counseling student

Mental Health Counseling

Counseling diverse population: Gender bias, Counseling the aged, the ethnic minorities, and the physically challenged

Examination Scheme:

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	8	10	7	5	70

Text & References:

Text:

- Williams, E.N., Hayes, J.A., & Fauth, J. (2008). Therapist self-awareness: Interdisciplinary connections and future directions. In S. Brown & R. Lent (Eds.), *Handbook of Counseling Psychology* (4th ed) (pp. 267–283). NY: Wiley.
- Levy, K. N., &Scala, J. (2012). Transference, transference interpretations, and transference-focused psychotherapies. *Psychotherapy*, 49(3), 391-403. doi:10.1037/a0029371
- Ladany, N. & Inman, A. (2008) *Handbook of Counseling Psychology*, (4th ed.). John Wiley & Sons: New York.

References:

- Society of Counseling Psychologists. (n.d.). About counseling psychologists. Found online at <http://www.apa.org/ed/accreditation/doctoral.html>
- Brems, C. & Johnson, M. E. (1997). Comparison of recent graduates of clinical versus counseling psychology programs. *Journal of Psychology*, 131, 91-99.
- Disner SG, Beevers CG, Haigh EA, Beck AT. (2011) "Neural mechanisms of the cognitive model of depression". *Nat Rev Neurosci*. 2011 Jul 6;12 (8):467-77.
- Whyte, C (1978) "Effective Counseling Methods for High-Risk College Freshmen". *Measurement and Evaluation in Guidance*. January. 6. (4).198-2000



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NEURO-PSYCHOLOGY

Course Code: PSY4306

Credit Units: 03

Course Objective:

The objective of this course is to give a better knowledge of brain and its various functions to understand its role in human behavior.

Course Contents:

Module I: Introduction

Understanding the concept of Neuropsychology
The rationale for Neuropsychological evaluation
Common problems with brain damage

Module II: Plasticity of Brain

Neuropsychological aspect of plasticity of brain
Cerebral cortex and lateralization / localization of functions

Module III: Frontal Lobe and Temporal Lobe Deficits

Behavioural/ emotional/ personality/ cognitive changes associated with the lobe functions.

Module IV: Parietal and Occipital Lobes Deficits

Behavioural / emotional/ cognitive functions associated with each lobe.

Module V: Neuropsychological Rehabilitation (Holistic Approach)

Planning, process and outcome of cognitive retraining
Role of family and larger community
Financial/ employment Rehabilitation
Neuropsychological Assessment

- Bender Gestalt Test
- Benton's Visual Retention Test

Module VI: Social Support and Health

Factors for Personality and Health Link
Types of Social Support
Link between social support and Health
Cross cultural images of health

Examination Scheme:

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	8	10	7	5	70


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Text & References:

Text:

- Luria, A.R. (1966), Higher cortical functions in man, New York, basic books.
- Hecaen, H. and Albert, M.L. (1978), Human Neuropsychology, New York, John Wily and Sons.
- Brannon, L. & Feist, J. (2007): Introduction to Health Psychology. Cengage Learning

References:

- Walsh, K. W. (1978), Neuropsychology a clinical approach, Edinburgh, Churchill Livingston.
- Vinken, P.J. & Bruyn, G.W. (1969) (Ed.), handbook of Clinical Neurology, Amesterdam, North Holland .
 - Kirshener, H.S, (1986) Behavioural Neurology, New York, Churchill Livingston.
- Lhermitte, F. (1986) Human Autonomy and the Frontal Lobes. Part II: Patient Behavioural in complex and social situation: The “Environmental Dependency Syndrome”. Annuals of Neurology, 19, 335- 343.
 - Strub and Black Neuro-behavioural Disorder.
 - Taylor, SE (1986) Health Psychology Random House, New York.



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RESEARCH METHODS: NON-EXPERIMENTAL DESIGN

Course Code: PSY4401

Credit Unit: 02

Course Objective:

Research Methodology is a way to find out the result of a given problem on a specific matter or problem that is also referred as research problem. In Methodology, researcher uses different criteria for solving/searching the given research problem. Different sources use different type of methods for solving the problem. So this course will enable the student to understand and apply basic research methods in psychology including research design, data analysis and report findings research conclusion apparently based on the parameters of particular research methods.

Course Contents:

Module I: Introduction

Nature and Purpose of Non-Experimental Research Designs and their importance

Advantages and Disadvantages of Non-experimental Research Designs

Differences between Experimental and Non-Experimental Research Designs

Types of Non-experimental Designs: Pure Descriptive design, Correlational Descriptive Design and Other type

Module II: Quasi- Experimental designs

Quasi- experimental research designs: their uses and importance

One-Group Designs

Non-equivalent control group designs

Pretest-Posttest Control Group Design

Module III: Non-Experimental Designs

Quantitative Non-Experimental Designs, Causal Comparative

Qualitative and Quantitative perspectives: Collecting qualitative data: Case study, interview,

Observational method. Discourse Analysis, Grand narrative analysis, Ethnographic methodology.

Time series Designs

Module IV: Correlational Designs

Correlational research design: Its Basic nature and uses

Kinds of Correlational designs: Panel Design, Cross-Sectional Design and Longitudinal Designs

Concept and application of Multiple Regression Analysis (linear and stepwise)

Factor analysis and Its Implications

Examination Scheme:

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	8	10	7	5	70


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Text & References:

Text:

- Shuttleworth, Martyn (2008). "Definition of Research". Experiment Resources. Experiment-Research.com. Retrieved 14 August 2011.
- Creswell, J. W. (2008). Educational Research: Planning, conducting, and evaluating quantitative and qualitative research (3rd ed). Upper Saddle River: Pearson.
- Trochim, W.M.K, (2006). Research Methods Knowledge Base.
- Montgomery, Douglas (2013). Design and analysis of experiments (8th ed). Hoboken, NJ: John Wiley & Sons, Inc. ISBN 9781118146927.

Reference:

- Kothari, C.R (2004), Research Methodology: Methods and Techniques.
- Kumar, R (2005), Research Methodology: A step-by-step beginners.
- Melville and Goddard (2004), Research Methodology: An introduction.
- Khan, J.A(2011), Research Methodology.



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MENTAL RETARDATION

Course Code: PSY4402

Credit Units: 02

Course Objective:

The paper on Mental Retardation introduces nature of mental retardation, its classification, assessment and intervention programs.

Course Contents:

Module I:

Mental Retardation: Definition of mental retardation, Classification-Psychological Classification Medical and Educational Classification, Causes and Prevention

Module II:

Mental Retardation: Psycho-educational Assessment, Intelligence Tests, FACP, BASIC-MR, BASAL-MR

Module III:

Mental Retardation: Enhancing Skills- CTC, IEP, Prompting, Task Analysis, Channing, Shaping, Modeling, Reinforcement

Module IV:

Mental Retardation: Reducing maladaptive behaviours- Assessment of maladaptive behaviours, plan of behavior modification, techniques for decreasing problem behavior.

Module V:

Vocational Training and Empowering families having child with Mental Retardation, Special Sports, Acts and Policies

Examination Scheme:

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	8	10	7	5	70

Text & References:

Text:

- NIMH (1989) Mental Retardation : A Manual for Psychologist, Secundrabad
- Peshawaria R. and Venkatesan (1992) Behavioural Approach in Teaching Mentally Retarded Children, NIMH, Secundrabad
- Thressiakutty A.T. and Govindrao L. (2001) Transition of Persons with Mental Retardation from School to Work, NIMH Secundrabad

References:

- Rao, T.A.S. (1992) Manual on Developing Communication Skills in Mentally Retarded Persons, NIMH, Secundrabad
- Hallahan D.P. and Kauffman J.M. (1980) Exceptional Children, Prentice Hall
- National Trust, Govt. of India, Handbook for Teachers

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PRACTICUM- IV

Course Code: PSY4412

Credit Units: 03

Course Objective:

1. To give practical experience to the students in administering and scoring psychological tests and interpreting the scores.
2. To acquaint the students with the basic procedure and design of psychology experiments.
3. To encourage and guide the students to undertake a small-scale research project.
4. To apply the general concepts of psychology through experimentation and testing

Note: Total 5 practicals will be conducted in the fourth semester among the list of following practicals

Course Content:

1	NEO-4™ - Comprehensive Kit	Personality
2	Comprehensive Test of Non-verbal Intelligence-Second Edition (CTONI-2)	Intelligence
3	Neuropsychological Assessment Battery® (NAB®) Attention Module Kit	Attention
4	Detroit Tests of Learning Aptitude - Fourth Edition (DTLA-4)	Learning
5	Reynolds Intellectual Assessment Scales (RIAS)	Intelligence
6	General Health Questionnaire (GHQ)	Health

Examination Scheme:

Components	A	File Demonstration	Viva	EE
Weightage (%)	5	35	35	25

Text & References:

- Mohsin, S. M.: Experiments in Psychology. Motilal Banarasidas
- Woodworth, R.S.: Experimental Psychology. Oxford & IBH & Schlosberg, H. Publishing
- Postman, L. & Egan, J. P.: Experimental Psychology: An Introduction. Harper and Row



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FIELD PRACTICE-IV

Course Code: PSY4413

Credit Units: 04

Course Objective:

To develop, in students the skills of observation, collection and documentation of data for conducting theoretically correct and practically relevant research

Methodology

Each student will engage themselves in interaction and observation of psychological processes in a subject/ field of their choice.

Student will then present their findings in the form of a paper for seminar discussions.

Similarly, field work will be done by students in their area of interest and present their practical observations, as a report with analysis and suggestions.

Examination Scheme:

Field/Seminar Report	: 40 marks
Viva-Voce	: 30 marks
Internal Faculty and Interaction	: 10 marks
Presentation/Daily Diary Report	: 20 marks



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DISSERTATION

Course Code: PSY4437

Credit Units: 06

GUIDELINES FOR DISSERTATION

The aim of the dissertation is to provide you with an opportunity to further your intellectual and personal development in your chosen field by undertaking a significant practical unit of activity, having an educational value at a level commensurate with the award of your degree

The dissertation can be defined as a scholarly inquiry into a problem or issues, involving a systematic approach to gathering and analysis of information / data, leading to production of a structured report.

Selecting the Dissertation Topic

It is usual to give you some discretion in the choice of topic for the dissertation and the approach to be adopted. You will need to ensure that your dissertation is related to your field of specialization.

Deciding this is often the most difficult part of the dissertation process, and perhaps, you have been thinking of a topic for some time.

It is important to distinguish here between 'dissertation topic' and 'dissertation title'. The topic is the specific area that you wish to investigate. The title may not be decided until the dissertation has been written so as to reflect its content properly.

Few restrictions are placed on the choice of the topic. Normally we would expect it to be:

- relevant to business, defined broadly;
- related to one or more of the subjects or areas of study within the core program and specialisation stream;
- clearly focused so as to facilitate an in-depth approach, subject to the availability of adequate sources of information and to your own knowledge;
- of value and interest to you and your personal and professional development.

Planning the Dissertation

This will entail following:

- Selecting a topic for investigation.
- Establishing the precise focus of your study by deciding on the aims and objectives of the dissertation, or formulating questions to be investigated. Consider very carefully what is worth investigating and its feasibility.
- Drawing up initial dissertation outlines considering the aims and objectives of the dissertation. Workout various stages of dissertation
- Devising a timetable to ensure that all stages of dissertation are completed in time. The timetable should include writing of the dissertation and regular meetings with your dissertation guide.

The Dissertation plan or outline

It is recommended that you should have a dissertation plan to guide you right from the outset. Essentially, the dissertation plan is an outline of what you intend to do, chapter wise and therefore should reflect the aims and objectives of your dissertation.

There are several reasons for having a dissertation plan

- It provides a focus to your thoughts.

- It provides your faculty-guide with an opportunity, at an early stage of your work, to make constructive comments and help guide the direction of your research.
- The writing of a plan is the first formal stage of the writing process, and therefore helps build up your confidence.
- In many ways, the plan encourages you to come to terms with the reading, thinking and writing in a systematic and integrated way, with plenty of time left for changes.
- Finally, the dissertation plan generally provides a revision point in the development of your dissertation report in order to allow appropriate changes in the scope and even direction of your work as it progresses.

Keeping records

This includes the following:

- Making a note of everything you read; including those discarded.
- Ensuring that when recording sources, author's name and initials, date of publication, title, place of publication and publisher are included. (You may consider starting a card index or database from the outset). Making an accurate note of all quotations at the time you read them.
- Make clear what is a direct quotation and what is your paraphrase.

Dissertation format

All students must follow the following rules in submitting their dissertation.

- Front page should provide title, author, Name of degree/diploma and the date of submission.
- Second page should be the table of contents giving page references for each chapter and section.
- The next page should be the table of appendices, graphs and tables giving titles and page references.
- Next to follow should be a synopsis or abstract of the dissertation (approximately 500 words) titled: **Executive Summary.**
- Next is the 'acknowledgements'.
- Chapter I should be a general introduction, giving the background to the dissertation, the objectives of the dissertation, the rationale for the dissertation, the plan, methodological issues and problems. The limitations of the dissertation should also be hinted in this chapter.
- Other chapters will constitute the body of the dissertation. The number of chapters and their sequence will usually vary depending on, among others, on a critical review of the previous relevant work relating to your major findings, a discussion of their implications, and conclusions, possibly with a suggestion of the direction of future research on the area.
- After this concluding chapter, you should give a list of all the references you have used. These should be cross - references with your text. For articles from journals, the following details are required e.g.

Draper P and Pandyal K. 1991, The Investment Trust Discount Revisited, Journal of Business Finance and Accounting, Vol18, No6, Nov, pp 791-832.

For books, the following details are required:

Levi, M. 1996, International Financial Management, Prentice Hall, New York, 3rd Ed, 1996

- Finally, you should give any appendices. These should only include relevant statistical data or material that cannot be fitted into the above categories.

The Layout Guidelines for the Dissertation:

- A4 size Paper
- Font: Arial (10 points) or Times New Roman (12 points)
- Line spacing: 1.5

- Top and bottom margins: 1 inch/ 2.5 cm; left and right margins: 1.25 inches/ 3 cm

Guidelines for the Assessment of the Dissertation

While evaluating the dissertation, faculty guide will consider the following aspects:

1. Has the student made a clear statement of the objective or objective(s).
2. If there is more than one objective, do these constitute parts of a whole?
3. Has the student developed an appropriate analytical framework for addressing the problem at hand.
4. Is this based on up-to-date developments in the topic area?
5. Has the student collected information / data suitable to the frameworks?
6. Are the techniques employed by the student to analyse the data / information appropriate and relevant?
7. Has the student succeeded in drawing conclusion from the analysis?
8. Do the conclusions relate well to the objectives of the project?
9. Has the student been regular in his work?
10. Layout of the written report.

Assessment Scheme:

Continuous Evaluation: 40%

(Based on Abstract, Regularity,
Adherence to initial plan, Records etc.)

Final Evaluation: Based on, 60%

Contents & Layout of the Report, 25

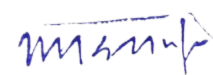
Conceptual Framework, 10

Objectives & Methodology and 10

Implications & Conclusions 15



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REHABILITATION PSYCHOLOGY

Course Code: PSY4404

Credit Unit: 03

Course Objective:

Objective of this course is to learn profession of Rehabilitation Psychology, Psychological Assessment of persons with disabilities, Psychological Interventions and dealing with families

Course Contents:

Module I:

Overview of the profession of Rehabilitation Psychology and practice, history, growth and scope, Role of Psychologist in Rehabilitation

Module II:

Psychological Assessment- Assessment of Cognition, aptitudes, psychopathology, work/vocational and daily functioning

Module III:

Health behavior: Theories of health behavior change, interventions strategies for individuals and families of disabled

Behaviour Modification and Cognitive Therapies in Rehabilitation

Module IV:

Dealing with Families- Family's reactions to disabilities, coping styles, family counseling, Coordination with Multidisciplinary team

Module V:

Community Based Rehabilitation – Goals of CBR, components of CBR, Role of Professionals, role of Community, Ethical Issues

Examination Scheme:

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	8	10	7	5	70

Text & References:

Text:

- NIMH (1989) Mental Retardation : A Manual for Psychologist, Secundrabad
- Mohapatra C.S. (2004) Disability Management, NIMH, Secundrabad
- Robert G. Frank Timothy R.Elliott (2000). Handbook of Rehabilitation Psychology, APA Washington.
- Michael Brnes Anthony Ward (2009) Oxford Handbook of Rehabilitation Medicine

References:

- Peshawaria R. and Venkatesan (1992) Behavioural Approach in Teaching Mentally Retarded Children, NIMH, Secundrabad
- WHO (2004) Community Based Rehabilitation
- Tally A.B, Sivaraman K.P and Murali T(1998) Neurorehabilitaion Principles &practice, NIMHANS Bangalore India

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CHILDHOOD PATHOLOGY AND EXCEPTIONAL CHILDREN

Course Code: PSY4405

Credit Unit: 03

Course Objective:

Objective of this course is to learn various categories of exceptionality, early identification, special and mainstream education

Course Contents:

Module I:

Developmental Disorders- Autism Spectrum Disorders, attention deficit hyperactivity disorder, Mental Retardation, Learning Disabilities, Hearing Impairment, Disability of Locomotion

Module II:

Bipolar disorder in children, conduct disorder, emotional disorders, eating disorders, enuresis
Psychological Assessment of Childhood disorders

Module III:

Special Education: Special Schools and Rehabilitation centres
Mainstreaming: assistive devices, adaptation, barrier free environment
Mainstreaming: Attitudinal change- teachers, non disabled students, Parents and Community

Module IV:

National Institutes in the field of disability: NIMH, NIVH, NIOH, AYJNIHH, NIEPMD, SVNIRTAR, Alimbco.
NGOs, Parent Organizations, Advocacy organization

Module V:

Legislative framework: Mental Health Act, RCI Act, Persons with Disability Act, National Trust Act, UNCRPD

Examination Scheme:

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	8	10	7	5	70

Text & References:

Text:

- Hallahan D.P. and Kauffman J.M. (1980) Exceptional Children, Prentice Hall
- Cratty B.J. and Goldman R.L. (1995) Learning Disabilities: Contemporary Viewpoints, Harwood Academic Publishers
- Cruschank, W.M. (1975). Psychology of Exceptional Children and Youth, Englewood Cliffs N.J.: Prentice Hall

References:

- Rao, T.A.S. (1992) Manual on Developing Communication Skills in Mentally Retarded Persons, NIMH, Secundrabad
- National Trust, Govt. of India, Handbook for Teachers
- NIMH (1989) Mental Retardation : A Manual for Psychologist, Secundrabad
- Peshawaria R. and Venkatesan (1992) Behavioural Approach in Teaching Mentally Retarded Children, NIMH, Secundrabad

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PSYCHOTHERAPEUTIC INTERVENTION IN CLINICAL SETTING

Course Code: PSY4406

Credit Unit: 03

Course Objective:

To equip students with the basic understanding of various types of therapies and their implications in different clinical settings

Course Contents

Module I: Introduction

Psychotherapy Overview of historical developments and current trends in psychotherapy, issues related to consent (assent in case of minors), planning and recording of counseling session; and setting goals; pre and post assessment, interviewing: objectives of interview, structured and unstructured interview, open and close ended questions, clarification, reflection, facilitation and confrontation, silences in interviews.

Module II: Behavior Therapy

Origin, Foundations; Principles and Methodologies, behavioral assessment, formulation and behavioral goals Systematic desensitization (in vivo and in vitro); Extinction: Flooding and Response Prevention, Implosion, Covert Sensitization, Negative Practice and stimulus satiation. Skill training: Assertiveness Training; Modeling; Behavioral Rehearsal. Operant procedures: Token economy, Contingency management. JPMR and Biofeedback

Module III: Cognitive Therapy

Cognitive behavior therapy: Cognitive model; automatic negative thoughts, schemas principles and assumptions, technique: Ellis's Rational Emotive Behavior Therapy (REBT) and Beck's cognitive therapy, dialectical behavior therapy

Module IV: Therapy in Special Condition

Chronic mental illness, Substance Abuse, Learning Disabilities and Mental retardation and such other conditions, where integrative/eclectic approach is the basis of clinical intervention

Module V: Biomedical Therapy

Electro-convulsive therapy, Drug therapy-Antipsychotic drugs, Anti depressant drugs and Anti anxiety drugs

Examination Scheme:

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	8	10	7	5	70


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Text & References:

Text:

- An introduction to the Psychotherapies, 3rd edition, bLoch, S (2000) Oxford Medical Publications.
- Encyclopedia of Psychotherapy, vol. 1 and 2, Hersen M & Sledge W. (2002). USA.
- Techniques of Psychotherapy, 4th edition, Parts 1 & 2, Wolberg, L.R. Grune and Stratton: NY.
- Theories of Psychotherapy and Counselling, 2nd edition, Sharf, R.S. (2000). Brooks/Cole; USA.

References:

- Bellack, A.S. & Hersen, M., (1998). Comprehensive Clinical Psychology, Vol., Elsevier Science Ltd.: Great Britain.
- Cognitive Behavior Therapy for Psychiatric Disorders. A Practical Guide, Hawton, K. Salkovskis, P.M., Kirk, J and Clark, D.M. (1989) Oxford University Press.



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DIFFERENTIAL DIAGNOSTIC TECHNIQUES

Course Code: PSY4407

Credit Unit: 03

Course Objective:

Enable students to selecting an appropriate test for a particular purpose, administration, scoring and interpreting psychological test profile in clinical settings

Course Contents

Module I: Introduction

Case history; mental status examination; rationale of psychological test; behavioral observation, response recording and syntheses of information from different sources; formats of report writing, context of clinical assessment, types of referrals, ethical practice of assessment, selecting psychological tests.

Module II: Assessment of Cognitive Functions

Bender gestalt test, PGI Memory scale; Bhatia's battery of performance tests of intelligence
Binet's test of intelligence, Wechsler adult intelligence scale

Module III: Test for Differential Diagnosis

Tests for diagnostic clarification: A) Rorschach psychodiagnostics, B) Tests for thought disorders – color form sorting test, object sorting test, proverbs test, C) Minnesota multiphasic personality inventory; Multiphasic questionnaire, clinical analysis questionnaire, IPDE, D) screening instruments such as GHQ, hospital anxiety/depression scale etc. to detect psychopathology.

Module IV: Tests for Adjustment and Personality Assessment

Questionnaires and Inventories – 16 personality factor questionnaire, NEO-5 personality inventory, temperament and character inventory, Eysenck's personality inventory, Eysenck's personality questionnaire, self-concept and self esteem scales, Rottor's locus of control scale, Bell's adjustment inventory (students' and adults'), subjective well-being questionnaires, QOL

Projective tests – sentence completion test, picture frustration test, draw-a-person test; TAT – Murray's and Uma Chowdhary's

Module V: Therapy in Special Condition

Psychological assessment of children: A) Developmental psychopathology check list, CBCL, B) Administration, scoring and interpretation of tests of intelligence scale for children such as SFB, C- 42 RPM, Malin's WISC, Binet's tests, and developmental schedules (Gesell's, Illingworth's and other) Vineland social maturity scale.

Examination Scheme:

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	8	10	7	5	70

Text & References:

Text:

- Freeman, F.S. (1965). Theory and practice of psychological testing, Oxford and IHBN: New Delhi.
- Bellack, A.S. & Hersen, M (1998): Comprehensive Clinical Psychology: Assessment, Vol. 4. Elsevier Science Ltd.: Great Britain
- Exner, J.E. The Rorschach – A Comprehensive System, Vol. 1, 4th ed., John Wiley and sons: NY.
- Choudhary, U. An Indian modification of the Thematic Apperception Test. Shree Saraswathi Press: Calcutta

References:

- Hersen, M; Segal, D. L; Hilsenroth, M.J. (2004). Comprehensive handbook of psychological assessment, Vol. 1 & 2. John Wiley & Sons: USA
- Murray H.A. (1971): The Thematic Apperception Test manual, Harvard University Press.



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COMMUNITY PSYCHOLOGY AND INTERVENTION

Course Code: PSY4408

Credit Units: 03

Course Objective:

This course provides an introduction to the community psychology. Rehabilitation and human service system and professionally prepares the students for becoming rehabilitation counselors. It lays emphasis on the stands, approaches and contemporary issues related to community and rehabilitation psychology.

Course Contents

Module I: Rehabilitation

Case history; mental status examination; rationale of psychological test; behavioral observation, response recording and syntheses of information from different sources; formats of report writing, context of clinical assessment, types of referrals, ethical practice of assessment, selecting psychological tests

Module II: Health Behavior

Theories of Health Behavior Change, Interventions Strategies For Individuals And Families of Disabled, Models Of Therapeutic Education For Successful Rehabilitation

Module III: Community issues

Evaluation of community needs, rehabilitation in community, social counseling, training in daily living skills, community awareness raising and increasing community involvement, facilitating access to loans, vocational training, information for local self-help groups, contacts with different authorities, school enrolment .

Module IV: Psychotherapy in the Indian Context

Historical perspective in psychological healing practices from the Vedic period and the systems of Ayurveda and Yoga, contemporary perspectives; socio-cultural issues in the Indian context in practice of psychotherapy; ongoing research related to process and outcome.

Module V: Mental Health Policies of Government (National Mental Health Program, Mental Health Act)

Examination Scheme:

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	8	10	7	5	70


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Text & References:

Text:

- Mann, A.P.; Community and Applications
- Rappaport, J.; Community Psychology: Values, Research and Action

Reference:

- Book, P. E.; Community Psychology Mental Health
- Kuppaswami, B.; An Introduction to Social Psychology
- Bates, A. P. & Julian, J.; Sociology— Understanding Social Behavior
- Broom, Leonard and Selzmick, Philip – A text with Adapted Readings
- Browning & Charles J.; Differential Impact of Family Disorganization on Male Adolescents in social problems.
- Burgers, E.W., and Lock, H.J.; ‘The Family’
- Nimkoff, M.E. ; ‘The Family’
- Albert C. K.; Deviance and Control
- Gobbons, Don, C.; Deviant Behavior (2nd ed.)
- Jenkins, Richard L., “Motivation and Frustration in Delinquency” ; American Journal of Orthopsychiatry



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Master of Social Work (MSW)

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Curriculum & Scheme of Examination

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Master of Social Work (MSW)

BASICS OF SOCIAL WORK

Course Code: SCW4102

Credit Units: 03

Course Objective:

- To understand the concept of social work.
- To get acquainted with the approaches and ethics of social work.
- To understand the areas of social work.

Course Contents:

Module I: Concepts in Social Work and Social Work Practice

Objectives and Functions of Social Work; Methods of Social Work (Primary and Secondary methods of social work); Social Service; Social Services
Social Exclusion (marginalization, exploitation, oppression); Empowerment
Social Development, Social Change, Social Action, Social Activism
Human rights and Human Rights Perspective

Module II: Approaches

The Concept of Social Welfare; Welfare approach,
Remedial and Therapeutic Approach,
Social Development Approach
Conflict Oriented Approach

Module III: The Profession of Social Work

The Basic Values and Principles of Professional Social Work
Religious, Political and Utilitarian Values
Code of professional ethic
Professional status of Social work in India

Module IV: Fields of Social Work

Family & Child Welfare;
Women Centric Practice
Medical and Psychiatric Social Work
Criminology and Correctional Work

Module V: HRD and HRM

Social Welfare Administration
Urban and Rural Community Development;
Dalit and Tribal Community Organization
Livelihoods and Social Entrepreneurship

Examination Scheme

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	7	10	8	5	70

CT: Class Test, H: Home Assignment, P/V/Q: Presentation/Viva/Quiz, A: Attendance,
EE: End Semester Examination

References

- Butrym, Zofia T. (1976). The Nature of Social Work, London, Macmillan Press Ltd.
- Yelaja, S. A. (1982). Ethical Issues in Social Work, Springfield, Charles, C. Thomas.


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WORK WITH INDIVIDUALS AND FAMILIES: SOCIAL CASE WORK

Course Code: SCW4103

Credit Units: 03

Course Objective:

- To be introduced to the method of working with individuals
- To understand the various contexts and the dimensions of issues and problems that individuals face and critically analyze them
- To be exposed to the approaches of social work practice with individuals
- To acquire the skills and techniques of working with individuals
- To comprehend the diversity of practice settings

Course Contents:

Module I: Social Casework as a Method of Social Work

Concept and Definition of Casework; Adjustment and maladjustment; Historical development of Social Casework; Influence of psychoanalysis on casework.

Principles of Social Casework Practice: Individualization, Acceptance, Non-judgmental Attitude, Participation, Relationship, Purposeful expression of feelings, Controlled emotional involvement, Client Self Determination, and Confidentiality

Components of Casework: Person- client, significant others and collaterals; Problem- need, impaired social functioning; Place- agency, objectives, functions, policies and resources; Process- Study, assessment, intervention, evaluation, follow-up, termination.

Skills and Techniques of working with individuals and families: Supportive, resource enhancement and Counselling, Knowledge of resources (networking)

Essential qualities in the caseworker: empathy, non-possessive warmth, genuineness.

Self as a professional: Conflicts and dilemmas in working with individuals and families.

Module II: Approaches and Models to understand clients and their contexts

Psycho Social Diagnostic approach (Richmond), Supportive and Modificatory Approach (Hamilton), Classified Treatment method (Floence Hollies)

Psychoanalytical, Functional approach

Problem solving approach (Perlman), Crisis intervention (Rappaport), Competence based approach (Elleen Grabrill), Empowerment approach

Family intervention, Person-in-Environment Model

Transactional Analysis, Holistic approach, Eclectic approach.

Module III: Case work tools

Listening, Communication Skills, Rapport Building.

Interview, Observation, Home visit, collateral contacts, referrals

Records: Nature, purpose and principles of recording. Types of Recording: narrative, process, problem oriented record keeping. Case history taking Use of case work records as tool of intervention.

Subjective –objective assessment plan (SOAP). Modeling, role-playing and confrontation

Case presentation as tool of professional development. Developing self awareness, JoHari window, dealing with stress and burnout

Module IV: Casework Process

Phase 1 – Exploration of person in environment

Phase 2 - Multidimensional assessment and planning, multidimensional intervention

Phase 3 – Helping: implementing intervention and goal attainment

Phase 4 – Termination and evaluation, follow up

Case worker - client Relationship; characteristics of professional relationship: transference, counter transference and resistance; sustaining the relationship; obstacles in client - worker relationship.

Module V: Application of Method

Types of problems faced by Individuals and families; individual differences and needs; Primary and secondary settings

Application of methods in family, women, and child welfare settings

Marriage Counselling centers

School settings

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Medical and psychiatric settings
Correctional institutions and industry

Examination Scheme

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	7	10	8	5	70

CT: Class Test, H: Home Assignment, P/V/Q: Presentation/Viva/Quiz, A: Attendance,
EE: End Semester Examination

References

- Bhattacharya, S. (2009). Social case work administration and development. New Delhi: Rawat Publications.
- Jeffrey, K. A., & Shepard, D. S. (2009). Counselling: theories and practice. New Delhi: Cengage Learning India Pvt. Ltd.
- Mathew, G., & Tata Institute of Social, S. (1992). An introduction to social casework: Tata Institute of Social Sciences.
- Mujawar, W. R., & Sadar, N. K. (2010). Field work training in social work. New Delhi: Mangalam Publications.
- Perlman, H. H. (1957). Social casework: a problem-solving process: University of Chicago Press.
- Timms, N. (1966). Social casework: principles and practice. Routledge & Kegan Paul.
- Timms, N. (1972). Recording in social work: Routledge and K. Paul.
- Upadhyay, R. K. (2003). Social casework: A therapeutic approach. New Delhi: Rawat Publications.



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WORK WITH GROUPS: SOCIAL GROUP WORK

Course Code: SCW4104

Credit Units: 03

Course Objective:

- To understand of group work as a method of professional social work
- To learn theoretical approaches that inform group work practice.
- To gain insight into dimensions of group processes and group work practice
- To develop competencies for working with groups in diverse settings.

Course Contents:

Module I: Social groups and Group Work

Definition, Characteristics, and Importance Classification of Groups

Cooley, Sumner, MacIver & Page, Tosel and Rivas Theories of Group formation

Social Group Work – Concept, Historical development of Group Work, Values and Skills

Principles and Purpose of Group work

Module II: Theoretical approaches of group work practice

Psychoanalytic, Learning, Field, Social Exchange, Systems theories.

Stages of Group Development – Tuckman, Klien, Garland, Jones & Kolodny.

Models of social group work – Social goals, Remedial, Reciprocal models.

Programme development process, Programme Media.

Module III: Basic Group Processes

Sub-group, Group conflict, Group decision making,

Leadership in groups.

Group dynamics – Concept, and Areas – Communication and Interaction Patterns, Group Cohesion,

Social Control Dynamics and Group Culture.

Module IV: Stages or Phases of Group work

Pre group formation, Beginning phase, Middle/Working phase and Termination phase, Follow up,

Facilitation Skills and Techniques used in these Phases.

Module V: Group Work Practice in diverse settings

Disaster victims, Substance abusers, Alcohol Anonymous and elderly care – Role of group worker –

Group psychotherapy, Group work Recording, Monitoring and Evaluation.

Examination Scheme

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	7	10	8	5	70

CT: Class Test, H: Home Assignment, P/V/Q: Presentation/Viva/Quiz, A: Attendance,

EE: End Semester Examination

References

- Cartwright, Dorwin and Zander, Alwin. (1995). Group dynamics. New York: Row, Peterson & Co.
- Coyle, Grace, L. (1947). Group experience and democratic values. New York: The Women's Press.
- Trecker, H.B. (1970). Social group work-principles and practices. New York : Associate Press
- Toseland, R. and Rivas, R. (1995). An introduction to group work practice, (Massachusetts: Allyn and Bacon)
- Bhatt R.M. (1960). Records of group work practice in India. Baroda:Baroda University.
- Delhi School of Social Work (1958). Field work records in group work and community organization. London : Tavistock Publication
- Doel, M. & Sawda, C. (2003). The essentials of group worker. London : Jessica Kingsley

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- Douglas, T. (1976). Group process in social work: A theoretical synthesis. New York : John Wiley & Sons
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- Barhard,. (1975). The use of groups in social work practice. USA : Routledge & Kegan Paul Ltd.
- Klein J. (1967). The study of groups. London :Routledge and Kegan Paul Ltd
- Konopka, G. (1954). Group work in institution. New York: Associate Press 13. Konopka, G. (1983 3rd Ed.). Social group work: A helping process. New Jersey : Prentice Hall
- Northen, H. (1969). Social work with groups. New York : Columbia University Press
- Northen, H. (1976). Theory of social work with groups. New York : Columbia University Press
- Phillips, H. (1962). Essentials of social group work skills. New York : Associate Press
- Ryland & Wilson,. (1949). Social group work practice. USA: Houghton Mifflin Co.
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RESEARCH METHODS IN SOCIAL WORK: QUANTITATIVE APPROACH

Course Code: SCW4105

Credit Units: 03

Course Objective:

- To develop an understanding about the scientific approach to human inquiry.
- To develop an appreciation of the value and approach in social work research in addressing problems in the field of professional practice.
- To develop attitudes and skills appropriate for social work research.
- To acquire the skills for data analyses and research writing

Course Contents:

Module I: Introduction

Meaning, purpose and Dimensions of Research, Paradigms of research: Quantitative and Qualitative Approaches; Types of variables; Levels of measurement

The main preoccupations of quantitative researchers: Measurement, Causality, Generalization, Replication.

Distinction between social research and social work research

Introduction to sampling, sampling error, types of probability sample, sample size, types of non-probability sampling

Module II: Analytic Techniques

Univariate analysis: Frequency tables, measures of central tendency, measures of dispersion

Bivariate analysis: Pearson's r, Spearman's rho

Inferential Analyses: measures of association, tests of significance (chi square, t-test,) analysis of variance (ANOVA)

Multivariate analysis: Regression; Factorial Analysis; Path Analysis

Module III: Social Work Research

Use of research in social work; Intervention research and practice based research, Difference between social science research and social work research.

Types of social work research: need assessment studies, situational analysis, monitoring and evaluation, impact assessment, policy research

Steps in Social Work Research: identification of problem; need assessment; selection of research design; baseline study; intervention; assessment of intervention effects/impact; data editing and classification, data processing and analysis, report writing.

Module IV: Research Designs in Social Work Research

Scientific Social Surveys and field studies

Experimental study design, logic of experimentation, causation and control, randomization and matching internal validity

Types of experimental design (pre-experiment, true experiment, quasi experiment, external validity)

Other research approaches supportive to social work research: Action research; Participatory research

Module V: Scaling Techniques and Psychometric worth of data

Objective tests and scales; Difference between test, scale, questionnaire and inventory,

Scaling Techniques: Likert, Thurstone, Guttman.

Reliability: The concepts of variance in and stability and consistency of measures; the maximum principle; Internal reliability; Inter-observer consistency. Types of reliability

Validity: Concept; Relationship between reliability and validity; Types of validity

Examination Scheme

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	7	10	8	5	70

CT: Class Test, H: Home Assignment, P/V/Q: Presentation/Viva/Quiz, A: Attendance, EE: End Semester Examination

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FIELD WORK PRACTICUM-I

Course Code: SCW4107

Credit Units: 04

Course Objective:

The emphasis is on-learning skills which revolve around specific tasks where cause-effect relationships are understood, where the persons have problems but they are more victims of their life circumstances rather than of pathology for which great knowledge of psychological and social dynamics would be required and lower order of skills of intervention is required to be utilized. The processes dealt with at the individual, group or community is specific. Show dynamics but do not require unusual skills of intervention. Administrative tasks are also specific, e.g. planning and programming around a specific service.

The specific objectives of field-work in the first semester may include:

Development of the knowledge of:

- (a) Socio-economic background and the living condition of tire vulnerable groups and the problems confronting them.
- (b) Problem-solving techniques utilized in the specific area of work of the organization where student is placed.
- (e) The use of simple research procedures and maintenance of scientific data to assess problems/needs/agency.

Development of skills in:

- (a) Work with individuals, families, groups and communities and seeing the need for an integrated approach to problem solving.
- (b) Selecting and utilization of community resources.
- (c) Work as a member of a team with other professional anti own discipline to, plan, organise and implement projects, programmes with emphasis cm the use of the process in problem-assessment and problem solving.

Development of professional attitudes, conducive to work with individual families group and communities, leading gradually to an awareness of self as a professional person.

Efforts will be made to work out objectives in each semester for every student in field practicum according to the nature and services of the agency and his performance will be evaluated accordingly.

Methodology

Each student will engage themselves in interaction and observation of social phenomenon and processes in a subject/ field of their choice. Student will then present their findings in the form of a paper for seminar discussions. Similarly, field work will be done by students in their area of interest and present their practical observations, as a report with analysis and suggestions.

Examination Scheme:

Field/Seminar Report :	40 marks
Viva-Voce :	30 marks
Internal Faculty and Interaction :	10 marks
Presentation/Daily Diary Report :	20 marks


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SOCIAL POLICY AND SOCIAL WELFARE ADMINISTRATION

Course Code: SCW4201

Credit Units: 03

Course Objective:

- To gain knowledge of policy analysis and the policy formulation process.
- To acquire skills in critical analysis of social policies and development plans.
- To develop an understanding of social policy in the perspective of national goals as stated in the Constitution, particularly with reference to Fundamental Rights and the Directive Principles of State Policy.
- To critically understand the concept, content and process of social development.
- To develop the capacity to identify linkages among social needs, problems, development issues and policies.
- To locate strategies and skills necessary for social development and reinforce values of social justice, gender justice and equality.

Course Contents:

Module I: Social Policy and Constitution

Concept of social policy, sectoral policies and social services. Relationship between social policy and social development. Values underlying social policy and planning based on the Constitutional provisions (i.e. the Directive Principles of State Policy and Fundamental Rights) and the Human Rights. Different models of social policy and their applicability to the Indian situation.

Module II: Sectoral Social Policies in India

Evolution of social policy in India in a historical perspective.

Implementation of different sectoral policies related to education, health, social welfare, women, children, welfare of backward classes, social security, housing, youth, population and family welfare, environment and ecology, urban, rural and tribal development, and poverty alleviation.

Module III: Social Planning

Concept and scope of social planning;

Goals of social development. The popular restricted view of planning for social services;

The wider view as inclusive of all sectoral planning to achieve social goals.

Indian planning in a historical perspective; The Constitutional position of planning in India.

The legal status of the Planning Commission; Coordination between Centre and State;

Need for decentralization; Panchayath Raj; People participation.

Module IV: Social Development

Concept of social development; Current debates about development;

Approaches to development; Social Development Index and Social Progress Index; Social capital;

Social development, community and reciprocity; Sustainable and equal society; Importance and challenges of a developing society;

Social development strategy of empowering people by transforming institutions

Module V: Procedures in registering an organization and its administrative processes

Societies Registration Act, 1860, Indian Trust Act, 1882, The Companies Act, 1956. Administrative Structure – Memorandum of Association, Bye laws, Constitution, Deed, Functions and responsibilities of governing board, committees and office bearers. Administrative structure of social welfare at the Central, State and Local level – Programmes of Central Social Welfare Board and State Social Welfare Boards.

Administrative Processes: Planning, Organizing, Staffing, Directing, Coordinating, Reporting and Budgeting (POSDCORB) – Mobilization of financial resources - Grants in Aid – Foreign Contribution Regulation Act, 1976 – Exemption from Income tax – Administrative skills – Writing reports, letters and minutes of meetings – Project formulation, implementation, monitoring and evaluation.

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Examination Scheme

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	7	10	8	5	70

CT: Class Test, H: Home Assignment, P/V/Q: Presentation/Viva/Quiz, A: Attendance,
EE: End Semester Examination

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SOCIAL WORK WITH COMMUNITIES

Course Code: SCW4202

Credit Units: 03

Course Objective:

- To gain knowledge about the primary method of social work practice with communities.
- To understand the techniques and approaches of social work practice with communities.
- To acquire the skill of working with communities.

Course Contents:

Module I: Community organization

History, Concept, Principles, Assumptions and Objectives

Community Organization and Community Development

Process of community organization: Study and Survey, Analysis, Assessment, Discussion, Organization, Action, Reflection, Modification and Continuation.

Module II: Models of community organization

Locality development, social planning, social action

Skills in community organization: Communication, Training, Consultation, Public relations, resource mobilization, liaisoning.

Approaches to community organization; General content, Specific content and Process objective.

Module III: Methods of community organization

Awareness creation, Planning and Organizing, Education, Networking, Participation,

Leadership; Community organization with vulnerable communities; Migrants, Refugees,

Slum dwellers and transgender.

Module IV: Social Action in Community Organization

Concept, Purpose, Strategies and Tactics in Social Action

Social Action as a method of social work

Approaches to social action; Paulo Friere, Saul Alinsky, Mahatma Gandhi and Ambedkar.

Module V: Concept of advocacy as a tool

Strategy for advocacy: Campaigning, Lobbying, Use of media and public opinion building in advocacy

Coalition and Network building, linking up protest movement with development work.

Examination Scheme

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	7	10	8	5	70

CT: Class Test, H: Home Assignment, P/V/Q: Presentation/Viva/Quiz, A: Attendance,

EE: End Semester Examination

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COMMUNITY ORGANIZATION AND SOCIAL ACTION

Course Code: SCW4204

Credit Units: 03

Course Objective:

To understand theory and practice of social work in community

Course Contents:

Module I: Community Work and Social Action

Definition of Community, Types of Communities. Difference between Rural and Urban Communities, Power Structure in the Community, Community Leaderships
Types of Community Leaders, Role of Community leaders in Community Development.

Module II: Strategies of Community Work and Social Action

Approaches to Community Work: Neighborhood Development, Systems and Radical, Politics and Community Work, Role of Community Organiser and Social Activist, Contemporary Social Action Interventions in India

Module III: Community Organization

Definition, Objectives, Community Organization as a Method of Social Work
Various approaches to Community Organization; General content approach, Specific content approach, Process content approach.
Community organization and Development

Module IV: Methods of Community Organization

Fact Finding, Planning, Group Decision Making, Conference and Committee Practice, Co-operative action negotiation, consultation, Methods of Conflict Resolutions, Resource Mobilization, Administration, Recording Evaluation, Skill required for Community Organization.

Module V: Application of Community Organization Methods

Application in Slums, Rural areas, during Flood, Famine and War. Community Organization for prompting Public Health and Family Welfare.

Examination Scheme

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	7	10	8	5	70

CT: Class Test, H: Home Assignment, P/V/Q: Presentation/Viva/Quiz, A: Attendance,
EE: End Semester Examination

References

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RESEARCH METHODS IN SOCIAL WORK: QUALITATIVE APPROACH

Course Code: SCW4205

Credit Units: 03

Course Objective:

- To understand various styles of interpretation of qualitative data.
- To analyze the relative appropriateness of different analysis approaches for a particular qualitative study.
- To apply one or more analytic approaches to data they have been collected and write a report.
- To understand ethical issues for qualitative research.
- To manage qualitative data files effectively to ensure ease of use and participant confidentiality.
- To use the basic and intermediate functions of a computer software program for coding of textual data.

Course Contents:

Module I: Introduction

Differences between Qualitative and Quantitative research

Nature and traditions of qualitative research: Naturalism, Ethnomethodology, Emotionalism, Post-Modernism,

Deductive and Inductive approaches to data collection

Paradigmatic issues in Qualitative research

Module II: Qualitative Validity

Reliability and Validity: Types and procedures

Criteria for evaluating the worth of qualitative research: Credibility, Transferability, Dependability, Conformability. Triangulation

Collaborative Enquiry

Module III: Theoretical Background for Qualitative Research

Phenomenology: Realistic and Constitutive Phenomenology, Existential analysis,

Constructivism: Social constructivism and Psychological Constructivism

Metaphysics: Existentialism

Grounded theory: Goals and Perspectives, Methods: Axial coding and selective coding

Module IV: Methods of Data Collection

Interview: Purposes; Stages; Types: Structured, Semi-structured and Unstructured; Advantages and disadvantages associated with each; Interviewing Skills;

Focus group: Uses, recording and Transcription, size of groups, Limitations

Discourse analysis; Narrative analysis; Rhetorical analysis; Conversational analysis

Ethnography and participant Observation: Forms; Logistics; Advantages and disadvantages; Confidentiality; Taking and expanding field notes; Documenting; Being an effective participant observer

Documents as sources of data: Personal, Public, Organizational, Mass-Media, visual and virtual

Qualitative content analysis; mixed methods analysis

Module V: Use of Computers and Software

Qualitative Data Analysis (QDA) Softwares: Computer Assisted Qualitative Data Analysis Software (CAQDAS); MAXQDA

Defining Variables; Developing coding systems; Tabulating Data

Quantification in qualitative research: Thematic, Qausi-Quantification in qualitative research

Data Analysis and knowledge management


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Examination Scheme

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	7	10	8	5	70

CT: Class Test, H: Home Assignment, P/V/Q: Presentation/Viva/Quiz, A: Attendance,
EE: End Semester Examination

References

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SKILL BASED PROJECT

Course Code: SCW4206

Credit Units: 01

Course Objective:

The aim of the skill based project is to help learners acquire specific skills to deal with situations encountered during practice and acquire skills for intervention. It provides learner with an opportunity to further their intellectual and personal development in the chosen field by undertaking a significant practical unit of activity. The project can be defined as a scholarly inquiry into a problem or issues, involving a systematic approach to gathering and analysis of information / data, leading to production of a structured report.

These may be for problems/ concerns, issues or situations like work with alcoholics, HIV/AIDS affected persons, adolescents for life skills development, youth for leadership development and couples for marital relationship and enrichment work with elderly. The skill based project is primarily to enhance skills/ develop new skills for practice in specific situation, specific problems and issues.

Chapter Scheme and distribution of marks:

Chapter 1: Introduction – 10 marks

Chapter 2: Conceptual Framework/ National/International Scenario – 25 marks

Chapter 3: Presentation, Analysis & Findings -- 25 marks

Chapter 4: Conclusion & Recommendations -- 10 marks

Chapter 5: Bibliography -- 05 marks

Project Report Power Point Presentation & Viva

75 marks 25 marks

Components of a Project Report

The outcome of Project Work is the Project Report. A project report should have the following components:

1- Cover Page: This should contain the title of the project proposal, to whom it is submitted, for which degree, the name of the author, name of the supervisor, year of submission of the project work, name of the University.

2- Acknowledgement: Various organizations and individuals who might have provided assistance /cooperation during the process of carrying out the study.

3-Table of Content: Page-wise listing of the main contents in the report, i.e., different Chapters and its main Sections along with their page numbers.

4- Body of the Report: The body of the report should have these four logical divisions

a) **Introduction:** This will cover the background, rationale/ need / justification, brief review of literature, objectives, methodology (the area of the study, sample, type of study, tools for data collection, and method of analysis), Limitations of the Study, and Chapter Planning.

b) **Conceptual Framework / National and International Scenario:** (relating to the topic of the Project).

c) **Presentation of Data, Analysis and Findings:** (using the tools and techniques mentioned in the methodology).

d) **Conclusion and Recommendations:** In this section, the concluding observations based on the main findings and suggestions are to be provided.

5- Bibliography or References: This section will include the list of books and articles which have been used in the project work, and in writing a project report.

6- Annexures: Questionnaires (if any) relevant reports etc.

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(The main text of the Project should normally be in the range of 5000 words. However, there may be annexure in addition to the main text)

The Steps of a Project Report

Step I: Selection of the topic for the project by taking following points into consideration:
Suitability of the topic.

Relevance of the topic.

Time available at the disposal.

Feasibility of data collection within the given time limit.

Challenges involved in the data collection (time & cost involved in the data collection, possibility of getting responses, etc.)

Step II: Finalisation of the Topic and preparation of Project Proposal in consultation with the Supervisor.

Step III: Collection of information and data relating to the topic and analysis of the same.

Step IV: Writing the report dividing it into suitable chapters, viz.,

Chapter 1: Introduction,

Chapter 2: Conceptual Framework / National & International Scenario.

Chapter 3: Analysis & Findings

Chapter 4: Conclusion and Recommendations.

Step V: The following documents are to be attached with the Final Project Report.

1) Approval letter from the supervisor (Annexure-IA)

2) Student's declaration (Annexure-IB)

3) Certificate from the Competent Authority of the Organisation / Institution, if the student undertakes the Project Work in any Organisation / Institution.

Guidelines for Evaluation:

- Each of the students has to undertake a Project individually under the supervision of a teacher and to submit the same following the guidelines stated below.
- Language of Project Report and Viva-Voce Examination may be English. The Project Report must be typed and hard bound.
- Failure to submit the Project Report or failure to appear at the Viva-voce Examination will be treated as "Absent" in the Examination. He /she has to submit the Project Report and appear at the Viva-Voce Examination in the subsequent years (within the time period as per University Rules).
- No marks will be allotted on the Project Report unless a candidate appears at the Viva-Voce Examination. Similarly, no marks will be allotted on Viva-Voce Examination unless a candidate submits his/her Project Report.
- Evaluation of the Project Work to be done jointly by one internal expert and one external expert with equal weightage, i.e., average marks of the internal and external experts will be allotted to the candidate.



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FIELD WORK PRACTICUM-II

Course Code: SCW4207

Credit Units: 04

Course Objective:

The emphasis is on-learning skills which revolve around specific tasks where cause-effect relationships are understood, where the persons have problems but they are more victims of their life circumstances rather than of pathology for which great knowledge of psychological and social dynamics would be required and lower order of skills of intervention is required to be utilized. The processes dealt with at the individual, group or community is specific. Show dynamics but do not require unusual skills of intervention. Administrative tasks are also specific, e.g. planning and programming around a specific service.

The specific objectives of field-work in the second semester may include:

1. Development of the knowledge of:
 - (a) Socio-economic background and the living condition of the vulnerable groups and the problems confronting them.
 - (b) Problem-solving techniques utilized in the specific area of work of the organization where student is placed.
 - (c) The use of simple research procedures and maintenance of scientific data to assess problems/needs/agency.
2. Development of skills in :
 - (a) Work with individuals, families, groups and communities and seeing the need for an integrated approach to problem solving.
 - (b) Selecting and utilization of community resources.
 - (c) Work as a member of a team with other professional and own discipline to, plan, organise and implement projects, programmes with emphasis on the use of the process in problem-assessment and problem solving.
3. Development of professional attitudes, conducive to work with individual families group and communities, leading gradually to an awareness of self as a professional person.
Efforts will be made to work out objectives in each semester for every student in field practicum according to the nature and services of the agency and his performance will be evaluated accordingly.

Methodology

Each student will engage themselves in interaction and observation of social phenomenon and processes in a subject/ field of their choice. Student will then present their findings in the form of a paper for seminar discussions. Similarly, field work will be done by students in their area of interest and present their practical observations, as a report with analysis and suggestions.

Examination Scheme:

Field/Seminar Report :	40 marks
Viva-Voce :	30 marks
Internal Faculty and Interaction :	10 marks
Presentation/Daily Diary Report :	20 marks


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SOCIAL JUSTICE AND EMPOWERMENT

Course Code: SCW4302

Credit Units: 03

Course Objective:

- To understand the concept of social justice and acquire information on the legal rights of people.
- To develop an understanding of the legal system and get acquainted with the process of the legal system with emphasis on functioning in India.
- To understand the role of the police, prosecution, judiciary and correction.
- To gain insight into the problems faced by the people belonging to different strata of society, in interacting with this system.
- To develop an understanding of the processes and problems of public interest litigation and legal aid to marginalized.

Course Contents:

Module I: Social Justice

Meaning and Concept; Social legislation: Definitions and concept. Social justice as an essential basis of social legislations; Social legislations in a welfare state with special reference to India.

Rights: Concept and definitions; Types of Rights; Rights of women and children; Rights of Scheduled Castes and Scheduled Tribes; Rights of accused and offender under Constitution of India, Indian Penal Code and Criminal Procedure Code.

Module II: Division of Law

Substantive Law and Procedural Law. Legislations pertaining to Social Institutions: Marriage, divorce, maintenance of spouse, adoption.

Legislations for prevention of Crime and Deviance: Indian Penal Code (relevant chapters on Offences against Public Tranquility, Public Health, Safety, Convenience, Decency and Morals, Offences relating to Religion, Offences affecting the Human Body, Offences relating to Marriage and Cruelty).

Legislations pertaining to women

Module III: Criminal Justice System in India

Objectives of Criminal Justice System.

Police: Structure, powers and functions and their role in maintaining of peace and order in the society.

Prosecution: Meaning, structure and role in criminal justice; Trial participation.

Administration of criminal justice system; Understaffed police and judiciary, and lack of political will as ailments of criminal justice system in India

Module IV: Judicial System in India

Constitution of Supreme Court and High Court: Powers and functions.

District and Subordinate Courts: District Sessions Court, Magistrate Courts, Family Courts, Tribunals, Fast Track Courts, Lok Adalats.

Salient features of judicial system in India.

Judicial activism.

Module-V: Correction and Correctional Laws

Corrective measures as per Criminal Procedure Code, Probation of Offenders Act, Juvenile Justice (Care and Protection of Children) Act. Legal Aid: Concept of legal-aid, history of legal-aid, persons needing legal-aid, legal-aid schemes.

Public Interest Litigation: Meaning, Concept, Process and Problems.

Right to Information Act- Provisions and implementation.

Role of Social Worker: Social Work intervention, need, methods.

Examination Scheme

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	7	10	8	5	70

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CT: Class Test, H: Home Assignment, P/V/Q: Presentation/Viva/Quiz, A: Attendance,
EE: End Semester Examination

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COMMUNICATION AND COUNSELLING

Course Code: SCW4303

Credit Units: 03

Course Objective:

- To understand the meaning and importance of communication in day-to-day life.
- To identify salient features of effective interpersonal communication and interviewing.
- To develop holistic understanding of Counselling as a tool for help.
- To acquire knowledge of various approaches: their theoretical under-pinnings for goals, values, processes and techniques.
- To develop and practice skills of communication and interviewing and applying it in real life situations.

Course Content:

Module I: Communication: Meaning and importance

Basics of Communication: Process, components, types Verbal and nonverbal communication; Interpersonal and Interpersonal communication; Education and communication for national development.

Interviewing: Objectives, principles of interviewing, interviewing skills: listening, reflection, questioning, confronting.

Formal verbal communication in seminars, conferences, lectures, group discussion, panel discussion, symposium, workshop, role playing, simulation exercises

Written communication: reports, letters, e mails, article/essay, project report.

Module II: Visual aids in communication

Posters, notice boards, flip charts, charts, flash cards, photographs, pamphlets, slide shows.

Mass Communication: Television, exhibition, newspapers and magazines, advertisements, radio, film, VCD/ DVD, social media and internet.

Impact of mass communication on society, family, marriage and child development.

Communication Analysis and Planning: Planning and executing a communication campaign on an issue using various methods of communication.

Module III: Counselling

Nature, goals and areas of counselling; ethics in counselling; cultural sensitivity in counselling; intentional Counselling and interviewing.

Counselling Situations: Developmental, preventive, educative, facilitative.

Process and stages of Counselling; Qualities of an effective counselor: Empathy, genuineness and non-possessive warmth

Counselling Skills: Building rapport, mind skills, feeling skills, relationship skills.

Module IV: Approaches to Counselling

Rogers Person-centered Approach

Beck's Cognitive Therapy; Ellis' Rational Emotive Behaviour Therapy

Behaviour Counselling and Therapy: common principles, methods based on classical conditioning, methods based on instrumental conditioning

Gestalt Therapy: assumptions, games and exercises; Existential approaches

Eclectic model; Indigenous Approach: Mindfulness, meditation, yoga, philosophy of *Nishkam Karma* and Non-Doer.

Module V: Group and Relational Approaches

Couple and Family Counselling: Issues related to dysfunctional communication, roles and boundaries in the family; Intervention strategies

Group Counselling: Process, advantages and disadvantages

Counselling in family Counselling centers, family courts, counselling bureau, vocational Counselling centers, mental health centers, child guidance clinics, correctional institutions, de-addiction and rehabilitation center, educational institutions.

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Examination Scheme

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	7	10	8	5	70

CT: Class Test, H: Home Assignment, P/V/Q: Presentation/Viva/Quiz, A: Attendance,
EE: End Semester Examination

References

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FIELD WORK PRACTICUM-III

Course Code: SCW4304

Credit Units: 04

Course Objective:

The emphasis is on-learning skills which revolve around specific tasks where cause-effect relationships are understood, where the persons have problems but they are more victims of their life circumstances rather than of pathology for which great knowledge of psychological and social dynamics would be required and lower order of skills of intervention is required to be utilized. The processes dealt with at the individual, group or community is specific. Show dynamics but do not require unusual skills of intervention. Administrative tasks are also specific, e.g. planning and programming around a specific service.

The specific objectives of field-work in the third semester may include:

1. Development of the knowledge of:
 - (a) Socio-economic background and the living condition of the vulnerable groups and the problems confronting them.
 - (b) Problem-solving techniques utilized in the specific area of work of the organization where student is placed.
 - (c) The use of simple research procedures and maintenance of scientific data to assess problems/needs/agency.
2. Development of skills in :
 - (a) Work with individuals, families, groups and communities and seeing the need for an integrated approach to problem solving.
 - (b) Selecting and utilization of community resources.
 - (c) Work as a member of a team with other professional and own discipline to, plan, organise and implement projects, programmes with emphasis on the use of the process in problem-assessment and problem solving.
3. Development of professional attitudes, conducive to work with individual families group and communities, leading gradually to an awareness of self as a professional person.

Efforts will be made to work out objectives in each semester for every student in field practicum according to the nature and services of the agency and his performance will be evaluated accordingly.

Methodology

Each student will engage themselves in interaction and observation of social phenomenon and processes in a subject/ field of their choice. Student will then present their findings in the form of a paper for seminar discussions. Similarly, field work will be done by students in their area of interest and present their practical observations, as a report with analysis and suggestions.

Examination Scheme:

Field/Seminar Report :	40 marks
Viva-Voce :	30 marks
Internal Faculty and Interaction :	10 marks
Presentation/Daily Diary Report :	20 marks


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SUMMER INTERNSHIP EVALUATION

Course Code: SCW4335

Credit Units: 06

GUIDELINES FOR INTERNSHIP FILE AND INTERNSHIP REPORT

(These guidelines will be useful for undertaking an internship programme during the summer or at any other time wherein the student/ researcher works full time with a company/organization)

There are certain phases of every Intern's professional development that cannot be effectively taught in the academic environment. These facets can only be learned through direct, on-the-job experience working with successful professionals and experts in the field. The internship programme can best be described as an attempt to institutionalize efforts to bridge the gap between the professional world and the academic institutions. Entire effort in internship is in terms of extending the program of education and evaluation beyond the classroom of a university or institution. The educational process in the internship course seeks out and focuses attention on many latent attributes, which do not surface in the normal class room situations. These attributes are intellectual ability, professional judgment and decision making ability, inter-disciplinary approach, skills for data handling, ability in written and oral presentation, sense of responsibility etc.

In order to achieve these objectives, each student will maintain and submit a file (**Internship File**) and a report (**Internship Report**).

INTERNSHIP FILE

The Internship File aims to encourage students to keep a personal record of their learning and achievements throughout the Programme. It can be used as the basis for lifelong learning and for job applications. ***Item scan be drawn from activities completed in the course modules and from the workplace to demonstrate learning and personal development.***

The File will assess the student's analytical skills and ability to present supportive evidence, whilst demonstrating understanding of their organization, its needs and his/her own personal contribution to the organization.

The File is essentially a comprehensive documentation of how one proceeds while working on the assignment and should be regularly checked by the faculty guide/ supervisor, issues discussed with the students, doubts if any clarified and signed as having done so. This will form the basis of **continuous evaluation** of the project.

The File will include **five sections** in the order described below.

1. **The Title Page** – An Internship Experience Report For (Your Name), name of internship organization, name of the Supervisor/Guide and his/her designation, date started and completed, and number of credits for which the report is submitted.
2. **Table of Content** – An outline of the contents of the file by topics and subtopics with the page number and location of each section.
3. **Introduction** – Short, but should include how and why you obtained the internship experience position and the relationship it has to your academic/professional and career goals.
4. **Main Body** – Should include a brief summary/ executive summary of the **Internship Project Report** that the student has worked on, an **analysis of the company/organization** in which the student is working, a **personal review** of the student's management skills and how they have been developed through the programme, the daily tasks performed, major projects contributed to, dates and hours spent on a task, observations and feelings, meetings attended and their purposes, listing of tools and materials and their suppliers, and photographs if possible of projects, buildings and co-workers.
5. **Appendices** - Include pamphlets, forms, charts, brochures, technical and descriptive literature, graphs and other information related to your Internship experience.

INTERNSHIP REPORT

The **Internship Report** is the research report that the student has to prepare on the project assigned by the organization. (Incase a student is not assigned a specific research project in the organization, he has to select any one aspect of the organization and prepare a research report on it). The lay out of the report should be as per the standard layout prescribed by the organization wherein the student

undertakes the Internship. In case, there is no layout prescribed by the organization the following components should be included in the report:

➤ **Title or Cover Page.**

The title page should contain Project Title; Student's Name; Programme; Year and Semester and Name of the Faculty Guide.

➤ **Acknowledgements.**

Acknowledgment to any advisory or financial assistance received in the course of work may be given. It is incomplete without student's signature.

➤ **Abstract**

A good "Abstract" should be straight to the point; not too descriptive but fully informative. First paragraph should state what was accomplished with regard to the objectives. The abstract does not have to be an entire summary of the project, but rather a concise summary of the scope and results of the project. It should not exceed more than 1000 words.

➤ **Table of Contents**

Titles and subtitles are to correspond exactly with those in the text.

➤ **Introduction**

Here a brief introduction to the problem that is central to the project and an outline of the structure of the rest of the report should be provided. The introduction should aim to catch the imagination of the reader, so excessive details should be avoided.

➤ **Materials and Methods**

This section should aim at experimental designs, materials used (wherever applicable). Methodology should be mentioned in details including modifications undertaken, if any. It includes organization site(s), sample, instruments used with its validation, procedures followed and precautions.

➤ **Results and Discussion**

Present results, discuss and compare these with those from other workers, etc. In writing this section, emphasis should be laid on what has been performed and achieved in the course of the work, rather than discuss in detail what is readily available in text books. Avoid abrupt changes in contents from section to section and maintain a lucid flow throughout the thesis. An opening and closing paragraph in every chapter could be included to aid in smooth flow.

Note that in writing the various sections, all figures and tables should as far as possible be next to the associated text, in the same orientation as the main text, numbered, and given appropriate titles or captions. All major equations should also be numbered and unless it is really necessary, do not write in "point" form.

While presenting the results, write at length about the the various statistical tools used in the data interpretation. The result interpretation should be simple but full of data and statistical analysis. This data interpretation should be in congruence with the written objectives and the inferences should be drawn on data and not on impression. Avoid writing straight forward conclusion rather, it should lead to generalization of data on the chosen sample.

Results and its discussion should be supporting/contradicting with the previous research work in the given area. Usually one should not use more than two researches in either case of supporting or contradicting the present case of research.

➤ **Conclusion(s) & Recommendations**

A conclusion should be the final section in which the outcome of the work is mentioned briefly. Check that your work answers the following questions:

- Did the research project meet its aims (check back to introduction for stated aims)?
- What are the main findings of the research?
- Are there any recommendations?
- Do you have any conclusion on the research process itself?

➤ **Implications for Future Research**

This should bring out further prospects for the study either thrown open by the present work or with the purpose of making it more comprehensive.

Appendices

The Appendices contain material which is of interest to the reader but not an integral part of

the thesis and any problem that have arisen that may be useful to document for future reference.

➤ **References**

References should include papers, books etc. referred to in the body of the report. These should be written in the alphabetical order of the author's surname. The titles of journals preferably should not be abbreviated; if they are, abbreviations must comply with an internationally recognised system.

The Layout Guidelines for the Internship File & Internship Report:

- A4 size Paper Font: Arial (10 points) or Times New Roman (12 points)
- Line spacing: 1.5
- Top and bottom margins: 1 inch/ 2.5 cm; left and right margins: 1.25 inches/ 3 cm

Assessment Scheme:


Continuous Evaluation:

(based on Internship File and the observations of the faculty guide/ supervisor) 30%

Feedback from Company/ Organization: 10%

Final Evaluation:

(Based on Internship Report, Viva/ Presentation) 60%


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HUMAN RESOURCE DEVELOPMENT AND EMPLOYEE WELLNESS

Course Code: SCW4305

Credit Units: 03

Course Objective:

- To develop multi facets of the personality and to build self confidence. To develop a spirit of continuous learning and innovation.
- To strengthen the competency base of individuals, teams and organization and also familiar with the organizational culture.
- To understand and further the organization culture.
- To appreciate the importance of bottom-line focus to the Human Resource function and trend toward HR Accountability.
- To understand the various approaches to and techniques of measuring HR issues.
- To create awareness of different types of information systems in an organization so as to enable the use of computer resources efficiently, for effective decision- making.

Course Content:

Module I: Human Resource Development (HRD)

Concept, origin and needs for HRD; Overview of HRD as a Total system; Approaches to HRD; human capital approach; social psychology approach and poverty alleviation approach

HRD and its dimension

Competency Mapping.

Module II: HRD Interventions

Performance Measurement Systems: Fundamental issues. Feedback sessions.

Organizational goal setting process, Key Result Area (KRA) and Key Performance Indicator (KPI), Coaching, Mentoring, career planning, career development, reward system, quality of work life.

HRIS: Computers and computer based Information Systems. Measuring HR: Changing role of HR, HR as a strategic partner, the need for measuring HR.

Approaches to measuring HR: Competitive Benchmarking, HR Accounting, HR Auditing, HR Effectiveness Index, HR Key Indicators, HR MBO (Management by Objectives).

Module III: Instructional Technology

Learning and HRD; Building Learning Organization; Learning as intellectual capital, Measuring learning

Architecting a learning organization, Organizational Learning, models and curriculum

Factors and principles of learning; group and individual learning; HRD trends; Behavioural Sciences; Transactional Analysis Concepts of continuous learning, Behaviour modeling and self-directed learning

Evaluating the HRD effort: Data gathering; analysis and feedback; HRD experience in Indian organizations; future of HRD - Organization culture and development.

Module IV: Talent Development

Concept and importance; Training Need Analysis, process of training, designing and evaluating training and development programs. Use of information technology, Types and Methods of Training: Training within industry (TWI), External training: on and off the job; Training methods; lecture, incident process, role play, structured and unstructured discussion, in-basket exercise, simulation, vestibule, training, management games, case study, programmed instruction, team development, and sensitivity training;

Review of training programs.

Module V: Employee Wellness

Concept, philosophy, principles and scope; Importance and relevance of wellness programs, Role of Welfare Officer as per the Factories Act 1948. Relevance - with reference to Accidents, Absenteeism, Alcoholism, Domestic Violence: Preventive and remedial measures. Employee Counselling. Role of Counselor in Organizations. Corporate Social Responsibility (CSR): CSR as a business strategy. Environmental management systems ISO 14001, ISO 26000: Social responsibility guidance standard, environmental impact assessment.

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Examination Scheme

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	7	10	8	5	70

CT: Class Test, H: Home Assignment, P/V/Q: Presentation/Viva/Quiz, A: Attendance,
EE: End Semester Examination

References

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MENTAL HEALTH AND PSYCHIATRIC SOCIAL WORK

Course Code: SCW4306

Credit Units: 03

Course Objective:

- Understand the concepts of mental health and mental illness.
- Understand the signs and symptoms, etiology, diagnosis and treatment of mental health problems.
- Understand different services for the care of mentally ill.
- Understand historical background of psychiatric social work in India and abroad.
- Understand the nature of psychiatric social work services and relevance of team work.
- Understand the nature of collaboration with voluntary organizations for the welfare of mentally ill.
- Identify the issues related to psychiatric social work department in hospitals and community mental health settings.

Course Contents:

Module I: Mental Health

Concept of health and illness; WHO's definition of Health; Mental health and mental illness; Deficit and competence based models of mental health; Classification of Mental Disorders: International Classification of Mental Disorders (ICD) and Diagnostic and Statistical Manual of Mental Disorders (DSM) – 5.

Symptoms, etiology, diagnosis, prognosis and management of –Neuroses, Psychoses, Psychophysiological disorders, Personality disorders, Psychiatric disturbances in children and adolescents, Organic psychotic conditions, Mental retardation.

Module II: Introduction to Psychiatric Social Work

Meaning and Scope: Historical background of psychiatric social work in India and abroad; Reasons for its development as a specialty.

Application of social work methods and other related techniques used in the field

Multi-disciplinary approach and team work in mental health care Problems of hospitalization; Impact of mental illness on the patient, family and community.

Module III: Practice of Social Work

Importance of home visit and visit to the place of work

Role of family in the treatment of mentally ill

Preparing the family and community for the return of the affected individual

Follow-up

Module IV: Care of mentally ill:

Day-care centre, night-care centre, half-way-home, sheltered workshop, Occupational therapy units;

Role of voluntary organizations, governmental-agencies and paraprofessionals in the welfare of mentally ill.

Role of social worker in mental health centers, departments of psychiatry, general hospitals, child guidance clinics, community mental health units, correctional institutions, industries, and family welfare centers.

Role of social worker in the management of substance abuse. Educational avenues in psychiatric social work; Research avenue in the field of mental health for social workers.

Module V: Organization of psychiatric social work

Psychiatric Departments: Functions and collaboration with other departments.

Community mental health and social work, NMHP, Innovations like Satellite clinics, district mental health programme etc.

Rehabilitation and Acts: Occupational therapy - Principles and practice - Psychosocial rehabilitation.

Mental Health Act, 1987.

The Persons with Disabilities (Equal Opportunities, Protection of Rights and Full Participation) Act, 1995.

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Examination Scheme

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	7	10	8	5	70

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SOCIAL WORK WITH FAMILIES AND CHILDREN

Course Code: SCW4307

Credit Units: 03

Course Objective:

- To strengthen the professional competence of Social work Practice with families and children.
- To gain understanding of type of practice settings working with families and children.
- To understand the role of the profession and the stakeholders in the welfare of families and children.

Course Content:

Module I: Social Work with Families and Children

Working effectively with children and families, Values and Ethics in social work with children and families, Family as a Client System, Strengthening Family structure and Communication.

Module II: Process of Intervention

Social Worker-client relationship, Social Study, Assessment, Goal Setting, Contracting, Intervention; Development of practice skills: Conceptual skills, Interviewing skills – Informational interview, Diagnostic/Assessment interview, Therapeutic Interview, Recording skills, Evaluation.

Module III: Social Work Practice in different settings

Social Work interventions for children in different settings: school settings, correctional settings, institutionalized children, community based interventions, children in care and protection, adoption centres, street children, children abusing substances, children in clinical settings, Social work interventions for families in different settings: Family Counselling centres, short stay, Respite care, Destitute homes, Clinical settings.

Module IV: Role of the Social Worker

Role of the Social Worker while working with children and families: Case worker, Group Facilitator, Community Organizer, Case Manager, Enabler, Reformer, Project Manager, Researcher, Activist, Advocacy and Lobbying, Sensitisation, Campaigning, Social Audits, Trainer, Monitoring and Evaluation, Documentation, Fund Raising, Resource Mobilisation, Policy Planning, Catalyst, Change maker, Role Model, Community Organiser, Coordinator, Enabler, Reformer, Facilitator, Volunteer

Module V: Stakeholder's Participation

State, Global Community, NGO's, Institutions of National Importance, Judiciary, Bureaucrats, Policy Makers, Social Activist, Educational Institutions, PRI's, Self Help Groups, Community Leaders, Religious Institutions, Gram Panchayats, Police, Health Workers, Grassroot Level workers, Anganwadi Workers, ASHA's, Donors, Volunteers, Youth, Civil Society Organisation, Community Based Organisations.

Examination Scheme

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	7	10	8	5	70

CT: Class Test, H: Home Assignment, P/V/Q: Presentation/Viva/Quiz, A: Attendance, EE: End Semester Examination

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CORRECTIONAL ADMINISTRATION AND SERVICES

Course Code: SCW4308

Credit Units: 03

Course Objective:

- To acquaint with the correctional institution and non-institutional programmes.
- To understand the different services for juvenile, young and adults offenders and also to understand the legal provisions and procedures for their assistance.
- To understand the role of custodial staff in the process of correction and rehabilitation.
- To understand the structure, function, treatment and facilities provided by the institutions.

Course Content:

Module I: Institutional systems

Introduction to correctional administration. History of Correctional Administration in India: Concept, objectives and functions of Correctional administration.

Institutional protection for children and young offenders: Juvenile Justice (Care and Protection of Children) Act -2002, 2005.

Observation Home, Juvenile Homes for Boys and Girls and their functions. District Shelter for boys and girls and their functions.

Module II: Institutional Treatment for Released Offenders and Convicts

Prison: Historical development of prison system; Indian Prison Act, Prison Manual (Haryana).

Prison administration, prison Labour, prison discipline and prison education; Pre-release programs; Prisoners' Welfare Board.

Open-air prison: Historical development of open-air prison system, organization and administration.

Module III: Non-institutional systems

Probation: Historical development of probation system, principles and procedure.

Parole: Historical development of parole; functions and powers of Parole Board; Conditions under the Prison Manual. Indian Penal Code, provisions on Parole.

Pre-release preparation of the parolee

Module IV: After care services

Legal provision for establishing social institution.

Provision for assistance to released prisoners: Role of voluntary organization, corporate bodies and the state in the rehabilitation.

Prevention of Immoral Traffic Act: Its objectives; State Home for Women (Sthrinikethana)

Citizen committees, Police help-line.

Module V: Social work intervention

Scope of social work intervention in prisons.

Role of social worker in the prison administration.

Social work practice in correctional services: Nature, scope and challenges

Comprehensive assessments: of offenders, their families, and communities to identify offenders' needs, strengths, ability to cope and any support networks they may require.

A career in social work at correctional services

Examination Scheme

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	7	10	8	5	70

CT: Class Test, H: Home Assignment, P/V/Q: Presentation/Viva/Quiz, A: Attendance,

EE: End Semester Examination

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MANAGEMENT OF DEVELOPMENT AND WELFARE SERVICES

Course Code: SCW4310

Credit Units: 03

Course Objective:

- To understand the overall environment and its impact on the nature, structure and development of organizations in corporate, public and voluntary sectors in the context of social work profession.
- To understand policies and procedures involved in establishing and maintaining human service organizations.
- To acquire skills to network and participate in the management of resources human, material and environmental.
- To develop skills to participate in management of programmes, as a part of the interdisciplinary team and initiate as well as develop new programmes.
- To develop ability to analyze the practices applied in specific settings.

Course Contents:

Module I: Social Services

Need for welfare and developmental organisations, Factors determining social welfare programmes, Development and Welfare organizations' response to societal needs; role of state, voluntary and corporate sector. Management services: Types of settings, organizational characteristics like origin, nature, size, structure, and design, organizational climate and impact of sociopolitical environment. Management process: Vision, Planning, Organizing, Directing, Staffing, Coordination, Reporting, Budgeting. Establishment: Registration, different types of legislations, legal status, constitution, rules and procedure, goals - Financial resources: Organizational Budget, Sources of finance, Fund Raising, Records, Audit.

Module II: Physical Structure and Infrastructure

All activities related to acquiring, hiring and maintaining importable structure and infrastructure, maintenance of premises and daily upkeep. Enhancing the involvement and the potential of people in organization's executive boards, committees; professionals and other staff-relationship, communication, team work, and facilitating team building, supervision, and participation in training.

Module III: Programme Development

Programme management: long term, short term, and Documentation. Project proposals based on felt-needs, nature of resources, eligibility criteria, records, evaluation and research. Impact analysis - Qualitative and quantitative

Module IV: Public Relations

Public relations need and its promotion by all in the organisation. Representing the organization, networking, public, corporate and voluntary sector, resource building, accountability, transparency, use of media for publicity.

Module V: Change and its Management

Understand and manage change, innovation in a rapidly changing social environment: for policy programmes and structure. Organizational understanding: Conflict, conflict resolution, creating positive climate.

Examination Scheme

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	7	10	8	5	70

CT: Class Test, H: Home Assignment, P/V/Q: Presentation/Viva/Quiz, A: Attendance,
EE: End Semester Examination

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HUMAN RIGHTS AND SOCIAL WORK PRACTICE

Course Code: SCW4401

Credit Units: 03

Course Content:

Module I: Human Rights

Definition and Classification

Civil and Political Rights, Socio Economic and Cultural Rights. Universal Declaration of Human Rights

Similarities and Differences between Human Rights and Fundamental Rights

Module II: Human Rights Acts and Institutions

Indian Constitution and Relevant Articles relating to HR. The protection of Human Rights Act 1993.

Structure and Function of National Human Rights Institutions National HR Commissions National

SC/ST Commissions National commission for Women National commission for Minorities State

Human Rights Institutions State HR commissions State commission for women State commission for

Minorities.

Module III: Human Rights in the Context of Specific Population

SC/ST, Religious Minorities

Physical, Visual and Mentally Handicapped.

HIV/AIDS victims

Refugees, War victims

Prisoners, Custodial Violence,

Women and Children, Senior Citizens

Work situations

Module IV: Social Policy

Definition, need, evolution and constitutional base; Sources and instrument of social policy.

Social Planning and Social Development: Meaning of social planning, community planning and community participation. Planning machineries at the State and National levels

Five year plans and Social development; Concept and indicators; social change and social development in India.

Module V: Social Legislations

Salient Features of Child Labour Act, Right To Information Act, Suppression of Immoral Traffic Act and Prevention of Immoral Trafficking. Domestic Violence Act.

Examination Scheme

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	7	10	8	5	70

CT: Class Test, H: Home Assignment, P/V/Q: Presentation/Viva/Quiz, A: Attendance,

EE: End Semester Examination

References

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SOCIAL WORK WITH URBAN, RURAL AND TRIBAL COMMUNITIES

Course Code: SCW4403

Credit Units: 03

Course Objective:

- To develop an understanding of Urban, tribal and rural communities.
- To understand the characteristics and problems of urban, tribal and rural communities.
- To acquire knowledge about the contribution of Governmental and Nongovernmental Organisations to urban, tribal and rural development.
- To develop an understanding of the functions of Panchayath Raj Institutions .Gain knowledge about the application of social work in tribal and rural development programmes.

Course Contents:

Module I: Tribe in Relation to Caste and Nation

Nature and Characteristics of Primitive Cultures: Tribes in India and their ecological distribution.

Important tribal groups in India

Emerging Trends in Tribal Social Institutions: Family and Kinship Systems, Jati Structure, Economic Structure, Political organizations.

Characteristics of Tribal Society: Economic, Social, Political and Cultural Problems of Tribal Life.

Module II: Government Programs for Tribal Societies

Post Independence Programs and their Impact on Tribal Societies Programmes of Voluntary Agencies and their Impact on Tribal Societies.

Analysis and Assessment of Tribal Communities; Special Problems of the Tribals in a different areas.

Social Work Practice in Tribal Development: Community organization as a method of intervention, Participatory Rural Appraisal (PRA), Logical Framework Approach/Analysis (LFA), Scope of other techniques of intervention in tribal community development.

Module III: Rural Society and Poverty

Historical perspective: Dynamics in the village society; Caste/class relationships; Control and Power, Conflict and Integration. Poverty in the rural context; Nature and manifestations.

Analysis of Basic Problems: Issues faced by the rural poor such as Indebtedness, Bonded labour, Low wages, Unemployment, Underemployment, and other forms of exploitations.

Current Rural Development Programs in India: Council for the Advancement of People's Action and Rural Technology (CAPART) and other Rural Development Statutory Bodies. Panchayat Raj System in Indian states and its role in rural and tribal development.

Role of social worker in tribal and rural development programs.

Module IV: Perspectives on Urban Community Development

Urban Economy: Urban economy in the context of land, labor, capital, technology, and organizations.

Concept and Meaning of Development: Basic Elements and Dimensions with an Urban Focus.

Economic Development in the Urban Context: Industrialization and Employment generation Different service sectors.

Infrastructure facilities: Road, Energy and Finance

Development of cities: production, distribution and the present shift; Economics of local Government – Revenue and tax collection and distribution for Development.

Module V: Urban Development and Civic Administration

Growth of High-rise as well as slums; Slum-city relationship and its problems

Role of civic administration

Voluntary Organizations (NGOs) and urban dwellers

Role of law and town planning in urban development.


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Examination Scheme

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	7	10	8	5	70

CT: Class Test, H: Home Assignment, P/V/Q: Presentation/Viva/Quiz, A: Attendance,
EE: End Semester Examination

References

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FIELD WORK PRACTICUM-IV

Course Code: SCW4404

Credit Units: 03

Course Objective:

The emphasis is on-learning skills which revolve around specific tasks where cause-effect relationships are understood, where the persons have problems but they are more victims of their life circumstances rather than of pathology for which great knowledge of psychological and social dynamics would be required and lower order of skills of intervention is required to be utilized. The processes dealt with at the individual, group or community is specific. Show dynamics but do not require unusual skills of intervention. Administrative tasks are also specific, e.g. planning and programming around a specific service.

The specific objectives of field-work in the Fourth semester may include:

1. Development of the knowledge of:
 - (a) Socio-economic background and the living condition of the vulnerable groups and the problems confronting them.
 - (b) Problem-solving techniques utilized in the specific area of work of the organization where student is placed.
 - (c) The use of simple research procedures and maintenance of scientific data to assess problems/needs/agency.
2. Development of skills in :
 - (a) Work with individuals, families, groups and communities and seeing the need for an integrated approach to problem solving.
 - (b) Selecting and utilization of community resources.
 - (c) Work as a member of a team with other professional and own discipline to, plan, organise and implement projects, programmes with emphasis on the use of the process in problem-assessment and problem solving.
3. Development of professional attitudes, conducive to work with individual families group and communities, leading gradually to an awareness of self as a professional person. Efforts will be made to work out objectives in each semester for every student in field practicum according to the nature and services of the agency and his performance will be evaluated accordingly.

Methodology

Each student will engage themselves in interaction and observation of social phenomenon and processes in a subject/ field of their choice. Student will then present their findings in the form of a paper for seminar discussions. Similarly, field work will be done by students in their area of interest and present their practical observations, as a report with analysis and suggestions.

Examination Scheme:

Field/Seminar Report :	40 marks
Viva-Voce :	30 marks
Internal Faculty and Interaction :	10 marks
Presentation/Daily Diary Report :	20 marks


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DISSERTATION

Course Code: SCW4437

Credit Units: 06

GUIDELINES FOR DISSERTATION

The aim of the dissertation is to provide you with an opportunity to further your intellectual and personal development in your chosen field by undertaking a significant practical unit of activity, having an educational value at a level commensurate with the award of your degree. The dissertation can be defined as a scholarly inquiry into a problem or issues, involving a systematic approach to gathering and analysis of information / data, leading to production of a structured report.

Selecting the Dissertation Topic

It is usual to give you some discretion in the choice of topic for the dissertation and the approach to be adopted. You will need to ensure that your dissertation is related to your field of specialization.

Deciding this is often the most difficult part of the dissertation process, and perhaps, you have been thinking of a topic for some time.

It is important to distinguish here between 'dissertation topic' and 'dissertation title'. The topic is the specific area that you wish to investigate. The title may not be decided until the dissertation has been written so as to reflect its content properly.

Few restrictions are placed on the choice of the topic. Normally we would expect it to be:

- relevant to business, defined broadly;
- related to one or more of the subjects or areas of study within the core program and specialisation stream;
- clearly focused so as to facilitate an in-depth approach, subject to the availability of adequate sources of;
- information and to your own knowledge; of value and interest to you and your personal and professional development.

Planning the Dissertation

This will entail following:

- Selecting a topic for investigation.
- Establishing the precise focus of your study by deciding on the aims and objectives of the dissertation, or formulating questions to be investigated. Consider very carefully what is worth investigating and its feasibility.
- Drawing up initial dissertation outlines considering the aims and objectives of the dissertation. Workout various stages of dissertation
- Devising a timetable to ensure that all stages of dissertation are completed in time. The timetable should include writing of the dissertation and regular meetings with your dissertation guide.

The Dissertation plan or outline

It is recommended that you should have a dissertation plan to guide you right from the outset. Essentially, the dissertation plan is an outline of what you intend to do, chapter wise and therefore should reflect the aims and objectives of your dissertation.

There are several reasons for having a dissertation plan

- It provides a focus to your thoughts.
- It provides your faculty-guide with an opportunity, at an early stage of your work, to make constructive comments and help guide the direction of your research.
- The writing of a plan is the first formal stage of the writing process, and therefore helps build up your confidence.
- In many ways, the plan encourages you to come to terms with the reading, thinking and writing in a systematic and integrated way, with plenty of time left for changes.


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- Finally, the dissertation plan generally provides a revision point in the development of your dissertation report in order to allow appropriate changes in the scope and even direction of your work as it progresses.

Keeping records

This includes the following:

- Making a note of everything you read; including those discarded.
- Ensuring that when recording sources, author's name and initials, date of publication, title, place of publication and publisher are included. (You may consider starting a card index or database from the outset). Making an accurate note of all quotations at the time you read them.
- Make clear what is a direct quotation and what is your paraphrase.

Dissertation format All students must follow the following rules in submitting their dissertation.

- Front page should provide title, author, Name of degree/diploma and the date of submission.
- Second page should be the table of contents giving page references for each chapter and section.
- The next page should be the table of appendices, graphs and tables giving titles and page references.
- Next to follow should be a synopsis or abstract of the dissertation (approximately 500 words) titled: **Executive Summary**.
- Next is the 'acknowledgements'.
- Chapter I should be a general introduction, giving the background to the dissertation, the objectives of the dissertation, the rationale for the dissertation, the plan, methodological issues and problems. The limitations of the dissertation should also be hinted in this chapter.
- Other chapters will constitute the body of the dissertation. The number of chapters and their sequence will usually vary depending on, among others, on a critical review of the previous relevant work relating to your major findings, a discussion of their implications, and conclusions, possibly with a suggestion of the direction of future research on the area.
- After this concluding chapter, you should give a list of all the references you have used. These should be cross - references with your text. For articles from journals, the following details are required e.g.

Draper P and Pandyal K. 1991, The Investment Trust Discount Revisited, Journal of Business Finance and Accounting, Vol18, No6, Nov, pp 791-832.

For books, the following details are required: Levi, M. 1996, International Financial Management, Prentice Hall, New York, 3rd Ed, 1996

- Finally, you should give any appendices. These should only include relevant statistical data or material that cannot be fitted into the above categories.

The Layout Guidelines for the Dissertation:

- A4 size Paper
- Font: Arial (10 points) or Times New Roman (12 points)
- Line spacing: 1.5 Top and bottom margins: 1 inch/ 2.5 cm; left and right margins: 1.25 inches/ 3 cm

Guidelines for the Assessment of the Dissertation

While evaluating the dissertation, faculty guide will consider the following aspects:

Has the student made a clear statement of the objective or objective(s).

If there is more than one objective, do these constitute parts of a whole?

Has the student developed an appropriate analytical framework for addressing the problem at hand.

Is this based on up-to-date developments in the topic area?

Has the student collected information/data suitable to the frameworks?

Are the techniques employed by the student to analyse the data / information appropriate and relevant?

Has the student succeeded in drawing conclusion form the analysis?

Do the conclusions relate well to the objectives of the project?

Has the student been regular in his work?

Layout of the written report

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Assessment Scheme:

Continuous Evaluation:

40%

(Based on Abstract, Regularity,
Adherence to initial plan, Records etc.)

Final Evaluation: Based on,
Contents & Layout of the Report,
Conceptual Framework,
Objectives & Methodology and
Implications & Conclusions

60%

25


10

10

15



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SOCIAL WORK WITH PWD

Course Code: SCW4407

Credit Units: 03

Course Objective:

- Gain knowledge about the concept of and different types of disabilities.
- Acquire an understanding of the theoretical models and approaches to disability
- Develop an attitude of respect and dignity towards persons with disability
- Become skilled at undertaking social work interventions with other stakeholders in the field of disability

Course Contents:

Module I: Concept of Disability and Impairment

ICIDH and WHO definitions of disability; causes, types Magnitude of various disabilities and their impact on persons with disability and their families

Discourses and models of disability

Developing an anti-oppressive and Inclusive understanding of disability

Module II: Types, Causes and Rehabilitative Concerns

Types of disability: physical, sensory, intellectual, multiple disabilities, learning developmental disabilities, psychosocial disability

Causes, types and care for persons with disabilities (medical and other interventions including aids and appliances)

Process of rehabilitation: early identification, education, vocational rehabilitation, social inclusion and empowerment within the family and community.

Understanding the experience of disability: Limitations, strengths and potentials of persons with disabilities

Module III: Impact of disability on individuals and their families

Reactions of parents/family members and individuals ways of coping with disability.

Needs and problems of persons with disability and their families across the life span and at critical stages in their lives

Social work intervention at each stage

Module IV: Disability Intervention at Individual and Family Levels

Individual level strategies: Self help and support groups; assertiveness training, life skills enrichment

Family level strategies: Family crisis intervention, family centered intervention, parent guidance, parent training

Role of social worker in different settings: Hospital and treatment centers, home, educational institutions, vocational rehabilitation centers, the community

Multidisciplinary rehabilitation teams and their roles.

Module V: Disability intervention at community and policy levels

Building awareness, community education, community based rehabilitation, advocacy and lobbying

Using international instruments (Salamanca Declaration, Standard Rules, UNCRPD) and legislations governing disability (Persons with Disability Act, 1995, RPD Bill, MHC Bill, RCI Act, National Trust Act, 1999) for advocacy

State's role in implementation of legislations.

Examination Scheme

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	7	10	8	5	70

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CT: Class Test, H: Home Assignment, P/V/Q: Presentation/Viva/Quiz, A: Attendance,
EE: End Semester Examination


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SOCIAL WORK WITH HIV/AIDS

Course Code: SCW4408

Credit Units: 03

Course Objective:

- To understand the issues related with HIV/AIDS positive cases.
- To develop an attitude of respect and dignity towards persons with HIV/AIDS.
- To become skilled at undertaking social work interventions with and HIV/AIDS cases.

Course Contents:

Module I: HIV and AIDS: The Current Landscape from a Death Sentence to a Chronic Disease

The History of the Epidemic; Nature of the retro virus; HIV as a Behaviourally acquired infection; Modes of transmission; Prevention of transmission of infection; Safer Behaviours
HIV Testing and Treatment; the issues of Confidentiality; Counselling Centers; High risk populations; Bridge populations
Enduring Themes of Stigma and Discrimination

Module II: National Response for HIV/AIDS Management

A Health Crisis; Risk Factors for HIV; Vulnerable Groups: Youth and children, women, prisoners
National Response to the HIV/AIDS Crisis: National AIDS Control Policy (NACP) I-IV and the Formation of NACO and SACS
Challenges of Positive Living; Approaching the Epidemic Holistically
Future for HIV/AIDS Social Work: Developing a New Agenda

Module III: HIV/AIDS Prevention for MSM and IDU

Risk factors for Men Who Have Sex with Men, Diverse ideologies and psychosocial settings of MSM
IDU practices and health risks; Nationwide distribution of IDUs
Intervention for HIV-Prevention among MSM and IDU: Condom distribution and syringe exchange programs
Intricacies of Counselling MSM and IDU

Module IV: HIV/AIDS Prevention and Care for At-Risk Adolescents and Young Adults

The Disproportionate Impact of HIV on Young People; Reasons for High Risk among Youth for HIV Infection
HIV/AIDS Education for Adolescents and Young Adults; Sex and reproductive education; Impacts of Drugs and Alcohol on HIV transmission; Adolescent Sexual Minorities, Sexual Behaviour
Experimentation among Adolescents; Assessment with Adolescents and Young Adults; The HEADSS Assessment Model; Suicide Risk/Depression Screening of Adolescents
Community Level Interventions Targeted at Adolescents for HIV Prevention

Module V: HIV Case Management: The Social Work Perspective

The Hub of Service Provision
Understanding Social Work Case Management
Description of Supportive HIV Case Management Services
Common Risks in People Living with HIV or AIDS
The Top Five Skills of an HIV Case Manager
The Top Five Attitudes of an HIV Case Manager
Partnership with people affected by HIV/AIDS

Examination Scheme

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	7	10	8	5	70

CT: Class Test, H: Home Assignment, P/V/Q: Presentation/Viva/Quiz, A: Attendance,
EE: End Semester Examination

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DISASTER MANAGEMENT

Course Code: SCW4410

Credit Units: 03

Course Objective:

- Understand key concepts, theories and approaches of disaster management with specific reference to Indian context.
- Develop skills to analyse factors contributing to disaster. Develop an understanding of the process of disaster management. Develop an understanding of the social worker's role in the team for disaster management.

Course Contents:

Module I: Disasters

Concept, types and impact - Famine, floods, cyclones, hurricanes, warfare, earthquake, volcanoes; traditional and modern disaster threats and care factor, classification of disasters; Disaster management - Definition and concept; approaches to disaster management, importance and relevance of disaster management in the present environmental scenario, cases studies of disaster management.

Module II: Disaster and Social Work Intervention

Scope of disaster related intervention, intervention during disaster impact stage, trauma Counselling and crisis intervention, post disaster management, damage assessment and long term rehabilitation and reconstruction, networking and co-ordination between government, NGOs, donor agencies, local bodies, police, military etc.

Module III: Disaster Prevention and Preparedness

Vulnerability analysis, hazard mapping, community based disaster preparedness programmes, training for CBDP, preparedness for post-disaster emergency response and long term rehabilitation, organization and planning, logistics; resource utilization, specialized skills and training needs; public awareness and education; first-aid training, civil defense training.

Module IV: Institutions and Instruments in Disaster Response

International decade for natural disaster reduction and UN resolutions, administration of relief in India - National, state, district and local levels.

Module V: Disaster related legislations and policies

National and international donor agencies; NGOs, mental health institutions in disaster management and relief.

Examination Scheme

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	7	10	8	5	70

CT: Class Test, H: Home Assignment, P/V/Q: Presentation/Viva/Quiz, A: Attendance, EE: End Semester Examination

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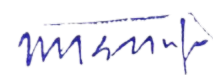
POSITIVE PSYCHOLOGY

Programme Structure-2017

Course Code	Course Title	Lecture (L) Hours /Week	Tutorial (T) Hours /Week	Total Credits
PSY2152	The Science of Happiness	3	-	3
PSY2252	Optimism and Success	3	-	3
PSY2352	Resilience and Well Being	3	-	3
PSY2452	Positive Psychology and Work Life	3	-	3
PSY2552	Creativity and Problem Solving	3	-	3
PSY2652	Positive Leadership & Competency Development	3	-	3
	TOTAL			18



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POSITIVE PSYCHOLOGY

Syllabus - Semester First

THE SCIENCE OF HAPPINESS

Course Code: PSY2152

Credit Units: 03

Positive Psychology is the scientific study of human flourishing, and an applied approach to optimal functioning. It has also been defined as the study of the strengths and virtues that enable individuals, communities and organizations to thrive. The underlying premise of positive psychology is that you can learn to be happier just as you can learn a foreign language or to be proficient at golf. This rapidly growing field is shedding light on what makes us happy, the pursuit of happiness, and how we can lead more fulfilling, satisfying lives. The course focuses on the psychological aspects of a fulfilling and flourishing life. Topics include happiness, self-esteem, empathy, love, achievement, creativity, music, spirituality.

Course Objectives:

- To bring an experience marked by predominance of positive emotions and informing them about emerging paradigm of Positive Psychology
- Build relevant competencies for experiencing and sharing happiness as lived experience and its implications

Course Contents:

Module-I: Introduction to Positive Psychology

Positive Psychology: Concept, History, Nature, Dimension and scope of Positive Psychology
Seligman's PERMA

Module-II: Positive Emotional States and Processes

Positive Emotions and well being: Hope & Optimism, Love
The Positive Psychology of Emotional Intelligence
Influence of Positive Emotions

Module-III: Strengths and Virtues

Character Strengths and Virtues
Resilience in the phase of challenge & Loss
Empathy and Altruism

Module-IV: Happiness

Introduction to Psychology of happiness, well being and scope, Types of happiness- Eudaimonic and Hedonic
History of Happiness, Theories, Measures and Positive correlates of happiness
Traits associated with Happiness
Setting Goals for Life and Happiness


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Module-V: Forgiveness and Gratitude

Forgiveness and Gratitude

Personal transformation and Role of suffering

Trust and Compassion

Examination Scheme:

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	10	10	5	5	70

A: Attendance, CT: Class Test, H/P/V/Q: Home Assignment/Presentation/Viva/Quiz,

EE: End Semester Exam

Text & References:

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Syllabus - Semester Second

OPTIMISM AND SUCCESS

Course Code: PSY2252

Credit Units: 03

Course Objectives:

This course synthesizes and integrates wellness principles and strategies into life, education and work place settings, thereby contributing to enhanced productivity, the prevention of chronic lifestyle disease, enjoyment of life, and personal fulfillment

Moreover, students will become holistic thinkers and lifelong learners who are able to integrate information across multiple disciplines and apply knowledge, skills, critical thinking and problem solving to real world situations.

Course Contents:

Module-I: Optimism and Physical Health

Optimism and coping with physical illness

Optimism and quality of life

Complementary Strengths of Health Psychology and Positive Psychology

Module-II: Optimism and Psychological Health

Hope Theory

Self Esteem and Self efficacy

Well-being therapy

From Positive Potential to Positive Excellence: Steps to be optimistic

Module-III: Gratitude: Parent of all virtues

Optimism, Gratitude and Happiness

Characteristics of grateful people

Cultivating Gratitude-Becoming more grateful

Module-IV: Problem Solving Appraisal and Psychological Adjustment

Motivation and Resilience

Stress and Stress Management

Module-V: Positive Psychology in Practice

Promoting Human Flourishing in Work, Health, Education, and Everyday Life

Positive Psychology and Life Coaching

Integrating positive psychology in practice

Module-VI: Success

What is success?

SMART Goal Setting & Letters to Yourself, Self-Motivation

Human Psychological Capital

Skills Sought by Employees


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Examination Scheme:

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	10	10	5	5	70

A: Attendance, CT: Class Test, H/P/V/Q: Home Assignment/Presentation/Viva/Quiz,
EE: End Semester Exam

Text & References:

- Tal Ben-Shahar (2009). The Pursuit of Perfect: How to Stop Chasing Perfection and Start Living a Richer, Happier Life.
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Syllabus - Semester Third

RESILIENCE AND WELL BEING

Course Code: PSY2352

Credit Units: 03

Course Objectives:

Wellbeing and resilience are vital to developing efficient problem solving skills, building and maintaining interpersonal relationships and realistic goal setting, all of which greatly enhance an individual's ability to perform and contribute meaningfully in daily life. The objective of this course is to develop an awareness of how mindfulness can allow one to navigate life's transitions, learn about Signs of resilience and wellbeing, and learn how to focus on wellbeing and resilience

Course Contents:

Module-I: Resilience

Meaning, Nature and Approaches
Theories of Resilience
Promoting Resilience

Module-II: Resilience in the phase of challenge & Loss,

Positive Response to loss, Resilience & Grit
Character Strengths and Virtues

Module-III: Post Traumatic Growth & Benefit Finding

Post Traumatic Growth, Models of PTG as Outcome, Models of PTG as a Coping Strategy
Benefit Finding, Meaning Making and Stress Inoculation
Types of Growth Outcome

Module-IV: Mindfulness and Well Being

Neuroscience of Well-being, Social / Emotional Wellbeing
Mindfulness-Based Interventions, Mindfulness and mental health
Mindfulness and Positive Thinking

Module-V: Subjective Wellbeing

Promoting Wellness: Integrating community and Positive Psychology
Building Resilience and Wellbeing

Examination Scheme:

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	10	10	5	5	70

A: Attendance, CT: Class Test, H/P/V/Q: Home Assignment/Presentation/Viva/Quiz,
EE: End Semester Exam


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Syllabus - Semester Fourth

POSITIVE PSYCHOLOGY AND WORK LIFE

Course Code: PSY2452

Credit Units: 03

Positive organizational psychology takes a strengths-based approach to work relationships, leadership and individual purpose in the workplace. In applying positive psychology to work settings, the goal is to improve organizational performance as well as individual performance, well-being, and fulfillment. This course is designed to explore Positive Psychology in the work place. It will focus on the application of positive subjective experiences and traits in organizations to improve workplace effectiveness. This course looks at historical trends as well as emerging changes in employees and the workplace. Directions for future research and implications for practice will be emphasized.

Course Objectives:

- Be able to summarize and identify applications of the theories, concepts, models and research in the field of positive organizational psychology.
- Personally reflect and deepen awareness of leadership skills, work attitudes, and analytical skills in relationship to the field.
- Demonstrate ability to be effective leaders and team members within business organizations, educational environments, and/or community settings.

Course Contents:

Module-I: The changing world of work

Introduction to positive psychology and its application to the workplace
Understand the world of work, upcoming trends that will affect work
Management of today's multi-generational and diverse work force

Module-II: Positive work environments for individuals and organizations:

Employee engagement- what causes individuals to join an organization and why they stay or leave, person-centered approach to engagement
Understand the concept of work as meaning
Impact of employee well-being on the organization and impact of feelings about work on the individual's well-being.
Bringing Positive Psychology to Organizational Psychology

Module-III: Enabling a positive work life

Understand the benefits of coaching, mindfulness, and strengths development in the workplace.
Work and home life balance.

Module-IV: Building psychological capital

Identify personal character strengths and understand their relationship with work satisfaction
Developing positivity and a positive team culture
Maintaining positive relationships at work


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Module-V: Positive Organizations

Applying the strengths-based approach for high performance

Appreciative Inquiry – positive change management

Maintaining positive relationships at work

Examination Scheme:

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	10	10	5	5	70

A: Attendance, CT: Class Test, H/P/V/Q: Home Assignment/Presentation/Viva/Quiz,

EE: End Semester Exam

Text & References:

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Syllabus - Semester Fifth

CREATIVITY AND PROBLEM SOLVING

Course Code: PSY2552

Credit Units: 03

Course Objectives:

To enable the students:

- Understand the process of problem solving and creative thinking.
- Facilitation and enhancement of skills required for decision-making.

Course Contents:

Module-I: Problem Solving Process

Problem-solving skills, including engaging with, researching and identifying strategies to solve unfamiliar problems and bring about change

Barriers to problem solving

Module-II: Thinking as a tool for Problem Solving

What is thinking: The Mind/Brain/Behaviour

Critical Thinking and Learning:

- Making Predictions and Reasoning
- Memory and Critical Thinking
- Emotions and Critical Thinking

Module-III: Creative Thinking

Definition and meaning of creativity

The nature of creative thinking

- Convergent and Divergent thinking
- Brain Storming

The six-phase model of Creative Thinking: ICEDIP model

Module-IV: Physical disability and Positive growth

Module-V: Change Management Skills

Examination Scheme:

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	10	10	5	5	70

A: Attendance, CT: Class Test, H/P/V/Q: Home Assignment/Presentation/Viva/Quiz,

EE: End Semester Exam



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Syllabus - Semester Sixth

POSITIVE LEADERSHIP AND COMPETENCY DEVELOPMENT

Course Code: PSY2652

Credit Units: 03

Course Objectives:

The major objective is to learn the essential principles and techniques of applying Positive Psychology in a coaching context. The students will also learn about essential techniques of Positive Psychology Coaching, Understanding, experiencing, and practicing the techniques at the heart of effective coaching.

Course Contents:

Module-I: Positive Psychology and Individuals

An exploration of positive psychology applications in coaching, clinical and other settings
Recognize and use personal leadership strengths

Module-II: Positive Psychology and Organizations

Positive Psychology Coaching:
Essential Techniques of Positive Psychology Coaching
Coaching for Positive Change

Module-III: Positive organizational leadership

Explore and develop the elements of Authentic Leadership
Development and Positive Organizational Scholarship
Understand the role of positive emotions in the workplace and strength-based organizational development.

Module-IV: Positive Organizations and Appreciative Inquiry

Meaning in work
Creativity
Leadership Coaching and Positive Psychology

Module-V: Competence Development

Examination Scheme:

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	10	10	5	5	70

A: Attendance, CT: Class Test, H/P/V/Q: Home Assignment/Presentation/Viva/Quiz,
EE: End Semester Exam

Text & References:

- Lift: Becoming a Positive Force in Any Situation (Ryan W. Quinn and Robert E. Quinn)
- The Deep Change Field Guide: A Personal Course to Discovering the Leader Within (Robert E. Quinn)
- The Best Teacher in You: How to Accelerate Learning and Change Lives (Robert E. Quinn, Katherine Heynoski, Mike Thomas and Gretchen M. Spreitzer) Suggested Readings

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- Competing Values Leadership: Second Edition (Kim S. Cameron, Robert E. Quinn, Jeff DeGraff, and Anjan J. Thakor) • Building the Bridge as You Walk on It (Robert E. Quinn)
- Company of Leaders: Five Disciplines for Unleashing the Power in Your Workforce (Gretchen Spreitzer and Robert E. Quinn)
- Lyubomirsky, Sonja. *The How of Happiness: A New Approach to Getting the Life You Want*. New York: Penguin, 2008.
- Dweck, Carol S. *Mindset: The New Psychology of Success*. New York: Random House, 2006.
- Neff, Kristin. *Self-Compassion: Stop Beating Yourself Up and Leave Insecurity Behind*. New York: William Morrow, 2011.
- Szabó, Peter, and Daniel Meier. *Coaching Plain & Simple: Solution-Focused Brief Coaching Essentials*. New York: W.W. Norton &, 2009.
- Theeboom, T., Beersma, B., and van Vianen, A. "Does Coaching Work? A Meta-Analysis of the Effects of Coaching Individual-Level Outcomes in an rganizational



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PSYCHOLOGY

Programme Structure

Course Code	Course Title	Lectures (L) Hours per week	Tutorial (T) Hours per week	Practical (P) Hours per week	Total Credits
PSY2151	Introductory Psychology	2	1	-	3
PSY2251	Abnormal Psychology	2	1	-	3
PSY2351	Basic Cognitive Psychology	2	1	-	3
PSY2451	Life Span Development	2	1	-	3
PSY2551	Psychometric Testing	2	1	-	3
PSY2651	Counselling Psychology	2	1	-	3
	TOTAL				18



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PSYCHOLOGY

Syllabus - Semester First

INTRODUCTORY PSYCHOLOGY

Course Code: PSY2151

Credit Units: 3

Course Objective:

This course is designed to introduce the science of psychology. It identifies and defines the theories, terms, methods, and various fields of psychology. This course can be used as a foundation towards continued education in more specific areas of psychology. General Psychology encourages students to study in depth the notions of modern scientific psychology. Upon completion of this course, student should have the following objectives:

- To know the major personalities important to the field of general psychology and the ideas, theories, and schools with which they are associated.
- To know the major terms associated with general psychology and their meanings.
- To know the major concepts associated with the area of general psychology.

Course Content

Module I:

Meaning, Definition, Nature and Goals of Psychology

Module II:

Scope of Psychology; Branches and Fields of Psychology

Module III:

Background of Psychology: Historical Perspective

Module IV:

Schools of Psychology: Structuralism, Functionalism, Behaviorism, Gestaltism, Psychoanalysis, Humanism, Existentialism, Cognitive

Module V:

Methods of Psychology: Introspection, Observation, Experimental, Interview, Questionnaire, Survey

Examination Scheme:

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	10	10	5	5	70

Text & References:

- Morgan & King: Introduction to Psychology. Tata McGraw Hill Publishing Company Limited, N. Delhi
- Munn, N.L.: Psychology. Oxford & IBH Publishing Co Pvt. Ltd, N. Delhi

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- Hilgard & Atkinson: Introduction to Psychology, 6th Ed. New Delhi: Oxford & IBH Publishing Co
- Sdorow : Psychology. 3rd Edition Broalu & Benewmark Publishers
- Guilford, J. P.: General Psychology. New York: D. Van Nostrand
- Mohsin, S.M. : Elementary Psychology. Motilal Banarasi Das.
- Morris, C. G. & Maisto, A. A.: Psychology: An Introduction. (12thed.). Upper Saddle River, NJ: Prentice Hall.
- Atkinson & Hilgard: Psychology: An Introduction. Cengage Learning EMEA
- Kosslyn & Rosenberg : Psychology (3rded.). Allyn & Bacon
- Mishra, B. K.: Psychology. PHI Learning Pvt. Ltd
- Lahey, B. B. & Majors, M.: Psychology: An Introduction. Tata McGraw Hill Humanities/Social Sciences/Lingua



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Syllabus - Semester Second

ABNORMAL PSYCHOLOGY

Course Code: PSY2251

Credit Units: 3

Course Objective:

Abnormal psychology is a branch of psychology that deals with psychopathology and abnormal behavior that causes suffering to the individual and others around him or her, and interferes with functioning in a significant way. The term covers a broad range of disorders, from depression to obsession-compulsion to sexual deviation and many more. The study of abnormal psychology also includes learning about the factors, situations, and conditions that cause mental disorders and how they may be best treated. Following are the objectives for the part of Psychology:

- To gain an appreciation of the fundamental issues that underlies the concept of mental abnormality.
- To become familiar with how, in terms of symptoms, the various psychological disorders present themselves.
- To appreciate different explanations of abnormality. That is, to understand the role of environment, genetic factors, psychodynamics, neuropsychology, and biochemistry in the determination of psychopathology.

Course Content:

Module I: Introduction

Concept of abnormality: Criteria and Perspectives

Classification: DSM IV-R, conceptual and operational evaluation.

Casual factors in Psychopathological Behaviour

- (a) Biological determinants
- (b) Psychological determinants
- (c) Socio-cultural determinants

Module II: Neurosis and Psychosis

Concept and Difference between both the two

Module III: Neurotic Disorder

Generalized anxiety disorders

Obsessive-Compulsive disorders

Phobic Disorders

Eating Disorder

Module IV: Mood Disorders

Depression

Bipolar Disorder

Module V: Psychotic Disorder

Bipolar disorders: Manic, Depressive, Mixed

Psychotic depression

Delusional Disorder

Schizophrenia


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Module VI: Mental Retardation and Development Disorders

Levels of mental retardation, Organic factors in mental retardation.

Autism: Clinical picture and casual factors.

Childhood Disorder

Module VII: Substance Abuse Disorders

Alcoholism

Drug Addition

Module VIII

Psychosomatic Disorder

Somatoform Disorders

Personality Disorders

Examination Scheme:


Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	10	10	5	5	70

Text & References:

- Page, J.D.: Abnormal Psychology. New Delhi: Tata McGraw Hill Publishing Company Limited
- Shanmugam, T.E.: Abnormal Psychology. New Delhi: Tata McGraw Hill Publishing Company Limited
- Coleman, J.C.: Abnormal Psychology and Modern Life. Bombay: D.B. Taraporewala Sons.&OCLtd.
- Davison G.C.: Abnormal Psychology. New York: John Willey & Neale, J. M. Sons.
- Carson, R.C., Butcher, J.N. & Mineka, S.: Abnormal Psychology and Modern Life. Delhi: & Person Education, 2000
- Kaur, R.: Abnormal Psychology: New Trends and Innovations Delhi: Deep & Deep Publications (P) Ltd.
- Sarason, I. G. & Sarason, B. R.: Abnormal Psychology: The Problem of Maladaptive Behaviour, 11th Ed. Prentice-Hall
- Mangal, S. K.: Abnormal Psychology. New Delhi: Sterling Publishers Pvt Ltd
- Comer, R. J.: Abnormal Psychology, 5th Ed. Worth Publishers
- Kumar, V.: Abnormal Psychology: Causes and Treatment. Aadi Publications



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Syllabus - Semester Third

BASIC COGNITIVE PSYCHOLOGY

Course Code: PSY2351

Credit Units: 3

Course Objective:

Cognitive Psychology is an objective, empirical discipline that tends to favor an experimental approach. This paper of Psychology is crucial to understand the basis of mental activity and human behaviour. The students of Psychology will need to have this knowledge about the normal mental operation of adults in order to understand more complex processes and their disorder. The subject emphasizes cognitive aspects to show the more up to date developments. In this paper of Psychology, Students will:

- Gain factual knowledge of the terminology, methods, and research findings in the field of cognitive psychology.
- Learn the fundamental theories and principles of cognitive psychology including being able to critique them.
- Learn how professionals in the field of cognitive psychology go about the process of gaining new knowledge.

Course Content

Module I:

Introduction, History and Background of Cognitive Psychology

Module II:

Thinking: Nature, and Types of Thinking:

Tools of thinking- Images, Concept, Symbols and Signs, Language, Muscle Activities and Brain Function

Module III:

Reasoning: Meaning and Types of Reasoning: Deductive and Inductive Reasoning

Module IV:

Problem solving: Meaning and Method of Problem solving

Decision Making: Meaning, types and hindrances

Module V:

Intelligence: Meaning, Nature and Theories of intelligence: Unitary Theory, Multifactor Theory, Two Factor Theory, Group Factor Theory.

Genetic and Environmental Influence on Intelligence

Classification of Intelligence Test

Concept of Mental Age and IQ

Examination Scheme:

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	10	10	5	5	70


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Text & References:

- Esgate, A. & Groome, D.: An Introduction to Applied Cognitive Psychology. England: Psychology Press.
- Kellogg, R. T.: Fundamentals of Cognitive Psychology. New Delhi: Sage Publication
- Morgan & King: Introduction to Psychology. Tata McGraw Hill Publishing Company Limited, N. Delhi
- Munn, N.L.: Psychology. Oxford & IBH Publishing Co Pvt. Ltd, New Delhi
- Solso, R. L.: Cognitive Psychology (8th ED.). Delhi: Pearson Education
- Best, B. J.: Cognitive Psychology. (3rded.). West Publishing Company
- Hilgard & Atkinson: Introduction to Psychology, 6th Ed. New Delhi: Oxford & IBH Publishing Co
- Sdorow : Psychology. 3rd Edition Broalu & Benewmark Publishers
- Mishra, B. K.: Psychology. PHI Learning Pvt. Ltd
- Haberlandt, K.: Cognitive Psychology. Allyn & Bacon



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Syllabus - Semester Fourth

LIFE SPAN DEVELOPMENT

Course Code: PSY2451

Credit Units: 3

Course Objective:

Developmental psychology, also known as human development, is the scientific study of systematic psychological changes, emotional changes, and perceptual changes that occur in human beings over the course of their life span. Originally concerned with infants and children, the field has expanded to include adolescence, adult development, aging, and the entire life span. Developmental psychology includes issues such as the extent to which development occurs through the gradual accumulation of knowledge versus stage-like development, or the extent to which children are born with innate mental structures versus learning through experience. The objective of this paper is:

1. To provide an understanding of Physical, cognitive, affective, moral, social and neural development during infancy, childhood, and adolescence.
2. To critically evaluate the role of heredity, maturation, and the environment in development.
3. To critically examine the relationship between scientific theories of development and the reality of development in everyday life.

Course Contents:

Module1: Introduction

Meaning and Concept of Development: Life Span Perspective,
Theoretical Perspective on Development,
Factors influencing development

Module 2: The Start to Life

Conception and Prenatal Development: The Interaction of Heredity and Environment;
Birth and newborn: Birth Complications, Competent Newborn.

Module 3: Development in Infancy and Toddlerhood (birth to 2years)

Physical Development
Cognitive Development: Roots of Language
Social and Personality Development

Module 4: Development in Childhood

The Preschool years (3-6 Years)

Physical Development;
Cognitive Development: Language Development
Social and Personality Development

The Middle Childhood (6-12 Years)

Physical Development
Cognitive Development: Intellectual and Language development
Social and Personality Development

Module 5: Development in Adolescence and Young Adulthood Adolescence (12-19 years)


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Physical Development

Cognitive development in Adolescence and School Performance

Social and Personality Development

Young Adulthood (19-35 years)

Physical Development: Physical Limitations and Challenges

Cognitive Development: Intelligence and Higher Education

Social and Personality Development: Forging Relationship and Choosing Career

Module 6: Development in Middle and Late Adulthood

Middle Adulthood (35-55 years)

Physical Development: Sexuality and Health

Cognitive Development: Memory and Remembering

Social and Personality Development: Cultural Dimensions

Late Adulthood (55 years to death)

Physical Development: Health and Wellness

Cognitive Development: Memory and Forgetting

Social and Personality Development: Successful Aging

Death, Dying and Bereavement

Examination Scheme:

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	10	10	5	5	70

Text & References:

- Hurlock, E. B.: Developmental Psychology. McGraw-Hill
- Papalia, D. E.; Olds, S. W. & Feldman, R.D: Human Development(10th ed.).New York: McGraw-Hill.
- Feldman, R. S.: Discovering the Life Span (2nd Ed.). Pearson
- Berk, L.E.: Child Development. New Delhi: Pearson Education.
- Brodzinsky, D.M.; Gormly, A.V. & Anibron, S.R.: Life Span Human Development; New Delhi: CBS Publication
- Heatherington, E.M. & Parke, R.D.: Child Psychology: A Contemporary Viewpoint New York: McGraw-Hill
- Kail R. V.: Children and their development. Prentice Hall Inc.
- Bee, H. & Boyd, D.: Life Span Development, Boston, M.A. : Allyn and Bacon.
- Bukatko, D. & Daehler, M.W.: Child Development: A Thematic Approach. New York: Houghton Mifflin Company.
- Crain, W.: Theories of Development. Englewood Cliffs, New Jersey: Prentice Hall.
- Newman, B.M. & Newman, P.R.: Development Through Life: A Psychosocial Approach. New York: Wadsworth Publishing Company.
- Santrock, J.W.: A Topical Approach to Life Span Development. New Delhi: Tata McGraw Hill.



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Syllabus - Semester Fifth

PSYCHOMETRIC TESTING

Course Code: PSY2551

Credit Units: 3

Course Objective:

Psychological assessment is a process of testing that uses a combination of techniques to help arrive at some hypotheses about a person and their behavior, personality and capabilities. Psychological assessment is also referred to as psychological testing, or performing a psychological battery on a person. A psychological assessment is the attempt of a skilled professional, usually a psychologist, to use the techniques and tools of psychology to learn either general or specific facts about another person, either to inform others of how they function now, or to predict their behavior and functioning in the future. Psychologists are the only profession that is expertly trained to perform and interpret psychological tests. Below are the objectives of studying this particular paper of Psychology:

- To train the students in various psychological assessment techniques.
- To impart skills necessary for selecting and applying different tests for different purposes such as evaluation, training and rehabilitation.

Course Content:

Module-I: Introduction

History of Psychological Testing
Meaning, Definition and Types of Psychological Testing
Ethical issues in Psychological Testing

Module-II: Measurement

Nature and significance of Measurement
Distinction between assessment and measurement
Levels of measurement
Techniques of Attitude Measurement

Module-III: Construction of Test

Steps of constructing a Psychological Test
Reliability: Meaning, types and factors affecting reliability
Validity: Meaning, types and factors affecting Validity
Characteristics of a good Psychological Test

Module-IV: Assessment of General and Special Abilities

Intelligence (DAP: IQ and Slosson Intelligence Test (SIT-3/R)
Creativity: Creativity Assessment Packet (CAP)
Achievement: Diagnostic Achievement Test for Adolescents (DATA-2)

Module-V: Application of Testing

Assessment in Educational and Occupational Set-up: Achievement Test
Assessment in Clinical Set-up and in Counselling


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Examination Scheme:

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	10	10	5	5	70

Text & References:

- Anastasi, A. & Urbina, S.: Psychological Testing. U.S.A.: Prentice Hall International Inc.
- Hasan, Q.: Personality Assessment: A fresh Psychological Look. New Delhi: Gyan Publishing House
- Graham, J. R. & Lilly, R. S.: Psychological Testing. New Jersey: Prentice Hall Inc.
- Kaplan, R. K. & Saccuzzo, D. P.: Psychological Testing- Principles, Applications and Issues. New Delhi: Cengage Learning India Pvt Ltd
- Kline, T. J. B.: Psychological Testing – A Practical Approach to Design and Evaluation. New Delhi: Vistaar Publication
- Aiken, L.R. & Groth-Marnat, G.: Psychological Testing and Assessment (12th Ed.) Pearson Education
- Freeman, F. S.: Psychological Testing. Oxford University Press



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Syllabus - Semester Sixth

COUNSELLING PSYCHOLOGY

Course Code: PSY2651

Credit Units: 3

Course Objective:

The paper of Counselling Psychology covers its history, theories, activities, specialties and trends. It concentrates on the importance of the personhood of counselors and of the multicultural, ethical and legal environments in which counsellors operate. This paper focuses on the context and process of counselling to provide a range of high quality and responsive counseling skills and its applications to help oneself and others.

Course Contents:

Module I: Introduction

Meaning, Definitions and Goals of counselling
Role of Counsellor in different Setting
Characteristics of a good counsellor

Module II: Counselling Process

Building Counselling Relationship
Working in a Counselling Relationship
Termination of Counselling Relationship

Module III: Counselling Approaches

Insight-Oriented Counselling: Client-Centred
Action-Oriented Counselling: Behavioural
Testing, Assessment and Diagnosis in Counselling

Module IV: Counselling Applications


Child Counselling and Counselling in School
Adolescent Counselling and Counselling in College
Career Counselling: Theories of Career Development
Group Counselling and Family Counselling
Addiction Counselling

Module V: Theories and Techniques of Counselling

Psychodynamic Approaches
Humanistic Approach
Cognitive Approach
Behavioural Approaches

Module VI: Current Issues in Counselling

Ethical and Legal Issues
Mental Health Counselling
Counselling in a Multicultural Society
Counselling with Diverse Population


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Examination Scheme:

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	10	10	5	5	70

Text & References:

- Rao, S. N.: Counselling and Guidance (2nd Ed.). Tata McGraw Hill
- Belkin, G.S.: Introduction to Counselling. W.C.: Brown Publishers
- Nelson, J.: The Theory and Practice of Counselling Psychology. New York: Holt Rinehart & Winston
- Gibson, R. L. & Mitchell, M. H.: Introduction to Counselling. And Guidance (7th). New Delhi Prentice-Hall of India Pvt. Ltd
- Gladding, S. T.: Counselling: A Comprehensive Profession (6th Ed.). Dorling Kindersley India Pvt. Ltd.
- Hansen, J. H. & Rosberg, R.H: Counselling: Theory and Process (5th Ed.). Allyn & Bacon
- Pal, O. B.: Guidance and Counselling. New Delhi: Motilal Banarsidas Publishers Private Ltd.
- Milner, J., Byrne, P. O. & Campling, J.: Assessment in Counselling: Theory, Process and Decision-Making. Palgrave MacMillan
- Patterson, L.E.: The Counselling Process. Wadsworth Publishing
- Welfel, E.R., & Patterson, L.E: The Counselling Process: A Multitheoretical Integrative Approach. Thomson Brooks / Cole



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M. Phil in Clinical Psychology



Achieving Academic Excellence

Curriculum & Scheme of Examination

2022



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Note: This is based on M.Phil (Clinical Psychology) Guidelines & Syllabus as given on the RCI website (www.rehabcouncil.nic.in/writereaddata/mphilcp09.pdf)

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PAPER-I: PSYCHOSOCIAL FOUNDATION OF BEHAVIOR AND PSYCHOPATHOLOGY

Course Code: PSY5101

Credit Units: 12

Aims: The psychosocial perspectives attempt to understand human cognition, motives, perceptions and behavior as well as their aberrations as product of an interaction amongst societal, cultural, familial and religious factors. The overall aim is to introduce conceptualizations of mental health problems within the psychosocial framework, giving due considerations to contextual issues. Each Module in this paper pays attention to the different types of causal factors considered most influential in shaping both vulnerability to psychopathology and the form that pathology may take.

Objectives: By the end of Part-I, trainees are required to demonstrate ability to:

- Demonstrate a working knowledge of the theoretical application of the psychosocial model to various disorders.
- Make distinctions between universal and culture-specific disorders paying attention to the different types of sociocultural causal factors.
- Demonstrate an awareness of the range of mental health problems with which clients can present to services, as well as their psychosocial/contextual mediation.
- Carry out the clinical work up of clients with mental health problems and build psychosocial formulations and interventions, drawing on their knowledge of psychosocial models and their strengths and weaknesses.
- Apply and integrate alternative or complementary theoretical frameworks, for example, biological and/or religious perspectives, sociocultural beliefs and practices etc. in overall management of mental health problems.
- Describe, explain and apply current code of conduct and ethical principles that apply to clinical psychologists working in the area of mental health and illness.
- Describe Mental Health Acts and Policies, currently prevailing in the country and their implications in professional activities of clinical psychologists.

Academic Format of Modules: Learning would be mainly through clinical workup of clients presenting with range of mental health problems, and supplemented by lectures, seminars and tutorials, allowing trainees to participate in collaborative discussion.

Evaluation: Theory – involving long and short essays

Course Contents: Part-A (Psychosocial Foundations of Behavior)

Module - I: Introduction

Overview of the profession and practice; history and growth; professional role and functions; current issues and trends; areas of specialization; ethical and legal issues; code of conduct

Module - II: Mental health and illness

Mental health care – past and present; stigma and attitude towards mental illness; concept of mental health and illness; perspectives – psychodynamic, behavioral, cognitive, humanistic, existential and biological models of mental health/illness;

Module - III: Epidemiology

Studies in Indian context; tools available/standardized for epidemiological surveys; socio-cultural correlates of mental illness; religion and mental health; psychological well-being and quality of life - measures and factors influencing

Module - IV: Self and relationships

Self-concept, self-image, self-perception and self-regulations in mental health and illness; learned helplessness and attribution theories; social skill model; interpersonal and communication models of mental illness; stress diathesis model, resilience, coping and social support.

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Module - V: Family influences

Early deprivation and trauma; neglect and abuse; attachment; separation; inadequate parenting styles; marital discord and divorce; maladaptive peer relationships; communication style; family burden; emotional adaptation; expressed emotions and relapse.

Module - VI: Societal influences

Discrimination in race, gender and ethnicity; social class and structure, poverty and unemployment; prejudice, social change and uncertainty; crime and delinquency; social tension & violence; urban stressors; torture & terrorism; culture shock; migration; religion & gender related issues with reference to India.

Module - VII: Disability

Definition and classification of disability; psychosocial models of disability; impact, needs and problems; issues related to assessment/certification of disability – areas and measures.

Module - VIII: Rehabilitation

Approaches to rehabilitation; interventions in the rehabilitation processes; models of adaptation to disability; family and caregivers issues; rights of mentally ill; empowerment issues; support to recovery.

Module - IX: Policies and Acts

Rehabilitation Policies and Acts; assistance, concessions, social benefits and support from government and voluntary organizations; contemporary challenges; rehabilitation ethics and professional code of conduct

Course Contents: Part-B (Psychopathology)**Module - X: Introduction to psychopathology**

Definition; concepts of normality and abnormality; clinical criteria of abnormality; continuity (dimensional) versus discontinuity (categorical), and prototype models of psychopathology; classification and taxonomies – reliability and utility; classificatory systems, currently in use and their advantages and limitations.

Module - XI: Signs and symptoms

Disorders of consciousness, attention, motor behavior, orientation, experience of self, speech, thought, perception, emotion, and memory.

Module - XII: Psychological theories

Psychodynamic; behavioral; cognitive; humanistic; interpersonal; psychosocial; and other prominent theories/models of principal clinical disorders and problems, viz. anxiety, obsessive-compulsive, somatoform, dissociative, adjustment, sexual, substance use, personality, suicide, childhood adolescence, psychotic, mood disorders, and culture-specific disorders.

Module - XIII: Indian thoughts

Concept of mental health and illness; nosology and taxonomy of mental illness; social identity and stratification (Varnashrama Vyawastha); concept of – cognition, emotion, personality, motivation and their disorders

Examination Scheme:

	Internal Assessment (30 Marks)				Final Exam	Total Marks
Components	CT	H/P/V/Q	CT	A		
Weightage	10	5	10	5	70	100

CT-Class Test; H-Home Assignment; P-Presentation; V-Viva; Q-Quiz; A-Attendance; EE-End Term Exam

Text & References:

- An Introduction to Social Psychology, 2nd ed. Kuppuswamy, B. Konark Publishers: New Delhi
- Culture, Socialization and human development, Saraswathi, T.S (1999). Sage publications: New Delhi
- Asian perspectives in Psychology, Vol. 19. Rao, H.S.R & Sinha D. (1997). Sage publications: New Delhi
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- Applied Cross cultural psychology, Brislin, R. W. (1990). Sage publications: New Delhi



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PAPER-II: PSYCHIATRY

Course Code: PSY5103

Credit Units: 12

Aim: The aim is to train in conceptualization of psychopathology from different etiological perspectives, eliciting phenomenology and arrive at the clinical diagnosis following a classificatory system and propose/carry out psychological interventions including psychosocial treatment/management for the entire range of psychological disorders. Also, to train in assessing the caregivers' burden, disability and dysfunctions that are often associated with mental disorders and intervene as indicated in a given case.

Objectives: By the end of Part-I, trainees are required to demonstrate ability to:

- Demonstrate an understanding of a clinically significant behavioral and psychological syndrome, and differentiate between child and adult clinical features/presentation.
- Understand that in many ways the culture, societal and familial practices shape the clinical presentation of mental disorders, and understand the role of developmental factors in adult psychopathology.
- Carryout the clinical work up of clients presenting with the range of mental health problems and make clinical formulations/diagnosis drawing on their knowledge of a pertinent diagnostic criteria and phenomenology.
- Summarizes the psychosocial, biological and socio-cultural causal factors associated with mental health problems and neuropsychological disorders with an emphasis on bio-psychosocial and other systemic models.
- Carryout with full competence the psychological assessment, selecting and using a variety of instruments in both children and adults.
- Describe various intervention programs in terms of their efficacy and effectiveness with regard to short and longer term goals, and demonstrate beginning competence in carrying out the indicated interventions, monitor progress and outcome.
- Discuss various pharmacological agents that are used to treat common mental disorders and their mode of action.
- Demonstrate an understanding of caregiver, and family burden and their coping style.
- Assess the disability/dysfunctions that are associated with mental health problems, using appropriate measures.
- Discuss the medico-legal and ethical issues in patients requiring chronic care and institutionalization.

Academic Format of Modules: The learning would be primarily through clinical workups of cases having psychiatric disorders. A mixed lectures/seminar format, allowing trainees to participate in collaborative discussion, could be adapted in addition, for imparting theory components.

Evaluation: Theory – involving long and short essays, practical/clinical exam in psychological assessment of psychiatric cases and comprehensive viva.

Course Contents:

Module - I: Introduction

Approach to clinical interviewing and diagnosis; case history; mental status examination; organization and presentation of psychiatric information; diagnostic formulation; classificatory system in use.

Module - II: Psychoses

Schizophrenia, affective disorders, delusional disorders and other forms of psychotic disorders – types, clinical features, etiology and management

Module - III: Neurotic, stress-related and somatoform disorders

Types, clinical features, etiology and management

Module - IV: Disorders of personality and behavior

Specific personality disorders; mental & behavioral disorders due to psychoactive substance use; habit and impulse disorders; sexual disorders and dysfunctions – types, clinical features, etiology and management.

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Module - V: Organic mental disorders

Dementia, delirium and other related conditions with neuralgic and systemic disorders – types, clinical features, etiology and management.

Module-VI: Behavioral, emotional and developmental disorders of childhood and adolescence: types, clinical features, etiology and management.

Module - VII: Mental retardation

Classification, etiology and management

Module - VIII: Neurobiology of mental disorders

Neurobiological theories of psychosis, mood disorders, suicide, anxiety disorders, substance use disorders and other emotional and behavioral syndromes.

Module - IX: Therapeutic approaches

Drugs, ECT, psychosurgery, psychotherapy, and behavior therapy, preventive and rehabilitative strategies – halfway home, sheltered workshop, daycare, and institutionalization.

Module - X: Consultation-liaison psychiatry

Psychiatric consultation in general hospital; primary care setting

Module - XI: Special populations/Specialties

Geriatric, terminally ill, HIV/AIDS, suicidal, abused, violent and non-cooperative patients; psychiatric services in community, and following disaster/calamity

Module - XII: Mental health policies and legislation

Mental Health Act of 1987, National Mental Health Program 1982, the Persons With Disabilities (equal opportunities, protection of rights and full participation) Act 1995; Rehabilitation Council of India (RCI) Act of 1993, National Trust for Mental Retardation, CP and Autistic Children 1999, Juvenile Justice Act of 1986; ethical and forensic issues in psychiatry practice.


Examination Scheme:

	Internal Assessment (30 Marks)				Final Exam	Total Marks
Components	CT	H/P/V/Q	CT	A		
Weightage	10	5	10	5	70	100

CT-Class Test; H-Home Assignment; P-Presentation; V-Viva; Q-Quiz; A-Attendance; EE-End Term Exam

Text & References:

- Comprehensive Textbook of Psychiatry, 6th ed., Vol. 1 & 2, Kaplan & Sadock, (1995). William & Wilkins: London.
- Oxford Textbook of psychiatry, 2nd ed., Gelder, Gath & Mayon, (1989). Oxford University Press: NY
- Symptoms in mind: Introduction to descriptive psychopathology, Sims A, Bailliere T, (1988) Textbook of postgraduate psychiatry, 2nd ed. Vol 1 & 2, Vyas, J.N. & Ahuja, N. (1999). Jaypee brothers: New Delhi.
- Child and Adolescent Psychiatry: Modern approaches, 3rd ed., Rutter, M. & Herson, L (1994) Blackwell Scientific Publications: London.


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PAPER-III: STATISTICS AND RESEARCH METHODOLOGY

Course Code: PSY5106

Credit Units: 12

Aim: The aim of this paper is to elucidate various issues involved in conduct of a sound experiment/survey. With suitable examples from behavioral field, introduce the trainees to the menu of statistical tools available for their research, and to develop their understanding of the conceptual bases of these tools. Tutorial work will involve exposure to the features available in a large statistical package (SPSS) while at the same time reinforcing the concepts discussed in lectures.

Objectives: By the end of Part-II, trainees are required to demonstrate ability to:

- Understand the empirical meaning of parameters in statistical models
- Understand the scientific meaning of explaining variability
- Understand experimental design issues - control of unwanted variability, confounding and bias.
- Take account of relevant factors in deciding on appropriate methods and instruments to use in specific research projects.
- Understand the limitations and shortcomings of statistical models
- Apply relevant design/statistical concepts in their own particular research projects.
- Analyze data and interpret output in a scientifically meaningful way
- Generate hypothesis/hypotheses about behavior and prepare a research protocol outlining the methodology for an experiment/survey.
- Critically review the literature to appreciate the theoretical and methodological issues.

Academic Format of Modules: The course will be taught mainly in a mixed lecture/tutorial format, allowing trainees to participate in collaborative discussion. Demonstration and hands-on experience with SPSS program are desired activities.

Evaluation: Theory - involving long and short essays, and problem-solving exercises.

Course Contents:

Module - I: Introduction

Various methods to ascertain knowledge, scientific method and its features; problems in measurement in behavioral sciences; levels of measurement of psychological variables - nominal, ordinal, interval and ratio scales; test construction - item analysis, concept and methods of establishing reliability, validity and norms.

Module - II: Sampling

Probability and non-probability; various methods of sampling - simple random, stratified, systematic, cluster and multistage sampling; sampling and non-sampling errors and methods of minimizing these errors

Module - III: Concept of probability

Probability distribution - normal, poisson, binomial; descriptive statistics - central tendency, dispersion, skewness and kurtosis

Module - IV: Hypothesis testing

Formulation and types; null hypothesis, alternate hypothesis, type I and type II errors, level of significance, power of the test, p-value. Concept of standard error and confidence interval

Module - V: Tests of significance- Parametric tests

Requirements, "t" test, normal z-test, and "F" test including post-hoc tests, one-way and two-way analysis of variance, analysis of covariance, repeated measures analysis of variance, simple linear correlation and regression.

Module - VI: Tests of significance - Non-parametric tests

Requirements, onesample tests – sign test, sign rank test, median test, Mc Nemer test; two-sample test Mann Whitney U test, Wilcoxon rank sum test, Kolmogorov-Smirnov test, normal scores test, chi-

square test; ksamle tests - Kruskal Wallies test, and Friedman test, Anderson darling test, Cramer-von Mises test.

Module - VII: Experimental design

Randomization, replication, completely randomized design, randomized block design, factorial design, crossover design, single subject design, non-experimental design.

Module - VIII: Epidemiological studies

Prospective and retrospective studies, case control and cohort studies, rates, sensitivity, specificity, predictive values, Kappa statistics, odds ratio, relative risk, population attributable risk, Mantel Haenzel test, prevalence, and incidence. Age specific, disease specific and adjusted rates, standardization of rates. Tests of association, 2 x 2 and row x column contingency tables

Module - IX: Multivariate analysis

Introduction, Multiple regression, logistic regression, factor analysis, cluster analysis, discriminant function analysis, path analysis, MANOVA, Canonical correlation, and Multidimensional scaling.

Module - X: Sample size estimation

Sample size determination for estimation of mean, estimation of proportion, comparing two means and comparing two proportions.

Module - XI: Qualitative analysis of data

Content analysis, qualitative methods of psychosocial research

Module - XII: Use of computers

Use of relevant statistical package in the field of behavioral science and their limitations

Examination Scheme:

	Internal Assessment (30 Marks)				Final Exam	Total Marks
Components	CT	H/P/V/Q	CT	A		
Weightage	10	5	10	5	70	100

CT-Class Test; H-Home Assignment; P-Presentation; V-Viva; Q-Quiz; A-Attendance; EE-End Term Exam

Text & References:

- Research Methodology, Kothari, C. R. (2003). Wishwa Prakshan: New Delhi
- Foundations of Behavioral Research, Kerlinger, F.N. (1995). Holt, Rinehart & Winston: USA.
- Understanding Biostatistics, Hassart, T.H. (1991). Mosby Year Book
- Biostatistics: a foundation for analysis in health sciences, 8th ed, Daniel, W.W. (2005). John Wiley and sons: USA
- Multivariate analysis: Methods & Applications, Dillon, W.R. & Goldstein, M. (1984), John Wiley & Sons: USA
- Non-parametric statistics for the behavioral sciences, Siegal, S & Castellan, N.J. (1988). McGraw Hill: New Delhi
- Qualitative Research: Methods for the social sciences, 6th ed, Berg, B.L. (2007). Pearson Education, USA.


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PAPER-IV: PRACTICAL: PSYCHOLOGICAL ASSESSMENT INCLUDING VIVA-VOCE

Course Code: PSY5104

Credit Units: 12

Aim: To provide hands-on experience in acquiring the necessary skills and competency in selecting, administering, scoring and interpreting psychological tests often employed in clients with mental or neuropsychological disorders. Since psychological assessment involves integration of information from multiple sources, the trainees are required to be given extensive exposure in working up of cases and carrying out the assessment at all levels. Typical areas of focus for psychological assessment includes (not necessarily limited to): cognition, intelligence, personality, diagnostic, levels of adjustment, disability/functional capacity, neuropsychological functions, clinical ratings of symptomatology, variables that help/direct treatment, and assess treatment outcomes.

Objectives: By the end of Part-I, trainees are required to demonstrate ability to:

- Use relevant criteria to assess the quality and appropriateness of a psychological test and evaluate its strengths and weaknesses for clinical purposes.
- Able to carry out the clinical work-up and discuss the diagnostic possibilities based on the history and mental status examination of the clients with psychological/neuropsychological problems.
- Synthesize and integrate collateral information from multiple sources and discuss the rationale for psychological assessment as relevant to the areas being assessed.
- Select and justify the use of psychological tests and carry out the assessment as per the specified procedures in investigating the relevant domains.
- Interpret the findings in the backdrop of the clinical history and mental status findings and arrive at a diagnosis.
- Prepare the report of the findings as relevant to the clinical questions asked or hypothesis set up before the testing began, and integrate the findings in service activities.

Academic Format of Modules: Acquiring the required competency/skills would be primarily through clinical workups of cases having psychological/neuropsychological disorders and carrying out the indicated psychological assessments within the clinical context. Demonstration and tutorials shall be held for imparting practical/theory components of the psychological tests.

Evaluation: Practical/clinical – involve working up cases and carrying out the psychological assessment within clinical context and viva voce.

Course Contents:

Module - I: Introduction

Case history; mental status examination; rationale of psychological assessment; behavioral observations, response recording, and syntheses of information from different sources; formats of report writing

Module - II: Tests of cognitive functions

Bender gestalt test; Wechsler memory scale; PGI memory scale; Wilcoxon cord sorting test, Bhatia's battery of performance tests of intelligence; Binet's test of intelligence (locally standardized); Raven's progressive matrices (all versions); Wechsler adult intelligence scale – Indian adaptation (WAPIS – Ramalingaswamy's), WAIS-R.

Module - III: Tests for diagnostic clarification

A) Rorschach psychodiagnostics, B) Tests for thought disorders – color form sorting test, object sorting test, proverbs test, C) Minnesota multiphasic personality inventory; multiphasic questionnaire, clinical analysis questionnaire, IPDE, D) screening instruments such as GHQ, hospital anxiety/depression scale etc. to detect psychopathology.

Module - IV: Tests for adjustment and personality assessment

A) Questionnaires and inventories – 16 personality factor questionnaire, NEO-5 personality inventory, temperament and character inventory, Eysenck's personality inventory, Eysenck's personality questionnaire, self-concept and self-esteem scales, Rottor's locus of control scale, Bell's adjustment

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inventory (students' and adults'), subjective wellbeing questionnaires, QOL , B) projective tests – sentence completion test, picture frustration test, draw-a-person test; TAT – Murray's and Uma Chowdhary's.

Module - V: Rating scales

Self-rated and observer-rated scales of different clinical conditions such as anxiety, depression, mania, OCD, phobia, panic disorder etc. (including Leyton's obsessional inventory, Y-BOCS, BDI, STAI, HADS, HARS, SANS, SAPS, PANSS, BPRS), issues related to clinical applications and recent developments.

Module - VI: Psychological assessment of children

A) Developmental psychopathology check list, CBCL, B) Administration, scoring and interpretation of tests of intelligence scale for children such as SFB, C-RPM, Malin's WISC, Binet's tests, and developmental schedules (Gesell's, Illingworth's and other) Vineland social maturity scale, AMD adaptation scale for mental retardation, BASIC-MR, developmental screening test (Bharatraj's), C) Tests of scholastic abilities, tests of attention, reading, writing, arithmetic, visuo-motor gestalt, and integration, D) Projective tests – Raven's controlled projection test, draw-a-person test, children's apperception test, E) Clinical rating scales such as for autism, ADHD etc.

Module - VII: Tests for people with disabilities

WAIS-R, WISC-R (for visual handicapped), blind learning aptitude test, and other interest and aptitude tests, Kauffman's assessment battery and such other tests/scales for physically handicapped individuals

Module - VIII: Neuropsychological assessment

LNNB, Halstead-Reitan battery, PGI-BBD, NIMHANS and other batteries of neuropsychological tests in current use

- Core Tests:**
1. Stanford Binet's test of intelligence (any vernacular version)
 2. Raven's test of intelligence (all forms)
 3. Bhatia's battery of intelligence tests
 4. Wechsler adult performance intelligence scale
 5. Malin's intelligence scale for children
 6. Gesell's developmental schedule
 7. Wechsler memory scale
 8. PGI memory scale
 9. 16 personality factor questionnaire
 10. NEO-5 personality inventory
 11. Temperament and character inventory
 12. Children personality questionnaire
 13. Clinical analysis questionnaire
 14. Multiphasic questionnaire
 15. Object sorting/classification test
 16. Sentence completion test
 17. Thematic apperception test
 18. Children' apperception test
 19. Rorschach psychodiagnostics
 20. Neuropsychological battery of tests (any standard version)

A certificate by the head of the department that the candidate has attained the required competence in all of the above tests shall be necessary for appearing in the university examinations of Part – I. However, if the center opts to test and certify the competency in neuropsychological tests as part of the requirements for appearing in the university examinations of Part - II (i.e. excluding it from Part - I), it could be done so. In such case, the Practical/Clinical examinations of Part – II shall include an examination in this area, in addition to examination in Psychological Therapies.

Examination Scheme:


	Internal Exam (30)			Final Exam (70)		Total Marks
Components	File demonstration	Case Conference, Seminar, Journal	A	End Term Exam	Viva	
Weightage	20	5	5	35	35	100

Text & References:

- Theory and practice of psychological testing, Freeman, F.S. (1965). Oxford and IHBN: New Delhi.
- Comprehensive handbook of psychological assessment, Vol 1 & 2, Hersen, M, Segal, D. L, Hilsenroth, M.J. (2004). John Wiley & Sons: USA
- Comprehensive Clinical Psychology: Assessment, Vol. 4, Bellack, A.S. & Hersen, M (1998). Elsiever Science Ltd.: Great Britain
- The Rorschach – A Comprehensive System, Vol 1, 4th ed., Exner, J.E. John Wiley and sons: NY.
- The Thematic Apperception Test manual, Murray H.A. (1971), Harvard University Press. An Indian modification of the Thematic Apperception Test, Choudhary, U. Shree Saraswathi Press: Calcutta.



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PAPER-V: SUBMISSION OF PSYCHODIAGNOSTIC RECORDS

Course Code: PSY5105

Credit Units: 12

Course Contents:

Five full-length Psycho-diagnostic Records: out of which one record each should be related to, child and neuropsychological assessment. The records should include a summary of the clinical history organized under relevant headings, and a discussion on

- a) rationale for testing,
- b) areas to be investigated,
- c) tests administered and their rationale,
- d) test findings and
- e) impression

Examination Scheme:

Components	Submission of five cases of full-length Psycho-diagnostics Report
Weightage (%)	100



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PAPER-I: PSYCHOTHERAPY AND COUNSELLING

Course Code: PSY5301

Credit Units: 12

Aim: Impart knowledge and skills necessary to carry out psychological interventions in mental health problems with required competency. As a prelude to problem-based learning within a clinical context, the trainees are introduced to factors that lead to development of an effective working therapeutic alliance, pre-treatment assessment, setting therapy goals, evaluation of success of therapy in producing desired changes, and variables that affect the therapy processes. Further, the aim is to equip the trainees with various theories of clinical problems, and intervention techniques, and their advantages and limitations.

Objectives: By the end of Part-II, trainees are required to demonstrate ability to:

- Describe what factors are important in determining how well patients do in psychotherapy?
- Demonstrate an ability to provide a clear, coherent, and succinct account of patient's problems and to develop an appropriate treatment plan.
- Demonstrate a sense of working collaboratively on the problem and ability to foster an effective alliance.
- Demonstrate a working knowledge of theoretical application of various approaches of therapy to clinical conditions.
- Set realistic goals for intervention taking into consideration the social and contextual mediation.
- Carry out specialized assessments and interventions, drawing on their knowledge of pertinent outcome/evidence research.
- Use appropriate measures of quantifying changes and, apply and integrate alternative or complementary theoretical approach, depending on the intervention outcome.
- Demonstrate skills in presenting and communicating some aspects of current intervention work for assessment by other health professionals, give and receive constructive feedback.
- Demonstrate ability to link theory-practice and assimilate clinical, professional, academic and ethical knowledge in their role of a therapist.
- Present a critical analysis of intervention related research articles and propose their own methods/design of replicating such research.

Academic Format of Modules: Acquiring the required competency/skills would be primarily through clinical workups and carrying out of various treatment techniques, under supervision, within clinical context. The trainees are required to be involved in all clinical service activities – institutional or community based, of the center. Demonstration, clinical issue seminar, clinical seminar, clinical case conferences are required to be planned to impart the necessary knowledge and skills.

Evaluation: Theory - involving long and short essays, and practical/clinical - involving workup and assessment of clinical cases with viva voce.

Course Contents:

Module - I: Introduction to Psychotherapy

Definitions, objectives, issues related to training professional therapists; ethical and legal issues involved in therapy work; rights and responsibilities in psychotherapy; issues related to consent (assent in case of minors); planning and recording of therapy sessions; structuring and setting goals; pre- and postassessment; practice of evidence-based therapies.

Module - II: Therapeutic Relationship

Client and therapist characteristics; illness, technique and other factors influencing the relationship

Module - III: Interviewing

Objectives of interview, interviewing techniques, types of interview, characteristics of structured and unstructured interview, interviewing skills (micro skills), open-ended questions, clarification, reflection, facilitation and confrontation, silences in interviews, verbal and non-verbal components

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Module - IV: Affective psychotherapies

Origin, basis, formulation, procedures, techniques, stages, process, outcome, indications, and research & current status with respect to psychodynamic, brief psychotherapy, humanistic, existential, gestalt, person-centered, Adlerian, transactional analysis, reality therapy, supportive, clinical hypnotherapy, play therapy, psychodrama, and oriental approaches such as yoga, meditation, shavasana, pranayama, healing, reiki, tai chi etc.

Module-V: Behavior therapies

Origin, foundations, principles & methodologies, problems and criticisms, empirical status, behavioral assessment, formulations and treatment goals, Desensitization - (imaginal, in-vivo, enriched, assisted), Extinction - (graded exposure, flooding and response prevention, implosion, covert extinction, negative practice, stimulus satiation), Skill training - (assertiveness training, modeling, behavioral rehearsal), Operant procedures - (token economy, contingency management), Aversion - (faradic aversion therapy, covert sensitization, aversion relief procedure, anxiety relief procedure and avoidance conditioning), Self-control procedures - (thought stop, paradoxical intention, stimulus satiation), Biofeedback – (EMG, GSR, EEG, Temp., EKG), Behavioral counseling, Group behavioral approaches, Behavioral family/marital therapies.

Module - VI: Cognitive therapies

Cognitive model, principles and assumptions, techniques, indications and current status of rational emotive behavior therapy, cognitive behavior therapy, cognitive analytic therapy, dialectical behavior therapy, problem-solving therapy, mindfulness based cognitive therapy, schema focused therapy, cognitive restructuring, and other principal models of cognitive therapies.

Module – VII: Systemic therapies

Origin, theoretical models, formulation, procedures, techniques, stages, process, outcome, indications, and research & current status with respect to family therapy, marital therapy, group therapy, sex therapy, interpersonal therapy and other prominent therapies.

Module – VIII: Physiological therapies

Origin, basis, formulation, procedures, techniques, stages, process, outcome, indications, and current status with respect to progressive muscular relaxation, autogenic training, biofeedback, eye-movement desensitization and reprocessing, and other forms of evidence-based therapies

Module – IX: Counseling

Definition and goals, techniques, behavioral, cognitive and humanistic approaches, process, counseling theory and procedures to specific domains of counseling

Module - X: Therapy in special conditions

Therapies and techniques in the management of deliberate self harm, bereavement, traumatic, victims of man-made or natural disasters, in crisis, personality disorders, chronic mental illness, substance use, HIV/AIDS, learning disabilities, mental retardation, and such other conditions where integrative/eclectic approach is the basis of clinical intervention.

Module - XI: Therapy with children

Introduction to different approaches, psychoanalytic therapies (Ana Freud, Melanie Klein, Donald Winnicott); special techniques (behavioral and play) for developmental internalizing and externalizing disorders; therapy in special conditions such as psycho-physiological and chronic physical illness; parent and family counseling; therapy with adolescents

Module – XII: Psycho-education (therapeutic education)

Information and emotional support for family members and caregivers, models of therapeutic education, family counseling for a collaborative effort towards recovery, relapse-prevention and successful rehabilitation with regard to various debilitating mental disorders.

Module – XIII: Psychosocial rehabilitation

Rehabilitation services, resources, medical and psychosocial aspects of disability, assessment, group therapy, supportive therapy and other forms of empirically supported psychotherapies for core and peripheral members.

Module - XIV: Psychotherapy in the Indian Context

Historical perspective in psychological healing practices from the Vedic period and the systems of Ayurveda and Yoga, contemporary perspectives; socio-cultural issues in the Indian context in practice of psychotherapy; ongoing research related to process and outcome.

Module - XV: Contemporary issues and research

Issues related evidence-based practice, managed care, and research related to process and outcome.

Examination Scheme:

	Internal Assessment (30 Marks)				Final Exam	Total Marks
Components	CT	H/P/V/Q	CT	A		
Weightage	10	5	10	5	70	100

CT-Class Test; H-Home Assignment; P-Presentation; V-Viva; Q-Quiz; A-Attendance; EE-End Term Exam

Text & References:

- An introduction to the psychotherapies, 3rd ed., Bloch, S (2000). Oxford Medical Publications: NY Encyclopedia of Psychotherapy, Vol 1 & 2, Hersen M & Sledge W. (2002). Academic Press: USA
- The techniques of psychotherapy, 4th ed., Parts 1 & 2, Wolberg, L.R. Grune & Stratton: NY Theories of Psychotherapy & Counseling, 2nd ed., Sharf, R.S. (2000). Brooks/Cole: USA Handbook of Psychotherapy & Behavior change – An empirical analysis, Bergin, A.G. & Garfield, S. L. (1978). John Wiley & Sons: NY
- Comprehensive Clinical Psychology, Vol 6, Bellack, A.S. & Hersen, M., (1998). Elsevier Science Ltd: Great Britain
- Handbook of Individual Therapy, 4th ed., Dryden, W. (2002). Sage Publications: New Delhi. Psychotherapy: an eclectic integrative approach, 2nd ed. Garfield, S. L. (1995). John Wiley and sons: USA
- International handbook of behavior modification and therapy, Bellack, A.S., Hersen, M and Kazdin, A.E. (1985). Plenum Press: NY
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- Handbook of Clinical Behavior therapy, Turner, S.M., Calhoun K.S and Adams H.E. (1992). Wiley Interscience: NY
- Dictionary of Behavior Therapy, Bellack, H. Pergamon Press: NY
- Comprehensive Handbook of cognitive therapy, Freeman, A., Simon, K.M., Beutler L.E. & Arkowitz, M. (1988), Plenum Press: NY
- Cognitive Behavior Therapy for psychiatric problems: A practical guide, Hawton, K. Salkovskis, P.M., Kirk, J. and Clark, D.M. (1989). Oxford University Press: NY
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- Advances in Cognitive Behavior therapy, Dobson, K S and Craig, K D. (1996). Sage publications: USA
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- Counseling and Psychotherapy: theories and interventions. 3rd ed. Capuzzi, D and Gross D. R. (2003). Merrill Prentice Hall: New Jersey
- Handbook of psychotherapy case formulation. 2nd ed. Eells, T.D (2007). Guilford press: USA Psychoanalytic techniques, a handbook for practicing psychoanalyst, Wolman BB Basic Book: NY
- The Technique and Practice of psychoanalysis Vol. 1, Greenson, R.R. (1967). International Universities Press: USA.

Psychotherapy: The analytic approach, Aronson, M. J and Scharfman, M.A. (1992). Jason Aronson Inc: USA

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- New Approach of Interpersonal Psychotherapy, Klerman, G. L., Weissman, M. M (1993). American Psychiatric press: Washington
- Handbook of clinical child psychology, 3rd ed., Walker, C.E. & Roberts, MC (2001). John Wiley and Sons: Canada.
- Abnormal child psychology, Mash, E.J & Wolfe, D.A. (1999). Wadsworth Publishing: USA
- Clinical Practice of cognitive therapy with children and adolescents, Friedberg R.D. & McClure, J.M. Guilford Press, NY
- CBT for children and families, 2nd ed., Graham, P.J. (1998). Cambridge University Press: UK
- Handbook of clinical behavior therapy, Turner, S.M, Calhour, K.S. & Adams, H.E.(1992). Wiley Interscience: NY
- Basic family therapy, Baker, P, (1992). Blackwell Scientific Pub.: New Delhi
- Handbook of family and marital therapy, Wolman, B.B. & Stricker, G, (1983). Plenum: NY
- Introduction to Counseling and Guidance, 6th ed., Gibson, R.L. & Mitchell M.H. (2006), Pearson, New Delhi.



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PAPER-II: BEHAVIOURAL MEDICINE

Course Code: PSY5302

Credit Units: 12

Aim: Health psychology, as one of the subspecialties of applied psychology, has made a notable impact on almost the entire range of clinical medicine. The field deals with psychological theories and methods that contribute immensely to the understanding and appreciation of health behavior, psychosocial and cultural factors influencing the development, adjustment to, treatment, outcome and prevention of psychological components of medical problems. The aim of behavioral medicine is to elucidate the effects of stress on immune, endocrine, and neurotransmitter functions among others, psychological process involved in health choices individuals make and adherence to preventive regimens, the effectiveness of psychological interventions in altering unhealthy lifestyles and in directly reducing illness related to various systems. Further, to provide the required skills and competency to assess and intervene for psychological factors that may predispose an individual to physical illness and that maintain symptoms, in methods of mitigating the negative effects of stressful situations/events, and buffering personal resources.

Objectives: By the end of Part-II, trainees are required to demonstrate ability to:

- Appreciate the impact of psychological factors on developing and surviving a systemic illness.
- Understand the psychosocial impact of an illness and psychological interventions used in this context.
- Understand the psychosocial outcomes of disease, psychosocial interventions employed to alter the unfavorable outcomes.
- Understand the rationale of psychological interventions and their relative efficacy in chronic disease, and carry out the indicated interventions.
- Understand the importance of physician-patient relationships and communication in determining health outcomes.
- Understand of how basic principles of health psychology are applied in specific context of various health problems, and apply them with competence.
- Demonstrate the required sensitivity to issues of death and dying, breaking bad news, and end-of-life issues.
- Carry out specialized interventions during period of crisis, grief and bereavement.
- Understand, assimilate, apply and integrate newer evidence-based research findings in therapies, techniques and processes.
- Critically evaluate current health psychology/behavioral medicine research articles, and present improved design/methods of replicating such research.
- Demonstrate the sense responsibility while working collaboratively with another specialist and foster a working alliance.

Academic Format of Modules: Format would be essentially same as Paper – I on Therapies. The competency/skills are imparted through supervised workups, assessment and practical work of carrying out various treatment techniques within clinical context. Depending on availability of resources at the parent center, the trainees may be posted for extra-institutional learning. Demonstration, clinical issue seminar, clinical seminar, clinical case conferences are required to impart the necessary knowledge and skills. Evaluation: Theory - involving long and short essays, and practical/clinical - involving workup and assessment of clinical cases with viva voce.

Course Contents:

Module-I: Introduction

Definition, boundary, psychological and behavioral influences on health and illness, neuroendocrine, neurotransmitter and neuroimmune responses to stress, negative affectivity, behavioral patterns, and coping styles, psychophysiological models of disease, theoretical models of health behavior, scope and application of psychological principles in health, illness and health care.


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Module – II: Central nervous system

Cognitive, personality, behavioral, emotional disturbances in major CNS diseases like cerebrovascular (stroke, vascular dementia etc.), developmental (cerebral palsy), degenerative (Parkinson's etc.), trauma (traumatic brain and spinal cord injury), convulsive (epilepsy), and infectious (AIDS dementia), assessment and methods for psychological intervention and rehabilitation with such patients.

Module – III: Cardiovascular system

Psychosocial, personality, lifestyle, and health practice issues, psychobehavioral responses including coping with illness and functional loss in hypertension, MI, following CABG and other cardiovascular conditions, salient issues with regard to quality-of-life and well-being, empirically proven methods of psychological management of CVS diseases.

Module – IV: Respiratory system

precipitants, such as emotional arousal, and other external stimuli, exacerbants such as anxiety and panic symptoms, effects, such as secondary gain, low self-esteem in asthma and other airway diseases, psychological, behavioral and biofeedback strategies as adjunct in the management.

Module – V: Gastrointestinal system

Evaluation of psychological factors including personality characteristics and stress/coping style in functional GI disorders such as irritable bowel syndrome, inflammatory bowel disease, peptic ulcer disease, esophageal disorder etc., role of psychotherapy, behavior modification, cognitive restructuring, biofeedback and relaxation training

Module – VI: Genitourinary/renal/reproductive system

Psychosocial issues in male/female sexual dysfunctions, micturition/voiding problems including primary / secondary enuresis, end-stage renal disease, dialysis treatment, primary and secondary infertility, empirically validated psychological and behavioral interventions in these conditions.

Module – VII: Dermatology:

Role of stress and anxiety in psychodermatological conditions such as psoriasis, chronic urticaria, dermatitis, alopecia and the impact of these on self-esteem, body image and mood, role of psychological interventions such as relaxation, stress management, counseling and biofeedback strategies.

Module – VIII: Oncology

Psychosocial issues associated with cancer - quality of life, denial, grief reaction to bodily changes, fear of treatment, side effects, abandonment, recurrence, resilience, assessment tools, and goals of interventions for individual and family, and therapy techniques.

Module – IX: HIV/AIDS

Model of HIV disease service program in India, pre- and post-test counseling, psychosocial issues and their resolutions during HIV progress, psychological assessment and interventions in infected adults and children, and family members/caregivers, highly active anti-retroviral treatments (HAART), neuropsychological findings at different stages of infection, issues related to prevention/spreading awareness and interventions in at risk populations.

Module – X: Pain

Physiological and psychological processes involved in pain experience and behavior, assessment tools for acute and chronic pain intensity, behavior, and dysfunctions/disability related to pain, psychological interventions such as cognitive, behavioral, biofeedback and hypnotic therapies.

Module – XI: Terminally ill

Medical, religious and spiritual definition of death and dying, psychology of dying and bereaved family, strategies of breaking bad news, bereavement and grief counseling, management of pain and other physical symptoms associated with end-of-life distress in patients with cancer, AIDS, and other terminal illness, professional issues related to working in hospice including working through one's own death anxiety, euthanasia – types, arguments for and against.

Module – XII: Other general clinical conditions

Application of psychological techniques and their rationale in the clinical care of patients in general medical settings where psychological services appears to affect the outcome of medical management positively, for example in diabetes, sleep disorders, obesity, dental anxiety, burns injury, pre- and postsurgery, preparing for amputation, evaluation of organ donors/recipient, pre- and post-transplantation, organ replacement, hemophiliacs, sensory impairment, rheumatic diseases, abnormal illness behavior, health anxiety etc.

Module – XIII: Contemporary Issues

Research and developments in health psychology, psychophysiology, psychoneuroimmunology, psychobiology, sociobiology and their implications, and effects of psychotherapy on the biology of brain

Examination Scheme:

	Internal Assessment (30 Marks)				Final Exam	Total Marks
Components	CT	H/P/V/Q	CT	A		
Weightage	10	5	10	5	70	100

CT-Class Test; H-Home Assignment; P-Presentation; V-Viva; Q-Quiz; A-Attendance; EE-End Term Exam

Text & References:

- International handbook of behavior modification and therapy, Bellack, A.S., Hersen, M and Kazdin, A.E. (1985). Plenum Press: NY
- Behavior therapy: Techniques and empirical findings, Rimm D.C. & Masters J.C. (1979). Academic Press: NY.
- Handbook of Clinical Behavior therapy, Turner, S.M., Calhoun, K.S and Adams, H.E. (1992). Wiley Interscience: NY
- Dictionary of Behavior Therapy, Bellack Handbook of clinical psychology in medical settings, Sweet, J.J, Rozensky, R.H. & Tavian, S.M. (1991), Plenum Press: NY.
- Health Psychology, Dimatteo, M R and Martin, L.R. (2002). Pearson, New Delhi
- Biofeedback – Principles and practice for clinicians, Basmajian J.V. (1979). Williams & Wilkins Company: Baltimore
- Handbook of Psychotherapy and behaviour change, 5th ed., Lambert, M.J (2004). John Wiley and Sons: USA
- Behavioral Medicine: Concepts & Procedures, Tunks, E & Bellismo, A. (1991). Pergamon Press: USA Health Psychology, Vol 1 to Vol 4, Weinman, J, Johnston, M & Molloy, G (2006). Sage publications: Great Britain.

PAPER-III: BIOLOGICAL FOUNDATION OF BEHAVIOR

Course Code: PSY5306

Credit Units: 12

Aim: Brain disorders cause symptoms that look remarkably like other functional psychological disorders. Learning how brain is involved in the genesis of normal and abnormal behavioral/emotional manifestation would result in better clinical judgment, lesser diagnostic errors and increase sensitivity to consider and rule out a neuropsychological origin or biochemical mediation of the psychopathology. Also, current researches have indicated many pharmacological agents dramatically alter the severity and course of certain mental disorders, particularly the more severe disorders. Therefore, the aim of this paper is to provide important biological foundations of human behavior and various syndromes. The main focus is the nervous system and its command center – the brain.

Objectives: By the end of Part-I, trainees are required to demonstrate ability to:

- Describe the nature and basic functions of the nervous system.
- Explain what neurons are and how they process information.
- Identify the brain's levels and structures, and summarize the functions of its structures.
- Describe the biochemical aspects of brain and how genetics increase our understanding of behavior.
- State what endocrine system is and how it regulates internal environment and affects behavior.
- Discuss the principles of psychopharmacology and review the general role of neurotransmitters and neuromodulators in the brain.
- Describe the monoaminergic and cholinergic pathway in the brain and the drugs that affect these neurons.
- Describe the role of neurons that release amino acid neurotransmitters and the drugs that affect these neurons.
- Describe what kinds of clinical symptoms are often associated with lesions of frontal, parietal, temporal and occipital lobes of the brain.
- Describe what kinds of neuropsychological deficits are often associated with lesions of frontal, parietal, temporal and occipital lobes of the brain, and carry out the indicated neuropsychological assessment employing any valid battery of tests.
- Describe what kinds of neuropsychological deficits are often associated with subcortical lesions of the brain.
- List symptoms that are typical of focal and diffuse brain damage.
- Enumerate the characteristics of clinical syndrome and the nature of neuropsychological deficits seen in various cortical and sub-cortical dementias.
- Describe the neuropsychological profile of principal psychiatric syndromes.
- Demonstrate an understanding of functional neuro-imaging techniques and their application in psychological disorders and cognitive neuroscience.
- Demonstrate an understanding of the principles involved in neuropsychological assessment, its strengths and weaknesses, and its indications.
- Describe the nature of disability associated with head injury in the short and longer term, methods of remedial training and their strengths and weakness.

Academic Format of Modules: The learning would be primarily through clinical assessment of cases with brain lesions and disorders. Lectures, seminars and demonstrations by the experts in specific discipline, disease, topics such as by Anatomist, Biochemist, Physiologist, Psychiatrist, Neurologist and Neurosurgeons are required to impart knowledge and skills in certain domains. Depending on the resources available at the center these academic activity can be arranged.

Evaluation: Theory– involving long and short essays, practical/clinical exam in neuropsychological assessment with cases having a brain lesion/disorder and comprehensive viva.


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Course Contents: Part-A (Anatomy, Physiology and Biochemistry of CNS)

Module – I: Anatomy of the brain

Major anatomical sub-divisions of the human brain; the surface anatomy and interior structures of cortical and subcortical regions; anatomical connectivity among the various regions; blood supply to brain and the CSF system; cytoarchitecture and modular organization in the brain.

Module – II: Structure and functions of cells

Cells of the nervous system (neurons, supporting cells, blood-brain barrier); communication within a neuron (membrane potential, action potential); communication between neurons (neurotransmitters, neuromodulators and hormones).

Module – III: Biochemistry of the brain

Biochemical and metabolic aspects of Brain; medical genetics; structure and function of chromosomes; molecular methods in genetics; genetic variation; population genetics; single-gene inheritance; cytogenetic abnormalities; multi-factorial inheritance; biochemistry of genetic diseases.

Module – IV: Neurobiology of sensory and motor systems

Organization of sensory system in terms of receptors, relay neurons, thalamus and cortical processing of different sensations; principle motor mechanisms of the periphery (muscle spindle), thalamus, basal ganglia, brain stem, cerebellum and cerebral cortex.

Module – V: Regulation of internal environment

Role of limbic, autonomic and the neuro-endocrine system in regulating the internal environment; reticular formation and other important neural substrates regulating the state of sleep/wakefulness

Module – VI: Neurobiology of behavior

Neurobiological aspects of drives, motivation, hunger, thirst, sex, emotions, learning and memory;

Module – VII: Psychopharmacology: Principles of psycho pharmacology (pharmacokinetics, drug effectiveness, effect of repeated administration); sites of drug action (effects on production, storage, release, receptors, reuptake and destruction); neurotransmitters and neuromodulators (acetylcholine, monoamines, amino acids, peptides, lipids).

Course Contents: Part-B (Neuropsychology)

Module - VIII: Introduction:

Relationship between structure and function of the brain; the rise of neuropsychology as a distinct discipline, logic of cerebral organization; localization and lateralization of functions; approaches and methodologies of clinical and cognitive neuro-psychologists.

Module- IX: Frontal lobe syndrome

Disturbances of regulatory functions; attentional processes; emotions; memory and intellectual activity; language and motor functions

Module-X: Temporal lobe syndrome

Special senses – hearing, vestibular functions and integrative functions; disturbances in learning and memory functions; language, emotions, time perception and consciousness

Module – XI: Parietal and occipital lobe syndromes

Disturbances in sensory functions and body schema perception; agnosias and apraxias; disturbances in visual space perception; color perception; writing and reading ability

Module–XII: Neuropsychological profile of various neurological and psychiatric conditions:

Huntington's disease, Parkinson's disease, progressive supranuclear palsy, thalamic degenerative disease, multiple sclerosis, cortical and subcortical dementias, Alzheimer's dementia, AIDS dementia complex etc., and principal psychiatric syndromes such as psychosis, mood disorders, suicide, anxiety disorders, and other emotional and behavioral syndromes.

Module – XIII: Functional human brain mapping

QEEG, EP & ERP, PET, SPECT, FMRI

Module – XIV: Neuropsychological assessment

Introduction, principles, relevance, scope and indications for neuropsychological assessment and issues involved in neuropsychological assessment of children.

Module – XV: Neuropsychological rehabilitation

Principles, objectives and methods of neuro-rehabilitation of traumatic brain injury and brain diseased; scope of computer-based retraining, neuro-feedback, cognitive aids etc.

Examination Scheme:

	Internal Assessment (30 Marks)				Final Exam	Total Marks
Components	CT	H/P/V/Q	CT	A		
Weightage	10	5	10	5	70	100

CT-Class Test; H-Home Assignment; P-Presentation; V-Viva; Q-Quiz; A-Attendance; EE-End Term Exam

Text & References:

- Clinical Neuroanatomy for Medical Students, Snell, R.S. (1992), Little Brown & Co.: Boston.
- Neuropsychology, a clinical approach, Walsh K. (1994), Churchill Livingstone: Edinburgh.
- Textbook of Medical Physiology, Guyton, A.C. Saunders Company: Philadelphia.
- Behavioral Neurology, Kirshner H.S, (1986). Churchill Livingstone: NY.
- Principles of neural science, Kandel, E. R, & Schwartz, J. H (1985). Elsevier: NY
- Foundations of physiological psychology, 6th ed., Carlson, N.R. (2005). Pearson Education Inc: India
- Essential psychopharmacology, Stahl, S.M. (1998). Cambridge University Press: UK
- Textbook of physiology, Vol 2, Jain, A.K (2005). Avichal Publishing Company: New Delhi.
- Handbook of clinical neurology, Vols, 2, 4, 45 and 46, Vinken, P J, & Bruyn, G W, (1969). North Holland Publishing Co.: Amsterdam
- Fundamentals of human neuropsychology, Kolb, B.I. Freeman & Company: NY
- Neuropsychology, a Clinical approach, 4th ed., Walsh, K (2003). Churchill Livingstone: Edinburgh
- Handbook of Cognitive Neuroscience, Gazzaniga, M. S. (1984). Plenum Press: NY
- Textbook of postgraduate psychiatry, 2nd ed., Vol 1 & 2, Vyas, J.N. & Ahuja, N (1999). Jaypee brothers: New Delhi.
- Handbook of clinical neurology, Vols, 2, 4, and 45, Vinken, PJ, & Bruyn, GW, (1969). North Holland Publishing Co.: Amsterdam
- Neuropsychological assessment of neuropsychiatric disorders, 2nd ed., Grant, I. & Adams, K.M. (1996). Oxford University Press: NY.
- Neuropsychology, a clinical approach, Walsh K. (1994), Churchill Livingstone: Edinburgh.
- Diagnosis & Rehabilitation in clinical neuropsychology, Golden, CJ, Charles, C.T. (1981). Spring Field: USA
- Principles of Neuropsychological Rehabilitation, Prigatano, G.P. (1999). Oxford University Press: NY
- Event Related brain potentials – Basic issues & applications, Rohrbaugh, J W (1990). Oxford University Press: NY.
- Neuropsychological assessment, Lezak, M.D. (1995), Oxford Univ. Press: NY
- Neuropsychological assessment of neuropsychiatric disorders, 2nd ed., Grant, I. & Adams, K.M. (1996), Oxford University Press: NY.
- Comprehensive clinical psychology- Assessment, Vol 4, Bellack A.S. & Hersen M. (1998). Elsevier Science Ltd.: Great Britain

PAPER-IV: PRACTICAL: PSYCHOLOGICAL THERAPIES INCLUDING VIVA-VOCE

Course Code: PSY5304

Credit Units: 12

Aim: Acquire and practice theoretical understanding, attitude and skills necessary to apply various psychotherapeutic interventions to mental health problems and to also develop skills and competency to intervene in stress associated with medical problems among patients as well as their care givers.

Objectives:

- Understanding the role of important client, counselor and context related factors in the psychotherapeutic process
- Systematic application of psychotherapeutic approaches in clinical conditions
- Carry out interventions considering relevant outcome research with ethical considerations
- Application and understanding of health psychology principles in various health conditions
- Working collaboratively with other health care professionals
- Appreciation of the role of social and cultural factors in intervention
- Learn strategies of raising and supporting mental health awareness

Core Topics for practical practice

1. Presenting a clear and precise account of client's problems and Skill of collaborative working
2. Developing appropriate treatment plans
3. Formulating realistic goals for intervention taking into consideration the social and contextual mediation
4. Using appropriate measures of quantifying therapeutic changes
5. Conducting specialized interventions
6. Identifying/making use of factors that help patients get better with psychotherapy
7. Skills in presenting and communicating aspects of current intervention work for assessment by other health professionals
8. Ability to link theory with practice assimilating clinical, professional, academic and ethical knowledge in their role of a therapist
9. Presenting a critical analysis of intervention related research articles and developing methods of replicating such research
10. Understanding, assimilating and integrating newer evidence based research findings in therapies, techniques and processes
11. Understanding psychosocial impact of an illness and relevant psychological interventions
12. Understanding the rationale of psychological interventions and their relative efficacy in various disorders
13. Understanding the importance of counselor-patient relationships in determining therapy outcomes
14. Application of health psychology principles in specific health problems
15. Sensitive handling of issues related to death and dying, breaking bad news and end of life concerns
16. Ability to carry out specialized interventions during periods of crisis, grief and bereavement
17. Understanding training aspects of psychotherapy and ethical/legal issues involved in therapy
18. Ability to conduct a well rounded interview in clinical settings
19. Developing interviewing and counseling micro skills
20. Understanding and application of behavior therapy approaches- classical conditioning based procedures, operant procedures, self control procedures, Biofeedback- in individual, group, family and marital counseling
21. Application of rational emotive behavior therapy, cognitive behavior therapy, cognitive analytic therapy, dialectical behavior therapy, problem solving therapy, mindfulness based cognitive therapy and schema focused therapy
22. Understanding progressive muscular relaxation, autogenic training, biofeedback, eye-movement desensitization and reprocessing
23. Application of psychoanalytic therapies (Ana Freud, Melanie Klein, Donald Winnicott); special techniques (behavioral and play) for developmental, internalizing and externalizing disorders in children


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24. Understanding and application of eclectic/integrative approaches for managing deliberate self harm, traumatic conditions, victims of disasters, chronic mental illnesses
25. Understanding of Yoga, meditation, Shavasana, Pranik Healing, Reiki, Tai Chi, etc.
26. Understanding of psycho-education for family members and care givers
27. Understanding psychosocial aspects of disabilities and extending various kinds of rehabilitation services
28. Understanding of stressors, resources and support systems specific to the Indian social context
29. Understanding of Indian psychological healing practices
30. Ability to review literature, appreciate theoretical/methodological issues involved, analyze data and interpret results in a scientifically meaningful ways

Note: A certificate by the head of the department that the candidate has attained the required competence in all of the above tests shall be necessary for appearing in the university examinations of Part-I & II.

Examination Scheme:

	Internal Exam (60)			Final Exam (140)		Total Marks
Components	File demonstration	Case Conference, Seminar, Journal Club	A	End Term Exam	Viva	
Weightage	45	10	5	70	70	200



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PAPER-V: SUBMISSION OF PSYCHOTHERAPY RECORDS

Course Code: PSY5305

Credit Units: 12

Course Contents:

Five fully worked-out Psychotherapy Records, out of which one should be child therapy record. The records should include a summary of the clinical history organized under relevant headings, and a discussion on

- a) reasons for intervention(s),
- b) areas to be focused including short- and long-term objectives,
- c) type and technique of intervention employed and rationale
- d) therapy processes,
- e) changes in therapy or objectives, if any, and the reasons for the same,
- f) outcome,
- g) prevention strategies,
- h) future plans

Examination Scheme:

Components	Submission of five fully worked-out Psychotherapy Records
Weightage (%)	100


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PAPER-VI: DISSERTATION

Course Code: PSY5337

Credit Units: 10

Under the guidance of a Clinical Psychology faculty member with Ph.D. or minimum 2-yr experience (post-qualification) in clinical teaching or clinical research. If the research work is of interdisciplinary nature requiring input/supervision from another specialist, co guide(s) from the related discipline may be appointed as deem necessary.

GUIDELINES FOR DISSERTATION

The aim of the dissertation is to provide you with an opportunity to further your intellectual and personal development in your chosen field by undertaking a significant practical unit of activity, having an educational value at a level commensurate with the award of your degree. The dissertation can be defined as a scholarly inquiry into a problem or issues, involving a systematic approach to gathering and analysis of information / data, leading to production of a structured report.

Selecting the Dissertation Topic

It is usual to give you some discretion in the choice of topic for the dissertation and the approach to be adopted. You will need to ensure that your dissertation is related to your field of specialization.

Deciding this is often the most difficult part of the dissertation process, and perhaps, you have been thinking of a topic for some time.

It is important to distinguish here between 'dissertation topic' and 'dissertation title'. The topic is the specific area that you wish to investigate. The title may not be decided until the dissertation has been written so as to reflect its content properly.

Few restrictions are placed on the choice of the topic. Normally we would expect it to be:

- relevant to business, defined broadly;
- related to one or more of the subjects or areas of study within the core program and specialisation stream;
- clearly focused so as to facilitate an in-depth approach, subject to the availability of adequate sources of;
- information and to your own knowledge; of value and interest to you and your personal and professional development.

Planning the Dissertation

This will entail following:

- Selecting a topic for investigation.
- Establishing the precise focus of your study by deciding on the aims and objectives of the dissertation, or formulating questions to be investigated. Consider very carefully what is worth investigating and its feasibility.
- Drawing up initial dissertation outlines considering the aims and objectives of the dissertation. Workout various stages of dissertation
- Devising a timetable to ensure that all stages of dissertation are completed in time. The timetable should include writing of the dissertation and regular meetings with your dissertation guide.

The Dissertation plan or outline

It is recommended that you should have a dissertation plan to guide you right from the outset. Essentially, the dissertation plan is an outline of what you intend to do, chapter wise and therefore should reflect the aims and objectives of your dissertation.

There are several reasons for having a dissertation plan

• It provides a focus to your thoughts.

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- It provides your faculty-guide with an opportunity, at an early stage of your work, to make constructive comments and help guide the direction of your research.
- The writing of a plan is the first formal stage of the writing process, and therefore helps build up your confidence.
- In many ways, the plan encourages you to come to terms with the reading, thinking and writing in a systematic and integrated way, with plenty of time left for changes.
- Finally, the dissertation plan generally provides a revision point in the development of your dissertation report in order to allow appropriate changes in the scope and even direction of your work as it progresses.

Keeping records

This includes the following:

- Making a note of everything you read; including those discarded.
- Ensuring that when recording sources, author's name and initials, date of publication, title, place of publication and publisher are included. (You may consider starting a card index or database from the outset). Making an accurate note of all quotations at the time you read them.
- Make clear what is a direct a direct quotation and what is your paraphrase.

Dissertation format All students must follow the following rules in submitting their dissertation.

- Front page should provide title, author, Name of degree/diploma and the date of submission.
- Second page should be the table of contents giving page references for each chapter and section.
- The next page should be the table of appendices, graphs and tables giving titles and page references.
- Next to follow should be a synopsis or abstract of the dissertation (approximately 500 words) titled: **Executive Summary**.
- Next is the 'acknowledgements'.
- Chapter I should be a general introduction, giving the background to the dissertation, the objectives of the dissertation, the rationale for the dissertation, the plan, methodological issues and problems. The limitations of the dissertation should also be hinted in this chapter.
- Other chapters will constitute the body of the dissertation. The number of chapters and their sequence will usually vary depending on, among others, on a critical review of the previous relevant work relating to your major findings, a discussion of their implications, and conclusions, possibly with a suggestion of the direction of future research on the area.
- After this concluding chapter, you should give a list of all the references you have used. These should be cross - references with your text. For articles from journals, the following details are required e.g.

Draper P and Pandyal K. 1991, The Investment Trust Discount Revisited, Journal of Business Finance and Accounting, Vol18, No6, Nov, pp 791-832.

For books, the following details are required: Levi, M. 1996, International Financial Management, Prentice Hall, New York, 3rd Ed, 1996

- Finally, you should give any appendices. These should only include relevant statistical data or material that cannot be fitted into the above categories.

The Layout Guidelines for the Dissertation:

- A4 size Paper
- Font: Arial (10 points) or Times New Roman (12 points)
- Line spacing: 1.5Top and bottom margins: 1 inch/ 2.5 cm; left and right margins: 1.25 inches/ 3 cm

Guidelines for the Assessment of the Dissertation

While evaluating the dissertation, faculty guide will consider the following aspects:

Has the student made a clear statement of the objective or objective(s).

If there is more than one objective, do these constitute parts of a whole?

Has the student developed an appropriate analytical framework for addressing the problem at hand.

Is this based on up-to-date developments in the topic area?

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Has the student collected information/data suitable to the frameworks?
 Are the techniques employed by the student to analyse the data / information appropriate and relevant?
 Has the student succeeded in drawing conclusion form the analysis?
 Do the conclusions relate well to the objectives of the project?
 Has the student been regular in his work?
 Layout of the written report


Assessment Scheme:

Continuous Evaluation: 30%
 (Based on Abstract, Regularity,
 Adherence to initial plan, Records etc.)

Final Evaluation: Based on, 70%
 Contents & Layout of the Report, 25
 Conceptual Framework, 15
 Objectives & Methodology and 15
 Implications & Conclusions 15



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Note: This is based on Professional Diploma in Clinical Psychology Guidelines & Syllabus as given on the RCI website

Paper I: PSYCHOSOCIAL PERSPECTIVES OF MENTAL DISORDERS

Course Code: PCP3101

Credit Units: 12

Course Contents:

Module-I: Clinical Psychology & Mental Health: History of Clinical Psychology and its role in understanding and alleviation of mental illness, promotion of mental health and rehabilitation of the mentally ill, role and functions of Clinical Psychologists in DMHP, Professional code of conduct and ethical issues

Module-II: Epidemiology: Epidemiological surveys in Indian context; socio- cultural correlates of mental illness; psychological well-being and quality of life – measures and factors influencing.

Module-III: Models of Mental Disorders: Concept of normality and abnormality, causes of mental disorders – psychodynamic, behavioral, cognitive, humanistic and biological models

Module-IV: Family influences: Early deprivation and trauma; neglect and abuse; attachment; separation; inadequate parenting styles; marital discord and divorce; maladaptive peer relationships; communication style; family burden; expressed emotions and relapse

Module-V: Social Pathology: Discrimination, gender and ethnicity, social class, poverty and unemployment, social tension & violence, crime and delinquency, suicide, addictive behavior, social aggression with special reference to Indian context.

Module-VI: Psychopathology of specific conditions: Neurotic, Stress-related, Somatoform, Psychotic, Personality, Childhood and Adolescence Disorders.

Module-VII: Disability: Definition and classification of disability; psychosocial models of disability; impact, needs and problems; issues related to assessment/certification of disability – areas and measures.

Module-VIII: Rehabilitation: Approaches to rehabilitation; interventions in the rehabilitation processes; models of adaptation to disability; family and caregivers issues; rights of mentally ill; empowerment issues; support to recovery, policies and Acts.

Essential References:

- An Introduction to Social Psychology, 2nd ed. Kuppaswamy, B. Konark Publishers: New Delhi
- Culture, Socialization and human development, Saraswathi, T.S (1999). Sage publications: New Delhi
- Asian perspectives in Psychology, Vol. 19. Rao, H.S.R & Sinha D. (1997). Sage publications: New Delhi
- Indian Social Problems, Vol.1 & 2, Madan G.R (2003). Allied Publishers Pvt. Ltd., New Delhi.
- Family Theories – an Introduction, Klein, D.M. & White, J.M. (1996). Sage Publications: New Delhi.
- Fish's Clinical Psychopathology, Fish, F. and Hamilton, M. (1979), John Wright & Sons: Bristol
- Personality & Social Psychology: towards a synthesis, Krahe, Sage Publications: New Delhi
- Psychopathology, Buss A.H. (1966). John Wiley and sons: NY
- Making sense of illness: the social psychology of health and disease. Radley, A. (1994). Sage publications: New Delhi
- Oxford Textbook of Psychopathology, Millon, T., Blaney, P.H. & Davis, R.D. (1999). Oxford University Press: NY
- Abnormal Psychology, 13th ed, Carson, R.C, Butcher, T.N, Mureka, S. & Hooley, J.M. (2007). Dorling Kindersley Pvt Ltd: India
- Developmental Psychopathology, Achenbach T.M. (1974). Ronald Press Co.: NY
- Psychopathology in

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the aged, Cole, J.O. & Barrett, J.E. (1980). Raven Press: NY

- Abnormal Child Psychology, Mash, E.J & Wolfe, D.A. (1999). Wadsworth Publishing: U.S.A
- Handbook of Clinical Child Psychology, 3rd ed. Walker, C.E & Roberts, M.C. (2001). John Wiley & Sons: Canada.
- Mental Health of Indian Children, Kapur, (1995). Sage publications: New Delhi



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Paper II : COUNSELING AND THERAPY

Course Code: PCP3102

Credit Units: 12

Course Contents:

Module-I: Introduction to Psychotherapy and Counseling: Definitions, Objectives, Models of counseling, Schools of Psychotherapy, Planning and recording of counseling and therapy sessions.

Module-II: Interviewing: Objectives of interviews, interviewing techniques, types of interview, characteristics of structured and unstructured interview, interviewing skills.

Module-III: Behavior Modification and Therapy: Introduction, Behavioral assessment, analysis and formulations (for Neuroses, Psychoses and other conditions), Relaxation techniques, social skills training, operant procedures, self control procedures and behavioral counseling.

Module-IV: Cognitive Therapies: Introduction to Cognitive Model, basic principles and assumptions, techniques based on Cognitive restructuring and therapies.

Module-V: Crisis Intervention: Definition of Crisis, phases of Crisis, Techniques, and Stages of crisis work, Applications, supportive psychotherapy – goals, indications and techniques.

Module-VI: Group Therapy: Theoretical models, types of groups, stages of group therapy, process issues including role of the therapist, techniques, applications of group therapy.

Module-VII: Family Counseling/Therapy: Models for the assessment of families, common family problems and their intervention, goals and methods of family intervention, ethical issues in family counseling and therapy.

Module-VIII: Therapy with children and special conditions: Interventions for internalizing and externalizing Disorders, disorder of scholastic skills, deliberate self-harm, trauma and abuse, bereavement, school counseling, Parent and Family Counseling, chronic mental disorders.

Essential References:

- An introduction to the psychotherapies, 3rd ed., Bloch, S (2000). Oxford Medical Pub.: NY
- Encyclopedia of Psychotherapy, Vol 1 & 2, Hersen M & Sledge W. (2002). Academic Press: USA
- The techniques of psychotherapy, 4th ed., Parts 1 & 2, Wolberg, L.R. Grune & Stratton: NY
- Theories of Psychotherapy & Counseling, 2nd ed., Sharf, R.S. (2000). Brooks/Cole: USA
- Handbook of Psychotherapy & Behavior change – An empirical analysis, Bergin, A.G. & Garfield, S. L. (1978). John Wiley & Sons: NY
- Comprehensive Clinical Psychology, Vol 6, Bellack, A.S. & Hersen, M., (1998). Elsevier Science Ltd: Great Britain Handbook of Individual Therapy, 4th ed., Dryden, W. (2002). Sage Publications: New Delhi.
- Psychotherapy: an eclectic integrative approach, 2nd ed. Garfield, S. L. (1995). John Wiley and International handbook of behavior modification and therapy, Bellack, A.S., Hersen, M and Kazdin, A.E. (1985). Plenum Press: NY
- Behavior therapy: Techniques and empirical findings, Rimm D.C. & Masters J.C. (1979). Academic Press: NY.
- Handbook of Clinical Behavior therapy, Turner, S.M., Calhoun K.S and Adams H.E. (1992). Wiley Interscience: NY
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- Introduction to Counseling and Guidance, 6 Pearson, New Delhi ed., Gibson, R.L. & Mitchell M.H. (2006),
- Cognitive Behavior Therapy for psychiatric problems: A practical guide, Hawton, K. Salkovskis, P.M., Kirk, J. and Clark, D.M. (1989). Oxford University Press: NY
- Counseling and Psychotherapy: theories and interventions. 3 (2003). Merrill Prentice Hall: New Jersey ed. Capuzzi, D and Gross D. R. Handbook of psychotherapy case formulation. 2 ed. Eells, T.D (2007). Guilford press: USA



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Paper - III: PSYCHIATRY

Course Code: PCP3103

Credit Units: 12

Course Contents:

Module-I: Nomenclature: Introduction to classificatory systems currently in use and their limitations.

Module-II: Psychoses: Schizophrenia, affective (mood) disorders, delusional disorders and other forms of psychotic disorders – types, clinical features, etiology and management.

Module-III: Neurotic, Stress-related and Somatoform disorders: types, clinical features, etiology and management.

Module-IV: Disorders of personality and behavior: Specific Personality disorders, Mental & behavioral disorders due to psychoactive substance use, Habit and impulse disorders, Sexual disorders and dysfunctions.

Module-V: Organic mental disorders: types, clinical features, etiology and management.

Module-VI: Behavioral, emotional and developmental disorders of childhood and adolescence: types, clinical features, etiology and management.

Module-VII: Mental Retardation: Classification, etiology and management/ rehabilitation.

Module-VIII: Mental health policies and legislation: Mental Health Act of 1987, National Mental Health Program 1982, the persons with disabilities (equal opportunities, protection of rights and full participation) Act 1995; Rehabilitation Council of India (RCI) Act of 1993, National Trust for Mental Retardation, CP and Autistic Children 1999, Forensic issues related to mental disorders.

Essential References:

- Comprehensive Textbook of Psychiatry, 6 & Wilkins: London ed., Vol. 1 & 2, Kaplan & Sadock, (1995). William Oxford Textbook of psychiatry, 2 Press: NYed., Gelder, Gath & Mayon, (1989). Oxford University
- Symptoms in mind: Introduction to descriptive psychopathology, Sims A, Bailliere T, (1988)
- Textbook of postgraduate psychiatry, 2 brothers: New Delhi. ed. Vol 1 & 2, Vyas, J.N. & Ahuja, N. (1999). Jaypee
- Child and Adolescent Psychiatry: Modern approaches, 3 Blackwell Scientific Publications: Londoned., Rutter, M. & Herson, L (1994)



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Practical – I: Psychological Assessment

Course Code: PCP3104

Credit Units: 12

Course Contents:

The candidates should be provided with abundant opportunities to acquire the necessary skill and competency in each of the following psychological tests. Since psychological assessment forms major part of Diploma level training, extensive exposure in working up of cases and carrying out the assessment shall be ensured.

The domains that should be emphasized include but not limited to: Case history method, mental status examinations, arriving at the clinical diagnosis, rationale of psychological testing, observations, response recording, analyze, interpret and communicate the findings to the team members.

Specific tests: Tests for attention, memory, intelligence, developmental skills, abstract ability, personality, diagnosis, rating scales, assessing disability, QOL and wellbeing, stress and adaptation (includes standardized vernacular version of tests/scales those used in adult and child conditions).

List of Core Tests:

- Binet-Kamat test
- Raven's tests of intelligence (all forms)
- Bhatia's battery of intelligence tests
- Malin's intelligence scale for children
- Wechsler adult performance intelligence scale
- Wechsler memory scale
- PGI memory scale
- 16-PF
- Eysenck's personality inventory/questionnaire
- Thematic apperception test
- Children apperception test
- Rorschach psychodiagnostics

A certificate by the Head of the Department that the candidate has attained the required competence in all of the above Core Tests shall be necessary for appearing in the final examination.

Essential References:

- Comprehensive handbook of psychological assessment, Vol 1 & 2, Hersen, M, Segal, D. L, Hilsenroth, M.J. (2004). John Wiley & Sons: USA
- Comprehensive Clinical Psychology: Assessment, Vol. 4, Bellack, A.S. & Hersen, M (1998). Elsevier Science Ltd.: Great Britain
- The Rorschach – A Comprehensive System, Vol 1, 4NY.ed., Exner, J.E. John Wiley and sons:
- The Thematic Apperception Test manual, Murray H.A. (1971), Harvard University Press.
- An Indian modification of the Thematic Apperception Test, Choudhary, U. Shree Saraswathi Press: Calcutta



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Curriculum & Scheme of Examination 2022

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Bachelor of Hotel Management

FOOD PRODUCTION FOUNDATION-I

Course Code: HMC2101

Credit Units: 02

Course Objective:

The curriculum is based on to familiarize the students with the basic concepts of food such as –

- To make the students learn about the professionalism and basic etiquette of culinary art
- To make them learnt about raw material, uses, composition, benefits and methods
- To sharpen the culinary skills in the field of food production
- To impart knowledge of history of culinary art and changes along with the times
- To give the basic idea about physical and chemical composition of different food products.

Course Contents:

Cookery

Module – I :Food Service industry

- 1.1 Culinary History

Module – II :Standards of Professionalism

- 2.1 Levels of Skills
- 2.2 Attitude and Professionalism in Kitchen
- 2.3 Attires of chefs

Module – III :Kitchen Organization

- 3.1 Kitchen Brigade & Work Flow
- 3.2 Duties & responsibilities of various chefs
- 3.3 Interdepartmental Relationship

Module – IV :Kitchen Equipment

- 4.1 Introduction to Different Equipments
- 4.2 Safety procedure in handling equipment

Module – V :Basic Cookery Principles

- 5.1 Transfer of heat
- 5.2 Aims & Objective of Cooking
- 5.3 Effect of Heat on Cooking
- 5.4 Characteristic of Raw Materials
- 5.5 Preparation of ingredients
- 5.6 Cooking Times
- 5.7 Different fuels used in commercial kitchen
- 5.8 Methods of Cooking with advantages & disadvantages
- 5.9 Pre-Preparation
- 5.10 Culinary Terms Indian & Western



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Module – VI : Commodities

- 6.1 Cereals – Types & Forms in Which The Products Are Available in The Market, Their Vernacular & English Names & Uses- Wheat, Rice, Maize, Oats, Barley, Ragi, Bajra & Other Millets
- 6.2 Pulses – Identification of The Wide Range of Pulses Available in The Market, The Vernacular & English Names and Uses.
- 6.3 Herbs, Spices & Condiments – Classification, Identification, Vernacular & English Names.
- 6.4 Fats & Oils – Types & Forms, Sources, Processing and Uses of Vanaspati, Margarine, Refined, Double Refined, Unrefined. Butter etc.

Bakery & Confectionery

Module – VII : Introduction to Bakery and Patisserie

- 7.1 History of Baking
- 7.2 Baking As An Art and Science

Module – VIII : Basic Principles of Bakery

- 8.1 Formulas and Measurements
- 8.2 Baking Process

Module – IX : Equipment Used in Bakery

- 9.1 Use, Care, Cleaning, Storage

Module – X : Ingredients Used in Bakery - Types and Use

- 10.1 Flour
- 10.2 Fat
- 10.3 Cream
- 10.4 Sugar
- 10.5 Milk
- 10.6 Egg

Module – XI : Definition and Terms Used in Bakery

Module – XII : Yeast Products

- 12.1 Importance of Yeast in Baking –
- 12.2 Types, Storage and Use

Module – XIII : Bread Making

- 13.1 Functions of ingredients Used
- 13.2 Steps in Bread Making
- 13.3 Bread Diseases –Origin and Remedies
- 13.4 Different Recipes of Breads - Rye Bread, Corn Bread, French bread, international Breads
- 13.5 Types of Rolls - Soft Rolls; Hard Rolls
- 13.6 Quick Breads.- Ingredients, Types of Batter and Dough, Examples

Examination Scheme:

Components	V	H	CT	A	EE
Weightage (%)	06	04	15	5	70

V-viva; H-home assignment; CT-class test; A-attendance; EE-end semester examination

Text & References:

Text:

- Theory of Catering by Kinton Cesserani, Published by Hodder & Stoughton
- Practical Cookery by Kinton Cesserani, Published by Hodder & Stoughton

References:

- Theory of Cookery by K Arora published by Frank Bros &Co., New Delhi
- Professional chef by John Wiley
- Ultimate Cooking Course by Carole clement publish by Joana Lorrenz
- Essential of Cooking by James Peterson published by Artisan
- Hospitality Management: Current Trends & Practices by Dr. JM Negi, Amity University Press, New Delhi.



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FOOD & BEVERAGE SERVICE FOUNDATION-I

Course Code: HMC2102

Credit Units: 02

Course Objective:

At the end of the semester the students will be able to –

- Explain the growth and role of hotel industry and catering establishment
- Understand the various types of hotels and their features
- List and explain various catering establishment with their features
- Explain staff organization structure of food and beverage department
- Describe and understand job description of each personnel working in each F&B service outlet
- List various F&B service equipments with its use and care.

Course Contents:

Module –I : Introduction to the World of Hospitality, Food & Beverage

- 1.1 Sectors of Hospitality industry
 - 1.1.1 Railway
 - 1.1.2 Airline
 - 1.1.3 Cruise Liners
 - 1.1.4 Industrial Catering
 - 1.1.5 Institutional Catering
- 1.2 Major Hospitality Organisations - international & National
 - 1.2.1 Oberoi, Taj Groups & Others

Module –II : Introduction to The Hotel industry

- 2.1 Classification of Catering Establishments
- 2.2 Types of F&B Outlets
- 2.3 Food & Beverage Departmental Organization
- 2.4 Duties & Responsibilities of F&B Staff at Various Levels
- 2.5 Attributes of a Hotelier

Module -III : Ancillary Departments

- 3.1 Still Room / Pantry
- 3.2 Wash Up (Kitchen Stewarding)
- 3.3 Plate Room

Module – IV : Restaurant Equipment

- 4.1 Glassware
- 4.2 Crockery
- 4.3 Silverware
- 4.4 Furniture
- 4.5 Linen

Module – V : Meals & Menu

- 5.1 Types of Meals
 - 5.1.1 EMT
 - 5.1.2 Breakfast
 - 5.1.3 Lunch
 - 5.1.4 Dinner


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- 5.1.5 Brunch
- 5.1.6 High Tea
- 5.1.7 Afternoon Tea
- 5.1.8 Elevenses
- 5.2 Types of Menu
 - 5.2.1 À La Carte & Table d'hôte
- 5.3 Courses of Menu
 - 5.3.1 Course Item Examples with Accompaniments
 - 5.3.2 Covers for Each Course

Module – VI : Service Procedures

- 6.1 Types of Services
 - 6.1.1 Assisted
 - 6.1.1.1 Platter to Plate / Silver
 - 6.1.1.2 Pre-Plated
 - 6.1.1.3 Host
 - 6.1.1.4 Guéridon
 - 6.1.2 Non-Assisted
 - 6.2.1.1 Buffet – Sit-down, Standing
 - 6.2.1.2 Single Service
 - 6.2.1.3 Counter Service

Examination Scheme:

Components	V	H	CT1	A	EE1
Weightage (%)	05	05	15	5	70

V-viva; H-home assignment; CT-class test; A-attendance; EE-end semester examination

Text & References:

Text:

- Food & Beverage Services by SN Bagchi & Anita Sharma, Aman Publications, New Delhi
- Food & Beverage Service by Lilicrap
- Food & Beverage Service by R. Singaravelavan, OUP

References:

- F & B Service Manual by Sudhir Andrews, Tata McGraw Hill
- The Waiter by John Fullar
- Professional Table Service by Dennis Lilicrap.
- Food & Beverage Management & Control by Dr. JM Negi, Kanishka Publications, New Delhi



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FRONT OFFICE FOUNDATION

Course Code: HMC2103

Credit Units: 02

Course Objective:

At the end of the semester the students will be able to explain & understand-

The growth, role of tourism in hospitality and hotel industry

The classification and main features of hotels

The Front Office staff and organization structure, duties/responsibilities of each personnel

Appraisal of Front Office equipment and furniture, welcoming of guest and telephone handling

Course Contents:

Module – I : Introduction to the Hospitality Industry

Module – II : Classification of Hotels

- 2.1 Size and Types of Hotel
- 2.2 Levels of Service
- 2.3 Ownership and Affiliation

Module – III :Basic Criteria of Star Categorization of Hotels

Module – IV :Hotel Organisation

- 4.1 Organization Chart

Module – V :Types of Rooms

Module – VI :Functional Organisation of Front office

- 6.1 Different Sections of Front office Department & Their Brief Functions

Module – VII : Staff Organisation of Front office Department

- 7.1 Duties & Responsibilities of Front office Department

Module – VIII :Front Desk Layout and Equipment

- 8.1 Layout
- 8.2 Equipment and Its Utility

Module – IX :Rate Categories

- 9.1 Food Plans
- 9.2 Basis of Charging Room Rates
- 9.3 Tariff Card

Module – X :Front office Systems

- 10.1 Non-Automated
- 10.2 Semi- Automated
- 10.3 Fully- Automated


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Examination Scheme:

Components	A	JE	P	CT	EE
Weightage (%)	05	05	05	15	70

CT-class test; A-attendance; EE-end semester examination; P-project; JE-Journal Evaluation

Text & References:***Text:***

- Front Office Management by Bardi, John Willy and Sons
- Front Office Management by Mr. Sbhal Nagar
- Professional Hotel Front Office Management – Anutosh Bhakta
- Hotel Management by Dr. Jagmohan Negi, Himalaya Publishing House, New Delhi.
- Professional Hotel Management by Dr. JM Negi, S. Chand & Co, New Delhi
- Hospitality Management: Current Trends & Practices by Dr. JM Negi, Amity University Press, New Delhi

References:

- Front Office by Abbott, Butter Worth Hiemann.
- Front Office Manual by Sudhir Andrews, Tata McGraw Hill



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HOUSEKEEPING FOUNDATION

Course Code: HMC2104

Credit Units: 02

Course Objective:

At the end of the semester the students would have a through knowledge of:
Organization of Housekeeping department and its basic functioning
All agents and equipment used for cleaning of all possible surfaces
Room layouts and what are constitutes in a guest room
Pests found in the hotel and their control.

Course Contents:

Module – I : The Role of Housekeeping in Hospitality Operation

- 1.1 Role of Housekeeping in Guest satisfaction and repeat Business

Module – II : Introduction to Housekeeping Department

- 2.1 Identifying Housekeeping Responsibilities
- 2.2 Organizational Structure of Housekeeping Department for: Small Hotel, Medium Hotel, Large Hotel
- 2.3 Duties & Responsibilities of Housekeeping Staff
- 2.4 Personality Attributes of Housekeeping Staff
- 2.5 Layout of the Housekeeping Department

Module – III : Cleaning Equipments

- 3.1 General Consideration for Selection
- 3.2 Classification & Types of Equipments
- 3.3 Method of Use and Mechanism for Each Type
- 3.4 Care and Maintenance

Module – IV : Cleaning Agents

- 4.1 Classification
- 4.2 General Criteria for Selection
- 4.3 Use, Care & Storage
- 4.4 Distribution & Control

Module – V : Use of Computers in Housekeeping Department

Module – VI : Care and Cleaning of Different Surface

- 6.1 Metals, Glass, Ceramics, Wood, Wall finishes, Floor finishes

Module – VII : Inter-Departmental Coordination with

- 7.1 Front office
- 7.2 Maintenance
- 7.3 Food Production & Service Areas
- 7.4 Personnel
- 7.5 Purchase, Receiving & Stores
- 7.6 Laundry
- 7.7 Computer Centre
- 7.8 Security


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7.9 Accounts & Credit

7.10 Other Departments

Examination Scheme:

Components	V	H	CT	A	EE
Weightage (%)	05	05	15	5	70

V-viva; H-home assignment; CT-class test; A-attendance; EE-end semester examination

Text & References:

Text:


- Professional Management of Housekeeping Operation by Robert J. Martin
- Hotel, Hostel & Hospital Housekeeping by John C. Branson & Margaret Lennox
- Housekeeping Management by Keppa Margret M
- Hospitality Management: Current Trends & Practices by Dr. JM Negi, Amity University Press, New Delhi

References:

- Accommodation Management by Roy C
- Hotel Housekeeping Training Manual by Sudhir Andrew
- Professional House Keeping by Madlin Tucker
- Housekeeping Management by Keppa Margret M
- Hospitality Management: Current Trends & Practices by Dr. JM Negi, Amity University Press, New Delhi



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APPLICATION OF COMPUTERS

Course Code: HMC2105

Credit Units: 01

Course Objective:

The basic objective of the course is to introduce the students to the world of computers and computer technology. The students will be introduced to the basic concept of operating system, word processing, database, presentation.

Course Contents:

Module I: Computer Fundamentals

Elements of a Computer system

Characteristic of Computers

Classification of Computers

Limitations

Hardware features and uses

Generations of Computer

Primary and Secondary Storage Concepts

Data Entry Devices

Data Output Devices

Software Concepts

System Software

Application Software

Language Classification

Compilers and Interpreters

Module II: Operating Systems/Environment

Introduction to Windows

GUI/Features

What are Window & Window 95 and above

Part of a Typical Window and their functions

Examination Scheme:

Components	V	H	A	CT	EE
Weightage (%)	05	05	05	15	70

V-viva; H-home assignment; CT-class test; A-attendance; EE-end semester examination


Text & References:

Text:

- Basic Computers by IBM
- DOEAC 'O' Level *Information Technology* by V.K. Jain BPB Publications

References:

- Insider Internet Marketing by Jim Deniels
- The Birth of Internet Marketing & Communication by Don Stan Boch


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FOOD PRODUCTION FOUNDATION LAB-I

Course Code: HMC2106

Credit Units: 03

Course Objective:

At the end of the semester the students will be able-

- To learn about the basics of food production in continental and Indian cuisine
- To make a menu and would be able to explain the meaning of the dishes
- To prepare the basic stock, sauce and soup
- To use the knife and other equipments confidently
- To cut all kind of vegetable cutting.

Course Contents:

Practical

Module – I : Cookery

- Identification of Kitchen Equipments
- Identification of raw materials
- Preparing & Cooking Vegetables
- Different cuts of vegetables
- Demonstration of various Cooking Methods
- Compiled 3 course menu

Module – II : Bakery & Confectionery

- Preparation of Breads using different Methods
- Identification & Understanding of Bread Ingredients
- Preparation of different types of bread rolls
- Preparation of Various Quick Breads – Muffins, Pancakes

Examination Scheme:

Internal: 30 Marks

Components	JE	LE	VV	A
Weightage (%)	05	15	5	5

End-Term: 70 Marks

Components	JE	VV	INDENT	LE
Weightage (%)	05	05	10	50

Abbreviation: JE= Journal Evaluation; LE= Lab Evaluation; VV= Viva-Voce; GP= Grooming & Punctuality

Text & References:

Text:

- Theory of Catering by Kinton Cesserani, Published by Hodder & Stoughton
- Practical Cookery by Kinton Cesserani, Published by Hodder & Stoughton

References:

- Theory of Cookery by K Arora published, Frank Bros & Co. New Delhi
- Professional Chef by John Wiley
- Ultimate Cooking Course by Carole Clement publish by Joana Lorrenz
- Essential of Cooking by James Peterson published by Artisan

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FOOD & BEVERAGE SERVICE FOUNDATION LAB-I

Course Code: HMC2107

Credit Units: 01

Course Objective:

At the end of the semester the students will be able-

- To use and maintain all items of crockery, cutlery, glassware, flatware and hollowware used in a restaurant
- To arrange the restaurant and connected service area
- To serve water & food as per the standard rules

Course Contents:

Module – I : Basics of Service

- Service Grooming and Restaurant Etiquettes.
- Identification of equipments
- Mis-en-Place and Mis-en-Scene

Module – II : Essentials of Service

- Writing a Menu in French
- Food and Beverage service sequence
- Water pouring and seating a guest.
- Laying and relaying of Tablecloth
- Napkin folds
- Carrying a Salver or Tray
- Sideboard setup

Module – III :Service at Table

- Rules for laying table - Laying covers as per menus
- TDH and A la carte cover Layout
- Handling service gear
- Carrying plates, Glasses and other Equipment
- Clearing an ashtray
- Crumbing, Clearance and presentation of bill
- Sequence of Service of a Meal
- Breakfast table lay-up
- Silver service
- American service

Module – IV : Basics of Service

- Situation handling
- Restaurant reservation system
- Hostess desk functions
- Order taking – writing a food KOT, writing a BOT

Examination Scheme:

Internal: 30 Marks

Components	JE	LE	VV	A
Weightage (%)	05	15	05	5

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End-Term: 70 Marks

Components	JE	VV	GP	LE
Weightage (%)	10	10	10	40


Abbreviation: JE= Journal Evaluation; LE= Lab Evaluation; VV= Viva-Voce; GP= Grooming & Punctuality

Text & References:***Text:***

- Food & Beverage Services by SN Bagchi & Anita Sharma, Aman Publications, New Delhi
- Food & Beverage Service by Lilicrap
- Food & Beverage Service by R. Singaravelavan, OUP

References:

- F & B Service Manual by Sudhir Andrews, Tata McGraw Hill
- The Waiter by John Fullar
- Professional Table Service by Dennis Lilicrap.
- Food & Beverage Management & Control by Dr. JM Negi, Kanishka Publications, New Delhi


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FRONT OFFICE FOUNDATION LAB

Course Code: HMC2108

Credit Units: 01

Course Objective:

At the end of the semester the students will be able-

- Understand the growth, role of tourism in hospitality and hotel industry
- Explain the classification and main features of hotels
- Describe Front Office staff and organization structure, duties/responsibilities of each personnel
- Do the Appraisal of Front Office equipment and furniture, welcoming of guest and telephone handling.

Course Contents:

- Basic Manners & Attributes for Front Office Operations.
- Communication Skills – Verbal & Non Verbal
- Telephone Handling
- Forms & Formats related to 1st Semester

Examination Scheme:

Internal: 30 Marks

Components	JE	LE	VV	A
Weightage (%)	05	15	05	05

End-Term: 70 Marks

Components	JE	VV	GP	LE
Weightage (%)	10	10	10	40

Abbreviation: JE= Journal Evaluation; LE= Lab Evaluation; VV= Viva-Voce; GP= Grooming & Punctuality A: Attendance

Text & References:

Text:

- Front Office Management by Bardi, John Willy and Sons
- Front Office Management by Mr. Sbbhal Nagar
- Professional Hotel Front Office Management – Anutosh Bhakta
- Hotel Management by Dr. Jagmohan Negi, Himalaya Publishing House, New Delhi.
- Professional Hotel Management by Dr. JM Negi, S. Chand & Co, New Delhi
- Hospitality Management: Current Trends & Practices by Dr. JM Negi, Amity University Press, New Delhi

References:

- Front Office by Abbott, Butter Worth Hiemann.
- Front Office Manual by Sudhir Andrews, Tata McGraw Hill


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HOUSEKEEPING FOUNDATION LAB

Course Code: HMC2109

Credit Units: 01

Course Objective:

At the end of the semester the students would have a thorough knowledge of-

- Use of cleaning agents
- Use of cleaning equipment (manual as well as mechanical)
- Cleaning of all kinds of surfaces in a hotel.

Course Contents:

- Identifying Cleaning Equipment & Agents
- Cleaning of Guest Room & Bathroom – Occupied / Vacant
- Cleaning of Various Surfaces
- Composition, Care and Cleaning of Various Surfaces
 - Metals - Brass, Copper, Silver, EPNS, Bronze, Chromium, Aluminum, Stainless Steel & Protective Finishes of Various Kinds
 - Glass-Variou Type
 - Leather, Rexine
 - Plastic
 - Ceramic - Various Types
 - Wood- Various Types & Their Protective Finishes

Examination Scheme:

Internal: 30 Marks

Components	JE	LE	VV	A
Weightage (%)	5	15	5	5

End-Term: 70 Marks

Components	JE	VV	GP	LE
Weightage (%)	10	10	10	40

Abbreviation: JE= Journal Evaluation; LE= Lab Evaluation; VV= Viva-Voce; GP= Grooming & Punctuality

Text & References:

Text:

- Professional Management of Housekeeping Operation by Robert J. Martin
- Hotel, Hostel & Hospital Housekeeping by John C. Branson & Margaret Lennox
- Housekeeping Management by Keppa Margret M
- Hospitality Management: Current Trends & Practices by Dr. JM Negi, Amity University Press, New Delhi

References:

- Accommodation Management by Roy C
- Hotel Housekeeping Training Manual by Sudhir Andrew
- Professional House Keeping by Madlin Tucker


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APPLICATION OF COMPUTERS LAB

Course Code: HMC2110

Credit Units: 01

Course Objective:

At the end of the semester the students would be able to-

- Create folders
- Shortcuts copy files & folders
- Deleting files and exploring windows etc.

Course Contents:

Module I: Window Operations

Creating Folders, Creating Shortcuts, Copying Files/Folders, Renaming Files/Folders, Deleting Files Exploring Windows Quick Menu

Module II: MS Word

Creating a Document, Formatting Documents, Special Effects Cut, Copy, Paste. Table, Graphics. Print Options.

Examination Scheme:

Internal: 30 Marks

Components	JE	LE	VV	A
Weightage (%)	05	15	05	05

End-Term: 70 Marks

Components	JE	VV	GP	LE
Weightage (%)	10	10	10	40

Abbreviation: JE= Journal Evaluation; LE= Lab Evaluation; VV= Viva-Voce; GP= Grooming & Punctuality

Text & References:

Text:

- Microsoft Work 2000 by Heidi Steele Techmedia Publications
- Basic Computers by IBM

References:

- Insider Internet Marketing by Jim Deniels
- The Birth of Internet Marketing & Communication by Don Stan Boch
- Hospitality Management: Current Trends & Practices by Dr. JM Negi, Amity University Press, New Delhi


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FIELD WORK PROJECT-I

Course Code: HMC2111

Credit Units: 02

Course Objective:

Students of hospitality need to go through the basics of practical service exposure in different hospitality outlets. To maximize this exposure students will be send for different hospitality services in all the major & minor areas of operation & management within & outside the campus.

Methodology:

Students should be send for various learning opportunity outside the class room. They should submit the journal after the event is over to assigned faculty from the committee in following format.

- Name of the event
- Location
- Time
- Faculty Responsible
- Task Assigned
- Learning Outcome
- Suggestions

All the assignments should be duly authorized by the faculty responsible for the event.

Student services will be monitored & evaluated by the committee comprising of Program leader & faculty (as approved by HOI) and the marks will be allotted based on the performance, attitude, learning and utilization of knowledge in practical field.

Examination Scheme:

Components	C	S	V	P	JE
Weightage (%)	20	20	20	20	20



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FOOD PRODUCTION FOUNDATION–II

Course Code: HMC2201

Credit Units: 02

Course Objective:

The curriculum is based on to familiarize the students with the basic concepts of food such as –

- To make the students learn about the professionalism and basic etiquette of culinary art
- To make them learnt about raw material, uses, composition, benefits and methods
- To sharpen the culinary skills in the field of food production
- To impart knowledge of history of culinary art and changes along with the times
- To give the basic idea about physical and chemical composition of different food products.

Course Contents:

Cookery

Module – I :Breakfast Cookery

- 1.1 Types of breakfast
- 1.2 International & Indian menu for breakfast
- 1.3 Various breakfast rolls

Module – II :Commodities

- 2.1 Elementary Pastas - Method of Manufacture, Ranges Available in The Market e.g. : Macaroni, Spaghetti, Noodle Etc. & Their Uses.
- 2.2 Milk & Milk Product - Forms in Which Available, Processing e.g. : Full Cream, Fresh Milk, Toned Milk, Skimmed Milk, Buffalo & Cow's Milk; Pasteurized, Sterilised, Dehydrated etc. Khoa, Paneer, Cream, Etc.
- 2.3 Cream - Process of Making Cream, Types of Cream
- 2.4 Cheese- Introduction, Types, Processing of Cheese, Serving of Cheese

Module – III :Stocks

- 2.5 Definition, Elements of Stock
- 2.6 Classification & uses
- 2.7 Special care during stock making

Module – IV :Sauces

- 2.8 Definition
- 2.9 Classification of Mother Sauces
- 2.10 Derivatives

Module – V :Soups

- 2.11 Definition
- 2.12 Classification With example

Module – VI :Vegetable Cookery

- 2.13 Basic Knowledge, Identification, Various Cuts.
- 2.14 Preparation, Storage, Nutritional Aspects

Module – VII :Fruits

- 2.15 Types, Classification


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- 2.16 Preparation, Handling, Storage
- 2.17 Nutritional Aspects

Bakery & Patisserie

Module – VIII :Cookies

- 2.18 Definition, ingredients Used & Their Functions, Different Methods Used and Examples

Module – IX :Pastries

- 2.19 Definition of Pastries
- 2.20 Classification
- 2.21 Ingredients Used, Methods
- 2.22 Usage, Faults

Examination Scheme:

Components	V	H	CT	A	EE
Weightage (%)	06	04	15	5	70

V-viva; H-home assignment; CT-class test; A-attendance; EE-end semester examination

Text & References:

Text:


- Theory of Catering by Kinton Cesserani, Published by Hodder & Stoughton
- Practical Cookery by Kinton Cesserani, Published by Hodder & Stoughton

References:

- Theory of Cookery by K Arora published by Frank Bros &Co., New Delhi
- Professional chef by John Wiley
- Ultimate Cooking Course by Carole clement publish by Joana Lorrenz
- Essential of Cooking by James Peterson published by Artisan
- Hospitality Management: Current Trends & Practices by Dr. JM Negi, Amity University Press, New Delhi.



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FOOD & BEVERAGE SERVICE FOUNDATION-II

Course Code: HMC2202

Credit Units: 02

Module – I :Beverages

- 1.1 Classification
 - 1.1.1 Non-Alcoholic Beverages
 - 1.1.1.1 Types of Waters
 - 1.1.1.2 Soft Drinks
 - 1.1.1.3 Juices / Syrups / Crushes
 - 1.1.1.4 Tea Coffee
 - 1.1.2 Alcoholic Beverages
 - 1.1.2.1 Introduction
 - 1.1.2.2 Types

Module – II :Beer

Module – III :Wines

- 2.1 Introduction to Wines
- 2.2 Classification of Wines
- 2.3 Grapes & Factors Affecting Wine Quality
- 2.4 Vinification
- 2.5 Production of Red / White / Rosé Wines
- 2.6 Production of Fortified & Aromatised Wines
- 2.7 Production of Sparkling Wine
- 2.8 Wine Producing Regions of the World
- 2.9 France, Germany, Italy, Spain, Portugal
- 2.10 USA
- 2.11 Australia & India
- 2.12 Food & Wine Harmony

Examination Scheme:

Components	V	H	CT1	A	EE1
Weightage (%)	05	05	15	5	70

V-viva; H-home assignment; CT-class test; A-attendance; EE-end semester examination

Text & References:

Text:

- Food & Beverage Services by SN Bagchi & Anita Sharma, Aman Publications, New Delhi
- Food & Beverage Service by Lillicrap
- Food & Beverage Service by R. Singaravelavan, OUP

References:

- F & B Service Manual by Sudhir Andrews, Tata McGraw Hill
- The Waiter by John Fullar
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- Food & Beverage Management & Control by Dr. JM Negi, Kanishka Publications, New Delhi

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FRONT OFFICE OPERATION-I

Course Code: HMC2203

Credit Units: 02

Module – I :Reservation Activities

- 1.1 Importance of Reservations
- 1.2 Sources of Reservation
- 1.3 Modes of Reservation
- 1.4 Telephone Etiquette
- 1.5 Reservation Activities
- 1.6 Tools of Reservation
 - 1.6.1 Room Status Board
 - 1.6.2 Advance Letting Chart
 - 1.6.3 Density Control Chart
 - 1.6.4 Movement List / Expected Arrival List
- 1.7 Systems of Reservation
 - 1.7.1 Diary System
 - 1.7.2 Whitney System
- 1.8 Processing Group Reservation
- 1.9 Product Knowledge of Receptionists
- 1.10 Up-selling : Techniques
- 1.11 Over-booking : Why & How
- 1.12 Cancellation Procedure
- 1.13 Amendment Procedure

Module – II :Registration

- 2.1 Room Position

Module – III :Pre Arrival

- 3.1 Pre Registration Procedure

Module – IV :On Arrival Procedures

- 4.1 Receiving, Greeting, Welcoming A Guest
- 4.2 Assessing The Guest Requirements
- 4.3 Registration & Rooming Procedure

Module – V :Post Arrival Procedure

Module – VI :Chapter 2 to Chapter 5 for :

- 6.1 FIT
- 6.2 VIP
- 6.3 Group
- 6.4 Foreigner

Module – VII :Room Change Procedure

Module – VIII :Handling of Special Situations Like

- 8.1 DNS
- 8.2 DNA
- 8.3 RNA


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- 8.4 NI (No information)
- 8.5 VIP / Spat / DG Guests
- 8.6 Scanty Baggage Guest
- 8.7 Refusing Accommodation
 - 8.7.1 Black Listed Guest
 - 8.7.2 Walking A Guest

Module – IX :Manual Key Control Procedure

Examination Scheme:

Components	A	JE	P	CT	EE
Weightage (%)	05	05	05	15	70

CT-class test; A-attendance; EE-end semester examination; P-project: JE-Journal Evaluation

Text & References:

Text:

- Front Office Management by Bardi, John Willy and Sons
- Front Office Management by Mr. Sbbhal Nagar
- Professional Hotel Front Office Management – Anutosh Bhakta
- Hotel Management by Dr. Jagmohan Negi, Himalaya Publishing House, New Delhi.
- Professional Hotel Management by Dr. JM Negi, S. Chand & Co, New Delhi
- Hospitality Management: Current Trends & Practices by Dr. JM Negi, Amity University Press, New Delhi

References:

- Front Office by Abbott, Butter Worth Hiemann.
- Front Office Manual by Sudhir Andrews, Tata McGraw Hill



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HOUSE KEEPING OPERATION-I

Course Code: HMC2204

Credit Units: 02

Course Objective:

At the end of the semester the students will have a thorough knowledge of-

- Key Control & its importance
- All types of beds and mattresses
- Cleaning Procedures & schedule
- All routine and records maintained of H.K. department
- Pest Control

Module – I :Keys

- 1.1 Types of keys,
- 1.2 Key control

Module – II :Types of Beds and Mattresses

Module – III :Introduction to Cleaning

- 3.1 Principles of cleaning
- 3.2 Methods of organizing cleaning
- 3.3 Frequency of cleaning daily, periodic, special

Module – IV :Cleaning Organization

- 4.1 Guestroom Cleaning
 - 4.1.1 Stacking of Chambers Maid Trolley
 - 4.1.2 Pre – Preparation
 - 4.1.3 Entering the guestroom
 - 4.1.4 Bed Making
 - 4.1.5 Bathroom Cleaning
 - 4.1.6 Second Service
 - 4.1.7 Turndown Service
- 4.2 Public Area CleaningHotel Entrance, Lobby, Front Office, Restaurants, Elevators, etc
- 4.3 Guest Room inspection

Module – V :Routine Systems and Records of Housekeeping Department

- 5.1 Room Occupancy Report,
- 5.2 Guest Room Inspection Checklists,
- 5.3 Work Orders, Log Sheet,
- 5.4 Lost and Found Register and Enquiry File,
- 5.5 Housekeeper's Report,
- 5.6 Guest's Special Requests Register,
- 5.7 Record of Special Cleaning,
- 5.8 Call Register,
- 5.9 VIP Lists.

Module – VI :Pest Control

- 6.1 Definitions of Pests & Control
- 6.2 Areas of infestations

- 6.3 Prevention & Control of Pests
- 6.4 Responsibility of Housekeeping in Pests Control

Examination Scheme:

Components	V	H	CT	A	EE
Weightage (%)	05	05	15	5	70

V-viva; H-home assignment; CT-class test; A-attendance; EE-end semester examination

Text & References:

Text:

- Professional Management of Housekeeping Operation by Robert J. Martin
- Hotel, Hostel & Hospital Housekeeping by John C. Branson & Margaret Lennox
- Housekeeping Management by Keppa Margret M
- Hospitality Management: Current Trends & Practices by Dr. JM Negi, Amity University Press, New Delhi

References:

- Accommodation Management by Roy C
- Hotel Housekeeping Training Manual by Sudhir Andrew
- Professional House Keeping by Madlin Tucker
- Housekeeping Management by Keppa Margret M
- Hospitality Management: Current Trends & Practices by Dr. JM Negi, Amity University Press, New Delhi



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FOOD SCIENCE & NUTRITION

Course Code: HMC2205

Credit Units: 01

Course Objective:

At the end of the semester students will be able to-

- Understand functions of Foods which supply our nutritional needs
- Explain how to meet human need nutrients in terms of available foods
- Acquire techniques of preparation which help us meet our needs in an enjoyable manner
- Understand role of nutrients in menu planning

Course Contents:

Module I: Food Science

Definition and scope of Food Science

Module II: Nutrition & Nutrients

Introduction, Type of Nutrients (Macro & Micro Nutrients), Classification of various nutrients, Dietary Sources of various nutrients, Effect of cooking on Nutrients, Uses of various nutrients in food preparation

Module III: Nutrient specific chemical Processes

Dextrinization, Autoxidation (factors and prevention measures), Flavour reversion, Refining, Hydrogenation & winterization, **Gelation, Emulsification, Foamability, Viscosity**, Browning

Module IV: Food Processing

Definition, Objectives, Types of treatment, Effect of factors like heat, acid, alkali on food constituents

Module V: Evaluation of Food

Objectives, Sensory assessment of food quality, Methods
Introduction to proximate analysis of Food constituents, Rheological aspects of food

Module VI: Emulsions & Colloids

Theory of emulsification & Colloids, Types of emulsions, Emulsifying agents, Role of emulsifying agents & Colloids in food preparation

Module VII: Flavour

Definition, Description of food flavours (tea, coffee, wine, meat, fish spices)

Module VIII: Energy

Definition of Energy and Units of its measurement (Kcal), Energy contribution from macronutrients (Carbohydrates, Proteins and Fat), Factors affecting energy requirements, Concept of BMR, SDA, Thermodynamic action of food, Dietary sources of energy, Concept of energy balance and the health hazards associated with Underweight, Overweight

Module IX: Balanced Diet

Definition, Importance of balanced diet, RDA for various nutrients – age, gender, physiological state


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Module X: Menu Planning

Planning of nutritionally balanced meals based upon the three food group system, Factors affecting meal planning, Critical evaluation of few meals served at the Institutes/Hotels based on the principle of meal planning, Calculation of nutritive value of dishes/meals

Examination Scheme:

Components	V	A	CT	EE
Weightage (%)	10	05	15	70

V-viva; H-home assignment; CT-class test; A-attendance; EE-end semester examination

Text & References:

Text:

- Human Nutrition by Guthrie HA & Picciano MF 1995, Mosby Pub.Co.Toronto
- Perspectives in Nutrition by Wardlaw MW & Insel PM 1993 Mosby Pub Co. Toronto
- Food facts & Principles by Manay & Shalakshara Swamy New Age Int. 2001
- Fundamentals of Food & Nutrition 4th edition 2001 by Mudambi & Rajgopal
- Nutritive Value of Indian Foods- Indian Council of Medical Research

References:

- Food Science by Potter & Hotchkiss
- Principles of Food Science by Borgstrom and Macmillan
- Food Chemistry by Fennema
- Sensory Evaluation by Amerine (Academic Press)
- Handbook of Analysis and Quality Control for fruits & Vegetables by Rangana S (Tata McGraw Hill)
- Principles of Food Technology by P.J Fellows.



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FUNDAMENTALS OF ACCOUNTING-I

Course Code: HMC2206

Credit Units: 02

Course Objective:

At the end of the semester the students will be able to-

- Understand basic concept of hospitality accounting system
- The meaning and need for accounting
- Distinguish between book keeping and accounting
- Record the transactions using rules of debit and credit
- Ascertain the correct bank balances
- To check the accuracy of accounting records.

Course Contents:

Module I: Introduction to Accounting

Meaning & Definition, Types and Classification, Principles of Accounting, Systems of Accounting, Generally Accepted Accounting, Principles

Module II: Primary Books (Journal)

Meaning and Definition, Format of Journal, Rules of Debit and Credit, Opening entry, simple and compound entries, Practical

Module III: Subsidiary Books (Ledger)

Meaning and Uses, Formats, Posting, Practical

Module IV: Subsidiary Books

Need and Use

Classification

- Purchase book
- Sales book
- Purchase returns
- Sales return
- Journal proper
- Practical

Module V: Trial Balance

Meaning, Methods, Advantages, Limitations, Practical

Examination Scheme:

Components	H	P	CT	A	EE
Weightage (%)	05	05	15	5	70

V-viva; H-home assignment; CT-class test; A-attendance; EE-end semester examination; P-project


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Text & References:

Text:

- Element of Hotel Accounting by Dr. JM Negi & G.S. Rawat, HKS International (now Aman Publication, New Delhi)
- Hotel Management Accounting & Control by Dr. JM Negi, Himalaya Publication, New Delhi
- Management Accounting by Dr. Hingorani & Prof. Ramanathan, Sultan Chand & Sons

References:

- Management Accounting & Financial Control by Dr. SN Maheshwari, Sultan Chand & Sons
- Understanding Hospitality Accounting by Raymond Cote, EI-AH&LA USA
- Financial Accounting by GC Maheshwari, NCERT, N. Delhi
- Fundamentals of Hotel Accounting by G.S. Rawat & Dr. JM Negi, Aman Publications, New Delhi



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FOOD PRODUCTION FOUNDATION LAB-II

Course Code: HMC2207

Credit Units: 03

Cookery

- Preparing & Cooking Fish & Shellfish
- Preparing & Cooking Poultry
- Preparing & Cooking Meat
- Preparing 3 to 5 course Continental Menu

Patisserie

- Different methods & Types Cookie making
- Different Types of Pastries & their applications

Examination Scheme:

Internal: 30 Marks

Components	JE	LE	VV	A
Weightage (%)	05	15	5	5

End-Term: 70 Marks

Components	JE	VV	INDENT	LE
Weightage (%)	05	05	10	50

Abbreviation: JE= Journal Evaluation; LE= Lab Evaluation; VV= Viva-Voce; GP= Grooming & Punctuality

Text & References:

Text:

- Theory of Catering by Kinton Cesserani, Published by Hodder & Stoughton
- Practical Cookery by Kinton Cesserani, Published by Hodder & Stoughton

References:

- Theory of Cookery by K Arora, Frank Bros & Co. New Delhi
- Professional Chef by John Wiley
- Ultimate Cooking Course by Carole Clement published by Joana Lorrenz
- Essential of Cooking by James Peterson published by Artisan



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FOOD & BEVERAGE SERVICE FOUNDATION LAB-II

Course Code: HMC2208

Credit Units: 01

- Room service tray and trolley lay-up and service
- Room service amenities, Set-up in rooms
- Functional and floor layouts for room service
- Conducting briefing and de-briefing for F&B Outlets
- Beverage order-taking
- Service of hot and cold non- alcoholic beverages
- Table set-up with wines on the menu
- Service of Beer, Sake, and Other fermented and brewed beverages
- Service of sparkling, aromatized, fortified, still wines.
- Glassware used for different spirits,
- Non alcoholic drinks offered with different Spirits - service procedure.
- Order taking –writing a BOT

Examination Scheme:

Internal: 30 Marks

Components	JE	LE	VV	A
Weightage (%)	05	15	05	5

End-Term: 70 Marks

Components	JE	VV	GP	LE
Weightage (%)	10	10	10	40

Abbreviation: JE= Journal Evaluation; LE= Lab Evaluation; VV= Viva-Voce; GP= Grooming & Punctuality

Text & References:


Text & References:

Text:

- Food & Beverage Services by SN Bagchi & Anita Sharma, Aman Publications, New Delhi
- Food & Beverage Service by Lilicrap
- Food & Beverage Service by R. Singaravelavan, OUP

References:

- F & B Service Manual by Sudhir Andrews, Tata McGraw Hill
- The Waiter by John Fullar
- Professional Table Service by Dennis Lilicrap.
- Food & Beverage Management & Control by Dr. JM Negi, Kanishka Publications, New Delhi


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FRONT OFFICE OPERATION LAB-I

Course Code: HMC2209

Credit Units: 01

- Identification of equipment, Work Structure & Stationery
- Procedure of taking Reservations – in Person & over Telephone
- Converting enquiry into valid reservation
- Suggestive Selling

Examination Scheme:

Internal: 30 Marks

Components	JE	LE	VV	A
Weightage (%)	05	15	05	05

End-Term: 70 Marks

Components	JE	VV	GP	LE
Weightage (%)	10	10	10	40

Abbreviation: JE= Journal Evaluation; LE= Lab Evaluation; VV= Viva-Voce; GP= Grooming & Punctuality A: Attendance

Text & References:

Text:

- Front Office Management by Bardi, John Willy and Sons
- Front Office Management by Mr. Sbhal Nagar
- Professional Hotel Front Office Management – Anutosh Bhakta
- Hotel Management by Dr. Jagmohan Negi, Himalaya Publishing House, New Delhi.
- Professional Hotel Management by Dr. JM Negi, S. Chand & Co, New Delhi
- Hospitality Management: Current Trends & Practices by Dr. JM Negi, Amity University Press, New Delhi

References:

- Front Office by Abbott, Butter Worth Hiemann.
- Front Office Manual by Sudhir Andrews, Tata McGraw Hill



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HOUSEKEEPING OPERATION LAB-I

Course Code: HMC2210

Credit Units: 01

- Identifying Guest Supplies
- Bed Making
- Bed Making (Variations)

Examination Scheme:

Internal: 30 Marks

Components	JE	LE	VV	A
Weightage (%)	5	15	5	5

End-Term: 70 Marks

Components	JE	VV	GP	LE
Weightage (%)	10	10	10	40

Abbreviation: JE= Journal Evaluation; LE= Lab Evaluation; VV= Viva-Voce; GP= Grooming & Punctuality

Text & References:

Text:

- Professional Management of Housekeeping Operation by Robert J. Martin
- Hotel, Hostel & Hospital Housekeeping by John C. Branson & Margaret Lennox
- Housekeeping Management by Keppa Margret M
- Hospitality Management: Current Trends & Practices by Dr. JM Negi, Amity University Press, New Delhi

References:

- Accommodation Management by Roy C
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- Professional House Keeping by Madlin Tucker



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FIELD WORK PROJECT-II

Course Code: HMC2211

Credit Units: 03

Course Objective:

Students of hospitality need to go through the basics of practical service exposure in different hospitality outlets. To maximize this exposure students will be send for different hospitality services in all the major & minor areas of operation & management within & outside the campus.

Methodology:

Students should be send for various learning opportunity outside the class room. They should submit the journal after the event is over to assigned faculty from the committee in following format.

- Name of the event
- Location
- Time
- Faculty Responsible
- Task Assigned
- Learning Outcome
- Suggestions

All the assignments should be duly authorized by the faculty responsible for the event.

Student services will be monitored & evaluated by the committee comprising of Program leader & faculty (as approved by HOI) and the marks will be allotted based on the performance, attitude, learning and utilization of knowledge in practical field.

C-20

S-20

V-20

P-20

JE-20



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FOOD PRODUCTION OPERATIONS-I

Course Code: HMC2301

Credit Units: 02

Course Objective:

After completion of this course the students will have the basic concepts of –

- Standard Recipe, Menu planning
- Classification & cooking of Egg, Meat, Poultry / Game, Fish
- Indian Gravies & Masalas
- Accompaniments & Garnish
- Production of Cakes, role of different ingredients used

Module I:Standard Recipe

- Introduction & Types of standard Recipes
- Method of writing & Uses

Module II :Menu planning

- Introduction
- Types of menus
- Factor effecting menu planning

Module III:Egg Cookery

- Structure, Composition, Varieties, Storage
- Nutritional Aspects
- Preparation

Module IV :Meat Cookery

- Composition, Selection, Grading of Mutton, Lamb, Pork, Beef, Veal
- Cuts of Different Meats, Cooking Times, & Handling
- Nutritional and Storage Points

Module V :Poultry / Game Cookery

- Types/Classification
- Food Value, Storage & Nutritional Value

Module VI:Fish Cookery

- Classification, Source
- Storage, Food Value Preservation

Module VII:Basic Gravies

- Basic ingredients used in gravies
- Types of gravies
- Uses with examples

Module VIII:Masalas

- Blending of spices
- Different Masalas used in Indian cookery
- Wet Masala
- Dry Masala


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- Composition of different Masalas
- Verities of Masalasavailable in regional areas
- Special Masala blends

Module IX : Accompaniments&Garnish

Module X :Cakes (Bakery & Patisserie)

- Ingredients Used in Cake-Making & Their Functions
- Type of Methods
- Cake Balancing Formulas, Faults & Remedies
- High Ratio Cakes, Pound Cakes - Definitions, Formulas
- Cake Decorations , Icings, Types of Icing, Other Decorative Items

Examination Scheme:

Components	V	H	CT	A	EE
Weightage (%)	06	04	15	5	70

V-viva; H-home assignment; CT-class test; A-attendance; EE-end semester examination

Text & References:

Text:

- Theory of Catering by Kinton Cesserani, Published by Hodder & Stoughton
- Practical Cookery by Kinton Cesserani, Published by Hodder & Stoughton

References:

- Theory of Cookery by K Arora published by Frank Bros &Co., New Delhi
- Professional chef by John Wiley
- Ultimate Cooking Course by Carole clement publish by Joana Lorrenz
- Essential of Cooking by James Peterson published by Artisan
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FOOD & BEVERAGE SERVICE OPERATIONS-I

Course Code: HMC2302

Credit Units: 02

Course Objective:

After completion of this course the students will have the clear concepts of –

- Spirits & their production methods
- Calculation of strength of Spirit
- Types of Spirits
- Liqueurs & Bitters
- Cigars & Cigarettes

Module I :Spirits

- 1.1 Introduction & Types
- 1.2 Measuring Strength of Spirit
- 1.3 Styles of Production
- 1.4 Whisky
- 1.5 Brandy
- 1.6 Rum
- 1.7 Gin
- 1.8 Vodka
- 1.9 Tequila
- 1.10 Other Spirits (Pernod, Marc, Grappa Etc.)

Module II :Liqueurs & Bitters

- 2.1 Types
- 2.2 Production
- 2.3 Bases & Brands

Module III :Cigars & Cigarettes

- 3.1 Manufacturing
- 3.2 Care & Storing
- 3.3 Types, Brands

Examination Scheme:

Components	V	H	CT1	A	EE1
Weightage (%)	05	05	15	5	70

V-viva; H-home assignment; CT-class test; A-attendance; EE-end semester examination

Text & References:

Text:

- Food & Beverage Services by SN Bagchi & Anita Sharma, Aman Publications, New Delhi
- Food & Beverage Service by Lillicrap
- Food & Beverage Service by R. Singaravelavan, OUP

References:

- F & B Service Manual by Sudhir Andrews, Tata McGraw Hill
- The Waiter by John Phullar
- Professional Table Service by Dennis Lillicrap.
- Food & Beverage Management & Control by Dr. JM Negi, Kanishka Publications, New Delhi

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FRONT OFFICE OPERATION-II

Course Code: HMC2303

Credit Units: 02

Course Objective:

After completion of this course the students will have clear concept on –

- Front office Communication
- Bell Desk Service
- Guest Services

Module I : Bell Desk Service

- 1.1 Bell Desk Layout, Equipment
- 1.2 Staff Organisation, Duty Rotas & Work Schedule
- 1.3 Luggage Handling Procedures
- 1.4 Left Luggage Procedures
- 1.5 Other Functions of Bell Desk

Module II :Front office Communication

- 2.1 Importance of inter-Departmental Communication
- 2.2 Types & Methods of Communication

Module III :Guest Services

- 3.1 Handling Guest Requests
- 3.2 Handling Guest Complaints
- 3.3 Mail Handling Procedures
 - 3.3.1 Importance of Handling Mail without Delay, Sorting of Mail
 - 3.3.2 Categories of Guest Mail :- Resident Guest, Departed Guest & Guest Still to Arrive
 - 3.3.3 Special Handling of Registered Mail and Parcels
- 3.4 Message Handling Procedure
 - 3.4.1 Importance, Procedure, Method of Receiving and Transmitting Messages for Guest, Location Form, Paging Procedure

Examination Scheme:

Components	A	JE	P	CT	EE
Weightage (%)	05	05	05	15	70

CT-class test; A-attendance; EE-end semester examination; P-project; JE-Journal Evaluation

Text & References:

Text:

- Front Office Management by Bardi, John Willy and Sons
- Front Office Management by Mr. Sbhal Nagar
- Professional Hotel Front Office Management – Anutosh Bhakta
- Hotel Management by Dr. Jagmohan Negi, Himalaya Publishing House, New Delhi.
- Professional Hotel Management by Dr. JM Negi, S. Chand & Co, New Delhi
- Hospitality Management: Current Trends & Practices by Dr. JM Negi, Amity University Press, New Delhi

References:

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- Front Office Manual by Sudhir Andrews, Tata McGraw Hill

HOUSE KEEPING OPERATION-II

Course Code: HMC2304

Credit Units: 02

Course Objective:

At the end of the semester the students will have a thorough knowledge of-

- Fibres & Fabrics, Methods of Weaving, Linen
- Linen Room
- Uniforms & Uniform Room
- Sewing Room.

Module I : Fibres & Fabrics

Definition of Fibre

Classification of Fibre - The Origin, Characteristics & Usage in the Hotel

Module II :Weaving

Stages

Terms Used - Weft, Warp, Selvage, Thread Count

Classification of Weaves - Plain -Basket, Twill, Damask, Satin, Figured, Bird Eye, Herring Bone, Dobby, Jacquard, Pile (Cut & Uncut)

Fabric Commonly Used - Flannel, Parcale, Calico, Cambrioc, Candlewick, Denim, Rayon, Velvet,

Finishes -Sizing, Degumming, Weighting, Boiling off, Scouring, Singeing, Calendering, Decatizing, Shearing, Brushing, Floacking, Sanforisation, Mercerization, Pleating / Fluting, Napping, Bleaching, Dyeing, Printing (Roller & Screen)

Module III :Linen

Classification of Linen

Items Classified As Bed and Bath Linen, Their Sizes

Items Classified As Table Linen, Their Sizes

Materials Used For Making Fabric & Their Classification

Selection Criteria for the Linen Items (Bed Sheets Pillowcases, Towels and Bath Mats, Table Cloths, Serviettes)

Selection Criteria & Calculating Material Required for Soft Furnishings (Curtains, Bedspreads, Upholstery & Cushions)

Module IV :Linen Room

Activities of Linen Room

Location, Equipment & Layout of a Linen Room (Basic Rules)

Purchase of Linen / Linen Hire / Quality & Quantity

Storage & inspection

Issuing of Linen to Floors & Departments (Procedure & Records)

Dispatch & Delivery from Laundry (Procedure & Records)

Stock Taking - Procedure & Records

Condemned Linen & Cut-Down-Procedure and Records

Marking & Monogramming

Module V :Uniforms & Uniform Room

Purpose of Uniforms

Number of Sets, Issuing Procedure & Exchange of Uniforms

Designing A Uniform - Functional Aesthetic Considerations
Layout & Planning of the Uniform Room (Basic Considerations)

Module VI :Sewing Room

Equipments in a sewing room
Functions carried out in a sewing room

Examination Scheme:

Components	V	H	CT	A	EE
Weightage (%)	05	05	15	5	70

V-viva; H-home assignment; CT-class test; A-attendance; EE-end semester examination

Text & References:

Text:

- Professional Management of Housekeeping Operation by Robert J. Martin
- Hotel, Hostel & Hospital Housekeeping by John C. Branson & Margaret Lennox
- Housekeeping Management by Keppa Margret M
- Hospitality Management: Current Trends & Practices by Dr. JM Negi, Amity University Press, New Delhi

References:

- Accommodation Management by Roy C
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- Professional House Keeping by Madlin Tucker
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FOOD PRODUCTION OPERATIONS LAB-I

Course Code: HMC2308

Credit Units: 03

Cookery

- Preparing Indian Masalas & Gravies
- Preparing & Cooking Indian Vegetables
- Preparing Rice, Dal, Breads
- Preparing Indian & continental Menus
- Preparing for Indian & Continental Desserts

Patisserie

- Different methods & Types Cake making
- Icing – Types & Applications

Examination Scheme:

Internal: 30 Marks

Components	JE	LE	VV	A
Weightage (%)	05	15	5	5

End-Term: 70 Marks

Components	JE	VV	INDENT	LE
Weightage (%)	05	05	10	50

Abbreviation: JE= Journal Evaluation; LE= Lab Evaluation; VV= Viva-Voce; GP= Grooming & Punctuality

Text & References:

Text:

- Theory of Catering by Kinton Cesserani, Published by Hodder & Stoughton
- Practical Cookery by Kinton Cesserani, Published by Hodder & Stoughton

References:

- Theory of Cookery by K Arora published, Frank Bros & Co. New Delhi
- Professional Chef by John Wiley
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- Essential of Cooking by James Peterson published by Artisan



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FOOD & BEVERAGE SERVICE OPERATIONS LAB-I

Course Code: HMC2309

Credit Units: 02

- Service of spirits and liqueurs
- Bar setup and operations
- Cocktail and Mocktail preparations, presentation and service
- Service of Cigars and cigarettes
- Service of Afternoon and High Teas
- Cocktail Parties

Examination Scheme:

Internal: 30 Marks

Components	JE	LE	VV	A
Weightage (%)	05	15	05	5

End-Term: 70 Marks

Components	JE	VV	GP	LE
Weightage (%)	10	10	10	40

Abbreviation: JE= Journal Evaluation; LE= Lab Evaluation; VV= Viva-Voce; GP= Grooming & Punctuality

Text & References:

Text:

- Food & Beverage Services by SN Bagchi & Anita Sharma, Aman Publications, New Delhi
- Food & Beverage Service by Lilicrap
- Food & Beverage Service by R. Singaravelavan, OUP

References:

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FRONT OFFICE OPERATION LAB-II

Course Code: HMC2310

Credit Units: 01

- Handling Telephones
- Taking Reservations
- Processing Reservations
- Role Play – Check-in / Walk-in / FIT / GIT / VIP / CIP / HG etc.
- Mock Situations – Role – Plays
- Filling up of C – Forms
- Preparation & Filling up of Guest Registration Card

Examination Scheme:

Internal: 30 Marks

Components	JE	LE	VV	A
Weightage (%)	05	15	05	05

End-Term: 70 Marks

Components	JE	VV	GP	LE
Weightage (%)	10	10	10	40

Abbreviation: JE= Journal Evaluation; LE= Lab Evaluation; VV= Viva-Voce; GP= Grooming & Punctuality A: Attendance

Text & References:

Text:

- Front Office Management by Bardi, John Willy and Sons
- Front Office Management by Mr. Sbhal Nagar
- Professional Hotel Front Office Management – Anutosh Bhakta
- Hotel Management by Dr. Jagmohan Negi, Himalaya Publishing House, New Delhi.
- Professional Hotel Management by Dr. JM Negi, S. Chand & Co, New Delhi
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HOUSEKEEPING OPERATION LAB-II

Course Code: HMC2311

Credit Units: 01

- Identification of Fibre & Fabrics
- Test of Fibre & Fabrics
- Sewing & Stitching

Examination Scheme:

Components	V	H	CT	A	EE
Weightage (%)	05	05	15	5	70

V-viva; H-home assignment; CT-class test; A-attendance; EE-end semester examination

Text & References:

Text:

- Professional Management of Housekeeping Operation by Robert J. Martin
- Hotel, Hostel & Hospital Housekeeping by John C. Branson & Margaret Lennox
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FOOD PRODUCTION OPERATIONS-II

Course Code: HMC2401

Credit Units: 02

Course Objective:

At the end of the semester the students will develop a clear concept on –

- Quantity Food Production
- Menu Planning
- Regional Indian Cuisine
- Frozen Desserts
- Sugar Cookery
- Chocolate Confectionary

Module I: Quantity Food Production- Equipment

Equipment required for mass/volume feeding
Heat and cold generating equipment
Care and maintenance of these equipments
Modern development in equipment manufacture

Module II: Menu Planning

Basic principles of menu planning – recapitulation
Points to consider in menu planning for various volume feeding outlets such as Industrial, Institutional, Mobile Catering Units
Planning menus for;
1. School/college students
2. Industrial workers
3. Hospitals
4. Outdoor parties
5. Theme dinners
6. Transport facilities, cruise lines, airlines, railway
Nutrition factors for the above

Module III: Indenting

Principles of indenting for volume feeding
Portion sizes of various items for different types of volume feeding
Modifying recipes for indenting for large scale catering
Practical difficulties while indenting for volume feeding

Module IV: Planning

Principles of planning for quantity food production with regard to

- Space allocation
- Equipment selection
- Staffing

Module V: Volume Feeding

Institutional and Industrial Catering

- Types of Institutional & Industrial Catering
- Problems associated with this type of catering
- Scope of development and growth

Hospital Catering

- Highlights of hospital catering for patients, staff, visitors
- Diet menus and nutritional requirements

Off Premises Catering

- Reasons for growth and development
- Menu planning and theme parties
- Concept of a Central Production Unit
- Problems associated with off-premises catering

Mobile Catering

- Characteristics of Rail, Airline (Flight Kitchen) and Sea Catering.
- Branches of Mobile Catering

Quantity Purchase & Storage

- Introduction of purchasing
- Purchasing system
- Purchasing specifications
- Purchasing techniques
- Storage

Module VI: Regional Indian Cuisine

Introduction to Regional Indian Cuisine

Heritage of Indian Cuisine

Cuisine and its highlights of different states/region/ communities to be discussed under:

- Geographic location
- Seasonal availability
- Special equipment
- Staple diets
- Specialty cuisine for festivals and special occasions

States - Andhra Pradesh, Bengal, Goa, Gujarat, Karnataka, Kashmir, Kerala, Madhya Pradesh, Maharashtra, North-Eastern States, Punjab, Rajasthan, Tamil Nadu and Uttar Pradesh/Uttranchal

Communities- Parsee, Chettinad, Hyderabad, Lucknowi (Avadhi), Malabari / Syrian, Christian and Bohri

Discussions- Indian Breads, Indian Sweets, Indian Snacks.

Patisserie

Module VII : Frozen Desserts : ingredients; Types

Sherbets,
Ice-creams

Module VIII :Sugar Cookery

Manufacturing, Syrups, Types, Stages of Cooking With Temperatures

Module IX :Chocolate Confectionary

Origin of Chocolate, Manufacturing, Tempering, Types, Usage

Examination Scheme:

Components	V	H	CT	A	EE
Weightage (%)	06	04	15	5	70

V-viva; H-home assignment; CT-class test; A-attendance; EE-end semester examination

Text & References:**Text:**

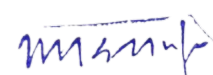
- Theory of Catering by Kinton Cesserani, Published by Hodder & Stoughton
- Practical Cookery by Kinton Cesserani, Published by Hodder & Stoughton

References:

- Theory of Cookery by K Arora published by Frank Bros & Co., New Delhi
- Professional chef by John Wiley
- Ultimate Cooking Course by Carole clement publish by Joana Lorrenz
- Essential of Cooking by James Peterson published by Artisan
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FOOD & BEVERAGE SERVICE OPERATIONS-II

Course Code: HMC2402

Credit Units: 02

Course Objective:

At the end of the semester the students will develop a clear concept on –

- Guéridon Service
- Banquets
- Bar Operations

Module I:Guéridon Service

- Types of Trolleys
- Sequence of Service

Module II:Banquets

- History of Banquets
- Types of Banquets
- Organization of Banquet Section
- Banquet Procedures
- Buffets
- Banquet Protocols
- Conferences

Module III :Bar Operations

- Bar Set Up
- Equipment
- Bar Control
- Cocktails

Examination Scheme:

Components	V	H	CT1	A	EE1
Weightage (%)	05	05	15	5	70

V-viva; H-home assignment; CT-class test; A-attendance; EE-end semester examination

Text & References:

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- Food & Beverage Service by Lillicrap
- Food & Beverage Service by R. Singaravelavan, OUP

References:

- F & B Service Manual by Sudhir Andrews, Tata McGraw Hill
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FRONT OFFICE MANAGEMENT-I

Course Code: HMC2403

Credit Units: 02

Course Objective:

At the end of the semester the students will develop a clear concept on –

- Checkout & Settlement
- Front office Accounting Systems
- Night Audit
- Hotel / Front office Security System
- Property Management Systems

Module I :Checkout & Settlement

- Procedures at Reception, Cash Section, Bell Desk
- Express Check-Out & Self Check-Out
- Reduction of Late Charges
- Effective Billing & Collection

Module II: Front office Accounting Systems

- Accounting Fundamentals
- Creation & Maintenance of Accounts
- Audits & internal Control
- Settlement of Accounts
- Cash Control
- Credit Control

Module III: Night Audit

- Night Audit Process
- Function of Night Auditor
- Night Audit Reports

Module IV: Hotel / Front office Security System

- Methods
- Equipment Used
- Card Key Control
- Emergency Procedures
- Management's Role in Security

Module V:Property Management Systems

- Reservation Management Software
- Room Management Software
- Guest Account Management Software
- General Management Software



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Examination Scheme:

Components	A	JE	P	CT	EE
Weightage (%)	05	05	05	15	70

CT-class test; A-attendance; EE-end semester examination; P-project; JE-Journal Evaluation

Text & References:***Text:***

- Front Office Management by Bardi, John Willy and Sons
- Front Office Management by Mr. Sbhal Nagar
- Professional Hotel Front Office Management – Anutosh Bhakta
- Hotel Management by Dr. Jagmohan Negi, Himalaya Publishing House, New Delhi.
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HOUSEKEEPING MANAGEMENT-I

Course Code: HMC2404

Credit Units: 02

Course Objective:

At the end of the semester the students will develop a clear concept on –

- Laundry Operation
- Contract Cleaning
- Flower Arrangement

Module I : Laundry Operation

- Duties & Responsibilities of Laundry Staff (Laundry Manager and Shift-In-Leader, Dry Cleaning, Supervisor, Spotter cum Presser, Laundry Clerk, Attendants Valet Runner, Laundry)
- Importance and Principles of Laundry Operations
- Flow Process of industrial Laundering [Collection, Transportation Arrivals, Sorting, Weighing, Loading, Washing, Rinsing, Starching, Hydro-Extraction, Drying, Unloading, Tumbling, Finishing (Calender / Steam Press) Folding, & Storing Transfer & Use]
- Stages in Wash Cycle (Flush-Suds-Bleach Rinse-Sour & Soft-Extract, Break & Soaking)
- Equipment, Layout & Planning & Laundry (Basic Rules)
- Role of Laundry Agents
- Classification of Laundry Agents (Synthetic, Detergent, Built Soap Detergents, Enzyme Action-Detergents, Explain Briefly)
- Stain Removal

Module II :Contract Cleaning

- Types of Contract Cleaning
- Methods of Pricing of Contract Cleaning
- Advantages and Disadvantages of Contract Cleaning
- Eco-Friendly Process

Module III :Flower Arrangement

- Purpose of Flower Arrangement, Placement & Level of Placement
- With Relevant Examples
- Equipment & Materials Required
- Conditioning of Plant Material
- Styles of Flower Arrangement (Western, Japanese, Free-Style & Abstract)
- Principle of Flower Arrangement (Design, Scale, Balance, Focal Point, Rhythm, Texture, Repetition, Unity & Harmony)

Examination Scheme:

Components	V	H	CT	A	EE
Weightage (%)	05	05	15	5	70

V-viva; H-home assignment; CT-class test; A-attendance; EE-end semester examination


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Text & References:

Text:

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- Hotel, Hostel & Hospital Housekeeping by John C. Branson & Margaret Lennox
- Housekeeping Management by Keppa Margret M
- Hospitality Management: Current Trends & Practices by Dr. JM Negi, Amity University Press, New Delhi

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FOOD PRODUCTION OPERATIONS LAB-II

Course Code: HMC2408

Credit Units: 04

Cookery

- To formulate different sets of menus from the following regions and to include more dishes from the respective regions. The practical class will be conducted preferably by demonstrative method.
 - Awadh
 - Bengal
 - Goa
 - Gujarat
 - Hyderabad
 - Kashmiri
 - Maharashtra
 - Punjabi
 - Rajasthan
 - South India (Tamil Nadu, Karnataka, Kerala).

Patisserie

- Preparation & Application of Cream, Filling & Custards & Their uses
- Sugar Products
- Chocolate Confectionery

Examination Scheme:

Internal: 30 Marks

Components	JE	LE	VV	A
Weightage (%)	05	15	5	5

End-Term: 70 Marks

Components	JE	VV	INDENT	LE
Weightage (%)	05	05	10	50

Abbreviation: JE= Journal Evaluation; LE= Lab Evaluation; VV= Viva-Voce; GP= Grooming & Punctuality

Text & References:

Text:

- Theory of Catering by Kinton Cesserani, Published by Hodder & Stoughton
- Practical Cookery by Kinton Cesserani, Published by Hodder & Stoughton

References:

- Theory of Cookery by K Arora published, Frank Bros & Co. New Delhi
- Professional Chef by John Wiley
- Ultimate Cooking Course by Carole Clement published by Joana Lorrenz
- Essential of Cooking by James Peterson published by Artisan


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FOOD & BEVERAGE SERVICE OPERATIONS LAB-II

Course Code: HMC2409

Credit Units: 02

- Buffet Lay-ups, theme Buffet setups
- Restaurant setups of different types
- Service of Cheese
- Preparation of Flambé dishes

Examination Scheme:

Internal: 30 Marks

Components	JE	LE	VV	A
Weightage (%)	05	15	05	5

End-Term: 70 Marks

Components	JE	VV	GP	LE
Weightage (%)	10	10	10	40

Abbreviation: JE= Journal Evaluation; LE= Lab Evaluation; VV= Viva-Voce; GP= Grooming & Punctuality

Text & References:

Text & References:

Text:

- Food & Beverage Services by SN Bagchi & Anita Sharma, Aman Publications, New Delhi
- Food & Beverage Service by Lilicrap
- Food & Beverage Service by R. Singaravelavan, OUP

References:

- F & B Service Manual by Sudhir Andrews, Tata McGraw Hill
- The Waiter by John Fullar
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FRONT OFFICE MANAGEMENT LAB

Course Code: HMC2410

Credit Units: 01

- Preparation & Study of Countries – Capitals & Currency, Airlines, Flag Charts, Credit Cards, Travel Agency etc.
- Telecommunication Skills
- Preparation of Guest Folio
- Guest Complaint Handling
- Preparation of Guest History Cards

Examination Scheme:

Internal: 30 Marks

Components	JE	LE	VV	A
Weightage (%)	05	15	05	05

End-Term: 70 Marks

Components	JE	VV	GP	LE
Weightage (%)	10	10	10	40

Abbreviation: JE= Journal Evaluation; LE= Lab Evaluation; VV= Viva-Voce; GP= Grooming & Punctuality A: Attendance


Text & References:

Text:

- Front Office Management by Bardi, John Willy and Sons
- Front Office Management by Mr. Sbhal Nagar
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HOUSEKEEPING MANAGEMENT LAB

Course Code: HMC2411

Credit Units: 01

- Laundry Operations
- Washing & Finishing of various Fibres & Fabrics
- Stain Removal

Examination Scheme:

Components	V	H	CT	A	EE
Weightage (%)	05	05	15	5	70

V-viva; H-home assignment; CT-class test; A-attendance; EE-end semester examination

Text & References:

Text:

- Professional Management of Housekeeping Operation by Robert J. Martin
- Hotel, Hostel & Hospital Housekeeping by John C. Branson & Margaret Lennox
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FOOD PRODUCTION TRAINING REPORT

Course Code: HMC2501

Credit Units: 05

Course Objective:

At the end of the industrial training the student would be able to;

- (i) Explain the organizational structure of the department
- (ii) Describe job description of various job titles, work schedules, opening & closing duties.
- (iii) Explain various sections and their functions
- (iv) Observe personal hygiene, kitchen hygiene and sanitation
- (v) Identify forms/formats, records and registers maintained
- (vi) Help in preparation of various dishes, garnish and service
- (vii) Observe food production standards of finished products

On completion of the project the student will be required to submit the following:

Project File or Industrial workflow log book - The File is the principal means by which the work carried out will be assessed and therefore great care should be taken in its preparation.

In general, the File should be comprehensive and include:

- A short account of the activities that were undertaken as part of the training;
- A statement about the extent to which the training has achieved its stated goals.
- A statement about the outcomes of the learning, evaluation and dissemination processes engaged in as part of the training;
- Any activities planned but not yet completed as part of the training, or as a future initiative directly resulting from the project;
- Any problems that have arisen that may be useful to document for future reference.

Training Report

The report should be submitted in duplicate (2 copies) spiral bound and a CD and should contain the following components:

- **Title or Cover Page**

The title page should contain the following information: Department Name; Student's Name; Course; Year; Supervisor's Name.

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- **Materials and Methods**

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This section should aim at experimental designs, materials used. Methodology should be mentioned in details including modifications if any.

- **Suggestions**

In writing these section, emphasis should be given on what has been performed and achieved in the course of the work and any ideas/suggestions they feel will can be implemented, rather than discuss in detail what is readily available in text books. Avoid abrupt changes in contents from section to section and maintain a lucid flow throughout the thesis.

- **Conclusion**

A conclusion should be the final section in which the outcome of the work is mentioned briefly.

- **Appendices**

The Appendix contains material which is of interest to the reader ,and may include any forms, formats and any problem that have arisen that may be useful to document for future reference.

- **Performance Appraisal & Completion Certificate** duly signed and stamped
Examination Scheme:

Project Report:	50
Log book + Attendance + Appraisal	20
Presentation & Viva Voce:	30
Total:	100



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FOOD & BEVERAGE SERVICE TRAINING REPORT

Course Code: HMC2502

Credit Units: 05

Course Objective:

At the end of the industrial training the student would be able to:

- (i) explain staff organization
- (ii) do layout
- (iii) list all equipments used (including crockery, cutlery, glassware etc) and use of these equipment
- (iv) describe and explain the menu and bar card
- (v) perform task for table reservation & receiving the guest
- (vi) lay the table, placing the order and pick-up, service and clearance procedure
- (vii) list all bar equipments
- (viii) take and serve orders of different beverages, cigars and cigarettes.

On completion of the project the student will be required to submit the following:

Project File or Industrial workflow log book - The File is the principal means by which the work carried out will be assessed and therefore great care should be taken in its preparation.

In general, the File should be comprehensive and include:

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Log book + Attendance + Appraisal	20
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FRONT OFFICE MANAGEMENT TRAINING REPORT

Course Code: HMC2503

Credit Units: 05

Course Objective:

At the end of the industrial training the student would be able to:

- (i) understand and explain the organization structure
- (ii) prepare job descriptions of various job titles at front office
- (iii) understand various procedures & functions followed for:-

1. reservations
2. reception & information
3. bell desk
4. bills and cash
5. guest relations
6. night auditing

- (iv) maintain various records & registers and understand their uses.

On completion of the project the student will be required to submit the following:

Project File or Industrial workflow log book - The File is the principal means by which the work carried out will be assessed and therefore great care should be taken in its preparation.

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Presentation & Viva Voce:	30
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HOUSEKEEPING MANAGEMENT TRAINING REPORT

Course Code: HMC2504

Credit Units: 05

Course Objective:

At the end of the industrial training the student would be able to:

- i) understand and explain the organization structure and various sections of the department
- ii) perform duties and responsibilities of the executives and non-executives of the department
- iii) describe the functions of various sections
- iv) explain the duties of room attendant and houseman in different shifts
- v) maintain various records and registers
- vi) demonstrate and follow procedures for:
 - a) cleaning of room and bathroom
 - b) lost and found items
 - c) exchange of linen
 - d) cleaning of various surfaces
 - e) pest control
 - f) flower arrangement procedures

On completion of the project the student will be required to submit the following:

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ADVANCED FOOD PRODUCTION OPERATIONS-I

Course Code: HMC2601

Credit Units: 02

Course Objective:

At the end of the semester the students will develop a clear concept on –

- Larder and its activities
- Chaud Froid, Aspic & Jelly
- Charcuterie, Ham, Bacon & Gammon, Forcemeats, Galantines, Pates, Terrine, Mouse & Mousseline, Quenelles, Parfaits, Roulades, Brines, Cures & Marinades
- Non edible Displays

Module I: Larder

Layout & Equipment

- Introduction of Larder Work
- Definition
- Equipment found in the larder
- Layout of typical larder with equipment and various sections

Terms & Larder Control

- Common terms used in the Larder and Larder Control
- Essentials of Larder Control
- Importance of larder Control
- Devising Larder Control Systems
- Liasoning with Other Departments
- Yield Testing

Duties & Responsibilities of the Larder Chef

- Functions of the Larder
- Hierarchy of larder Staff
- Sections of the Larder
- Duties and responsibilities of larder Chef.

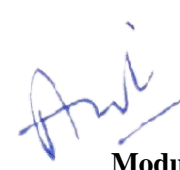
Module II: Charcuterie

- Introduction to charcuterie
- Sausage – Types & Varieties
- Casings – Types & Varieties
- Fillings – Types & Varieties
- Additives & Preservatives

Module III :Forcemeats

- Types of forcemeats
- Preparation of forcemeats
- Uses of forcemeats

Module IV :Brines, Cures & Marinades


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- Types of Brines
- Preparation of Brines
- Methods of Curing
- Types of marinades
- Uses of Marinades
- Difference between Brines, Cures & Marinades

Module V :Ham, Bacon & Gammon

- Cuts of Ham, Bacon & Gammon
- Differences between Ham, Bacon & Gammon
- Processing of Ham & Bacon
- Green Bacon
- Uses of the different cuts

Module VI :Galantines

- Making of Galantines
- Types of Galantine
- Ballotines

Module VII: Pate& Terrine

- Types of Pate
- Pate de foie gras
- Making of Pate
- Commercial pate and Pate Maison
- Truffle – sources, cultivation and uses of types of truffle

Module VIII: Mouse & Mousseline

- Types of mousse
- Preparation of mousse
- Preparation of mousseline
- Difference between mousse and mousseline

Module IX : Chaud Froid

- Meaning of chaud froid
- Making of chaud froid & precautions
- Types of chaud froid
- Uses of chaud froid


Module X :Aspic & Jelly

- Definition of aspic and jelly
- Difference between the two
- Making of aspic and Jelly
- Uses of aspic and Jelly

Module XI:Quenelles, Parfaits, Roulades

- Preparation of Quenelles, Parfaits and roulades

Module XII :Non edible Displays


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- Ice carvings
- Tallow sculpture
- Fruit & vegetable displays
- Salt dough
- Pastillage
- Jelly Logo
- Thermocol work.

Examination Scheme:

Components	V	H	CT	A	EE
Weightage (%)	06	04	15	5	70

V-viva; H-home assignment; CT-class test; A-attendance; EE-end semester examination

Text & References:

Text:

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ADVANCED FOOD & BEVERAGE SERVICE OPERATIONS-I

Course Code: HMC2602

Credit Units: 02

Course Objective:

At the end of the semester the students will develop a clear concept on –

- Restaurant Planning & Layout
- Menu Planning
- Manpower Planning

Module I :Restaurant Planning & Layout

- Choosing of Location
- Layout Planning
- Décor
- Furnishing, Fixtures & Fittings
- Equipment Selection

Module II :Menu Planning

- Objectives & Procedures
- Menu Planning Considerations & Constrains
- Menu Designing
- Menu Merchandising

Module III :Manpower Planning

- Job Description
- Job Specification
- Recruitment
- Induction & Training

Examination Scheme:

Components	V	H	CT1	A	EE1
Weightage (%)	05	05	15	5	70

V-viva; H-home assignment; CT-class test; A-attendance; EE-end semester examination

Text & References:

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FRONT OFFICE MANAGEMENT-II

Course Code: HMC2603

Credit Units: 02

Course Objective:

At the end of the semester the students will develop a clear concept on –

- Establishing Room Rates
- Forecasting Room Availability
- Budgeting for Operations
- Evaluating Front office Operations

Module I :Establishing Room Rates

- Market Condition Approach
- Rule-of-Thumb Approach
- Hubbart Formula

Module II :Forecasting Room Availability

- Forecasting Data
- Percentage of No-Shows
- Percentage of Walk-Ins
- Percentage of Over-stays
- Percentage of Under-stays
- ARR (Average Room Rate)
- RevPAR (Revenue Per Available Room)
- Forecast Formula
- Room Count Considerations

Module III :Budgeting for Operations

- Forecasting Rooms Revenue
- Estimating Expenses

Module IV :Evaluating Front office Operations

- Daily Operations Report
- Occupancy Ratios
- Rooms Revenue Analysis
- Operating Ratios
- Rooms Division income Statement & Budget Reports

Examination Scheme:

Components	A	JE	P	CT	EE
Weightage (%)	05	05	05	15	70

CT-class test; A-attendance; EE-end semester examination; P-project; JE-Journal Evaluation


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HOUSEKEEPING MANAGEMENT-II

Course Code: HMC2604

Credit Units: 02

Course Objective:

At the end of the semester the students will develop a clear concept on –

- Interior Designing
- Interior Decoration
- Safety and Security

Module I :Interior Designing

- Objectives
- Elements
- Principles
- Planning Trends in Hotels

Module II :Interior Decoration

- Colours
- Lighting
- Furniture
- Floor Finishes
- Carpets
- Wall Coverings
- Windows
- Guestroom Accessories

Module III :Safety and Security

- Fire Prevention
- Accident Prevention
- First Aid
- Crime Prevention
- Dealing With Emergencies

Examination Scheme:

Components	V	H	CT	A	EE
Weightage (%)	05	05	15	5	70

V-viva; H-home assignment; CT-class test; A-attendance; EE-end semester examination

Text & References:

Text:

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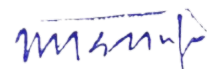
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References:

- Accommodation Management by Roy C
- Hotel Housekeeping Training Manual by Sudhir Andrew
- Professional House Keeping by Madlin Tucker
- Housekeeping Management by Keppa Margret M
- Hospitality Management: Current Trends & Practices by Dr. JM Negi, Amity University Press, New Delhi



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ADVANCED FOOD PRODUCTION OPERATIONS LAB-I

Course Code: HMC2608

Credit Units: 04

Course Objective:

At the end of the semester students would be able to-

- learn about the technique of advance skill in food production
- develop concept of International cuisine

Course Contents:

Module I: Three course menus to be formulated featuring International Cuisines

- French.
- Oriental (Chinese and Thai)
- Italian
- Scandinavian
- British
- Spanish
- Demonstration
 - German Greece, Mexican, Mediterranean and Lebanese.

Module II: Demonstration of- Charcuterie

- Galantines
- Pate
- Terrines
- Mousselines

Module III: Bakery & Patisserie Practical-

- Decorated Cakes
- Gateaux
- International Breads
- Sorbets, Parfaits
- Hot / Cold Desserts

Examination Scheme:

Internal: 30 Marks

Components	JE	LE	VV	A
Weightage (%)	05	15	5	5

End-Term: 70 Marks

Components	JE	VV	INDENT	LE
Weightage (%)	05	05	10	50

Abbreviation: JE= Journal Evaluation; LE= Lab Evaluation; VV= Viva-Voce

Text & References:

Text:

- Theory of Catering by Kinton Cesroni, Hodder & Stoughton
- Practical Cookery by Kinton Cesroni, Hodder & Stoughton
- Theory of Cookery by K Arora, Frank Bros & Co. New Delhi

References:

- Professional Chef by John Wiley
- Ultimate Cooking Course by Carole Clement, Joana Lorrenz
- Essential of Cooking by James Peterson, Artisan



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ADVANCED FOOD & BEVERAGE SERVICE OPERATIONS LAB-I

Course Code: HMC2609

Credit Units: 02

Course Objective:

At the end of the semester students will be able to-

- Prepare and give presentation on case studies on planning of F&B outlets
- Plan and supervise service of banquet, buffet, cocktails, gueridon service and setup bar for parties.

Course Contents:

Module I: Case Study on planning of

- Special Restaurant
- Room Service
- Coffee Shop
- Presentation.

Module II

- Case Study on Planning of Manpower of F&B department:-
- Presentation.

Module III

- Supervision of F&B Service in Training Restaurant.

Module IV

- Case Study of Planning Formal & Informal Banquet function including space requirement, Menu Planning.

Module V

- Setting up of various types of Buffet (Design, Layout).

Module VI


- Demonstration and Practice of Guerdon Service.

Module VII

- Case Study on setting up of Bar for parties.

Module VIII

- Demonstration and Practice of Making Cocktails.


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Examination Scheme:

Internal: 30 Marks

Components	JE	LE	VV	A
Weightage (%)	05	15	05	5

End-Term: 70 Marks

Components	JE	VV	GP	LE
Weightage (%)	10	10	10	40

Abbreviation: JE= Journal Evaluation; LE= Lab Evaluation; VV= Viva-Voce; GP= Grooming & Punctuality

Text & References:

Text:


- Food & Beverage Services by SN Bagchi & Anita Sharma, Aman Publications, New Delhi
- Food & Beverage Service by Lilicrap
- Food & Beverage Service by R. Singaravelavan, OUP

References:

- F & B Service Manual by Sudhir Andrews, Tata McGraw Hill
- The Waiter by John Fullar
- Professional Table Service by Dennis Lilicrap.
- Food & Beverage Management & Control by Dr. JM Negi, Kanishka Publications, New Delhi



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FRONT OFFICE MANAGEMENT LAB-II

Course Code: HMC2610

Credit Units: 02

- Role Play – Lobby Manager, GRE, Concierge, Bell Boy, Bell Captain etc.
- Accommodation Management Related Calculations

Examination Scheme:

Internal: 30 Marks

Components	JE	LE	VV	A
Weightage (%)	05	15	05	05

End-Term: 70 Marks

Components	JE	VV	GP	LE
Weightage (%)	10	10	10	40

Abbreviation: JE= Journal Evaluation; LE= Lab Evaluation; VV= Viva-Voce; GP= Grooming & Punctuality A: Attendance

Text & References:

Text:

- Front Office Management by Bardi, John Willy and Sons
- Front Office Management by Mr. Sbhal Nagar
- Professional Hotel Front Office Management – Anutosh Bhakta
- Hotel Management by Dr. Jagmohan Negi, Himalaya Publishing House, New Delhi.
- Professional Hotel Management by Dr. JM Negi, S. Chand & Co, New Delhi
- Hospitality Management: Current Trends & Practices by Dr. JM Negi, Amity University Press, New Delhi

References:

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- Front Office Manual by Sudhir Andrews, Tata McGraw Hill



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HOUSEKEEPING MANAGEMENT LAB-II

Course Code: HMC2611

Credit Units: 02

- Flower Arrangement
- Theme Decoration

Examination Scheme:

Internal: 30 Marks

Components	JE	LE	VV	A
Weightage (%)	05	15	05	05

End-Term: 70 Marks

Components	JE	VV	GP	LE
Weightage (%)	10	10	10	40

Abbreviation: JE= Journal Evaluation; LE= Lab Evaluation; VV= Viva-Voce; GP= Grooming & Punctuality A: Attendance

Text & References:

Text:

- Professional Management of Housekeeping Operation by Robert J. Martin
- Hotel, Hostel & Hospital Housekeeping by John C. Branson & Margaret Lennox
- Housekeeping Management by Keppa Margret M
- Hospitality Management: Current Trends & Practices by Dr. JM Negi, Amity University Press, New Delhi

References:

- Accommodation Management by Roy C
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- Housekeeping Management by Keppa Margret M
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ADVANCED FOOD PRODUCTION-II

Course Code: HMC2701

Credit Units: 02

Course Objective:

At the end of the semester the students will develop clear concept on -

- Modern Trend in Food Production
- Rechauffé Cookery
- Kitchen Planning, Layout and Design
- Quality Control & Standardization of Recipes
- Freezing Techniques
- Food Cost

Module – I :Modern Trend in Food Production Concept

- Frozen Foods
- Types
- Advantages & Disadvantages
- Handling Frozen Foods
- Defrosting Techniques

Module – II : Rechauffé Cookery

- Changes in Food Items
- Optimum Utilization

Module – III :Kitchen Planning, Layout and Design

- Principles of kitchen layout and design,
- Areas of various kitchens with recommended dimension,
- Factors that affect kitchen design,
- Placement of equipments,Flow of work,
- Space allocation,
- Layout of commercial kitchen (types, drawing a layout of a Commercial kitchen),
- Central Kitchen, Satellite Kitchen
- Planning of various supporting services (pot wash, wet grinding, chef room, larder, store and other staff facilities)

Module – IV :Quality Control & Standardization of Recipes

- Raw Materials
- Finished Goods
- Structure of Recipe

Module – V :Indenting

- Concept of indenting\
- Problems Related to indenting
- Storage System

Module – VI :Purchasing

- Receiving
- Ordering


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- Movements of Goods
- Purchasing Techniques

Module – VII :Freezing Techniques

- Dry Storage
- Cold Rooms

Module – VIII :Food Cost

- Food Cost
- Food Cost Percentage
- Control Cycle
- Various Reports

Examination Scheme:

Components	V	H	CT	A	EE
Weightage (%)	06	04	15	5	70

V-viva; H-home assignment; CT-class test; A-attendance; EE-end semester examination

Text & References:

Text:

- Theory of Catering by Kinton Cesserani, Published by Hodder & Stoughton
- Practical Cookery by Kinton Cesserani, Published by Hodder & Stoughton

References:

- Theory of Cookery by K Arora published by Frank Bros &Co., New Delhi
- Professional chef by John Wiley
- Ultimate Cooking Course by Carole clement publish by Joana Lorrenz
- Essential of Cooking by James Peterson published by Artisan
- Hospitality Management: Current Trends & Practices by Dr. JM Negi, Amity University Press, New Delhi.



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ADVANCED FOOD & BEVERAGE SERVICE-II

Course Code: HMC2702

Credit Units: 02

Course Objective:

At the end of the semester the students will develop clear concept on -

- Cycles of Control
- Food Cost Control
- Budgets & Budgetary Control
- Liquor Control

Module – I :Cycles of Control

- 3.1 Purchasing
- 3.2 Receiving
- 3.3 Storing
- 3.4 Issuing
- 3.5 Preparation
- 3.6 Costing & Selling
- 3.7 Control

Module – II :Food Cost Control

- 4.1 Food Costing
- 4.2 Checks & Checking System
- 4.3 Standard Costing
- 4.4 Variance Analysis

Module – III :Budgets & Budgetary Control

- 5.1 Definition, Different Types of Budgeting
- 5.2 Different Steps of Preparing Different Budgets
- 5.3 Budgetary Control
- 5.4 Formats for Budgeting

Module – IV :Liquor Control

- 6.1 Purchase Procedures
- 6.2 Assessment of Quality
- 6.3 Stock Control
- 6.4 Beverage Sales Control

Examination Scheme:

Components	V	H	CT1	A	EE1
Weightage (%)	05	05	15	5	70

V-viva; H-home assignment; CT-class test; A-attendance; EE-end semester examination



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Text & References:

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- Food & Beverage Services by SN Bagchi & Anita Sharma, Aman Publications, New Delhi
- Food & Beverage Service by Lillicrap
- Food & Beverage Service by R. Singaravelavan, OUP

References:

- F & B Service Manual by Sudhir Andrews, Tata McGraw Hill
- The Waiter by John Phullar
- Professional Table Service by Dennis Lillicrap.
- Food & Beverage Management & Control by Dr. JM Negi, Kanishka Publications, New Delhi



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ADVANCED FRONT OFFICE MANAGEMENT

Course Code: HMC2703

Credit Units: 02

Course Objective:

At the end of the semester the students will develop clear concept on -

- Yield Management
- Human Relations Management

Module – I :Yield Management

- Concept of Yield Management
- Capacity Management
- Discount Allocation

Module – II :Measuring Yield

- Potential Average SGL / DBL Rate
- Multiple Occupancy Percentage
- Rate Spread
- Potential Average Rate
- Room Rate Achievement Factor
- Yield Statistic
- Equivalent Occupancy
- Required Non-Room Revenue Per Guest

Module – III :Elements of Yield Management

- Group Room Sales
- Transient Room Sales
- Food & Beverage Activity
- Special Events
- Using Yield Management

Module – IV :Human Relations Management

Examination Scheme:

Components	V	H	CT	A	EE
Weightage (%)	05	05	15	5	70

V-viva; H-home assignment; CT-class test; A-attendance; EE-end semester examination

Text & References:

Text:

- Front Office Management by Bardi, John Willy and Sons
- Front Office Management by Mr. Sbhal Nagar
- Professional Hotel Front Office Management – Anutosh Bhakta
- Hotel Management by Dr. Jagmohan Negi, Himalaya Publishing House, New Delhi.
- Professional Hotel Management by Dr. JM Negi, S. Chand & Co, New Delhi
- Hospitality Management: Current Trends & Practices by Dr. JM Negi, Amity University Press, New Delhi

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References:

- Front Office by Abbott, Butter Worth Hiemann.
- Front Office Manual by Sudhir Andrews, Tata McGraw Hill
- Front Office Training manual – Sudhir Andrews.
- Managing Front Office Operations – Kasavana & Brooks
- Front Office – operations and management – Ahmed Ismail (Thomson Delmar).
- Managing Computers in Hospitality Industry – Michael Kasavana & Cahell.
- Front Office Operations – Colin Dix & Chris Baird.
- Front Office Operations & Management – S. Bhatnagar



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ACCOMMODATION MANAGEMENT

Course Code: HMC2704

Credit Units: 02

Course Objective:

At the end of the semester the students will develop clear concept on -

- Budgeting, Purchasing, Controls in Housekeeping Department
- Recruitment of Staff, Induction & Training of Hotel Housekeeping Staff
- Working Methods

Module – I :Budgeting

- Definition
- Capital & Operational Budget
- Advantages
- Preparation of a Budget
- Budgetary Control

Module – II :Purchasing

- Department Requirements
- Methods of Purchasing

Module – III :Controls in Housekeeping Department

- Purpose
- Expenses
- Functioning
- Forms

Module – IV :Recruitment of Staff

- Job Specifications & Job Descriptions
- Duty Rotas,
- Manual for Standard Housekeeping Procedures of Commercial Establishments

Module – V :Induction & Training of Hotel Housekeeping Staff

Module – VI :Working Methods

- Optimum Time Requirement
- Planning of Work Methods

Examination Scheme:

Components	V	H	CT	A	EE
Weightage (%)	05	05	15	5	70

V-viva; H-home assignment; CT-class test; A-attendance; EE-end semester examination

Text & References:

Text:

- Professional Management of Housekeeping Operation by Robert J. Martin
- Hotel, Hostel & Hospital Housekeeping by John C. Branson & Margaret Lennox

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- Housekeeping Management by Keppa Margret M
- Hospitality Management: Current Trends & Practices by Dr. JM Negi, Amity University Press, New Delhi

References:

- Accommodation Management by Roy C
- Hotel Housekeeping Training Manual by Sudhir Andrew
- Professional House Keeping by Madlin Tucker
- Housekeeping Management by Keppa Margret M
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FACILITY MANAGEMENT, PLANNING & DESIGN

Course Code: HMC2705

Credit Units: 01

Course Objective:

At the end of the semester the students will be able to-

- Explain & understand hotel design, project management, architectural aspects of facility planning, kitchen stewarding layout & design and methods of energy conservation.,.

Course Contents:

Module I: Hotel Design

Design Consideration, Attractive Appearance, Efficient Plan, Good Location, Suitable Material, Good Workmanship, Sound financing, Competent Management

Module II : Project Management

Introduction of Network analysis, Basic rules and procedures for Network analysis, C.P.M. and PERT, Comparison of CPM and PERT, Classroom exercises, Network crashing determining crash cost, normal cost.

Module III : Facilities Planning

The Systematic Layout Planning Pattern (SLP) for hotel, Planning Consideration, Flow Process and Flow Diagram Procedure for determining space considering the guiding factors for the guest room / public facilities, support facilities and services, hotel administration,

Module IV : Architectural Consideration

Difference between carpet area, plinth area and super built area, their relationships, reading of blueprint (plumbing, electrical, AC, ventilation, FSI, FAR, public areas), Approximate cost of construction estimation Approximate operating areas in budget type / 5 star type hotel / guest room, Approximate requirement and estimation of water / electrical load gas, ventilation.

Module V : Kitchen Stewarding Layout and Design

Importance of kitchen stewarding, Kitchen stewarding department layout and design, Equipment found in kitchen stewarding department

Module VI: Stores – Layout and Design

Stores layout and planning (dry, cold and bar), Various equipment of the stores work flow in stores

Module VII : Car Parking

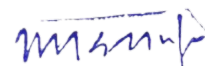
Calculation of car park area for different types of hotels

Module VIII : Energy Conservation

Necessity for energy conservation, Methods of conserving energy in different area of operation of a hotel, Developing and implementing energy conservation program for a hotel



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Examination Scheme:

Components	V	H	CT	A	EE
Weightage (%)	05	05	15	5	70

V-viva; H-home assignment; CT-class test; A-attendance; EE-end semester examination

Text & References:***Text:***

- Systematic Layout Planning by Richard Muther, Cahnern Books Division of Sahnern Publishing Company Inc. 9 Franklin Street, USA
- Food Service Planning- Layout Equipment by Lendal H Kotschevar & Margrat E Terrell

References:

- Management Operations & Research by N. Satyanarayan & Latika Raman, Himalaya Publishing House.
- Hospitality Facilities Management and Design by David M Stipanuk



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ENTREPRENEURSHIP DEVELOPMENT

Course Code: HMC2708

Credit Units: 01

Course Objective:

At the end of semester students will be able to-

- Acquire be self-employed and inculcate a habit of self-earning and maintain a dignified life
- Plan a path for hospitality students to make them successful entrepreneurs in their life and contribute to society
- To understand basic knowledge in the field of entrepreneurship development and give them basic exposure of Govt. policies and assistance
- Describes the roles that new venture creation plays in the economy, defines entrepreneurship and show how three factors – individuals, environments and organizations comes through to create the entrepreneurship event
- Impart the knowledge of the resource based framework i.e. Financial, physical, technological, human and organizational
- Exposed get with franchising opportunity and discuss what elements make a business concepts a legitimate franchise opportunity
- Acquire an effective leadership, quality and effective decision-making.

Course Contents:

Module I: Entrepreneurship Skills

Personality attribute of an entrepreneurs

- Self control-value attitude, Socio-culture factors

Unique characters of the hospitality industry

- Human psychology, Inter-personal relationship, Team building, Customer orientation

Positive entrepreneurship behaviour

- Overcoming external constraints, Solving internal problems

Module II: Identification of business opportunities in the hospitality industry

Demand / Market Analysis, Present and future competition, Government policy regarding small Enterprises

Module III: Organization of small enterprises - Form of organization

Sole ownership, Partnership, Private Ltd. Company, Public Ltd. Company, Manpower requirement

Module IV: Incentives and Assistance-

From central government, From State Government, From Financial Institutions

Module V: Small Enterprises Risk Analysis

Motivational factors, Developing Achievement Orientation, Strength and weakness of Independent Business, Feasibility and viability

Module VI: Establishment of an Enterprise

Registration of business, Licenses and Permits, Financial resources ,Organizing material, human and technical resource, Launching the enterprises, Formulating and implanting business strategies


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Examination Scheme

Components	V	H	CT	A	EE
Weightage (%)	05	05	15	5	70

V-viva; H-home assignment; CT-class test; A-attendance; EE-end semester examination

Text & References:

Text:

- Small Scale Industries and Entrepreneurship, by Desai Vasant; Bombay, Himalaya
- Small Scale Industries in the Developing Countries, by Staley E. & Morsey R. McGraw Hill.
- Management of Small Scale Industries, by Malhotra I. S. & Gupta S. L,
- Innovation and Entrepreneurship, by Drucker, Peter F; East-West Press (P) Ltd.

References:

- Entrepreneurial Development in India, by Gupta CB & Srinivasan; Sultan Chand
- Entrepreneur Development– New Ventures Creation, by Taneja S & Gupta SL
- Entrepreneurship Management by Dr. Aruna Kaulgud, Vikas Publishing House.



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EVENT MANAGEMENT

Course Code: HMC2709

Credit Units: 01

Course Objective:

At the end of the semester the students will be able to Explain & understand the concept of Event Management, its Design & Feasibility, Marketing of Event, Financial Management, Risk Management, Planning, Operations & Logistics, Control & Evaluation

Module I :Introduction to Event Management

- Size of Events
- Types of Events
- The Event Team
- Code of Ethics

Module II :Concept and Design

- Developing The Concept
- Analysing The Concept
- Designing The Event
- Logistics of The Concept

Module III :Feasibility

- Keys to Success
- The SWOT Analysis

Module IV :Legal Compliance

- Relevant Legislation
- Official Bodies Involved
- Contracts

Module V :Marketing of Event

- Nature of Event Marketing
- Process of Event Marketing
- The Marketing Mix
- Sponsorship

Module VI :Promotion

- Image / Branding
- Advertising
- Publicity
- Public Relations

Module VII :Financial Management

- The Budget
- Break-Even Point & Cash Flow Analysis
- Profit & Loss Statement
- Balance Sheet
- Financial Control Systems

Module VIII :Risk Management

- Process of Risk Management
- Incident Reporting
- Emergency Response Plans
- Standards for Risk Management

Module IX :Planning

- Establish The Aims of The Event & Objectives
- Prepare an Event Proposal
- Planning Tools

Module X :Protocol

- Order of Precedence; Titles; Styles of Address; Dress Codes
- Protocol for Speakers
- Seating Plans
- Religious & Cultural Protocol
- Rules of Flag Flying

Module XI :Staging The Event

- Choosing The Event Site
- Developing The Theme
- Providing Services
- Managing The Environment

Module XII :Staffing

- Recruitment & Selection; Rosters
- Training; Briefing Staff
- Managing Volunteers

Module XIII :Operations & Logistics

- Logistics
- Policies
- Procedures
- Performance Standards
- Functional Areas

Module XIV :Crowd Management & Evacuation

- The Crowd Management Plan
- Emergency Planning
- Implementing Emergency Procedures

Module XV :Control & Evaluation

- Monitoring & Control Systems
- Operational Monitoring & Control
- Evaluation



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ADVANCED FOOD PRODUCTION OPERATIONS LAB-II

Course Code: HMC2710

Credit Units: 04

Preparation & Presentation of International Cuisine

- France
- Italian
- Spanish
- Chinese
- Thai
- Mexican

Basket Cooking

- Planning & Practicing for 3 to 5 course including Patisserie Products

Examination Scheme:

Internal: 30 Marks

Components	JE	LE	VV	A
Weightage (%)	05	15	5	5

End-Term: 70 Marks

Components	JE	VV	INDENT	LE
Weightage (%)	05	05	10	50

Abbreviation: JE= Journal Evaluation; LE= Lab Evaluation; VV= Viva-Voce; GP= Grooming & Punctuality

Text & References:

Text:

- Theory of Catering by Kinton Cesserani, Published by Hodder & Stoughton
- Practical Cookery by Kinton Cesserani, Published by Hodder & Stoughton

References:

- Theory of Cookery by K Arora published, Frank Bros & Co. New Delhi
- Professional Chef by John Wiley
- Ultimate Cooking Course by Carole Clement published by Joana Lorrenz
- Essential of Cooking by James Peterson published by Artisan



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ADVANCED FOOD & BEVERAGE SERVICE LAB-II

Course Code: HMC2711

Credit Units: 01

Course Objective:

At the end of the semester the students will be able to-

- Prepare budget of a F&B outlet
- Calculate breakeven point & display on graphs
- Take & record inventories
- Demonstrate & perform supervisory skills in a F&B service outlet.

Course Contents:

Module I

Preparation of Budget of an Event / Outlet.

Module II

Calculate breakeven for an F&B outlet and prepare graphs for the above.

Module III

Case Study & Presentation on calculating cost and cost %.

Module IV

Taking and Recording of Inventory.

Module V

Preparation of Bar Inventory procedure and taking Bar Inventory.

Module VI

Case Study and Presentation of Menu Engineering.

Module VII

Preparation of MIS of F&B Outlet of a month with Graphs.

Module VIII

Supervision - F&B Service in Training Restaurant.

Examination Scheme:


Internal: 30 Marks

Components	JE	LE	VV	A
Weightage (%)	05	15	05	5

End-Term: 70 Marks

Components	JE	VV	GP	LE
Weightage (%)	10	10	10	40

Abbreviation: JE= Journal Evaluation; LE= Lab Evaluation; VV= Viva-Voce; GP= Grooming & Punctuality


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Text & References:

Text:

- Food & Beverage Services by SN Bagchi & Anita Sharma, Aman Publications, New Delhi
- Food & Beverage Service by Lilicrap
- Food & Beverage Service by R. Singaravelavan, OUP

References:

- F & B Service Manual by Sudhir Andrews, Tata McGraw Hill
- The Waiter by John Fullar
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- Food & Beverage Management & Control by Dr. JM Negi, Kanishka Publications, New Delhi



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RESEARCH METHODOLOGY

Course Code: HMC2803

Credit Units: 02

Course Objective:

Research methodology will be taught in the theory class to prepare students how to approach the subject of research project in the semester. To deal with surging information data regarding the various aspects of tourism industry, one should have a working efficiency with research and statistical techniques. The techniques may be applied in collecting, organizing, analyzing and interpreting data for decision-making. These may also be applied for formulating and testing research hypothesis. The course has been designed to equip the students with latest and necessary field techniques and to build a necessary statistical acumen among them. Students will master the skill for-

- Writing different types of research proposals
- Constructing the relevant tools of research
- Conduct a research project using appropriate qualitative and quantitative techniques
- Write a research report
- Evaluate a research report
- Give presentation of report supported by latest aids.

Course Contents:

Module I: Research Methodology

Meaning of research, Need and importance of research, Types of research, Criteria of good research

Module III: Data collection, analysis and interpretation (Sample designing)

Types & Sources of Data, Techniques of data collection; Correlation and regression analysis of two variables only. Hypothesis testing Test of significance, Chi-square analysis, Reports

Module IV: Preparation of research proposals-

Selection and formulation of research problem, Operationalization of concepts and constructs, Review of related literature, Aims and objectives, Hypothesis, method, sample and tools.

Module V: Evaluation of research report

Research Report Format, Presentation of Report

Examination Scheme:

Components	V	A	S	CT	EE
Weightage (%)	05	05	05	15	70

V-viva; H-home assignment; CT-class test; A-attendance; EE-end semester examination; S-seminar

Text & References:

Text:

- Applied General Statistics by Crovton and Crowder
- Behavioural Process in Organizations by Pareek, U.Rao. T.V. & Pestonjee D.M
- Professional Hotel Management by J.M. Negi, S Chand & Co, New Delhi

References:

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- Towards Appropriate Tourism– The case of Developing Countries by Peter long Frankfurt
- Method of Social Research – New York; The Free Press
- How to Complete Your Research Work Successfully by Judith Bell; UBS Publisher, Delhi
- How to Research and Write a Thesis in Hospitality & Tourism by James M. Paynter, John Wiley & Sons, New York, USA
- Strategic Management by John A Pearce II & Richard B Robinson Jr.
- Strategic Management by Samual C Cerco
- Quantitative Techniques in Management by Vokra
- Quantitative Approaches to Management by Levin I Richerd



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SPECIALIZATION COURSE (LAB)

Course Code: HMC2804

Credit Units: 04

Course Objective:

At the end of the semester the students will be develop competency in specialized area selected by him/her.

FOOD PRODUCTION

- **Module I**
Theme Cuisine
- **Module II**
Planning and implementing strategies for Quantity Food Production
- **Module III**
Fusion Cooking
- **Module IV**
Display Cuisine
- **Module V**
Designing & setting up Commercial Kitchen Area

F&B SERVICE

- **Module I: Case Study on planning of**
Special Restaurant
Room Service
Coffee Shop
Presentation.
- **Module II**
Case Study on Planning of Manpower of F&B department:-
Presentation.
- **Module III**
Supervision of F&B Service in Training Restaurant.
- **Module IV**
Case Study of Planning Formal & Informal Banquet function including space requirement, Menu Planning.
- **Module V**
Setting up of various types of Buffet (Design, Layout).
- **Module VI**
Demonstration and Practice of Guerdon Service.
- **Module VII**


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Case Study on setting up of Bar for parties.

➤ **Module VIII**

Demonstration and Practice of Making Cocktails.

FRONT OFFICE

➤ **Module I**

Role Play

➤ **Module II**

Situation Handling

➤ **Module III**

Work – Time Management

➤ **Module IV**

Work Schedule Designing

HOUSEKEEPING

➤ **Module I:**

First Aid

First aid kit

Dealing with emergency situation

➤ **Module II**

Special Decorations

➤ **Module III**

Layout of a guest room (Refurbishing & Redecoration)

➤ **Module IV**

Team cleaning Management

➤ **Module V**

Devising Training modules/standard operating procedure/Inspection check lists

Internal: 30 Marks

Components	JE	LE	VV	A
Weightage (%)	05	15	05	5

End-Term: 70 Marks

Components	JE	VV	GP	LE
Weightage (%)	10	10	10	40

Abbreviation: JE= Journal Evaluation; LE= Lab Evaluation; VV= Viva-Voce; GP= Grooming & Punctuality



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GDPI SESSIONS

Course Code: HMC2805

Credit Units: 03

Course Objective:

These sessions would help the students to perform well in the campus interview at the final year stage.

1. Pre-Preparation before GD/PI

- 1.1 Previous day
- 1.2 Previous night
- 1.3 Type of food
- 1.4 Rest & sleep
- 1.5 On GD/PI day
- 1.6 Personal Hygiene
- 1.7 Grooming
- 1.8 Curriculum Vitae & Testimonials
- 1.9 Sense of Time

2. Process of Evaluation during Group Discussion

- 2.1 Skills assessed in a Group Discussion Session
 - 2.1.1 Leadership skills
 - 2.1.2 Communication skills
 - 2.1.3 Interpersonal skills
 - 2.1.4 Persuasive skills
 - 2.1.5 Problem solving skills
 - 2.1.6 Conceptualizing skills
- 2.2 Rules to follow during the Group Discussion
- 2.3 Points to remember during Group Discussion
- 2.4 What to avoid during Group Discussion - Common Mistakes
- 2.5 Preparations to be taken before appearing in a Group Discussion
 - 2.5.1 Get noticed - But for the right reasons
 - 2.5.2 Egotism Showing off
 - 2.5.3 Quality Vs Quantity

3. Types of Group Discussion GD topics

- 3.1 Factual
- 3.2 Abstract
- 3.3 Argumentative/ Controversial topics
- 3.4 Opinion based
- 3.5 Current topics
- 3.6 Case based topics

4. Steps on how to prepare for an interview?

5. What is an interview?

6. What's the purpose of an interview

7. What to do Before an Interview


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8. What to do During the Interview
 - 8.1 Make Your Entrance
 - 8.2 Getting Started
 - 8.3 Attitude Counts
9. What to do after the Interview is over
10. Interview Do's and Don'ts

Examination Scheme:

Components	V	A	S	CT	EE
Weightage (%)	05	05	05	15	70

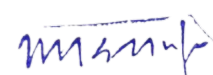
V-viva; H-home assignment; CT-class test; A-attendance; EE-end semester examination; S-seminar

Suggested Reading :

- Body Language – Your Success Mantra Dr. Shalini Verma S. Chand
- The Pocket Guide to Manwatching; Desmond Morris Triad Grafton Books



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RESEARCH PROJECT

Course Code: HMC2837

Credit Units: 12

Course Objective:

The purpose of research (Hospitality and Tourism based) is to seek answers to problems through the application of scientific methodology, which guarantees that the information is reliable and unbiased. This information is utilized to make conclusions and recommend solution. Some elementary factors need to be kept in mind while preparing a research and deciding the topic, these could be based on its relevance, feasibility, coverage, accuracy and research, objectivity and ethics.

To deal with surging information data regarding the various aspects of tourism industry, one should have a working efficiency with research and statistical techniques. The techniques may be applied in collecting, organizing, analyzing and interpreting data for decision-making. These may also be applied for formulating and testing research hypothesis. The course has been designed to equip the students with latest and necessary field techniques and to build a necessary statistical acumen among them. Students will master the skill for-

- Writing different types of research proposals and reports
- Constructing the relevant tools of research
- Conduct a research project using appropriate qualitative and quantitative techniques
- Do presentation with the help of tutorial aid
- Evaluate a research report.

The research topic should be assigned by the deputed subject faculty in the beginning of semester & should be approved by PL & HOI. Continuous monitoring and guidance should be provided to student at all the steps.

At the term end, the research project will be presented before a panel and evaluated by examiners (As nominated by HOI). The evaluation should be based on presentation, viva, report content & format & conclusion.

Examination Scheme:

Internal Assessment:

Abstract:	10
Draft:	15
Research Orientation:	10
Reading:	05

External Evaluation:

Objective:	05
Issue Profile:	10
Comprehensiveness	10
Relevance:	10
Presentation:	15
Viva:	10



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Text & References:

Text:

- Applied General Statistics by Crovton and Crowder
- Behavioural Process in Organizations by Pareek, U.Rao. T.V. Pestonjee D.M
- Professional Hotel Management by J.M. Negi, S Chand & Co, New Delhi

References:

- Towards Appropriate Tourism– The case of Developing Countries by Peter long Frankfurt
- Method of Social Research – New York; The Free Press
- How to Complete Your Research Work Successfully by Judith Bell; UBS Publisher, Delhi
- How to Research and Write a Thesis in Hospitality & Tourism by James M. Paynter, John Wiley & Sons, New York, USA.
- Hospitality Management: Current Trends & Practices by Dr. JM Negi, Amity University Press, New Delhi
- Methodology & Techniques of Social Research by Wilkinson & Bhandarkar
- Methods in Social Research by Gode WJ & Hatt PK
- Scientific Social Surveys & Research by Pouline Young & CF Schmid
- Evaluation Information: A Guide for users of Social Scienec by Lescard, Kartzer Jeffery
- Understanding & Conducting Research Application Education & Behavioural Sciences- 2nd Edition.



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FOOD & BEVERAGE SERVICE

(Skill Track)

Programme Structure

Course Code	Course Title	Lectures (L) Hours per week	Tutorial (T) Hours per week	Practical (P) Hours per week	Total Credits
VHM2152	Basics of Food Service	1	-	4	3
VHM2252	Advanced Food Service	1	-	4	3
VHM2352	Beverage Studies-Basic	1	-	4	3
VHM2452	Beverage Studies-Advanced	1	-	4	3
VHM2552	F&B Service Supervisory Skills	1	-	4	3
VHM2652	F&B Management Skills	3	-	-	3
	TOTAL				18



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FOOD & BEVERAGE SERVICE

Syllabus - Semester First

BASICS OF FOOD SERVICE

Course Code: VHM2152

Credit Units: 03

Prerequisites : 10+2

Course Objective:

At the end of the semester the students will be able to –

- Explain the growth and role of hotel industry and catering establishment
- Understand the various types of hotels and their features
- List and explain various catering establishment with their features
- Explain staff organization structure of food and beverage department
- Describe and understand job description of each personnel working in each F&B outlet
- List various F&B service equipment with its use and care.

Course Contents:

Module –I

- 1.0 Growth of Hotel Industry
 - 1.1 Sections of The Industry
- 2.0 Catering Establishments
 - 2.1 Different Types

Module –II

- 3.0 Personnel
 - 3.1 Staff Organisation in F&B Department
 - 3.2 Attributes of a Waiter

Module –III

- 4.0 Furniture & Equipment in a Restaurant

Module –IV

- 5.0 Plan for serving food and beverages
- 6.0 Greet customer, take orders and serve
- 7.0 Clean tables and counters

Module –V

- 8.0 Communicate with customer and colleagues
- 9.0 Maintain customer-centric service orientation
- 10.0 Maintain standard of etiquette and hospitable conduct


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Examination Scheme:

Components	Internal Assessment			EE	
	V	LP	A	Th	Pr
Weightage (%)	05	20	05	40	30

V-Viva; LP-Lab Performance; A-Attendance; EE-End Semester Examination

Suggested Readings :

- Food & Beverage Services by SN Bagchi & Anita Sharma, Aman Publications, New Delhi
- Food & Beverage Service by Lilicrap
- Food & Beverage Service by R. Singaravelavan, OUP
- F & B Service Manual by Sudhir Andrews, Tata McGraw Hill
- The Waiter by John Fullar
- Professional Table Service by Dennis Lilicrap.
- Food & Beverage Management & Control by Dr. JM Negi, Kanishka Publications, New Delhi



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Syllabus - Semester Second

ADVANCED FOOD SERVICE

Course Code: VHM2252

Credit Units: 03

Prerequisites : Basics of Food Service (VHM2152)

Course Objective:

At the end of the semester the students will be able to –

- Explain the various types of Meals
- Define & explain the concept of Menu
- Classify various methods of Service
- Calculate bill for meals & Handle payment made by the guests
- Deal with different types of guests in different situations
- Maintain hygiene and safety at workplace

Course Contents:

Module – I

- 1.0 Meals & Menu
 - 1.1 Types of Meals
 - 1.2 Introduction to Menu
 - 1.3 Courses of Menu
 - 1.4 Classification of Menu
 - 1.5 Types of Service

Module – II

- 2.0 Deal with customer payment
- 3.0 Resolve customer service issues
- 4.0 Follow gender and age sensitive service practices

Module – III

- 5.0 Maintain IPR of organisation and customers

Module – IV

- 6.0 Maintain health and hygiene
- 7.0 Maintain safety at workplace

Module – V

- 8.0 Service Terminology

Examination Scheme:

Components	Internal Assessment			EE	
	V	LP	A	Th	Pr
Weightage (%)	05	20	05	40	30

V-Viva; LP-Lab Performance; A-Attendance; EE-End Semester Examination

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Suggested Readings :

- Food & Beverage Services by SN Bagchi & Anita Sharma, Aman Publications, New Delhi
- Food & Beverage Service by Lilicrap
- Food & Beverage Service by R. Singaravelavan, OUP
- F & B Service Manual by Sudhir Andrews, Tata McGraw Hill
- The Waiter by John Fullar
- Professional Table Service by Dennis Lilicrap.
- Food & Beverage Management & Control by Dr. JM Negi, Kanishka Publications, New Delhi

After successful completion of study of the above Courses (VHM2152 & VHM2252), the student becomes eligible to appear for “Qualification Pack: Food & Beverage Service – Steward” (NSQF level - 4) examination under THSC & NSDC by paying fees as applicable.



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Syllabus - Semester Third

BEVERAGE STUDIES - BASIC

Course Code: VHM2352

Credit Units: 03

Prerequisites : Advanced Food Service (VHM2252)

Course Objective:

At the end of the semester the students will be able to –

- Define & Classify Beverage
- State the various types of Non-Alcoholic & Alcoholic Beverages
- Understand & Explain the Classification, Production & service of Beer & Wine
- Manage inventory

Course Contents:

Module – I

- 1.0 Classification of Beverage
- 2.0 Non-Alcoholic Beverages

Module – II

- 3.0 Alcoholic Beverages : Classification
- 4.0 Beer : Manufacture, Service, Brands

Module – III

- 5.0 Wine : Classification, Still Wine, Fortified Wine, Sparkling Wine, Production, Wine producing countries, Wine & Food Harmony

Module – IV

- 6.0 Supervise food and beverage service
- 7.0 Manage customer service

Module – V

- 8.0 Manage inventory and staff

Examination Scheme:

Components	Internal Assessment			EE	
	V	LP	A	Th	Pr
Weightage (%)	05	20	05	40	30

V-Viva; LP-Lab Performance; A-Attendance; EE-End Semester Examination

Suggested Readings :

- Food & Beverage Services by SN Bagchi & Anita Sharma, Aman Publications, New Delhi
- Food & Beverage Service by Lilicrap
- Food & Beverage Service by R. Singaravelavan, OUP
- F & B Service Manual by Sudhir Andrews, Tata McGraw Hill
- The Waiter by John Fullar
- Professional Table Service by Dennis Lilicrap.
- Food & Beverage Management & Control by Dr. JM Negi, Kanishka Publications, New Delhi

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Syllabus - Semester Fourth

BEVERAGE STUDIES - ADVANCED

Course Code: VHM2452

Credit Units: 03

Prerequisites : Beverage Studies – Basic (VHM2352)

Course Objective:

At the end of the semester the students will be able to –

- Define & Explain Distillation process
- Classify Spirits
- State the various types of Non-Alcoholic & Alcoholic Beverages
- Understand & Explain the Production & service of various Spirits
- Prepare Cocktails

Course Contents:

Module – I

1.0 Distillation & Spirits

Module – II

2.0 Whisky : Manufacture, Service, Brands

3.0 Rum : Manufacture, Service, Brands

4.0 Gin : Manufacture, Service, Brands

5.0 Vodka : Manufacture, Service, Brands

6.0 Brandy : Manufacture, Service, Brands

Module – III

7.0 Other Spirits – Country of origin, Manufacture, Service, Brands

Module – IV

8.0 Liqueurs : Manufacture, Service, Brands

Module – V

9.0 Cocktails

Examination Scheme:

Components	Internal Assessment			EE	
	V	LP	A	Th	Pr
Weightage (%)	05	20	05	40	30

V-Viva; LP-Lab Performance; A-Attendance; EE-End Semester Examination


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Suggested Readings :

- Food & Beverage Services by SN Bagchi & Anita Sharma, Aman Publications, New Delhi
- Food & Beverage Service by Lilicrap
- Food & Beverage Service by R. Singaravelavan, OUP
- F & B Service Manual by Sudhir Andrews, Tata McGraw Hill
- The Waiter by John Fullar
- Professional Table Service by Dennis Lilicrap.
- Food & Beverage Management & Control by Dr. JM Negi, Kanishka Publications, New Delhi

After successful completion of study of the above Courses (VHM2552&VHM2452), the student becomes eligible to appear for “Qualification Pack: Captain” (NSQF level - 6) examination under THSC & NSDC by paying fees as applicable.



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Syllabus - Semester Fifth

F&B SERVICE SUPERVISORY SKILLS

Course Code: VHM2552

Credit Units: 03

Prerequisites : Beverage Studies – Advanced (VHM2452)

Course Objective:

At the end of the semester the students will be able to –

- Develop Supervisory Skills
- Train Staffs
- Manage Inventory & Budget

Course Contents:

Module – I

- 1.0 Restaurant Planning & Layout
 - 1.1 Choosing of Location
 - 1.2 Layout Planning
 - 1.3 Décor
 - 1.4 Furnishing, Fixtures & Fittings
 - 1.5 Equipment Selection

Module – II

- 2.0 Arranging Equipment
- 3.0 Manage stock

Module – III

- 4.0 Supervisory Skills

Module – IV

- 5.0 Training Staffs
- Manage human resource and quality

Module – V

- 6.0 Manage finances of the facility

Examination Scheme:

Components	Internal Assessment			EE	
	V	LP	A	Th	Pr
Weightage (%)	05	20	05	40	30

V-Viva; LP-Lab Performance; A-Attendance; EE-End Semester Examination


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Suggested Readings :

- Food & Beverage Services by SN Bagchi & Anita Sharma, Aman Publications, New Delhi
- Food & Beverage Service by Lilicrap
- Food & Beverage Service by R. Singaravelavan, OUP
- F & B Service Manual by Sudhir Andrews, Tata McGraw Hill
- The Waiter by John Fullar
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Syllabus - Semester Sixth

F&B MANAGEMENT SKILLS

Course Code: VHM2652

Credit Units: 03

Prerequisites : Service Supervisory Skills (VHM2552)

Course Objective:

At the end of the semester the students will be able to –

- Understand & Explain F&B Control
- Implement Menu Engineering

Course Contents:

Module – I

- 1.0 Cycles of Control
 - 1.1 Purchasing
 - 1.2 Receiving
 - 1.3 Storing
 - 1.4 Issuing
 - 1.5 Preparation
 - 1.6 Costing & Selling
 - 1.7 Control

Module – II

- 2.0 Food Cost Control
 - 2.1 Food Costing
 - 2.2 Checks & Checking System
 - 2.3 Standard Costing
 - 2.4 Variance Analysis

Module – III

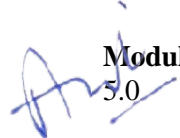
- 3.0 Budgets & Budgetary Control
 - 3.1 Definition, Different Types of Budgeting
 - 3.2 Different Steps of Preparing Different Budgets
 - 3.3 Budgetary Control
 - 3.4 Formats for Budgeting

Module – IV

- 4.0 Liquor Control
 - 4.1 Purchase Procedures
 - 4.2 Assessment of Quality
 - 4.3 Stock Control
 - 4.4 Beverage Sales Control

Module – V

- 5.0 Menu Engineering


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Examination Scheme:

Components	Internal Assessment				EE
	V	H	CT	A	Th
Weightage (%)	05	05	15	05	70

V-Viva; H-Home Assignment; CT-Class Test; A-Attendance; EE-End Semester Examination

Suggested Readings :

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- Food & Beverage Service by Lilicrap
- Food & Beverage Service by R. Singaravelavan, OUP
- F & B Service Manual by Sudhir Andrews, Tata McGraw Hill
- The Waiter by John Fullar
- Professional Table Service by Dennis Lilicrap.
- Food & Beverage Management & Control by Dr. JM Negi, Kanishka Publications, New Delhi

After successful completion of study of the above Courses (VHM2552&VHM2652), the student becomes eligible to appear for “Qualification Pack: Assistant Catering Manager” (NSQF level - 6) examination under THSC & NSDC by paying fees as applicable.



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FOOD PRODUCTION TECHNIQUES


(Skill Track)

Programme Structure

Course Code	Course Title	Lectures (L) Hours per week	Tutorial (T) Hours per week	Practical (P) Hours per week	Total Credits
VHM2151	Basics of Food Production	1	-	4	3
VHM2251	Food Production Skills	1	-	4	3
VHM2351	Food Production Operations	1	-	4	3
VHM2451	Advanced Food Production	1	-	4	3
VHM2551	Food Production Supervisory Skills	1	-	4	3
VHM2651	Food Production Management	1	-	4	3
	TOTAL				18



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FOOD PRODUCTION TECHNIQUES

Syllabus - Semester First

BASICS OF FOOD PRODUCTION

Course Code: VHM2151

Credit Units: 03

Course Objective:

At the end of the semester the students will be able to –

- Explain the structure of Kitchen in hotel industry
- Understand the use of various resources used in kitchen
- Handle Commodities used in Food Production
- State the methods of cooking & apply them on various ingredients
- Define & prepare Stocks, Sauces & Gravies
- Understand Vegetable Cookery
- Set up and close kitchen
- Meet the need of the customers

Course Contents:

Module –I

1. Organising Kitchen
 - 1.1. Kitchen Brigade
 - 1.2. Kitchen Equipment
 - 1.3. Commodities

Module – II

2. Fundamentals of Cookery
 - 2.1. Preparation of Ingredients
 - 2.2. Methods of Cooking
 - 2.3. Stocks – Definition, Types & Methods
 - 2.4. Sauce – Definition, Types & Methods
 - 2.5. Gravy – Definition, Types & Methods

Module – III

3. Soups – Definition, Types & Methods
4. Vegetable Cookery - Basic Knowledge, Identification, Various Cuts, Preparation

Module – IV

5. Assist in food preparation
6. Set up and close kitchen

Module – V

7. Communicate with customer and colleagues
8. Maintain customer-centric service orientation
9. Maintain standard of etiquette and hospitable conduct

Examination Scheme:

Components	Internal Assessment			EE	
	V	LP	A	Th	Pr
Weightage (%)	05	20	05	40	30

V-Viva; LP-Lab Performance; A-Attendance; EE-End Semester Examination

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Suggested Readings :

- Theory of Catering by KintonCesserani, Published by Hodder & Stoughton
- Practical Cookery by KintonCesserani, Published by Hodder & Stoughton
- Theory of Cookery by K Arora published by Frank Bros &Co., New Delhi
- Professional chef by John Wiley
- Ultimate Cooking Course by Carole clement publish by Joana Lorrenz
- Essential of Cooking by James Peterson published by Artisan
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Syllabus - Semester Second

FOOD PRODUCTION SKILLS

Course Code: VHM2251

Credit Units: 03

Prerequisites : Basics of Food Production (VHM2151)

Course Objective:

At the end of the semester the students will be able to –

- Understand concept of Egg cookery
- Classify Fish and prepare various preparations
- Understand types, Cuts & preparation of Poultry / Game
- Explain the various types of Meals
- Define & explain the concept of Menu
- Classify various methods of Service
- Calculate bill for meals & Handle payment made by the guests
- Deal with different types of guests in different situations
- Maintain hygiene and safety at workplace

Course Contents:

Module – I

1. Egg Cookery - Structure, Composition, Varieties, Preparation

Module – II

2. Fish Cookery - Classification, Various Cuts, Preparation

Module – III

3. Poultry / Game Cookery - Classification, Various Cuts, Preparation

Module – IV

4. Meat Cookery
 - 4.1. Types - Mutton, Lamb, Pork, Beef, Veal
 - 4.2. Different Cuts & Preparation

Module – V

5. Monitor stock movement

Module – VI

6. Follow gender and age sensitive service practices
7. Maintain IPR of organization and customers
8. Maintain health and hygiene
9. Maintain safety at workplace

Examination Scheme:

Components	Internal Assessment			EE	
	V	LP	A	Th	Pr
Weightage (%)	05	20	05	40	30

V-Viva; LP-Lab Performance; A-Attendance; EE-End Semester Examination


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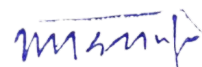
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- Ultimate Cooking Course by Carole clement publish by Joana Lorrenz
- Essential of Cooking by James Peterson published by Artisan
- Hospitality Management: Current Trends & Practices by Dr. JM Negi, Amity University Press, New Delhi.

After successful completion of study of the above Courses (VHM2151&VHM2251), the student becomes eligible to appear for “Qualification Pack: Commis Chef” (NSQF level - 4) examination under THSC & NSDC by paying fees as applicable.



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Syllabus - Semester Third

FOOD PRODUCTION OPERATIONS

Course Code: VHM2351

Credit Units: 03

Prerequisites : Food Production Skills (VHM2251)

Course Objective:

At the end of the semester the students will be able to –

- Understand importance of Mise-en-place & Mise-en-scene
- Design & Prepare Menu as per Indian Regional Cuisine
- Plan Indian Breakfast Menu & prepare
- Plan Western Breakfast Menu & prepare

Course Contents:

Module –I

1. Indian Regional Cuisine
 - 1.1. Study of Main Regions: North, South, East & West
 - 1.2. Main Meals & Snacks

Module –II

2. Indian Regional Cuisine
 - 2.1. Ethnic Eating Traditional Indian Bread & Sweet Meats

Module –III

3. Indian Regional Cuisine
 - 3.1. Indian Masalas & their characteristics

Module – IV

4. Breakfast Cookery
 - 4.1. Indian – region wise
 - 4.2. Western

Module – V

5. Prepare for food and kitchen activities


Examination Scheme:

Components	Internal Assessment			EE	
	V	LP	A	Th	Pr
Weightage (%)	05	20	05	40	30

V-Viva; LP-Lab Performance; A-Attendance; EE-End Semester Examination

Suggested Readings :

- Theory of Catering by Kinton Cesserani, Published by Hodder & Stoughton
- Practical Cookery by Kinton Cesserani, Published by Hodder & Stoughton
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Syllabus - Semester Fourth

ADVANCED FOOD PRODUCTION

Course Code: VHM2451

Credit Units: 03

Prerequisites : Food Production Operations (VHM2351)

Course Objective:

At the end of the semester the students will be able to –

- Design & Prepare Menu as per Occidental & Oriental Cuisines
- Understand concept of Bakery & Confectionery
- Prepare Cookies & Cakes

Course Contents:

Module – I

1. International Cuisine
 - 1.1. English
 - 1.2. Spanish
 - 1.3. French
 - 1.4. Mexican
 - 1.5. Oriental
 - 1.6. Italian
 - 1.7. Pasta Cookery

Module – II

2. Fundamentals of Bakery
 - 2.1. Various Ingredients & their use

Module – III

3. Cookies – types, methods

Module – IV

4. Cakes – types, methods, decoration, faults

Module – V

5. Perform food preparation as per standards
6. Assist the commi and senior chefs

Examination Scheme:

Components	Internal Assessment			EE	
	V	LP	A	Th	Pr
Weightage (%)	05	20	05	40	30

V-Viva; LP-Lab Performance; A-Attendance; EE-End Semester Examination

Suggested Readings :

- Theory of Catering by Kinton Cesserani, Published by Hodder & Stoughton
- Practical Cookery by Kinton Cesserani, Published by Hodder & Stoughton
- Theory of Cookery by K Arora published by Frank Bros & Co., New Delhi
- Professional chef by John Wiley
- Basic Baking – S. C Dubey

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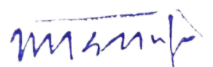
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- Ultimate Cooking Course by Carole clement publish by Joana Lorrenz
- Essential of Cooking by James Peterson published by Artisan
- Hospitality Management: Current Trends & Practices by Dr. JM Negi, Amity University Press, New Delhi.

After successful completion of study of the above Courses (VHM2351&VHM2451), the student becomes eligible to appear for “Qualification Pack: Commi 1” (NSQF level - 5) examination under THSC & NSDC by paying fees as applicable.



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Syllabus - Semester Fifth

FOOD PRODUCTION SUPERVISORY SKILLS

Course Code: VHM2551

Credit Units: 03

Prerequisites : Advanced Food Production (VHM2451)

Course Objective:

- At the end of the semester the students will be able to –
- Prepare Various types of Salads & Sandwiches
- Decorate & Present with appropriate garnish
- Prepare various types of Cold Desserts
- Design Menu for different Catering outlets & understand the importance of Standard Recipe

Course Contents:

Module –I

1. Salads & Sandwiches - Definition, Classification, Preparation Use & Function

Module – II

2. Food Presentation & Garnish
 - 2.1. Various Aspects of Presentation; Materials Used

Module – III

3. Cold Desserts – Bakery & Confectionery

Module – IV

4. Menu Planning
5. Standardization of Recipe

Module – IV

6. Assist in creating new recipes and writing menus
7. Manage food resources in the kitchen

Examination Scheme:

Components	Internal Assessment			EE	
	V	LP	A	Th	Pr
Weightage (%)	05	20	05	40	30

V-Viva; LP-Lab Performance; A-Attendance; EE-End Semester Examination

Suggested Readings :

- Theory of Catering by KintonCesserani, Published by Hodder & Stoughton
- Practical Cookery by KintonCesserani, Published by Hodder & Stoughton
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Syllabus - Semester Sixth

FOOD PRODUCTION MANAGEMENT

Course Code: VHM2651

Credit Units: 03

Prerequisites : Supervisory Skills (VHM2551)

Course Objective:

At the end of the semester the students will be able to –

- Understand concept & methods of Quantity Food Production
- Prepare various types of Pastries
- Define & explain the concept of Menu
- Classify various methods of Service
- Calculate bill for meals & Handle payment made by the guests
- Deal with different types of guests in different situations
- Maintain hygiene and safety at workplace

Course Contents:

Module – I

1.0 Quantity Food Production

Module – II

2.0 Pastries

- 2.1 Definition
- 2.2 Ingredients Used,
- 2.3 Classification, Methods, Usage, Faults

Module – III

3.0 Modern Trend in Food Production Concept

- 3.1 Frozen Foods
- 3.2 Types
- 3.3 Advantages & Disadvantages
- 3.4 Handling Frozen Foods
- 3.5 Defrosting Techniques

Module – IV

4.0 Kitchen Management

- 4.1 Manage kitchen operations
- 4.2 Perform administrative work


Module – V

5.0 Food Cost

- 5.1 Food Cost Concept
- 5.2 Food Cost Percentage
- 5.3 Control Cycle
- 5.4 Various Reports



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Examination Scheme:

Components	Internal Assessment			EE	
	V	LP	A	Th	Pr
Weightage (%)	05	20	05	40	30

V-Viva; LP-Lab Performance; A-Attendance; EE-End Semester Examination

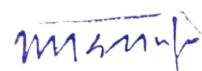
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- Professional chef by John Wiley
- Basic Baking – S. C Dubey
- Ultimate Cooking Course by Carole clement publish by Joana Lorrenz
- Essential of Cooking by James Peterson published by Artisan
- Hospitality Management: Current Trends & Practices by Dr. JM Negi, Amity University Press, New Delhi.

After successful completion of study of the above Courses (VHM2551&VHM2651), the student becomes eligible to appear for “Qualification Pack: Sous Chef” (NSQF level - 7) examination under THSC & NSDC by paying fees as applicable



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FRONT OFFICE OPERATIONS

(Skill Track)

Programme Structure

Course Code	Course Title	Lectures (L) Hours per week	Tutorial (T) Hours per week	Practical (P) Hours per week	Total Credits
VHM2153	Fundamentals of Front Office Operations	1	-	4	3
VHM2253	Handling Reception	1	-	4	3
VHM2353	Check-in & Check-out Process	1	-	4	3
VHM2453	Front Office Supervisory Skills	1	-	4	3
VHM2553	Front Office Yield Management	3	-	-	3
VHM2653	Managing Front Office	3	-	-	3
	TOTAL				18



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FRONT OFFICE OPERATIONS

Syllabus - Semester First

FUNDAMENTALS OF FRONT OFFICE OPERATIONS

Course Code: VHM2153

Credit Units: 03

Prerequisites : 10+2

Course Objective:

At the end of the semester the students will be able to –

- Understand the various types of hotels and their features
- Explain the structure of Front Office Department
- Develop clear concept about Accommodation facilities
- Handle Reservation activities
- Deal effectively with Guests & Colleagues
- Maintain Personal Care & Safety

Course Contents:

Module – I

- 1.0 Structure of Front Office Department
 - 1.1 Functional Organisation of Front office
 - 1.2 Front Desk Layout and Equipment

Module – II

- 2.0 Accommodation Concept
 - 2.1 Size and Types of Hotel
 - 2.2 Types of Rooms
 - 2.3 Rate Categories
 - 2.4 Food Plans
 - 2.5 Basis of Charging Room Rates
 - 2.6 Tariff Card

Module – III

- 3.0 Reservation Activities
 - 3.1 Processing of reservation request
 - 3.2 Systems & Tools used

Module – IV

- 4.0 Communicate with customer and colleagues
 - 4.1 Maintain standard of etiquette and hospitable conduct
 - 4.2 Maintain customer-centric service orientation
 - 4.3 Follow gender and age sensitive service practices

Module – V

- 5.0 Personal Care & Safety
 - 5.1 Maintain health and hygiene
 - 5.2 Maintain safety at work place


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Examination Scheme:

Components	Internal Assessment			EE	
	V	LP	A	Th	Pr
Weightage (%)	05	20	05	40	30

V-Viva; LP-Lab Performance; A-Attendance; EE-End Semester Examination

Suggested Readings :

- Front Office Management by Bardi, John Willy and Sons
- Front Office Management by Mr. Sbhal Nagar
- Professional Hotel Front Office Management – Anutosh Bhakta
- Hotel Management by Dr. Jagmohan Negi, Himalaya Publishing House, New Delhi.
- Professional Hotel Management by Dr. JM Negi, S. Chand & Co, New Delhi
- Hospitality Management: Current Trends & Practices by Dr. JM Negi, Amity University Press, New Delhi
- Front Office by Abbott, Butter Worth Hiemann.
- Front Office Manual by Sudhir Andrews, Tata McGraw Hill



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Syllabus - Semester Second

HANDLING RECEPTION

Course Code: VHM2253

Credit Units: 03

Prerequisites : Fundamentals of Front Office Operations(VHM2153)

Course Objective:

At the end of the semester the students will be able to –

- Handle 'On-Arrival' Procedures of a Guest
- Understand & Explain various terminologies used in Hotel reception
- Handle Guest's Queries, Complaints & Requests
- Prepare Guest Bill & Complete the transaction

Course Contents:

Module – I

- 1.0 On-Arrival Procedures
 - 1.1 Receiving, Greeting, Welcoming A Guest
 - 1.2 Assessing The Guest Requirements
 - 1.3 Registration & Rooming Procedure
 - 1.4 Room Change

Module – II

- 2.0 Concept of - Over Booking, Scanty Baggage, Room Position, Cancellation, Amendment, Walk-in Guest, walking a Guest, Black listed Guest

Module – III

- 3.0 Attend to guest queries
 - 3.1 Handling Guest Requests
 - 3.2 Mail Handling Procedures
 - 3.3 Message Handling Procedure - Importance, Procedure, Method of Receiving and Transmitting Messages for Guest, Location Form, Paging Procedure

Module – IV

- 4.0 Checkout & Settlement
 - 4.1 Procedures at Reception, Cash Section, Bell Desk
 - 4.2 Reduction of Late Charges
 - 4.3 Effective Billing & Collection

Module – V

- 5.0 Maintain IPR of organisation and customers



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Examination Scheme:

Components	Internal Assessment			EE	
	V	LP	A	Th	Pr
Weightage (%)	05	20	05	40	30

V-Viva; LP-Lab Performance; A-Attendance; EE-End Semester Examination

Suggested Readings :

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- Front Office Management by Mr. Sbhal Nagar
- Professional Hotel Front Office Management – Anutosh Bhakta
- Hotel Management by Dr. Jagmohan Negi, Himalaya Publishing House, New Delhi.
- Professional Hotel Management by Dr. JM Negi, S. Chand & Co, New Delhi
- Hospitality Management: Current Trends & Practices by Dr. JM Negi, Amity University Press, New Delhi
- Front Office by Abbott, Butter Worth Hiemann.
- Front Office Manual by Sudhir Andrews, Tata McGraw Hill

After successful completion of study of the above Courses (VHM2153&VHM2253), the student becomes eligible to appear for “Qualification Pack: Front Office Associate” (NSQF level - 4) examination under THSC & NSDC by paying fees as applicable.



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Syllabus - Semester Third

CHECK-IN & CHECK-OUT PROCESS

Course Code: VHM2353

Credit Units: 03

Prerequisites : Handling Reception (VHM2253)

Course Objective:

At the end of the semester the students will be able to –

- Understand the importance of Communication
- Deal with special situations that may arise during Front Office operations
- Handle Guest complaints
- Guide staffs in handling situations
- Prepare Duty Rota

Course Contents:

Module –I

- 1.0 Front office Communication
 - 2.1 Importance of inter-Departmental Communication
 - 2.2 Types & Methods of Communication

Module – II

- 2.0 Handling of Special Situations Like
 - 2.1 DNS, DNA, RNA, NI (No information)
 - 2.2 Scanty Baggage Guest
 - 2.3 Refusing Accommodation
 - 2.3.1 Black Listed Guest
 - 2.3.2 Walking A Guest

Module – III

- 3.0 Assist guest in check-in and checkout process –‘Express Check-Out’&‘Self Check-Out’

Module – IV

- 4.0 Handling guest complaints and guide front office staff – Staff Organisation, Duty Rotas& Work Schedule

Module – V

- 5.0 Front Office related terms

Examination Scheme:

Components	Internal Assessment			EE	
	V	LP	A	Th	Pr
Weightage (%)	05	20	05	40	30

V-Viva; LP-Lab Performance; A-Attendance; EE-End Semester Examination

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Suggested Readings :

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- Hospitality Management: Current Trends & Practices by Dr. JM Negi, Amity University Press, New Delhi
- Front Office by Abbott, Butter Worth Hiemann.
- Front Office Manual by Sudhir Andrews, Tata McGraw Hill

After successful completion of study of the above Course (VHM2353), the student becomes eligible to appear for “Qualification Pack: Front Office Executive” (NSQF level - 5) examination under THSC & NSDC by paying fees as applicable.



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Syllabus - Semester Fourth

FRONT OFFICE SUPERVISORY SKILLS

Course Code: VHM2453

Credit Units: 03

Prerequisites : Check-in & Check-out Process (VHM2353)

Course Objective:

At the end of the semester the students will be able to –

- Understand need of Guests
- Handle Guests Requests, Complaints, Messages, Mails
- Understand Hotel's Security System
- Perform as per the operating System of the department
- Guide Staffs in dealing with guests

Course Contents:

Module – I

1.0 Communicating with Guests

- 1.1 Handling Guest Requests & Guest Complaints
- 1.2 Message Handling Procedure – Importance, Procedure, Method of Receiving and Transmitting Messages for Guests, Location Form, Paging Procedure
- 1.3 Importance of Handling Mail without Delay, Sorting of Mail

Module – II

2.0 Facilitate a smooth stay for the guests at the hotel

- 2.1 Manual Key Control Procedure
- 2.2 Left Luggage Procedures
- 2.3 Handling of Special Situations Like – VIP / Spat / DG Guests

Module – III

3.0 Hotel / Front office Security System

- 3.1 Methods
- 3.2 Equipment Used
- 3.3 Card Key Control
- 3.4 Emergency Procedures
- 3.5 Management's Role in Security

Module – IV

4.0 Front office Systems

- 4.1 Non-Automated
- 4.2 Semi- Automated
- 4.3 Fully- Automated

Module – V

5.0 Train and supervise front office staffs for –

- 5.1 Receiving, Greeting, Welcoming A Guest
- 5.2 Assessing The Guest Requirements in cases like – FIT, VIP, Group, Foreigner


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Examination Scheme:

Components	Internal Assessment			EE	
	V	LP	A	Th	Pr
Weightage (%)	05	20	05	40	30

V-Viva; LP-Lab Performance; A-Attendance; EE-End Semester Examination

Suggested Readings :

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- Professional Hotel Front Office Management – Anutosh Bhakta
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- Hospitality Management: Current Trends & Practices by Dr. JM Negi, Amity University Press, New Delhi
- Front Office by Abbott, Butter Worth Hiemann.
- Front Office Manual by Sudhir Andrews, Tata McGraw Hill

After successful completion of study of the above Course (VHM2453), the student becomes eligible to appear for “Qualification Pack: Guest Relations Manager” (NSQF level - 6) examination under THSC & NSDC by paying fees as applicable.



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Syllabus - Semester Fifth

FRONT OFFICE YIELD MANAGEMENT

Course Code: VHM2553

Credit Units: 03

Prerequisites : Front Office Supervisory Skills (VHM2453)

Course Objective:

At the end of the semester the students will be able to –

- Explain the concept of Yield Management
- Take measures to maximize yield of the department
- Deal with Staff needs
- Analyze Training needs and arrange Training

Course Contents:

Module –I

1.0 Yield Management

- 1.1 Concept of Yield Management
- 1.2 Capacity Management
- 1.3 Discount Allocation

Module – II

2.0 Measuring Yield

- 2.1 Potential Average SGL / DBL Rate
- 2.2 Multiple Occupancy Percentage
- 2.3 Rate Spread
- 2.4 Potential Average Rate
- 2.5 Room Rate Achievement Factor
- 2.6 Yield Statistic
- 2.7 Equivalent Occupancy
- 2.8 Required Non-Room Revenue Per Guest

Module – III

3.0 Elements of Yield Management

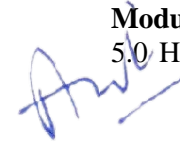
- 3.1 Group Room Sales
- 3.2 Transient Room Sales
- 3.3 Food & Beverage Activity
- 3.4 Special Events

Module – IV

4.0 Application of Yield Management Concepts

Module – V

5.0 Human Relations Management


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Examination Scheme:

Components	Internal Assessment				EE
	V	H	CT	A	Th
Weightage (%)	05	05	15	05	70

V-Viva; H-Home Assignment; CT-Class Test; A-Attendance; EE-End Semester Examination

Suggested Readings :

- Front Office Management by Bardi, John Willy and Sons
- Front Office Management by Mr. Sbhal Nagar
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- Hotel Management by Dr. Jagmohan Negi, Himalaya Publishing House, New Delhi.
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Syllabus - Semester Sixth

MANAGING FRONT OFFICE

Course Code: VHM2653

Credit Units: 03

Prerequisites : Front Office Yield Management (VHM2553)

Course Objective:

At the end of the semester the students will be able to –

- Explain the various types of Meals
- Define & explain the concept of Menu
- Classify various methods of Service
- Calculate bill for meals & Handle payment made by the guests
- Deal with different types of guests in different situations
- Maintain hygiene and safety at workplace

Course Contents:

Module – I

- 1.0 Planning & Operations
 - 1.1 Plan and control day to day front office activities
 - 1.2 Assist in managing the front office operation
 - 1.3 Manage the front office staffing process

Module – II


- 2.0 Establishing Room Rates
 - 2.1 Market Condition Approach
 - 2.2 Rule-of-Thumb Approach
 - 2.3 Hubbart Formula

Module – III

- 3.0 Forecasting Room Availability
 - 3.1 Forecasting Data
 - 3.2 Percentage of No-Shows
 - 3.3 Percentage of Walk-Ins
 - 3.4 Percentage of Over-stays
 - 3.5 Percentage of Under-stays
 - 3.6 ARR (Average Room Rate)
 - 3.7 RevPAR (Revenue Per Available Room)
 - 3.8 Forecast Formula
 - 3.9 Room Count Considerations

Module – IV

- 4.0 Budgeting for Operations
 - 4.1 Forecasting Rooms Revenue
 - 4.2 Estimating Expenses


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Module – V

5.0 Evaluating Front Office Operations

- 5.1 Daily Operations Report
- 5.2 Occupancy Ratios
- 5.3 Rooms Revenue Analysis
- 5.4 Operating Ratios
- 5.5 Rooms Division Income Statement & Budget Reports

Examination Scheme:

Components	Internal Assessment				EE
	V	H	CT	A	Th
Weightage (%)	05	05	15	05	70

V-Viva; H-Home Assignment; CT-Class Test; A-Attendance; EE-End Semester Examination

Suggested Readings:

- Front Office Management by Bardi, John Willy and Sons
- Front Office Management by Mr. Sbhal Nagar
- Professional Hotel Front Office Management – Anutosh Bhakta
- Hotel Management by Dr. Jagmohan Negi, Himalaya Publishing House, New Delhi.
- Professional Hotel Management by Dr. JM Negi, S. Chand & Co, New Delhi
- Hospitality Management: Current Trends & Practices by Dr. JM Negi, Amity University Press, New Delhi
- Front Office by Abbott, Butter Worth Hiemann.
- Front Office Manual by Sudhir Andrews, Tata McGraw Hill

After successful completion of study of the above Courses (VHM2553&VHM2653), the student becomes eligible to appear for “Qualification Pack: Duty Manager” (NSQF level - 7) examination under THSC & NSDC by paying fees as applicable.



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HOUSEKEEPING FUNCTIONS

(Skill Track)

Programme Structure

Course Code	Course Title	Lectures (L) Hours per week	Tutorial (T) Hours per week	Practical (P) Hours per week	Total Credits
VHM2154	Basics of Housekeeping	1	-	4	3
VHM2254	Rules for Cleaning	1	-	4	3
VHM2354	Laundry Operations	1	-	4	3
VHM2454	Maintaining Guest Room	1	-	4	3
VHM2554	Housekeeping Supervisory Skills	1	-	4	3
VHM2654	Housekeeping Management Skills	3	-	-	3
	TOTAL				18



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HOUSEKEEPING FUNCTIONS

Syllabus - Semester First

BASICS OF HOUSEKEEPING

Course Code: VHM2154

Credit Units: 03

Prerequisites : 10+2

Course Objective:

At the end of the semester the students would have a thorough knowledge of:

- Organization of Housekeeping department and its basic functioning
- All agents and equipment used for cleaning of all possible surfaces

Course Contents:

Module –I

- 1.0 Housekeeping Department in Hospitality Industry
 - 1.1 Role of Housekeeping in Guest satisfaction and repeat Business
 - 1.2 Organizational Structure of Housekeeping Department for: Small Hotel, Medium Hotel, Large Hotel
 - 1.3 Layout of the Housekeeping Department

Module –II

- 2.0 Cleaning Equipment
 - 2.1 General Consideration for Selection
 - 2.2 Classification & Types of Equipments
 - 2.3 Method of Use and Mechanism for Each Type
 - 2.4 Care and Maintenance

Module – III

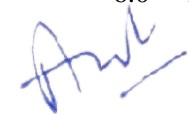
- 3.0 Cleaning Agents
 - 3.1 Classification
 - 3.2 General Criteria for Selection
 - 3.3 Use, Care & Storage
 - 3.4 Distribution & Control

Module – IV

- 4.0 Care and Cleaning of Different Surface
 - 4.1 Metals, Glass, Ceramics, Wood, Wall finishes, Floor finishes, Floor Coverings

Module – V

- 5.0 Communicate with customer and colleagues
- 6.0 Maintain safety at workplace



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Examination Scheme:

Components	Internal Assessment			EE	
	V	LP	A	Th	Pr
Weightage (%)	05	20	05	40	30

V-Viva; LP-Lab Performance; A-Attendance; EE-End Semester Examination

Suggested Readings :

- Professional Management of Housekeeping Operation by Robert J. Martin
- Hotel, Hostel & Hospital Housekeeping by John C. Branson & Margaret Lennox
- Housekeeping Management by Keppa Margret M
- Hospitality Management: Current Trends & Practices by Dr. JM Negi, Amity University Press, New Delhi
- Accommodation Management by Roy C
- Hotel Housekeeping Training Manual by Sudhir Andrew
- Professional House Keeping by Madlin Tucker



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Syllabus - Semester Second

RULES FOR CLEANING

Course Code: VHM2254

Credit Units: 03

Prerequisites : Basics of Housekeeping (VHM2154)

Course Objective:

At the end of the semester the students would have a thorough knowledge of:

- Cleaning Methods & Schedules
- Pests & their control
- Customer-Centric Service
- Maintaining Etiquette & Hygiene

Course Contents:

Module – I

- 1.0 Introduction to Cleaning
 - 1.1 Rules & methods of cleaning
 - 1.2 Organizing cleaning schedules
 - 1.3 Frequency of cleaning daily, periodic, special

Module – II

- 2.0 Pests found in the hotel and their control.

Module – III

- 3.0 Maintain customer-centric service orientation
- 4.0 Follow gender and age sensitive service practices (FM)

Module – IV

- 5.0 Maintain standard of etiquette and hospitable conduct
- 6.0 Maintain health and hygiene

Module – V

- 7.0 Maintain IPR of organisation and customer

Examination Scheme:

Components	Internal Assessment			EE	
	V	LP	A	Th	Pr
Weightage (%)	05	20	05	40	30

V-Viva; LP-Lab Performance; A-Attendance; EE-End Semester Examination

Suggested Readings :

- Professional Management of Housekeeping Operation by Robert J. Martin
- Hotel, Hostel & Hospital Housekeeping by John C. Branson & Margaret Lennox
- Housekeeping Management by Keppa Margret M

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- Hospitality Management: Current Trends & Practices by Dr. JM Negi, Amity University Press, New Delhi
- Accommodation Management by Roy C
- Hotel Housekeeping Training Manual by Sudhir Andrew
- Professional House Keeping by Madlin Tucker

After successful completion of study of the above Courses (VHM2154&VHM2254), the student becomes eligible to appear for “Qualification Pack: Cleaner – Carpet and Chair / Surface Polisher” (NSQF level - 4) examination under THSC & NSDC by paying fees as applicable.



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Syllabus - Semester Third

LAUNDRY OPERATIONS

Course Code: VHM2354

Credit Units: 03

Prerequisites : Rules for Cleaning (VHM2254)

Course Objective:

At the end of the semester the students would have a thorough knowledge of:

Fibre & Fabrics
Laundry Operations
Stain Removal

Course Contents:

Module – I

- 1.0 Fibres & Fabrics
 - 1.1 Definition of Fibre
 - 1.1 Classification of Fibre - The Origin, Characteristics & Usage in the Hotel, Care & Cleaning

Module – II

- 2.0 Laundry in Hotel
 - 2.1 Duties & Responsibilities of Laundry Staff (Laundry Manager and Shift-In-Leader, Dry Cleaning, Supervisor, Spotter cum Presser, Laundry Clerk, Attendants Valet Runner, Laundry)
 - 2.2 Importance and Principles of Laundry Operations
 - 2.3 Equipment, Layout & Planning & Laundry (Basic Rules)

Module – III

- 3.0 Laundry Work Flow
 - 3.1 Flow Process of industrial Laundering [Collection, Transportation Arrivals, Sorting, Weighing, Loading, Washing, Rinsing, Starching, Hydro-Extraction, Drying, Unloading, Tumbling, Finishing (Calender / Steam Press) Folding, & Storing Transfer & Use]
 - 3.2 Stages in Wash Cycle (Flush-Suds-Bleach Rinse-Sour & Soft-Extract, Break & Soaking)

Module – IV

- 4.0 Laundry Cleaning Agents
 - 4.1 Role of Laundry Agents
 - 4.2 Classification of Laundry Agents (Synthetic, Detergent, Built Soap Detergents, Enzyme Action- Detergents, Explain Briefly)

Module – V

- 5.0 Stain Removal
 - 5.1 Special Equipment & Agents
 - 5.2 Process of Stain Removal



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Examination Scheme:

Components	Internal Assessment			EE	
	V	LP	A	Th	Pr
Weightage (%)	05	20	05	40	30

V-Viva; LP-Lab Performance; A-Attendance; EE-End Semester Examination

Suggested Readings :

- Professional Management of Housekeeping Operation by Robert J. Martin
- Hotel, Hostel & Hospital Housekeeping by John C. Branson & Margaret Lennox
- Housekeeping Management by Keppa Margret M
- Hospitality Management: Current Trends & Practices by Dr. JM Negi, Amity University Press, New Delhi
- Accommodation Management by Roy C
- Hotel Housekeeping Training Manual by Sudhir Andrew
- Professional House Keeping by Madlin Tucker

After successful completion of study of the above Course (VHM2354), the student becomes eligible to appear for “Qualification Pack: Laundry Machine Operator” (NSQF level - 5) examination under THSC & NSDC by paying fees as applicable.



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Syllabus - Semester Fourth

MAINTAINING GUEST ROOM

Course Code: VHM2454

Credit Units: 03

Prerequisites : Laundry Operations (VHM2354)

Course Objective:

At the end of the semester the students would have a thorough knowledge of:

- Guest Room of a Hotel
- Cleaning of Guest Room
- Bed Making
- Use of Guest Room Supplies
- Waste Disposal
- Room inspection & Report documentation

Course Contents:

Module – I

- 1.0 Guest Room
 - 1.1 Types of Rooms
 - 1.2 Room layouts and what are constitutes in a guest room

Module – II

- 2.0 Guestroom Cleaning
 - 2.1 Stacking of Chambers Maid Trolley
 - 2.2 Pre – Preparation
 - 2.3 Entering the guestroom
 - 2.4 Bed Making
 - 2.5 Bathroom Cleaning
 - 2.6 Second Service
 - 2.7 Turndown Service

Module – III

- 3.0 Identifying Guest Supplies

Module – IV

- 4.0 Conduct periodic deep cleaning
- 5.0 Collect and dispose waste properly

Module – V

- 6.0 Guest Room inspection
- 7.0 Report, record and prepare documentation



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Examination Scheme:

Components	Internal Assessment			EE	
	V	LP	A	Th	Pr
Weightage (%)	05	20	05	40	30

V-Viva; LP-Lab Performance; A-Attendance; EE-End Semester Examination

Suggested Readings :

- Professional Management of Housekeeping Operation by Robert J. Martin
- Hotel, Hostel & Hospital Housekeeping by John C. Branson & Margaret Lennox
- Housekeeping Management by Keppa Margret M
- Hospitality Management: Current Trends & Practices by Dr. JM Negi, Amity University Press, New Delhi
- Accommodation Management by Roy C
- Hotel Housekeeping Training Manual by Sudhir Andrew
- Professional House Keeping by Madlin Tucker

After successful completion of study of the above Course (VHM2454), the student becomes eligible to appear for “Qualification Pack: Room Attendant” (NSQF level - 4) examination under THSC & NSDC by paying fees as applicable.



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Syllabus - Semester Fifth

HOUSEKEEPING SUPERVISORY SKILLS

Course Code: VHM2554

Credit Units: 03

Prerequisites : Maintaining Guest Room (VHM2454)

Course Objective:

At the end of the semester the students would have a thorough knowledge of:

- Safety & Security measures in the organization
- Planning & Supervising Housekeeping work schedule
- Monitoring performance & designing training needs
- Prepare documented record & reports

Course Contents:

Module – I

- 1.0 Safety and Security
 - 1.1 Fire Prevention
 - 1.2 Accident Prevention
 - 1.3 First Aid
 - 1.4 Crime Prevention
 - 1.5 Dealing with Emergencies

Module – I

- 2.0 Plan and prepare for housekeeping services
 - 2.1 Periodical Cleaning schedule
 - 2.2 Special Cleaning schedule

Module – II

- 3.0 Supervise and monitor housekeeping services
 - 3.1 Inspection & Checking

Module – III

- 4.0 Support individual and team performance
 - 4.1 Analysis performance & Arrange Training if required

Module – IV

- 5.0 Record and prepare documentation
- 6.0 Report submission

Examination Scheme:

Components	Internal Assessment			EE	
	V	LP	A	Th	Pr
Weightage (%)	05	20	05	40	30

V-Viva; LP-Lab Performance; A-Attendance; EE-End Semester Examination

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Suggested Readings :

- Professional Management of Housekeeping Operation by Robert J. Martin
- Hotel, Hostel & Hospital Housekeeping by John C. Branson & Margaret Lennox
- Housekeeping Management by Keppa Margret M
- Hospitality Management: Current Trends & Practices by Dr. JM Negi, Amity University Press, New Delhi
- Accommodation Management by Roy C
- Hotel Housekeeping Training Manual by Sudhir Andrew
- Professional House Keeping by Madlin Tucker

After successful completion of study of the above Courses (VHM2554), the student becomes eligible to appear for “Qualification Pack: Housekeeping Supervisor” (NSQF level - 6) examination under THSC & NSDC by paying fees as applicable.



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Syllabus - Semester Sixth

HOUSEKEEPING MANAGEMENT SKILLS

Course Code: VHM2654

Credit Units: 03

Prerequisites : Housekeeping Supervisory Skills (VHM2554)

Course Objective:

At the end of the semester the students would have a thorough knowledge of:

Housekeeping Contract Cleaning

Interior Decoration

Planning & use of Resources in Housekeeping department

Overall control of the department

Course Contents:

Module – I

1.0 Contract Cleaning

1.1 Types of Contract Cleaning

1.2 Methods of Pricing of Contract Cleaning

1.3 Advantages and Disadvantages of Contract Cleaning

1.4 Eco-Friendly Process

Module – II

2.0 Interior Decoration

2.1 Colours

2.2 Lighting

2.3 Furniture

2.4 Floor Finishes

2.5 Carpets

2.6 Wall Coverings

2.7 Windows

2.8 Guestroom Accessories

Module – III

3.0 Plan effectively the activities of housekeeping department

Module – IV

4.0 Perform staffing and organizing of housekeeping department

Module – V

5.0 Control the activities of housekeeping department


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Examination Scheme:

Components	Internal Assessment				EE
	V	H	CT	A	Th
Weightage (%)	05	05	15	05	70

V-Viva; H-Home Assignment; CT-Class Test; A-Attendance; EE-End Semester Examination

Suggested Readings :

- Professional Management of Housekeeping Operation by Robert J. Martin
- Hotel, Hostel & Hospital Housekeeping by John C. Branson & Margaret Lennox
- Housekeeping Management by Keppa Margret M
- Hospitality Management: Current Trends & Practices by Dr. JM Negi, Amity University Press, New Delhi
- Accommodation Management by Roy C
- Hotel Housekeeping Training Manual by Sudhir Andrew
- Professional House Keeping by Madlin Tucker

After successful completion of study of the above Courses (VHM2654), the student becomes eligible to appear for “Qualification Pack: Housekeeping Manager” (NSQF level - 7) examination under THSC & NSDC by paying fees as applicable.



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TOURISM OPERATIONS

(Skill Track)

Programme Structure

Course Code	Course Title	Lectures (L) Hours per week	Tutorial (T) Hours per week	Practical (P) Hours per week	Total Credits
VTM2151	Fundamentals of Tourism	2	1	-	3
VTM2251	Tour Operations & Tourist Guidance	2	1	-	3
VTM2351	Handling Travel Agency	2	1	-	3
VTM2451	Coordinating Tour Transportations	2	1	-	3
VTM2551	Tourism Management	2	1	-	3
VTM2651	Event Planning	2	1	-	3
	TOTAL				18



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TOURISM OPERATIONS

Syllabus - Semester First

FUNDAMENTALS OF TOURISM

Course Code: VTM2151

Credit Units: 03

Prerequisites : 10+2

Course Objective:

At the end of the semester the students would have a thorough knowledge of:

History of Tourism

Forms & Types of Tourism

Tourist Attractions & facilities

Course Contents:

Module –I

- 1.0 Introduction to Tourism
 - 1.1 Origin, Growth & Development of Tourism
 - 1.2 Early History
 - 1.3 Development of Tourism
 - 1.4 Forms & Types of Tourism

Module –II

- 2.0 Tourist Attractions & facilities
 - 2.1 Tourism Accommodation & Accessibility
 - 2.2 Geographical Resources for Tourism
 - 2.3 Tourism Potential
 - 2.4 Various Tourist Attractions of India

Module –III


- 3.0 Coordinate with travel partners
- 4.0 Engage with tourists
- 5.0 Communicate with customer and colleagues

Module –IV

- 6.0 Guide the tourists at heritage sites
- 7.0 Maintain customer-centric service orientation

Module – V

- 8.0 Maintain standard of etiquette and hospitable conduct
- 9.0 Follow gender and age sensitive service practices
- 10.0 Maintain health and hygiene


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Examination Scheme:

Components	Internal Assessment				EE
	V	H	CT	A	Th
Weightage (%)	05	05	15	05	70

V-Viva; H-Home Assignment; CT-Class Test; A-Attendance; EE-End Semester Examination

Suggested Readings:

- Pran Seth: Successful tourism Management (Vol. 1 & 2)
- Anand, M.M., Tourism and hotel Industry in India, Prentice Hall, New Delhi, 1976
- Bhatia, A. K., International Tourism, Sterling Publishers, New Delhi
- Bhatia, A. K., Tourism development: Principles, Practices and Philosophies, Sterling Publishers, New Delhi
- McIntosh, Robert, W. Goldner, Charles, Tourism: Principles, Practices and Philosophies, John Wiley and Sons Inc. New York, 1990 (9th edition)
- Mill, Robert Christie and Alastair M. Morrison, The Tourism System, Englewood Cliffs, N.J., Prentice Hall, 1985
- Negi, J.M.S., Tourism and Travel- Concepts and principles, Gitanjali Publishing House, New Delhi, 1990
- Robinson, H.A., Geography of Tourism, Me Donald and Evans, London, 1976

After successful completion of study of the above Course (VTM2151), the student becomes eligible to appear for “Qualification Pack: Heritage Tour Guide” (NSQF level - 4) examination under THSC & NSDC by paying fees as applicable.



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Syllabus - Semester Second

TOUR OPERATIONS & TOURIST GUIDANCE

Course Code: VTM2251

Credit Units: 03

Prerequisites : Fundamentals of Tourism (VTM2151)

Course Objective:

At the end of the semester the students would have a thorough knowledge of:

- Various forms of Tourism
- Effective communication with Tourists
- Guiding Tourists

Course Contents:

Module – I

- 1.0 Guide tourists at religious destinations
- 2.0 Guide tourists during culture tours

Module – II

- 3.0 Guide tourists at nature/eco/rural spots
- 4.0 Guide tourists during gastronomy tours

Module – III

- 5.0 Guide tourists in leisure and recreation tours
- 6.0 Guide tourists in cruise

Module – IV

- 7.0 Guide tourists for sporting events
- 8.0 Guide tourist on desert tours

Module – V

- 9.0 Guide tourist on wellness and medical tours

Examination Scheme:

Components	Internal Assessment				EE
	V	H	CT	A	Th
Weightage (%)	05	05	15	05	70

V-Viva; H-Home Assignment; CT-Class Test; A-Attendance; EE-End Semester Examination

Suggested Readings:

- Pran Seth: Successful tourism Management (Vol. 1 & 2)
- Anand, M.M., Tourism and hotel Industry in India, Prentice Hall, New Delhi, 1976
- Bhatia, A. K., International Tourism, Sterling Publishers, New Delhi
- Bhatia, A. K., Tourism development: Principles, Practices and Philosophies, Sterling Publishers, New Delhi
- McIntosh, Robert, W. Goldner, Charles, Tourism: Principles, Practices and Philosophies, John Wiley and Sons Inc. New York, 1990 (9th edition)

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- Mill, Robert Christie and Alastair M. Morrison, The Tourism System, Englewood Cliffs, N.J., Prentice Hall, 1985
- Negi, J.M.S., Tourism and Travel- Concepts and principles, Gitanjali Publishing House, New Delhi, 1990
- Robinson, H.A., Geography of Tourism, Me Donald and Evans, London, 1976

After successful completion of study of the above Courses (VTM2251), the student becomes eligible to appear for “Qualification Pack: Tour Guide” (NSQF level - 4) examination under THSC & NSDC by paying fees as applicable.



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Syllabus - Semester Third

HANDLING TRAVEL AGENCY

Course Code: VTM2351

Credit Units: 03

Prerequisites : Tour Operations & Tourist Guidance (VTM2251)

Course Objective:

At the end of the semester the students would have a thorough knowledge of:

- Tour Package
- Planning of Tour Package
- Designing Tour Packages

Course Contents:

Module –I

1.0 Tour Package - Meaning, Type of Tour Package & its Components

Module – II

2.0 Planning of Tour Package

- 2.1 Designing and Process of Tour Package
- 2.2 Engage with customer to understand their tour packaging requirements
- 2.3 Plan travel itinerary as per customer's requirement
- 2.4 Factor Affecting Tour Package
- 2.5 Arrange tour package in coordination with service providers and partners

Module – III

3.0 Designing Tour Packages

- 3.1 Cultural Tourism Product: Designing, Development, Issues and Considerations
- 3.2 Heritage Tourism Product: Designing, Development, Issues and Considerations
- 3.3 Religious Tourism Product: Designing, Development, Issues and Considerations

Module – IV

4.0 Designing Tour Packages

- 4.1 Adventure Tourism Product: Designing, Development, Issues and Considerations
- 4.2 Medical Tourism Product: Designing, Development, Issues and Considerations

Module – V

5.0 Destination Management

- 5.1 Meaning, Factor of Consideration to choose Destination Management Handling Company
- 5.2 Monitor the tour progress
- 5.3 Maintain IPR of organisation and customer

Examination Scheme:

Components	Internal Assessment				EE
	V	H	CT	A	Th
Weightage (%)	05	05	15	05	70

V-Viva; H-Home Assignment; CT-Class Test; A-Attendance; EE-End Semester Examination

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Suggested Readings:

- Pran Seth: Successful tourism Management (Vol. 1 & 2)
- Anand, M.M., Tourism and hotel Industry in India, Prentice Hall, New Delhi, 1976
- Bhatia, A. K., International Tourism, Sterling Publishers, New Delhi
- Bhatia, A. K., Tourism development: Principles, Practices and Philosophies, Sterling Publishers, New Delhi
- McIntosh, Robert, W. Goldner, Charles, Tourism: Principles, Practices and Philosophies, John Wiley and Sons Inc. New York, 1990 (9th edition)
- Mill, Robert Christie and Alastair M. Morrison, The Tourism System, Englewood Cliffs, N.J., Prentice Hall, 1985
- Negi, J.M.S., Tourism and Travel- Concepts and principles, Gitanjali Publishing House, New Delhi, 1990
- Robinson, H.A., Geography of Tourism, Me Donald and Evans, London, 1976

After successful completion of study of the above Course (VTM2351), the student becomes eligible to appear for “Qualification Pack: Travel Consultant” (NSQF level - 4) examination under THSC & NSDC by paying fees as applicable.



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Syllabus - Semester Fourth

COORDINATING TOUR TRANSPORTATIONS

Course Code: VTM2451

Credit Units: 03

Prerequisites : Handling Travel Agency (VTM2351)

Course Objective:

At the end of the semester the students would have a thorough knowledge of:

Transport System

Transport Schedule & Arrangement for tourists

Course Contents:

Module – I

1.0 Modes of Transport

1.1 Road ways

1.2 Railways

1.3 Air ways

1.4 Water ways

Module – II

2.0 Types of transport operator

2.1 Public & Private

2.2 Domestic & International

Module – III

3.0 Transport Schedule

3.1 Travel Time

3.2 Preparation of itinerary

Module – IV

4.0 Interact with the customers or tourists

5.0 Arrange for the travel

Module – V

6.0 Follow up with customer or tourist

Examination Scheme:

Components	Internal Assessment				EE
	V	H	CT	A	Th
Weightage (%)	05	05	15	05	70

V-Viva; H-Home Assignment; CT-Class Test; A-Attendance; EE-End Semester Examination


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Suggested Readings:

- Pran Seth: Successful tourism Management (Vol. 1 & 2)
- Anand, M.M., Tourism and hotel Industry in India, Prentice Hall, New Delhi, 1976
- Bhatia, A. K., International Tourism, Sterling Publishers, New Delhi
- Bhatia, A. K., Tourism development: Principles, Practices and Philosophies, Sterling Publishers, New Delhi
- McIntosh, Robert, W. Goldner, Charles, Tourism: Principles, Practices and Philosophies, John Wiley and Sons Inc. New York, 1990 (9th edition)
- Mill, Robert Christie and Alastair M. Morrison, The Tourism System, Englewood Cliffs, N.J., Prentice Hall, 1985
- Negi, J.M.S., Tourism and Travel- Concepts and principles, Gitanjali Publishing House, New Delhi, 1990
- Robinson, H.A., Geography of Tourism, Me Donald and Evans, London, 1976

After successful completion of study of the above Course (VTM2451), the student becomes eligible to appear for “Qualification Pack: Transport Coordinator” (NSQF level - 5) examination under THSC & NSDC by paying fees as applicable.



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Syllabus - Semester Fifth

TOURISM MANAGEMENT

Course Code: VTM2551

Credit Units: 03

Prerequisites : Coordinating Tour Transportations (VTM2451)

Course Objective:

At the end of the semester the students would have a thorough knowledge of:

- Motivation of Travel and Tourism
- Significance of Travel and Tourism
- Growth factors of Tourism& its barriers
- Eco-Tourism

Course Contents:

Module –I

1.0 Motivation of Travel and Tourism

- 1.1 Physical Motivations: Travel for Sports and Adventure, Rest and Relaxation, Health and Medical Reasons etc.
- 1.2 Cultural Motivations: Pilgrimage Tourism, Cultural Curiosity, Religious etc.
- 1.3 Interpersonal Motivation: Meeting New People, VFR, etc
- 1.4 Status and Prestige Motivation
- 1.5 Business Motivation

Module – II

2.0 Significance of Travel and Tourism

- 2.1 The Economic, Social and Cultural Significance of Tourism

Module – III

3.0 Growthfactors of Tourism

- 3.1 Technology and Destination Development
- 3.2 Changing Social Patterns
- 3.3 Changing Living Standards

Module –IV

4.0 Barriers to the Growth of Tourism

- 4.1 Factors Existing at the Destination: Terrorism, & Political and Social Environment
- 4.2 Factors Barring a Potential Tourist from Traveling: Time, Cost, and Social Barriers.

Module – V

5.0 Eco-Tourism Planning and development strategies

- 5.1 Eco-Tourism Strategies with Special Reference to Environmental Protection (Environmental Impact Analysis)



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Examination Scheme:

Components	Internal Assessment				EE
	V	H	CT	A	Th
Weightage (%)	05	05	15	05	70

V-Viva; H-Home Assignment; CT-Class Test; A-Attendance; EE-End Semester Examination

Suggested Readings:

- Pran Seth: Successful tourism Management (Vol. 1 & 2)
- Anand, M.M., Tourism and hotel Industry in India, Prentice Hall, New Delhi, 1976
- Bhatia, A. K., International Tourism, Sterling Publishers, New Delhi
- Bhatia, A. K., Tourism development: Principles, Practices and Philosophies, Sterling Publishers, New Delhi
- McIntosh, Robert, W. Goldner, Charles, Tourism: Principles, Practices and Philosophies, John Wiley and Sons Inc. New York, 1990 (9th edition)
- Mill, Robert Christie and Alastair M. Morrison, The Tourism System, Englewood Cliffs, N.J., Prentice Hall, 1985
- Negi, J.M.S., Tourism and Travel- Concepts and principles, Gitanjali Publishing House, New Delhi, 1990
- Robinson, H.A., Geography of Tourism, Me Donald and Evans, London, 1976



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Syllabus - Semester Sixth

EVENT PLANNING

Course Code: VTM2651

Credit Units: 03

Prerequisites : Tourism Management (VTM2551)

Course Objective:

At the end of the semester the students would have a thorough knowledge of:

- Concept of MICE
- Marketing MICE
- Planning MICE
- Staging MICE

Course Contents:

Module – I

1.0 Introduction to Concept of MICE

- 1.1 Types of Events- meetings, incentives, conference/conventions, and exhibitions
- 1.2 Size of Events
- 1.3 The Event Team
- 1.4 Code of Ethics
- 1.5 The impact of conventions on local and national communities.

Module – II

2.0 Map the customer requirement

- 2.1 Visualise the need
- 2.2 Guide the customer
- 2.3 Estimate the budget

Module – III

3.0 Concept and Design

- 3.1 Developing The Concept
- 3.2 Analysing The Concept
- 3.3 Designing The Event
- 3.4 Logistics of The Concept

Module – IV


4.0 Marketing of Event

- 4.1 Nature of Event Marketing
- 4.2 Process of Event Marketing
- 4.3 The Marketing Mix
- 4.4 Sponsorship

Module – V

5.0 Staging The Event

- 5.1 Choosing The Event Site
- 5.2 Developing The Theme
- 5.3 Providing Services
- 5.4 Managing The Environment


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Examination Scheme:

Components	Internal Assessment				EE
	V	H	CT	A	Th
Weightage (%)	05	05	15	05	70

V-Viva; H-Home Assignment; CT-Class Test; A-Attendance; EE-End Semester Examination

Suggested Reading :

- Behind The Scenes at Special Events - by Lena Malouf
- Global Meetings & Exhibitions, - by Krugman, John Wiley & Sons
- How to Plan Exhibitions & Conferences From A to Z, Sam Black
- Special Events : Event Leadership for a New World, Goldblatt

After successful completion of study of the above Courses (VTM2551&VTM2651), the student becomes eligible to appear for “Qualification Pack: Meeting, Conference and Event Planner” (NSQF level - 5) examination under THSC & NSDC by paying fees as applicable.



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Curriculum & Scheme of Examination

2022

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LEGAL METHOD

Course Code: LAW2104

Credit Units: 04

Course Objective:

This paper focuses on orientation of students to legal studies from the point of view of basic concepts of law and legal system.

Course Contents:

Module I: Meaning and Classification of Laws

Meaning, Definition, Functions: Justice, Stability and Peaceful Change; Classification of laws: Public and Private Law, Substantive and Procedural Law, Municipal and International Law.

Module II: Sources of Law

Custom; Precedent, Ratio, Obiter; Legislation

Module III: Basic Concepts of Indian Legal System

Common Law, Essentials of a Valid Law, Constitution as the Basic Law, Rule of Law, Separation of Powers, Judicial system in India, **Principles of Equity**.

Module IV: Legal Writing and Research

Legal materials: Case law, Statutes, Reports, Journals, Manuals, Digests etc.; Importance of legal research ; Techniques of Legal Research : Doctrinal, Empirical Research, Legal writings and citations.

Examination Scheme:

Components	P/S/V	CT	A	C	EE
Weightage (%)	10	10	5	5	70

Text & References:

- Glanville Willains – Learning the law
- Avtar Singh – Jurisprudence (Legal Theory)
- B.N.M. Tripathi – An Introduction to Jurisprudence and Legal theory
- Benjamin N. Cardozo, The Nature of Judicial Process
- LI Publication – Indian Legal System
- ILI Publication in Legal Research and Methodology


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LAW OF CONTRACT-I

Course Code: LAW2105

Credit Units: 04

Course Objective:

Whatever may be the nature of a given society, the contractual relations, as are obtained in that society, are governed by certain principles which are more or less of a general and basic nature. In India these general principles are included in the statute of the Indian Contract Act. 1872. This course is designed to acquaint a student with the conceptual and operational parameters of these various general principles of contractual relations. Specific enforcement of contract is an important aspect of the law of contracts. Analysis of the kinds of contracts that can be specifically enforced and the methods of enforcement forms a significant segment of this study.

Course Contents:

Module I: Formation of Contract

Meaning and nature of contract, Offer / Proposal (Definition, Communication, Revocation, General/Specific offer, Invitation to treat), Acceptance (Definition, Communication, Revocation, Tenders / Auctions). 'E'Contract

Module II: Consideration and Capacity

Consideration (Definition, Essentials, Privity of contract), Capacity to enter into a contract (Minor's position, Nature / effect of minor's agreements).

Module III: Validity of Contract

Unlawful consideration and object, Free Consent, Coercion, undue influence, Misrepresentation, Fraud, Mistake, Contingent contract, Quasi contracts, Effect of void, voidable, valid, illegal, unlawful and uncertain agreements contracts.

Module IV: Discharge and Performance of Contract

Discharge of Contracts, Performance, Time and Place of performance, Impossibility of performance and frustration, Breach – Anticipatory & Present.

Module V: Remedies

Damages, Remoteness etc., Injunction, Specific performance, Quantum Merit.

Module VI: Specific Relief Act, 1963

Recovery of property, Specific performance of contracts, Rescission of Contract, Declaratory Decree, Injunctions: Temporary and Perpetual, Mandatory.

Examination Scheme:

Components	P/S/V	CT	A	C	EE
Weightage (%)	10	10	5	5	70

Text & References:

- Anson - Law of Contract
- Pollock and Mulla - Indian Contract Act
- Avtar Singh - Indian Contract Act
- Bangia - Law of Contract and Specific Relief
- Cheshire and Fifoot - Law of Contract.


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MICRO ECONOMICS-I

Course Code: LAW2106

Credit Units: 04

Course Objective:

This course is designed to expose first –year students, who may be new to economics, the basic principles of microeconomic theory. The emphasis would be on thinking like an economists & the course will illustrate how microeconomic concepts can be applied to analyze real life situations.

Course Contents:

Module I: Exploring the Subject Matter of Economics

Why study economics? The scope and method of economics; scarcity and choice; questions of what, how and for whom to produce and how to distribute output

Module II: Supply and Demand: How Markets Work, Markets and Welfare

Individual demand and supply schedules and the derivation of market demand and supply; shifts in demand and supply curves; the role prices in resource allocation; Elasticity of Demand — price, income and cross; Consumer's surplus

Module III: Consumer's Behavior

Utility-cardinal and ordinal approaches, Indifference curves; budget constraints;. Consumer's equilibrium (Hicks and Slutsky); Giffin goods; Compensated demand; Revealed preference theory; Engel curve.

Module IV: Theory of Production and Costs:

Technology, Isoquants, production with one and more variable inputs, Returns to scale, short run and long run costs, cost curves in the short run and long run, total, average, and marginal product, cost minimization and expansion path, elasticity of substitution.

Examination Scheme:

Components	A	P	HA	CT	EE
Weightage (%)	5	10	5	10	70

(A-Attendance; P-Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination)

Text & References:

Text:

- C. Snyder and W. Nicholson, Fundamentals of Microeconomics, Cengage Learning (India), 2010.
- B. Douglas Bernheim and Michael D. Whinston, Microeconomics, Tata McGraw-Hill (India), 2009
- Ahuja H.L. (2010) Principles of Microeconomics, 18th Edition, S. Chand & Co. Ltd.
- Robert S. Pindyck and D.L. Rubinfeld, (2000), Microeconomics, 3rd edition, Prentice Hall India.
- Ferguson & Gould (1989) Micro Economic Theory, 6th edition, all India Traveller Bookseller.
- Koutsoyiannis, A. (1990), Modern Microeconomics, Macmillan

References:

- N. Gregory Mankiw (2007), Economics: Principles and Applications, 4th edition, India edition by South-Western, a part of Cengage Learning, Cengage Learning India Private
- Karl E. Case and Ray C. Fair (2007), Principles of Economics, 8th edition, Pearson Education Inc., ISBN 81-317-1587-6. (hereafter Case & Fair, 2007, 8e).
- Joseph E. Stiglitz and Carl E. Walsh (2006), Economics, International Student Edition, 4th Edition, W.W. Norton & Company, Inc., New York, ISBN 0-393-92622-2. (hereafter Stiglitz & Walsh, 2006, 4e). Limited, ISBN-13: 978-81-315-0577-9 (hereafter Mankiw, 2007, 4e). M.L. Trivedi (2002) Managerial Economics- Theory & Applications, Tata McGraw Hill
- W.J. Baumol, Economic Theory & Operations Analysis, Prentice Hall.
- Jhingan M.L. (2008) Microeconomic Theory, 4th edition, Konark, Delhi.

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LAW OF CONTRACT-II

Course Code: LAW2204

Credit Units: 04

Course Objective:

This course shall be taught after the students have been familiarized with the general principles of Contract in which the emphasis is on understanding and appreciating the basic essentials of a valid Contract and on the existence of Contractual relationship in various instances. Obviously, Contract Law assumes special significance to suit changes in society. These special Contracts are studied in the light of statutory provisions and decisional Law. With the advent of globalization in various sectors of economy today and are in need of specialized legal Professionals due to huge contractual requirements, joint venture Partnerships and the like, Therefore, this Course of Special Contracts provides an insight into the justification for special statutory provisions for certain kind of Contracts.

Course Contents:

Module I: Indemnity and Guarantee/Bailment and Pledge

Meaning, Distinction between Indemnity and Guarantee, Right / Duties of Indemnifier, Indemnified and Surety, Discharge of Surety, Kinds of Guarantee, Bailment and Pledge: Meaning and Distinction, Rights and Duties of Bailor/Bailee, Pawnor/Pawnee, Lien, Termination of Bailment.

Module II: Agency

Definitions of Agent and Principal, Appointment of an Agent, Authority of an Agent, Creation of agency: by agreement, Ratification and law, Relation of principal / agent, subagent and substituted agent, Ratification of Agents Authority, Revocation of Agency Authority, Effects of Agency on Contracts with third person, Personal Liability of agents, Termination of agency.

Module III: Sale of Goods Act 1930

Contract of Sale: Nature and definition, Conditions and Warranties, Transfer of Property and Title, Performance of the contracts, rights of unpaid seller, suit for breach of contract.

Module IV: The Indian Partnership Act, 1932

Nature of partnership firm, Relations of partners to one another and outsiders, Rights /Duties of partners *inter se*, Partnership Property: Relations of Partners to third parties, Liability for holding out, Minor as a partner; Incoming and outgoing partners, Dissolution of Partnership Firm, Modes of Dissolution, Consequences of dissolution, Registration of firms and effects of non registration.

Examination Scheme:

Components	P/S/V	CT	C	A	EE
Weightage (%)	10	10	5	5	70

Texts & References:

- Pollock and Mulla, Indian Contract Act
- Avtar Singh, Indian Contracts Act
- Mulla, D. F., Indian Partnership Act
- Desai, T.R., Law of Contracts and Partnership sale of good Act
- R.K. Bangia, Sales of Goods Act, 1930
- Avtar Singh, Sales of Good Act
- Avtar Singh, Indian Partnership Act.
- K. Sukumaran, Pollock & Mulla - The Indian Partnership Act


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MICRO ECONOMICS-II

Course Code: LAW2205

Credit Units: 04

Course Objective:

The main objective of the course is to provide a deeper knowledge on some specific field of Microeconomics such as game theory, factor pricing, oligopoly & welfare Economics.

Course Contents:

Module I: Decision theory under Uncertainty: Utility Functions and Expected Utility

Risk aversion and risk preference, insurance and investor's choice.

Asymmetric information- Adverse selection and moral hazard

Module II: Oligopoly

Analysis of Cournot & Stackelberg, Collusive Oligopoly and application of Prisoner's Dilemma of Nash equilibrium

Module III: Market Structure

Review of perfect competition and monopoly; Pricing with market power; price discrimination, peak load pricing, two-part tariff; monopolistic competition and oligopoly.

Module IV: Factor Pricing

Derived demand for a single input and multiple inputs in competitive & imperfect competition markets, firm demand and industry demand, collective bargaining and exploitation rent & quasi rent.

Module V: Welfare Economics

Conditions of Pareto optimality in pure exchange and with production, optimality of perfect competition

Examination Scheme:

Components	A	P	HA	CT	EE
Weightage (%)	5	10	5	10	70

A-Attendance; P-Project; HA-Home Assignment; CT-Class Test; EE-End Semester Examination

Text & References:

Text:

- W.J. Baumol, 'Economic Theory and Operations Analysis' 4th edition, Prentice hall
- Ahuja H.L (2010) Principles of Microeconomics, 18th edition, S.Chand & Co. Ltd.
- Ferguson, 'Microeconomic Theory', Cambridge University Press.

References:

- A K Koutsyanni's, 'Modern Microeconomics', Macmillan.
- L.M.B. Cabral, (2000) Introduction to Industrial Organization, MIT Press.
- P.K. Dutta (1999) Strategies and Games: Theory and Practice, MIT Press.
- Formson & Gould – Microeconomic Theory


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MACRO ECONOMICS-I

Course Code: LAW2302

Credit Units: 04

Course Objective:

The objective of this paper is to make the student to understand how the business organizations work by applying economic principles in their business management. The course will attempt to relate theory to practice and try to instill in students the ability to apply basic microeconomic concepts to the understanding of everyday phenomena.

Course Contents:

Module I: Nature and Methodology of Economics

Definition, Nature of economics, Micro and Macro economics; Basic economic problems, Economic problems, Economic laws and Government laws, Dynamic v. Static; Methodology: Inductive v. Deductive methods; Economics and Law.

Module II: Consumer Behavior and utility analysis

Utility Analysis: law of diminishing marginal utility. Law of equi-marginal utility; Law of demand and supply, Application of demand and supply: Tax floor and ceiling; Elasticity of demand and supply; Marshallian Scissors, Consumer's surplus.

Module III: Theory of Production and Market structure

Factors of Production, Laws of returns, Returns to scale; Forms of entrepreneurial organization; Cost curves and revenue concepts; Market: Meaning and classifications, equilibrium of the firm and industry; Price and output determination under perfect, monopoly, monopolistic competitions, oligopoly and duopoly.

Module IV: Factor Pricing


The General Theory of factor pricing ; Wage determination, exploitation of labour, role of trade unions, Minimum Wage Act ; Theory of Rent, Quasi rent ; Theory of Interest: Classical, Neo Classical and Loanable Fund Theory, Liquidity Preference Theory; Theory of Profit.

Examination Scheme:

Components	P/S/V	CT	C	A	EE
Weightage (%)	10	10	5	5	70

Texts & References:

- I.C. Dhingra, Principles of Microeconomics- Sultan Chand & Sons
- H.L. Ahuja- Microeconomics
- Baumol, W.J. Economic Theory and Operations Analysis, Prentice Hall of India, New Delhi.
- Bach, G.L, Economics, Prentice Hall of India, New Delhi.
- Gould, J.P. and Edward P.L, Microeconomic Theory, Richard, Irwin. Homewood.
- Koutsoyiannis, A, Modern Microeconomics, Macmillan.
- Lipsey, R.G. and K.A. Chrystal, Principles of Economics, Oxford University Press, Oxford.


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CONSTITUTIONAL LAW-I

Course Code: LAW2303

Credit Units: 04

Course Objective:

The course aims at analyzing constitutional institutions, its powers, limitations and interrelationships with one another and seeks to mould a frame of mind in the student to appreciate and assess constitutional policy and changes for the future.

Course Contents:

Module I: Fundamental Rights and Directive Principles, and Fundamental Duties

Idea of Fundamental Rights and their importance, against whom the Fundamental rights are available? Definition of 'State'? Law in Art. 13, Directive Principles; Nature and reasons for incorporation, inter-relationship between fundamental rights and directive principles, judicial policy towards Directive principles from Champakam to Minerva Mills and thereafter, Art. 51-A (K) and its correlation with Art. 21-A.

Module II: Freedom and Personal Liberty

Freedom of speech and expression and of press; Is Right to Information inclusive in Freedom of Speech and Expression? Freedom of Assembly, Freedom of Association, Freedom of Movement, Freedom to reside and settle, Freedom of profession/Business, etc. Art. 19: Are these freedoms absolute? Rights of an accused: Double Jeopardy, Self-incrimination and retrospective punishment, Art. 20; Right to life and personal liberty: Meaning of personal liberty, Procedure established by Law, Before Maneka Gandhi, Maneka Gandhi and thereafter, Art. 21; preventive detention and constitutional safeguards: Art. 22; Right to education Art. 21-A.

Module III: Equality and Protective Discrimination

Equality before Law and equal protection of Laws, meaning, constitutional provisions Arts 14, 15, 16, 17, 29 (2), 325: Total conspectus, Classification for differential treatment, prohibited grounds of discrimination: Arts. 15(1), (2), (3), 16 (2), (3), 29 (2); Protective Discrimination in favour of SC / ST and other backward classes and recent trends eg. Schedule IX and Reservation Policy, Women and children Art. 15, 15(3), 15(4), 15(5) Abolition of titles – Arts. 18.

Module IV: Secularism

Concept of Secularism, Indian Constitutional provisions, Indian concept of Secularism, Freedom of religion, Scope: Arts. 25, 26, Limits of Freedom, Religion and State in India, State Control and non-interference with religion; Minority rights: Why? Scope: Meaning and Minority, Minority right to educational institutions and judicial attitude.

Module V: Judicial Process under the constitution

Judicial Review : Nature of Judicial Review, Arts. 32, 136, 141, 226, 227.

Judges: Appointments, conditions of service, etc; Public Interest Litigation.

Supreme Courts Original and Advisory Jurisdiction.

Examination Scheme:

Components	P/S/V	CT	C	A	EE
Weightage (%)	10	10	5	5	70

Text & References:

- V.N. Shukla, Constitution of India
- M.P. Jain – Indian Constitutional Law.
- H.M. Seervai – Constitutional Law of India.
- Durga Das Basu – Shorter Constitution.
- P.M. Bakshi – Constitution of India.
- J.M. Lalit – Constitution of India..

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LAW OF CRIMES-I (INDIAN PENAL CODE SECTION 1-120B)

Course Code: LAW2304

Credit Units: 04

Course Objective:

Course on Law of Crimes aims at introducing students to the basic principles of criminal law. There has been a progressive as well as regressive change in the Indian society since Independence. A proper understanding of crimes and the causal factors for the occurrence of crime is extremely important in the larger context of India's development, if young law students are to use their knowledge and skills to build a just and humane society. The young law students are the would be lawyers and as such they must have an acquaintance with such knowledge to make criminal justice system serve the goals of social defense as well as social justice. Therefore, a study of the basic concepts of specific offences under the Indian Penal Code is imperative.

Course Contents:

Module-I: Introduction to Substantive Criminal Law: Extent and operation of the Indian Penal Code, Definition of Crime, Fundamental elements of crime, Stages in commission of a crime, Intention, Preparation, Attempt.

Module-II: Punishment: Theories: Deterrent, Retributive, Preventive, Expiatory and Reformative Theory. Punishment under the IPC: Fine, Imprisonment, Capital Punishment.

Module-III: General Explanations and Exceptions: Definitions, Constructive joint liability, Mistake, Judicial and Executive acts, Accident, Necessity, Infancy, Insanity, Intoxication, Consent, Good faith, Private defence

Module-IV: Abetment and Criminal Conspiracy

Examination Scheme:

Components	P/S/V	CT	A	C	EE
Weightage (%)	10	10	5	5	70

Text & References:

- Ratanlal & Dhirajlal – The Indian Penal Code
- K. D. Gaur – A Text Book on Indian Penal Code
- S.N. Misra, Indian Penal Code
- B.M. Gandhi, Indian Penal Code (1996), Eastern, Nagpur.
- P.S. Achutan Pillai, Criminal Law (1995) Eastern, Lucknow.


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FAMILY LAW-I

Course Code: LAW2305

Credit Units: 04

Course Objective:

This Course aims at providing adequate Sociological perspective so that the basic concepts relating to family are expounded in their social setting. It is designed to address the various aspects of Hindu Law and strives to give an overview of some of the current problems arising out of the foundational inequalities in the various family concepts.

Course Contents:

Module I: Introduction (Sources, Schools and Joint Hindu Family)

Sources and Schools of Hindu Law; The Concept, Formation and incidents of Joint Hindu Family of Mitakshara and Dayabhaga; The Coparcenaries : It's formation and various incidents of Joint Hindu Family of Mitakshara and Dayabhaga; Karta of the Joint Family : His position, powers, privileges and obligation.

Module II: Hindu Marriage (Vivah) and Matrimonial Remedies (The Hindu Marriage Act, 1955)

Hindu Marriage: Nature, concept, Essential conditions & Prohibitions; Void & Voidable Marriages; Divorce: Customary and Judicial- Matrimonial fault theory, irretrievable breakdown and of marriage; Option of puberty; Restitution of conjugal rights; Judicial separation.

Module III: Alimony, maintenance, Adoption and Guardianship (The Hindu Adoption and Maintenance Act, 1956 and The Hindu Minority and Guardianship Act, 1956)

Maintenance of neglected wives, divorced wives, minor children, disabled children and parents under sections 125, 127 of Code of Criminal Procedure, 1973; Alimony : Temporary Permanent; Maintenance: Pendente Lite and permanent and maintenance for Divorced Hindu women under The Hindu Adoption and Maintenance Act, 1956; The Hindu Minority and Guardianship Act, 1956,

Module IV: Law of Succession, inheritance and Partition among Hindus (The Hindu Succession Act, 1956)

Property under Mitakshara Law and Dayabhaga: Formation and Incidents; Devolution of interest in Mitakshara Coparcenaries, Coparcenaries with reference to the provisions of Hindu Succession Act, 1956, Succession to property of Hindu female dying intestate under the Hindu Succession Act, 1956, Disqualifications relating to succession; Partition and Re-union.

Module V: Dispositions of Property under Hindu Law

Testamentary Disposition (Will): Definition and basis, Capacity of the Legatee, Formalities of a Will; subject matter of Will, Restrictions on testamentary power of disposition, interpretation of the Will, Revocation of the Will; Disposition inter vivos (Gift).

Examination Scheme:

Components	P/S/V	CT	C	A	EE
Weightage (%)	10	10	5	5	70

Text & References:

- Mulla, D.F., Principles of Hindu Law
- Paras Diwan, Modern Hindu Law
- Mulla, D.F., Principal of Mohammadan Law
- Fyzee, A.A.A., Outlines of Mohammadan Law
- Mahmood, T., Muslim Law of India
- Paras Diwan, Law of Intestate and Testamentary Succession (1998), Universal.


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THE CODE OF CRIMINAL PROCEDURE

Course Code: LAW2311

Credit Units: 04

Course Objective:

In the absence of effective enforcement machinery, the substantive Criminal Law which defines offences and provides punishments for them, would be almost worthless. Therefore, the need of the Code of Criminal Procedure. The present course intends at acquainting the students with the various pre judicial and judicial procedures. This course also includes the rights and duties of those proceeded against and the powers, duties and restraints on those administering the criminal judicial process.

Course Contents:

Module I: Introduction

The importance of Fair Trial - constitutional perspectives of fair trial: Articles 14, 20, 21, Section – 2: Definitions; classes of Criminal Courts: Sections 6 to 13 including their powers and jurisdiction. The organization of Police, Prosecutor, Defense Counsel and Prison Authorities alongwith their duties, functions and powers.

Module II: Pre – Trial processes

FIR, Arrest and Bail provisions, bonds, process to compel appearances and production of things, search and seizure – search warrants, search without warrants, police search during investigations, general principles of search, seizure and constitutional aspects of validity of search and seizure proceedings.

Module III: Charge and common features relating to Trials

Form of Charge, joinder of charges, alteration of charge, basic rule regarding charge and its trial, withdrawal of charges, effect of error in the charge. Language of Courts, decision on evidence partly recorded by one judge or magistrate and partly by another, summary procedure to deal with certain cases of perjury and certain kinds of contempt of court, evidence in inquiries and trials, general provisions as to inquiries and trials, provisions as to accused persons of unsound mind.

Module IV: Criminal Trials and Execution Proceedings

Trial before Court of Sessions, Trial of warrant case by magistrate, Trial of Summons Case, Summary Trial, Judgment, submission of death sentence for confirmation, execution, suspension, remission and commutation of sentences.

Module V: Review Procedures

Appeal, Review and Reference

Module VI: Miscellaneous

Maintenance of wives, children and parents, Transfer of criminal cases, Irregular proceedings, Limitations for taking cognizance, Security for keeping peace and for good behavior, Disputes as regarding immovable property, Probation of Offenders Act

Module VII

Juvenile Justice (Care & Protection of Children) Act 2000. Concept of juvenile delinquency, juvenile court system, treatment and rehabilitation of juveniles, law for protection of juvenile offenders. Juvenile Justice (Care & Protection of Children) Act 2014.

Examination Scheme:

Components	P/S/V	CT	C	A	EE
Weightage (%)	10	10	5	5	70

Text & References:

- Ratan Lal and Dheeraj Lal, Criminal Procedure Code
- D.D. Basu, Criminal Procedure Code

- R.V. Kelkar, Lectures on Criminal Procedure Code

- R.V. Kelkar, Code of Criminal Procedure

- Chandrasekharan Pillai (ed.) Kelkar's Outlines of Criminal Procedure (2001), Eastern, Lucknow

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SUMMER INTERNSHIP EVALUATION-I

Course Code: LAW2335

Credit Units: 03

It is a mode of Clinical Legal education Specified period to be spent by the student with a law firm/court/Commissions/NGO's and like institutions working with the realm of law or connected therewith. The reports both by the student and the office together with diary where applicable to be certified will be submitted for evaluation

The Internship during the summer break is a compulsory course. There is a Internship Data form where students fill in the details of where they are interning with complete address and phone numbers Customized Legal Reference /Diary is provided to the students on payment They maintain a day to day record of the work that they do at the place they are interning. They are expected to intern for a minimum 90 days. They submit their completed diary, certificate from the employer and also a report of their experience at work. After submission there is a Viva by concerned faculty. They assess the student on the kind of work they have done during internship, presentation of the work they have done and also on the practical knowledge they have gained

The Paper is marked out of 100 marks. The break up of the marks is as follows:

- | | | |
|----|---|----------|
| 1. | Diary submission | 25 Marks |
| 2. | Report and certificate | 25 Marks |
| 3. | Viva (Panel of External Examiners) | 40 Marks |
| 4. | Attendance (Regularity in meeting the supervisor) | 10 Marks |

Total	100
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MACRO ECONOMICS-II

Course Code: LAW2402

Credit Units: 04

Course Objective:

The objective of this paper to understand the issues related to economic development and planning and International trade and enables them to have a broader perspective while dealing with these issues as a policy maker.

Course Contents:

Module I: Economic development

Concepts of economic development and growth, determinants of economic growth, obstacles to economic growth, Vicious circle of poverty, Strategy of economic development: Balanced and unbalanced growth, Inequalities of income and wealth.

Module II: Economic planning

Economic planning: meaning, forms of planning, objectives & significance and rationale of planning, features of planned economy, Five year plans: Strategy of plans, critical appraisal of plans, Public v. Private Sector.

Module III: International trade

Liberalization & Globalization: Argument for and against, Economic Reforms: Banking, Money market, capital market and International Trade Reforms, Special Economic Zones, Foreign Direct Investment.

Examination Scheme:

Components	P/S/V	CT	C	A	EE
Weightage (%)	10	10	5	5	70

Text & References:

- Rudra Dutt & Sundran, "Indian Economy: S. Chand & Co., Ltd. New Delhi.
- Mishra & Puri, "Economic development & Planning, Himalaya Publishing House, Mumbai.
- M.L. Thinghan, "Money, Banking, International Trade & Public Finance.
- Meier & Baldwin, economic Development: Theory, History & Policy." Harper & Row London.
- M. Todaro, 'Economic Development in the Third World, Longman, New York.
- I.C. Dhingra, Indian Economy & Environment & Policy, Sultan Chand & Sons New Delhi.
- M.L. Seth, Money Banking, International Trade & Public Finance, Laxmi Narain Agarwal, Agra


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CONSTITUTIONAL LAW-II

Course Code: LAW2403

Credit Units: 04

Course Objective:

The course material seeks to introduce the student to the relevance of inalienable fundamental rights and restrictions in the Constitution of India and the principles that ought to guide policy making in India. The student is expected to appreciate the text and the juristic discourse by reference to landmark case laws, juristic opinion and vibrant classroom discussions as the subject raises issues, conflict of interests and dilemmas in a pulsating democracy with changing dynamic priorities in a developing country like India.

Course Contents:

Module I: Distribution of powers between Centre and States – (Arts. 245-281)

Legislative Powers, Administrative Powers, Financial Powers, Relevant Doctrines: Territorial nexus, Harmonious construction, Pith and substance, Repugnancy: Overview of Panchayati Raj Provisions (Art. 243), Freedom of Trade and Commerce.

Module II: Union and State Executive, legislature and Judiciary

Union Executive, President: Appointment, Election, Removal, conditions of service; Powers of president focus on ordinance, pardon, emergency; Assessment of relevance of presidential office on governance; Council of ministers and Prime minister: Appointment, Conditions, functioning, collective responsibility, dismissal of cabinet minister; Office of Attorney General: Significance, Appointment, functions, Conditions; State executive, Governor: Appointment, Removal, Powers, State cabinet dismissal; governors role in the context of centre state relations. (Art 79-122).

Union Legislature: Lok Sabha, Composition, functioning, membership, qualifications and disqualifications, Dissolution of, Effect; Bills : Procedure for the passage; Privileges of legislature; State legislature: functioning, dissolution ; Anti defection law and its impact. (Arts. 168-212).

Union Judiciary: Supreme Court Judges: Appointment, removal, impeachment; jurisdiction of Supreme Court: Original, appellate, advisory, Court of Record; Assessment of independence of judiciary; State judiciary: High Court Judges: Appointment, transfer, removal, promotion; High Court jurisdiction, Art. 226, writs; Subordinate judiciary. (Arts. 124 -147) (Arts. 214 to 237).

Module III: Emergency Provisions

National, State and financial Provisions.

Module IV: Miscellaneous

Official Language, Language of Courts, Trade, Commerce and Intercourse in India, Services Under the Union and State, Elections, Parliamentary, Privileges and Schedules, etc .

Module V: Amendment of the Constitution

Amendment of Constitution, Doctrine of basic Structure.

Examination Scheme:

Components	P/S/V	CT	C	A	EE
Weightage (%)	10	10	5	5	70

Texts & References:

- V.N. Shukla, Constitution of India
- M.P. Jain – Indian Constitutional Law.
- H.M. Seervai – Constitutional Law of India.
- Durga Das Basu – Shorter Constitution.
- R.M. Bakshi – Constitution of India.
- J.N. Pandey – Constitution of India.

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ADMINISTRATIVE LAW

Course Code: LAW2404

Credit Units: 04

Course Objective:

Administrative law is as old as the administration itself. However, the form in which we find it today, Administrative is described a most outstanding legal development of the twentieth century. The reason for this development can only be attributed to a change of philosophy as regards the role and function of the State. The change in the concept of State from 'laissez faire' to a 'welfare state' has led to emergence of state activities in almost all spheres of human life. With the phenomenal increase in the area of state operation, the State was bound to take over a number of functions which were earlier left to private enterprise. In order to ensure that such functions are performed effectively and further due to certain other factors namely contingency, expertise etc. administrative agencies are given extraordinary powers and functions such as to make rules and deciding disputes apart from its wide discretionary powers. Obviously, this necessitated a new set of laws to check the possible abuses of such extraordinary powers on the part of administration. The courts in India and abroad in the course of time have developed various doctrines and methods to deal with such p[roblems. However, there is no end to this journey. The field is still open for new changes.

The main thrust of administrative law has been to study the nature of functions and powers exercised by the authorities on whom they have been conferred on and the study of remedies available to common man in case the limits of exercising power are transferred by such an authority. The focus or the centre point of this study, as usual as in cases of the study of other branches of public law, is the rights of individual *vis a vis* the public interest.

Course Contents:

Module I: Evolution, Nature and scope of Administrative law

Definitions, scope, classification and reason for the growth of administrative law; Relationship between constitutional law and administrative law; doctrine of Separation of Powers and its application in administrative law; Doctrine of Rule of law and application in administrative law.

Module II: Legislative function of Administration

Delegated legislation: Necessity for delegated legislation, classification of delegated legislation and its requirement, constitutionality of delegated legislation, All form of control of delegated legislation i.e. Parliamentary, Procedural and Judicial control (doctrine of ultra vires).

Module III: Judicial function of Administration

Reason for Administrative adjudication; Tribunals and classification of Tribunals; Principles of Natural Justice; Ombudsman: Lokpal, Lokayukta; Central Vigilance Commission (CVC).

Module IV: Administrative discretion

Need and legality and abuses; Constitutional objections and discretion, failure to exercise discretion; Doctrine of proportionality; Legitimate expectation.

Module V: Judicial control of administrative action

Courts as the final authority to determine the legality of Administrative actions ; Public Interest Litigation and the principle of *locus standi*, laches, Judicial review ; scope and extent, statutory appeals, writs.

Examination Scheme:

Components	P/S/V	CT	C	A	EE
Weightage (%)	10	10	5	5	70

Text & References:

- M.P. Jain and S.N. Jain: Principles of Administrative Law.
- I.P. Massey: Administrative Law.
- C.K. Talewani: Lectures on Administrative Law.
- D. S. Mishra: Judicial Review of Administrative Action.
- H.W.R. Wade: Administrative Law
- S.P. Sathe: Administrative Law.

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FAMILY LAW-II

Course Code: LAW2405

Credit Units: 04

Course Objective:

Family Law II Course is mainly devoted to the study of Muslim Personal Law relating to Marriage, Maintenance, Dower, Adoption & Guardianship, Divorce, Hiba, Pre-emption, Succession, and disposition of Property. The main objective of the course is to provide an indepth knowledge of the Laws governing Muslims.

Course Contents:

Module I: Introduction (Sources, Schools and Muslim Marriage (Nikah)

Sources and Schools of Muslim Law: Shia and Sunni; Muslim Marriage: Nature and concepts of Muslim Marriage, Essential conditions of a valid marriage, prohibitions/ disabilities, classification of marriage and effects of valid, irregular, void marriage.

Module II: Dower and Matrimonial Remedies (Dower, Restitution, Separation and Divorce)

Dower : Concept and Nature; Divorce under Muslim personal Law, Nullity of marriage; Option of puberty; Restitution of conjugal rights; Judicial separation; Grounds for divorce under Muslim Law; Bars to matrimonial relief under Muslim Law; Grounds for Divorce under Indian Dissolution of Muslim Marriage Act 1939.

Module III: Alimony, maintenance and Adoption & Guardianship (Hizanat)

Maintenance of neglected wives, divorced wives, minor children, disabled children and parents who are unable to support themselves vide sections 125, 127 of Code of Criminal Procedure, 1973; Alimony and maintenance as an independent remedy, Maintenance (Nafaqa) for Muslim Women under the Muslim Women Protection of Right on Divorce Act, 1986; Guardianship under Muslim Law.

Module IV: Law of Succession and inheritance among Muslims

General rules of succession; inclusion and exclusion of inheritors to the property. Classification of heirs under Hanafi and Ithma Asharia School and their shares and distribution of property.

Module V: Dispositions under Muslim Law, Waqf and Pre- Emption

Wasiyat : Testamentary Disposition and various incidents of wasiyat. Disposition inter vivos (Gift), Gift (Hiba), Musha, Revocation of Gifts; Distinction between Hiba, Ariya, Sadaqa & Wakf, Hiba-bil-Sharatful-ewaz, Gift during death illness (Marz-ul-maut).

Waqf : Meaning, Kinds, Objects, purpose, Requisites and various incidents of waqf.

Pre-emption – Origin, Definition, Classification, Subject matter, formalities, effects, constitutional validity.

Examination Scheme:

Components	P/S/V	CT	C	A	EE
Weightage (%)	10	10	5	5	70

Text & References:

- Mulla, D.F., Principles of Hindu Law
- Paras Diwan, Modern Hindu Law
- Mulla, D.F., Principal of Mohammadan Law
- Fyzee, A.A.A., Outlines of Mohammadan Law
- Mahmood, T., Muslim Law of India
- Paras Diwan, Law of Intestate and Testamentary Succession (1998), Universal .


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LAW OF CRIMES-II (INDIAN PENAL CODE SECTION- 121-511)

Course Code: LAW2406

Credit Units: 04

Course Objective:

Course on Law of Crimes aims at introducing students to the basic principles of criminal law. There has been a progressive as well as regressive change in the Indian society since Independence. A proper understanding of crimes and the causal factors for the occurrence of crime is extremely important in the larger context of India's development, if young law students are to use their knowledge and skills to build a just and humane society. The young law students are the would be lawyers and as such they must have an acquaintance with such knowledge to make criminal justice system serve the goals of social defense as well as social justice. Therefore, a study of the basic concepts of specific offences under the Indian Penal Code is imperative.

Course Contents:

Module-I: Offences affecting the Human body: Offences affecting life, causing miscarriage, or injuries to unborn children, Offences of hurt, of wrongful restraint and wrongful confinement, Offences of criminal force and Assault, offences of kidnapping and Abduction

Module-II: Offences against Women: Obscene acts and songs, Outraging the modesty of women, Rape, Cruelty by husband or relatives of husband, Offences relating to marriage

Module-III: Offences against Property: Theft, Extortion, robbery and dacoity, Criminal misappropriation and criminal breach of trust, Cheating, Mischief, Criminal trespass

Module-IV: Defamation and offences relating to documents and property marks: Defamation, Forgery, Counterfeiting.

Module-V: Offences against State, Public Tranquillity, Public Servants, Religion

Examination Scheme:

Components	P/S/V	CT	C	A	EE
Weightage (%)	10	10	5	5	70

Text & References:

- Ratanlal & Dhirajlal – The Indian Penal Code
- K. D. Gaur – A Text Book on Indian Penal Code
- S.N. Misra, Indian Penal Code
- B.M. Gandhi, Indian Penal Code (1996), Eastern, Nagpur.
- P.S. Achutan Pillai, Criminal Law (1995) Eastern, Lucknow.


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LAW OF EVIDENCE

Course Code: LAW2502

Credit Units: 04

Course Objective:

This paper is to orient students with importance of evidence for establishment of claims and the related rules and principles.

Course Contents:

Module I: Definitions and Relevancy of Facts

Evidence and its relationship with the substantive and procedural laws ;Definitions : Facts, facts in issue, relevant, evidence proved, disproved, not proved, oral and documentary evidence ;Relevancy and admissibility; Doctrine of *res gestae* ;Conspiracy.

Module II: Admissions, confessions and statements by person who cannot be called as witnesses:

Definition of admission, who can make admissions by or on their behalf, proof of admission against the persons making them and admissions in civil cases. (Section 17-23, 31); Definition, relevance and consideration of confessions (section 24-30); Dying declaration (Section 32 and Section 33). **Opinion of Third Persons (Sec. 45 to 51) & Character Evidence (Sec. 52 to 55).**

Module III: Documentary Evidence

Primary and Secondary Evidence, Proof and verification of documents; Public documents and presumption as to documents.

Module IV: Production and Effect of Evidence

Burden of proof (Sections 101-114); Estoppels (Section 115); Competence of witnesses (Sections 118-120).

Module V: Examination of Witnesses (Sections 135-166) and Rejection of evidence (Section 167)


Examination –in-chief : Cross Examination, Re-examination; Leading questions; Hostile witnesses; Refreshing memory; Judge's power to put questions or order production.

Examination Scheme:

Components	P/S/V	CT	A	C	EE
Weightage (%)	10	10	5	5	70

Text & References:

- Ratanlal and Dheerajlal : Law of Evidence
- Monir Field : Law of Evidence
- Batuklal : Law of Evidence
- Avtar Singh : Evidence Law
- Bare Act : Indian Evidence Act, 1872


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CODE OF CIVIL PROCEDURE

Course Code: LAW2503

Credit Units: 04

Course Objective:

This paper is to help a law student to acquire a thorough knowledge of procedural aspects of working of civil courts and other machineries.

Course Contents:

Module I: Initial steps in a suit

Jurisdiction and place of suing; Institution of suit, cause of action, joinder, non-joinder and mis-joinder of parties; Summons; Pleadings: Meaning, object, General rules, Amendment of pleadings; Plaint and written statement: Particulars, set off and counter claim; Admission return and rejection; Discovery, Inspection and production of documents; Appearance and non-appearance of parties, ex-parte proceedings; First hearing: Meaning, object, framing of issues, omission to frame issues, disposal of suit in the first hearing; Trial: Summoning and attendance of witnesses, summons to produce documents, adjournment, hearing of suit.

Module II: Significant Terms and Definitions

Definitions: Decree, Judgment, Order, Foreign Court, Foreign Judgment, Mesne, Profits, Affidavit, Suit, Plaint, Written Statement, Suit of civil nature ;Important Concepts: Res Sub-Judice, Resjudicata, Restitution, Caveat, Inherent powers of courts.

Module III: Interim Orders

Commissions, Arrest before judgment, Attachment before judgment, Temporary Injunctions, Interlocutory orders, Receiver, Security of costs.

Module IV: Suits in Particular Cases

Suits by or against Government, Suits by Indigent persons, Interpleader Suit, Summary Procedure, Suits relating to public nuisance. Execution Proceedings

Module V: Law of Limitation

Definitions, period of limitation, plaintiff, defendant; and in foreign countries, limitation of suits, appeals, and application, computation of period of limitation.

Examination Scheme:

Components	P/S/V	CT	A	C	EE
Weightage (%)	10	10	5	5	70

Text & References:

- Mulla's Code of Civil Procedure, Universal, Delhi
- C.K. Thakkar's (Takwani), Code of Civil Procedure
- Majumdar, P.K. and Kataria, R.P., Commentary on the Code of Civil Procedure, 1908, universal, Delhi.


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LABOUR LAW-I

Course Code: LAW2504

Credit Units: 04

Course Objective:

The course aims at imparting to the students an indepth understanding of Labour Laws in India by recourse to relevant judicial pronouncements in this regard.

Course Contents:

Module I: Regulation of Trade Union & Unfair Labour Practices

History of Trade Union Movement in India and need to form Trade Union, Workers Right to form Union vis-à-vis Indian Constitution; the Membership of Trade Union, Closed shop and Union shop, Registration of Trade Union, Remedies in case of non-registration and cancellation of registration of union, Privileges and Protection of registered Trade Union form certain acts and omissions, Unfair labour practices and victimization.

Module II: Collective Bargaining:

Concept and importance of collective bargaining, Pre-requisites for collective bargaining, Process of administering collective agreement (Negotiation, Mediation, & Voluntary arbitration & Compulsory Arbitration.), Duration and enforcement of bipartite Agreement (Secs. 18, 19, Industrial Disputes Act, 1947), Pressurization: Strike, Go-Slow, wok to rule, Gherao and Lockout.

Module III: Regulation of Industrial Disputes

Define the concept of Industry, Industrial Dispute and workman, Power of Government to refer Industrial Disputes for adjudication: The Adjudicatory Machinery, Award and its binding nature, Judicial review of Awards, The concept of lay-off, retrenchment and procedure and compensation relating to lay-off and retrenchment.

Module IV: Standing Orders

Concept, Nature and scope of standing orders under Industrial Employment (Standing Order) Act, 1946, Formulation of Standing Orders and its Certification process, Modification: Modification and temporary application of Model Standing Order, Interpretation and Legal status of Standing Orders.

Module V: Discipline in Industries

Doctrine of hire and fire in the context of social welfare, Fairness in disciplinary process: Meaning of misconduct, Right to know: The Charge Sheet, Right to defend; Domestic enquiry notice, evidence, cross examination, unbiased enquiry officer and reasoned decision, Punishment of misconduct, Prenatal (permission) and Postnatal (Approach) control during pendency of proceeding (Sec. 33 of industrial and Disputes Act).

Examination Scheme:

Components	P/S/V	CT	C	A	EE
Weightage (%)	10	10	5	5	70

Text & References:

- O.P. Malhotra, Law of Industrial Disputes.
- Indian Law Institute, Labour Law and Labour Relations.
- K.D. Srivastava, Commentary of Industrial Employment (S.C.) Act, 1946.
- S.C. Srivastava, Industrial Relation and Labour Law.
- Report of National Commission on Labour, 1969.
- Industrial Disputes Act, 1947.
- R.B. Sethi & R.N. Dwivedi, Law of Trade Union.

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PROPERTY LAW

Course Code: LAW2505

Credit Units: 04

Course Objective:

The subject imparts to the student an understanding of the law in India relating to transfer of immovable property and the norms and doctrines that aid in carrying out secure transactions in this regard.

Course Contents:

Module I: Jurisprudential Basis (Sections 5-21)

Concept and meaning of property – New property, Kinds of property – movable and immovable property, tangible and intangible property,

Module II: Sale of Immovable Property

Doctrine of Election Sec. 35, Fraudulent Transfer Sec. 53 ; Sale of immovable property (Secs. 54 – 55). (Sale, Contract of Sale; Contract to sell; Rights and Liabilities of buyer and seller).

Module III: Specific Transfers

Mortgages of immovable Property: Secs. 58 – 77 (Kinds of mortgage, Rights and Liabilities of the mortgagor and mortgagee, Marshalling and Contribution (Secs. 81 – 82), Redemption (Secs. 91 – 96).

Module IV: Leases

Leases (Secs. 105 – 117): Definition, Leases how made, Rights and Liabilities of lesser and lessee, Charges (Section, 100 – 104).

Module V: Easements

Creation of Easements (Secs. 4 – 7), Nature and characteristics of Easements, Extinction, Suspension and Revival of Easements (Secs. 37–51), Riparian Rights, Licenses (Secs. 52 – 64).

Module VI

Indian Stamp and Registration Act.

Examination Scheme:

Components	P/S/V	CT	A	C	EE
Weightage (%)	10	10	5	5	70

Text & References:

- Mulla, D.F., Transfer of Property Act.
- Shukla, S.N., Transfer of Property Act.
- Shah, S.M., Transfer of Property Act.
- Tripathi, Lectures on Indian Easement Act.
- Jain, J.D., Indian Easement Act.


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SUMMER INTERNSHIP EVALUATION-II

Course Code: LAW2535

Credit Units: 03

It is a mode of Clinical Legal education Specified period to be spent by the student with a law firm/court/Commissions/NGO's and like institutions working with the realm of law or connected therewith. The reports both by the student and the office together with diary where applicable to be certified will be submitted for evaluation

The Internship during the summer break is a compulsory course. There is a Internship Data form where students fill in the details of where they are interning with complete address and phone numbers Customized Legal Reference /Diary is provided to the students on payment They maintain a day to day record of the work that they do at the place they are interning. They are expected to intern for a minimum 90 days. They submit their completed diary, certificate from the employer and also a report of their experience at work. After submission there is a Viva by concerned faculty. They assess the student on the kind of work they have done during internship, presentation of the work they have done and also on the practical knowledge they have gained

The Paper is marked out of 100 marks. The breakup of the marks is as follows:

1.	Diary submission	25 Marks
2.	Report and certificate	25 Marks
3.	Viva (Panel of External Examiners)	40 Marks
4.	Attendance (Regularity in meeting the supervisor)	10 Marks
	Total	100


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COMPANY LAW

Course Code: LAW2603

Credit Units: 04

Course Objective:

The paper aims to make the student familiar and to provide insight into formation and winding up of companies beside corporate administrations.

Course Contents:

Module I: Company

Definition, Characteristics, Lifting of Corporate Veil; Types of Companies;
Formation of a Company: Promoters, Pre-incorporation Contracts, Provisional Contracts,

Module II: Memorandum of Association, Articles of Association and Prospectus

Memorandum of Association; Articles of Association; Prospectus: Issues, contents, Kinds, liability for misstatements, Shelf Prospectus, Statement in lieu of Prospectus.

Module III: Share Capital

Issue and allotment of shares, SEBI guidelines on allotment, Issue of shares at premium and at discount, Share Certificate, Demat system ; Forfeiture and surrender of Shares, Transfer & Transmission of shares; Provisions relating to payment of dividend, Investor's Education and Protection Fund.

Module IV: Corporate Administration

Directors: kinds, powers and duties; Insider trading; Meetings kinds and procedure; The balance of powers within companies: Majority control and minority protection, Prevention of oppression, and powers of court and Central Government,

Module V: Winding up of Companies

Kinds, consequences and reasons of winding up; Role of the court; Liability of past members; Payment of liabilities; Reconstruction and amalgamation.

Examination Scheme:

Components	P/S/V	CT	C	A	EE
Weightage (%)	10	10	5	5	70

Text & References:

- Avtar Singh : Indian Company Law
- Shah S. M : Lectures on Company Law
- Saharay H.K.: Company Law, 5th Edn.


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LAW OF TORTS (MOTOR VEHICLES ACT AND CONSUMER PROTECTION ACT, 2019)

Course Code: LAW2604

Credit Units: 04

Course Objective:

This course aims to introduce the student to the specialized discipline of tort law that is one of the most litigated areas of law in west. In India this realm is on the verge of a lot of litigational activity. The course covers Consumer Protection Act as well as Motor Vehicle Act which are carved out from the general principles of tort.

Course Contents:

MODULE 1: Introduction:

- Nature and Definition of Torts
- Tort distinguished from Contract and Quasi-Contract
- Crime:
 - Conditions of liability including *damnum sine injuria, injuria sine damnum*
 - Remoteness of damages
- Maxims: *Ubius ibi remedium, Res ipsa loquitur*, etc.
- Justification in Tort:
 - *Volenti non-fit Injuria*,
 - Necessity,
 - Plaintiff's default,
 - Act of God,
 - Inevitable accidents,
 - Private defences,
- Judicial and Quasi
 - Judicial Acts,
 - Parental and quasi-parental authority.

MODULE 2: Actions in Tort

- Assault
- Battery
- False Imprisonment
- Malicious Prosecution
- Defamation
 - Libel
 - Slander including defences in an action for defamation
- Vicarious Liability
- Liability of State
- Doctrine of Sovereign Immunity

MODULE 3: Negligence

- Negligence including contributory negligence and other defenses.
- Absolute liability/Strict liability, Rules in *Ryland v. Fletcher*.
- Principles for the application of the rule and defenses
- Enterprises engaged in hazardous activities – *M.C. Mehta v. Union of India*
- Nuisance Trespass

MODULE 4: Consumer Protection: Consumer Protection Act, 2019

- Brief overview of the Consumer Protection Act, 2019.
- Major Difference between Consumer Protection Act, 2019 and Consumer Protection Act, 1986.
- Consumer Protection Act, 2019:

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Consumer Protection Councils Chapter II: Ss. 3-9
Central Consumer Protection Authority: Section 2(4) Chapter III: Ss. 10-27

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- Consumer Disputes Redressal Commission S. 2(15): District Commission S. 2(44): State Commission S. 2(29): National Commission Chapter IV- with special focus on Ss. 28,34, 35, 37,39, 41, 42, 47,51 53,54,58,59
- Product Liability
- Consumer Protection vis-a vis E-Commerce- Key Aspects

MODULE 5: Motor Vehicles:

- Motor Vehicles Claims and compensation:
 - Relevant provisions of the relating Motor Vehicles Act relating to the liability and assessment of compensation:
 - Liability without fault in certain cases : voidance of contracts restrictive of liability
 - Special provisions and scheme of compensation in case of hit and run motor accidents
- Offences, Penalties and Procedure
- Insurance of Motor Vehicles against Third Party Risks(Sec. 145 – 152)
- Claims Tribunals: Sec. 165-176
- Special provisions as to payment of compensation on structured formula basis: Claims on non-structured basis: Method of calculating compensation evolved by the courts(study with reference to relevant judgments)
- Defences: Changing parameters of negligence and burden of proof

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

Text Books

- Winfield and Jolowicz, Tort
- Law of Torts, Universal law Publishing Company, Dr. S.P. Singh
- The Law of Torts: Ratanlal & Dhirajlal,
- Winfield, Law of Torts,
- Dr. D.N. Saraf, Law of Consumer Protection in India,
- Dr. Avtar Singh, Law of Consumer Protection in India, Dr. Gurjeet Singh, The law of Consumer Protection in India.
- Motor Vehicle Laws, Universal Law Publishing Company.

Reference Books

- William Salmond, “Salmond on the Law of Torts”, Sweet & Maxwell, 16th Edition: 1973
- Heuston Salmond, “The Law of Torts”, Universal Law Publishing Co Ltd: 2004
- Edward White, “Tort Law in America: An Intellectual History”, Oxford University Press: 2003
- Frederick Pollock, “The Law of Torts: A Treatise on the Principles of Obligations Arising from Civil Wrongs in the Common Law: To which is Added the Draft of a Code of Civil Wrongs Prepared for the Government of India”, BiblioBazaar: 2008
- Jenny Steele, “Tort Law: Text, Cases & Materials”, Oxford University Press: 2007
- Vivienne Harpwood, “Modern Tort Law”, Rutledge: 2008
- Carl F. Cranor, “Toxic Torts: Science, Law and the Possibility of Justice”, Cambridge University Press: 2006
- N.R. Madhava Menon, “Documents and Court Opinions on Bhopal Gas Leak Disaster Case”, National Law School of Indian University: 1991
- Upendra Baxi, Thomas Paul, “Mass Disaster and Multinational Liability: the Bhopal Case”, N.M. Tripathi: 1986
- Upendra Baxi, Amita Dhanda and Indian Law Institute, “Valiant Victims and Lethal Litigation: the Bhopal Case”, N.M. Tripathi: 1990
- Jenny B. Wahl, “Economic Analysis of Tort and Products Liability Law: A Collection of Essays & Cases (Law and Economics)”, Routledge: 1998

LABOUR LAW-II

Course Code: LAW2605

Credit Units: 04

Course Objective:

The paper is to focus on wage policies, compensation for learn caused during the course of employment and working conditions of employees.

Course Contents:

Module I: Minimum Wages Act, 1948

Concept of Labour Welfare, Classification and Importance, Labour welfare activities, Concept of minimum wage, fair wage, living wage and need based minimum wage, Constitutional validity of the Minimum wages Act, 1948, Procedure for fixation and revision of minimum wages, Fixation of minimum rates of wage by time rate or by piece rate, Procedure for hearing and deciding claims.

Module II: Payment of Wages Act, 1936

Object, scope and application of the Act, Definition of wage, Responsibility for payment of wages, Fixation of wage period, Time of payment of wage, Deductions which may be made from wages, Maximum amount of deduction.

Module III: Workmen's Compensation Act, 1923

Definition of dependant, workman, partial disablement and total disablement, Employer's liability for compensation: Scope of arising out of and in the course of employment, Doctrine of notional extension, When employer is not liable, Employer's Liability when contract or is engaged, Amount of compensation, Distribution of Compensation, Procedure in proceedings before Commissioner, Appeals.

Module IV: Factories Act, 1948 & Social Security

Concept of "factory", "manufacturing process" "worker" and "occupier" : General duties of occupier, Measures to be taken in factories for health, safety and welfare of workers, Working hours of adults, Employment of young person and children, Annual leave with wages, Additional provisions regulating employment of women in factory, Social Security of Workmen ; Concept and scope of social security : Origin of Social Security in India, Claim and Adjudication of Disputes under Employee's State Insurance Act. 1948.

Examination Scheme:

Components	P/S/V	CT	C	A	EE
Weightage (%)	10	10	5	5	70

Text & References:

- S.C. Srivastava, Commentaries on factories Act, 1948, Universal Law Publishing House, Delhi
- H.L. Kumar, Workmen's Compensation Act, 1923.


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CYBER LAWS

Course Code: LAW2606

Credit Units: 04

Course Objective:

With the advent of information technology law and Right to Information Law, new strides and strategies in legal justice education have come up. There is a need that Law students must also be acquainted with these new developments if a law student has to find a comfortable berth in the competitive legal market as a Law Professional as well as legal manager. Therefore, there seems to be an impending need to generate e-Legal Justice Education that exposes the students to have deep insights into the complexities of information technology and right to information. Objectives of this course, therefore, are understanding the legal recognition and procedure, Digital signatures, legal recognition of cyber authorities and Cyber appellate tribunal, legal implications of new varieties of offences and penalties under the Information Technology Act, 2000. A student of law should also be given the understanding of copy right issues, TRIPS agreements, application of patents to computer technology, etc. Besides, the course also aims at developing insights into the Right to Information Act, 2005 and its grey areas.

Course Contents:

Module I: Introduction (Need, Role and various aspect related to Cyber Law)

Need and role of Cyber; Jurisprudence of Cyber Law in India; Free speech and expression on Internet & Privacy; issues, Right to data protection, Cyber Law & Protection of Domain name.

Module II: Cyber Jurisdiction, Investigation & Cyber Forensics

Cybercrimes: Extradition and Jurisdictional issues; Investigation of Cyber Offences: Cyber equipment's & Cyber Cell; Cyber Forensics: provisions, need and role in cyber investigation.

Module III: Electronic Governance, Cyber space & IPR issues

Legal aspect of Electronic Governance; IPR Issues: An Overview, Patent, Copyright and Trademark & other related Issues in Cyberspace.

Module IV: Cyber Legislations (Laws, National and International treaties & Conventions)

Cyber Legislation: An Indian and International Regime; The Information Technology 2000, The Provisions relating to- Legal recognition of – Digital & Electronic Signature, Secure E- records and Signature, E- signature Certificates, Certifying Authorities, Cyber, Appellate Tribunal and Miscellaneous Provisions.

Module V: Cyber Crimes (Civil & Criminal)

Cyber Crimes and Cyber Victimization; Cyber Offences: Types & the provisions for Penalties mentioned in IT Act, 2000; Cyber Pornography, Cyber Terrorism, Cyber Tort and Cyber defamation etc.

Examination Scheme:

Components	P/S/V	CT	C	A	EE
Weightage (%)	10	10	5	5	70

Text & References:

- Nandan Kamath, Universal Law Publishing Company and E –commerce: Law relating to computers Internet.
- K.K. Kumar, Dominant Publication: Cyber Law
- B.L. Wadhera : Patent, trademarks, Copyrights
- Ganguly (LMH): Intellectual Property Rights.


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ENVIRONMENTAL LAW

Course Code: LAW2702

Credit Units: 05

Course Objective:

This paper provides the study of environmental laws covering legislations related to it and protection of forest and wild life.

Course Contents:

Module I: Environmental Law: International and National Perspective

Introduction: Environment and Environment Pollution: Problem and prospects; constitutional Perspective Right to Evolution and Application, Co relation between: Directive Principles of State Policies and Fundamental Degrees, Fundamental Rights and Directive Principles of State Policy; International Norms :Sustainable Development :Precautionary Principle, Polluter Pays Principle, Agenda 21, Inter generational equity, Public Trust Doctrine, Principle of no fault liability : Absolute Liability; Environment Protection through Public Interest Litigation, Remedies under various other laws.

Module II: Prevention and Control of Water and Air Pollution

The Water (Prevention and Control of Pollution) Act, 1974: Water Pollution : Definition, Central and State Pollution Control Boards: Constitution, Powers and Functions, Water Pollution Control Areas, Sample of effluents : Procedure; Restraint order, Consent requirement : Procedure, Grant/Refusal, Withdrawal, Citizen Suit Provision; Air (Prevention and Control of Pollution) Act, 1981: Air Pollution: Definition, Central and State Pollution Control Boards: Constitution, Powers and functions, Air Pollution Control Areas; Consent Requirement : Procedure, Grant/Refusal, Withdrawal, Sample of effluents – Procedure; Restraint order.

Module III: Protection of Forests and Wild Life

Indian Forest Act, 1927: Kinds of forest: Private, Reserved, Protected and Village Forests, The Forest (Conservation) Act, 1980; The Wild Life (Protection) Act, 1972: Authorities to be appointed and constituted under the Act, Hunting of Wild Animals, Protection of Specified Plants, Protected Area, Trade or Commerce in wild animals, animal articles and trophies; Its prohibition.

Module IV: Special Environmental Legislations

Environmental (Protection) Act, 1986, Public Liability Insurance Act, 1991, The National Environment Tribunal Act, 1995, The National Appellate Environmental Authority Act, 1997.

Examination Scheme:

Components	P/S/V	CT	C	A	EE
Weightage (%)	10	10	5	5	70

Text & References:

- Environmental Law & Policy in India – Shyam Diwan, Armin Rosencranz
- Environmental Law in India – P. Leelakrishnan
- PIL and Environmental Protection-Geetanjali Chandra
- The Water (Prevention and Control of Pollution) Act, 1974
- The Air (Prevention and Control of Pollution) Act, 1981
- The Indian Forest Act, 1927
- The Forest (Conservation) Act, 1980
- The Wild Life Protection Act, 1972
- The Environment (Protection) Act, 1986
- The Public Liability Insurance Act, 1991
- The National Environment Tribunal Act, 1995
- The National Environment Appellate Authority Act, 1997

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JURISPRUDENCE

Course Code: LAW2703

Credit Units: 05

Course Objective:

The objective of the course is to create an understanding of basic legal concepts and provide an insight to the student into philosophical, ideological and theoretical foundations of the discipline of law with special reference to Indian legal system.

Course Contents:

Module I: Introduction

Nature and scope of Jurisprudence, State, Sovereignty and Law: Sources of Law: Custom, Precedent, Legislation, Equity.

Module II: Schools of Jurisprudence – I

Natural Law, Analytical positivism, Pure Theory, Historical Jurisprudence, Sociological Jurisprudence, Economic Approach, Legal Realism, Theories of justice: Aristotle, Rawls, Distributive Justice in India.

Module III: Concepts of Rights and Duties

Rights and Duties, Types, Theories, Critique of Rights and Duties, Contemporary issues in Rights.

Module IV: Concepts of Ownership and Possession:

Evolution of concept of possession, ownership, Essentials of ownership, Corpus and Animus, Res Nulius and Res Possessionis

Module V: Indian Perspectives in Jurisprudence

Classical and Medieval Influences, Modern Trends study with reference to judicial pronouncements with state policy.

Examination Scheme:

Components	P/S/V	CT	C	A	EE
Weightage (%)	10	10	5	5	70

Text & References:

- Bodenheimer, Jurisprudence – The Philosophy and Method of Law (1996), Universal, Delhi.
- Fitzgerald, (ed.) Salmond on Jurisprudence (1999) Tripathi, Bombay
- W. Friedmann, Legal Theory (1999) Universal, Delhi
- V.D. Mahajan, Jurisprudence and Legal theory (1996 re-print), Eastern, Lucknow
- M.D.A. Freeman (ed.) Lloyd's Introduction to Jurisprudence, (1994), Sweet & Maxwell
- Paton G.W. Jurisprudence (1972) Oxford, ELBS
- H.L.A. Hart, The Concepts of Law (1970) Oxford, ELBS
- Roscoe Pond, Introduction to the Philosophy of Law (1998 Re-print) Universal, Delhi
- Dias, Jurisprudence (1994 First Indian re-print), Adithya Books, New Delhi
- Dhyani S.N., Jurisprudence: Jurisprudence and Indian Legal theory
- Dhyani S. N., Fundamentals of Jurisprudence
- Jayakumar N. K., Lectures in Jurisprudence, Butterworths
- Justice Markandey Katju, Law in the Scientific Era, Universal
- Justice J. S. Verma, Dimensions of Justice, Universal
- Justice Rama Jois, Seeds of Modern Public Law in Ancient Indian Jurisprudence
- Justice Rama Jois, Eternal Values in Ancient Law.


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PUBLIC INTERNATIONAL LAW

Course Code: LAW2704

Credit Units: 05

Course Objective:

The objective of this paper is to provide knowledge to the students regarding the Public International Law to enable them to deal with the transnational legal order.

Course Contents:

Module I: Introduction

Definition and Basis of International Law, Subjects of International Law, Relationship between International Law and Municipal Law.

Module II: Sources of International Law

Custom, Treaties, General Principles of law, Juristic Works, General Assembly Resolutions, Other sources (Conventions).

Module III: State Recognition, State Jurisdiction and Law of the Sea

State Recognition: Recognition of states, Recognition of governments, *De facto* and *De jure* Recognition, Types of Recognition: Implied Recognition, Conditional Recognition, Collective Recognition; Withdrawal of Recognition, The legal effects of recognition; **State Jurisdiction:** Basics of Jurisdiction, Principles of Jurisdiction, Exemption from Jurisdiction: Diplomatic Immunities and Privileges, Armed Forces, Public Ships; **Law of the Sea:** First and Second Law of the Sea Conventions: Third Law of the Sea Convention {UNCLOS III (United Nations Convention on the Law of The Sea), Maritime Zones; Territorial Waters, Contiguous Zone, Exclusive Economic Zone, Continental Shelf High Seas; Sea Bed Authority, Deep Sea Bed Mining and International Sea – Bed Area.

Module IV: Conflict Resolution, War and Neutrality of States


Modes of Settlement of Disputes: Peaceful means, Coercive means; War: Laws of War, Humanitarian Laws: Rules of neutrality.

Examination Scheme:

Components	P/S/V	CT	C	A	EE
Weightage (%)	10	10	5	5	70

Text & References:

- Oppenheim, International Law, Vol. – 1.
- J.G. Strake, Introduction to International Law.
- Grieg, International Law.
- R.C. and Hingorani, Modern International Law.
- H.O. Aggarwal, International Law.
- S.K. Kapoor, International Law.
- Bowell, The Law of International Institutions.
- Verma, S.K., An Introduction of Public International Law.


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ARBITRATION AND ALTERNATE DISPUTE RESOLUTION

Course Code: LAW2705

Credit Units: 05

Course Objective:

The course material imparts to the students an understanding of the concept of alternate methods of resolving disputes in addition to the traditional court oriented processes. It focuses on an analytical study of arbitration law and practice in India and the relevant institutions monitoring the same. The paper also focuses on other alternate dispute resolving mechanisms through State mediatory services under the supervision of the courts.

Course Contents:

Module I: Introduction

Alternative Dispute Resolution (ADR): Concept and Need and International and National initiatives in India; IIC, UNCITRAL, KSID.

Arbitration and Conciliation Act, 1996

General Provisions, Definitions, receipt of written communications, waiver of right to object, extent of Judicial Intervention, Administration Assistance; Arbitration agreement, power to refer parties to arbitration where there is an arbitration agreement, Interim measures by court.

Module II: Composition of Arbitral Tribunal

Composition, Jurisdiction, Conduct of Arbitral Proceedings: Settlement, form and contents of arbitral award, termination of proceedings, correction and interpretation of awards, additional award.

Module III: Recourse against Arbitral Award

Application for setting aside Arbitral Award, Finality and enforcement of Arbitral Award, appealable orders, Miscellaneous, Deposits, Lien on Arbitral Award and Deposits as to costs, Arbitration agreement not to be discharged by death of party thereof, Provisions in case of insolvency, Jurisdiction, limitation, Limitations, Enforcement of certain Foreign Awards.

Module IV: Techniques of ADR – I

Negotiation / Consultation, Mediation, Good offices, Conciliation: Nature, Scope and Methods.

Legal Services: Meaning and scope in Legal Aid and Advice, Lok Adalats-nature, scope, procedure and functioning.

Examination Scheme:

Components	P/S/V	CT	C	A	EE
Weightage (%)	10	10	5	5	70

Text & References:

- Rao, P.C., Arbitration and Conciliation Act, 1996, Universal Law Book Co., Pvt. Ltd., (1997)
- Rao P.C. & Sheffield William, Alternative Dispute Resolution
- Sujan, M.A., Law relating to Arbitration and conciliation.
- Kawatra, G.K., The New Law of Arbitration and conciliation
- Chaudhary, S.K. Roy, Law of Arbitration Conciliation, 4th Ed. Eastern Book
- Saharay H.K., Law of Arbitration (197) (Revised Print)

Statutory Material:

- Arbitration and Conciliation Act, 1996.
- Legal Services Authority Act, 1987.
- UNCITRAL


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SUMMER INTERNSHIP EVALUATION-III

Course Code: LAW2735

Credit Units: 03

It is a mode of Clinical Legal education Specified period to be spent by the student with a law firm/court/Commissions/NGO's and like institutions working with the realm of law or connected therewith. The reports both by the student and the office together with diary where applicable to be certified will be submitted for evaluation

The Internship during the summer break is a compulsory course. There is a Internship Data form where students fill in the details of where they are interning with complete address and phone numbers Customized Legal Reference /Diary is provided to the students on payment They maintain a day to day record of the work that they do at the place they are interning. They are expected to intern for a minimum 90 days. They submit their completed diary, certificate from the employer and also a report of their experience at work. After submission there is a Viva by concerned faculty. They assess the student on the kind of work they have done during internship, presentation of the work they have done and also on the practical knowledge they have gained

The Paper is marked out of 100 marks. The breakup of the marks is as follows:

1.	Diary submission	25 Marks
2.	Report and certificate	25 Marks
3.	Viva (Panel of External Examiners)	40 Marks
4.	Attendance (Regularity in meeting the supervisor)	10 Marks
	Total	100



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TAXATION LAW

Course Code: LAW2802

Credit Units: 05

Course Objective:

Power to tax has been described as the power to destroy. This idea is being floated often whenever the State introduces a new tax. Is this true? Is it not necessary that in order to raise revenue and place the economy on solid foundation, the taxing power should be conferred on the State? The power to tax shall not go unregulated. In this context of a federal structure the distribution of the taxing powers assumes added significance. Obviously, a study of the Constitutional framework on taxation becomes important. Along with this, an analysis of the different laws enacted in exercise of these powers with their safeguards and remedies sheds light on the mechanics of the taxation by the Union and the States.

Course Contents:

Module I: General Principles of Taxation Laws

History and Development of Tax Laws in India, Fundamental Principles relating to Tax Laws, Taxing power and constitutional limitations, Distinction between: Tax, Fee and Cess; Tax avoidance and Tax evasion .

Module II: Basic concepts of Income Tax

Income, Previous Year, assessment Year, Person, Assessee and Total Income, Income not included in the Total Income. Residential status, Clubbing of Income, Tax planning, Rate of Income Tax, Heads of Income, Salaries, Income from House Property, Income from Business or Profession, Capital Gains, Income from Other sources, Deductions under the Income Tax Act, 1961, Income Tax Authorities: Power and Functions, Filing of returns and procedure for assessment, Offences and Penal Sanctions .

Module III: Value Added Tax

Meaning and importance of VAT, Difference between VAT and Sales Tax, West Bengal Value Added Tax Act, 2003, Criticisms and limitations of Vat system.

Module IV: Service Tax


Taxable Service, Meaning and importance of Service Tax, Valuation of Taxable Service, Offences and Penalties.

Examination Scheme:

Components	P/S/V	CT	C	A	EE
Weightage (%)	10	10	5	5	70

Text & References:

- Iyengar, Sampath (1998), Law of Income Tax New Delhi, Bharath Law House.
- Jain, Narayan (2004) How to Handle Income Tax Problems, Book Corporation.
- Palkivala, N.A. (1999), The Law & Practice of Income Tax, Nagpur: Wadha Publication.
- Parameswaran, K. (1987), Power of Taxation under the Constitution, Eastern Book Company.
- Sharma, Remesh (1998), Supreme Court on Direct Taxes, New Delhi: Bharath Law House.
- Singh S.D. (1973), Principles of Law of Sales Tax, Eastern Book Company.
- V. Ramachandran & T.A. Ramakrishnan (eds.) (2000), A.N. Aiyar's Indian Tax Laws, Chennai: Company Law Institute of India Pvt. Ltd.


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INTERPRETATION OF STATUTES

Course Code: LAW2803

Credit Units: 05

Course Objective:

Judicial interpretation involves construction of words, phrases and expressions. In their attempt to make the old and existing statutes contextually relevant, courts used to develop certain rules, doctrines and principles of interpretation. The course material seeks to impart to the students, the necessary skills to interpret the statutes with a judicial mind set.

Course Contents:

Module I: Rules of Interpretation

Commencement, repeal and revival of a statute; Rules of interpretation: Liberal rule, mischief rule and golden rules, Harmonious construction.

Module II: Principles of interpretation

Ejusdem of Generis, Noscitur – A Socius, Reddendo Singula Singlis., Expressio Unius Est exclusion Alterius, UI Res Magis Valent Quam Pereat, Contemporanea Espositio Est Optima Et Protissima Lege.

Module III: Internal Aids to Interpretation

Module IV: External Aids to Interpretation

Module V

Construction of Penal Statutes, Mens rea in statutory offences, Principles to be applied in interpreting the Constitution, Strict construction of taxing statutes and its limitations.

Examination Scheme:

Components	P/S/V	CT	C	A	EE
Weightage (%)	10	10	5	5	70

Text & References:

- Maxwell, Interpretation of Statutes.
- Sarup, Interpretation Statues.
- G.P. Singh, Principles of Statutory Interpretation.
- V.P. Sarathi, The Interpretation of Statutes.
- Bindra, Interpretation of Statutes.


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INTERNATIONAL TRADE LAW

Course Code: LAW2804

Credit Units: 05

Course Objective:

To acquaint the Students about the basic aspects of International Trade Law, including the WTO and its different principles and Agreements.

Course Contents:

Module I: Contract of Sale

Uniform Rules on Contract of Sale, Types of Sale Contract - CIF, FOB, C & F Contract, Special Trade Terms in International Sale Contract, Indian Bill of Lading Act 1856, International Conventions Governing Bill of lading

Addition of Special Trade Terms in International Sale Contract, Indian Bill of Lading Act 1856 and International Conventions Governing Bill of Lading in Module I.

Addition of Background Role and Structure of WTO, and difference between GATT & WTO in Module IV

Module II: Payment for International Sales

Letters of Credit, Bills of Exchange, and function and connected issues.

Module III: Settlement of Disputes

Arbitration, Enforcement of Arbitral Awards.

Module IV: World Trade organization (WTO) and General Agreement on Tariffs and Trade (GATT)

Background of formation of WTO, Role of WTO in International Trade, Difference of GATT and WTO, Structure of WTO.

Basic Principles: MFN, Treatment, National Treatment and Non-Discrimination, Exceptions to MFN : Tariff Bindings, Regional Trade Agreements, Escape Clause, Safeguard Measures, Quantitative Restrictions, Anti-dumping and counter-vailing duties.

Module V: WTO and Multilateral Agreements

Trade Related Investment Measures (TRIMS), General Agreement on Trade in Services (GATS), Trade Related aspects of Intellectual Property Rights (TRIPS).


Module VI: Dispute Settlement Mechanism under WTO

Examination Scheme:

Components	P/S/V	CT	A	C	EE
Weightage (%)	10	10	05	5	70

Text & References:

- Basic Texts of GATT and WTO.
- Jackson, John, H. (1997) Law of International Trading System, The MIT Press.
- Jackson, John, H. (1997) World Trade and Law of GATT, The MIT Press.
- Dam, K. W. (1970) The GATT Law and International Economic Organisations, Chicago University Press
- Koul, A.K. (2001) World Trade Organisation, Satayam Publication.
- Internet Sources : www.wto.org, www.uncitral.org.
- Text of the Indian Arbitration and Conciliation Act, 1996.


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LAND LAWS

Course Code: LAW2805

Credit Units: 05

Course Objective:

The legislative power to make laws relating to land and land ceiling is in the state list. Different States have enacted their own laws on this subject. The Constitutional perspectives relating to this subject have to be taught as an essential part of this course. The provisions in the Constitution in Part III, IV and XII as well as those in Schedule VII relating to distribution of legislative powers over land are essentially to be taught with emphasis.

Course Contents:

Module I: Punjab Land Revenue Act 1887 (Applicable over Punjab and Haryana), Definition of Key Words, Revenue Officers: Their Power and Functions, Preparation of Revenue Record: Like Documents of Jamabandi, Girdawari, Mutation, Intkaal, SijraNasab (Pedigree Table) Sirjra Axe (Map of the Village), Assessment of Land Revenue, Collection of Land Revenue, Concepts & Procedure of Partitions.

Module II: Punjab Land Revenue Act, 1887:

Records-Of-Rights and Annual Records, Collection Of Land Revenue, Recovery of other Demands by Revenue-officers, Partition, **Assessment** and other relevant provisions.

Module III: Haryana Rent Control Act, 1973

Definitions (Sec. 1-4), Rights & Duties of Tenants, Rights and Duties of Landlords, Grounds of Ejectment of Tenants.

Haryana Panchayati Raj Act ,1994 (Sec. 1 to 54) (Chapter 1 to 6) Definition of Key Words, Constitution of Gram Sabha and Gram Panchayat, Gram Panchayat's Duties, Functions and Powers, Finance and Taxation, Control of Gram Panchayat, Sources of Income and Expenditure of Gram Panchayat.

Module IV: Haryana Panchayati Raj Act 1994,

PanchayatiSamiti (Chapter 7 To 11) And Sec. 55 To 116) Definition of Key Words, Conduct of Business of PanchayatSamities, Servant of PanchayatSamities, Duties and Powers of PanchayatSamiti, Finance and Taxation, Sources of Income of PanchayatSamiti, Control of PanchayatSamiti

Module V: Delhi Land Laws

Real Estate Development and Apartment ownership

Delhi Apartment Ownership Act, 2009,

Examination Scheme:

Components	P/S/V	CT	A	C	EE
Weightage (%)	10	10	05	5	70

Text & References:

- Law, poverty and development, Prof. M.L. Upadhyay.
- Upendra Baxi, Towards a Sociology of Indian Law, pp. 25-65 (1986)
- Atul Kohli, The state and Poverty in India (1987)
- Francine R. Frankel, India's Political Economy, 1947-77 (1988)
- L.H. Rudolph and S.H. Rudolph, The Political Economy of Lakshmi (1987)
- Mohammad Ghouse, "Nehru and Agrarian reform" in Rajeev Dhavan and Thomas Paul (eds.)
- Nehru and the Constitution (1992), Thripathi
- Walter C. Neale, Developing Rural India Policies and Progress (1990) Allied
- Alice, Jacob, Land Reform and Rural Change 6-19 (1992), Land Reforms in India: a Review.
- IASSI quarterly 1992, Vol. X, Numbers 3 and 4.
- B.R. Beotra, Law of Forests (Central and State) 6th Edition 1999, The Law Book Company.
- A. Krishnan, Forest Laws in India, 1998, Asia Law House
- Srivastava, Encyclopedia on forest, 1998, Asia Law House
- Padala Rami Reddy, Forest Laws, 1989, Asia Law House
- Baden Powell, Manual of Jurisprudence for Forests Officers (1982)

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INTELLECTUAL PROPERTY RIGHTS

Course Code: LAW2902

Credit Units: 05

Course Objective:

The course is designed to provide comprehensive knowledge to the students regarding Indian position of the Patent Law (1970), Copy Right Law (1957) and Designs Act of 2000 which invariably form the part of Intellectual Property Law and shall comprise of the following.

The importance of this branch of the law is to be sufficiently realized in the Indian legal education. These areas are now internationally conceptualized as representing intellectual property. It is often the case that while the law of patents and trademarks is referred to as industrial property, the law relating to copyright is named intellectual property. While both these terms could be suitably invoked, we here speak of intellectual property as signifying all the three bodies of the law as well as the law on industrial designs.

Unlike other forms of property, intellectual property refers to regimes of legal recognition of, primarily, the products of the mind or imagination. The subject matter of property relations is here preeminently based on mental labour. The law relating to intellectual property protects the right to mental labour.

The law confers rights of proprietary nature on relative intellectual labour primarily on the basis that it is in the interests of society and state to promote creativeness and inventiveness. Limited monopoly provides incentive for greater inventive and innovative efforts in society. An important aspect of the exploration in this course would be ways in which the laws strike a fair balance between the interests and rights of the intellectual labourers on the one hand and organized industrial enterprises on the other. Another dimension is a study of the ways in which this regime of laws militates against, or favours, comm. Moduley property in national cultures. As concerns 'modernization' crucial questions arise in the field of copyright protection in computer software and hardware, internet, electronic music and scientific research. Both copyright, trademarks, design and patent law here relate basically to the law of unfair competition and constitute an aspect of consumer protection and welfare not only in the context of national perspectives but also in view of the waves of globalization already set in. Both from the standpoint of human resources development, modernization and justice it is important that the law students get sufficient insights in Intellectual Property Law.

Course Contents:

Module I: Introduction

Intellectual Property, Concept and Philosophy, Need for Private Rights versus Public Interests, Advantages and Disadvantages of IPR.

Module II: Patent

Development of patent law, Rationale for patent protection, Nature and definition, Types of patentable subject matter, Patentability criteria, non-patentable inventions, Rights of patentee, Procedure for granting a patent, Grounds for opposition, Transfer of patent rights, Compulsory Licenses, Acquisition, Surrender, Revocation, restoration, Patent infringement and remedies, Bio patents and software patents, Official Machinery, Controller, Powers and Functions, Patent in pharmaceutical industry, Patent cooperation treaty, Paris convention.

Module III: Copyright

History, Concept of copyright, conditions for grant of copyright, extent of rights exception to copyright protection, fair use provision, assignment and licensing, Compulsory licensing and statutory licensing, Collective administration, Copyright board and office, powers and functions, Moral rights: Neighboring rights; infringement penalties and remedies, Appeals, Berne Convention, Universal Copyright Convention - WIPO Copyright Treaty: WIPO Phonograms and Performances treaty, TRIPS with respect to Copyright and Neighboring rights.

Module IV: Designs, Protection, Historical development, Rationale

Designs Act of 2000: Meaning of Design, Conditions for grant of protection, Ambit of Protection, Exceptions, Registration of Designs, Cancellation, Copyright in Registered Designs, Enforcement, Infringement and remedies, Powers and duties of Controller.

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Module V: Trademarks

Evolution, Functions, Objective, Definition, Kinds of Marks, Domain names, Registration, Concurrent registration, Procedure for registration, Relative and absolute grounds of refusal, opposition and its grounds, Assignment, transmission and licensing of Trademarks, Infringement, Penalties and Remedies, Withdrawal of protection, Passing off, Official machinery for regulation administration and Redressal, Registrar, Difference between Trade Mark, **Trade Secret, Traditional Knowledge** and Geographical Indications, TRIPS on Trademarks, Madrid Agreement for The Repression of False or Deceptive Indications of Source on Goods, 1891- Madrid Agreement for the International Registration of Marks, 1891 and protocol relating to that agreement 1989.

Module VI: Plant Varieties Protection Act, 2001


Objectives, Rationale, Registry, Official machinery, registration, Criteria of fulfillment Exclusions, Benefit sharing, Farmers rights, Community Rights, compulsory license Redressal fora, Appellate tribunal, Infringement, offences and penalties; Geographical indications of Goods (Registration and Protection Act, 1999: History, Definition, Rationale, Functioning, official Machinery, Registry, Rights conferred, Registration Procedure. Redressal Machinery, Appeal, Passing off, Offences, penalties and Procedure.

Examination Scheme:

Components	P/S/V	CT	A	C	EE
Weightage (%)	10	10	05	5	70

Text & References:

- D.P. Mittal (Taxman Publication), Indian Patents Law and Procedure
- B.L. Wadera, Patents, trademarks, copyright, Designs and Geographical Judications.
- P. Narayanan (Eastern Law House), Intellectual Property Law
- W. Cornish (Universal Publication), Intellectual Property Law
- R.K. Nagarjan, Intellectual Property Law
- Ganguli (Tata Megraw), Intellectual Property Rights


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LAW, POVERTY AND DEVELOPMENT

Course Code: LAW2903

Credit Units: 05

Course Objective:

The objective of this paper is to provide an understanding of basic concepts of poverty and development and their relationship with law.

Course Contents:

Module I: Understanding Poverty and Development

Poverty: Meaning and Concept, Relative Dimensions, Measurement and Determinants, Issues related to Poverty in India; Development: Perspectives, Developmental index.

Module II: Constitutional Guarantees for the Poor

Equality and Protective Discrimination, Right to Basic Needs and Welfare, Abolition of Untouchability and Protection of Civil Rights, Right to Development.

Module III: Criminal Justice System and the Poor

Treatment of the poor by Police, Inability to get Bail, Problems of Poor Under trials, Working of free legal aid schemes.

Module IV: Impoverishment of Women, Children and Disabled Persons

Deprivations of women under family laws, Problems of women workers in organized and unorganized sectors, Child labour, Approaches to disability and rights of the disabled persons, Right to education and dignity.

Examination Scheme:

Components	P/S/V	CT	A	C	EE
Weightage (%)	10	10	05	5	70

Text & References:

- Law, Poverty and Development – Upendra Baxi
- State and Poverty in India – Atul Kohli
- The Poverty Question (Search for Solution) – Yogesh Atal
- Poverty, Rural Development and Public Policy - Amarendra


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PROFESSIONAL ETHICS

Course Code: LAW2904

Credit Units: 05

Course Objective:

The Course has been designed to acquaint the students of Law about the Professional Ethics and Professional etiquettes that are essentially significant for an advocate to observe while at the Bar. Accountability and transparency are imperative to the profession. Besides, the conducive and cordial Bar- Bench relations can send a good message concerning the richness of the Legal profession. With this background cue, the course aims at developing insights of the students about the professional parameters.

Course Contents:

Module I: Historical Introduction

Historical introduction to legal profession in India – Barristers, Vakils, High Court Pleaders, Advocates, etc. The All India Bar Committee, 1951 and the passing of Indian Advocates Act, 1961. The Advocates Act 1961: Definitions Section 2, Constitution and function of State Bar Councils, Bar Council of India, Terms of Office, various sub-committees including Disciplinary Committee and the qualification for their membership. Power to make rules Sections 3 to 15 – Chapter –II.

Module II: The Advocate's Act, 1961

The Advocate Act, 1961.

Admission and enrolment of Advocate – Senior and other Advocates, Common role of Advocates, Qualifications and Disqualifications for enrolment and procedure thereof, Chapter – III Section 16 to 28.

Rights to Practice: Monopoly of representation, Exclusion of advocates from certain cases, self representation by litigants. Chapter IV Secs. 29 to 34.

Professional and other misconduct, Principles for determining misconduct, Disciplinary Committees of State Bar Council and the Bar Council of India, Punishment of advocates for misconduct, Appeals to the Supreme Court, Chapter – V – Secs. 35 to 44.

Module III: Legal Profession

Nature of Legal Profession, Need for an Ethical Code of Rights: privileges and duties of Advocates, Preparation of a case and fees of an Advocate, under – cutting, Bar against soliciting work and advertisement, Bar against touting, refusal of briefs, accountability to the client, confidentiality communication between Advocates to compromise, Study of Code of Ethics prepared by the Bar Council of India.

Module IV: Contempt of Courts Act, 1971

Contempt of Courts Act, 1971,

What is Contempt? Civil and criminal contempt, punishment for contempt.

Procedures in contempt cases. High Court Rules and the Supreme Court

Rules to regulate contempt proceedings.

Examination Scheme:

Components	P/S/V	CT	C	A	EE
Weightage (%)	10	10	5	5	70

Text & References:

- Sanjeev Rao, Indian Advocates Act, 1971.
- M.P. Jain, Indian Legal History (Chap. On Legal Profession).
- Krishna Murthy Iyer's Book on Advocacy.
- The Contempt of Courts Act, 1971.
- Journal of Bar Council of India.

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PRIVATE INTERNATIONAL LAW

Course Code: LAW2905

Credit Units: 05

Course Objective:

The course equips the student to deal with dispute involving a foreign element in personal, civil and commercial matters *i.e.* increasing in frequency as a result of a globalized economic and social environment.

Course Contents:

Module I: Introduction

Application and subject matter of Private International Law, Distinction with Public International Law, Characterization and theories of characterization, Concept of Renvoi, Application of foreign law, Domicile, Jurisdiction of courts.

Module II: Family Law and Adoptions

Material and formal validity of marriage under Indian and English law, Choice of law and jurisdiction of courts in matrimonial causes: dissolution of marriage, grounds of divorce, restitution of conjugal rights, recognition of foreign judgment, Recognition of foreign adoptions, Adoption by foreign parents, Jurisdiction under Indian and English law.

Module III: Civil and Commercial matters

Tort, Theories of foreign tort, Contract, Theory of Proper Law of Contract, Ascertaining the applicable law, Property.

Module IV: Indian Law relating to foreign judgment

Basis of recognition; Recognition and Enforcement of Foreign Judgments, Finality, Failure, Direct execution of foreign judgments, decrees.

Examination Scheme:

Components	P/S/V	CT	C	A	EE
Weightage (%)	10	10	5	5	70

Text & References:

- Dr. Paras Diwan :Private International Law
- Cheshire : Private International Law
- Morris : Private International Law


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ELECTION LAW

Course Code: LAW2906

Credit Units: 05

Course Objective:

The objective of this paper is to acquaint the students with the election laws governing the elections of the Houses of the Parliament and the State Legislatures as well as to the offices of President and Vice President.

Course Contents:

Module I: Introduction

Election: Meaning and Process, Constitutional Mandate, Laws governing elections, Election disputes, Election to the Offices of the President and Vice President.

Module II: Election Commission

Composition, Functions, Powers; Delimitation of Constituencies, Preparation and Revision of Electoral Rolls.

Module III: Qualifications and Disqualifications of Candidates

Constitutional and Statutory Provisions: Disqualifications of sitting members, Nomination and Candidature, Voters Right to Information; Anti Defection Law (Tenth Schedule to the Constitution of India).

Module IV: Corrupt Practices in the Election Law; Electoral Offences

Examination Scheme:


Components	P/S/V	CT	C	A	EE
Weightage (%)	10	10	5	5	70

Text & References:

- Manual of Election Law in India – Dev Inder
- Chawla's Elections Law & Practice - P.C. Jain & Kiran Jain
- Election Laws and Practice in India- R.N. Choudhry
- Corrupt Practices in Election Law – K.C. Sunny
- How India Votes – Election Laws, Practice and Procedure – V.S. Rama Devi & S.K. Mendiretta
- V.N. Shukla's The Constitution of India – M.P. Singh.

Statutory Reading:

- Relevant Provisions of the Constitution of India
- The Representation of the People Act, 1951.
- The Representation of the People Act, 1950.
- The Presidential and Vice-Presidential Elections Act, 1952
- The Election Commission (Condition of service of Election Commissioners and Transaction of Business) Act, 1991.
- The Delimitation Act, 2002.


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BANKING AND INSURANCE LAWS

Course Code: LAW2907

Credit Units: 05

Course Objective:

This course acquaints students with banking system of India and teaches them the various aspects and rights that exists for them in banking and insurance sector.

Course Contents:

Module I: Banking System in India

Kinds of banks and their functions; Banking Regulation Laws: Reserve Bank of India Act, 1934, Banking Regulation Act, 1949; Relationship between banker and customer: Legal Character, Contract between banker & customer, Banks duty to customers; The Banking Ombudsman Scheme, 1995; Liability under Consumer Protection Act, 1986.

Module II: Lending, Securities and Recovery by Banks

Principles of Lending ; Position of Weaker Sections; Nature of Securities and Risks Involved ; Recovery of debts with and without intervention of courts / tribunal: Recovery of Debts due to Banks and Financial Institutions Act, 1993, Securitisation and Reconstruction of Financial Assets and Enforcement of Security Interests Act, 2002.

Module III: Banking Frauds

Nature of Banking Frauds; Legal Regime to Control Banking Frauds; Recent Trends in Banking: Automatic Teller Machine and Internet Banking, Smart Cards, Credit Cards.

Module IV: Insurance Law


Nature of Insurance Contracts; Kinds of Insurance: Life Insurance, Medi claim, Property Insurance, Fire Insurance, Motor Vehicles Insurance (with special reference to third party insurance; Constitution, Functions and Powers of Insurance Regulatory and Development Authority; Application of Consumer Protection Act, 1986.

Examination Scheme:

Components	P/S/V	CT	C	A	EE
Weightage (%)	10	10	5	5	70

Text & References:

- Banking Law & Negotiable Instruments Act – Sharma and Nainta
- Banking System, Frauds and Legal Control – R.P. Namita
- Law of Insurance – M.N. Mishra
- Handbook of Insurance and Allied Laws – C. Rangarajan
- Banking Law & Practice in India – M.L. Tannan.


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INTERNATIONAL HUMANITARIAN AND REFUGEE LAW

Course Code: LAW2908

Credit Units: 05

Course Objective:

The objective of this paper is to make students aware of the principles of International Humanitarian and Refugee Laws.

Course Contents:

Module I: Historical Development of International Humanitarian Law

History and evolution, Growth, Character of International Humanitarian Law.

Module II: Geneva Conventions, 1949

Geneva Convention I, Geneva Convention II, Geneva Convention III and Geneva Convention IV, 1949, Additional Protocol I to Geneva Conventions, 1977, Additional Protocol II to Geneva Conventions II 1977.

Module III: Enforcement Machinery

War Crimes, Serious breaches of International Humanitarian Law, International Criminal Court (ICC).

Module IV: Refugees under International Law

Who is a refugee?, Convention Relating to the Status of Refugees, 1933, Convention on Status of Refugees, 1951, The 1967 Protocol, The AALCC Principles 1966, The OAU Convention 1969.

Module V: Implementation and Monitoring of the Rights of Refugees

Status of the UNHCR 1950, Cartagena Declaration 1984.

Module VI: Treatment of Refugees under Indian Laws


Draft SAARC Convention.

Examination Scheme:

Components	P/S/V	CT	C	A	EE
Weightage (%)	10	10	5	5	70

Text & References:

- Ingrid Detter, The Law of War, (Cambridge, 2000)
- A. Roberts and R. Guelff, eds., Documents on the Laws of War (Oxford, 2000)
- Legality of the Threat or Use of nuclear weapons, Advisory Opinion, ICJ Reports (1996)
- M.K. Balachandran and Rose Verghese (eds.) – International Humanitarian Law ICRC (1997)
- Ravindra Pratap, “India’s Attitude towards IHL”, in Mani (ed.) International Humanitarian Law in South Asia (Geneva: ICRC, 2003)
- Guy S. Goodwin – The Refugee in International Law (Oxford, 2000)
- A. Vibeke Egge, Mass Refugee Influx and the Limits of Public International Law (The Hague: Nijhoff, 2002).


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CORRUPTION LAWS

Course Code: LAW2911

Credit Units: 05

Course Objective:

To update the students about corruption laws that have already been formed. The main aim of the course is to make the students aware of the laws prevalent and the legal remedies available

Course Contents:

Module I: Introduction to Corruption Laws

Introduction- definition of corruption,

Genesis of corruption- Historical Background, corruption in ancient time, corruption in Mahabharata need for integrating

Nature of corruption, various types of corruption- in kind, cash or in service Individual Corruption, Institutional Corruption. Why and how of corruption – Nexus between Position of a Public servant and corruption consequences and ill effects

Module II: Offences by Public Servant

Offences under the Prevention of Corruption Act, 1988,

Corruption by Public servant- Prevention of Corruption Act 1988-

Definition of Public Servant sec 2(cc)

Categories of public servant- person in the pay of the Government- a person in the service of the Government a person remunerated by fees or commission for the performance of any public duty by the Government.

Sec 7: public Servant taking gratifications other legal remuneration in respect of an official act.

Gratification: legal remuneration, meaning of holding out as a Public Servant – whether covered under the Act.

Sec 8: Gratification by person other than public servant – to influence public servant by corrupt or illegal means.

Sec 9: Gratification by person other than Public Servant- to influence public servant- and not by corruptor illegal means.

Sec10, Sec11, Sec 12: Habitual committing of offence under Sec 8, 9, 12, 14.

Sec 15 Attempt

Sec 16 Fine Criteria

Sec 13 Criminal Misconduct by Public Servant.

Bribe giver Guilty or Abetment?

Investigation and Trial under the Act

Sec 17 Persons authorized to investigate.

Sec 19 Sanction for prosecution

Sec 20 presumptions under the Act.

Sec 3, 4, 5: Special Judges Court- procedure and powers of Special Judge.

Module III: Commission of Enquiry Acts

Section 6 Summary Trial. Commission of Enquiry Act 1952

Composition, function and role of CAG

The Central Vigilance Commission

Central Bureau of Investigation its role, function and Jurisdiction.

Proposed Lok Pal Bill ,its various drafts , legality of sting operations , provision relating to corruption cases of judges , Immunity of legislations and parliamentarians . Law on whistle blowers

Module IV: Money Laundering & National Investigative Agency Act

The Prevention of Money Laundering Act 2002, General Principles, Confiscation of Property earned through crime Sec5

Sec 171-B of IPC Bribery – Offences relating to elections.

Sec 171-C

Sec 171- D Undue influence and Impression at election

Sec 171- E Punishment for Bribery

Sec 171- F Punishment for Influence and Personating at an election.

National Investigative Agency Act 2009

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Module V: International Effort

International Efforts

The United Nations Directions

The Convention on Combating Bribery of Foreign Public Officials

UN Convention against Transnational Organized Crime.

UN Convention against Corruption (UNCAC)

Examination Scheme:

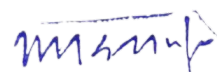
Components	P	A	C	CT	EE
Weightage (%)	5	5	10	10	70

Text & References:

- Prevention of Corruption Act, 1988
- Prevention of Money laundering Act, 2002
- National Investigative Agency act, 2009
- Un Conventions



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SUMMER INTERNSHIP EVALUATION-IV

Course Code: LAW2935

Credit Units: 03

It is a mode of Clinical Legal education Specified period to be spent by the student with a law firm/court/Commissions/NGO's and like institutions working with the realm of law or connected therewith. The reports both by the student and the office together with diary where applicable to be certified will be submitted for evaluation

The Internship during the summer break is a compulsory course. There is a Internship Data form where students fill in the details of where they are interning with complete address and phone numbers Customized Legal Reference /Diary is provided to the students on payment They maintain a day to day record of the work that they do at the place they are interning. They are expected to intern for a minimum 90 days. They submit their completed diary, certificate from the employer and also a report of their experience at work. After submission there is a Viva by concerned faculty. They assess the student on the kind of work they have done during internship, presentation of the work they have done and also on the practical knowledge they have gained

The Paper is marked out of 100 marks. The break up of the marks is as follows:

1.	Diary submission	25 Marks
2.	Report and certificate	25 Marks
3.	Viva (Panel of External Examiners)	40 Marks
4.	Attendance (Regularity in meeting the supervisor)	10 Marks
	Total	100


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MOOT COURT/ INTERNSHIP

Course Code: LAW2003

Credit Units: 14

Course Objective:

This course relates to litigation advocacy and as such this shall be simulation course that shall have two parts. First part shall focus on preparation for trial and trial strategies. It shall also disseminate techniques of examination-in-chief cross examination and re-examination of witnesses, argumentation in courts, bail application, injunction application, etc. The second part shall focus on writing briefs in civil suits and criminal cases, appellate briefs in civil and criminal cases, and writ matters, memorial writings and arguing before the appropriate forums. The students shall be given a case to argue, that shall help to articulate their argumentative zeal as well as capacity.

Course Contents:

Module I: Moot Court

Bench Memorial, Court Craft: Presentation of case, Interaction with Bench, Question Answer Court etiquette and mannerism section.

Module II: Internship

Specified period to be spent by the student with a law firm/court/Commissions/NGO's and like institutions working with the realm of law or connected therewith. The report and diary to be certified and submitted for evaluation.

Module III: Corporate Legal Training

Corporate communication skills and client interaction and etiquette in corporate law work environment.

Examination Scheme:

Components	P/S/V	CT	A	C	EE
Weightage (%)	10	10	05	05	70


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FINANCIAL ACCOUNTING

Course Code: LAW2110

Credit Units: 03

Course Objective:

To understand the basics of accounting and concepts of double entry system. The students will be given a detailed grounding on recording of transactions and preparation of final accounting statements for business organizations

Course Contents:

Module I: Introduction to Accounting

Understanding the meaning, nature, functions and usefulness of accounting, branches of accounting, accounting equation, accounting concepts and Generally Accepted Accounting Principles. Difference between Indian GAAP and US GAAP

Module II: Recording of Transactions and Subsidiary Books

Concept of double entry system. Understanding the Accounting cycle. Preparation of voucher, journal, ledger and trial balance and numerical on the same. Preparation of subsidiary books including purchase book, sales book, purchase returns book and sales return books and numerical on the same. Cash book, types of cash book and balancing of cashbook. Numerical on single column cashbook, double column cashbook, triple column cashbook and petty cash book.

Module III: Reconciliation of Bank Accounts

Causes for difference in the balance as per pass book and balance as per cashbook. Procedure for preparation of bank reconciliation statement when there is favorable balance and in case of overdraft and numerical on the same.

Module IV: Financial Statements

Preparation of trading account, manufacturing account, profit and loss account and balance sheet along with adjustments and numerical on the same and non-profit making organizations an overview. AS-1, AS-21 (no numerical)

Module V: Accounting For Partnership

Introduction to partnership accounts, partnership deed. **Admission of a new partner**-Revaluation account, Computation of new profit sharing ratio and sacrificing ratio, Proportionate capital, Treatment of goodwill in partnership accounts and its valuation. **Retirement and Death of a partner**: Determining the gaining ratio, Revaluation of assets and liabilities, Reserve, Final payment to retiring partner, Treatment and adjustment of goodwill. Numericals on preparation of various accounts in case of retirement and death of a partner. **Dissolution of the firm**: Circumstances leading to dissolution of partnership, Settlement of the accounts, Capital ratio on insolvency, Insolvency of all partners and Garner Vs Murray decision.

Examination Scheme:

Components	CT	HA	C	V	A	EE
Weightage (%)	10	5	5	5	5	70

Text & References:

Text:

- Maheshwari, S.N., Advanced Accountancy Volume-I, Ninth Edition, Vikas Publishing House Pvt. Ltd.

References:

- Grewal, T. S., Shukla, M. C., Advanced Accountancy, Sixteenth Edition, Sultan Chand and Sons.
- Tulsian, P.C, Financial Accounting 2005, Pearson Education.
- Narayanaswamy, R. Financial Accounting-A Managerial Perspective Second Edition, Prentice Hall India.
- Ramachandran, N., Kakani, R.K., Financial Accounting for Management, 2006, Tata McGraw Hill Publishing Company Limited.

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LEGAL METHOD

Course Code: LAW2104

Credit Units: 04

Course Objective:

This paper focuses on orientation of students to legal studies from the point of view of basic concepts of law and legal system.

Course Contents:

Module I: Meaning and Classification of Laws

Meaning, Definition, Functions: Justice, Stability and Peaceful Change; Classification of laws: Public and Private Law, Substantive and Procedural Law, Municipal and International Law.

Module II: Sources of Law

Custom; Precedent, Ratio, Obiter; Legislation. ;

Module III: Basic Concepts of Indian Legal System

Common Law, Essentials of a Valid Law, Constitution as the Basic Law, Rule of Law, Separation of Powers, Judicial system in India, **Principles of Equity**.

Module IV: Legal Writing and Research

Legal materials: Case law, Statutes, Reports, Journals, Manuals, Digests etc.; Importance of legal research ; Techniques of Legal Research : Doctrinal, Empirical Research, Legal writings and citations.

Examination Scheme:


Components	P/S/V	CT	A	C	EE
Weightage (%)	10	10	5	5	70

Text & References:

- Glanville Willains – Learning the law
- Avtar Singh – Jurisprudence (Legal Theory)
- B.N.M. Tripathi – An Introduction to Jurisprudence and Legal theory
- Benjamin N. Cardozo, The Nature of Judicial Process
- LI Publication – Indian Legal System
- ILI Publication in Legal Research and Methodology



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LAW OF CONTRACT-I

Course Code: LAW2105

Credit Units: 04

Course Objective:

Whatever may be the nature of a given society, the contractual relations, as are obtained in that society, are governed by certain principles which are more or less of a general and basic nature. In India these general principles are included in the statute of the Indian Contract Act. 1872. This course is designed to acquaint a student with the conceptual and operational parameters of these various general principles of contractual relations. Specific enforcement of contract is an important aspect of the law of contracts. Analysis of the kinds of contracts that can be specifically enforced and the methods of enforcement forms a significant segment of this study.

Course Contents:

Module I: Formation of Contract

Meaning and nature of contract, Offer / Proposal (Definition, Communication, Revocation, General/Specific offer, Invitation to treat), Acceptance (Definition, Communication, Revocation, Tenders / Auctions). 'E'Contract

Module II: Consideration and Capacity

Consideration (Definition, Essentials, Privity of contract), Capacity to enter into a contract (Minor's position, Nature / effect of minor's agreements).

Module III: Validity of Contract

Unlawful consideration and object, Free Consent, Coercion, undue influence, Misrepresentation, Fraud, Mistake, Contingent contract, Quasi contracts, Effect of void, voidable, valid, illegal, unlawful and uncertain agreements contracts.

Module IV: Discharge and Performance of Contract

Discharge of Contracts, Performance, Time and Place of performance, Impossibility of performance and frustration, Breach – Anticipatory & Present.

Module V: Remedies

Damages, Remoteness etc., Injunction, Specific performance, Quantum Merit.

Module VI: Specific Relief Act, 1963


Recovery of property, Specific performance of contracts, Rescission of Contract, Declaratory Decree, Injunctions: Temporary and Perpetual, Mandatory.

Examination Scheme:

Components	P/S/V	CT	A	C	EE
Weightage (%)	10	10	5	5	70

Text & References:

- Anson - Law of Contract
- Pollock and Mulla - Indian Contract Act
- Avtar Singh - Indian Contract Act
- Bangia - Law of Contract and Specific Relief
- Cheshire and Fifoot - Law of Contract.


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E-COMMERCE

Course Code: COM2103

Credit Units: 03

Course Objective:

In the changed business environment of today, it has become imperative for businesses to understand, appreciate and learn to create their presence in cyber space. This course focuses on exposing the students to the world of e-commerce, the opportunities, and the threats and teaches them the strategies of making businesses viable and successful.

Course Contents:

Module I: E-Commerce Concept

Meaning, definition, concept, features, function of E-Commerce, E-Commerce practices v/s traditional practices, scope and basic models of E-Commerce, limitations of E-Commerce, precaution for secure E-Commerce, proxy services. Concept of EDI, difference between paper based Business and EDI Based business, Advantages of EDI, Application areas for EDI, Action plan for Implementing EDI, Factors influencing the choice of EDI, Software Concept of Electronic Signature, Access Control.

Module II: Types of E-Commerce

Meaning of B2C, B2B, C2C, P2P. Applications in B2C- E-Banking, E-Trading. E-Auction - Introduction and overview of these concepts. Application of B2B- E-distributor, B2B service provider, benefits of B2B on Procurement, Just in time delivery. Consumer to consumer and peer to peer business model Introduction and basic concepts.

Module III: E-Marketing

Traditional Marketing V/S E-Marketing, Impact of Ecommerce on markets, Marketing issue in E-Marketing, Promoting your E-Business. Direct marketing, one to one marketing.

Module IV: E-Finance

Areas of E-Financing, E-Banking, traditional v/s E-Banking, operations in E-Banking. E-Trading- Stock marketing, trading v/s E-Trading, Importance of E-Trading, Advantages of E-trading, operational aspects of E-Trading.

Module V: E-Payment

Transactions through Internet, Requirements of E-Payment system, Post paid payment system- Credit card solutions, cyber cash Internet cheques. Instant Paid payment system- Debit card, direct debit. Prepaid payment system- Electronic cash, digicash, Netcash, cybercash, smart cards.

Examination Scheme:

Components	CT	HA	C	V	A	EE
Weightage (%)	10	5	5	5	5	70

Text & References:

Text:

- Electronic Commerce from Vision to fulfilment, Third Edition, Elias M Awad, Pearson Education

References:

- Electronic Commerce – A manager's Guide, Ravi Kalakota & Andrew B. Shinston, Pearson Education.
- Electronic Commerce - Technologies & Applications, Bhaskar Bharat, Tata McGraw Hill.
- Global E-Commerce, University Press, J. Christopher & T.H.K. Clerk.


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ECONOMIC SYSTEM AND SOCIETY

Course Code: ECO2104

Credit Units: 03

Course Objective:

This course will reflect the socio-economic change in historical perspective, capitalism as an economic system, structure of capitalism and capitalism in global context.

Course Contents:

Module I

Analyzing Socio-Economic Change in Historical Perspective

Module II

Capitalism as an economic system

Origins, nature and structure of capitalism; Accumulation and crisis; Alternative perspectives on capitalism.

Module III

The transition from feudalism to capitalism

Module IV: The evolving structure of capitalism

Monopoly capitalism, The modern corporation: divorce between ownership and control; The institutional diversity of capitalism; Alternative perspectives on the role of state.

Module V: Capitalism in Global Context

Multinational corporations and their impact on the developing economics; imperialism.

Examination Scheme:

Components	ATT	P	HA	CT	EE
Weightage (%)	5	5	5	15	70

ATT-Attendance; **P**-Project; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination


Text & References:

Text:

- J. Schumpeter (1942), Capitalism, Socialism and Democracy, George Allen and Unwin (1976 edition).
- T. Bottomore (1985), Theories of Modern Capitalism, Allen & Unwin. Chapters on Weber & Schumpeter.

References:

- D. Foley (1983), "Commodity", in T. Bottomore et al(ed.), The Dictionary of Marxist Thought., OUP, (Indian edition, Maya Blackwell, 2000)
- R. Blackburn (ed.) (1972), Ideology in Social Science, Chapter 8, Fontana
- Rodney Hilton(ed.) The Transition from Feudalism to Capitalism, Introduction
- P. Hirst and J. Zeitlin (1997), "Flexible Specialization: Theory and Evidence in the Analysis of Industrial Change", in R. Boyer et al (ed.), Contemporary Capitalism, Cambridge University Press.


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READINGS IN MANAGEMENT

Course Code: MGT2130

Credit Units: 02

Course Objective:

The objective of this concentration elective is to inculcate reading habit along with value addition to the existing understanding of the subject. The book would be a kind of knowledge enhancer that would envision the student about some current thoughts related to the discipline. The book reading and its critical analysis would help broaden the intellectual horizon of the student. The selection of the book will be department specific so that it can be discipline specific.

Guidelines:

The student is expected to thoroughly go through the discipline related prescribed book with the objective of critically reviewing each aspect and character of the book. The student is supposed to have a detailed insight into the following:

1. Content
2. Writing style
3. Information/learning
4. Content handling
5. Characters(if any)
6. Thematic Clarity

The report is to be submitted in about 3000 words on A4 size sheets, Font 12pt., Times New Roman, 1.5 spacing. Headings in Font Size 16

Evaluation:

Report on the Book in 3000 words	Written Test
50 marks	50 marks



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TERM PAPER

Course Code: MGT2131

Credit Units: 02

Course Objective:

The objective of this course is to judge the understanding as well as application of the knowledge gained by the students. The aim of the term paper is to provide the students with an opportunity to further enhance their knowledge in a sector of their choice by undertaking a significant practical unit of examining and analyzing various aspects of business management at a level commensurate with the learning outcomes of the various courses taken up them in the ongoing semester.


A term paper is primarily a record of intelligent reading in several sources on a particular subject. The students will choose the topic at the beginning of the session in consultation with the faculty assigned. At least one middle level or senior level person of a company from the chosen sector may be interviewed face to face.

Guidelines:

1. The term paper will be related to the contemporary business issue and the topic will be given by the department.
2. The presentation of the term paper is scheduled to be held before the commencement of Semester examinations.
3. The paper will carry 100 marks that will be marked on the basis of understanding and organization of content based on the literature review. The Bibliography shall form an important part of the paper.
4. Examples of a few broad areas for Term Paper (List is indicative, not exhaustive)
 - Credit rating
 - Risk management
 - Subprime meltdown and its after effect with case study from Indian industry
 - Corporate frauds
 - Micro finance institutions in India
 - Carbon Trading
 - IFRS
 - Celebrity Endorsement in real estate
 - Social media marketing
 - Green marketing
 - Sustainable branding practices
 - Relationship management
 - CSR
 - Balanced Score Card
 - Corporate Governance
 - Employee retention
 - NGOs.

Examination Scheme:

Organisation and relevance of content	Literature Review	Bibliography	Total
40	40	20	100


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PROJECT (WITH PRESENTATION & EVALUATION)

Course Code: MGT2132

Credit Units: 03

Objectives:

The aim of the project is to provide the students with an opportunity to further their intellectual and personal development in the chosen field by undertaking a significant practical unit of activity. The project can be defined as a scholarly inquiry into a problem or issues, involving a systematic approach to gathering and analysis of information / data, leading to production of a structured report.

Chapter Scheme and distribution of marks:

Chapter 1: Introduction	– 10 marks
Chapter 2: Conceptual Framework/ National/International Scenario	– 25 marks
Chapter 3: Presentation, Analysis & Findings	– 25 marks
Chapter 4: Conclusion & Recommendations	– 10 marks
Chapter 5: Bibliography	– 05 marks

Components of a Project Report

The outcome of Project Work is the Project Report. A project report should have the following components:

- 1) Cover Page: This should contain the title of the project proposal, to whom it is submitted, for which degree, the name of the author, name of the supervisor, year of submission of the project work, name of the University.
- 2) Acknowledgement: Various organizations and individuals who might have provided assistance /co-operation during the process of carrying out the study.
- 3) Table of Content: Page-wise listing of the main contents in the report, i.e., different Chapters and its main Sections along with their page numbers.
- 4) Body of the Report: The body of the report should have these four logical divisions
 - a) *Introduction*: This will cover the background, rationale/ need / justification, brief review of literature, objectives, methodology (the area of the study, sample, type of study, tools for data collection, and method of analysis), Limitations of the Study, and Chapter Planning.
 - b) *Conceptual Framework / National and International Scenario*: (relating to the topic of the Project).
 - c) *Presentation of Data, Analysis and Findings*: (using the tools and techniques mentioned in the methodology).
 - d) *Conclusion and Recommendations*: In this section, the concluding observations based on the main findings and suggestions are to be provided.
- 5) Bibliography or References: This section will include the list of books and articles which have been used in the project work, and in writing a project report.
- 6) Annexures: Questionnaires (if any), relevant reports, etc.
(The main text of the Project should normally be in the range of 5000 words. However, there may be annexure in addition to the main text)

The Steps of a Project Report

Step I: Selection of the topic for the project by taking following points into consideration:

- Suitability of the topic.
- Relevance of the topic
- Time available at the disposal.
- Feasibility of data collection within the given time limit.
- Challenges involved in the data collection (time & cost involved in the data collection, possibility of getting responses, etc.)

Step II: Finalisation of the Topic and preparation of Project Proposal in consultation with the Supervisor.

Step III: Collection of information and data relating to the topic and analysis of the same.

Step IV: Writing the report dividing it into suitable chapters, viz.,

Chapter 1: Introduction,

Chapter 2: Conceptual Framework / National & International Scenario,

Chapter 3: Analysis & Findings

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Chapter 4: Conclusion and Recommendations.

Step V: The following documents are to be attached with the Final Project Report.

- 1) Approval letter from the supervisor (Annexure-IA)
- 2) Student's declaration (Annexure-IB)
- 3) Certificate from the Competent Authority of the Organisation / Institution, if the student undertakes the Project Work in any Organisation / Institution.

Guidelines for Evaluation:

Each of the students has to undertake a Project individually under the supervision of a teacher and to submit the same following the guidelines stated below:


- Language of Project Report and Viva-Voce Examination may be English. The Project Report must be typed and hard bounded.
- Failure to submit the Project Report or failure to appear at the Viva-voce Examination will be treated as "Absent" in the Examination. He /she has to submit the Project Report and appear at the Viva-Voce Examination in the subsequent years (within the time period as per University Rules).
- No marks will be allotted on the Project Report unless a candidate appears at the Viva-Voce Examination. Similarly, no marks will be allotted on Viva-Voce Examination unless a candidate submits his/her Project Report.
- Evaluation of the Project Work to be done jointly by one internal expert and one external expert with equal weightage, i.e., average marks of the internal and external experts will be allotted to the candidate.

Evaluation Scheme:

Project Report	Power Point Presentation & Viva	Total
75 marks	25 marks	100



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WORKSHOP

Course Code: MGT2133

Credit Units: 01

Course Objective:

A workshop is primarily an activity based academic event that is organized to provide the students a one to one and hands on experience on any aspect of their learning. The communication in a workshop has to be necessarily two ways. The trainer has to make sure that the aspects covered are practically practiced by the participants. The student will choose the option of workshop from amongst their concentration electives. The evaluation will be done by Board of examiners comprising of the faculties.

Major Themes for Workshop:

The workshop may be conducted on any of the following major themes:

Accounting

Finance

Human Resources

Marketing

Economics

Operations

Supply Chain Management

These themes are merely indicative and the trainer may choose any recent and relevant topic of study.

Guidelines for Workshop:

The procedure for earning credits from workshop consists of the following steps:

1. Relevant study material and references will be provided by the trainer in advance.
2. The participants are expected to explore the topic in advance and take active part in the discussions held
3. Attending and Participating in all activities of the workshop
4. Group Activities have to be undertaken by students as guided by the trainer.
5. Evaluation of workshop activities would be done through test and quiz at the end of the workshop.
6. Submitting a write up of atleast 500 words about the learning outcome from the workshop.

Methodology:

The methodology followed at the workshop could be based on any one or more of the following methods:

Case Study

Business Game

Simulation

Group Activity


Role Play

Business Planning

Quiz

Examination Scheme:

Attendance	Active Participation	Multiple Choice Questions/ Quiz	Solving the case/ Assignment/ Write up	Total
10	30	30	30	100


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LAW OF CONTRACT-II

Course Code: LAW2204

Credit Units: 04

Course Objective:

This course shall be taught after the students have been familiarized with the general principles of Contract in which the emphasis is on understanding and appreciating the basic essentials of a valid Contract and on the existence of Contractual relationship in various instances. Obviously, Contract Law assumes special significance to suit changes in society. These special Contracts are studied in the light of statutory provisions and decisional Law. With the advent of globalization in various sectors of economy today and are in need of specialized legal Professionals due to huge contractual requirements, joint venture Partnerships and the like, Therefore, this Course of Special Contracts provides an insight into the justification for special statutory provisions for certain kind of Contracts.

Course Contents:

Module I: Indemnity and Guarantee/Bailment and Pledge

Meaning, Distinction between Indemnity and Guarantee, Right / Duties of Indemnifier, Indemnified and Surety, Discharge of Surety, Kinds of Guarantee, Bailment and Pledge: Meaning and Distinction, Rights and Duties of Bailor/Bailee, Pawnor/Pawnee, Lien, Termination of Bailment.

Module II: Agency

Definitions of Agent and Principal, Appointment of an Agent, Authority of an Agent, Creation of agency: by agreement, Ratification and law, Relation of principal / agent, subagent and substituted agent, Ratification of Agents Authority, Revocation of Agency Authority, Effects of Agency on Contracts with third person, Personal Liability of agents, Termination of agency.

Module III: Sale of Goods Act 1930

Contract of Sale: Nature and definition, Conditions and Warranties, Transfer of Property and Title, Performance of the contracts, rights of unpaid seller, suit for breach of contract.

Module IV: The Indian Partnership Act, 1932

Nature of partnership firm, Relations of partners to one another and outsiders, Rights /Duties of partners *inter se*, Partnership Property: Relations of Partners to third parties, Liability for holding out, Minor as a partner; Incoming and outgoing partners, Dissolution of Partnership Firm, Modes of Dissolution, Consequences of dissolution, Registration of firms and effects of non registration.

Examination Scheme:

Components	P/S/V	CT	C	A	EE
Weightage (%)	10	10	5	5	70

Texts & References:

- Pollock and Mulla, Indian Contract Act
- Avtar Singh, Indian Contracts Act
- Mulla, D. F., Indian Partnership Act
- Desai, T.R., Law of Contracts and Partnership sale of good Act
- R.K. Bangia, Sales of Goods Act, 1930
- Avtar Singh, Sales of Good Act
- Avtar Singh, Indian Partnership Act.
- K. Sukumaran, Pollock & Mulla - The Indian Partnership Act


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ANALYSIS AND DESIGN OF BUSINESS SYSTEM

Course Code: MGT2204

Credit Units: 03

Course Objective:

The course aims at preparing students conceptualize and define scope and domain of system analysis and design. It also focuses on system development life cycle using conventional and structural look.

Course Contents:

Module I: The systems development Environment. (Information system development life cycle)

System & its parts, Types of Systems, Characteristics of a System, System Analyst in system Development, Developing Systems- SDLC, Approaches to System Development (Prototyping, Joint Application Design (JAD), Participatory Design (PD)), System Development Models (Waterfall model & Spiral Model), System Planning & Selection (Identifying, Selecting, Initiating & Planning System Development Project).

Module II: System Planning and Selection (Graphic technology modeling tool)

Identifying and Selecting Projects (Identifying potential development projects, classifying and ranking projects, and selecting projects for development), Methods for project identification and selection, Evaluation criteria for classifying and ranking projects, Initiating and Planning System Development Projects (Process & performed Activities, Deliverables & Outcomes), Assessing Project Feasibility (Economic, Operational, Technical, Schedule, Legal & Contractual, Political Feasibility)

Module III: System & Data Analysis (Data Analyzing Modeling)

Determining System Requirements (Traditional Methods, Modern & Radical Methods), Structuring System Requirements (Process Modeling – DFD, Logic Modeling – Structured English & Decision Tables, Conceptual Modeling – ER Model), Data Analysis & Techniques (Interpretive, Coding, Recursive Abstraction and Mechanical Technique), Types of Analysis (Descriptive, Exploratory, Confirmatory and Predictive), Modeling Methodologies (Bottom Up method & Top Down Method), Generic and Schematic Data Modeling.

Module IV: System & Database Design

System Design (Design Objectives, Phases in Designing, Purpose of System Design), System Design Goals, Type of Design, Design Strategy, System Decomposition (Modeling, Connection and Coupling of a System), System Design Methodologies, Database Design, Database Management System – an introduction, Overview of Data Models, Relational Database Model – Well structured relations, Keys, Schema & Subschema, Structure, Facilities & Users, Constraints, Anomalies, Functional Dependency, Normalization, Roles & Duties of System Administration.

Module V: System Implementation & Operation (System Management)

Activities in implementing (Coding, Testing & Installation, Documentation, Training, Support, Maintenance), Types of testing, planning installation, approaches to installation, Documenting a system, Training and Supporting users, Types & Frequencies of Training Methods, Reasons of System Implementation Failures, Project Closedown, Conducting System Maintenance – Types of Maintenance (Corrective, Adaptive and Perfective Maintenance), effective maintenance, Evaluation of System's Success, System Enhancement, Quality Assurance in System Cycle.

Module VI: System Security and Auditing

System Security: Data Security, Backup & Recovery during System & Database failure, Ethical Issues in System Development, Threat and Risk Analysis, Audit, System Audit, System Audit Standards (Planning, Implantation and Reporting Standards), System Analysis and Programming (Overview, Role & Duties of System Experts as Analyst and Programmer).

Examination Scheme:

Components	CT	HA	C	V	A	EE
Weightage (%)	10	5	5	5	5	70

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Text & References:

Text:

- Essentials of System Analysis & Design, Second Edition, Valacich George Hoffer, Prentice-Hall India

References:

- Analysis and Design of information systems, James A. Senn
- Computer Based Information Systems, Kroeber, Donald W. and Watron, Hugh J.
- Systems Analysis & Design, E. M. Awad.
- Systems Analysis and Design – An Applied Approach, Dennis Wixom, Wiley



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INNOVATION & CREATIVITY MANAGEMENT

Course Code: MGT2205

Credit Units: 03

Course Objective:

To develop an appreciation for new ideas and out of the box thinking so that students can successfully imbibe the habit of innovative and creative thinking in situations is demanding such an approach.

Course Contents:

Module I:

Innovation Management- Introduction, characteristics, Components, Types, Models of Innovation process, Innovation Environment-Originators of Innovation, Key Drivers of Innovation, Factors influencing innovation, Nurturing innovation in e-business.

Module II:

Organizing for Innovation- Organizational theories and structures, traits of innovative organizations, current trends, factors influencing organizational design and size decisions, Need & Characteristics for creative organization, 7S framework, creativity crushers, fostering innovation climate and culture, The creativity Hit List.

Module III:

Research and Development management- Significance, Prerequisites, Process, Technology development approaches, management of R &D, In source to open source environment, R&D in small industry, Managing Creative employees, significance and challenges of managing creative employees, Traits of a creative person, motivation to creativity, strategies for unblocking creativity, factors influencing group creativity, Promoting group creativity, Left and right thinking, Linear and non-linear thinking process, creative thinking, Tradition vs creative thinking.

Module IV:

Individual creativity techniques- Inner and Directed creativity techniques, Group Creativity Techniques-creativity methods, writing techniques, techniques based on pictures, maps and networks, Product innovation-types of new products, Target markets for Disruptive Innovation, Technology strategies for innovation, new product development, packaging and positioning innovations, beyond product innovation, New product failures.

Module V:

Innovation Diffusion- Concept of diffusion and adaptation, diffusion types, Innovation diffusion theory, Innovation adoption by organizations, Innovation adoption across countries, Marketing strategy and the diffusion process.

Module VI:

Legal aspects of innovation- IPR, Indian Patents Act, trademark, Copyrights, Trade secrets, Towards Innovative Society-Innovation for social development, Spirit of innovation in India, Favourable and Unfavourable factors.

Examination Scheme:

Components	CT 1	HA	V	A	EE
Weightage (%)	10	10	5	5	70

Text & References:

Text:

- Krishnamacharyulu and Lalitha, *Innovation Management*, Himalaya Publishing House, New Delhi- 2007

References:

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Pisek, *Creativity, Innovation and Quality*, Prentice Hall of India, New Delhi-2003


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SALIENT PEDAGOGICAL FEATURES-

1. Classroom teaching to focus on enhancing out of the box thinking.
2. Assignments: Practical tasks emphasising on honing up creative thinking.
3. Case study analysis: To enable students to appreciate the application of concepts in real life environment.
4. Active student participation in class discussions.
5. Role plays to boost spontaneity.



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HUMAN VALUES AND PROFESSIONAL ETHICS

Course Code: MGT2206

Credit Units: 03

Course Objective:

The aim of this course is to facilitate the development of a Holistic perspective among students towards life, profession and happiness, based on a correct understanding of the Human reality and the rest of Existence. Such a holistic perspective forms the basis of value based living in a natural way. Recognize the need for lifelong learning and have the knowledge and skills that prepare them to identify the Moral issues involved in Management areas and to provide an understanding of the interface between Social, Technological and Natural environments.

Course Contents:

Module I: Human Values

Morals, Values, Types of values, evolution of human values, Ethics – Integrity – Work Ethic – Honesty – Courage –Empathy – Self-Confidence – Character, Challenges at Work place

Module II: Values in Management

Relevance of values in Management, need for values in global change, values for managers, holistic approach for managers in decision making, problems related to stress in corporate management

Module III:

Workplace Rights and Responsibilities: Organizational complaint procedures. Government agencies. Resolving Employee concerns. Limits on acceptable behavior in large corporation.

Work environment: Ethical and legal considerations, Organizational responses to offensive behavior and harassment. Ethics in a Global Context.

Module IV: Industrial Integrity

The epitome of industrial success, Integrity and organization, Exploring learning process of integrity, Consequences of lack of integrity.

Examination Scheme:


Components	CPA	Viva	HA	A	ME	EE
Weightage (%)	5	5	5	5	10	70

Text &References:

R R Gaur, R Sangal, G P Bagaria, 2010, *A Foundation Course in Human Values and Professional Ethics*, Excel Books

References:

- Ivan Illich, 1974, *Energy & Equity*, The Trinity Press, Worcester, and HarperCollins, USA
- E.F. Schumacher, 1973, *Small is Beautiful: a study of economics as if people mattered*, Blond & Briggs, Britain.
- A Nagraj, 1998, *Jeevan Vidya ek Parichay*, Divya Path Sansthan, Amarkantak.
- Sussan George, 1976, *How the Other Half Dies*, Penguin Press. Reprinted 1986, 1991
- PL Dhar, RR Gaur, 1990, *Science and Humanism*, Commonwealth Purblishers.
- A.N. Tripathy, 2003, *Human Values*, New Age International Publishers.
- Donella H. Meadows, Dennis L. Meadows, Jorgen Randers, William W. Behrens III, 1972, *Limits to Growth – Club of Rome's report*, Universe Books.


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READINGS IN MANAGEMENT

Course Code: MGT2230

Credit Units: 02

Course Objective:

The objective of this concentration elective is to inculcate reading habit along with value addition to the existing understanding of the subject. The book would be a kind of knowledge enhancer that would envision the student about some current thoughts related to the discipline. The book reading and its critical analysis would help broaden the intellectual horizon of the student. The selection of the book will be department specific so that it can be discipline specific.

Guidelines:

The student is expected to thoroughly go through the discipline related prescribed book with the objective of critically reviewing each aspect and character of the book. The student is supposed to have a detailed insight into the following:

- Content
- Writing style
- Information/learning
- Content handling
- Characters(if any)
- Thematic Clarity


The report is to be submitted in about 3000 words on A4 size sheets, Font 12pt., Times New Roman, 1.5 spacing. Headings in Font Size 16

Evaluation:

Report on the Book in 3000 words	Written Test
50 marks	50 marks



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TERM PAPER

Course Code: MGT2231

Credit Units: 02

Course Objective:

The objective of this course is to judge the understanding as well as application of the knowledge gained by the students. The aim of the term paper is to provide the students with an opportunity to further enhance their knowledge in a sector of their choice by undertaking a significant practical unit of examining and analyzing various aspects of business management at a level commensurate with the learning outcomes of the various courses taken up them in the ongoing semester.

A term paper is primarily a record of intelligent reading in several sources on a particular subject. The students will choose the topic at the beginning of the session in consultation with the faculty assigned. At least one middle level or senior level person of a company from the chosen sector may be interviewed face to face.

Guidelines:

1. The term paper will be related to the contemporary business issue and the topic will be given by the department.
2. The presentation of the term paper is scheduled to be held before the commencement of Semester examinations.
3. The paper will carry 100 marks that will be marked on the basis of understanding and organization of content based on the literature review. The Bibliography shall form an important part of the paper.
4. Examples of a few broad areas for Term Paper (List is indicative, not exhaustive)
 - Credit rating
 - Risk management
 - Subprime meltdown and its after effect with case study from Indian industry
 - Corporate frauds
 - Micro finance institutions in India
 - Carbon Trading
 - IFRS
 - Celebrity Endorsement in real estate
 - Social media marketing
 - Green marketing
 - Sustainable branding practices
 - Relationship management
 - CSR
 - Balanced Score Card
 - Corporate Governance
 - Employee retention
 - NGOs.

EVALUATION

Organisation and relevance of content	Literature Review	Bibliography	Total
40	40	20	100



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PROJECT (WITH PRESENTATION & EVALUATION)

Course Code: MGT2232

Credit Units: 03

Objectives:

The aim of the project is to provide the students with an opportunity to further their intellectual and personal development in the chosen field by undertaking a significant practical unit of activity. The project can be defined as a scholarly inquiry into a problem or issues, involving a systematic approach to gathering and analysis of information / data, leading to production of a structured report.

Chapter Scheme and distribution of marks:

Chapter 1: Introduction	– 10 marks
Chapter 2: Conceptual Framework/ National/International Scenario	– 25 marks
Chapter 3: Presentation, Analysis & Findings	– 25 marks
Chapter 4: Conclusion & Recommendations	– 10 marks
Chapter 5: Bibliography	– 05 marks

Components of a Project Report

The outcome of Project Work is the Project Report. A project report should have the following components:

- 1) Cover Page: This should contain the title of the project proposal, to whom it is submitted, for which degree, the name of the author, name of the supervisor, year of submission of the project work, name of the University.
 - 2) Acknowledgement: Various organizations and individuals who might have provided assistance /co-operation during the process of carrying out the study.
 - 3) Table of Content: Page-wise listing of the main contents in the report, i.e., different Chapters and its main Sections along with their page numbers.
 - 4) Body of the Report: The body of the report should have these four logical divisions
 - a) *Introduction*: This will cover the background, rationale/ need / justification, brief review of literature, objectives, methodology (the area of the study, sample, type of study, tools for data collection, and method of analysis), Limitations of the Study, and Chapter Planning.
 - b) *Conceptual Framework / National and International Scenario*: (relating to the topic of the Project).
 - c) *Presentation of Data, Analysis and Findings*: (using the tools and techniques mentioned in the methodology).
 - d) *Conclusion and Recommendations*: In this section, the concluding observations based on the main findings and suggestions are to be provided.
 - 5) Bibliography or References: This section will include the list of books and articles which have been used in the project work, and in writing a project report.
 - 6) Annexures: Questionnaires (if any), relevant reports, etc.
- (The main text of the Project should normally be in the range of 5000 words. However, there may be annexure in addition to the main text)

The Steps of a Project Report

Step I: Selection of the topic for the project by taking following points into consideration:

- Suitability of the topic.
- Relevance of the topic
- Time available at the disposal.
- Feasibility of data collection within the given time limit.
- Challenges involved in the data collection (time & cost involved in the data collection, possibility of getting responses, etc.)

Step II: Finalisation of the Topic and preparation of Project Proposal in consultation with the Supervisor.

Step III: Collection of information and data relating to the topic and analysis of the same.

Step IV: Writing the report dividing it into suitable chapters, viz.,

Chapter 1: Introduction,

Chapter 2: Conceptual Framework / National & International Scenario,

Chapter 3: Analysis & Findings

Chapter 4: Conclusion and Recommendations.

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Step V: The following documents are to be attached with the Final Project Report.

- 1) Approval letter from the supervisor (Annexure-IA)
- 2) Student's declaration (Annexure-IB)
- 3) Certificate from the Competent Authority of the Organisation / Institution, if the student undertakes the Project Work in any Organisation / Institution.


Guidelines for evaluation:

Each of the students has to undertake a Project individually under the supervision of a teacher and to submit the same following the guidelines stated below:

- Language of Project Report and Viva-Voce Examination may be English. The Project Report must be typed and hard bounded.
- Failure to submit the Project Report or failure to appear at the Viva-voce Examination will be treated as "Absent" in the Examination. He /she has to submit the Project Report and appear at the Viva-Voce Examination in the subsequent years (within the time period as per University Rules).
- No marks will be allotted on the Project Report unless a candidate appears at the Viva-Voce Examination. Similarly, no marks will be allotted on Viva-Voce Examination unless a candidate submits his/her Project Report.
- Evaluation of the Project Work to be done jointly by one internal expert and one external expert with equal weightage, i.e., average marks of the internal and external experts will be allotted to the candidate.

Evaluation Scheme:

Project Report	Power Point Presentation & Viva	Total
75 marks	25 marks	100


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WORKSHOP

Course Code: MGT2233

Credit Units: 01

Course Objective:

A workshop is primarily an activity based academic event that is organized to provide the students a one to one and hands on experience on any aspect of their learning. The communication in a workshop has to be necessarily two ways. The trainer has to make sure that the aspects covered are practically practiced by the participants. The student will choose the option of workshop from amongst their concentration electives. The evaluation will be done by Board of examiners comprising of the faculties.

Major Themes for Workshop:

The workshop may be conducted on any of the following major themes:

Accounting

Finance

Human Resources

Marketing

Economics

Operations

Supply Chain Management

These themes are merely indicative and the trainer may choose any recent and relevant topic of study.

Guidelines for Workshop:

The procedure for earning credits from workshop consists of the following steps:

- Relevant study material and references will be provided by the trainer in advance.
- The participants are expected to explore the topic in advance and take active part in the discussions held
- Attending and Participating in all activities of the workshop
- Group Activities have to be undertaken by students as guided by the trainer.
- Evaluation of workshop activities would be done through test and quiz at the end of the workshop.
- Submitting a write up of atleast 500 words about the learning outcome from the workshop.

Methodology:

The methodology followed at the workshop could be based on any one or more of the following methods:

Case Study

Business Game

Simulation

Group Activity

Role Play

Business Planning

Quiz

Evaluation Scheme:

Attendance	Active Participation	Multiple Choice Questions/ Quiz	Solving the case/ Assignment/ Write up	Total
10	30	30	30	100


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CONSTITUTIONAL LAW-I

Course Code: LAW2303

Credit Units: 04

Course Objective:

The course aims at analyzing constitutional institutions, its powers, limitations and interrelationships with one another and seeks to mould a frame of mind in the student to appreciate and assess constitutional policy and changes for the future.

Course Contents:

Module I: Fundamental Rights and Directive Principles, and Fundamental Duties

Idea of Fundamental Rights and their importance, against whom the Fundamental rights are available? Definition of 'State'? Law in Art. 13, Directive Principles; Nature and reasons for incorporation, inter-relationship between fundamental rights and directive principles, judicial policy towards Directive principles from Champakam to Minerva Mills and thereafter, Art. 51-A (K) and its correlation with Art. 21-A.

Module II: Freedom and Personal Liberty

Freedom of speech and expression and of press; Is Right to Information inclusive in Freedom of Speech and Expression? Freedom of Assembly, Freedom of Association, Freedom of Movement, Freedom to reside and settle, Freedom of profession/Business, etc. Art. 19: Are these freedoms absolute? Rights of an accused: Double Jeopardy, Self-incrimination and retrospective punishment, Art. 20; Right to life and personal liberty: Meaning of personal liberty, Procedure established by Law, Before Maneka Gandhi, Maneka Gandhi and thereafter, Art. 21; preventive detention and constitutional safeguards: Art. 22; Right to education Art. 21-A.

Module III: Equality and Protective Discrimination

Equality before Law and equal protection of Laws, meaning, constitutional provisions Arts 14, 15, 16, 17, 29 (2), 325: Total conspectus, Classification for differential treatment, prohibited grounds of discrimination: Arts. 15(1), (2), (3), 16 (2), (3), 29 (2); Protective Discrimination in favour of SC / ST and other backward classes and recent trends eg. Schedule IX and Reservation Policy, Women and children Art. 15, 15(3), 15(4), 15(5) Abolition of titles – Arts. 18.

Module IV: Secularism

Concept of Secularism, Indian Constitutional provisions, Indian concept of Secularism, Freedom of religion, Scope: Arts. 25, 26, Limits of Freedom, Religion and State in India, State Control and non-interference with religion; Minority rights: Why? Scope: Meaning and Minority, Minority right to educational institutions and judicial attitude.

Module V: Judicial Process under the constitution

Judicial Review : Nature of Judicial Review, Arts. 32, 136, 141, 226, 227.

Judges: Appointments, conditions of service, etc; Public Interest Litigation.

Supreme Courts Original and Advisory Jurisdiction.

Examination Scheme:

Components	P/S/V	CT	C	A	EE
Weightage (%)	10	10	5	5	70

Text & References:

- V.N. Shukla, Constitution of India
- M.P. Jain – Indian Constitutional Law.
- H.M. Seervai – Constitutional Law of India.
- Durga Das Basu – Shorter Constitution.
- P.M. Bakshi – Constitution of India.
- J.N. Pandey – Constitution of India..

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LAW OF CRIMES - I (INDIAN PENAL CODE SECTION 1-120B)

Course Code: LAW2304

Credit Units: 04

Course Objective:

Course on Law of Crimes aims at introducing students to the basic principles of criminal law. There has been a progressive as well as regressive change in the Indian society since Independence. A proper understanding of crimes and the causal factors for the occurrence of crime is extremely important in the larger context of India's development, if young law students are to use their knowledge and skills to build a just and humane society. The young law students are the would be lawyers and as such they must have an acquaintance with such knowledge to make criminal justice system serve the goals of social defense as well as social justice. Therefore, a study of the basic concepts of specific offences under the Indian Penal Code is imperative.

Course Contents:

Module-I: Introduction to Substantive Criminal Law: Extent and operation of the Indian Penal Code, Definition of Crime, Fundamental elements of crime, Stages in commission of a crime, Intention, Preparation, Attempt.

Module-II: Punishment: Theories: Deterrent, Retributive, Preventive, Expiatory and Reformative Theory. Punishment under the IPC: Fine, Imprisonment, Capital Punishment.

Module-III: General Explanations and Exceptions: Definitions, Constructive joint liability, Mistake, Judicial and Executive acts, Accident, Necessity, Infancy, Insanity, Intoxication, Consent, Good faith, Private defence

Module-IV: Abetment and Criminal Conspiracy

Examination Scheme:

Components	P/S/V	CT	A	C	EE
Weightage (%)	10	10	5	5	70

Text & References:

- Ratanlal & Dhirajlal – The Indian Penal Code
- K. D. Gaur – A Text Book on Indian Penal Code
- S.N. Misra, Indian Penal Code
- B.M. Gandhi, Indian Penal Code (1996), Eastern, Nagpur.
- P.S. Achutan Pillai, Criminal Law (1995) Eastern, Lucknow


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FAMILY LAW-I

Course Code: LAW2305

Credit Units: 04

Course Objective:

This Course aims at providing adequate Sociological perspective so that the basic concepts relating to family are expounded in their social setting. It is designed to address the various aspects of Hindu Law and strives to give an overview of some of the current problems arising out of the foundational inequalities in the various family concepts.

Course Contents:

Module I: Introduction (Sources, Schools and Joint Hindu Family)

Sources and Schools of Hindu Law; The Concept, Formation and incidents of Joint Hindu Family of Mitakshara and Dayabhaga; The Coparcenaries : It's formation and various incidents of Joint Hindu Family of Mitakshara and Dayabhaga; Karta of the Joint Family : His position, powers, privileges and obligation.

Module II: Hindu Marriage (Vivah) and Matrimonial Remedies (The Hindu Marriage Act, 1955)

Hindu Marriage: Nature, concept, Essential conditions & Prohibitions; Void & Voidable Marriages; Divorce: Customary and Judicial- Matrimonial fault theory, irretrievable breakdown and of marriage; Option of puberty; Restitution of conjugal rights; Judicial separation.

Module III: Alimony, maintenance, Adoption and Guardianship (The Hindu Adoption and Maintenance Act, 1956 and The Hindu Minority and Guardianship Act, 1956)

Maintenance of neglected wives, divorced wives, minor children, disabled children and parents under sections 125, 127 of Code of Criminal Procedure, 1973; Alimony : Temporary Permanent; Maintenance: Pendente Lite and permanent and maintenance for Divorced Hindu women under The Hindu Adoption and Maintenance Act, 1956; The Hindu Minority and Guardianship Act, 1956,

Module IV: Law of Succession, inheritance and Partition among Hindus (The Hindu Succession Act, 1956)

Property under Mitakshara Law and Dayabhaga: Formation and Incidents; Devolution of interest in Mitakshara Coparcenaries, Coparcenaries with reference to the provisions of Hindu Succession Act, 1956, Succession to property of Hindu female dying intestate under the Hindu Succession Act, 1956, Disqualifications relating to succession; Partition and Re-union.

Module V: Dispositions of Property under Hindu Law

Testamentary Disposition (Will): Definition and basis, Capacity of the Legatee, Formalities of a Will; subject matter of Will, Restrictions on testamentary power of disposition, interpretation of the Will, Revocation of the Will; Disposition inter vivos (Gift).

Examination Scheme:

Components	P/S/V	CT	C	A	EE
Weightage (%)	10	10	5	5	70

Text & References:

- Mulla, D.F., Principles of Hindu Law
- Paras Diwan, Modern Hindu Law
- Mulla, D.F., Principal of Mohammadan Law
- Fyzee, A.A.A., Outlines of Mohammadan Law
- Mahmood, T., Muslim Law of India
- Paras Diwan, Law of Intestate and Testamentary Succession (1998), Universal

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THE CODE OF CRIMINAL PROCEDURE

Course Code: LAW2311

Credit Units: 04

Course Objective:

In the absence of effective enforcement machinery, the substantive Criminal Law which defines offences and provides punishments for them, would be almost worthless. Therefore, the need of the Code of Criminal Procedure. The present course intends at acquainting the students with the various pre judicial and judicial procedures. This course also includes the rights and duties of those proceeded against and the powers, duties and restraints on those administering the criminal judicial process.

Course Contents:

Module I: Introduction

The importance of Fair Trial - constitutional perspectives of fair trial: Articles 14, 20, 21, Section – 2: Definitions; classes of Criminal Courts: Sections 6 to 13 including their powers and jurisdiction. The organization of Police, Prosecutor, Defense Counsel and Prison Authorities alongwith their duties, functions and powers.

Module II: Pre – Trial processes

FIR, Arrest and Bail provisions, bonds, process to compel appearances and production of things, search and seizure – search warrants, search without warrants, police search during investigations, general principles of search, seizure and constitutional aspects of validity of search and seizure proceedings.

Module III: Charge and common features relating to Trials

Form of Charge, joinder of charges, alteration of charge, basic rule regarding charge and its trial, withdrawal of charges, effect of error in the charge. Language of Courts, decision on evidence partly recorded by one judge or magistrate and partly by another, summary procedure to deal with certain cases of perjury and certain kinds of contempt of court, evidence in inquiries and trials, general provisions as to inquiries and trials, provisions as to accused persons of unsound mind.

Module IV: Criminal Trials and Execution Proceedings

Trial before Court of Sessions, Trial of warrant case by magistrate, Trial of Summons Case, Summary Trial, Judgment, submission of death sentence for confirmation, execution, suspension, remission and commutation of sentences.

Module V: Review Procedures

Appeal, Review and Reference

Module VI: Miscellaneous

Maintenance of wives, children and parents, Transfer of criminal cases, Irregular proceedings, Limitations for taking cognizance, Security for keeping peace and for good behavior, Disputes as regarding immovable property, Probation of Offenders Act

Module VII

Juvenile Justice (Care & Protection of Children) Act 2000. Concept of juvenile delinquency, juvenile court system, treatment and rehabilitation of juveniles, law for protection of juvenile offenders. Juvenile Justice (Care & Protection of Children) Act 2014.

Examination Scheme:

Components	P/S/V	CT	C	A	EE
Weightage (%)	10	10	5	5	70

Text & References:

- Ratan Lal and Dheeraj Lal, Criminal Procedure Code
- D.D. Basu, Criminal Procedure Code
- R.V. Kelkar, Lectures on Criminal Procedure Code
- R.V. Kelkar, Code of Criminal Procedure
- Chandrasekharan Pillai (ed.) Kelkar's Outlines of Criminal Procedure (2001), Eastern, Lucknow.

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INDUSTRIAL PSYCHOLOGY

Course Code: MGT2305

Credit Units: 03

Course Objective:

This course is designed to provide an overview of I/O Psychology including individual, group, and organizational issues resulting in enhanced understanding of the world of business and related career concerns. The main aim is to create awareness about the role and importance of Psychological factors and processes in the world of work

Course Contents:

Module I: Introduction

Nature and scope of organizational Psychology, History and development of field, Major problems of Industrial Psychology, Current trends in organizational Psychology

Module II: Types of Psychology

Mental psychology, Male & Female psychology, Impact on behavior and efficiency

Module III: Test of Psychology

Types of Tests, Effectiveness of these tests, Measures to control the tests steps to improve the psychology

Module IV: Individual and group behavior

Interaction and psychology involved in individuals, Improving psychology, Group Dynamics, Characteristics of group behavior, Attitude measurement, Methods of measuring attitudes, Leadership and supervision, Theories of Leadership.

Module V: Performance Management

Performance appraisal- Introduction, types, importance, Training and development- Introduction, significance and categories/types.

Examination Scheme:

Components	C	HA/P	CT	V	A	EE
Weightage (%)	10	5	5	5	5	70


C - Case Discussion/ Presentation; HA - Home Assignment; P - Project; S - Seminar; V - Viva; Q - Quiz; CT - Class Test; A - Attendance; EE - End Semester Examination

Text &References:

- Miner J.B. (1992) Industrial/Organizational Psychology. N Y : McGraw Hill.
- Blum & Naylor (2004) Industrial Psychology. Its Theoretical & Social Foundations CBS Publication.

References:

- Aamodt, M.G. (2012) Industrial/Organizational Psychology : An Applied Approach (7th edition) Wadsworth/Thompson : Belmont, C.A.
- Aswathappa K. (2008). Human Resource Management (fifth edition) New Delhi : Tata McGraw Hill.


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TERM PAPER

Course Code: MGT2331

Credit Units: 02

Course Objective:

The objective of this course is to judge the understanding as well as application of the knowledge gained by the students. The aim of the term paper is to provide the students with an opportunity to further enhance their knowledge in a sector of their choice by undertaking a significant practical unit of examining and analyzing various aspects of business management at a level commensurate with the learning outcomes of the various courses taken up them in the ongoing semester.


A term paper is primarily a record of intelligent reading in several sources on a particular subject. The students will choose the topic at the beginning of the session in consultation with the faculty assigned. At least one middle level or senior level person of a company from the chosen sector may be interviewed face to face.

Guidelines:

1. The term paper will be related to the contemporary business issue and the topic will be given by the department.
2. The presentation of the term paper is scheduled to be held before the commencement of Semester examinations.
3. The paper will carry 100 marks that will be marked on the basis of understanding and organization of content based on the literature review. The Bibliography shall form an important part of the paper.
4. Examples of a few broad areas for Term Paper (List is indicative, not exhaustive)
 - Management practices
 - Talent management
 - HR cases from Indian any industry
 - Employee motivation
 - Managerial competencies
 - Employability skills
 - Industrial relations
 - Knowledge management
 - Social media
 - Green marketing
 - Six Sigma
 - Sustainable branding practices
 - Training and development
 - Relationship management
 - CSR
 - Performance management system
 - Balanced Score Card
 - Corporate Governance
 - Employee retention
 - NGOs.

Evaluation Scheme:

Organisation and relevance of content	Literature Review	Bibliography	Presentation & Viva	Total
30	30	20	20	100


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PROJECT (WITH PRESENTATION & EVALUATION)

Course Code: MGT2332

Credit Units: 03

Objectives:

The aim of the project is to provide the students with an opportunity to further their intellectual and personal development in the chosen field by undertaking a significant practical unit of activity. The project can be defined as a scholarly inquiry into a problem or issues, involving a systematic approach to gathering and analysis of information / data, leading to production of a structured report.

Chapter Scheme and distribution of marks:

Chapter 1: Introduction	– 10 marks
Chapter 2: Conceptual Framework/ National/International Scenario	– 25 marks
Chapter 3: Presentation, Analysis & Findings	-- 25 marks
Chapter 4: Conclusion & Recommendations	-- 10 marks
Chapter 5: Bibliography	-- 05 marks

Components of a Project Report

The outcome of Project Work is the Project Report. A project report should have the following components:

- 1) Cover Page: This should contain the title of the project proposal, to whom it is submitted, for which degree, the name of the author, name of the supervisor, year of submission of the project work, name of the University.
 - 2) Acknowledgement: Various organizations and individuals who might have provided assistance /co-operation during the process of carrying out the study.
 - 3) Table of Content: Page-wise listing of the main contents in the report, i.e., different Chapters and its main Sections along with their page numbers.
 - 4) Body of the Report: The body of the report should have these four logical divisions
 - a. *Introduction*: This will cover the background, rationale/ need / justification, brief review of literature, objectives, methodology (the area of the study, sample, type of study, tools for data collection, and method of analysis), Limitations of the Study, and Chapter Planning.
 - b. *Conceptual Framework / National and International Scenario*: (relating to the topic of the Project).
 - c. *Presentation of Data, Analysis and Findings*: (using the tools and techniques mentioned in the methodology).
 - d. *Conclusion and Recommendations*: In this section, the concluding observations based on the main findings and suggestions are to be provided.
 - 5) Bibliography or References: This section will include the list of books and articles which have been used in the project work, and in writing a project report.
 - 6) Annexure: Questionnaires (if any), relevant reports, etc.
- (The main text of the Project should normally be in the range of 5000 words. However, there may be annexure in addition to the main text)

Steps of a Project Report

Step I: Selection of the topic for the project by taking following points into consideration:

- Suitability of the topic.
- Relevance of the topic
- Time available at the disposal.
- Feasibility of data collection within the given time limit.
- Challenges involved in the data collection (time & cost involved in the data collection, possibility of getting responses, etc.)

Step II: Finalisation of the Topic and preparation of Project Proposal in consultation with the Supervisor.

Step III: Collection of information and data relating to the topic and analysis of the same.

Step IV: Writing the report dividing it into suitable chapters, viz.,

Chapter 1: Introduction,

Chapter 2: Conceptual Framework / National & International Scenario,

Chapter 3: Analysis & Findings

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Chapter 4: Conclusion and Recommendations.

Step V: The following documents are to be attached with the Final Project Report.

- 1) Approval letter from the supervisor (Annexure-IA)
- 2) Student's declaration (Annexure-IB)
- 3) Certificate from the Competent Authority of the Organisation / Institution, if the student undertakes the Project Work in any Organisation / Institution.

Guidelines for evaluation:

Each of the students has to undertake a Project individually under the supervision of a teacher and to submit the same following the guidelines stated below:

- Language of Project Report and Viva-Voce Examination may be English. The Project Report must be typed and hard bounded.
- Failure to submit the Project Report or failure to appear at the Viva-voce Examination will be treated as "Absent" in the Examination. He /she has to submit the Project Report and appear at the Viva-Voce Examination in the subsequent years (within the time period as per University Rules).
- No marks will be allotted on the Project Report unless a candidate appears at the Viva-Voce Examination. Similarly, no marks will be allotted on Viva-Voce Examination unless a candidate submits his/her Project Report.
- Evaluation of the Project Work to be done jointly by one internal expert and one external expert with equal weightage, i.e., average marks of the internal and external experts will be allotted to the candidate.

Evaluation Scheme:

Project Report	Power Point Presentation & Viva	Total
75 marks	25 marks	100



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Declaration

Ihereby declare that the Project Work with the title (in block letters).....
submitted by me for the partial fulfilment of the degree of BBA is my original work and has not been submitted earlier to any other University /Institution for the fulfilment of the requirement for any course of study.

I also declare that no chapter of this manuscript in whole or in part has been incorporated in this report from any earlier work done by others or by me. However, extracts of any literature which has been used for this report has been duly acknowledged providing details of such literature in the references.

Signature of supervisor:


Signature of the student

Name:

Registration No

Place:

Date:


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WORKSHOP

Course Code: MGT2333

Credit Units: 01

Course Objective:

A workshop is primarily an activity based academic event that is organized to provide the students a one to one and hands on experience on any aspect of their learning. The communication in a workshop has to be necessarily two ways. The trainer has to make sure that the aspects covered are practically practiced by the participants. The student will choose the option of workshop from amongst their concentration electives. The evaluation will be done by Board of examiners comprising of faculties.

Major Themes for Workshop:

The workshop may be conducted on any of the following major themes:

- Accounting
- Finance
- Human Resources
- Marketing
- Economics
- Operations
- Supply Chain Management

These themes are merely indicative and the trainer may choose any recent and relevant topic of study.

Guidelines for Workshop:

The procedure for earning credits from workshop consists of the following steps:

1. Relevant study material and references will be provided by the trainer in advance.
2. The participants are expected to explore the topic in advance and take active part in the discussions to be held
3. Attending and Participating in all activities of the workshop
4. Group Activities have to be undertaken by students as guided by the trainer.
5. Evaluation of workshop activities would be done through test and quiz at the end of the workshop.
6. Submitting a write up of atleast 500 words about the learning outcome from the workshop.


Methodology:

The methodology followed at the workshop could be based on any one or more of the following methods:

- Case Study
- Business Game
- Simulation
- Group Activity
- Role Play
- Business Planning
- Quiz

Evaluation Scheme:

Attendance	Active Participation	Multiple Choice Questions/ Quiz	Solving the case/ Assignment/ Write up	Total
10	30	30	30	100


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SUMMER INTERNSHIP EVALUATION-I

Course Code: LAW2335

Credit Units: 03

It is a mode of Clinical Legal education Specified period to be spent by the student with a law firm/court/Commissions/NGO's and like institutions working with the realm of law or connected therewith. The reports both by the student and the office together with diary where applicable to be certified will be submitted for evaluation


The Internship during the summer break is a compulsory course. There is a Internship Data form where students fill in the details of where they are interning with complete address and phone numbers Customized Legal Reference /Diary is provided to the students on payment They maintain a day to day record of the work that they do at the place they are interning. They are expected to intern for a minimum 90 days. They submit their completed diary, certificate from the employer and also a report of their experience at work. After submission there is a Viva by concerned faculty. They assess the student on the kind of work they have done during internship, presentation of the work they have done and also on the practical knowledge they have gained

The Paper is marked out of 100 marks. The break up of the marks is as follows:

1.	Diary submission	25 Marks
2.	Report and certificate	25 Marks
3.	Viva (Panel of External Examiners)	40 Marks
4.	Attendance (Regularity in meeting the supervisor)	10 Marks
	Total	100



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RESEARCH METHODOLOGY AND REPORT PREPARATION

Course Code: MGT2410

Credit Units: 03

Course Objective:

To provide an exposure to the students pertaining to the nature and extent of research orientation, which they are expected to possess when they enter the industry as practitioners. To give them an understanding of the basic techniques and tools of marketing research. To train the students in evaluating and developing the marketing information system.

Course Contents:

Module I: Introduction

Nature and scope of marketing research, Marketing research as input in decision making process, Marketing research and marketing information system. Applications of marketing research, Planning a research project, Problem identification and formulation of Research Design, introduction to Research Design, Market research on the Internet.

Module II: Data collection methods

Attitudes measurement and scaling techniques, Ratio, Interval, Ordinal and nominal scales, Likert's scale, Thurstone scale, Semantic differentiation method. Observation methods and questionnaire method, Questionnaire design, Steps in constructing a questionnaire, Types of questions, introduction to Projective techniques and perceptual mapping.

Module III: Sampling

Sampling decisions, Sampling frame, Sample selection methods - Probability and non probability, Sample size, sampling error and error in sampling. Application of sampling methods to marketing problems.

Module IV: Data Collection Field Force

Data collection field force, Fieldwork procedure, common sources of error in the fieldwork, minimizing fieldwork errors, Tabulation of collected data.

Module V: Data Analysis

Data analysis-I, Test of significance Z, t, F and chi-square, Data analysis-II, Correlation and regression techniques, Data analysis – III – Cluster Analysis, Introduction to Statistical Package

Module VI: Report Writing

Research presentation and research process examination; Report writing - Types of research report. Examination of the research procedure, Selected applications of marketing research, identifying market segments, Product research, Advertising research.

Examination Scheme:

Components	CT	HA	C	V	A	EE
Weightage (%)	10	5	5	5	5	70

Text & References:

Text:

- Luck, David J and Rubin, Ronald S., Marketing Research, Seventh edition, Prentice Hall of India

References:

- Aaker, David A; Kumar V and George S., Marketing Research, Sixth edition, John Wiley & Sons
- Boyd, Harper W, Westphall, Ralph & Stasch, Stanely F, Market Research – Text & Cases, Richard D. Irwin Inc. Homewood, Illinois.


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CONSTITUTIONAL LAW-II

Course Code: LAW2403

Credit Units: 04

Course Objective:

The course material seeks to introduce the student to the relevance of inalienable fundamental rights and restrictions in the Constitution of India and the principles that ought to guide policy making in India. The student is expected to appreciate the text and the juristic discourse by reference to landmark case laws, juristic opinion and vibrant classroom discussions as the subject raises issues, conflict of interests and dilemmas in a pulsating democracy with changing dynamic priorities in a developing country like India.

Course Contents:

Module I: Distribution of powers between Centre and States – (Arts. 245-281)

Legislative Powers, Administrative Powers, Financial Powers, Relevant Doctrines: Territorial nexus, Harmonious construction, Pith and substance, Repugnancy: Overview of Panchayati Raj Provisions (Art. 243), Freedom of Trade and Commerce.

Module II: Union and State Executive, legislature and Judiciary

Union Executive, President: Appointment, Election, Removal, conditions of service; Powers of president focus on ordinance, pardon, emergency; Assessment of relevance of presidential office on governance; Council of ministers and Prime minister: Appointment, Conditions, functioning, collective responsibility, dismissal of cabinet minister; Office of Attorney General: Significance, Appointment, functions, Conditions; State executive, Governor: Appointment, Removal, Powers, State cabinet dismissal; governors role in the context of centre state relations. (Art 79-122).

Union Legislature: Lok Sabha, Composition, functioning, membership, qualifications and disqualifications, Dissolution of, Effect; Bills : Procedure for the passage; Privileges of legislature; State legislature: functioning, dissolution ; Anti defection law and its impact. (Arts. 168-212).

Union Judiciary: Supreme Court Judges: Appointment, removal, impeachment; jurisdiction of Supreme Court: Original, appellate, advisory, Court of Record; Assessment of independence of judiciary; State judiciary: High Court Judges: Appointment, transfer, removal, promotion; High Court jurisdiction, Art. 226, writs; Subordinate judiciary. (Arts. 124 -147) (Arts. 214 to 237).

Module III: Emergency Provisions

National, State and financial Provisions.

Module IV: Miscellaneous

Official Language, Language of Courts, Trade, Commerce and Intercourse in India, Services Under the Union and State, Elections, Parliamentary, Privileges and Schedules, etc .

Module V: Amendment of the Constitution

Amendment of Constitution, Doctrine of basic Structure.

Examination Scheme:

Components	P/S/V	CT	C	A	EE
Weightage (%)	10	10	5	5	70

Texts & References:

- V.N. Shukla, Constitution of India
- M.P. Jain – Indian Constitutional Law.
- H.M. Seervai – Constitutional Law of India.
- Durga Das Basu – Shorter Constitution.
- P.M. Bakshi – Constitution of India.
- J.N. Pandey – Constitution of India.

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ADMINISTRATIVE LAW

Course Code: LAW2404

Credit Units: 04

Course Objective:

Administrative law is as old as the administration itself. However, the form in which we find it today, Administrative is described a most outstanding legal development of the twentieth century. The reason for this development can only be attributed to a change of philosophy as regards the role and function of the State. The change in the concept of State from 'laissez faire' to a 'welfare state' has led to emergence of state activities in almost all spheres of human life. With the phenomenal increase in the area of state operation, the State was bound to take over a number of functions which were earlier left to private enterprise. In order to ensure that such functions are performed effectively and further due to certain other factors namely contingency, expertise etc. administrative agencies are given extraordinary powers and functions such as to make rules and deciding disputes apart from its wide discretionary powers. Obviously, this necessitated a new set of laws to check the possible abuses of such extraordinary powers on the part of administration. The courts in India and abroad in the course of time have developed various doctrines and methods to deal with such p[roblems. However, there is no end to this journey. The field is still open for new changes.

The main thrust of administrative law has been to study the nature of functions and powers exercised by the authorities on whom they have been conferred on and the study of remedies available to common man in case the limits of exercising power are transferred by such an authority. The focus or the centre point of this study, as usual as in cases of the study of other branches of public law, is the rights of individual *vis a vis* the public interest.

Course Contents:

Module I: Evolution, Nature and scope of Administrative law

Definitions, scope, classification and reason for the growth of administrative law; Relationship between constitutional law and administrative law; doctrine of Separation of Powers and its application in administrative law; Doctrine of Rule of law and application in administrative law.

Module II: Legislative function of Administration

Delegated legislation: Necessity for delegated legislation, classification of delegated legislation and its requirement, constitutionality of delegated legislation, All form of control of delegated legislation i.e. Parliamentary, Procedural and Judicial control (doctrine of ultra vires).

Module III: Judicial function of Administration

Reason for Administrative adjudication; Tribunals and classification of Tribunals; Principles of Natural Justice; Ombudsman: Lokpal, Lokayukta; Central Vigilance Commission (CVC).

Module IV: Administrative discretion

Need and legality and abuses; Constitutional objections and discretion, failure to exercise discretion; Doctrine of proportionality; Legitimate expectation.

Module V: Judicial control of administrative action

Courts as the final authority to determine the legality of Administrative actions ; Public Interest Litigation and the principle of *locus standi*, laches, Judicial review ; scope and extent, statutory appeals, writs.

Examination Scheme:

Components	P/S/V	CT	C	A	EE
Weightage (%)	10	10	5	5	70

Text & References:

- M.P. Jain and S.N. Jain: Principles of Administrative Law.
- L.P. Massey: Administrative Law.
- C.K. Talewani: Lectures on Administrative Law.
- De Smith: Judicial Review of Administrative Action.
- H.W.R. Wade: Administrative Law
- S.P. Sathe: Administrative Law.

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FAMILY LAW-II

Course Code: LAW2405

Credit Units: 04

Course Objective:

Family Law II Course is mainly devoted to the study of Muslim Personal Law relating to Marriage, Maintenance, Dower, Adoption & Guardianship, Divorce, Hiba, Pre-emption, Succession, and disposition of Property. The main objective of the course is to provide an indepth knowledge of the Laws governing Muslims.

Course Contents:

Module I: Introduction (Sources, Schools and Muslim Marriage (Nikah)

Sources and Schools of Muslim Law: Shia and Sunni; Muslim Marriage: Nature and concepts of Muslim Marriage, Essential conditions of a valid marriage, prohibitions/ disabilities, classification of marriage and effects of valid, irregular, void marriage.

Module II: Dower and Matrimonial Remedies (Dower, Restitution, Separation and Divorce)

Dower : Concept and Nature; Divorce under Muslim personal Law, Nullity of marriage; Option of puberty; Restitution of conjugal rights; Judicial separation; Grounds for divorce under Muslim Law; Bars to matrimonial relief under Muslim Law; Grounds for Divorce under Indian Dissolution of Muslim Marriage Act 1939.

Module III: Alimony, maintenance and Adoption&Guardianship (Hizanat)

Maintenance of neglected wives, divorced wives, minor children, disabled children and parents who are unable to support themselves vide sections 125, 127 of Code of Criminal Procedure, 1973; Alimony and maintenance as an independent remedy, Maintenance (Nafaqa) for Muslim Women under the Muslim Women Protection of Right on Divorce Act, 1986; Guardianship under Muslim Law.

Module IV: Law of Succession and inheritance among Muslims

General rules of succession; inclusion and exclusion of inheritors to the property. Classification of heirs under Hanafi and Ithma Asharia School and their shares and distribution of property.

Module V: Dispositions under Muslim Law, Waqf and Pre- Emption

Wasiyat : Testamentary Disposition and various incidents of wasiyat. Disposition inter vivos (Gift), Gift (Hiba), Musha, Revocation of Gifts; Distinction between Hiba, Ariya, Sadaqa&Wakf, Hiba-bil-Sharatful- ewaz, Gift during death illness (Marz-ul-maut).

Waqf : Meaning, Kinds, Objects, purpose, Requisites and various incidents of waqf.

Pre-emption – Origin, Definition, Classification, Subject matter, formalities, effects, constitutional validity.

Examination Scheme:

Components	P/S/V	CT	C	A	EE
Weightage (%)	10	10	5	5	70

Text & References:

- Mulla, D.F., Principles of Hindu Law
- Paras Diwan, Modern Hindu Law
- Mulla, D.F., Principal of Mohammadan Law
- Fyzee, A.A.A., Outlines of Mohammadan Law
- Mahmood, T., Muslim Law of India
- Paras Diwan, Law of Intestate and Testamentary Succession (1998), Universal .


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LAW OF CRIMES - II (INDIAN PENAL CODE SECTION- 121-511)

Course Code: LAW2406

Credit Units: 04

Course Objective:

Course on Law of Crimes aims at introducing students to the basic principles of criminal law. There has been a progressive as well as regressive change in the Indian society since Independence. A proper understanding of crimes and the causal factors for the occurrence of crime is extremely important in the larger context of India's development, if young law students are to use their knowledge and skills to build a just and humane society. The young law students are the would be lawyers and as such they must have an acquaintance with such knowledge to make criminal justice system serve the goals of social defense as well as social justice. Therefore, a study of the basic concepts of specific offences under the Indian Penal Code is imperative.

Course Contents:

Module-I: Offences affecting the Human body: Offences affecting life, causing miscarriage, or injuries to unborn children, Offences of hurt, of wrongful restraint and wrongful confinement, Offences of criminal force and Assault, offences of kidnapping and Abduction

Module-II: Offences against Women: Obscene acts and songs, Outraging the modesty of women, Rape, Cruelty by husband or relatives of husband, Offences relating to marriage

Module-III: Offences against Property: Theft, Extortion, robbery and dacoity, Criminal misappropriation and criminal breach of trust, Cheating, Mischief, Criminal trespass

Module-IV: Defamation and offences relating to documents and property marks: Defamation, Forgery, Counterfeiting.


Module-V: Offences against State, Public Tranquillity, Public Servants, Religion

Examination Scheme:

Components	P/S/V	CT	C	A	EE
Weightage (%)	10	10	5	5	70

Text & References:

- Ratanlal & Dhirajlal – The Indian Penal Code
- K. D. Gaur – A Text Book on Indian Penal Code
- S.N. Misra, Indian Penal Code
- B.M. Gandhi, Indian Penal Code (1996), Eastern, Nagpur.
- P.S. Achutan Pillai, Criminal Law (1995) Eastern, Lucknow.


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BUSINESS INFORMATION AND DATA BASE SYSTEM

Course Code: MGT2404

Credit Units: 03

Course Objective:

The aim of this course is to introduce the students to the managerial issues relating to information systems, its role in organization and how information technology can be leveraged to provide business value.

Course Contents:

Module I:

MIS need and concepts, characteristics, Typology of MIS, Structure of MIS. Planning for MIS, System Development Methodologies, Conceptual and detailed designs of MIS, System Implementation strategies and process, System Evaluation and Maintenance.

Module II:

Introduction to data base management system- Data versus information, record, file; data dictionary, database administrator, functions and responsibilities, file-oriented system versus databases system.

Module III:

Advanced Concepts in Information Systems: Enterprise Resource Planning, Supply Chain Management, Customer Relationship Management, Data, Warehousing and Data Mining.

Module IV:

Database system architecture- Introduction, schemas, sub schemas and instances; data base architecture, data independence, mapping, data models, types of database systems.

Module V:

Data base security- Threats and security issues, firewalls and database recovery; techniques of data base security; distributed data base.

Examination Scheme:


Components	C	H	CT	V	A	EE
Weightage (%)	5	5	10	5	5	70

Text & References:

- James, A. O'Brien, *Introduction to Information Systems*, Tata McGraw-Hill Publishing Co. Ltd., New Delhi, 2005.
- Kenneth C. Laudon and Jane P. Laudon, *Management Information Systems*, Prentice-Hall of India, New Delhi, 9th Edition, 2006.

References:

- Navathe, *Data Base System Concepts* 3rd, McGraw Hill.
- Date, C.J., *An Introduction to Data Base System* 7ed, Addison Wesley.
- Singh, C.S., *Data Base System*, New Age Publications, New Delhi.


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PERSONAL FINANCIAL PLANNING

Course Code: MGT2405

Credit Units: 03

Course Objective:

Post Liberalization, India has witnessed a phenomenal growth in her GDP. With the advent of MNC's, and growth in private business, individuals income and saving pattern has changed. Therefore the need arises to manage these funds in a manner that it is no more called as savings but addressed as a need for Personal financial planning. This course is essential for every student irrespective of the specialization as every individual needs to plan his finances.

Course Contents:

Module I: Introduction to personal financial planning and personal accounting

Concept of Personal Financial Planning: Need, Significance, Scope; Ethical issues in Personal Financial Planning; Changing per capita investors. Need to maintain Accounts, Methods: Traditional & Using Electronic Media. Applying for PAN & filing of Income Tax returns.

Module II: Investment Avenues

Real Assets: Investment in Real Assets: Real Estate, Precious Metals, Other Fixed assets. Their relative merits & demerits. Change in their returns over the past few years.

Financial Assets: Investments in securities: Through IPO, Secondary Market. Investment in G-sec; Debt instruments, Post Office instruments, Insurance Policies, Mutual Funds, Certificate of Deposits, Foreign Market.

Module III: Introduction to Income tax and Income from salary

Introduction to Income tax act 1961 and Finance Act. Previous year, Assessment year, Income, Total Income, Gross Total Income, Capital and Revenue Receipts / Expenditures, Exempted Incomes, Residential Status and incidence of Tax.

Salary, Exemption:- Leave encashment, Gratuity, Pension, Annuity, Pension fund, Allowance (HRA, Entertainment, Special allowance – dependent of expense ad not dependent on expenae, perquisites – rent free accommodation, Leave travel concession, medical facility), Deductions 80c to 80u.). Sections (2(9), 2(31), 2(7), 2(24), 3, 6, 14, 288A, 288B, 2(17), 4, 9, 45, 9(1)(ii), 9(1)(iv), 9(1)(v), 10, 11, 12, 17(1), 22,

Module IV: Income from house property, capital gains and other sources

Income from House Property (Types of house property, Exempted house property income, Computation of GAV and NAV, Treatment of unrealized, recovered and arrears of rent), Capital Gains and other Sources (Short term & Long term capital gain, Cost of acquisition, Cost of improvement, Index cost, Income that are taxed under other sources, Deduction under other sources, Tax treatment of lotteries, puzzles. Sections 23, 24, 2528, 30, 31, 32.

Module V: Tax planning

Concept, significance and problems of tax planning, Tax evasion and tax avoidance, Individual Taxation Slabs, Wealth Tax, Gift Tax, Capital Gains Tax, Service tax, Recent Tax saving schemes

Module VI: Retirement & Goal Planning

Concept of risk assessment of individual, Introduction to portfolio management, Retirement planning & investment: Income generation after retirement, liability management, anticipation of expenses. Investment for major goals: House, Family, Education, Medical, Wealth Management/ Financial Advisory companies. Their role, significance & growth.

Examination Scheme:

Components	P-1	C-1	CT-1	Attendance	EE1
Weightage (%)	10	5	10	5	70

Text & References:

Text:

- Chandra P, Investment analysis and Portfolio Management, 3rd edition, Tata McGraw Hill
- Lal & Vashisht, Direct Taxes, 29th Edition, Tata McGraw Hill.

References:

- V.K. Bhalla, Security analysis and Portfolio Management, 16th edition, S.Chand

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TERM PAPER

Course Code: MGT2431

Credit Units: 02

Course Objective:

The objective of this course is to judge the understanding as well as application of the knowledge gained by the students. The aim of the term paper is to provide the students with an opportunity to further enhance their knowledge in a sector of their choice by undertaking a significant practical unit of examining and analyzing various aspects of business management at a level commensurate with the learning outcomes of the various courses taken up them in the ongoing semester.

A term paper is primarily a record of intelligent reading in several sources on a particular subject. The students will choose the topic at the beginning of the session in consultation with the faculty assigned. At least one middle level or senior level person of a company from the chosen sector may be interviewed face to face.

Guidelines:

1. The term paper will be related to the contemporary business issue and the topic will be given by the department.
2. The presentation of the term paper is scheduled to be held before the commencement of Semester examinations.
3. The paper will carry 100 marks that will be marked on the basis of understanding and organization of content based on the literature review. The Bibliography shall form an important part of the paper.
4. Examples of a few broad areas for Term Paper (List is indicative, not exhaustive)
 - Credit rating
 - Risk management
 - Subprime meltdown and its after effect with case study from Indian industry
 - Corporate frauds
 - Micro finance institutions in India
 - Carbon Trading
 - IFRS
 - Celebrity Endorsement in real estate
 - Social media marketing
 - Green marketing
 - Sustainable branding practices
 - Relationship management
 - CSR
 - Balanced Score Card
 - Corporate Governance
 - Employee retention
 - NGOs.

EVALUATION

Organisation and relevance of content	Literature Review	Bibliography	Total
40	40	20	100



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PROJECT (WITH PRESENTATION & EVALUATION)

Course Code: MGT2432

Credit Units: 03

Objectives:

The aim of the project is to provide the students with an opportunity to further their intellectual and personal development in the chosen field by undertaking a significant practical unit of activity. The project can be defined as a scholarly inquiry into a problem or issues, involving a systematic approach to gathering and analysis of information / data, leading to production of a structured report.

Chapter Scheme and distribution of marks:

Chapter 1: Introduction	– 10 marks
Chapter 2: Conceptual Framework/ National/International Scenario	– 25 marks
Chapter 3: Presentation, Analysis & Findings	-- 25 marks
Chapter 4: Conclusion & Recommendations	-- 10 marks
Chapter 5: Bibliography	-- 05 marks

Components of a Project Report

The outcome of Project Work is the Project Report. A project report should have the following components:

- 1) Cover Page: This should contain the title of the project proposal, to whom it is submitted, for which degree, the name of the author, name of the supervisor, year of submission of the project work, name of the University.
- 2) Acknowledgement: Various organizations and individuals who might have provided assistance /co-operation during the process of carrying out the study.
- 3) Table of Content: Page-wise listing of the main contents in the report, i.e., different Chapters and its main Sections along with their page numbers.
- 4) Body of the Report: The body of the report should have these four logical divisions
 - a. *Introduction*: This will cover the background, rationale/ need / justification, brief review of literature, objectives, methodology (the area of the study, sample, type of study, tools for data collection, and method of analysis), Limitations of the Study, and Chapter Planning.
 - b. *Conceptual Framework / National and International Scenario*: (relating to the topic of the Project).
 - c. *Presentation of Data, Analysis and Findings*: (using the tools and techniques mentioned in the methodology).
 - d. *Conclusion and Recommendations*: In this section, the concluding observations based on the main findings and suggestions are to be provided.
- 5) Bibliography or References: This section will include the list of books and articles which have been used in the project work, and in writing a project report.
- 6) Annexures: Questionnaires (if any), relevant reports, etc.
(The main text of the Project should normally be in the range of 5000 words. However, there may be annexure in addition to the main text)

Steps of a Project Report

Step I: Selection of the topic for the project by taking following points into consideration:

- Suitability of the topic.
- Relevance of the topic
- Time available at the disposal.
- Feasibility of data collection within the given time limit.
- Challenges involved in the data collection (time & cost involved in the data collection, possibility of getting responses, etc.)

Step II: Finalisation of the Topic and preparation of Project Proposal in consultation with the Supervisor.

Step III: Collection of information and data relating to the topic and analysis of the same.

Step IV: Writing the report dividing it into suitable chapters, viz.,

Chapter 1: Introduction,

Chapter 2: Conceptual Framework / National & International Scenario,

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Step V: The following documents are to be attached with the Final Project Report.

- 1) Approval letter from the supervisor (Annexure-IA)
- 2) Student's declaration (Annexure-IB)
- 3) Certificate from the Competent Authority of the Organisation / Institution, if the student undertakes the Project Work in any Organisation / Institution.


Guidelines for evaluation:

Each of the students has to undertake a Project individually under the supervision of a teacher and to submit the same following the guidelines stated below:

- Language of Project Report and Viva-Voce Examination may be English. The Project Report must be typed and hard bounded.
- Failure to submit the Project Report or failure to appear at the Viva-voce Examination will be treated as "Absent" in the Examination. He /she has to submit the Project Report and appear at the Viva-Voce Examination in the subsequent years (within the time period as per University Rules).
- No marks will be allotted on the Project Report unless a candidate appears at the Viva-Voce Examination. Similarly, no marks will be allotted on Viva-Voce Examination unless a candidate submits his/her Project Report.
- Evaluation of the Project Work to be done jointly by one internal expert and one external expert with equal weightage, i.e., average marks of the internal and external experts will be allotted to the candidate.

Evaluation Scheme:

Project Report	Power Point Presentation & Viva	Total
75 marks	25 marks	100


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WORKSHOP

Course Code: MGT2433

Credit Units: 01

Course Objective:

A workshop is primarily an activity based academic event that is organized to provide the students a one to one and hands on experience on any aspect of their learning. The communication in a workshop has to be necessarily two ways. The trainer has to make sure that the aspects covered are practically practiced by the participants. The student will choose the option of workshop from amongst their concentration electives. The evaluation will be done by Board of examiners comprising of the faculties.

Major Themes for Workshop:

The workshop may be conducted on any of the following major themes:

Accounting

Finance

Human Resources

Marketing

Economics

Operations

Supply Chain Management

These themes are merely indicative and the trainer may choose any recent and relevant topic of study.

Guidelines for Workshop:

The procedure for earning credits from workshop consists of the following steps:

1. Relevant study material and references will be provided by the trainer in advance.
2. The participants are expected to explore the topic in advance and take active part in the discussions held
3. Attending and Participating in all activities of the workshop
4. Group Activities have to be undertaken by students as guided by the trainer.
5. Evaluation of workshop activities would be done through test and quiz at the end of the workshop.
6. Submitting a write up of atleast 500 words about the learning outcome from the workshop.

Methodology:

The methodology followed at the workshop could be based on any one or more of the following methods:

Case Study

Business Game

Simulation

Group Activity


Role Play

Business Planning

Quiz

EVALUATION

Attendance	Active Participation	Multiple Choice Questions/ Quiz	Solving the case/ Assignment/ Write up	Total
10	30	30	30	100


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LAW OF EVIDENCE

Course Code: LAW2502

Credit Units: 04

Course Objective:

This paper is to orient students with importance of evidence for establishment of claims and the related rules and principles.

Course Contents:

Module I: Definitions and Relevancy of Facts

Evidence and its relationship with the substantive and procedural laws ;Definitions : Facts, facts in issue, relevant, evidence proved, disproved, not proved, oral and documentary evidence ;Relevancy and admissibility; Doctrine of *res gestae* ;Conspiracy.

Module II: Admissions, confessions and statements by person who cannot be called as witnesses:

Definition of admission, who can make admissions by or on their behalf, proof of admission against the persons making them and admissions in civil cases. (Section 17-23, 31); Definition, relevance and consideration of confessions (section 24-30); Dying declaration (Section 32 and Section 33). **Opinion of Third Persons (Sec. 45 to 51) & Character Evidence (Sec. 52 to 55).**

Module III: Documentary Evidence

Primary and Secondary Evidence, Proof and verification of documents; Public documents and presumption as to documents.

Module IV: Production and Effect of Evidence

Burden of proof (Sections 101-114); Estoppels (Section 115); Competence of witnesses (Sections 118-120).

Module V: Examination of Witnesses (Sections 135-166) and Rejection of evidence (Section 167)


Examination –in-chief : Cross Examination, Re-examination; Leading questions; Hostile witnesses; Refreshing memory; Judge's power to put questions or order production.

Examination Scheme:

Components	P/S/V	CT	A	C	EE
Weightage (%)	10	10	5	5	70

Text & References:

- Ratanlal and Dheerajlal : Law of Evidence
- Monir Field : Law of Evidence
- Batuklal : Law of Evidence
- Avtar Singh : Evidence Law
- Bare Act : Indian Evidence Act, 1872


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CODE OF CIVIL PROCEDURE

Course Code: LAW2503

Credit Units: 04

Course Objective:

This paper is to help a law student to acquire a thorough knowledge of procedural aspects of working of civil courts and other machineries.

Course Contents:

Module I: Initial steps in a suit

Jurisdiction and place of suing; Institution of suit, cause of action, joinder, non-joinder and mis-joinder of parties; Summons; Pleadings: Meaning, object, General rules, Amendment of pleadings; Plaint and written statement: Particulars, set off and counter claim; Admission return and rejection; Discovery, Inspection and production of documents; Appearance and non-appearance of parties, ex-parte proceedings; First hearing: Meaning, object, framing of issues, omission to frame issues, disposal of suit in the first hearing; Trial: Summoning and attendance of witnesses, summons to produce documents, adjournment, hearing of suit.

Module II: Significant Terms and Definitions

Definitions: Decree, Judgment, Order, Foreign Court, Foreign Judgment, Mesne, Profits, Affidavit, Suit, Plaint, Written Statement, Suit of civil nature ;Important Concepts: Res Sub-Judice, Resjudicata, Restitution, Caveat, Inherent powers of courts.

Module III: Interim Orders

Commissions, Arrest before judgment, Attachment before judgment, Temporary Injunctions, Interlocutory orders, Receiver, Security of costs.

Module IV: Suits in Particular Cases

Suits by or against Government, Suits by Indigent persons, Interpleader Suit, Summary Procedure, Suits relating to public nuisance. Execution Proceedings

Module V: Law of Limitation

Definitions, period of limitation, plaintiff, defendant; and in foreign countries, limitation of suits, appeals, and application, computation of period of limitation.

Examination Scheme:

Components	P/S/V	CT	A	C	EE
Weightage (%)	10	10	5	5	70

Text & References:

- Mulla's Code of Civil Procedure, Universal, Delhi
- C.K. Thakkar's (Takwani), Code of Civil Procedure
- Majumdar, P.K. and Kataria, R.P., Commentary on the Code of Civil Procedure, 1908, universal, Delhi.


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LABOUR LAW-I

Course Code: LAW2504

Credit Units: 04

Course Objective:

The course aims at imparting to the students an indepth understanding of Labour Laws in India by recourse to relevant judicial pronouncements in this regard.

Course Contents:

Module I: Regulation of Trade Union & Unfair Labour Practices

History of Trade Union Movement in India and need to form Trade Union, Workers Right to form Union vis-à-vis Indian Constitution; the Membership of Trade Union, Closed shop and Union shop, Registration of Trade Union, Remedies in case of non-registration and cancellation of registration of union, Privileges and Protection of registered Trade Union form certain acts and omissions, Unfair labour practices and victimization.

Module II: Collective Bargaining:

Concept and importance of collective bargaining, Pre-requisites for collective bargaining, Process of administering collective agreement (Negotiation, Mediation, & Voluntary arbitration & Compulsory Arbitration.), Duration and enforcement of bipartite Agreement (Secs. 18, 19, Industrial Disputes Act, 1947), Pressurization: Strike, Go-Slow, wok to rule, Gherao and Lockout.

Module III: Regulation of Industrial Disputes

Define the concept of Industry, Industrial Dispute and workman, Power of Government to refer Industrial Disputes for adjudication: The Adjudicatory Machinery, Award and its binding nature, Judicial review of Awards, The concept of lay-off, retrenchment and procedure and compensation relating to lay-off and retrenchment.

Module IV: Standing Orders

Concept, Nature and scope of standing orders under Industrial Employment (Standing Order) Act, 1946, Formulation of Standing Orders and its Certification process, Modification: Modification and temporary application of Model Standing Order, Interpretation and Legal status of Standing Orders.

Module V: Discipline in Industries


Doctrine of hire and fire in the context of social welfare, Fairness in disciplinary process: Meaning of misconduct, Right to know: The Charge Sheet, Right to defend; Domestic enquiry notice, evidence, cross examination, unbiased enquiry officer and reasoned decision, Punishment of misconduct, Prenatal (permission) and Postnatal (Approach) control during pendency of proceeding (Sec. 33 of industrial and Disputes Act).

Examination Scheme:

Components	P/S/V	CT	C	A	EE
Weightage (%)	10	10	5	5	70

Text & References:

- O.P. Malhotra, Law of Industrial Disputes.
- Indian Law Institute, Labour Law and Labour Relations.
- K.D. Srivastava, Commentary of Industrial Employment (S.C.) Act, 1946.
- S.C. Srivastava, Industrial Relation and Labour Law.
- Report of National Commission on Labour, 1969.
- Industrial Disputes Act, 1947.
- R.B. Sethi & R.N. Dwivedi, Law of Trade Union.


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PROPERTY LAW

Course Code: LAW2505

Credit Units: 04

Course Objective:

The subject imparts to the student an understanding of the law in India relating to transfer of immovable property and the norms and doctrines that aid in carrying out secure transactions in this regard.

Course Contents:

Module I: Jurisprudential Basis (Sections 5-21)

Concept and meaning of property – New property, Kinds of property – movable and immovable property, tangible and intangible property,

Module II: Sale of Immovable Property

Doctrine of Election Sec. 35, Fraudulent Transfer Sec. 53 ; Sale of immovable property (Secs. 54 – 55). (Sale, Contract of Sale; Contract to sell; Rights and Liabilities of buyer and seller).

Module III: Specific Transfers

Mortgages of immovable Property: Secs. 58 – 77 (Kinds of mortgage, Rights and Liabilities of the mortgagor and mortgagee, Marshalling and Contribution (Secs. 81 – 82), Redemption (Secs. 91 – 96).

Module IV: Leases

Leases (Secs. 105 – 117): Definition, Leases how made, Rights and Liabilities of lesser and lessee, Charges (Section, 100 – 104).

Module V: Easements

Creation of Easements (Secs. 4 – 7), Nature and characteristics of Easements, Extinction, Suspension and Revival of Easements (Secs. 37–51), Riparian Rights, Licenses (Secs. 52 – 64).

Module VI


Indian Stamp and Registration Act.

Examination Scheme:

Components	P/S/V	CT	A	C	EE
Weightage (%)	10	10	5	5	70

Text & References:

- Mulla, D.F., Transfer of Property Act.
- Shukla, S.N., Transfer of Property Act.
- Shah, S.M., Transfer of Property Act.
- Tripathi, Lectures on Indian Easement Act.
- Jain, J.D., Indian Easement Act.


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TERM PAPER

Course Code: MGT2531

Credit Units: 02

Course Objective:

The objective of this course is to judge the understanding as well as application of the knowledge gained by the students. The aim of the term paper is to provide the students with an opportunity to further enhance their knowledge in a sector of their choice by undertaking a significant practical unit of examining and analyzing various aspects of business management at a level commensurate with the learning outcomes of the various courses taken up them in the ongoing semester.

A term paper is primarily a record of intelligent reading in several sources on a particular subject. The students will choose the topic at the beginning of the session in consultation with the faculty assigned. At least one middle level or senior level person of a company from the chosen sector may be interviewed face to face.

Guidelines:


1. The term paper will be related to the contemporary business issue and the topic will be given by the department.
2. The presentation of the term paper is scheduled to be held before the commencement of Semester examinations.
3. The paper will carry 100 marks that will be marked on the basis of understanding and organization of content based on the literature review. The Bibliography shall form an important part of the paper.
4. Examples of a few broad areas for Term Paper (List is indicative, not exhaustive)
 - Credit rating
 - Risk management
 - Subprime meltdown and its after effect with case study from Indian industry
 - Corporate frauds
 - Micro finance institutions in India
 - Carbon Trading
 - IFRS
 - Celebrity Endorsement in real estate
 - Social media marketing
 - Green marketing
 - Sustainable branding practices
 - Relationship management
 - CSR
 - Balanced Score Card
 - Corporate Governance
 - Employee retention
 - NGOs.

EVALUATION

Organisation and relevance of content	Literature Review	Bibliography	Total
40	40	20	100



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PROJECT (WITH PRESENTATION & EVALUATION)

Course Code: MGT2532

Credit Units: 03

Objectives:

The aim of the project is to provide the students with an opportunity to further their intellectual and personal development in the chosen field by undertaking a significant practical unit of activity. The project can be defined as a scholarly inquiry into a problem or issues, involving a systematic approach to gathering and analysis of information / data, leading to production of a structured report.

Chapter Scheme and distribution of marks:

Chapter 1: Introduction	– 10 marks
Chapter 2: Conceptual Framework/ National/International Scenario	– 25 marks
Chapter 3: Presentation, Analysis & Findings	-- 25 marks
Chapter 4: Conclusion & Recommendations	-- 10 marks
Chapter 5: Bibliography	-- 05 marks

Components of a Project Report

The outcome of Project Work is the Project Report. A project report should have the following components:

- 1) Cover Page: This should contain the title of the project proposal, to whom it is submitted, for which degree, the name of the author, name of the supervisor, year of submission of the project work, name of the University.
 - 2) Acknowledgement: Various organizations and individuals who might have provided assistance /co-operation during the process of carrying out the study.
 - 3) Table of Content: Page-wise listing of the main contents in the report, i.e., different Chapters and its main Sections along with their page numbers.
 - 4) Body of the Report: The body of the report should have these four logical divisions
 - *Introduction*: This will cover the background, rationale/ need / justification, brief review of literature, objectives, methodology (the area of the study, sample, type of study, tools for data collection, and method of analysis), Limitations of the Study, and Chapter Planning.
 - *Conceptual Framework / National and International Scenario*: (relating to the topic of the Project).
 - *Presentation of Data, Analysis and Findings*: (using the tools and techniques mentioned in the methodology).
 - *Conclusion and Recommendations*: In this section, the concluding observations based on the main findings and suggestions are to be provided.
 - 5) Bibliography or References: This section will include the list of books and articles which have been used in the project work, and in writing a project report.
 - 6) Annexures: Questionnaires (if any), relevant reports, etc.
- (The main text of the Project should normally be in the range of 5000 words. However, there may be annexure in addition to the main text)

Steps of a Project Report

Step I: Selection of the topic for the project by taking following points into consideration:

- Suitability of the topic.
- Relevance of the topic
- Time available at the disposal.
- Feasibility of data collection within the given time limit.
- Challenges involved in the data collection (time & cost involved in the data collection, possibility of getting responses, etc.)

Step II: Finalisation of the Topic and preparation of Project Proposal in consultation with the Supervisor.

Step III: Collection of information and data relating to the topic and analysis of the same.

Step IV: Writing the report dividing it into suitable chapters, viz.,

Chapter 1: Introduction,

Chapter 2: Conceptual Framework / National & International Scenario,

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Step V: The following documents are to be attached with the Final Project Report.

- 1) Approval letter from the supervisor (Annexure-IA)
- 2) Student's declaration (Annexure-IB)
- 3) Certificate from the Competent Authority of the Organisation / Institution, if the student undertakes the Project Work in any Organisation / Institution.


Guidelines for evaluation:

Each of the students has to undertake a Project individually under the supervision of a teacher and to submit the same following the guidelines stated below:

- Language of Project Report and Viva-Voce Examination may be English. The Project Report must be typed and hard bounded.
- Failure to submit the Project Report or failure to appear at the Viva-voce Examination will be treated as "Absent" in the Examination. He /she has to submit the Project Report and appear at the Viva-Voce Examination in the subsequent years (within the time period as per University Rules).
- No marks will be allotted on the Project Report unless a candidate appears at the Viva-Voce Examination. Similarly, no marks will be allotted on Viva-Voce Examination unless a candidate submits his/her Project Report.
- Evaluation of the Project Work to be done jointly by one internal expert and one external expert with equal weightage, i.e., average marks of the internal and external experts will be allotted to the candidate.

Evaluation Scheme:

Project Report	Power Point Presentation & Viva	Total
75 marks	25 marks	100


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WORKSHOP

Course Code: MGT2533

Credit Units: 01

Course Objective:

A workshop is primarily an activity based academic event that is organized to provide the students a one to one and hands on experience on any aspect of their learning. The communication in a workshop has to be necessarily two ways. The trainer has to make sure that the aspects covered are practically practiced by the participants. The student will choose the option of workshop from amongst their concentration electives. The evaluation will be done by Board of examiners comprising of the faculties.

Major Themes for Workshop:

The workshop may be conducted on any of the following major themes:

Accounting

Finance

Human Resources

Marketing

Economics

Operations

Supply Chain Management

These themes are merely indicative and the trainer may choose any recent and relevant topic of study.

Guidelines for Workshop:

The procedure for earning credits from workshop consists of the following steps:

1. Relevant study material and references will be provided by the trainer in advance.
2. The participants are expected to explore the topic in advance and take active part in the discussions held
3. Attending and Participating in all activities of the workshop
4. Group Activities have to be undertaken by students as guided by the trainer.
5. Evaluation of workshop activities would be done through test and quiz at the end of the workshop.
6. Submitting a write up of atleast 500 words about the learning outcome from the workshop.

Methodology:

The methodology followed at the workshop could be based on any one or more of the following methods:

Case Study

Business Game

Simulation

Group Activity

Role Play

Business Planning

Quiz

EVALUATION

Attendance	Active Participation	Multiple Choice Questions/ Quiz	Solving the case/ Assignment/ Write up	Total
10	30	30	30	100


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TRAINING AND DEVELOPMENT

Course Code: MGT2510

Credit Units: 03

Course Objective:

The objective of the course is to help students acquire and enhance their knowledge of how to plan, develop, carry out, and evaluate training and executive development programmes in Business Organizations.

Course Contents:

Module I: Introduction

Meaning and definition of training, Training vs education, Culture and Context, Introduction to training Strategy.

Module II: Process of Training

Establishing objectives, training need assessment, designing the programs, training methods, trainers and training styles, Introduction to Management Development program.

Module III: Evaluation of Training & Development

Training Evaluation – Need for evaluation, Measuring Training Effectiveness, Concept of Return on Investment, Cost – Benefit Analysis, Models of Training Evaluation.

Module IV: Training Systems

Action Research for better training, knowledge management, career development, succession planning, diversity training, orientation training.

Module V: Changes in Training Needs for Modern Organizations

Concept and Need for Learning Organizations, Training for Trainers, Leadership, Team Playing and Group Dynamics, Basics of Sensitivity Training, Computer Based Training.

Module VI: Development

Executive Development – significance & nature, identifying development needs and setting objectives. Techniques of development and advantages. Role of HRD in 21st Century.

Examination Scheme:

Components	CT	HA	C	V	A	EE
Weightage (%)	10	5	5	5	5	70


Text & References:

Text:

- Lynton R.P and Pareek U (1990). Training for Development. Vistaar Publications, New Delhi

References:

- Goldstein, Training in Organizations, Thomson Learning
- Pareek Udai, Training and Development, Tata McGraw Hill.
- Srivastava, S., Recruitment, Selection & Retention, ABS Course pack, 1999.
- Wexley, K & Lathan Gary, Developing & Training HR in Organization. P. Hall, 2002.


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SUMMER INTERNSHIP EVALUATION-II

Course Code: LAW2535

Credit Units: 03

It is a mode of Clinical Legal education Specified period to be spent by the student with a law firm/court/Commissions/NGO's and like institutions working with the realm of law or connected therewith. The reports both by the student and the office together with diary where applicable to be certified will be submitted for evaluation


The Internship during the summer break is a compulsory course. There is a Internship Data form where students fill in the details of where they are interning with complete address and phone numbers Customized Legal Reference /Diary is provided to the students on payment They maintain a day to day record of the work that they do at the place they are interning. They are expected to intern for a minimum 90 days. They submit their completed diary, certificate from the employer and also a report of their experience at work. After submission there is a Viva by concerned faculty. They assess the student on the kind of work they have done during internship, presentation of the work they have done and also on the practical knowledge they have gained

The Paper is marked out of 100 marks. The breakup of the marks is as follows:

1.	Diary submission	25 Marks
2.	Report and certificate	25 Marks
3.	Viva (Panel of External Examiners)	40 Marks
4.	Attendance (Regularity in meeting the supervisor)	10 Marks
	Total	100



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COMPANY LAW

Course Code: LAW2603

Credit Units: 04

Course Objective:

The paper aims to make the student familiar and to provide insight into formation and winding up of companies beside corporate administrations.

Course Contents:

Module I: Company

Definition, Characteristics, Lifting of Corporate Veil; Types of Companies;
Formation of a Company: Promoters, Pre-incorporation Contracts, Provisional Contracts,

Module II: Memorandum of Association, Articles of Association and Prospectus

Memorandum of Association; Articles of Association; Prospectus: Issues, contents, Kinds, liability for misstatements, Shelf Prospectus, Statement in lieu of Prospectus.

Module III: Share Capital

Issue and allotment of shares, SEBI guidelines on allotment, Issue of shares at premium and at discount, Share Certificate, Demat system ; Forfeiture and surrender of Shares, Transfer & Transmission of shares; Provisions relating to payment of dividend, Investor's Education and Protection Fund.

Module IV: Corporate Administration

Directors: kinds, powers and duties; Insider trading; Meetings kinds and procedure; The balance of powers within companies: Majority control and minority protection, Prevention of oppression, and powers of court and Central Government,

Module V: Winding up of Companies


Kinds, consequences and reasons of winding up; Role of the court; Liability of past members; Payment of liabilities; Reconstruction and amalgamation.

Examination Scheme:

Components	P/S/V	CT	C	A	EE
Weightage (%)	10	10	5	5	70

Text & References:

- Avtar Singh : Indian Company Law
- Shah S. M : Lectures on Company Law
- Saharay H.K.: Company Law, 5th Edn.


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LAW OF TORTS (MOTOR VEHICLES ACT AND CONSUMER PROTECTION ACT, 2019)

Course Code: LAW2604

Credit Units: 04

Course Objective:

This course aims to introduce the student to the specialized discipline of tort law that is one of the most litigated areas of law in west. In India this realm is on the verge of a lot of litigational activity. The course covers Consumer Protection Act as well as Motor Vehicle Act which are carved out from the general principles of tort.

Course Contents:

MODULE 1: Introduction:

- Nature and Definition of Torts
- Tort distinguished from Contract and Quasi-Contract
- Crime:
 - Conditions of liability including *damnum sine injuria, injuria sine damnum*
 - Remoteness of damages
- Maxims: *Ubius ibi remedium, Res ipsa loquitur*, etc.
- Justification in Tort:
 - *Volenti non-fit Injuria*,
 - Necessity,
 - Plaintiff's default,
 - Act of God,
 - Inevitable accidents,
 - Private defences,
- Judicial and Quasi
 - Judicial Acts,
 - Parental and quasi-parental authority.

MODULE 2: Actions in Tort


- Assault
- Battery
- False Imprisonment
- Malicious Prosecution
- Defamation
 - Libel
 - Slander including defences in an action for defamation
- Vicarious Liability
- Liability of State
- Doctrine of Sovereign Immunity

MODULE 3: Negligence

- Negligence including contributory negligence and other defenses.
- Absolute liability/Strict liability, Rules in *Ryland v. Fletcher*.
- Principles for the application of the rule and defenses
- Enterprises engaged in hazardous activities – *M.C. Mehta v. Union of India*
- Nuisance Trespass

MODULE 4: Consumer Protection: Consumer Protection Act, 2019

- Brief overview of the Consumer Protection Act, 2019.
- Major Difference between Consumer Protection Act, 2019 and Consumer Protection Act, 1986.
- Consumer Protection Act, 2019:
 - Consumer Protection Councils Chapter II: Ss. 3-9
 - Central Consumer Protection Authority: Section 2(4) Chapter III: Ss. 10-27


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- Consumer Disputes Redressal Commission S. 2(15): District Commission S. 2(44): State Commission S. 2(29): National Commission Chapter IV- with special focus on Ss. 28,34, 35, 37,39, 41, 42, 47,51 53,54,58,59
- Product Liability
- Consumer Protection vis-a vis E-Commerce- Key Aspects

MODULE 5: Motor Vehicles:

- Motor Vehicles Claims and compensation:
 - Relevant provisions of the relating Motor Vehicles Act relating to the liability and assessment of compensation:
 - Liability without fault in certain cases : voidance of contracts restrictive of liability
 - Special provisions and scheme of compensation in case of hit and run motor accidents
- Offences, Penalties and Procedure
- Insurance of Motor Vehicles against Third Party Risks(Sec. 145 – 152)
- Claims Tribunals: Sec. 165-176
- Special provisions as to payment of compensation on structured formula basis: Claims on non-structured basis: Method of calculating compensation evolved by the courts(study with reference to relevant judgments)
- Defences: Changing parameters of negligence and burden of proof

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

Text Books

- Winfield and Jolowicz, Tort
- Law of Torts, Universal law Publishing Company, Dr. S.P. Singh
- The Law of Torts: Ratanlal & Dhirajlal,
- Winfield, Law of Torts,
- Dr. D.N. Saraf, Law of Consumer Protection in India,
- Dr. Avtar Singh, Law of Consumer Protection in India, Dr. Gurjeet Singh, The law of Consumer Protection in India.
- Motor Vehicle Laws, Universal Law Publishing Company.

Reference Books

- William Salmond, “Salmond on the Law of Torts”, Sweet & Maxwell, 16th Edition: 1973
- Heuston Salmond, “The Law of Torts”, Universal Law Publishing Co Ltd: 2004
- Edward White, “Tort Law in America: An Intellectual History”, Oxford University Press: 2003
- Frederick Pollock, “The Law of Torts: A Treatise on the Principles of Obligations Arising from Civil Wrongs in the Common Law: To which is Added the Draft of a Code of Civil Wrongs Prepared for the Government of India”, BiblioBazaar: 2008
- Jenny Steele, “Tort Law: Text, Cases & Materials”, Oxford University Press: 2007
- Vivienne Harpwood, “Modern Tort Law”, Rutledge: 2008
- Carl F. Cranor, “Toxic Torts: Science, Law and the Possibility of Justice”, Cambridge University Press: 2006
- N.R. Madhava Menon, “Documents and Court Opinions on Bhopal Gas Leak Disaster Case”, National Law School of Indian University: 1991
- Upendra Baxi, Thomas Paul, “Mass Disaster and Multinational Liability: the Bhopal Case”, N.M. Tripathi: 1986
- Upendra Baxi, Amita Dhanda and Indian Law Institute, “Valiant Victims and Lethal Litigation: the Bhopal Case”, N.M. Tripathi: 1990
- Jenny B. Wahl, “Economic Analysis of Tort and Products Liability Law: A Collection of Essays & Cases (Law and Economics)”, Routledge: 1998

LABOUR LAW-II

Course Code: LAW2605

Credit Units: 04

Course Objective:

The paper is to focus on wage policies, compensation for loss caused during the course of employment and working conditions of employees.

Course Contents:

Module I: Minimum Wages Act, 1948

Concept of Labour Welfare, Classification and Importance, Labour welfare activities, Concept of minimum wage, fair wage, living wage and need based minimum wage, Constitutional validity of the Minimum wages Act, 1948, Procedure for fixation and revision of minimum wages, Fixation of minimum rates of wage by time rate or by piece rate, Procedure for hearing and deciding claims.

Module II: Payment of Wages Act, 1936

Object, scope and application of the Act, Definition of wage, Responsibility for payment of wages, Fixation of wage period, Time of payment of wage, Deductions which may be made from wages, Maximum amount of deduction.

Module III: Workmen's Compensation Act, 1923

Definition of dependant, workman, partial disablement and total disablement, Employer's liability for compensation: Scope of arising out of and in the course of employment, Doctrine of notional extension, When employer is not liable, Employer's Liability when contract or is engaged, Amount of compensation, Distribution of Compensation, Procedure in proceedings before Commissioner, Appeals.

Module IV: Factories Act, 1948 & Social Security


Concept of "factory", "manufacturing process" "worker" and "occupier" : General duties of occupier, Measures to be taken in factories for health, safety and welfare of workers, Working hours of adults, Employment of young person and children, Annual leave with wages, Additional provisions regulating employment of women in factory, Social Security of Workmen ; Concept and scope of social security : Origin of Social Security in India, Claim and Adjudication of Disputes under Employee's State Insurance Act. 1948.

Examination Scheme:

Components	P/S/V	CT	C	A	EE
Weightage (%)	10	10	5	5	70

Text & References:

- S.C. Srivastava, Commentaries on factories Act, 1948, Universal Law Publishing House, Delhi
- H.L. Kumar, Workmen's Compensation Act, 1923.


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CYBER LAWS

Course Code: LAW2606

Credit Units: 04

Course Objective:

With the advent of information technology law and Right to Information Law, new strides and strategies in legal justice education have come up. There is a need that Law students must also be acquainted with these new developments if a law student has to find a comfortable berth in the competitive legal market as a Law Professional as well as legal manager. Therefore, there seems to be an impending need to generate e-Legal Justice Education that exposes the students to have deep insights into the complexities of information technology and right to information. Objectives of this course, therefore, are understanding the legal recognition and procedure, Digital signatures, legal recognition of cyber authorities and Cyber appellate tribunal, legal implications of new varieties of offences and penalties under the Information Technology Act, 2000. A student of law should also be given the understanding of copy right issues, TRIPS agreements, application of patents to computer technology, etc. Besides, the course also aims at developing insights into the Right to Information Act, 2005 and its grey areas.

Course Contents:

Module I: Introduction (Need, Role and various aspect related to Cyber Law)

Need and role of Cyber; Jurisprudence of Cyber Law in India; Free speech and expression on Internet & Privacy; issues, Right to data protection, Cyber Law & Protection of Domain name.

Module II: Cyber Jurisdiction, Investigation & Cyber Forensics

Cybercrimes: Extradition and Jurisdictional issues; Investigation of Cyber Offences: Cyber equipment's & Cyber Cell; Cyber Forensics: provisions, need and role in cyber investigation.

Module III: Electronic Governance, Cyber space & IPR issues

Legal aspect of Electronic Governance; IPR Issues: An Overview, Patent, Copyright and Trademark & other related Issues in Cyberspace.

Module IV: Cyber Legislations (Laws, National and International treaties & Conventions)

Cyber Legislation: An Indian and International Regime; The Information Technology 2000, The Provisions relating to- Legal recognition of – Digital & Electronic Signature, Secure E- records and Signature, E- signature Certificates, Certifying Authorities, Cyber, Appellate Tribunal and Miscellaneous Provisions.

Module V: Cyber Crimes (Civil & Criminal)

Cyber Crimes and Cyber Victimization; Cyber Offences: Types & the provisions for Penalties mentioned in IT Act, 2000; Cyber Pornography, Cyber Terrorism, Cyber Tort and Cyber defamation etc.

Examination Scheme:

Components	P/S/V	CT	C	A	EE
Weightage (%)	10	10	5	5	70

Text & References:

- Nandan Kamath, Universal Law Publishing Company and E –commerce: Law relating to computers Internet.
- K.K. Kumar, Dominant Publication: Cyber Law
- B.L. Wadhera : Patent, trademarks, Copyrights
- Ganguly (LMH): Intellectual Property Rights.


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BRAND MANAGEMENT

Course Code: MGT2602

Credit Units: 03

Course Objective:

The objective of the course is to help the students understand and appreciate the theoretical concepts of brands. To generate the ability to apply the concepts in real life.

Course Contents:

Module I: Introduction

Meaning and importance of brands. Brands v/s products. Challenges and opportunities of branding. Concept of Brand Equity. Brand management process. Role of CRM in building brands.

Module II: Brand Positioning and value

Sources of brand equity. Brand Building. Implications of brand building. Brand positioning: Brand value. Internal branding.

Module III: Brand Marketing

Criteria for choosing Brand elements. Building brand equity: Product strategy, pricing strategy. Integrated marketing communication. Celebrity endorsements. Concept of co-branding

Module IV: Brand Performance and Branding strategies

Brand value chain, Brand equity management system. Brand hierarchy. Designing branding strategy. Brand extension: Concept, Advantages and disadvantages. Evaluating opportunities of brand extension. Branding strategy over PLC.

Module V: Managing Brands

Reinforcing Brands. Brands revitalization Managing brands internationally, advantages and disadvantages of global marketing. Standardization v/s customization. Global Brand strategy.

Examination Scheme:

Components	CT	HA	C	V	A	EE
Weightage (%)	10	5	5	5	5	70


Text & References:

Text:

- Keller Kevin Lane, Strategic Brand Management: Building, Measuring and Managing Brand Equity, Second Edition, Printice Hall.

References:

- Jean Noel Kampferer, Kogan Page, Strategic Brand Management, Second Edition
- Understanding Brands, Cowley D.


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ADVERTISING AND SALES PROMOTION

Course Code: MGT2603

Credit Units: 03

Course Objective:

The objective of the course is to familiarize students with advertising concepts and strategies, the methods and tools used. Enabling them to develop advertising strategies and plans and to develop the judgment parameters required in product management, to evaluate advertising.

Course Contents:

Module I: Introduction

Role of Promotion in Marketing Mix. Components of promotion mix viz Advertising Publicity, Personal selling, Public relations and Sales promotion. Concept of integrated marketing communication.

Module II: Advertising

Need, scope objectives and importance of advertising, Strengths and Weaknesses of Advertising as a Promotion Tool, role of advertising in current market, advertising and society- latest trends in advertisements different types of advertisements.

Module III: Advertising Campaign Planning

Setting advertising goals and objectives- The DAGMAR Approach. Message strategies and tactics- Creative approaches, Copywriting and testing. Advertising copy design. Copy layout, Advertising appeals and themes, Classification of advertisement copies-Essentials of a good copy Ethics in advertising.

Module IV: Advertising Media and Agencies

Types of media, media planning and scheduling. Advertising budgets. Approaches to advertising budgeting. Measuring advertising effectiveness. Advertising business in India. Rural advertising. Legal and ethical aspects of advertising, Advertising and society. Advertising in international perspective.

Module V: Sales Promotion

Need, scope objectives and importance of sales promotion. Management of sales Promotion at the consumer, trade and sales force levels. Strengths and weaknesses of Sales Promotion.

Module VI: Sales Promotion Strategy

Planning and designing sales promotion programme with specific reference to sales contest, trade in discount coupons etc. sales display and merchandising. Latest trends in sales promotion.

Examination Scheme:

Components	CT	HA	C	V	A	EE
Weightage (%)	10	5	5	5	5	70


Text & References:

Text:

- Belch and Belch, Advertising and Promotion, Sixth Edition, Tata McGraw Hill

References:

- Batra Rajeev, Aaker, David A and Myere John G. Advertising Management, Fifth Edition, Pearson Education
- Advertising Management – Chunawalla


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TERM PAPER

Course Code: MGT2631

Credit Units: 02

Course Objective:

The objective of this course is to judge the understanding as well as application of the knowledge gained by the students. The aim of the term paper is to provide the students with an opportunity to further enhance their knowledge in a sector of their choice by undertaking a significant practical unit of examining and analyzing various aspects of business management at a level commensurate with the learning outcomes of the various courses taken up them in the ongoing semester.

A term paper is primarily a record of intelligent reading in several sources on a particular subject. The students will choose the topic at the beginning of the session in consultation with the faculty assigned. At least one middle level or senior level person of a company from the chosen sector may be interviewed face to face.

Guidelines:

1. The term paper will be related to the contemporary business issue and the topic will be given by the department.
2. The presentation of the term paper is scheduled to be held before the commencement of Semester examinations.
3. The paper will carry 100 marks that will be marked on the basis of understanding and organization of content based on the literature review. The Bibliography shall form an important part of the paper.
4. Examples of a few broad areas for Term Paper (List is indicative, not exhaustive)
 - Credit rating
 - Risk management
 - Subprime meltdown and its after effect with case study from Indian industry
 - Corporate frauds
 - Micro finance institutions in India
 - Carbon Trading
 - IFRS
 - Celebrity Endorsement in real estate
 - Social media marketing
 - Green marketing
 - Sustainable branding practices
 - Relationship management
 - CSR
 - Balanced Score Card
 - Corporate Governance
 - Employee retention
 - NGOs.

Evaluation Scheme:

Organisation and relevance of content	Literature Review	Bibliography	Total
40	40	20	100



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PROJECT (WITH PRESENTATION & EVALUATION)

Course Code: MGT2632

Credit Units: 03

Objectives:

The aim of the project is to provide the students with an opportunity to further their intellectual and personal development in the chosen field by undertaking a significant practical unit of activity. The project can be defined as a scholarly inquiry into a problem or issues, involving a systematic approach to gathering and analysis of information / data, leading to production of a structured report.

Chapter Scheme and distribution of marks:

Chapter 1: Introduction	– 10 marks
Chapter 2: Conceptual Framework/ National/International Scenario	– 25 marks
Chapter 3: Presentation, Analysis & Findings	-- 25 marks
Chapter 4: Conclusion & Recommendations	-- 10 marks
Chapter 5: Bibliography	-- 05 marks

Components of a Project Report

The outcome of Project Work is the Project Report. A project report should have the following components:

- 1) Cover Page: This should contain the title of the project proposal, to whom it is submitted, for which degree, the name of the author, name of the supervisor, year of submission of the project work, name of the University.
- 2) Acknowledgement: Various organizations and individuals who might have provided assistance /co-operation during the process of carrying out the study.
- 3) Table of Content: Page-wise listing of the main contents in the report, i.e., different Chapters and its main Sections along with their page numbers.
- 4) Body of the Report: The body of the report should have these four logical divisions
 - a. *Introduction*: This will cover the background, rationale/ need / justification, brief review of literature, objectives, methodology (the area of the study, sample, type of study, tools for data collection, and method of analysis), Limitations of the Study, and Chapter Planning.
 - b. *Conceptual Framework / National and International Scenario*: (relating to the topic of the Project).
 - c. *Presentation of Data, Analysis and Findings*: (using the tools and techniques mentioned in the methodology).
 - d. *Conclusion and Recommendations*: In this section, the concluding observations based on the main findings and suggestions are to be provided.
- 5) Bibliography or References: This section will include the list of books and articles which have been used in the project work, and in writing a project report.
- 6) Annexures: Questionnaires (if any), relevant reports, etc.
(The main text of the Project should normally be in the range of 5000 words. However, there may be annexure in addition to the main text)

The Steps of a Project Report

Step I: Selection of the topic for the project by taking following points into consideration:

- Suitability of the topic.
- Relevance of the topic
- Time available at the disposal.
- Feasibility of data collection within the given time limit.
- Challenges involved in the data collection (time & cost involved in the data collection, possibility of getting responses, etc.)

Step II: Finalisation of the Topic and preparation of Project Proposal in consultation with the Supervisor.

Step III: Collection of information and data relating to the topic and analysis of the same.

Step IV: Writing the report dividing it into suitable chapters, viz.,

Chapter 1: Introduction,

Chapter 2: Conceptual Framework / National & International Scenario,

Chapter 3: Analysis & Findings

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Chapter 4: Conclusion and Recommendations.

Step V: The following documents are to be attached with the Final Project Report.

- 1) Approval letter from the supervisor (Annexure-IA)
- 2) Student's declaration (Annexure-IB)
- 3) Certificate from the Competent Authority of the Organisation / Institution, if the student undertakes the Project Work in any Organisation / Institution.

Guidelines for evaluation:

Each of the students has to undertake a Project individually under the supervision of a teacher and to submit the same following the guidelines stated below:


- Language of Project Report and Viva-Voce Examination may be English. The Project Report must be typed and hard bounded.
- Failure to submit the Project Report or failure to appear at the Viva-voce Examination will be treated as "Absent" in the Examination. He /she has to submit the Project Report and appear at the Viva-Voce Examination in the subsequent years (within the time period as per University Rules).
- No marks will be allotted on the Project Report unless a candidate appears at the Viva-Voce Examination. Similarly, no marks will be allotted on Viva-Voce Examination unless a candidate submits his/her Project Report.
- Evaluation of the Project Work to be done jointly by one internal expert and one external expert with equal weightage, i.e., average marks of the internal and external experts will be allotted to the candidate.

Evaluation Scheme:

Project Report	Power Point Presentation & Viva	Total
75 marks	25 marks	100



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WORKSHOP

Course Code: MGT2633

Credit Units: 01

Course Objective:

A workshop is primarily an activity based academic event that is organized to provide the students a one to one and hands on experience on any aspect of their learning. The communication in a workshop has to be necessarily two ways. The trainer has to make sure that the aspects covered are practically practiced by the participants. The student will choose the option of workshop from amongst their concentration electives. The evaluation will be done by Board of examiners comprising of the faculties.

Major Themes for Workshop:

The workshop may be conducted on any of the following major themes:

Accounting

Finance

Human Resources

Marketing

Economics

Operations

Supply Chain Management

These themes are merely indicative and the trainer may choose any recent and relevant topic of study.

Guidelines for Workshop:

The procedure for earning credits from workshop consists of the following steps:

1. Relevant study material and references will be provided by the trainer in advance.
2. The participants are expected to explore the topic in advance and take active part in the discussions held
3. Attending and Participating in all activities of the workshop
4. Group Activities have to be undertaken by students as guided by the trainer.
5. Evaluation of workshop activities would be done through test and quiz at the end of the workshop.
6. Submitting a write up of atleast 500 words about the learning outcome from the workshop.

Methodology:

The methodology followed at the workshop could be based on any one or more of the following methods:

Case Study

Business Game

Simulation

Group Activity

Role Play

Business Planning

Quiz

Evaluation Scheme:

Attendance	Active Participation	Multiple Choice Questions/ Quiz	Solving the case/ Assignment/ Write up	Total
10	30	30	30	100


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CORPORATE TAX PLANNING

Course Code: MGT2605

Credit Units: 03

Course Objective:

To provide understanding of Direct Tax including Rules pertaining there to and application to different business situations. To understand principles underlying the Service Tax and concepts of VAT.

Course Contents:

Module I: Introduction to Tax Management

Concept of tax planning, Tax avoidance and tax evasions, Corporate taxation.

Module II Income from business

Residential Status of companies, Taxable income under Business and Profession, Computation of Profit and Gains from business profession, Deemed business profits, Assessment of Retail Business, Deemed incomes (cash credit, unexplained investments, unexplained money and other assets, unexplained expenditures, investments and valuable articles not fully disclosed in books of accounts).

Module III: Deductions allowed under business and profession

Deduction Expressly allowed section 30-35, Depreciation deduction calculation, Setoff and carry forward of unabsorbed depreciation section 32(2). Determining Actual Cost 43(1), Set-off and Carry Forward Losses, Bonus or commission to employees section, Interest on borrowed capital, Insurance premium 36(1(i)), Employees contribution to provident fund, Bad debts 36, Revenue expenditure incurred by statutory corporation, Banking transaction tax, Security transaction tax, Commodity transaction tax, provision for admissibility of general deduction 37(1),

Module IV: International accounting and Taxation

Analysis of foreign financial statement, Accounting standard: US GAAP, Indian GAAP, IAS, IFRS. Transfer Pricing – Meaning, measurement, strategic considerations Norms & Practices, tax havens, Double taxation agreement among countries, Tax implication of activities of foreign enterprise in India: Mode of entry and taxation respectively.

Module V: Indirect tax - concepts and general principles

Service tax - Charge of service tax and taxable services, Valuation of taxable services, Payment of service tax and filing of returns.

VAT – Introduction, Calculation of VAT Liability including input Tax Credits, Small Dealers and Composition Scheme, VAT Procedures, Central Sales Tax.

Module VI: Tax Planning and Financial Management Decisions

Tax planning relating to capital structure decision, Dividend policy, Inter – corporate, dividends and bonus shares, Tax provisions relating to free trade zones, Infrastructure sector and backward areas, Tax incentives for exports. Tax deductions and collection at source, Advance payment of tax.

Examination Scheme:

Components	P-1	C-1	CT-1	Attendance	EE1
Weightage (%)	10	5	10	5	70

Text & Reference:

Text:

- Lal & Vashisht, Direct Taxes, 29th Edition, Pearson

References:

- Singhania & Singhania, Income Tax, 39th Edition, Taxmann

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BANKING AND FINANCIAL INSTITUTIONS

Course Code: MGT2606

Credit Units: 03

Course Objective:

The aim of the course is to orient the finance students to the change in the banking industry. The financial industry much like the computer industry is changing rapidly. The students will be familiarized with institutions of today and developing an understanding why they are the way they are, and why they are changing is the core aim of the course. An Indian perspective will be added but conceptually the Global frameworks will be used.

Course Contents:

Module I: Introduction

Money, Process of Capital Formation., Banking and Financial Institutions and economic development, Role of Development Banks in Industrial Financing.

Module II: Banking System & Operations.

Banking system and structure in India- Types of banks in operation and their functions, Retail and Wholesale Banking, Near Banks, Rural Banking. Cooperative Banking, Universal Banking, NBFCs- International Banking- financing exporters and importers – Important ECGC Policies and guarantees governing export financing) Banking Operation: An overview Principles of Lending, Study of Borrowers & Project Evaluation Criteria

Module III: Banking Sector Reforms

Provisions of Banking Regulation Act, Prudential Norms - Narsimhan Committee Recommendations, Regulatory Institutions RBI & SEBI, Basle Committee Recommendations, Asset Liability Management in Commercial Banks.

Module IV: Insurance Institutions

Introduction to Insurance – Elements of Insurance Risk, Principles of Insurance, Types of Insurance – Life Insurance and General Insurance Products including unit linked plans, Re-insurance, Bancassurance- concepts, critical issues & functional aspects. Role of Insurance companies in Industrial Financing.

Module V: Financial Inclusion

Concept, Financial Inclusion in India: Challenges, Scope of Financial Inclusion in banking activities & financial services.

Micro Finance as a tool of Financial inclusion: Evolution: Grameen Model, Self Help groups.

Progress in India, Principles of microfinance- institutional structures and delivery mechanisms. Enforcement and savings

Module VI: Trends in Banking

Banking Innovations. Marketing of banking services; Banking Technology - Internet banking, ATMs, mobile banking; Banking Technology - ECS, debit, credit and smart cards
Securitization (SARFAECI Act, SPV, ARC)

Examination Scheme:

Components	P-1	C-1	CT-1	Attendance	EE1
Weightage (%)	10	5	10	5	70

Text & References:

Text:

- Khan, M. 3rd Reprint, 1998, Financial Institutions and Markets, Tata McGraw Hill Publishing Company Limited.

References:

- Cornett and Saunders, 1999, Fundamentals of Financial Institutions Management, 1999 McGraw Hill Publishing Company Limited.
- Bhole L.M., Third Edition, Financial Institutions and Markets; Structure, Growth and Innovation, Third Edition. Tata McGraw Hill Publishing Company Limited.
- Patel, V. Bharati Second Edition, The Indian Financial System Pearson Education

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ADVANCED CORPORATE FINANCE

Course Code: MGT2607

Credit Units: 03

Course Objective:

The basic objective of this course is to acquaint the students with the latest developments in the field of corporate finance. This course will be a step above Financial Management II where they will learn advanced topics related to behavioural finance, corporate restructuring & corporate governance

Course Contents:

Module I: Introduction

Objectives of Corporate finance. Shareholder wealth maximization. Agency Problems, Management Compensation & measurement of Performance

Module II: Valuation Concepts

Valuation Models, Application of Valuation Model, EVA/MVA, Balanced scorecard and other methods/measures of financial performance.

Module III: Corporate restructuring

Differential Efficiency & Financial Synergy: Theory of Mergers, Operating Synergy & Pure Diversification: Theory of mergers, Costs and Benefits of Merger, Evaluation of Merger as a Capital Budgeting Decision, Poison Pills, Turnaround Strategies, Tax Planning relating to mergers and Amalgamation

Module IV: Corporate Governance & Business Ethics

Implementation of Corporate Governance, Ethics and finance, Ethical practices in market place, corporate responsibility, social audit and ethical investing.

Module V: Behavioural Finance

Introduction and Expected Utility, Non-Expected Utility Preferences, A review of classical probability theory, Beliefs, Biases and Heuristics, Preferences and Anomalies in the Financial markets

Module VI: Strategic Cost management

Financial aspects of supply chain management, Operations management perspective on Costs, Strategic cost analysis (using activity based costing, target costing and life cycle costing) and product pricing at Different stages of product's life cycle

Examination Scheme:

Components	CT	HA	C	V	A	EE
Weightage (%)	10	5	5	5	5	70


Text & References:

Text:

- Brealey and Myers, Principles of Corporate Finance, Eighth Edition, Tata McGraw Hill Publishing Company Limited.

References:

- Ross, Westerfield and Jaffe, Seventeenth Edition, Tata McGraw Hill.
- Quiry, P., Dallocochio, M., YannLE Fur., Antonio Salvi, Seventh Edition, John Wiley and Sons


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INDUSTRIAL RELATIONS AND LABOUR LAW

Course Code: MGT2608

Credit Units: 03

Course Objective:

The objective of the course is to acquaint students with the origin and importance of Labour laws governing general functioning of employees in an organisation and also to educate student with the important provisions under these laws. This will enable them to develop the right perspective of this delicate responsibility to deal with union constructively and to maintain industrial democracy.

Course Contents:

Module I: Basic Concepts

Industrial Relations, Industrial Peace, Industrial unrest and Industrial Discipline

Module II: Laws Relating to Industry

The factories Act, 1948 - Definition - Approval licencing and registration of factories - Notice by occupier, Health, and welfare measures - weekly holidays. Leave with wages, Employment of women and young person - Penalties and returns. The Industrial Disputes Act, 1947 - Definition - conciliation, court of enquiry and voluntary process for the settlement of industrial disputes - power of the Govt. under ID Act - Instrument of economic coercion - Strike & lock out, Lay off Retrenchment, Transfer and closures - Discharge and Dismissal - Managements prerogative during pendency of proceeding - Work Committee, arbitration and adjudication.

Module III: Laws Relating to Remuneration

The Payment of Wages Act, 1936 - Definition - Rules for payment of wages and deductions from wage. The Minimum Wages Act 1948 - Fixing of minimum wages, Procedure for raising minimum wage - Concept of living wages, Fair wage and minimum wage. The Employees State Insurance Act 1948 - Definition - Applicability of the Act - Insurable workmen - Contribution Benefit - Penalties. The Employees Provident Fund and Miscellaneous Provisions Act, 1952 and Employees family pension scheme - definition - Coverage of the organization and employees under the Act - Employees Provident Fund and pension fund scheme - Calculation of contribution withdrawal of Provident Fund amount - Penalties for offence. The Payment of Gratuity Act, 1972 - Definition - Scope and Coverage of the Act - Eligibility criteria - Calculation of Gratuity Nomination. The Payment of Bonus Act 1965 - Applicability of Act - Coverage of employee - Calculation of bonus Rate of Payable bonus - available surplus - allocable surplus.

Module IV: Laws Relating to Trade Union

The Trade Union Act 1926. Statutory Definition - Registration of TU Immoduley granted to Registered Trade Union - Recognition of TU.

Module V: Compensation and Insurance

The workmen's compensation Act 1923 - Definition - Rules regarding workmen's compensation - Defense available to employer and employees, The Maternity Benefit Act 1961.

Module VI: Misc Acts

The Industrial Employment (standing order) Act 1946 - Scope and coverage of the Act - Concept of standing order - its certification process - Modification - interpretation and enforcement of standing orders.

Examination Scheme:

Components	CT	HA	C	V	A	EE
Weightage (%)	10	5	5	5	5	70


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Text & References:

Text:


- P L Malik, Handbook of Labour and Industrial Law Eastern Book Publication 9th Edition 2005

References:

- R. C. Chawla and K.C. Garg, "Industrial Law", Ludhiana, Kalyani Publishers, 1993.
- P.L. Malik, "Industrial Law", Lucknow, Eastern Book Co., 1995. 19th edition reprinted 2006
- J.K. Bareja, "Industrial Law", New Delhi, Galgotia Publishing Co., 2001.
- M.Y. Pylee and George Simon, "Industrial Relations and Personnel Management", New Delhi, Vikas Publishing House, 1996.
- P. Subba Rao, "Essentials of Human Resource Management and Industrial Relations: Text, Cases and Games", Mumbai, Himalaya, 2000.
- S.C. Shrivastava, "Industrial Relations and Labour Laws", New Delhi, Vikas Publishing House, 2000 Fourth revised Edition. Reprinted 2006



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PERFORMANCE MANAGEMENT SYSTEM

Course Code: MGT2609

Credit Units: 03

Course Objective:

This course will help students understand the significance of appraisal for an organization and individuals. It will develop an understanding of various Performance Appraisal tools and their applications and potential appraisal. Further it will develop a right perspective in them towards managing and improving performance.

Course Contents:

Module I: Overview of Performance Management

Employee Motivation & Needs (Vroom's & Adam's Theory of Motivation), Performance Appraisal: The past & the future, Human Resource Development & Performance Appraisal, Planning Performance & Role Clarity, Accountability and Effectiveness.

Module II: Process of Performance Appraisal

Measuring Performance Appraisal – Objectives & Indicators, Methods of Appraisal – Contemporary & Modern methods, Performance feedback & counseling, PMS.

Module III: 360 degree Feedback

Definition, methodology, advantages/disadvantages of Feedback, RSDQ Model, and Criteria for success, Experiences in 360 appraisals.

Module IV: Potential Appraisal

Concept, difference between performance appraisal and potential appraisal, Competency mapping & potential appraisal –case studies

Module V: Performance Management in application

Performance Management and development, Performance Management and Pay, Creating High Performance organization.

Module VI: Emerging Concerns & Performance Management

Appraisal for future – going beyond tangible performance, HR Scorecard.

Examination Scheme:

Components	CT	HA	C	V	A	EE
Weightage (%)	10	5	5	5	5	70


Text & References:

Text:

- T.V. Rao; Performance Management and Appraisal; Jaico Publication
- Dinesh K. Srivastava, "Strategies for Performance Management", New Delhi, 2005, Excel Books,

References:

- K Aswathappa; Human Resource and Personnel Management; McGraw- Hill Companies
- Desimone; Human Resource Development Thomson Learning


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COMPENSATION AND REWARD MANAGEMENT

Course Code: MGT2610

Credit Units: 03

Course Objective:

The objective of this course is to familiarize students with the dynamics of wage and salary administration and current trends in India.

Course Contents:

Module I: Introduction

Overview of Compensation Management, Wage and Salary Administration – Nature, Importance, Philosophy, Objectives, Definition, Goals Role of various parties – Employees, Employers, Unions & Government and Legislations for compensation.

Module II: Developing Compensation Programs

Job Evaluation, Basic systems Time wage, Piece wage, Incentives, Wage payments and Total Salary Structure, Compensation Surveys, Hay Plan, Developing Competitive Compensation Programs, Developing Salary Structures

Module III: Derivatives of Compensation

Pay for Performance, Merit pay and Performance Appraisal, Performance based rewards, Performance Criteria Choices, and Competency Mapping & Developing Performance Matrix, Performance based Compensation Schemes.

Module IV: Incentive Plans

Incentive Plans: individual and group incentive plans, Productivity Gain sharing plans, Profit Sharing Plans, Non - Financial and Financial incentives, Measuring Cost- to – Company (CTC).

Module V: Employee Benefits

Employee Benefits: Supplemented Pay benefits (pay for time not worked) insurance benefits, Retirement benefits, Employees' service benefits, Introduction to ESOPs, Flexible benefits and Benefit Surveys.

Module VI: Current Trends

Current Trends in Compensation and Reward Management

Examination Scheme:

Components	CT	HA	C	V	A	EE
Weightage (%)	10	5	5	5	5	70

Text & References:

Text:

- Garry Dressler, "Personnel / Human Resource Management", London, Prentice Hall, 1994.
- William B. Werther Jr. and Keith Davis "Human Resource Management". New Jersey: McGraw Hill. (1993)
- Milkovich & Newman, Compensation, Irwin/McGraw-Hill 8th Ed.

References:

- Frans Poets, The Art of HRD – Job Evaluation & Remuneration, Crest Publishing, Volume7 1st Edition
- Michael Armstrong, Helen Murlis, The Art of HRD – Reward Management, Crest Publishing
- Michael Armstrong, Employee Reward, (University Press)
- P. Zingheim, The New Pay, Linking Employee & Organization Performance, Schuster, (Jossey-Bass)
- Sara Rynes, Compensation in Organization, Gerhart (Jossey BASS)
- Wendell L French, "Human Resource Management", USA, Houghton Mifflin Company, 1994.
- David D. Decenzo and Stephen P. Robbins, "Human Resource Management", New Delhi, Prentice Hall, 3rd Edn., 1988.

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HUMAN RIGHTS LAW

Course Code: LAW2701

Credit Units: 05

Course Objective:

Learning about human rights is largely cognitive, including human rights history, documents, and implementation mechanisms. All segments of society need to understand the provisions of the UDHR and how these international standards affect governments and individuals. They also need to understand the interdependence of rights, both civil and political and social, economic, and cultural. The course analyses International instruments on human rights, provisions of the Indian Constitution and protection of Human Rights Act emphasizing the role of NHRC and HRC. The Course include the study on the role of media, NGO and Human rights education at the grass root level to protect the basic rights of the people.

Course Contents:

Module I: The concept of Human Rights

Theoretical foundations of Human Rights- meaning, basic concept and origin of Human Rights,- Sources and significance of Human Rights-Different definitions of Human Rights-Classification of Human Rights.-Theories of Human Rights- Historical development of the concept of Human Rights- Concept of natural law and the concept of natural Rights- Human Rights in legal tradition- International law and National law.

Module II: UN and Human Rights

International documents related to Human Rights- Universal declaration of Human rights- Individual Rights and Group Rights- Significance and limitations- International Covenant on Civil and Political Rights,1966-International Covenant on Economic, Social and Cultural Rights,1966- Specific Conventions dealing with Human Rights-Importance and binding effect of above documents on the member countries of UN-Impact and implementation of Human Rights norms in India-Human Rights norms reflected in the Fundamental Rights under the Constitution of India- Directive principles legislative and administrative implementation of Human Rights norms-Implementation of Human Rights norms through judicial process. Regional arrangements –EU- Inter American System.

Module III: Human Rights under the Constitution and Different legislation in India

Provisions to ensure Human Rights to woman and children in India-Human Rights granted to Scheduled Castes and Scheduled Tribes and other socially and economically backward communities- Human Rights of prisoners

Module IV: Enforcement of Human Rights


Organs under the UN- International commissions of Human Rights- Amnesty International- American system and European system-Role of the Judiciary in India- Statutory Commissions- Woman's Commission- Minority Commission- SC/ST Commission.

Module V: Human Rights Commissions and Human Rights

Protection of Human Rights Act,1993- National Human Rights Commission- State Human Rights Commissions- Role of Media- Role of NGO's- Human Rights Education

Examination Scheme:

Components	P/S/V	CT	C	A	EE
Weightage (%)	10	10	5	5	70


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Text & References:

- Jack Donnelly, Universal Human Rights in Theory and Practice (Cornell University Press, 2013)
- David P. Forsythe, Encyclopedia of Human Rights: Vol. 1 (Oxford University Press, 2009)
- Beth A. Simmons, Mobilizing for Human Rights: International Law in Domestic Politics (Cambridge University Press, 2009)
- D.D. Basu, Human Rights in Constitutional Law, Lexis Nexis, 2008 (3rd Edn)
- Upendra Baxi, The Future of Human Rights, Oxford University Press, 2012 (3rd Edn)
- Thomas Buergenthal, International Human Rights in a Nutshell, West Publisher Company, 2009 (4th Edn)
- Henry Steiner & Philip Alston, International Human Rights in Context: Law, Politics, Morals: Text and Materials, Oxford University Press, 2008
- S. K. Kapoor, International Law and Human Rights, Central Law Agency, 2014
- M. K. Sinha, Implementation of Basic Human Rights, Lexis Nexis, 2013



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ENVIRONMENTAL LAW

Course Code: LAW2702

Credit Units: 05

Course Objective:

This paper provides the study of environmental laws covering legislations related to it and protection of forest and wild life.

Course Contents:

Module I: Environmental Law: International and National Perspective

Introduction: Environment and Environment Pollution: Problem and prospects; constitutional Perspective :Right to Evolution and Application, Co relation between: Directive Principles of State Policies and Fundamental Degrees, Fundamental Rights and Directive Principles of State Policy; International Norms :Sustainable Development :Precautionary Principle, Polluter Pays Principle, Agenda 21, Inter generational equity, Public Trust Doctrine, Principle of no fault liability : Absolute Liability; Environment Protection through Public Interest Litigation, Remedies under various other laws.

Module II: Prevention and Control of Water and Air Pollution

The Water (Prevention and Control of Pollution) Act, 1974:Water Pollution : Definition, Central and State Pollution Control Boards: Constitution, Powers and Functions, Water Pollution Control Areas, Sample of effluents : Procedure; Restraint order, Consent requirement : Procedure, Grant/Refusal, Withdrawal, Citizen Suit Provision; Air (Prevention and Control of Pollution) Act, 1981: Air Pollution: Definition, Central and State Pollution Control Boards: Constitution, Powers and functions, Air Pollution Control Areas; Consent Requirement : Procedure, Grant/Refusal, Withdrawal, Sample of effluents – Procedure; Restraint order.

Module III: Protection of Forests and Wild Life

Indian Forest Act, 1927: Kinds of forest: Private, Reserved, Protected and Village Forests, The Forest (Conservation) Act, 1980; The Wild Life (Protection) Act, 1972: Authorities to be appointed and constituted under the Act, Hunting of Wild Animals, Protection of Specified Plants, Protected Area, Trade or Commerce in wild animals, animal articles and trophies; Its prohibition.

Module IV: Special Environmental Legislations

Environmental (Protection) Act, 1986, Public Liability Insurance Act, 1991, The National Environment Tribunal Act, 1995, The National Appellate Environmental Authority Act, 1997.

Examination Scheme:

Components	P/S/V	CT	C	A	EE
Weightage (%)	10	10	5	5	70

Text & References:

- Environmental Law & Policy in India – Shyam Diwan, Armin Rosencranz
- Environmental Law in India – P. Leelakrishnan
- PIL and Environmental Protection-Geetanjali Chandra
- The Water (Prevention and Control of Pollution) Act, 1974
- The Air (Prevention and Control of Pollution) Act, 1981
- The Indian Forest Act, 1927
- The Forest (Conservation) Act, 1980
- The Wild Life Protection Act, 1972
- The Environment (Protection) Act, 1986
- The Public Liability Insurance Act, 1991
- The National Environment Tribunal Act, 1995
- The National Environment Appellate Authority Act, 1997

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JURISPRUDENCE

Course Code: LAW2703

Credit Units: 05

Course Objective:

The objective of the course is to create an understanding of basic legal concepts and provide an insight to the student into philosophical, ideological and theoretical foundations of the discipline of law with special reference to Indian legal system.

Course Contents:

Module I: Introduction

Nature and scope of Jurisprudence, State, Sovereignty and Law: Sources of Law: Custom, Precedent, Legislation, Equity.

Module II: Schools of Jurisprudence – I

Natural Law, Analytical positivism, Pure Theory, Historical Jurisprudence, Sociological Jurisprudence, Economic Approach, Legal Realism, Theories of justice: Aristotle, Rawls, Distributive Justice in India.

Module III: Concepts of Rights and Duties

Rights and Duties, Types, Theories, Critique of Rights and Duties, Contemporary issues in Rights.

Module IV: Concepts of Ownership and Possession:

Evolution of concept of possession, ownership, Essentials of ownership, Corpus and Animus, Res Nulius and Res Possessionis

Module V: Indian Perspectives in Jurisprudence

Classical and Medieval Influences, Modern Trends study with reference to judicial pronouncements with state policy.

Examination Scheme:

Components	P/S/V	CT	C	A	EE
Weightage (%)	10	10	5	5	70

Text & References:

- Bodenheimer, Jurisprudence – The Philosophy and Method of Law (1996), Universal, Delhi.
- Fitzgerald, (ed.) Salmond on Jurisprudence (1999) Tripathi, Bombay
- W. Friedmann, Legal Theory (1999) Universal, Delhi
- V.D. Mahajan, Jurisprudence and Legal theory (1996 re-print), Eastern, Lucknow
- M.D.A. Freeman (ed.) Lloyd's Introduction to Jurisprudence, (1994), Sweet & Maxwell
- Paton G.W. Jurisprudence (1972) Oxford, ELBS
- H.L.A. Hart, The Concepts of Law (1970) Oxford, ELBS
- Roscoe Pond, Introduction to the Philosophy of Law (1998 Re-print) Universal, Delhi
- Dias, Jurisprudence (1994 First Indian re-print), Adithya Books, New Delhi
- Dhyani S.N., Jurisprudence: Jurisprudence and Indian Legal theory
- Dhyani S. N., Fundamentals of Jurisprudence
- Jayakumar N. K., Lectures in Jurisprudence, Butterworths
- Justice Markandey Katju, Law in the Scientific Era, Universal
- Justice J. S. Verma, Dimensions of Justice, Universal
- Justice Rama Jois, Seeds of Modern Public Law in Ancient Indian Jurisprudence
- Justice Rama Jois, Eternal Values in Ancient Law.


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PUBLIC INTERNATIONAL LAW

Course Code: LAW2704

Credit Units: 05

Course Objective:

The objective of this paper is to provide knowledge to the students regarding the Public International Law to enable them to deal with the transnational legal order.

Course Contents:

Module I: Introduction

Definition and Basis of International Law, Subjects of International Law, Relationship between International Law and Municipal Law.

Module II: Sources of International Law

Custom, Treaties, General Principles of law, Juristic Works, General Assembly Resolutions, Other sources (Conventions).

Module III: State Recognition, State Jurisdiction and Law of the Sea

State Recognition: Recognition of states, Recognition of governments, *De facto* and *De jure* Recognition, Types of Recognition: Implied Recognition, Conditional Recognition, Collective Recognition; Withdrawal of Recognition, The legal effects of recognition; **State Jurisdiction:** Basics of Jurisdiction, Principles of Jurisdiction, Exemption from Jurisdiction: Diplomatic Immunities and Privileges, Armed Forces, Public Ships; **Law of the Sea:** First and Second Law of the Sea Conventions: Third Law of the Sea Convention {UNCLOS III (United Nations Convention on the Law of the Sea), Maritime Zones; Territorial Waters, Contiguous Zone, Exclusive Economic Zone, Continental Shelf High Seas; Sea Bed Authority, Deep Sea Bed Mining and International Sea – Bed Area.

Module IV: Conflict Resolution, War and Neutrality of States


Modes of Settlement of Disputes: Peaceful means, Coercive means; War: Laws of War, Humanitarian Laws: Rules of neutrality.

Examination Scheme:

Components	P/S/V	CT	C	A	EE
Weightage (%)	10	10	5	5	70

Text & References:

- Oppenheim, International Law, Vol. – 1.
- J.G. Strake, Introduction to International Law.
- Grieg, International Law.
- R.C. and Hingorani, Modern International Law.
- H.O. Aggarwal, International Law.
- S.K. Kapoor, International Law.
- Bowell, The Law of International Institutions.
- Verma, S.K., An Introduction of Public International Law.


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FORENSIC SCIENCE-I

Course Code: LAW2707

Credit Units: 05

Course Objective:

Forensic Science is science related to the law. It is the scientific method of gathering and examining information about the past which is then used in a court of law. It is applied science and consists of a range of different disciplines which often require different underpinning science knowledge. It continues to evolve and is now applicable to crime disruption and crime prevention as well as crime detection and the identification of victims in mass disasters.

The course focuses on the following objectives:

1. Developing an understanding and appreciation for the Forensic Sciences.
2. Brief description of crime scene investigation alongwith its various techniques and significance of physical evidences.
3. Develop an understanding on different types of questioned documents, the types of forgeries and disguise generally encountered.
4. Developing an understanding of handwriting and typewriting alongwith its analysis.

Course Contents:

Module I: Introduction to Forensic Sciences

Brief description of Forensic Sciences, historical development of forensic sciences in India and forensic lab, laws and principles of forensic science, mobile forensic units their distribution in India.

Module II: Crime Scene Investigation

Definition, types- mobile, indoor and outdoor crime scene, various searching techniques used for locating physical evidence at crime scene, recording the scene, reconstruction of crime scene- modus operandi, role of investigating officer.

Module III: Physical Evidences in Forensic Science

Definition, collecting, packaging, preservation and forwarding of evidences, fingerprint its characteristics, classification, developmental techniques- chemical developmental techniques.

Module IV: Introduction to Questioned Documents

Questioned documents, types, disputed documents, security documents, bank notes, tampered documents, age of the documents and ink analysis, examinations of the fake currencies, instrumentations.

Module V: Handwriting and Typewriting Analysis

Handwriting identification forged and disguises handwriting, typewriting identification, general equipments for examinations

Module VI: Tool marks and other impressions

Definitions, types and decipherment of tool marks and techniques; examination of tool marks; introduction to tyre marks: its nature and types, skid marks tread marks; footprints and shoeprints types significance and examinations.

Examination Scheme:

Components	P/S/V	CT	A	C	EE
Weightage (%)	10	10	5	5	70

Text & References:

- Sharma. B.R., Forensic Science in Criminal Investigations and trials (3rd Edn) Universal Law Publishing Co. Ltd
- Nath.S, Fingerprint Identification CRC Press 2nd Edn, 2002
- Fisher, B, Techniques of Crime Scene Investigation 6th Edn CRC Press,
- Albert. S. Osborn, Questioned Documents, 2nd Edn, Universal Law Publishing Delhi, 1998

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OFFENCES AGAINST CHILD AND JUVENILE OFFENCE HUMAN RIGHT LAW

Course Code: LAW2708

Credit Units: 05

Course Objective: To impart knowledge and expertise in legal and social issues relating to juvenile justice system in India, and sensitize about juvenile crimes and justice delivery system.

Course Contents:

Module I: Definition and concepts of term child and Juvenile. Causes of offence against child, International protection to child and convention, Offences against Child, Child abuse, Child labour and forced labour, Kidnapping, abduction, Abetment of suicide of child, Sale of obscene objects to young.

Module II: Concepts of: juvenile in conflict with laws, neglected juvenile, Determining factors of juvenile in conflict with laws: differential association, anomie, economic pressure, peer group influence, gang sub-culture, and class differentials.

Module III: Legislative Approaches, Constitutional provisions, Relevant provisions of the Juvenile Justice (Care and Protection of Children) Act, 2000, Relevant provisions of Protection of Children from Sexual Offences Act, 2012.

Module IV: Child and Criminal Liability, Crimes committed by child, Crimes committed by others in relation to children, Implementation of social policy through criminal sanctions in relation to child, Variation of procedure in case of child offender, Judicial proceedings in criminal cases relating to children, Protection of Children from Sexual Offences.

Module V: Judicial Contribution and Preventive Strategies, Social action litigation concerning juvenile justice, recent judicial decisions, Role of legal profession in juvenile justice system, State welfare programs: health, nutrition, ICWS, grant-in-aid, and compulsory education, Role of community, family, voluntary bodies, and individuals.

Examination Scheme:


Components	P/S/V	CT	C	A	EE
Weightage (%)	10	10	5	5	70

Text & References:

- Bhattacharya, S.K.; Juvenile Justice: An Indian Scenario; Regency Publications
- Kumar, K. and Rani, Punam; Offences Against Children: Socio Legal Perspective; Regency Publications
- Josine Junger-Tas and Decker, Scott H.; International Handbook of Juvenile Justice; Springer
- Dunkel, Frieder; Juvenile Justice Systems in Europe: Current Situation and Reform Developments; Forum Verlag Godesberg



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LAW AND MEDICINE-I

Course Code: LAW2709

Credit Units: 05

Course Objective:

The course aims to provide the students the knowledge about the interrelationship between law and medicine and complex legal and ethical issues involved in the field of medicine and medical profession. The course include the doctor-patient relationship and its legal dimensions, medical negligence, socio-legal issues involved in the new technologies in medical science and biotechnology as well. As medico-legal issues became a consumer issue as well as a fundamental rights violation the course will help the students to have knowledge in laws related to medicine and analyse the issues in a better way.

Course Contents:

Module I: Introduction

Inter-relationship between law and medicine-issues involved and legal control- Doctor-Patient relationship- Constitutional perspective and penal provisions- Indian penal Code- Directive principles- Right to life- Right to health and emergency medical care.

Module II: Regulation of medical and Paramedical profession

Medical profession in India- Para medical profession- Regulatory authorities- Self regulation- medical Ethics- WHO declarations- Declaration of Geneva- Helsinki declaration- Regulatory authorities created by statutes- Regulations under medical Degrees Act, 1916- Pharmacy Act, 1948- Indian medical Councils Act- education regulations- Medical Council of India- Disciplinary Control- Hospital and research centers- Responsibility to patients- Duty to take care- Medical examination- Informed consent- Confidentiality- Access to medical records.

Module III: Liability of Professional Negligence

Medical negligence- Negligence in diagnosis, treatment- Duty to warn- Civil negligence and criminal negligence- Vicarious liability- negligence of students and nurses- Liability of Doctors and Hospitals under the Consumer protection Act, 1986.

Module IV: regulation of Manufacture, Storage and sale of Medicines

Drugs and Cosmetic Act, 1940-Production, storage and sale of drugs- Advertisement drugs and Magic remedies Act, 1954- penalties.-Access to medicine and Public health.

Module V: Medical Science and Technologies

Boitechnology-Bioethics-Genetic Engineering- Cloning-Human genome project- Biomedicine Convention- In vitro fertilization(IVF)- Selective reproduction- Surrogacy- Euthanasia- abortion- Medical termination of pregnancy Act- Indian penal Code-Stem cell therapy and research- Transplantation of Human organs- Organ Transplantation Act, 1994- Human Subjects Research- Helsinki declaration- Schedule Y, Drugs and Cosmetic Act 1940- ICMR Code- AMA code of Ethics- WHO Good Clinical Practices.

Examination Scheme:

Components	P/S/V	CT	C	A	EE
Weightage (%)	10	10	5	5	70

Text & References:

- Vijay Malik – Drug and Cosmetic Act, 1940, Eastern Book Company, 24th Edition, 2014
- Anoop K. Kaushal – Medical Negligence & Legal Remedies, Universal Publishing House, 2nd Edition, 2004
- Dr Jagdish Singh – Medical negligence Compensation, Bharat Law House, 3rd Edition, 2007


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- P K. Dutta – Drug Control, Eastern Law House, 3rd Edition, 1997.
- Annas, George J. *American Bioethics: Crossing Human Rights and Health Law Boundaries*. New York: Oxford University Press, 2005.
- Annas, George J. Michael A. Gordin. *The Nazi Doctors and the Nuremberg Code: Human Rights in Human Experimentation*. New York: Oxford University Press, 1995.
- Dworkin, Ronald. *Life's Dominion: An Argument about Abortion, Euthanasia, and Individual Freedom*. New York: Alfred A. Knopf, 1993.
- Dr. Lily Srivastava, Law & Medicine (Universal Law Publishing, 2006)
- W. Noel Keyes, Bioethical and Evolutionary Approaches to Medicine and the Law (American Bar Association, 2007)
- Cynthia Ho, Access to Medicine in the Global Economy: International Agreements on Patents and Related Rights (Oxford University Press, 21-Apr-2011)



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SUMMER INTERNSHIP EVALUATION-III

Course Code: LAW2735

Credit Units: 03

It is a mode of Clinical Legal education Specified period to be spent by the student with a law firm/court/Commissions/NGO's and like institutions working with the realm of law or connected therewith. The reports both by the student and the office together with diary where applicable to be certified will be submitted for evaluation

The Internship during the summer break is a compulsory course. There is a Internship Data form where students fill in the details of where they are interning with complete address and phone numbers Customized Legal Reference /Diary is provided to the students on payment They maintain a day to day record of the work that they do at the place they are interning. They are expected to intern for a minimum 90 days. They submit their completed diary, certificate from the employer and also a report of their experience at work. After submission there is a Viva by concerned faculty. They assess the student on the kind of work they have done during internship, presentation of the work they have done and also on the practical knowledge they have gained

The Paper is marked out of 100 marks. The breakup of the marks is as follows:

1.	Diary submission	25 Marks
2.	Report and certificate	25 Marks
3.	Viva (Panel of External Examiners)	40 Marks
4.	Attendance (Regularity in meeting the supervisor)	10 Marks
	Total	100



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INVESTMENT AND COMPETITION LAWS

Course Code: LAW2801

Credit Units: 05

Course Objective:

This paper focuses on the investment and competition laws of India in the context of new economic order.

Course Contents:

Module I: Competition Law

Background, Prohibitions, Competition Commission of India.

Module II: Corporate Finance and regulatory framework

Security Contract (Regulation) Act 1956, SEBI Act 1992, Depositories Act 1996, The Securitisation and Reconstruction of Financial Assets and enforcement of security Interest Act, 2002.

Module III: Regulatory framework for foreign trade, multinational companies

Foreign Trade (Development & Regulation) Act 1992, UNCTAD Draft Model on Trans – national Corporations, Control and regulation of foreign companies in India, Foreign collaborations and joint ventures.

Module IV: Foreign Exchange Management

Background, Policies, Authorities.

Module V

Role of Information Technology in the investment market, functioning of demat A/c portal. Investment through internet and virtual banking.

Examination Scheme:


Components	P/S/V	CT	A	C	EE
Weightage (%)	10	10	5	5	70

Text & References:

- Competition Act 2002
- Security Contract (Regulation) Act 1956
- SEBI Act 1992
- Depositories Act 1996
- Foreign Trade (Development & Regulation) Act 1992,
- Foreign Exchange Management Act, 1999
- Taxman's Student's Guide to Economic Laws



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TAXATION LAW

Course Code: LAW2802

Credit Units: 05

Course Objective:

Power to tax has been described as the power to destroy. This idea is being floated often whenever the State introduces a new tax. Is this true? Is it not necessary that in order to raise revenue and place the economy on solid foundation, the taxing power should be conferred on the State? The power to tax shall not go unregulated. In this context of a federal structure the distribution of the taxing powers assumes added significance. Obviously, a study of the Constitutional framework on taxation becomes important. Along with this, an analysis of the different laws enacted in exercise of these powers with their safeguards and remedies sheds light on the mechanics of the taxation by the Union and the States.

Course Contents:

Module I: General Principles of Taxation Laws

History and Development of Tax Laws in India, Fundamental Principles relating to Tax Laws, Taxing power and constitutional limitations, Distinction between: Tax, Fee and Cess; Tax avoidance and Tax evasion .

Module II: Basic concepts of Income Tax

Income, Previous Year, assessment Year, Person, Assessee and Total Income, Income not included in the Total Income. Residential status, Clubbing of Income, Tax planning, Rate of Income Tax, Heads of Income, Salaries, Income from House Property, Income from Business or Profession, Capital Gains, Income from Other sources, Deductions under the Income Tax Act, 1961, Income Tax Authorities: Power and Functions, Filing of returns and procedure for assessment, Offences and Penal Sanctions .

Module III: Value Added Tax

Meaning and importance of VAT, Difference between VAT and Sales Tax, West Bengal Value Added Tax Act, 2003, Criticisms and limitations of Vat system.

Module IV: Service Tax


Taxable Service, Meaning and importance of Service Tax, Valuation of Taxable Service, Offences and Penalties.

Examination Scheme:

Components	P/S/V	CT	C	A	EE
Weightage (%)	10	10	5	5	70

Text & References:

- Iyengar, Sampath (1998), Law of Income Tax New Delhi, Bharath Law House.
- Jain, Narayan (2004) How to Handle Income Tax Problems, Book Corporation.
- Palkivala, N.A. (1999), The Law & Practice of Income Tax, Nagpur: Wadha Publication.
- Parameswaran, K. (1987), Power of Taxation under the Constitution, Eastern Book Company.
- Sharma, Remesh (1998), Supreme Court on Direct Taxes, New Delhi: Bharath Law House.
- Singh S.D. (1973), Principles of Law of Sales Tax, Eastern Book Company.
- V. Ramachandran & T.A. Ramakrishnan (eds.) (2000), A.N. Aiyar's Indian Tax Laws, Chennai: Company Law Institute of India Pvt. Ltd.


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INTERPRETATION OF STATUTES

Course Code: LAW2803

Credit Units: 05

Course Objective:

Judicial interpretation involves construction of words, phrases and expressions. In their attempt to make the old and existing statutes contextually relevant, courts used to develop certain rules, doctrines and principles of interpretation. The course material seeks to impart to the students, the necessary skills to interpret the statutes with a judicial mind set.

Course Contents:

Module I: Rules of Interpretation

Commencement, repeal and revival of a statute; Rules of interpretation: Liberal rule, mischief rule and golden rules, Harmonious construction.

Module II: Principles of interpretation

Ejusdem of Generis, Noscitur – A Socius, Reddendo Singula Singlis., Expressio Unius Est exclusion Alterius, UI Res Magis Valent Quam Pereat, Contemporanea Espositio Est Optima Et Protissima Lege.

Module III: Internal Aids to Interpretation

Module IV: External Aids to Interpretation

Module V

Construction of Penal Statutes, Mens rea in statutory offences, Principles to be applied in interpreting the Constitution, Strict construction of taxing statutes and its limitations.

Examination Scheme:


Components	P/S/V	CT	C	A	EE
Weightage (%)	10	10	5	5	70

Text & References:

- Maxwell, Interpretation of Statutes.
- Sarup, Interpretation Statues.
- G.P. Singh, Principles of Statutory Interpretation.
- V.P. Sarathi, The Interpretation of Statutes.
- Bindra, Interpretation of Statutes.



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INTERNATIONAL TRADE LAW

Course Code: LAW2804

Credit Units: 05

Course Objective:

To acquaint the Students about the basic aspects of International Trade Law, including the WTO and its different principles and Agreements.

Course Contents:

Module I: Contract of Sale

Uniform Rules on Contract of Sale, Types of Sale Contract - CIF, FOB, C & F Contract, Special Trade Terms in International Sale Contract, Indian Bill of Lading Act 1856, International Conventions Governing Bill of lading

Addition of Special Trade Terms in International Sale Contract, Indian Bill of Lading Act 1856 and International Conventions Governing Bill of Lading in Module I.

Addition of Background Role and Structure of WTO, and difference between GATT & WTO in Module IV

Module II: Payment for International Sales

Letters of Credit, Bills of Exchange, and function and connected issues.

Module III: Settlement of Disputes

Arbitration, Enforcement of Arbitral Awards.

Module IV: World Trade organization (WTO) and General Agreement on Tariffs and Trade (GATT)

Background of formation of WTO, Role of WTO in International Trade, Difference of GATT and WTO, Structure of WTO.

Basic Principles: MFN, Treatment, National Treatment and Non-Discrimination, Exceptions to MFN : Tariff Bindings, Regional Trade Agreements, Escape Clause, Safeguard Measures, Quantitative Restrictions, Anti-dumping and counter-vailing duties.

Module V: WTO and Multilateral Agreements

Trade Related Investment Measures (TRIMS), General Agreement on Trade in Services (GATS), Trade Related aspects of Intellectual Property Rights (TRIPS).


Module VI: Dispute Settlement Mechanism under WTO

Evaluation Scheme:

Components	P/S/V	CT	A	C	EE
Weightage (%)	10	10	05	5	70

Text & References:

- Basic Texts of GATT and WTO.
- Jackson, John, H. (1997) Law of International Trading System, The MIT Press.
- Jackson, John, H. (1997) World Trade and Law of GATT, The MIT Press.
- Dam, K. W. (1970) The GATT Law and International Economic Organisations, Chicago University Press
- Koul, A.K. (2001) World Trade Organisation, Satayam Publication.
- Internet Sources : www.wto.org, www.uncitral.org.
- Text of the Indian Arbitration and Conciliation Act, 1996.


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LAND LAWS

Course Code: LAW2805

Credit Units: 05

Course Objective:

The legislative power to make laws relating to land and land ceiling is in the state list. Different States have enacted their own laws on this subject. The Constitutional perspectives relating to this subject have to be taught as an essential part of this course. The provisions in the Constitution in Part III, IV and XII as well as those in Schedule VII relating to distribution of legislative powers over land are essentially to be taught with emphasis.

Course Contents:

Module I: Punjab Land Revenue Act 1887 (Applicable over Punjab and Haryana), Definition of Key Words, Revenue Officers: Their Power and Functions, Preparation of Revenue Record: Like Documents of Jamabandi, Girdawari, Mutation, Intkaal, Sirja Nasab (Pedigree Table) Sirja Aze (Map of the Village), Assessment of Land Revenue, Collection of Land Revenue, Concepts & Procedure of Partitions.

Module II: Punjab Land Revenue Act, 1887:

Records-Of-Rights and Annual Records, Collection Of Land Revenue, Recovery of other Demands by Revenue-officers, Partition, **Assessment** and other relevant provisions.

Module III: Haryana Rent Control Act, 1973

Definitions (Sec. 1-4), Rights & Duties of Tenants, Rights and Duties of Landlords, Grounds of Ejectment of Tenants.

Haryana Panchayati Raj Act, 1994 (Sec. 1 to 54) (Chapter 1 to 6) Definition of Key Words, Constitution of Gram Sabha and Gram Panchayat, Gram Panchayat's Duties, Functions and Powers, Finance and Taxation, Control of Gram Panchayat, Sources of Income and Expenditure of Gram Panchayat.

Module IV: Haryana Panchayati Raj Act 1994,

Panchayati Samiti (Chapter 7 To 11) And Sec. 55 To 116) Definition of Key Words, Conduct of Business of Panchayat Samities, Servant of Panchayat Samities, Duties and Powers of Panchayat Samiti, Finance and Taxation, Sources of Income of Panchayat Samiti, Control of Panchayat Samiti

Module V: Delhi Land Laws

Real Estate Development and Apartment ownership

Delhi Apartment Ownership Act, 2009,

Examination Scheme:

Components	P/S/V	CT	A	C	EE
Weightage (%)	10	10	05	5	70

Text & References:

- Law, poverty and development, Prof. M.L. Upadhyay.
- Upendra Baxi, Towards a Sociology of Indian Law, pp. 25-65 (1986)
- Atul Kohli, The state and Poverty in India (1987)
- Francine R. Frankel, India's Political Economy, 1947-77 (1988)
- L.H. Rudolph and S.H. Rudolph, The Political Economy of Lakshmi (1987)
- Mohammad Ghose, "Nehru and Agrarian reform" in Rajeev Dhavan and Thomas Paul (eds.)
- Nehru and the Constitution (1992), Thiripathi
- Walter C. Neale, Developing Rural India Policies and Progress (1990) Allied
- Alice, Jacob, Land Reform and Rural Change 6-19 (1992), Land Reforms in India: a Review.
- IASSI quarterly 1992, Vol. X, Numbers 3 and 4.
- B.R. Beotra, Law of Forests (Central and State) 6th Edition 1999, The Law Book Company.
- A. Krishnan, Forest Laws in India, 1998, Asia Law House

• Shivastava, Encyclopedia on forest, 1998, Asia Law House

• Padma Rami Reddy, Forest Laws, 1989, Asia Law House Baden Powell, Manual of Jurisprudence for Forest Officers (1982)

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WOMEN AND CRIMINAL LAW

Course Code: LAW2806

Credit Units: 05

Objectives: Women had suffered in the society since centuries and even after 50 years of Adoption of the Constitution, for women, equality appears to be a distant mirage to be reached. Effective political representation of women in Legislature and other forums too has become a difficult proposition to be acceptable. Breach of her personality, through various forms of violence, too has not subsided. The course intends to educate about the legal provisions enacted to ameliorate these situations with special emphasis on Indian Municipal Law, its scope and to evaluate the existing provisions.

Module-I

Women in Pre-Constitution Period: Social and Legal Inequality; Social Reform Movement in India; Legislative response in India. Women & children in Post-Constitution Period, Provisions of Constitution of India Preamble, Art.14, 15, 23, and Part IV Legal Measures in relating to Child Labour Women and Political Representation

Module-II

Different Personal Laws- Unequal Position of Indian Women-Uniform Civil Code; Sex Inequality in Inheritance Rights: Right of Inheritance by birth for Sons and not for Daughters; Inheritance under Christian Law; Inheritance under Muslim Law; Matrimonial Property Law; Right of Women to be Guardian of her minor sons and daughters.

Module-III

Law of Divorce - Christian Law-Discriminatory Provision; Muslim Law- Inheritance divorce. Women and Social Legislation: Dowry Prohibition Law; Sex Determination Test, Law relating to Prevention of Immoral Trafficking in Women Act.

Module-IV

Women and Criminal Law: Adultery; Rape; Outraging the Modesty of Women; Kidnapping; Sati Prohibition Law; Law relating to Domestic Violence; Law relating Eve Teasing; Indecent Representation of Women Act.

Module-V

Women and Employment: Factories Act- Provisions relating to women; Maternity Benefit Act; Equal Remuneration Act; Law Relating to Sexual Harassment at Working Place; N.C.W-Aims, Functions and Performance.

Examination Scheme:

Components	P/S/V	CT	C	A	EE
Weightage (%)	10	10	5	5	70

PRESCRIBED BOOKS:

- Indu Prakash Singh- Women, Law and Social Change in India.
- Paras Dewan- Dowry and Protection to Married Women.
- S.P.Sathe- Towards Gender Justice.
- Dwarka Nath Mitter- Position of Women in Hindu Law
- Shaukat Nasir- Muslim Women and their Rights.

REFERENCE MATERIAL:

- Relevant Provisions of Constitution of India.
- Relevant Provisions of Indian Penal Code.
- S.125, Criminal Procedure Code.
- National Commission on Women Act, 1990.
- Matrimonial Property- Private Members Bill Introduced in Parliament Towards Equality- Report of Committee on the Status of Women (Govt. of India) Chapter IV and Section IV
- General Conclusions and Recommendations

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PROBATION AND PAROLE

Course Code: LAW2807

Credit Units: 05

Course Objective:

This course will introduce the student to the emerging discipline of community corrections. This alternative has become an integral resource to the criminal justice system.

Course Contents:

Module I: Theories of Punishment: (i) Deterrent Theory (ii) Retributive Theory (iii) Preventive Theory (iv) Reformatory Theory Efficacy of Punishment: Early stages-Medieval Period, Modern or New Penology, Essentials of an ideal system of Penal Policy.

Module II: Concept of Correction Genesis and evolutions, objectives and theories of correction - various types of correctional methods.

Institutional Correction Origin and development of Indian Prison System, daily routine - prison as an institution, scientific classification of prisons and prisoners.

Module III: Treatment of correction of offenders. The need for reformation and rehabilitation of offenders, Undergoing punishment/imprisonment, Classification of offenders through modern diagnostic techniques, The role of psychiatrists and Social workers in the prison., Vocational and religious education and apprenticeship programmes for the offenders, Group counseling & Resocialization programmes, Participation of inmates in community service.

Module IV: Non-Institutional Methods Open air jails, Admonition, fine, probation and parole. Half way houses - organization and significance.

Recent trends in corrections Role of voluntary agencies in prevention of crime and treatment of offenders - Discharged prisoners' aid society. After care and rehabilitation, Need, importance and services in India - Pre-release and premature release., Attitude of the community towards released offender, Prisoner Aid Society and other Voluntary Organization governmental Action.


Module V: The place of probation in penal policy – public participation in probation, Legislations on Parole and probation in India, Probation of Offenders Act, 1958, Section 360 of the Criminal Procedure Code, 1973

Examination Scheme:

Components	P/S/V	CT	C	A	EE
Weightage (%)	10	10	5	5	70

Text & References:

- Martin Wasik, Emmins On Sentencing (1998) 2.
- Hall J., Law, Social Science and Criminal Theory
- J.M.Sethna, Society and the Criminal, 1980
- Siddique, Criminology-Problems and Perspectives, 1997
- Sutherland, E H, Cressey, D R, Criminology A. Siddique, Criminology (1984) Eastern, Lucknow.
- Law Commission of India, Forty-Second Report Ch. 3 (1971)
- K.S. Shukla, "Sociology of Deviant Behaviour" in 3 ICSSR Surveys of Sociology and Social Anthropology 1969-179 (1986)
- Tapas Kumar Banerjee, Background to Indian Criminal Law (1990)
- Bhattacharya S.K. (1986) Probation system in India,
- Mans Publications, New Delhi. 2. Bhattacharya,
- S.K. (1985) Social defence: An Indian perspective, Manas publications.


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FORENSIC SCIENCE-II

Course Code: LAW2808

Credit Units: 05

Course Objective:

Forensic science is science related to the law. It is the scientific method of gathering and examining information about the past which is then used in a court of law. It is applied science and consists of a range of different disciplines which often require different underpinning science knowledge. It continues to evolve and is now applicable to crime disruption and crime prevention as well as crime detection and the identification of victims in mass disasters.

The course focuses on the following objectives:

1. Developing and understanding the concept of forensic anthropology
2. Brief description on the ballistic its analysis and reconstruction
3. Developing an understanding to wounds and its medico-legal aspect.
4. Developing an understanding on explosives and its crime scene investigations.

Course Contents:

Module I: Forensic Anthropology

Definition, scope, and application; time since death: assessing and determining the time and cause of death, study of burned bones and bones fragments; identification.

Module II: Ballistics

Definition, Indian Arms Act, forensic importance, classification of firearms; ammunition; range of fire; firearms injuries, analysis and reconstruction.

Module III: Wounds and its medico-legal aspects

Introduction to wounds; determining the age of the injury and its medico-legal aspect, injuries due to blunt forces, injuries due to sharp forces, miscellaneous injuries.

Module IV: Explosives and Explosion Scene Investigation

Explosive Act: nature and classification, composition and characteristics of explosives, pyrotechnics, IEDs, specific approach to scene of explosion, post-blast residue collection, reconstruction of sequences of events; evaluation and assessment of scene of explosion and its examination.

Module V: Advanced fingerprint and other impression

Fingerprint in personal identification, examination on the basis of poroscopy and its significances; evaluation of fingerprints on the basis of edgescopy and its significance in fingerprint field, Palmer, Planter and other impression its evaluation.

Examination Scheme:

Components	P/S/V	CT	A	C	EE
Weightage (%)	10	10	5	5	70

Text & References:

- Sharma. B.R., Forensic Science in Criminal Investigations and trials (3rd Edn) Universal Law Publishing Co. Ltd
- Nath.S, Fingerprint Identification CRC Press 2nd Edn, 2002
- Fisher, B, Techniques of Crime Scene Investigation 6th Edn CRC Press,
- Albert, S. Osborn, Questioned Documents, 2nd Edn, Universal Law Publishing Delhi, 1998
- James, S. H. and Nordby, J.J (Eds), Forensic Science- An Introduction to Scientific and Investigation Techniques CRC Press, London, 2003.


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LAW AND MEDICINE-II

Course Code: LAW2809

Credit Units: 05

Course Objective:

The course aims to provide the students the knowledge about the interrelationship between law and medicine and complex legal and ethical issues involved in the field of medicine and medical profession. The course include the ethical and legal issues in population control, surrogate motherhood, HIV/AIDS, the rights of the unborn, AID and Law, mental health and medical experimentation on human beings.

Course Contents:

Module I: Population control and community health

Law, Practice and Society- Causes for Population Explosion- National Population Policy, 2000- Terminal methods female sterilization and male sterilization- State Imposed sterilization and its legal validity- Population control and Right to family and Right to privacy.

Module II: Surrogate Motherhood and the Rights of the Unborn

Surrogacy in foreign countries- Motherhood Debated-Legality of contract- problems-Refusal to accept the child-health Tourism and sanctity of woman's life- ICMR Code- The Unborn- Introduction- Right of an Unborn Child-Prenatal Diagnosis (and Amniocentesis)-Miscarriage

Module III: AIDS

Rights, Freedom and duties of HIV/AIDS Patients- Privacy and Public health- Liberty and Security- Movement- Marriage and Finding a family- Right to work- Education for an infected person- Protection of children infected or born to infected parents- Right against degrading Treatment- Equality before law- access to medicine

Module-IV

International Norms- general Provision-Consent-Human Genome-Scientific Research-Donors for Transplantation Purposes-Prohibition of Financial gain and Disposal of a part of the Human Body

Module-V

Mental Health- Historical Background-types of Causes of Mental Illness- Development of the Human being and mental health-Prevention of Mental Illness and Treatment-Alcoholism and Drug Addiction- Mental health Act- Admission and discharge to mental hospital legal issues

Module-VI

Experiments of Human Beings- The concept-Kinds of Experiments-Subject of Experimentation-controls-Clinical Trials-Studies in special Populations-Informed consent-Special Studies of Bioavailability and Bioequivalence-Ethics committee- Stem cell research- International documents and Indian laws-Ethical norms on experimentation

Examination Scheme:

Components	P/S/V	CT	C	A	EE
Weightage (%)	10	10	5	5	70

Text & References:

- Vijay Malik – Drug and Cosmetic Act, 1940, Eastern Book Company, 24th Edition, 2014
- Anoop K. Kaushal – Medical Negligence & Legal Remedies, Universal Publishing House, 2nd Edition, 2004
- Dr. Jagdish Singh – Medical negligence Compensation, Bharat Law House, 3rd Edition, 2007
- P.K. Dutta – Drug Control, Eastern Law House, 3rd Edition, 1997.
- Annas, George J. *American Bioethics: Crossing Human Rights and Health Law Boundaries*. New York:Oxford University Press, 2005.

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- Annas, George J. Michael A. Gordin. *The Nazi Doctors and the Nuremberg Code: Human Rights in Human Experimentation*. New York: Oxford University Press, 1995.
- Dworkin, Ronald. *Life's Dominion: An Argument about Abortion, Euthanasia, and Individual Freedom*. New York: Alfred A. Knopf, 1993.
- Dr. Lily Srivastava, Law & Medicine (Universal Law Publishing, 2006)
- W. Noel Keyes, Bioethical and Evolutionary Approaches to Medicine and the Law (American Bar Association, 2007)
- Cynthia Ho, Access to Medicine in the Global Economy: International Agreements on Patents and Related Rights (Oxford University Press, 21-Apr-2011)



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INTELLECTUAL PROPERTY RIGHTS

Course Code: LAW2902

Credit Units: 05

Course Objective:

The course is designed to provide comprehensive knowledge to the students regarding Indian position of the Patent Law (1970), Copy Right Law (1957) and Designs Act of 2000 which invariably form the part of Intellectual Property Law and shall comprise of the following.

The importance of this branch of the law is to be sufficiently realized in the Indian legal education. These areas are now internationally conceptualized as representing intellectual property. It is often the case that while the law of patents and trademarks is referred to as industrial property, the law relating to copyright is named intellectual property. While both these terms could be suitably invoked, we here speak of intellectual property as signifying all the three bodies of the law as well as the law on industrial designs.

Unlike other forms of property, intellectual property refers to regimes of legal recognition of, primarily, the products of the mind or imagination. The subject matter of property relations is here preeminently based on mental labour. The law relating to intellectual property protects the right to mental labour.

The law confers rights of proprietary nature on relative intellectual labour primarily on the basis that it is in the interests of society and state to promote creativeness and inventiveness. Limited monopoly provides incentive for greater inventive and innovative efforts in society. An important aspect of the exploration in this course would be ways in which the laws strike a fair balance between the interests and rights of the intellectual labourers on the one hand and organized industrial enterprises on the other. Another dimension is a study of the ways in which this regime of laws militates against, or favours, communal property in national cultures. As concerns 'modernization' crucial questions arise in the field of copyright protection in computer software and hardware, internet, electronic music and scientific research. Both copyright, trademarks, design and patent law here relate basically to the law of unfair competition and constitute an aspect of consumer protection and welfare not only in the context of national perspectives but also in view of the waves of globalization already set in. Both from the standpoint of human resources development, modernization and justice it is important that the law students get sufficient insights in Intellectual Property Law.

Course Contents:

Module I: Introduction

Intellectual Property, Concept and Philosophy, Need for Private Rights versus Public Interests, Advantages and Disadvantages of IPR.

Module II: Patent

Development of patent law, Rationale for patent protection, Nature and definition, Types of patentable subject matter, Patentability criteria, non-patentable inventions, Rights of patentee, Procedure for granting a patent, Grounds for opposition, Transfer of patent rights, Compulsory Licenses, Acquisition, Surrender, Revocation, restoration, Patent infringement and remedies, Bio patents and software patents, Official Machinery, Controller, Powers and Functions, Patent in pharmaceutical industry, Patent cooperation treaty, Paris convention.

Module III: Copyright

History, Concept of copyright, conditions for grant of copyright, extent of rights exception to copyright protection, fair use provision, assignment and licensing, Compulsory licensing and statutory licensing, Collective administration, Copyright board and office, powers and functions, Moral rights: Neighboring rights; infringement penalties and remedies, Appeals, Berne Convention, Universal Copyright Convention - WIPO Copyright Treaty: WIPO Phonograms and Performances treaty, TRIPS with respect to Copyright and Neighboring rights.

Module IV: Designs, Protection, Historical development, Rationale

Designs Act of 2000: Meaning of Design, Conditions for grant of protection, Ambit of Protection, Exceptions, Registration of Designs, Cancellation, Copyright in Registered Designs, Enforcement, Infringement and remedies, Powers and duties of Controller.

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Module V: Trademarks

Evolution, Functions, Objective, Definition, Kinds of Marks, Domain names, Registration, Concurrent registration, Procedure for registration, Relative and absolute grounds of refusal, opposition and its grounds, Assignment, transmission and licensing of Trademarks, Infringement, Penalties and Remedies, Withdrawal of protection, Passing off, Official machinery for regulation administration and Redressal, Registrar, Difference between Trade Mark, **Trade Secret, Traditional Knowledge** and Geographical Indications, TRIPS on Trademarks, Madrid Agreement for The Repression of False or Deceptive Indications of Source on Goods, 1891- Madrid Agreement for the International Registration of Marks, 1891 and protocol relating to that agreement 1989.

Module VI: Plant Varieties Protection Act, 2001

Objectives, Rationale, Registry, Official machinery, registration, Criteria of fulfillment Exclusions, Benefit sharing, Farmers rights, Community Rights, compulsory license Redressal fora, Appellate tribunal, Infringement, offences and penalties; Geographical indications of Goods (Registration and Protection Act, 1999: History, Definition, Rationale, Functioning, official Machinery, Registry, Rights conferred, Registration Procedure. Redressal Machinery, Appeal, Passing off, Offences, penalties and Procedure.

Examination Scheme:


Components	P/S/V	CT	A	C	EE
Weightage (%)	10	10	05	5	70

Text & References:

- D.P. Mittal (Taxman Publication), Indian Patents Law and Procedure
- B.L. Wadera, Patents, trademarks, copyright, Designs and Geographical Judications.
- P. Narayanan (Eastern Law House), Intellectual Property Law
- W. Cornish (Universal Publication), Intellectual Property Law
- R.K. Nagarjan, Intellectual Property Law
- Ganguli (Tata Megraw), Intellectual Property Rights



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LAW, POVERTY AND DEVELOPMENT

Course Code: LAW2903

Credit Units: 05

Course Objective:

The objective of this paper is to provide an understanding of basic concepts of poverty and development and their relationship with law.

Course Contents:

Module I: Understanding Poverty and Development

Poverty: Meaning and Concept, Relative Dimensions, Measurement and Determinants, Issues related to Poverty in India; Development: Perspectives, Developmental index.

Module II: Constitutional Guarantees for the Poor

Equality and Protective Discrimination, Right to Basic Needs and Welfare, Abolition of Untouchability and Protection of Civil Rights, Right to Development.

Module III: Criminal Justice System and the Poor

Treatment of the poor by Police, Inability to get Bail, Problems of Poor Under trials, Working of free legal aid schemes.

Module IV: Impoverishment of Women, Children and Disabled Persons

Deprivations of women under family laws, Problems of women workers in organized and unorganized sectors, Child labour, Approaches to disability and rights of the disabled persons, Right to education and dignity.

Examination Scheme:

Components	P/S/V	CT	A	C	EE
Weightage (%)	10	10	05	5	70

Text & References:

- Law, Poverty and Development – Upendra Baxi
- State and Poverty in India – Atul Kohli
- The Poverty Question (Search for Solution) – Yogesh Atal
- Poverty, Rural Development and Public Policy - Amarendra



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PROFESSIONAL ETHICS

Course Code: LAW2904

Credit Units: 05

Course Objective:

The Course has been designed to acquaint the students of Law about the Professional Ethics and Professional etiquettes that are essentially significant for an advocate to observe while at the Bar. Accountability and transparency are imperative to the profession. Besides, the conducive and cordial Bar- Bench relations can send a good message concerning the richness of the Legal profession. With this background cue, the course aims at developing insights of the students about the professional parameters.

Course Contents:

Module I: Historical Introduction

Historical introduction to legal profession in India – Barristers, Vakils, High Court Pleaders, Advocates, etc. The All India Bar Committee, 1951 and the passing of Indian Advocates Act, 1961. The Advocates Act 1961: Definitions Section 2, Constitution and function of State Bar Councils, Bar Council of India, Terms of Office, various sub-committees including Disciplinary Committee and the qualification for their membership. Power to make rules Sections 3 to 15 – Chapter –II.

Module II: The Advocate's Act, 1961

The Advocate Act, 1961.

Admission and enrolment of Advocate – Senior and other Advocates, Common role of Advocates, Qualifications and Disqualifications for enrolment and procedure thereof, Chapter – III Section 16 to 28.

Rights to Practice: Monopoly of representation, Exclusion of advocates from certain cases, self representation by litigants. Chapter IV Secs. 29 to 34.

Professional and other misconduct, Principles for determining misconduct, Disciplinary Committees of State Bar Council and the Bar Council of India, Punishment of advocates for misconduct, Appeals to the Supreme Court, Chapter – V – Secs. 35 to 44.

Module III: Legal Profession

Nature of Legal Profession, Need for an Ethical Code of Rights: privileges and duties of Advocates, Preparation of a case and fees of an Advocate, under – cutting, Bar against soliciting work and advertisement, Bar against touting, refusal of briefs, accountability to the client, confidentiality communication between Advocates to compromise, Study of Code of Ethics prepared by the Bar Council of India.

Module IV: Contempt of Courts Act, 1971

Contempt of Courts Act, 1971,

What is Contempt? Civil and criminal contempt, punishment for contempt.

Procedures in contempt cases. High Court Rules and the Supreme Court

Rules to regulate contempt proceedings.

Examination Scheme:

Components	P/S/V	CT	C	A	EE
Weightage (%)	10	10	5	5	70

Text & References:

- Sanjeev Rao, Indian Advocates Act, 1971.
- M.P. Jain, Indian Legal History (Chap. On Legal Profession).
- Krishna Murthy Iyer's Book on Advocacy.
- The Contempt of Courts Act, 1971.
- Journal of Bar Council of India.

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PRIVATE INTERNATIONAL LAW

Course Code: LAW2905

Credit Units: 05

Course Objective:

The course equips the student to deal with dispute involving a foreign element in personal, civil and commercial matters *i.e.* increasing in frequency as a result of a globalized economic and social environment.

Course Contents:

Module I: Introduction

Application and subject matter of Private International Law, Distinction with Public International Law, Characterization and theories of characterization, Concept of Renvoi, Application of foreign law, Domicile, Jurisdiction of courts.

Module II: Family Law and Adoptions

Material and formal validity of marriage under Indian and English law, Choice of law and jurisdiction of courts in matrimonial causes: dissolution of marriage, grounds of divorce, restitution of conjugal rights, recognition of foreign judgment, Recognition of foreign adoptions, Adoption by foreign parents, Jurisdiction under Indian and English law.

Module III: Civil and Commercial matters

Tort, Theories of foreign tort, Contract, Theory of Proper Law of Contract, Ascertaining the applicable law, Property.

Module IV: Indian Law relating to foreign judgment

Basis of recognition; Recognition and Enforcement of Foreign Judgments, Finality, Failure, Direct execution of foreign judgments, decrees.

Examination Scheme:


Components	P/S/V	CT	C	A	EE
Weightage (%)	10	10	5	5	70

Text & References:

- Dr. Paras Diwan :Private International Law
- Cheshire : Private International Law
- Morris : Private International Law



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ELECTION LAW

Course Code: LAW2906

Credit Units: 05

Course Objective:

The objective of this paper is to acquaint the students with the election laws governing the elections of the Houses of the Parliament and the State Legislatures as well as to the offices of President and Vice President.

Course Contents:

Module I: Introduction

Election: Meaning and Process, Constitutional Mandate, Laws governing elections, Election disputes, Election to the Offices of the President and Vice President.

Module II: Election Commission

Composition, Functions, Powers; Delimitation of Constituencies, Preparation and Revision of Electoral Rolls.

Module III: Qualifications and Disqualifications of Candidates

Constitutional and Statutory Provisions: Disqualifications of sitting members, Nomination and Candidature, Voters Right to Information; Anti Defection Law (Tenth Schedule to the Constitution of India).

Module IV: Corrupt Practices in the Election Law; Electoral Offences

Examination Scheme:

Components	P/S/V	CT	C	A	EE
Weightage (%)	10	10	5	5	70

Text & References:

- Manual of Election Law in India – Dev Inder
- Chawla's Elections Law & Practice - P.C. Jain & Kiran Jain
- Election Laws and Practice in India- R.N. Choudhry
- Corrupt Practices in Election Law – K.C. Sunny
- How India Votes – Election Laws, Practice and Procedure – V.S. Rama Devi & S.K. Mendiretta
- V.N. Shukla's The Constitution of India – M.P. Singh.

Statutory Reading:

- Relevant Provisions of the Constitution of India
- The Representation of the People Act, 1951.
- The Representation of the People Act, 1950.
- The Presidential and Vice-Presidential Elections Act, 1952
- The Election Commission (Condition of service of Election Commissioners and Transaction of Business) Act, 1991.
- The Delimitation Act, 2002.



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BANKING AND INSURANCE LAWS

Course Code: LAW2907

Credit Units: 05

Course Objective:

This course acquaints students with banking system of India and teaches them the various aspects and rights that exists for them in banking and insurance sector.

Course Contents:

Module I: Banking System in India

Kinds of banks and their functions; Banking Regulation Laws: Reserve Bank of India Act, 1934, Banking Regulation Act, 1949; Relationship between banker and customer: Legal Character, Contract between banker & customer, Banks duty to customers; The Banking Ombudsman Scheme, 1995; Liability under Consumer Protection Act, 1986.

Module II: Lending, Securities and Recovery by Banks

Principles of Lending ; Position of Weaker Sections; Nature of Securities and Risks Involved ; Recovery of debts with and without intervention of courts / tribunal: Recovery of Debts due to Banks and Financial Institutions Act, 1993, Securitisation and Reconstruction of Financial Assets and Enforcement of Security Interests Act, 2002.

Module III: Banking Frauds

Nature of Banking Frauds; Legal Regime to Control Banking Frauds; Recent Trends in Banking: Automatic Teller Machine and Internet Banking, Smart Cards, Credit Cards.

Module IV: Insurance Law

Nature of Insurance Contracts; Kinds of Insurance: Life Insurance, Medi claim, Property Insurance, Fire Insurance, Motor Vehicles Insurance (with special reference to third party insurance; Constitution, Functions and Powers of Insurance Regulatory and Development Authority; Application of Consumer Protection Act, 1986.

Examination Scheme:


Components	P/S/V	CT	C	A	EE
Weightage (%)	10	10	5	5	70

Text & References:

- Banking Law & Negotiable Instruments Act – Sharma and Nainta
- Banking System, Frauds and Legal Control – R.P. Namita
- Law of Insurance – M.N. Mishra
- Handbook of Insurance and Allied Laws – C. Rangarajan
- Banking Law & Practice in India – M.L. Tannan.



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INTERNATIONAL HUMANITARIAN AND REFUGEE LAW

Course Code: LAW2908

Credit Units: 05

Course Objective:

The objective of this paper is to make students aware of the principles of International Humanitarian and Refugee Laws.

Course Contents:

Module I: Historical Development of International Humanitarian Law

History and evolution, Growth, Character of International Humanitarian Law.

Module II: Geneva Conventions, 1949

Geneva Convention I, Geneva Convention II, Geneva Convention III and Geneva Convention IV, 1949, Additional Protocol I to Geneva Conventions, 1977, Additional Protocol II to Geneva Conventions II 1977

Module III: Enforcement Machinery

War Crimes, Serious breaches of International Humanitarian Law, International Criminal Court (ICC).

Module IV: Refugees under International Law

Who is a refugee?, Convention Relating to the Status of Refugees, 1933, Convention on Status of Refugees, 1951, The 1967 Protocol, The AALCC Principles 1966, The OAU Convention 1969.

Module V: Implementation and Monitoring of the Rights of Refugees

Status of the UNHCR 1950, Cartagena Declaration 1984.

Module VI: Treatment of Refugees under Indian Laws


Draft SAARC Convention.

Examination Scheme:

Components	P/S/V	CT	C	A	EE
Weightage (%)	10	10	5	5	70

Text & References:

- Ingrid Detter, The Law of War, (Cambridge, 2000)
- A. Roberts and R. Guelff, eds., Documents on the Laws of War (Oxford, 2000)
- Legality of the Threat or Use of nuclear weapons, Advisory Opinion, ICJ Reports (1996)
- M.K. Balachandran and Rose Verghese (eds.) – International Humanitarian Law ICRC (1997)
- Ravindra Pratap, “India’s Attitude towards IHL”, in Mani (ed.) International Humanitarian Law in South Asia (Genava: ICRC, 2003)
- Guy S. Goodwin – The Refugee in International Law (Oxford, 2000)
- A. Vibeke Eggli, Mass Refugee Influx and the Limits of Public International Law (The Hague: Nijhoff, 2002).


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CRIMINOLOGY

Course Code: LAW2909

Credit Units: 05

Course Objective:

The course is intended to introduce students to the broad study of criminology. It is to give a broad overview to the scope of criminology, to the ideas which have influenced the area of the subject and to the practical uses and impact to which these have been, or might be put.

Course Contents:

Module I: Introduction to Crime & Criminology

Definition and Scope, Criminology & other Social-Science; Legal, Social and Psychological aspects of crime, Traditional crimes; Organized Crimes, Socio Economic Crimes, Modern Crimes; Corruption, Cyber Crimes Environmental Crimes Terrorism and insurgency ; Specific theories: Classical School and Neoclassical School; Positive School; Cartographic School; Sociological theories : Social Structural Theories and Social Process Theories; Economic Theories of Crime .

Module II: Juvenile Delinquency

Concept & Causes, Pre delinquency stages: Truancy and Vagrancy, Main features of juvenile Justice Act, (New & Old), Institutional Services like Observation homes, Juvenile Homes, Special Homes & Juvenile Aftercare Services.

Module III: Punishment

History & Theories of Punishment, Capital Punishment, Historical Development from Punishment to Correction and Reformation, Prison System In India; Correctional Programmes in jail; After care services, Probation & Parole.

Module IV: Impact on Society

Social Disorganization and Social Problems, Victimless Crimes: Alcoholism, Drug Addiction, Beggary, Commercial Sex, Suicide; Crimes related to Family: Dowry death, Domestic Violence, Child Abuse.

Module V: Victimology

Concept, origin & Development, Need to study victims, U.N. Declaration on the basic principles of justice for victims of crimes and abuse of power, Victim's rights in India: Fair Access to Justice, Restitution, Compensation and assistance to victims, Human Rights Protection.

Examination Scheme:

Components	P/S/V	CT	C	A	EE
Weightage (%)	10	10	5	5	70

Text & References:

- Sutherland and Crssey – Criminology
- Ahmed Siddique – Criminology
- Mrs. Vedkumari – Juvenile Justice



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CORRUPTION LAWS

Course Code: LAW2911

Credit Units: 05

Course Objective:

To update the students about corruption laws that has already been formed. The main aim of the course is to make the students aware of the laws prevalent and the legal remedies available

Course Contents:

Module I: Introduction to Corruption Laws

Introduction- definition of corruption,

Genesis of corruption- Historical Background, corruption in ancient time, corruption in Mahabharata need for integrating

Nature of corruption, various types of corruption- in kind, cash or in service Individual Corruption, Institutional Corruption. Why and how of corruption – Nexus between Position of a Public servant and corruption. consequences and ill effects

Module II: Offences by Public Servant

Offences under the Prevention of Corruption Act, 1988,

Corruption by Public servant- Prevention of Corruption Act 1988-

Definition of Public Servant sec 2(cc)

Categories of public servant- person in the pay of the Government- a person in the service of the Government a person remunerated by fees or commission for the performance of any public duty by the Government.

Sec 7: public Servant taking gratifications other legal remuneration in respect of an official act.

Gratification: legal remuneration, meaning of holding out as a Public Servant – whether covered under the Act.

Sec 8: Gratification by person other than public servant – to influence public servant by corrupt or illegal means.

Sec 9: Gratification by person other than Public Servant- to influence public servant- and not by corruptor illegal means.

Sec10, Sec11, Sec 12: Habitual committing of offence under Sec 8, 9, 12, 14.

Sec 15 Attempt

Sec 16 Fine Criteria

Sec 13 Criminal Misconduct by Public Servant.

Bribe giver Guilty or Abetment?

Investigation and Trial under the Act

Sec 17 Persons authorized to investigate.

Sec 19 Sanction for prosecution

Sec 20 presumptions under the Act.

Sec 3, 4, 5: Special Judges Court- procedure and powers of Special Judge.

Module III: Commission of Enquiry Acts

Section 6 Summary Trial. Commission of Enquiry Act 1952

Composition, function and role of CAG

The Central Vigilance Commission

Central Bureau of Investigation its role, function and Jurisdiction.

Proposed Lok Pal Bill ,its various drafts , legality of sting operations , provision relating to corruption cases of judges , Immunity of legislations and parliamentarians . Law on whistle blowers

Module IV: Money Laundering & National Investigative Agency Act

The Prevention of Money Laundering Act 2002, General Principles, Confiscation of Property earned through crime Sec5

Sec 171-B of IPC Bribery – Offences relating to elections.

Sec 171-C

Sec 171- D Undue influence and Impression at election

Sec 171- E Punishment for Bribery

Sec 171- F Punishment for Influence and Personating at an election.

National Investigative Agency Act 2009

Module V: International Effort

International Efforts

The United Nations Directions

The Convention on Combating Bribery of Foreign Public Officials

UN Convention against Transnational Organized Crime

UN Convention against Corruption (UNCAC)

Examination Scheme:

Components	P	A	C	CT	EE
Weightage (%)	5	5	10	10	70

Text & References:

- Prevention of Corruption Act, 1988
- Prevention of Money laundering Act, 2002
- National Investigative Agency act, 2009
- Un Conventions



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SUMMER INTERNSHIP EVALUATION-IV

Course Code: LAW2935

Credit Units: 03

It is a mode of Clinical Legal education Specified period to be spent by the student with a law firm/court/Commissions/NGO's and like institutions working with the realm of law or connected therewith. The reports both by the student and the office together with diary where applicable to be certified will be submitted for evaluation

The Internship during the summer break is a compulsory course. There is a Internship Data form where students fill in the details of where they are interning with complete address and phone numbers Customized Legal Reference /Diary is provided to the students on payment They maintain a day to day record of the work that they do at the place they are interning. They are expected to intern for a minimum 90 days. They submit their completed diary, certificate from the employer and also a report of their experience at work. After submission there is a Viva by concerned faculty. They assess the student on the kind of work they have done during internship, presentation of the work they have done and also on the practical knowledge they have gained

The Paper is marked out of 100 marks. The breakup of the marks is as follows:

1.	Diary submission	25 Marks
2.	Report and certificate	25 Marks
3.	Viva (Panel of External Examiners)	40 Marks
4.	Attendance (Regularity in meeting the supervisor)	10 Marks
	Total	100



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MOOT COURT/ INTERNSHIP

Course Code: LAW2003

Credit Units: 14

Course Objective:

This course relates to litigation advocacy and as such this shall be simulation course that shall have two parts. First part shall focus on preparation for trial and trial strategies. It shall also disseminate techniques of examination-in-chief cross examination and re-examination of witnesses, argumentation in courts, bail application, injunction application, etc. The second part shall focus on writing briefs in civil suits and criminal cases, appellate briefs in civil and criminal cases, and writ matters, memorial writings and arguing before the appropriate forums. The students shall be given a case to argue, that shall help to articulate their argumentative zeal as well as capacity.

Course Contents:

Module I: Moot Court

Bench Memorial, Court Craft: Presentation of case, Interaction with Bench, Question Answer Court etiquette and mannerism section.

Module II: Internship

Specified period to be spent by the student with a law firm/court/Commissions/NGO's and like institutions working with the realm of law or connected therewith. The report and diary to be certified and submitted for evaluation.

Module III: Corporate Legal Training


Corporate communication skills and client interaction and etiquette in corporate law work environment.

Examination Scheme:

Components	P/S/V	CT	A	C	EE
Weightage (%)	10	10	05	05	70



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Curriculum & Scheme of Examination

2022

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FINANCIAL ACCOUNTING-I

Course Code: LAW2107

Credit Units: 03

Course Objective:

To develop conceptual understanding of the fundamentals of financial accounting system which processes transactions and other events through a book-keeping mechanism to prepare financial statements, and also to impart skills in accounting for recording various kinds of business transactions.

Course Contents:

Module I

Financial Accounting Concepts, importance and scope, Single entry vs Double entry system of accounting. Journal, Ledger, Trial Balance, Errors and their rectification, Cash Book, Bank reconciliation statement.

Module II

Final accounts, receipts and payments, income and expenditure accounts, balance sheet.

Module III

Depreciation accounting and its methods, Inventory valuation and its methods. Accounting for Hire Purchase Transactions, Journal entries and ledger accounts in the books of Hire Vendors and Hire purchaser

Module IV

Inland Branches: Dependent branches only and ascertainment of profit by debtors method and stock and debtors method.


Examination Scheme:

Components	A	P	HA	CT	EE
Weightage (%)	5	5	5	15	70

A-Attendance; P-Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination

Text & References:

- Dr. S.N. Maheswari, Financial Accounting
- BS Raman, Financial Accounting
- Grewal and Gupta, Advanced Accounting
- Radhaswamy and R.L. Gupta, Advanced Accounting
- S.Kr. Paul, Advanced Accounting
- P.C. Tulasian, Pearson Editions, Introduction to Accounting
- Jain & Narang, Financial Accounting
- Sehgal, A and Sehgal, D “Advanced Accounting”, Part – 1, Taxmann Applied services, New Delhi


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LEGAL METHOD

Course Code: LAW2104

Credit Units: 04

Course Objective:

This paper focuses on orientation of students to legal studies from the point of view of basic concepts of law and legal system.

Course Contents:

Module I: Meaning and Classification of Laws

Meaning, Definition, Functions: Justice, Stability and Peaceful Change; Classification of laws: Public and Private Law, Substantive and Procedural Law, Municipal and International Law.

Module II: Sources of Law

Custom; Precedent, Ratio, Obiter; Legislation. ;

Module III: Basic Concepts of Indian Legal System

Common Law, Essentials of a Valid Law, Constitution as the Basic Law, Rule of Law, Separation of Powers, Judicial system in India, **Principles of Equity**.

Module IV: Legal Writing and Research


Legal materials: Case law, Statutes, Reports, Journals, Manuals, Digests etc.; Importance of legal research ; Techniques of Legal Research : Doctrinal, Empirical Research, Legal writings and citations.

Examination Scheme:

Components	P/S/V	CT	A	C	EE
Weightage (%)	10	10	5	5	70

Text & References:

- Glanville Willains – Learning the law
- Avtar Singh – Jurisprudence (Legal Theory)
- B.N.M. Tripathi – An Introduction to Jurisprudence and Legal theory
- Benjamin N. Cardozo, The Nature of Judicial Process
- LI Publication – Indian Legal System
- ILI Publication in Legal Research and Methodology


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LAW OF CONTRACT-I

Course Code: LAW2105

Credit Units: 04

Course Objective:

Whatever may be the nature of a given society, the contractual relations, as are obtained in that society, are governed by certain principles which are more or less of a general and basic nature. In India these general principles are included in the statute of the Indian Contract Act. 1872. This course is designed to acquaint a student with the conceptual and operational parameters of these various general principles of contractual relations. Specific enforcement of contract is an important aspect of the law of contracts. Analysis of the kinds of contracts that can be specifically enforced and the methods of enforcement forms a significant segment of this study.

Course Contents:

Module I: Formation of Contract

Meaning and nature of contract, Offer / Proposal (Definition, Communication, Revocation, General/Specific offer, Invitation to treat), Acceptance (Definition, Communication, Revocation, Tenders / Auctions). 'E'Contract

Module II: Consideration and Capacity

Consideration (Definition, Essentials, Privity of contract), Capacity to enter into a contract (Minor's position, Nature / effect of minor's agreements).

Module III: Validity of Contract

Unlawful consideration and object, Free Consent, Coercion, undue influence, Misrepresentation, Fraud, Mistake, Contingent contract, Quasi contracts, Effect of void, voidable, valid, illegal, unlawful and uncertain agreements contracts.

Module IV: Discharge and Performance of Contract

Discharge of Contracts, Performance, Time and Place of performance, Impossibility of performance and frustration, Breach – Anticipatory & Present.

Module V: Remedies

Damages, Remoteness etc., Injunction, Specific performance, Quantum Merit.

Module VI: Specific Relief Act, 1963


Recovery of property, Specific performance of contracts, Rescission of Contract, Declaratory Decree, Injunctions: Temporary and Perpetual, Mandatory.

Examination Scheme:

Components	P/S/V	CT	A	C	EE
Weightage (%)	10	10	5	5	70

Text & References:

- Anson - Law of Contract
- Pollock and Mulla - Indian Contract Act
- Avtar Singh - Indian Contract Act
- Bangia - Law of Contract and Specific Relief
- Cheshire and Fifoot - Law of Contract.


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READINGS IN MANAGEMENT

Course Code: MGT2130

Credit Units: 02

Objectives

The objective of this concentration elective is to inculcate reading habit alongwith value addition to the existing understanding of the subject. The book would be a kind of knowledge enhancer that would envision the student about some current thoughts related to the discipline. The book reading and its critical analysis would help broaden the intellectual horizon of the student. A contemporary and relevant book will be selected by the concerned department.

Guidelines

The student is expected to thoroughly go through the discipline related prescribed book with the objective of critically reviewing each aspect and character of the book. The student is supposed to have a detailed insight into the following:

1. Content
2. Writing style
3. Information/learning
4. Content handling
5. Characters(if any)
6. Thematic Clarity

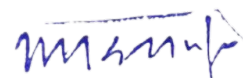
The report is to be submitted in about 3000 words on A4 size sheets, Font 12pt., Times New Roman, 1.5 spacing. Headings in Font Size16.

Evaluation Scheme

Report on the Book in 3000 words	Written Test
50 marks	50 marks



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TERM PAPER

Course Code: COM2131

Credit Units: 02

Objectives

The objective of this course is to judge the understanding as well as application of the knowledge gained by the students. The aim of the term paper is to provide the students with an opportunity to further enhance their knowledge in a sector of their choice by undertaking a significant practical unit of examining and analyzing various aspects of business management at a level commensurate with the learning outcomes of the various courses taken up them in the ongoing semester.

A term paper is primarily a record of intelligent reading in several sources on a particular subject. The students will choose the topic at the beginning of the session in consultation with the faculty assigned. At least one middle level or senior level person of a company from the chosen sector may be interviewed face to face

Guidelines:

1. The term paper will be related to the contemporary business issue and the topic will be given by the department.

2. The presentation of the term paper is scheduled to be held before the commencement of Semester examinations.

3. The paper will carry 100 marks that will be marked on the basis of understanding and organization of content based on the literature review. The Bibliography shall form an important part of the paper.

4. **Examples of a few broad areas for Term Paper (List is indicative, not exhaustive)**

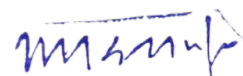
- Credit rating
- Risk management
- Subprime meltdown and its after effect with case study from Indian industry
- Corporate frauds
- Micro finance institutions in India
- Carbon Trading
- IFRS
- Celebrity Endorsement in real estate
- Social media marketing
- Green marketing
- Sustainable branding practices
- Relationship management
- CSR
- Balanced Score Card
- Corporate Governance
- Employee retention
- NGOs.

Evaluation Scheme

Organisation and relevance of content	Literature Review	Bibliography	Total
40	40	20	100



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PROJECT

Course code: COM2132

Credit Units: 03

Objectives:

The aim of the project is to provide the students with an opportunity to further their intellectual and personal development in the chosen field by undertaking a significant practical unit of activity. The project can be defined as a scholarly inquiry into a problem or issues, involving a systematic approach to gathering and analysis of information / data, leading to production of a structured report.

Chapter Scheme and distribution of marks:

Chapter 1: Introduction – 10 marks

Chapter 2: Conceptual Framework/ National/International Scenario – 25 marks

Chapter 3: Presentation, Analysis & Findings -- 25 marks

Chapter 4: Conclusion & Recommendations -- 10 marks

Chapter 5: Bibliography -- 05 marks

Project Report	Power Point Presentation & Viva
75 marks	25 marks

components of a Project Report

The outcome of Project Work is the Project Report. A project report should have the following components:

1) Cover Page: This should contain the title of the project proposal, to whom it is submitted, for which degree, the name of the author, name of the supervisor, year of submission of the project work, name of the University.

2) Acknowledgement: Various organizations and individuals who might have provided assistance /co-operation during the process of carrying out the study.

3) Table of Content: Page-wise listing of the main contents in the report, i.e., different Chapters and its main Sections along with their page numbers.

4) Body of the Report: The body of the report should have these four logical divisions

a) **Introduction:** This will cover the background, rationale/ need / justification, brief review of literature, objectives, methodology (the area of the study, sample, type of study, tools for data collection, and method of analysis), Limitations of the Study, and Chapter Planning.

b) **Conceptual Framework / National and International Scenario:** (relating to the topic of the Project).

c) **Presentation of Data, Analysis and Findings:**(using the tools and techniques mentioned in the methodology).

d) **Conclusion and Recommendations:** In this section, the concluding observations based on the main findings and suggestions are to be provided.

5) Bibliography or References: This section will include the list of books and articles which have been used in the project work, and in writing a project report.

6) Annexures: Questionnaires (if any), relevant reports, etc.

(The main text of the Project should normally be in the range of 5000 words. However, there may be annexure in addition to the main text)

The Steps of a Project Report

Step I : Selection of the topic for the project by taking following points into consideration:

- Suitability of the topic.
- Relevance of the topic
- Time available at the disposal.
- Feasibility of data collection within the given time limit.
- Challenges involved in the data collection (time & cost involved in the data collection, possibility of getting responses, etc.)

Step II : Finalisation of the Topic and preparation of Project Proposal in consultation with the Supervisor.

Step III : Collection of information and data relating to the topic and analysis of the same.

Step IV : Writing the report dividing it into suitable chapters, viz.,

Chapter 1: Introduction,

Chapter 2: Conceptual Framework / National & International Scenario,

Chapter 3: Analysis & Findings


Chapter 4: Conclusion and Recommendations.

Step V : The following documents are to be attached with the Final Project Report.

- 1) Approval letter from the supervisor (Annexure-IA)
- 2) Student's declaration (Annexure-IB)
- 3) Certificate from the competent Authority of the Organisation / Institution, if the student undertakes the Project Work in any Organisation / Institution.

Guidelines for Evaluation:

- Each of the students has to undertake a Project individually under the supervision of a teacher and to submit the same following the guidelines stated below.
- Language of Project Report and Viva-Voce Examination may be English. The Project Report must be typed and hard bound.
- Failure to submit the Project Report or failure to appear at the Viva-voce Examination will be treated as "Absent" in the Examination. He /she has to submit the Project Report and appear at the Viva-Voce Examination in the subsequent years (within the time period as per University Rules).
- No marks will be allotted on the Project Report unless a candidate appears at the Viva-Voce Examination. Similarly, no marks will be allotted on Viva-Voce Examination unless a candidate submits his/her Project Report.
- Evaluation of the Project Work to be done jointly by one internal expert and one external expert with equal weightage, i.e., average marks of the internal and external experts will be allotted to the candidate.



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WORKSHOP

Course Code: COM2133

Credit Units: 01

Objectives

A workshop is primarily an activity based academic event that is organized to provide the students a one to one and hands on experience on any aspect of their learning. The communication in a workshop has to be necessarily two way. The trainer has to make sure that the aspect covered are practically practiced by the participants. The student will choose the option of workshop from amongst their concentration electives. The evaluation will be done by Board of examiners comprising of the faculties.

Major Themes for Workshop

The workshop may be conducted on any of the following major themes:

Accounting

Finance

Human Resources

Marketing

Economics

Operations

Supply Chain Management

These themes are merely indicative and other recent and relevant topics of study may be included.

Guidelines for Workshop

The procedure for earning credits from workshop consists of the following steps:

1. Relevant study material and references will be provided by the trainer in advance.
2. The participants are expected to explore the topic in advance and take active part in the discussions held
3. Attending and Participating in all activities of the workshop
4. Group Activities have to be undertaken by students as guided by the trainer.
5. Evaluation of workshop activities would be done through test and quiz at the end of the workshop.
6. Submitting a write up of atleast 500 words about the learning outcome from the workshop.

Methodology

The methodology followed at the workshop could be based on any one or more of the following methods:

Case Study

Business Game

Simulation

Group Activity


Role Play

Business Planning

Quiz

Evaluation Scheme:

Attendance	Active Participation	Multiple Choice Questions/ Quiz	Solving the case/ Assignment/ Write up	Total
10	30	30	30	100


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FINANCIAL ACCOUNTING-II

Course Code: LAW2206

Credit Units: 03

Course Objective:

To develop conceptual understanding of the fundamentals of financial accounting system which processes transactions and other events through a book-keeping mechanism to prepare financial statements, and also to impart skills in accounting for recording various kinds of business transactions.

Course Contents:

Module I

Consignment and Joint Venture Accounts:

- (i) **Consignments:** Features, Accounting treatment in the books of the consignor and consignee.
- (ii) **Joint Ventures:** Accounting procedures: Joint Bank Account, Records Maintained by Co-venturer of (a) all transactions (b) only his own transactions. (Memorandum joint venture account).

Module II

Accounting for bills of exchange - bills receivable and payable, acceptance, endorsement, discounting, dishonour and renewal of bills, accommodation bills.

Module III

Partnership

Admission of a partner: partnership deed, goodwill valuation and treatment. Sacrificing ratio.
Retirement and death of a partner: gaining ratio, goodwill treatment
Dissolution of partnership: revaluation of assets and liabilities. Legal Position, Accounting for simple dissolution,
Applications of rule in case of Garner Vs. Murray in case of insolvency of partner(s)
(excluding piecemeal distribution and sale of a firm to a company).


Examination Scheme:

components	A	P	HA	CT	EE
Weightage (%)	5	5	5	15	70

A-Attendance; P -Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination

Text & References:

- Dr. S.N. Maheswari, Financial Accounting
- BS Raman, Financial Accounting
- Grewal and Gupta, Advanced Accounting
- Radhaswamy and R.L. Gupta, Advanced Accounting
- S.Kr. Paul, Advanced Accounting
- P.C. Tulasian, Pearson Editions, Introduction to Accounting
- Jain & Narang, Financial Accounting
- Sehgal, A and Sehgal, D "Advanced Accounting", Part – 1, Taxmann Applied services, New Delhi


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LAW OF CONTRACT-II

Course Code: LAW2204

Credit Units: 04

Course Objective:

This course shall be taught after the students have been familiarized with the general principles of Contract in which the emphasis is on understanding and appreciating the basic essentials of a valid Contract and on the existence of Contractual relationship in various instances. Obviously, Contract Law assumes special significance to suit changes in society. These special Contracts are studied in the light of statutory provisions and decisional Law. With the advent of globalization in various sectors of economy today and are in need of specialized legal Professionals due to huge contractual requirements, joint venture Partnerships and the like, Therefore, this Course of Special Contracts provides an insight into the justification for special statutory provisions for certain kind of Contracts.

Course Contents:

Module I: Indemnity and Guarantee/Bailment and Pledge

Meaning, Distinction between Indemnity and Guarantee, Right / Duties of Indemnifier, Indemnified and Surety, Discharge of Surety, Kinds of Guarantee, Bailment and Pledge: Meaning and Distinction, Rights and Duties of Bailor/Bailee, Pawnor/Pawnee, Lien, Termination of Bailment.

Module II: Agency

Definitions of Agent and Principal, Appointment of an Agent, Authority of an Agent, Creation of agency: by agreement, Ratification and law, Relation of principal / agent, subagent and substituted agent, Ratification of Agents Authority, Revocation of Agency Authority, Effects of Agency on Contracts with third person, Personal Liability of agents, Termination of agency.

Module III: Sale of Goods Act 1930

Contract of Sale: Nature and definition, Conditions and Warranties, Transfer of Property and Title, Performance of the contracts, rights of unpaid seller, suit for breach of contract.

Module IV: The Indian Partnership Act, 1932

Nature of partnership firm, Relations of partners to one another and outsiders, Rights /Duties of partners *inter se*, Partnership Property: Relations of Partners to third parties, Liability for holding out, Minor as a partner; Incoming and outgoing partners, Dissolution of Partnership Firm, Modes of Dissolution, Consequences of dissolution, Registration of firms and effects of non registration.

Examination Scheme:

Components	P/S/V	CT	C	A	EE
Weightage (%)	10	10	5	5	70

Texts & References:

- Pollock and Mulla, Indian Contract Act
- Avtar Singh, Indian Contracts Act
- Mulla, D. F., Indian Partnership Act
- Desai, T.R., Law of Contracts and Partnership sale of good Act
- R.K. Bangia, Sales of Goods Act, 1930
- Avtar Singh, Sales of Good Act
- Avtar Singh, Indian Partnership Act.
- K. Sukumaran, Pollock & Mulls - The Indian Partnership Act

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COMPUTER APPLICATIONS IN BUSINESS

Course Code: COM2204

Credit Units: 03

Course Objective:

To provide computer skills and knowledge for commerce students, and to make them complacent with the use of new tools of IT.

Course Contents:

Module I

General features of a computer. Generation of computers. Personal computer, Workstation, Mainframe computer and super computers. computer applications – data processing, information processing, Application areas of computer.

Module II

Computer organization. Central processing module. Computer memory- primary memory and secondary memory. Secondary storage devices – magnetic and optical media. Input and output modules. OMR, OCR, MICR, scanner, mouse, Modem.

Module III

Computer hardware and software. Machine language and high level language. Application software. Computer program. Operating system. Computer virus, Antivirus and Computer security, Windows OS and its features.

Computer arithmetic. Binary, octal and hexadecimal number systems. Algorithm and flowcharts. Illustrations. Elements of database and its applications.

Module IV

Introduction to MS office Packages- Ms-Word – Editing a Document – Move and Copy text – Formatting text and paragraph – Finding and Replacing text and spelling checking – Using tabs, Tables, and other features, Enhancing document – using mail merge and other features.

Introduction to Worksheet- Getting started with excel – Editing Cells and using commands and functions – Moving And Coping, Inserting and Deleting Rows and Columns – Getting help and formatting a worksheet – Printing the worksheet – Creating Charts – using formulae and functions in excel. Introduction to Power Point Presentation

Module V

Computer Networks & Internet Technology

Introduction to Computer Networks, Networking Components, Classification and types of Networks, Network Topologies – Overview with Advantages and Disadvantages, Communication Channels, Client Server Architecture, LAN concepts.

Introduction to internet intranet and Extranet, Myths about the Internet, Basic concepts of internet, Domain Name Service, Internet Protocols and Addressing, Services of internet, Internet and support Technologies, Censorship and Privacy issues

Examination Scheme:

Components	A	P	HA	CT	EE
Weightage (%)	5	5	5	15	70

A-Attendance; P -Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination

Text & References:

- Craig Stinson “Running Microsoft Windows-98” – Microsoft press.
- Joshua C. Nossiter. “ Using Excel – 5 for Windows”
- “Working with Word” – Aptech Computer Education
- “Power Point Presentation” – Aptech Computer Education.
- Malhotra, Computer Applications in Business
- Rajaraman V, Analysis and Design of Information System, Prentice Hall of India, New Delhi

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- Murdick, RG and Ross, JE Information Systems for Modern Management
- Kanter, J, Management Oriented MIS, Prentice Hall of India
- Bhattacharya SK, Management Planning and Information Systems



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HUMAN VALUES AND PROFESSIONAL ETHICS

Course Code: MGT2206

Credit Units: 03

Course Objective:

The aim of this course is to facilitate the development of a holistic perspective among students towards life, profession and happiness, based on a correct understanding of the Human reality and the rest of Existence. Such a holistic perspective forms the basis of value based living in a natural way. Recognize the need for lifelong learning and have the knowledge and skills that prepare them to identify the Moral issues involved in Management areas and to provide an understanding of the interface between Social, Technological and Natural environments.

Course Contents:

Module I: Human Values

Morals, Values, Types of values, evolution of human values, Ethics – Integrity – Work Ethic – Honesty – Courage –Empathy – Self-Confidence – Character, Challenges at Work place

Module II: Values in Management

Relevance of values in Management, need for values in global change, values for managers, holistic approach for managers in decision making, problems related to stress in corporate management

Module III:

Workplace Rights and Responsibilities: Organizational Complaint procedures. Government agencies. Resolving Employee concerns. Limits on acceptable behavior in large corporation. Work environment: Ethical and legal considerations, Organizational responses to offensive behavior and harassment. Ethics in a Global Context.

Module IV: Industrial Integrity

The epitome of industrial success, Integrity and organization, Exploring learning process of integrity, Consequences of lack of integrity.

Examination Scheme:

Components	A	P	HA	CT	EE
Weightage (%)	5	5	5	15	70

A-Attendance; P -Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination

Text &References:

Text

- R R Gaur, R Sangal, G P Bagaria, 2010, *A Foundation Course in Human Values and Professional Ethics*, Excel Books

References:

- Ivan Illich, 1974, *Energy & Equity*, The Trinity Press, Worcester, and HarperCollins, USA
- E.F. Schumacher, 1973, *Small is Beautiful: a study of economics as if people mattered*, Blond & Briggs, Britain.
- A Nagraj, 1998, *Jeevan Vidya ek Parichay*, Divya Path Sansthan, Amarkantak.
- Sussan George, 1976, *How the Other Half Dies*, Penguin Press. Reprinted 1986, 1991
- PL Dhar, RR Gaur, 1990, *Science and Humanism*, Commonwealth Purblishers.
- A.N. Tripathy, 2003, *Human Values*, New Age International Publishers.
- Donella H. Meadows, Dennis L. Meadows, Jorgen Randers, William W. Behrens III, 1972, *Limits to Growth – Club of Rome's report*, Universe Books.


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READINGS IN MANAGEMENT

Course Code: MGT2230

Credit Units: 02

Objectives

The objective of this concentration elective is to inculcate reading habit alongwith value addition to the existing understanding of the subject. The book would be a kind of knowledge enhancer that would envision the student about some current thoughts related to the discipline. The book reading and its critical analysis would help broaden the intellectual horizon of the student. A contemporary and relevant book will be selected by the concerned department.

Guidelines


The student is expected to thoroughly go through the discipline related prescribed book with the objective of critically reviewing each aspect and character of the book. The student is supposed to have a detailed insight into the following:

1. Content
2. Writing style
3. Information/learning
4. Content handling
5. Characters(if any)
6. Thematic Clarity

The report is to be submitted in about 3000 words on A4 size sheets, Font 12pt., Times New Roman, 1.5 spacing. Headings in Font Size 16.

Evaluation Scheme

Report on the Book in 3000 words	Written Test
50 marks	50 marks


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TERM PAPER

Course Code: COM2231

Credit Units: 02

Objectives

The objective of this course is to judge the understanding as well as application of the knowledge gained by the students. The aim of the term paper is to provide the students with an opportunity to further enhance their knowledge in a sector of their choice by undertaking a significant practical unit of examining and analyzing various aspects of business management at a level commensurate with the learning outcomes of the various courses taken up by them in the ongoing semester.

A term paper is primarily a record of intelligent reading in several sources on a particular subject. The students will choose the topic at the beginning of the session in consultation with the faculty assigned. At least one middle level or senior level person of a company from the chosen sector may be interviewed face to face.

Guidelines:

1. The term paper will be related to the contemporary business issue and the topic will be given by the department.

2. The presentation of the term paper is scheduled to be held before the commencement of Semester examinations.


3. The paper will carry 100 marks that will be marked on the basis of understanding and organization of content based on the literature review. The Bibliography shall form an important part of the paper.

4. **Examples of a few broad areas for Term Paper (List is indicative, not exhaustive)**

- Credit rating
- Risk management
- Subprime meltdown and its after effect with case study from Indian industry
- Corporate frauds
- Micro finance institutions in India
- Carbon Trading
- IFRS
- Celebrity Endorsement in real estate
- Social media marketing
- Green marketing
- Sustainable branding practices
- Relationship management
- CSR
- Balanced Score Card
- Corporate Governance
- Employee retention
- NGOs.

Evaluation Scheme

Organisation and relevance of content	Literature Review	Bibliography	Total
40	40	20	100


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PROJECT

Course Code: COM2232

Credit Units: 03

Objectives:

The aim of the project is to provide the students with an opportunity to further their intellectual and personal development in the chosen field by undertaking a significant practical unit of activity. The project can be defined as a scholarly inquiry into a problem or issues, involving a systematic approach to gathering and analysis of information / data, leading to production of a structured report.

Chapter Scheme and distribution of marks:

Chapter 1: Introduction – 10 marks

Chapter 2: Conceptual Framework/ National/International Scenario – 25 marks

Chapter 3: Presentation, Analysis & Findings -- 25 marks

Chapter 4: Conclusion & Recommendations -- 10 marks

Chapter 5: Bibliography -- 05 marks

Project Report	Power Point Presentation & Viva
75 marks	25 marks

Components of a Project Report

The outcome of Project Work is the Project Report. A project report should have the following Components:

1) Cover Page: This should contain the title of the project proposal, to whom it is submitted, for which degree, the name of the author, name of the supervisor, year of submission of the project work, name of the University.

2) Acknowledgement: Various organizations and individuals who might have provided assistance /co-operation during the process of carrying out the study.

3) Table of Content: Page-wise listing of the main contents in the report, i.e., different Chapters and its main Sections along with their page numbers.

4) Body of the Report: The body of the report should have these four logical divisions

a) **Introduction:** This will cover the background, rationale/ need / justification, brief review of literature, objectives, methodology (the area of the study, sample, type of study, tools for data collection, and method of analysis), Limitations of the Study, and Chapter Planning.

b) **Conceptual Framework / National and International Scenario:** (relating to the topic of the Project).

c) **Presentation of Data, Analysis and Findings:**(using the tools and techniques mentioned in the methodology).

d) **Conclusion and Recommendations:** In this section, the concluding observations based on the main findings and suggestions are to be provided.

5) Bibliography or References: This section will include the list of books and articles which have been used in the project work, and in writing a project report.

6) Annexures: Questionnaires (if any), relevant reports, etc.

(The main text of the Project should normally be in the range of 5000 words. However, there may be annexure in addition to the main text)

The Steps of a Project Report

Step I : Selection of the topic for the project by taking following points into consideration:

- Suitability of the topic.
- Relevance of the topic
- Time available at the disposal.
- Feasibility of data collection within the given time limit.
- Challenges involved in the data collection (time & cost involved in the data collection, possibility of getting responses, etc.)

Step II : Finalisation of the Topic and preparation of Project Proposal in consultation with the Supervisor.

Step III : Collection of information and data relating to the topic and analysis of the same.

Step IV : Writing the report dividing it into suitable chapters, viz.,

Chapter 1: Introduction,

Chapter 2: Conceptual Framework / National & International Scenario,

Chapter 3: Analysis & Findings


Chapter 4: Conclusion and Recommendations.

Step V : The following documents are to be attached with the Final Project Report.

- 1) Approval letter from the supervisor (Annexure-IA)
- 2) Student's declaration (Annexure-IB)
- 3) Certificate from the competent Authority of the Organisation / Institution, if the student undertakes the Project Work in any Organisation / Institution.

Guidelines for Evaluation:

- Each of the students has to undertake a Project individually under the supervision of a teacher and to submit the same following the guidelines stated below.
- Language of Project Report and Viva-Voce Examination may be English. The Project Report must be typed and hard bound.
- Failure to submit the Project Report or failure to appear at the Viva-voce Examination will be treated as "Absent" in the Examination. He /she has to submit the Project Report and appear at the Viva-Voce Examination in the subsequent years (within the time period as per University Rules).
- No marks will be allotted on the Project Report unless a candidate appears at the Viva-Voce Examination. Similarly, no marks will be allotted on Viva-Voce Examination unless a candidate submits his/her Project Report.
- Evaluation of the Project Work to be done jointly by one internal expert and one external expert with equal weightage, i.e., average marks of the internal and external experts will be allotted to the candidate.



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WORKSHOP

Course Code: COM2233

Credit Units: 01

Objectives

A workshop is primarily an activity based academic event that is organized to provide the students a one to one and hands on experience on any aspect of their learning. The communication in a workshop has to be necessarily two way. The trainer has to make sure that the aspect covered are practically practiced by the participants. The student will choose the option of workshop from amongst their concentration electives. The evaluation will be done by Board of examiners comprising of the faculties.

Major Themes for Workshop

The workshop may be conducted on any of the following major themes:

Accounting

Finance

Human Resources

Marketing

Economics

Operations

Supply Chain Management

These themes are merely indicative and other recent and relevant topics of study may be included.

Guidelines for Workshop \

The procedure for earning credits from workshop consists of the following steps:

1. Relevant study material and references will be provided by the trainer in advance.
2. The participants are expected to explore the topic in advance and take active part in the discussions held
3. Attending and Participating in all activities of the workshop
4. Group Activities have to be undertaken by students as guided by the trainer.
5. Evaluation of workshop activities would be done through test and quiz at the end of the workshop.
6. Submitting a write up of atleast 500 words about the learning outcome from the workshop.

Methodology

The methodology followed at the workshop could be based on any one or more of the following methods:

Case Study

Business Game

Simulation

Group Activity


Role Play

Business Planning

Quiz

Evaluation Scheme:

Attendance	Active Participation	Multiple Choice Questions/ Quiz	Solving the case/ Assignment/ Write up	Total
10	30	30	30	100


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CORPORATE ACCOUNTING

Course Code: LAW2307

Credit Units: 03

Course Objective:

This course enables the students to develop awareness about Corporate Accounting in conformity with the Provision of companies' Act and latest amendments thereto with adoption of Accounting Standards that are likely to be introduced from time to time.

Course Contents:

Module I- Introduction to Corporate Accounts

Statutory records to be maintained by a company; Accounting for share capital transactions- issue of shares at par, at premium and at discount; forfeiture and re-issue of shares; buy-back of equity shares; redemption of preference shares - statutory requirements, disclosure in balance sheet; rights issue.

Module II

Issue & Redemption of debentures - accounting treatment and procedures; conversion of debentures into shares; Final accounts of Limited liability companies; Preparation of Profit & Loss account, Profit & Loss appropriation & Balance Sheet account in accordance with the provisions of existing companies act(excluding managerial remuneration).

Module III

Holding and subsidiary companies - accounting treatment and disclosures; consolidation of accounts.

Module IV

Valuation of Goodwill and shares

Good will- Meaning, definition, elements, types and methods of valuation of Goodwill, Methods of share valuation (Equity & preference shares).

Module V

Accounting treatment for amalgamation with reference to As-14 (excluding intercompany transactions & holdings), absorption and reconstruction of companies; internal & external reconstruction, Liquidation – Preparation of Liquidator's Statement of affairs, deficiency /surplus statement, calculation of pro rata treatment of uncalled capital.


Examination Scheme:

Components	A	P	HA	CT	EE
Weightage (%)	5	5	5	15	70

A-Attendance; P -Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination

Text & References:

- S.N. Maheswari, Financial Accounting
- Narayanaswamy, Financial Accounting
- SP Iyengar, Advanced Accountancy
- RL Gupta, Advanced Accountancy
- Jain and Narang, Corporate Accounting
- Tulsian, Advanced Accounting


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STATISTICAL METHODS IN RESEARCH-I

Course Code: LAW2308

Credit Units: 03

Course Objectives:

To provide basic understanding of quantitative tools and their elementary application to business problems.

Module I- Introduction to Statistics

Basic Concepts, Primary & Secondary data, classification of data, Graphical representation of data, frequency distribution.

Module II- Central Tendency and Dispersion

Measures of central tendency; Mean, Median, Mode, Geometric mean and Harmonic mean; Measures of dispersion; Range, Mean Deviation, Standard Deviation, Coefficient of variation, Quartile Deviation, Skewness and Kurtosis; Difference between these measures and their interpretation.

Module III- Correlation & Regression

Correlation- Concepts and importance, Positive & Negative correlation, Karl-Pearson's coefficient of correlation, Rank correlation coefficient, Spurious correlation, Coefficient of determination.

Regression-Concept, Difference between correlation & regression.

Module IV- Time Series and Index numbers

Time Series- Introduction, Components of a time series, Multiplicative and additive models, Semi Average & Moving Average method;

Index Numbers- Concept, price relative, quantity relative, value relative, Laspeyre's, Passche's and Fisher's index numbers, Family Budget method, problems in construction and limitations of index numbers Tests for adequacy of index numbers.

Examination Scheme:

Components	A	P	HA	CT	EE
Weightage (%)	5	5	5	15	70

A-Attendance; P -Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination


Text & References:

Text:

- Fundamentals of Applied Statistics, V.K.Kapoor & S.C.Gupta, S. Chand & Sons, New Delhi.
- Theory and Problems of Statistics, M.R. Theory, McGraw-Hill Book, London.

References:

- Essential Mathematics for Economics, J. Black & J.F. Bradley, John Wiley and Sons.
- Fundamental Method of Mathematical Economics, Chiang, McGraw-Hill New Delhi.
- Applied General Statistics. F.E. Croxton & D.J. Cowden, Prentice Hall, New Delhi.


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CONSTITUTIONAL LAW-I

Course Code: LAW2303

Credit Units: 04

Course Objective:

The course aims at analyzing constitutional institutions, its powers, limitations and interrelationships with one another and seeks to mould a frame of mind in the student to appreciate and assess constitutional policy and changes for the future.

Course Contents:

Module I: Fundamental Rights and Directive Principles, and Fundamental Duties

Idea of Fundamental Rights and their importance, against whom the Fundamental rights are available? Definition of 'State'? Law in Art. 13, Directive Principles; Nature and reasons for incorporation, inter-relationship between fundamental rights and directive principles, judicial policy towards Directive principles from Champakam to Minerva Mills and thereafter, Art. 51-A (K) and its correlation with Art. 21-A.

Module II: Freedom and Personal Liberty

Freedom of speech and expression and of press; Is Right to Information inclusive in Freedom of Speech and Expression? Freedom of Assembly, Freedom of Association, Freedom of Movement, Freedom to reside and settle, Freedom of profession/Business, etc. Art. 19: Are these freedoms absolute? Rights of an accused: Double Jeopardy, Self-incrimination and retrospective punishment, Art. 20; Right to life and personal liberty: Meaning of personal liberty, Procedure established by Law, Before Maneka Gandhi, Maneka Gandhi and thereafter, Art. 21; preventive detention and constitutional safeguards: Art. 22; Right to education Art. 21-A.

Module III: Equality and Protective Discrimination

Equality before Law and equal protection of Laws, meaning, constitutional provisions Arts 14, 15, 16, 17, 29 (2), 325: Total conspectus, Classification for differential treatment, prohibited grounds of discrimination: Arts. 15(1), (2), (3), 16 (2), (3), 29 (2); Protective Discrimination in favour of SC / ST and other backward classes and recent trends eg. Schedule IX and Reservation Policy, Women and children Art. 15, 15(3), 15(4), 15(5) Abolition of titles – Arts. 18.

Module IV: Secularism

Concept of Secularism, Indian Constitutional provisions, Indian concept of Secularism, Freedom of religion, Scope: Arts. 25, 26, Limits of Freedom, Religion and State in India, State Control and non-interference with religion; Minority rights: Why? Scope: Meaning and Minority, Minority right to educational institutions and judicial attitude.

Module V: Judicial Process under the constitution

Judicial Review : Nature of Judicial Review, Arts. 32, 136, 141, 226, 227.

Judges: Appointments, conditions of service, etc; Public Interest Litigation.

Supreme Courts Original and Advisory Jurisdiction.

Examination Scheme:

Components	P/S/V	CT	C	A	EE
Weightage (%)	10	10	5	5	70

Text & References:

- V.N. Shukla, Constitution of India
- M.P. Jain – Indian Constitutional Law.
- H.M. Seervai – Constitutional Law of India.
- Durga Das Basu – Shorter Constitution.
- P.M. Bakshi – Constitution of India.
- J.N. Pandey – Constitution of India..

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LAW OF CRIMES - I (INDIAN PENAL CODE Section 1-120B)

Course Code: LAW2304

Credit Units: 04

Course Objective:

Course on Law of Crimes aims at introducing students to the basic principles of criminal law. There has been a progressive as well as regressive change in the Indian society since Independence. A proper understanding of crimes and the causal factors for the occurrence of crime is extremely important in the larger context of India's development, if young law students are to use their knowledge and skills to build a just and humane society. The young law students are the would be lawyers and as such they must have an acquaintance with such knowledge to make criminal justice system serve the goals of social defense as well as social justice. Therefore, a study of the basic concepts of specific offences under the Indian Penal Code is imperative.

Course Contents:

Module-I: Introduction to Substantive Criminal Law: Extent and operation of the Indian Penal Code, Definition of Crime, Fundamental elements of crime, Stages in commission of a crime, Intention, Preparation, Attempt.

Module-II: Punishment: Theories: Deterrent, Retributive, Preventive, Expiatory and Reformative Theory. Punishment under the IPC: Fine, Imprisonment, Capital Punishment.

Module-III: General Explanations and Exceptions: Definitions, Constructive joint liability, Mistake, Judicial and Executive acts, Accident, Necessity, Infancy, Insanity, Intoxication, Consent, Good faith, Private defence


Module-IV: Abetment and Criminal Conspiracy

Examination Scheme:

Components	P/S/V	CT	A	C	EE
Weightage (%)	10	10	5	5	70

Text & References:

- Ratanlal & Dhirajlal – The Indian Penal Code
- K. D. Gaur – A Text Book on Indian Penal Code
- S.N. Misra, Indian Penal Code
- B.M. Gandhi, Indian Penal Code (1996), Eastern, Nagpur.
- P.S. Achutan Pillai, Criminal Law (1995) Eastern, Lucknow.


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FAMILY LAW-I

Course Code: LAW2305

Credit Units: 04

Course Objective:

This Course aims at providing adequate Sociological perspective so that the basic concepts relating to family are expounded in their social setting. It is designed to address the various aspects of Hindu Law and strives to give an overview of some of the current problems arising out of the foundational inequalities in the various family concepts.

Course Contents:

Module I: Introduction (Sources, Schools and Joint Hindu Family)

Sources and Schools of Hindu Law; The Concept, Formation and incidents of Joint Hindu Family of Mitakshara and Dayabhaga; The Coparcenaries : It's formation and various incidents of Joint Hindu Family of Mitakshara and Dayabhaga; Karta of the Joint Family : His position, powers, privileges and obligation.

Module II: Hindu Marriage (Vivah) and Matrimonial Remedies (The Hindu Marriage Act, 1955)

Hindu Marriage: Nature, concept, Essential conditions & Prohibitions; Void & Voidable Marriages; Divorce: Customary and Judicial- Matrimonial fault theory, irretrievable breakdown and of marriage; Option of puberty; Restitution of conjugal rights; Judicial separation.

Module III: Alimony, maintenance, Adoption and Guardianship (The Hindu Adoption and Maintenance Act, 1956 and The Hindu Minority and Guardianship Act, 1956)

Maintenance of neglected wives, divorced wives, minor children, disabled children and parents under sections 125, 127 of Code of Criminal Procedure, 1973; Alimony : Temporary Permanent; Maintenance: Pendente Lite and permanent and maintenance for Divorced Hindu women under The Hindu Adoption and Maintenance Act, 1956; The Hindu Minority and Guardianship Act, 1956,

Module IV: Law of Succession, inheritance and Partition among Hindus (The Hindu Succession Act, 1956)

Property under Mitakshara Law and Dayabhaga: Formation and Incidents; Devolution of interest in Mitakshara Coparcenaries, Coparcenaries with reference to the provisions of Hindu Succession Act, 1956, Succession to property of Hindu female dying intestate under the Hindu Succession Act, 1956, Disqualifications relating to succession; Partition and Re-union.

Module V: Dispositions of Property under Hindu Law

Testamentary Disposition (Will): Definition and basis, Capacity of the Legatee, Formalities of a Will; subject matter of Will, Restrictions on testamentary power of disposition, interpretation of the Will, Revocation of the Will; Disposition inter vivos (Gift).

Examination Scheme:

Components	P/S/V	CT	C	A	EE
Weightage (%)	10	10	5	5	70

Text & References:

- Mulla, D.F., Principles of Hindu Law
- Paras Diwan, Modern Hindu Law
- Mulla, D.F., Principal of Mohammadan Law
- Fyzee, A.A.A., Outlines of Mohammadan Law
- Mahmood, T., Muslim Law of India
- Paras Diwan, Law of Intestate and Testamentary Succession (1998), Universal

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THE CODE OF CRIMINAL PROCEDURE

Course Code: LAW2311

Credit Units: 04

Course Objective:

In the absence of effective enforcement machinery, the substantive Criminal Law which defines offences and provides punishments for them, would be almost worthless. Therefore, the need of the Code of Criminal Procedure. The present course intends at acquainting the students with the various pre judicial and judicial procedures. This course also includes the rights and duties of those proceeded against and the powers, duties and restraints on those administering the criminal judicial process.

Course Contents:

Module I: Introduction

The importance of Fair Trial - constitutional perspectives of fair trial: Articles 14, 20, 21, Section – 2: Definitions; classes of Criminal Courts: Sections 6 to 13 including their powers and jurisdiction. The organization of Police, Prosecutor, Defense Counsel and Prison Authorities alongwith their duties, functions and powers.

Module II: Pre – Trial processes

FIR, Arrest and Bail provisions, bonds, process to compel appearances and production of things, search and seizure – search warrants, search without warrants, police search during investigations, general principles of search, seizure and constitutional aspects of validity of search and seizure proceedings.

Module III: Charge and common features relating to Trials

Form of Charge, joinder of charges, alteration of charge, basic rule regarding charge and its trial, withdrawal of charges, effect of error in the charge. Language of Courts, decision on evidence partly recorded by one judge or magistrate and partly by another, summary procedure to deal with certain cases of perjury and certain kinds of contempt of court, evidence in inquiries and trials, general provisions as to inquiries and trials, provisions as to accused persons of unsound mind.

Module IV: Criminal Trials and Execution Proceedings

Trial before Court of Sessions, Trial of warrant case by magistrate, Trial of Summons Case, Summary Trial, Judgment, submission of death sentence for confirmation, execution, suspension, remission and commutation of sentences.

Module V: Review Procedures

Appeal, Review and Reference

Module VI: Miscellaneous

Maintenance of wives, children and parents, Transfer of criminal cases, Irregular proceedings, Limitations for taking cognizance, Security for keeping peace and for good behavior, Disputes as regarding immovable property, Probation of Offenders Act

Module VII

Juvenile Justice (Care & Protection of Children) Act 2000. Concept of juvenile delinquency, juvenile court system, treatment and rehabilitation of juveniles, law for protection of juvenile offenders. Juvenile Justice (Care & Protection of Children) Act 2014.

Examination Scheme:

Components	P/S/V	CT	C	A	EE
Weightage (%)	10	10	5	5	70

Text & References:

- Ratan Lal and Dheeraj Lal, Criminal Procedure Code
- D.D. Basu, Criminal Procedure Code
- R.V. Kelkar, Lectures on Criminal Procedure Code
- R.V. Kelkar, Code of Criminal Procedure
- Chandrasekharan Pillai (ed.) Kelkar's Outlines of Criminal Procedure (2001), Eastern, Lucknow.

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STATISTICAL METHODS IN RESEARCH-II

Course Code: LAW2408

Credit Units: 03

Course Objectives:

To provide basic understanding of quantitative tools and their elementary application to business problems.

Module I- Probability Theory

Independent, Dependent, Mutually Exclusive, Favourable, Exhaustive & Complementary events, Addition theorem, Conditional Probability, multiplication Theorem, Bayes's Theory.

Module II- Statistical Methods

Random Variable- Continuous & discrete; Discrete distribution- Binomial & Poisson, Bernoulli's trials; Continuous Distribution- Normal distribution, Properties of normal curve, importance & application

Module III- Tests of Hypothesis

Significance test: concepts and applications, acceptance and critical regions, null and alternative hypothesis, judgemental errors, level of significance. Power of a test, z test for testing of mean, proportion and equality of means, t- test.

Module IV- Decision Tree

Decision Theory: Decision making, under certainty, uncertainty & risk, Bayesian Analysis, Decision tree.

Examination Scheme:

Components	A	CT	C	H	EE
Weightage (%)	5	15	5	5	70


Texts and References:

Text:

- Fundamentals of Applied Statistics, V.K.Kapoor & S.C.Gupta, S. Chand & Sons, New Delhi.
- Theory and Problems of Statistics, M.R. Theory, McGraw-Hill Book, London.

References:

- Business Statistics, J.K. Sharma, Pearson Education.
- Statistical Methods, S.P.Gupta, S. Chand and Sons, New Delhi.
- Applied General Statistics. F.E. Croxton & D.J. Cowden, Prentice Hall, New Delhi.


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CONSTITUTIONAL LAW-II

Course Code: LAW2403

Credit Units: 04

Course Objective:

The course material seeks to introduce the student to the relevance of inalienable fundamental rights and restrictions in the Constitution of India and the principles that ought to guide policy making in India. The student is expected to appreciate the text and the juristic discourse by reference to landmark case laws, juristic opinion and vibrant classroom discussions as the subject raises issues, conflict of interests and dilemmas in a pulsating democracy with changing dynamic priorities in a developing country like India.

Course Contents:

Module I: Distribution of powers between Centre and States – (Arts. 245-281)

Legislative Powers, Administrative Powers, Financial Powers, Relevant Doctrines: Territorial nexus, Harmonious construction, Pith and substance, Repugnancy: Overview of Panchayati Raj Provisions (Art. 243), Freedom of Trade and Commerce.

Module II: Union and State Executive, legislature and Judiciary

Union Executive, President: Appointment, Election, Removal, conditions of service; Powers of president focus on ordinance, pardon, emergency; Assessment of relevance of presidential office on governance; Council of ministers and Prime minister: Appointment, Conditions, functioning, collective responsibility, dismissal of cabinet minister; Office of Attorney General: Significance, Appointment, functions, Conditions; State executive, Governor: Appointment, Removal, Powers, State cabinet dismissal; governors role in the context of centre state relations. (Art 79-122).

Union Legislature: Lok Sabha, Composition, functioning, membership, qualifications and disqualifications, Dissolution of, Effect; Bills : Procedure for the passage; Privileges of legislature; State legislature: functioning, dissolution ; Anti defection law and its impact. (Arts. 168-212).

Union Judiciary: Supreme Court Judges: Appointment, removal, impeachment; jurisdiction of Supreme Court: Original, appellate, advisory, Court of Record; Assessment of independence of judiciary; State judiciary: High Court Judges: Appointment, transfer, removal, promotion; High Court jurisdiction, Art. 226, writs; Subordinate judiciary. (Arts. 124 -147) (Arts. 214 to 237).

Module III: Emergency Provisions

National, State and financial Provisions.

Module IV: Miscellaneous

Official Language, Language of Courts, Trade, Commerce and Intercourse in India, Services Under the Union and State, Elections, Parliamentary, Privileges and Schedules, etc .

Module V: Amendment of the Constitution

Amendment of Constitution, Doctrine of basic Structure.

Examination Scheme:

Components	P/S/V	CT	C	A	EE
Weightage (%)	10	10	5	5	70

Texts & References:

- V.N. Shukla, Constitution of India
- M.P. Jain – Indian Constitutional Law.
- H.M. Seervai – Constitutional Law of India.
- Durga Das Basu – Shorter Constitution.
- P.M. Bakshi – Constitution of India.
- J.N. Pandey – Constitution of India.


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ADMINISTRATIVE LAW

Course Code: LAW2404

Credit Units: 04

Course Objective:

Administrative law is as old as the administration itself. However, the form in which we find it today, Administrative is described a most outstanding legal development of the twentieth century. The reason for this development can only be attributed to a change of philosophy as regards the role and function of the State. The change in the concept of State from 'laissez faire' to a 'welfare state' has led to emergence of state activities in almost all spheres of human life. With the phenomenal increase in the area of state operation, the State was bound to take over a number of functions which were earlier left to private enterprise. In order to ensure that such functions are performed effectively and further due to certain other factors namely contingency, expertise etc. administrative agencies are given extraordinary powers and functions such as to make rules and deciding disputes apart from its wide discretionary powers. Obviously, this necessitated a new set of laws to check the possible abuses of such extraordinary powers on the part of administration. The courts in India and abroad in the course of time have developed various doctrines and methods to deal with such p[roblems. However, there is no end to this journey. The field is still open for new changes.

The main thrust of administrative law has been to study the nature of functions and powers exercised by the authorities on whom they have been conferred on and the study of remedies available to common man in case the limits of exercising power are transferred by such an authority. The focus or the centre point of this study, as usual as in cases of the study of other branches of public law, is the rights of individual *vis a vis* the public interest.

Course Contents:

Module I: Evolution, Nature and scope of Administrative law

Definitions, scope, classification and reason for the growth of administrative law; Relationship between constitutional law and administrative law; doctrine of Separation of Powers and its application in administrative law; Doctrine of Rule of law and application in administrative law.

Module II: Legislative function of Administration

Delegated legislation: Necessity for delegated legislation, classification of delegated legislation and its requirement, constitutionality of delegated legislation, All form of control of delegated legislation i.e. Parliamentary, Procedural and Judicial control (doctrine of ultra vires).

Module III: Judicial function of Administration

Reason for Administrative adjudication; Tribunals and classification of Tribunals; Principles of Natural Justice; Ombudsman: Lokpal, Lokayukta; Central Vigilance Commission (CVC).

Module IV: Administrative discretion

Need and legality and abuses; Constitutional objections and discretion, failure to exercise discretion; Doctrine of proportionality; Legitimate expectation.

Module V: Judicial control of administrative action

Courts as the final authority to determine the legality of Administrative actions ; Public Interest Litigation and the principle of *locus standi*, laches, Judicial review ; scope and extent, statutory appeals, writs.

Examination Scheme:

Components	P/S/V	CT	C	A	EE
Weightage (%)	10	10	5	5	70

Text & References:

- M.P. Jain and S.N. Jain: Principles of Administrative Law.
- I.P. Massey: Administrative Law.
- C.K. Talewani: Lectures on Administrative Law.
- De Smith: Judicial Review of Administrative Action.
- A.W.R. Wade: Administrative Law
- S.P. Sathe: Administrative Law.

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FAMILY LAW-II

Course Code: LAW2405

Credit Units: 04

Course Objective:

Family Law II Course is mainly devoted to the study of Muslim Personal Law relating to Marriage, Maintenance, Dower, Adoption & Guardianship, Divorce, Hiba, Pre-emption, Succession, and disposition of Property. The main objective of the course is to provide an indepth knowledge of the Laws governing Muslims.

Course Contents:

Module I: Introduction (Sources, Schools and Muslim Marriage (Nikah)

Sources and Schools of Muslim Law: Shia and Sunni; Muslim Marriage: Nature and concepts of Muslim Marriage, Essential conditions of a valid marriage, prohibitions/ disabilities, classification of marriage and effects of valid, irregular, void marriage.

Module II: Dower and Matrimonial Remedies (Dower, Restitution, Separation and Divorce)

Dower : Concept and Nature; Divorce under Muslim personal Law, Nullity of marriage; Option of puberty; Restitution of conjugal rights; Judicial separation; Grounds for divorce under Muslim Law; Bars to matrimonial relief under Muslim Law; Grounds for Divorce under Indian Dissolution of Muslim Marriage Act 1939.

Module III: Alimony, maintenance and Adoption & Guardianship (Hizanat)

Maintenance of neglected wives, divorced wives, minor children, disabled children and parents who are unable to support themselves vide sections 125, 127 of Code of Criminal Procedure, 1973; Alimony and maintenance as an independent remedy, Maintenance (Nafaqa) for Muslim Women under the Muslim Women Protection of Right on Divorce Act, 1986; Guardianship under Muslim Law.

Module IV: Law of Succession and inheritance among Muslims

General rules of succession; inclusion and exclusion of inheritors to the property. Classification of heirs under Hanafi and Ithma Asharia School and their shares and distribution of property.

Module V: Dispositions under Muslim Law, Waqf and Pre- Emption

Wasiyat : Testamentary Disposition and various incidents of wasiyat. Disposition inter vivos (Gift), Gift (Hiba), Musha, Revocation of Gifts; Distinction between Hiba, Ariya, Sadaqa & Wakf, Hiba-bil-Sharatful-ewaz, Gift during death illness (Marz-ul-maut).

Waqf : Meaning, Kinds, Objects, purpose, Requisites and various incidents of waqf.

Pre-emption – Origin, Definition, Classification, Subject matter, formalities, effects, constitutional validity.

Examination Scheme:

Components	P/S/V	CT	C	A	EE
Weightage (%)	10	10	5	5	70

Text & References:

- Mulla, D.F., Principles of Hindu Law
- Paras Diwan, Modern Hindu Law
- Mulla, D.F., Principal of Mohammadan Law
- Fyzee, A.A.A., Outlines of Mohammadan Law
- Mahmood, T., Muslim Law of India
- Paras Diwan, Law of Intestate and Testamentary Succession (1998), Universal .


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LAW OF CRIMES-II (INDIAN PENAL CODE SECTION- 121-511)

Course Code: LAW2406

Credit Units: 04

Course Objective:

Course on Law of Crimes aims at introducing students to the basic principles of criminal law. There has been a progressive as well as regressive change in the Indian society since Independence. A proper understanding of crimes and the causal factors for the occurrence of crime is extremely important in the larger context of India's development, if young law students are to use their knowledge and skills to build a just and humane society. The young law students are the would be lawyers and as such they must have an acquaintance with such knowledge to make criminal justice system serve the goals of social defense as well as social justice. Therefore, a study of the basic concepts of specific offences under the Indian Penal Code is imperative.

Course Contents:

Module-I: Offences affecting the Human body: Offences affecting life, causing miscarriage, or injuries to unborn children, Offences of hurt, of wrongful restraint and wrongful confinement, Offences of criminal force and Assault, offences of kidnapping and Abduction

Module-II: Offences against Women: Obscene acts and songs, Outraging the modesty of women, Rape, Cruelty by husband or relatives of husband, Offences relating to marriage

Module-III: Offences against Property: Theft, Extortion, robbery and dacoity, Criminal misappropriation and criminal breach of trust, Cheating, Mischief, Criminal trespass

Module-IV: Defamation and offences relating to documents and property marks: Defamation, Forgery, Counterfeiting.


Module-V: Offences against State, Public Tranquillity, Public Servants, Religion

Examination Scheme:

Components	P/S/V	CT	C	A	EE
Weightage (%)	10	10	5	5	70

Text & References:

- Ratanlal & Dhirajlal – The Indian Penal Code
- K. D. Gaur – A Text Book on Indian Penal Code
- S.N. Misra, Indian Penal Code
- B.M. Gandhi, Indian Penal Code (1996), Eastern, Nagpur.
- P.S. Achutan Pillai, Criminal Law (1995) Eastern, Lucknow.


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COST ACCOUNTING

Course Code: LAW2507

Credit Units: 03

Course Objective:

To get an expert knowledge in the area of cost management and cost control to enable effective management decisions.

Course Contents:

Module I: Cost Accounting

Introduction – Meaning of Cost, costing and Cost Accounting – Comparison between Financial Accounts and Cost Accounts –Cost concepts and Classification of Costs – Cost Module – Cost Center, cost object –Preparation of cost sheet

Module II: Material Costing

Issue of materials, Methods of pricing of material issues- LIFO, FIFO- Weighed Average Method, Simple Average Method; Inventory Control- Concept & techniques like fixing of stock levels, EOQ, ABC analysis, perpetual & periodic inventory systems, material losses & their treatment.

Module III: Labour Costing

Control of labour cost – Labour Turn Turnover – Causes and effects of labour turnover – Meaning of Time and Motion Study, Merit Rating, Job Analysis, Time keeping and Time booking – Idle time, causes and treatment – Overtime – Methods of Wage Payment, Time rate and Piece Rate – Incentive Schemes – Halsey Premium Plan – Rowan Bonus Plan – Taylor's and Merrick's differential piece rate systems – Problems.

Module IV: Overhead Costing

Definition, Classification, allocation, apportionment & absorption of overhead, treatment of over & under absorption

Module V:

Costing Methods Introduction - Job Costing – Batch Costing – Contract Costing- Process Costing – principles – distinction between Process and Job – Preparation of process accounts – treatment of normal loss – abnormal loss – abnormal gain – Joint and By-products. Service costing. Marginal costing- introduction, contribution, PVR, BEP Chart and Margin of safety.

Module VI:

Reconciliation of Cost and Financial Accounts - Need for reconciliation – Reasons for difference in profits – Problems on preparation of Reconciliation statements including Memorandum Reconciliation account.

Examination Scheme:

Components	A	P	HA	CT	EE
Weightage (%)	5	5	5	15	70

A-Attendance; P -Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination

Text & References:

- N.K. Prasad: Cost Accounting
- Nigam & Sharma: Cost Accounting
- Khanna Pandey & Ahuja: Practical Costing
- M.L. Agarwal: Cost Accounting
- Jain & Narang: Cost Accounting
- S.P. Iyengar: Cost Accounting
- S.N. Maheshwari: Cost Accounting
- Horngren: Cost Accounting: A Managerial Emphasis
- M. N. Arora: Cost Accounting

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MACRO ECONOMICS

Course Code: LAW2508

Credit Units: 03

Course Objective:

This course aims at introducing the fundamentals of Macroeconomic theories, policies and models in a historical perspective. It will enable the students to develop a critical insight on Classical and Keynesian macroeconomic models, to understand the relationship between inflation and employment by providing exposure to the constructions of Friedman, Phelps & Phillips.

Course Contents:

Module I: Introduction to Macroeconomics

The roots of macroeconomics, macroeconomic concerns, the role of government in the macro economy, the components of the macro economy, the methodology of macroeconomics

Module II: Introduction to National Income Accounting

Concepts of GDP and national income, approaches to calculating GDP, GDP and personal income, Nominal and real GDP, Limitations of the GDP concept, GDP and the black economy.

Module III: Schools of Macroeconomic Thoughts

Classical, Neo Classical and Keynesian Models.; Say's Law of Markets and Classical Theory of Employment

Module IV: Keynesian Model

Aggregate expenditure and equilibrium output; Consumption function; theory of investment-marginal efficiency of capital; saving and investment; The Investment Multiplier and its application to LDC's

Module V: Money in the Modern Economy

Theories of Demand for Money: Quantity Theory and Keynes approach. Baumol and Tobin Contributions and Friedman's restatement of quantity theory Characteristics of a monetary economy; the supply of money and overall liquidity position; credit creation

Module VI: Inflation

The causes of inflation, level of prices and the value of money, The Fisher effect, the cost of inflation.

Examination Scheme:

Components	A	P	HA	CT	EE
Weightage (%)	5	5	5	15	70

A-Attendance; P -Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination

Text & References:

Text:

- Mc Connell. C.R & H.C. Gupta, "Introduction to Macro Economics", Tata McGraw Hill, Delhi
- Gardner Ackeley, "Macro Economics".

References:

- J.E. Stiglitz, and C.E. Walsh (2002), *Principles of Economics*, 3rd Edition, W.W. Norton & Company, New York.
- R. Stone and G. Stone (1962), *National Income and Expenditure*, Bowes and Bowes London.
- Lipsey & Chrystal- Principles of Economics
- K.K. Dewett: Modern Economic Theory, New Delhi, Shyamlal Charitable Trust.


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LAW OF EVIDENCE

Course Code: LAW2502

Credit Units: 04

Course Objective:

This paper is to orient students with importance of evidence for establishment of claims and the related rules and principles.

Course Contents:

Module I: Definitions and Relevancy of Facts

Evidence and its relationship with the substantive and procedural laws ;Definitions : Facts, facts in issue, relevant, evidence proved, disproved, not proved, oral and documentary evidence ;Relevancy and admissibility; Doctrine of *res gestae* ;Conspiracy.

Module II: Admissions, confessions and statements by person who cannot be called as witnesses:

Definition of admission, who can make admissions by or on their behalf, proof of admission against the persons making them and admissions in civil cases. (Section 17-23, 31); Definition, relevance and consideration of confessions (section 24-30); Dying declaration (Section 32 and Section 33). **Opinion of Third Persons (Sec. 45 to 51) & Character Evidence (Sec. 52 to 55).**

Module III: Documentary Evidence

Primary and Secondary Evidence, Proof and verification of documents; Public documents and presumption as to documents.

Module IV: Production and Effect of Evidence

Burden of proof (Sections 101-114); Estoppels (Section 115); Competence of witnesses (Sections 118-120).

Module V: Examination of Witnesses (Sections 135-166) and Rejection of evidence (Section 167)


Examination –in-chief : Cross Examination, Re-examination; Leading questions; Hostile witnesses; Refreshing memory; Judge's power to put questions or order production.

Examination Scheme:

Components	P/S/V	CT	A	C	EE
Weightage (%)	10	10	5	5	70

Text & References:

- Ratanlal and Dheerajlal : Law of Evidence
- Monir Field : Law of Evidence
- Batuklal : Law of Evidence
- Avtar Singh : Evidence Law
- Bare Act : Indian Evidence Act, 1872


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CODE OF CIVIL PROCEDURE

Course Code: LAW2503

Credit Units: 04

Course Objective:

This paper is to help a law student to acquire a thorough knowledge of procedural aspects of working of civil courts and other machineries.

Course Contents:

Module I: Initial steps in a suit

Jurisdiction and place of suing; Institution of suit, cause of action, joinder, non-joinder and mis-joinder of parties; Summons; Pleadings: Meaning, object, General rules, Amendment of pleadings; Plaint and written statement: Particulars, set off and counter claim; Admission return and rejection; Discovery, Inspection and production of documents; Appearance and non-appearance of parties, ex-parte proceedings; First hearing: Meaning, object, framing of issues, omission to frame issues, disposal of suit in the first hearing; Trial: Summoning and attendance of witnesses, summons to produce documents, adjournment, hearing of suit.

Module II: Significant Terms and Definitions

Definitions: Decree, Judgment, Order, Foreign Court, Foreign Judgment, Mesne, Profits, Affidavit, Suit, Plaint, Written Statement, Suit of civil nature ;Important Concepts: Res Sub-Judice, Resjudicata, Restitution, Caveat, Inherent powers of courts.

Module III: Interim Orders

Commissions, Arrest before judgment, Attachment before judgment, Temporary Injunctions, Interlocutory orders, Receiver, Security of costs.

Module IV: Suits in Particular Cases

Suits by or against Government, Suits by Indigent persons, Interpleader Suit, Summary Procedure, Suits relating to public nuisance. Execution Proceedings

Module V: Law of Limitation


Definitions, period of limitation, plaintiff, defendant; and in foreign countries, limitation of suits, appeals, and application, computation of period of limitation.

Examination Scheme:

Components	P/S/V	CT	A	C	EE
Weightage (%)	10	10	5	5	70

Text & References:

- Mulla's Code of Civil Procedure, Universal, Delhi
- C.K. Thakkar's (Takwani), Code of Civil Procedure
- Majumdar, P.K. and Kataria, R.P., Commentary on the Code of Civil Procedure, 1908, universal, Delhi.


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LABOUR LAW-I

Course Code: LAW2504

Credit Units: 04

Course Objective:

The course aims at imparting to the students an indepth understanding of Labour Laws in India by recourse to relevant judicial pronouncements in this regard.

Course Contents:

Module I: Regulation of Trade Union & Unfair Labour Practices

History of Trade Union Movement in India and need to form Trade Union, Workers Right to form Union vis-à-vis Indian Constitution; the Membership of Trade Union, Closed shop and Union shop, Registration of Trade Union, Remedies in case of non-registration and cancellation of registration of union, Privileges and Protection of registered Trade Union form certain acts and omissions, Unfair labour practices and victimization.

Module II: Collective Bargaining:

Concept and importance of collective bargaining, Pre-requisites for collective bargaining, Process of administering collective agreement (Negotiation, Mediation, & Voluntary arbitration & Compulsory Arbitration.), Duration and enforcement of bipartite Agreement (Secs. 18, 19, Industrial Disputes Act, 1947), Pressurization: Strike, Go-Slow, wok to rule, Gherao and Lockout.

Module III: Regulation of Industrial Disputes

Define the concept of Industry, Industrial Dispute and workman, Power of Government to refer Industrial Disputes for adjudication: The Adjudicatory Machinery, Award and its binding nature, Judicial review of Awards, The concept of lay-off, retrenchment and procedure and compensation relating to lay-off and retrenchment.

Module IV: Standing Orders

Concept, Nature and scope of standing orders under Industrial Employment (Standing Order) Act, 1946, Formulation of Standing Orders and its Certification process, Modification: Modification and temporary application of Model Standing Order, Interpretation and Legal status of Standing Orders.

Module V: Discipline in Industries

Doctrine of hire and fire in the context of social welfare, Fairness in disciplinary process: Meaning of misconduct, Right to know: The Charge Sheet, Right to defend; Domestic enquiry notice, evidence, cross examination, unbiased enquiry officer and reasoned decision, Punishment of misconduct, Prenatal (permission) and Postnatal (Approach) control during pendency of proceeding (Sec. 33 of industrial and Disputes Act).

Examination Scheme:

Components	P/S/V	CT	C	A	EE
Weightage (%)	10	10	5	5	70

Text & References:

- O.P. Malhotra, Law of Industrial Disputes.
- Indian Law Institute, Labour Law and Labour Relations.
- K.D. Srivastava, Commentary of Industrial Employment (S.C.) Act, 1946.
- S.C. Srivastava, Industrial Relation and Labour Law.
- Report of National Commission on Labour, 1969.
- Industrial Disputes Act, 1947.
- R.B. Sethi & R.N. Dwivedi, Law of Trade Union.


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PROPERTY LAW

Course Code: LAW2505

Credit Units: 04

Course Objective:

The subject imparts to the student an understanding of the law in India relating to transfer of immovable property and the norms and doctrines that aid in carrying out secure transactions in this regard.

Course Contents:

Module I: Jurisprudential Basis (Sections 5-21)

Concept and meaning of property – New property, Kinds of property – movable and immovable property, tangible and intangible property,

Module II: Sale of Immovable Property

Doctrine of Election Sec. 35, Fraudulent Transfer Sec. 53 ; Sale of immovable property (Secs. 54 – 55). (Sale, Contract of Sale; Contract to sell; Rights and Liabilities of buyer and seller).

Module III: Specific Transfers

Mortgages of immovable Property: Secs. 58 – 77 (Kinds of mortgage, Rights and Liabilities of the mortgagor and mortgagee, Marshalling and Contribution (Secs. 81 – 82), Redemption (Secs. 91 – 96).

Module IV: Leases

Leases (Secs. 105 – 117): Definition, Leases how made, Rights and Liabilities of lesser and lessee, Charges (Section, 100 – 104).

Module V: Easements

Creation of Easements (Secs. 4 – 7), Nature and characteristics of Easements, Extinction, Suspension and Revival of Easements (Secs. 37–51), Riparian Rights, Licenses (Secs. 52 – 64).

Module VI

Indian Stamp and Registration Act

Examination Scheme:

Components	P/S/V	CT	A	C	EE
Weightage (%)	10	10	5	5	70

Text & References:

- Mulla, D.F., Transfer of Property Act.
- Shukla, S.N., Transfer of Property Act.
- Shah, S.M., Transfer of Property Act.
- Tripathi, Lectures on Indian Easement Act.
- Jain, J.D., Indian Easement Act.


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ADVANCED CORPORATE ACCOUNTING

Course Code: COM2503

Credit Units: 04

Course Objectives:

Course Contents:

Module I-

Advanced problems on final Accounts of Companies, Disposal of Profit and Capitalization Of Profits
Issue of Bonus Shares.

Module II-

Problems of Amalgamation, (AS-14) and Reconstruction, Aspects of Corporate Reconstructuring.

Module III-

Consolidated Accounts of Holding and Group Companies.

Module IV-

Preparation of Final Accounts of Banking Companies and Insurance Companies.

Module V-

Preparation of Final Accounts of electricity Companies and Double Account System.

Examination Scheme:

Components	A	P	HA	CT	EE
Weightage (%)	5	5	5	15	70

A-Attendance; P -Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination

Texts and References:

Texts:

- Advanced Accounts, Batliboi
- Advanced Accounts, R.R. Gupta

References:

- Advanced Accounts, Shukla & Grewal
- Advanced Accounts, S.N. Maheswari
- Accountancy, W. Pickles
- Advanced Accountancy, R.L. Gupta



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CORPORATE TAX LAW AND PRACTICE

Course Code: COM2504

Credit Units: 04

Course Objectives:

Course Contents:

Module I-

Computation of total income in case of companies including non-residents, Co-operative Society

Module II-

Procedure for assessment: Section 139 to 148 (Return of Income) PAN, Assessments, Methods of Accounting, Accounting standards, Time limit for completion of Assessment, Rectification of mistake etc. Special procedure for assessment of search cases.

Module III-

Liability in Special Cases: Legal representatives, Representative assesses: provisions applicable to firms, AOP & BOI, executors succession, shipping companies. Recovery of tax in respect of non-resident, persons leaving India, person trying to alienate their property, discontinuation of business & profession

Module IV-

Collection and Recovery of tax, TDS, Advance payment of income tax, Interest u/s 234, Refunds and settlement of cases

Module V-

Appeals & Revision, Acquisition of Immovable properties, provisions to counter evasion of tax, Penalties, Offences and Prosecutions, Authorized representation and miscellaneous provisions.

Examination Scheme:

Components	A	P	HA	CT	EE
Weightage (%)	5	5	5	15	70

A-Attendance; P -Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination

Texts & References:

Texts:

- Income Tax Act, Taxmann, New Delhi
- Income Tax Rules, Taxmann, New Delhi

References:

- Direct taxes, V.K. Singhania, Taxmann, New Delhi
- Circulars and Notification issued by CBDT



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BUSINESS TAXATION

Course Code: COM2505

Credit Units: 04

Course Objectives:

Course Contents:

Module I-

C.S.T.: Constitutional History, Definitions, principle for determining different sales, Registration of Dealer, Rate of Tax.

C.S.T.: Determination of Taxable turn-over, Computation of Tax, Liability, Different forms used under C.S.T.

Module II-

Value Added Tax Act: Definitions, incidence and levy of tax, Computation Registration of Dealer, Exemptions Determination of taxable turn-over, computation of tax liability.

Module III-

C.S.T./V.A.T. : Tax authorities, filling of returns, assessments, payment and recovery of tax, appeal, revision and rectification.

Module IV-

Wealth Tax Act : Definitions, incidence of tax, deemed assets. exempted assets, computation of net wealth, Valuation of assets, assessment, appeals, penalties.

Module V-

Indian Tax System: Central and State Powers of taxation, Distribution of revenue between Centre and State. Finance Commission constitution, functions and recommendations.

Examination Scheme:

Components	A	P	HA	CT	EE
Weightage (%)	5	5	5	15	70

A-Attendance; P -Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination


Texts & References:

Texts:

- Indirect Taxes, V.K. Singhania, Taxmann , New Delhi
- Central Sales Tax Act 1956

References:

- Bare Act of Value Added tax
 - Central Sales tax Rules
 - An Introduction to Rajasthan and Central Sales Tax Act, B.L.Gupta
- Wealth Tax Rules, Taxmann, New Delhi


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SUMMER INTERNSHIP EVALUATION-II

Course code: LAW2535

Credit Units: 03

Objective:

The basic objective of a Summer Internship is to refine the practical exposure of the corporate functioning. This summer training will provide an opportunity to the students to apply their theoretical understanding while working on the concerned project in the industry. Thus this summer internship programme is an attempt to bridge the gap between theory and practice. This will also enhance the students' intellectual ability and attributes related to data handling, decision making, report writing, oral presentation and imbibing an interdisciplinary approach.

General Guidelines:

Every student of B.Com (Hons.) shall be required to undergo a practical training in an corporate organization approved by the Institute for eight weeks, normally in the Summer Vacation, after the end of the fourth semester examinations. The candidates shall be required to undergo training in the various areas of the organization concerned. The organization may assign a specific project to the candidate, which will be completed by him/her during the period of training. The work done by the candidate during the training period shall be submitted in form of a training report.

The last date for the receipt of training report in the department shall be one month after the date of completion of training, i.e. at the beginning of the fifth semester.

Chapter Scheme

Chapter I: Introduction 20 marks

Chapter II: Conceptual Framework/National/International Scenario 5 marks

Chapter III: Presentation, Analysis and Findings 35 marks

Chapter IV: Conclusion and Recommendations 15 marks

The report has to be type written in font Times New Roman, 12 points, 1.5 line spacing on both sides of the paper, Spiral Bound. The report should comprise of a maximum of 80 to 100 pages and has to be submitted in two copies.

Examination Scheme:

SIP Report	Power Point Presentation & Viva
75 marks	25 marks

Components of the Report

The outcome of Summer Internship is the Project Report. A project report should have the following Components:

1) **Cover Page:** This should contain the title of the project proposal, to whom it is submitted, for which degree, the name of the author, name of the supervisor, year of submission of the project work, name of the University.

2) **Acknowledgement:** Various organizations and individuals who might have provided assistance /co-operation during the process of carrying out the study.

3) **Table of Content:** Page-wise listing of the main contents in the report, i.e., different Chapters and its main Sections along with their page numbers.

4) **Body of the Report:** The body of the report should have these four logical divisions

a) **Introduction:** This will cover the background, rationale/ need / justification, brief review of literature, objectives, methodology (the area of the study, sample, type of study, tools for data collection, and method of analysis), Limitations of the Study, and Chapter Planning.

b) **Conceptual Framework / National and International Scenario:** (relating to the topic of the Project).

c) **Presentation of Data, Analysis and Findings:**(using the tools and techniques mentioned in the methodology).

d) **Conclusion and Recommendations:** In this section, the concluding observations based on the main findings and suggestions are to be provided.

5) **Bibliography or References:** This section will include the list of books and articles which have been used in the project work, and in writing a project report.

6) **Annexures:** Questionnaires (if any), relevant reports, etc.

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MANAGEMENT ACCOUNTING

Course Code: LAW2607

Credit Units: 03

Course Objective:

To provide the students knowledge about the use of costing data for planning, control and decision making.

Course Contents:

Module I: Management Accounting

Nature & Scope: Meaning and Definition - Objectives of Management Accounting - Management Accounting and Financial Accounting - Management Accounting and Cost Accounting - Utility of Management Accounting - Limitations of Management Accounting - Position of Management Accountant in the Organisation.

Module II: Analysis and Interpretation of Financial Statements - I

Concept of Financial Statements and their Nature - Limitations of Financial Statements - Analysis and Interpretation - Tools - comparative Financial Statements -common size Statements - Trend Percentages

Ratio Analysis - Nature and Interpretation - Utility and Limitations of Ratios - Short-term Financial Ratios - Long-term Financial Ratios - Profitability Ratios - Proprietary and Yield Ratios - Turnover Ratios - DUPONT Control Chart

Module III: Cash Flow Analysis

Distinction of cash from funds-utility of cash flow statement construction of cash flow statement

Module IV: Responsibility Accounting and Standard Costing

Concept of Responsibility Accounting - Cost Centers and Profit Centers - Contribution by Segments

Module V: Budgets and Budgetary Control

Concept of Budgets and Budgetary Control - Nature and Objectives of Budgetary Control - Advantages and Limitations of Budgetary Control - Establishing a system of Budgetary Control - Preparation of Sales Budget, Selling and Distribution Cost Budget, Production Budget, Purchase Budget, Cash Budget etc. - Flexible Budgets and Master Budgets

Examination Scheme:

Components	A	P	HA	CT	EE
Weightage (%)	5	5	5	15	70

A-Attendance; P -Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination

Text & References:

- Dr. S.N. Maheswari , Management Accounting
- Sexana, Management Accounting
- Made Gowda, Management Accounting
- Dr. S.N. Goyal and Manmohan, Management Accounting
- B.S. Raman, Management Accounting
- R.S.N. Pillai and Bagavathi, Management Accounting
- Sharma and Gupta, Management Accounting
- J. Batty, Management Accounting
- Foster, Financial Statement Analysis, Pearson.
- PN Reddy & Appanaiah, Essentials of Management Accounting


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COMPANY LAW

Course Code: LAW2603

Credit Units: 04

Course Objective:

The paper aims to make the student familiar and to provide insight into formation and winding up of companies beside corporate administrations.

Course Contents:

Module I: Company

Definition, Characteristics, Lifting of Corporate Veil; Types of Companies;
Formation of a Company: Promoters, Pre-incorporation Contracts, Provisional Contracts,

Module II: Memorandum of Association, Articles of Association and Prospectus

Memorandum of Association; Articles of Association; Prospectus: Issues, contents, Kinds, liability for misstatements, Shelf Prospectus, Statement in lieu of Prospectus.

Module III: Share Capital

Issue and allotment of shares, SEBI guidelines on allotment, Issue of shares at premium and at discount, Share Certificate, Demat system ; Forfeiture and surrender of Shares, Transfer & Transmission of shares; Provisions relating to payment of dividend, Investor's Education and Protection Fund.

Module IV: Corporate Administration

Directors: kinds, powers and duties; Insider trading; Meetings kinds and procedure; The balance of powers within companies: Majority control and minority protection, Prevention of oppression, and powers of court and Central Government,

Module V: Winding up of Companies


Kinds, consequences and reasons of winding up; Role of the court; Liability of past members; Payment of liabilities; Reconstruction and amalgamation.

Examination Scheme:

Components	P/S/V	CT	C	A	EE
Weightage (%)	10	10	5	5	70

Text & References:

- Avtar Singh : Indian Company Law
- Shah S. M : Lectures on Company Law
- Saharay H.K.: Company Law, 5th Edn.


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LAW OF TORTS (MOTOR VEHICLES ACT AND CONSUMER PROTECTION ACT, 2019)

Course Code: LAW2604

Credit Units: 04

Course Objective:

This course aims to introduce the student to the specialized discipline of tort law that is one of the most litigated areas of law in west. In India this realm is on the verge of a lot of litigational activity. The course covers Consumer Protection Act as well as Motor Vehicle Act which are carved out from the general principles of tort.

Course Contents:

MODULE 1: Introduction:

- Nature and Definition of Torts
- Tort distinguished from Contract and Quasi-Contract
- Crime:
 - Conditions of liability including *damnum sine injuria, injuria sine damnum*
 - Remoteness of damages
- Maxims: *Ubius ibi remedium, Res ipsa loquitur*, etc.
- Justification in Tort:
 - *Volenti non-fit Injuria*,
 - Necessity,
 - Plaintiff's default,
 - Act of God,
 - Inevitable accidents,
 - Private defences,
- Judicial and Quasi
 - Judicial Acts,
 - Parental and quasi-parental authority.

MODULE 2: Actions in Tort

- Assault
- Battery
- False Imprisonment
- Malicious Prosecution
- Defamation
 - Libel
 - Slander including defences in an action for defamation
- Vicarious Liability
- Liability of State
- Doctrine of Sovereign Immunity

MODULE 3: Negligence

- Negligence including contributory negligence and other defenses.
- Absolute liability/Strict liability, Rules in *Ryland v. Fletcher*.
- Principles for the application of the rule and defenses
- Enterprises engaged in hazardous activities – *M.C. Mehta v. Union of India*
- Nuisance Trespass

MODULE 4: Consumer Protection: Consumer Protection Act, 2019

- Brief overview of the Consumer Protection Act, 2019.
- Major Difference between Consumer Protection Act, 2019 and Consumer Protection Act, 1986.
- Consumer Protection Act, 2019:

- Consumer Protection Councils Chapter II: Ss. 3-9
- Central Consumer Protection Authority: Section 2(4) Chapter III: Ss. 10-27

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- Consumer Disputes Redressal Commission S. 2(15): District Commission S. 2(44): State Commission S. 2(29): National Commission Chapter IV- with special focus on Ss. 28,34, 35, 37,39, 41, 42, 47,51 53,54,58,59
- Product Liability
- Consumer Protection vis-a vis E-Commerce- Key Aspects

MODULE 5: Motor Vehicles:

- Motor Vehicles Claims and compensation:
 - Relevant provisions of the relating Motor Vehicles Act relating to the liability and assessment of compensation:
 - Liability without fault in certain cases : voidance of contracts restrictive of liability
 - Special provisions and scheme of compensation in case of hit and run motor accidents
- Offences, Penalties and Procedure
- Insurance of Motor Vehicles against Third Party Risks(Sec. 145 – 152)
- Claims Tribunals: Sec. 165-176
- Special provisions as to payment of compensation on structured formula basis: Claims on non-structured basis: Method of calculating compensation evolved by the courts(study with reference to relevant judgments)
- Defences: Changing parameters of negligence and burden of proof

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

Text Books

- Winfield and Jolowicz, Tort
- Law of Torts, Universal law Publishing Company, Dr. S.P. Singh
- The Law of Torts: Ratanlal & Dhirajlal,
- Winfield, Law of Torts,
- Dr. D.N. Saraf, Law of Consumer Protection in India,
- Dr. Avtar Singh, Law of Consumer Protection in India, Dr. Gurjeet Singh, The law of Consumer Protection in India.
- Motor Vehicle Laws, Universal Law Publishing Company.

Reference Books

- William Salmond, “Salmond on the Law of Torts”, Sweet & Maxwell, 16th Edition: 1973
- Heuston Salmond, “The Law of Torts”, Universal Law Publishing Co Ltd: 2004
- Edward White, “Tort Law in America: An Intellectual History”, Oxford University Press: 2003
- Frederick Pollock, “The Law of Torts: A Treatise on the Principles of Obligations Arising from Civil Wrongs in the Common Law: To which is Added the Draft of a Code of Civil Wrongs Prepared for the Government of India”, BiblioBazaar: 2008
- Jenny Steele, “Tort Law: Text, Cases & Materials”, Oxford University Press: 2007
- Vivienne Harpwood, “Modern Tort Law”, Rutledge: 2008
- Carl F. Cranor, “Toxic Torts: Science, Law and the Possibility of Justice”, Cambridge University Press: 2006
- N.R. Madhava Menon, “Documents and Court Opinions on Bhopal Gas Leak Disaster Case”, National Law School of Indian University: 1991
- Upendra Baxi, Thomas Paul, “Mass Disaster and Multinational Liability: the Bhopal Case”, N.M. Tripathi: 1986
- Upendra Baxi, Amita Dhanda and Indian Law Institute, “Valiant Victims and Lethal Litigation: the Bhopal Case”, N.M. Tripathi: 1990
- Jenny B. Wahl, “Economic Analysis of Tort and Products Liability Law: A Collection of Essays & Cases (Law and Economics)”, Routledge: 1998

LABOUR LAW-II

Course Code: LAW2605

Credit Units: 04

Course Objective:

The paper is to focus on wage policies, compensation for loss caused during the course of employment and working conditions of employees.

Course Contents:

Module I: Minimum Wages Act, 1948

Concept of Labour Welfare, Classification and Importance, Labour welfare activities, Concept of minimum wage, fair wage, living wage and need based minimum wage, Constitutional validity of the Minimum wages Act, 1948, Procedure for fixation and revision of minimum wages, Fixation of minimum rates of wage by time rate or by piece rate, Procedure for hearing and deciding claims.

Module II: Payment of Wages Act, 1936

Object, scope and application of the Act, Definition of wage, Responsibility for payment of wages, Fixation of wage period, Time of payment of wage, Deductions which may be made from wages, Maximum amount of deduction.

Module III: Workmen's Compensation Act, 1923

Definition of dependant, workman, partial disablement and total disablement, Employer's liability for compensation: Scope of arising out of and in the course of employment, Doctrine of notional extension, When employer is not liable, Employer's Liability when contract or is engaged, Amount of compensation, Distribution of Compensation, Procedure in proceedings before Commissioner, Appeals.

Module IV: Factories Act, 1948 & Social Security

Concept of "factory", "manufacturing process" "worker" and "occupier" : General duties of occupier, Measures to be taken in factories for health, safety and welfare of workers, Working hours of adults, Employment of young person and children, Annual leave with wages, Additional provisions regulating employment of women in factory, Social Security of Workmen ; Concept and scope of social security : Origin of Social Security in India, Claim and Adjudication of Disputes under Employee's State Insurance Act. 1948.

Examination Scheme:

Components	P/S/V	CT	C	A	EE
Weightage (%)	10	10	5	5	70

Text & References:

- S.C. Srivastava, Commentaries on factories Act, 1948, Universal Law Publishing House, Delhi
- H.L. Kumar, Workmen's Compensation Act, 1923.


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CYBER LAWS

Course Code: LAW2606

Credit Units: 04

Course Objective:

With the advent of information technology law and Right to Information Law, new strides and strategies in legal justice education have come up. There is a need that Law students must also be acquainted with these new developments if a law student has to find a comfortable berth in the competitive legal market as a Law Professional as well as legal manager. Therefore, there seems to be an impending need to generate e-Legal Justice Education that exposes the students to have deep insights into the complexities of information technology and right to information. Objectives of this course, therefore, are understanding the legal recognition and procedure, Digital signatures, legal recognition of cyber authorities and Cyber appellate tribunal, legal implications of new varieties of offences and penalties under the Information Technology Act, 2000. A student of law should also be given the understanding of copy right issues, TRIPS agreements, application of patents to computer technology, etc. Besides, the course also aims at developing insights into the Right to Information Act, 2005 and its grey areas.

Course Contents:

Module I: Introduction (Need, Role and various aspect related to Cyber Law)

Need and role of Cyber; Jurisprudence of Cyber Law in India; Free speech and expression on Internet & Privacy; issues, Right to data protection, Cyber Law & Protection of Domain name.

Module II: Cyber Jurisdiction, Investigation & Cyber Forensics

Cybercrimes: Extradition and Jurisdictional issues; Investigation of Cyber Offences: Cyber equipment's & Cyber Cell; Cyber Forensics: provisions, need and role in cyber investigation.

Module III: Electronic Governance, Cyber space & IPR issues

Legal aspect of Electronic Governance; IPR Issues: An Overview, Patent, Copyright and Trademark & other related Issues in Cyberspace.

Module IV: Cyber Legislations (Laws, National and International treaties & Conventions)

Cyber Legislation: An Indian and International Regime; The Information Technology 2000, The Provisions relating to- Legal recognition of – Digital & Electronic Signature, Secure E- records and Signature, E-signature Certificates, Certifying Authorities, Cyber, Appellate Tribunal and Miscellaneous Provisions.

Module V: Cyber Crimes (Civil & Criminal)


Cyber Crimes and Cyber Victimization; Cyber Offences: Types & the provisions for Penalties mentioned in IT Act, 2000; Cyber Pornography, Cyber Terrorism, Cyber Tort and Cyber defamation etc.

Examination Scheme:

Components	P/S/V	CT	C	A	EE
Weightage (%)	10	10	5	5	70

Text & References:

- Nandan Kamath, Universal Law Publishing Company and E –commerce: Law relating to computers Internet.
- K.K. Kumar, Dominant Publication: Cyber Law
- B.L. Wadhera : Patent, trademarks, Copyrights
- Ganguly (LMH): Intellectual Property Rights.


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ADVANCED COST ACCOUNTING

Course Code: COM2603

Credit Units: 04

Course Objectives:

Course Contents:

Module I: Cost Book-Keeping

Non-integrated Accounting system, Accounting Ledgers And Control Accounts, Integrated Accounting, Reconciliation of Cost & Financial Accounts.

Module II: Process Costing

Basic Concept, Joint products and By-products, work-in-progress, (Equivalent production), inter-Process profits, Uniform Costing and inter firm comparisons.

Module III: Activity Based Costing

Problems of Traditional Costing, Cost analysis under ABC, Institution of ABC, Benefits and Weaknesses, Life Cycle Costing; Target Costing.

Module IV: Cost Management System

Total Quality Management, Benchmark, Back-flush Costing, Reengineering, Cost Reduction and value Analysis: Concept and Techniques.

Module V:

Service Costing, Marginal Costing, Standard Costing, Decision Making, Make or buy, Add or Drop, Operate/Shutdown, Sell/Process.

Examination Scheme:

Components	A	P	HA	CTT	EE
Weightage (%)	5	5	5	15	70

A-Attendance; P -Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination


Text & References:

Text:

- Principles and Practice of Cost Accounting, N. K. Prasad
- Cost Accounting, C.D. Vashisht & V. K. Saxena, Sultan Chand & Sons, New Delhi.

References:

- Principles & Practice of Cost Accounting, Asish K Bhattacharyya, Wheller Publishing, N. Delhi
- Management Accounting, J. Batty
- Advanced Cost Accounting & Cost System, M. Kishore Ravi
- Accounting For Management, Guru Prasad Murthy
- Decisional Phenomena And Management Accountants, Backer and Jacobson


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INDIRECT TAXES INCLUDING GST

Course Code: COM2604

Credit Units: 04

Course Objectives: To provide students with adequate theoretical and working knowledge about GST and its practical application in unification of indirect tax system in India. The course intends to make students aware of the latest developments and changes being incorporated in GST at the systemic level and its implications in the process of economic and financial integration.

Course Contents:

Module I-

Origin of GST – Evolution of GST concept, How GST came into existence, GST Laws, Constitutional Perspectives – Cooperative Federalism in economic system, Application of GST in tax sharing – CGST/SGST/IGST, Classification of goods and services in GST assessment, Exemption from Tax, Composition levy.

Module II-

Basic Framework of GST – Unification of indirect tax system, GST Council – composition, objectives, functions and significance, Tax sharing and disbursement mechanism between the Centre and states, Responsibilities of various stakeholders – government, firms, traders, consumers, Registration, Tax invoice, Returns.

Module III-

Administration of GST – GST Network, Registration, Tax Invoice, Credit & Debit Notes, Electronic way bill for interstate movement of goods, Computation of GST Liability, Input Tax Credit, Concept of times value of supply, Filing of Returns, Payment of Tax, Search, Seizure & arrest, Demand & Recovery, Offences & Penalties.

Module IV-

Safeguard Measures – Anti-profiteering clause, Reverse charge mechanism, Assessment & Audit, Inspection – Concept of HSN and SAC, Advance Ruling, Appeals & Revision, Implications on Tax terrorism, corruption, tax evasion and black money

Module V-

Comparative analysis between GST in India and other countries such as Canada, France, Australia and China, Advantages and Disadvantages.

Examination Scheme:

Components	A	P	HA	CT	EE
Weightage (%)	5	5	5	15	70

A-Attendance; P -Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination

Text & References:

Text:

- GST Council, Government of India, Publications.
- Singh, Awdhesh (2018), *GST Made Simple: A Complete Guide to Goods and Services Tax in India*, Centax Publications.

References:

- Bhattacharjee Govind and Debasis Bhattacharya (2018), *GST and Its Aftermath – Is Consumer Really the King?* SAGE Publications.
- Garg, Rakesh (2016), *Handbook of GST in India: Concepts and Procedures*, Bloomsbury.


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PUBLIC FINANCE AND TAX PRACTICES

Course Code: COM2605

Credit Units: 04

Course Objective:

Course Contents:

Module I:

Origin and Development of Public Finance

Meaning, public finance and federal finance, public finance and private finance, principle

Principles of Taxation and Government Expenditure

Benefit approach, allocation of public goods, ability to pay approach, excess burden of taxes

Module II:

Raising of Public Funds

Sources and classification of public revenues, incidences and shifting of taxes

Distribution of Public Funds

Effect on production, employment, distribution and stability, public debt and fiscal deficit

Module III:

Public Debt Management and Taxation

Development of Federal Finance in India

The constitutional arrangements, Finance Commissions

Module IV: Central and State Finances

Sources and uses of funds, effects of Fiscal Policy, relation between planning and central budgeting

State Finances- Sources and uses of funds, issues of federalism

Module V: Financing of Five-year Plans

Changing scenario of Indian tax Structure, new economic policy since 1991

Indian Fiscal Policy and Deficit Financing

Examination Scheme:

Components	A	P	HA	CT	EE
Weightage (%)	5	15	5	5	70

A-Attendance; P-Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination

Texts & References:

Texts:

- R. Mursgrave, The Theory of Public Finance, McGraw Hill
- R. Mursgrave and P.B. Mursgrave, Public Finance in Theory and Practice, McGraw Hill
- J. M. Buchanan, Public Finance

References:

- Due and Friedlandar, Public Finance
- S. Ganguli, Public Finance, World Press
- B. M. Bhargava, Public Finance
- B. M. Bhargava, The Theory and Working of Union Public of India
- Vaish and Agarwal, Public Finance, Wiley Eastern


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ENVIRONMENTAL LAW

Course Code: LAW2702

Credit Units: 05

Course Objective:

This paper provides the study of environmental laws covering legislations related to it and protection of forest and wild life.

Course Contents:

Module I: Environmental Law: International and National Perspective

Introduction: Environment and Environment Pollution: Problem and prospects; constitutional Perspective :Right to Evolution and Application, Co relation between: Directive Principles of State Policies and Fundamental Degrees, Fundamental Rights and Directive Principles of State Policy; International Norms :Sustainable Development :Precautionary Principle, Polluter Pays Principle, Agenda 21, Inter generational equity, Public Trust Doctrine, Principle of no fault liability : Absolute Liability; Environment Protection through Public Interest Litigation, Remedies under various other laws.

Module II: Prevention and Control of Water and Air Pollution

The Water (Prevention and Control of Pollution) Act, 1974:Water Pollution : Definition, Central and State Pollution Control Boards: Constitution, Powers and Functions, Water Pollution Control Areas, Sample of effluents : Procedure; Restraint order, Consent requirement : Procedure, Grant/Refusal, Withdrawal, Citizen Suit Provision; Air (Prevention and Control of Pollution) Act, 1981: Air Pollution: Definition, Central and State Pollution Control Boards: Constitution, Powers and functions, Air Pollution Control Areas; Consent Requirement : Procedure, Grant/Refusal, Withdrawal, Sample of effluents – Procedure; Restraint order.

Module III: Protection of Forests and Wild Life

Indian Forest Act, 1927: Kinds of forest: Private, Reserved, Protected and Village Forests, The Forest (Conservation) Act, 1980; The Wild Life (Protection) Act, 1972: Authorities to be appointed and constituted under the Act, Hunting of Wild Animals, Protection of Specified Plants, Protected Area, Trade or Commerce in wild animals, animal articles and trophies; Its prohibition.

Module IV: Special Environmental Legislations

Environmental (Protection) Act, 1986, Public Liability Insurance Act, 1991, The National Environment Tribunal Act, 1995, The National Appellate Environmental Authority Act, 1997.

Examination Scheme:

Components	P/S/V	CT	C	A	EE
Weightage (%)	10	10	5	5	70

Text & References:

- Environmental Law & Policy in India – Shyam Diwan, Armin Rosencranz
- Environmental Law in India – P. Leelakrishnan
- PIL and Environmental Protection-Geetanjali Chandra
- The Water (Prevention and Control of Pollution) Act, 1974
- The Air (Prevention and Control of Pollution) Act, 1981
- The Indian Forest Act, 1927
- The Forest (Conservation) Act, 1980
- The Wild Life Protection Act, 1972
- The Environment (Protection) Act, 1986
- The Public Liability Insurance Act, 1991
- The National Environment Tribunal Act, 1995
- The National Environment Appellate Authority Act, 1997

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JURISPRUDENCE

Course Code: LAW2703

Credit Units: 05

Course Objective:

The objective of the course is to create an understanding of basic legal concepts and provide an insight to the student into philosophical, ideological and theoretical foundations of the discipline of law with special reference to Indian legal system.

Course Contents:

Module I: Introduction

Nature and scope of Jurisprudence, State, Sovereignty and Law: Sources of Law: Custom, Precedent, Legislation, Equity.

Module II: Schools of Jurisprudence – I

Natural Law, Analytical positivism, Pure Theory, Historical Jurisprudence, Sociological Jurisprudence, Economic Approach, Legal Realism, Theories of justice: Aristotle, Rawls, Distributive Justice in India.

Module III: Concepts of Rights and Duties

Rights and Duties, Types, Theories, Critique of Rights and Duties, Contemporary issues in Rights.

Module IV: Concepts of Ownership and Possession:

Evolution of concept of possession, ownership, Essentials of ownership, Corpus and Animus, Res Nulius and Res Possessionis

Module V: Indian Perspectives in Jurisprudence

Classical and Medieval Influences, Modern Trends study with reference to judicial pronouncements with state policy.

Examination Scheme:

Components	P/S/V	CT	C	A	EE
Weightage (%)	10	10	5	5	70

Text & References:

- Bodenheimer, Jurisprudence – The Philosophy and Method of Law (1996), Universal, Delhi.
- Fitzgerald, (ed.) Salmond on Jurisprudence (1999) Tripathi, Bombay
- W. Friedmann, Legal Theory (1999) Universal, Delhi
- V.D. Mahajan, Jurisprudence and Legal theory (1996 re-print), Eastern, Lucknow
- M.D.A. Freeman (ed.) Lloyd's Introduction to Jurisprudence, (1994), Sweet & Maxwell
- Paton G.W. Jurisprudence (1972) Oxford, ELBS
- H.L.A. Hart, The Concepts of Law (1970) Oxford, ELBS
- Roscoe Pond, Introduction to the Philosophy of Law (1998 Re-print) Universal, Delhi
- Dias, Jurisprudence (1994 First Indian re-print), Adithya Books, New Delhi
- Dhyani S.N., Jurisprudence: Jurisprudence and Indian Legal theory
- Dhyani S. N., Fundamentals of Jurisprudence
- Jayakumar N. K., Lectures in Jurisprudence, Butterworths
- Justice Markandey Katju, Law in the Scientific Era, Universal
- Justice J. S. Verma, Dimensions of Justice, Universal
- Justice Rama Jois, Seeds of Modern Public Law in Ancient Indian Jurisprudence
- Justice Rama Jois, Eternal Values in Ancient Law.


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PUBLIC INTERNATIONAL LAW

Course Code: LAW2704

Credit Units: 05

Course Objective:

The objective of this paper is to provide knowledge to the students regarding the Public International Law to enable them to deal with the transnational legal order.

Course Contents:

Module I: Introduction

Definition and Basis of International Law, Subjects of International Law, Relationship between International Law and Municipal Law.

Module II: Sources of International Law

Custom, Treaties, General Principles of law, Juristic Works, General Assembly Resolutions, Other sources (Conventions).

Module III: State Recognition, State Jurisdiction and Law of the Sea

State Recognition: Recognition of states, Recognition of governments, *De facto* and *De jure* Recognition, Types of Recognition: Implied Recognition, Conditional Recognition, Collective Recognition; Withdrawal of Recognition, The legal effects of recognition; **State Jurisdiction:** Basics of Jurisdiction, Principles of Jurisdiction, Exemption from Jurisdiction: Diplomatic Immunities and Privileges, Armed Forces, Public Ships; **Law of the Sea:** First and Second Law of the Sea Conventions: Third Law of the Sea Convention {UNCLOS III (United Nations Convention on the Law of The Sea), Maritime Zones; Territorial Waters, Contiguous Zone, Exclusive Economic Zone, Continental Shelf High Seas; Sea Bed Authority, Deep Sea Bed Mining and International Sea – Bed Area.

Module IV: Conflict Resolution, War and Neutrality of States


Modes of Settlement of Disputes: Peaceful means, Coercive means; War: Laws of War, Humanitarian Laws: Rules of neutrality.

Examination Scheme:

Components	P/S/V	CT	C	A	EE
Weightage (%)	10	10	5	5	70

Text & References:

- Oppenheim, International Law, Vol. – 1.
- J.G. Strake, Introduction to International Law.
- Grieg, International Law.
- R.C. and Hingorani, Modern International Law.
- H.O. Aggarwal, International Law.
- S.K. Kapoor, International Law.
- Bowell, The Law of International Institutions.
- Verma, S.K., An Introduction of Public International Law.


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FORENSIC SCIENCE-I

Course Code: LAW2707

Credit Units: 05

Course Objective:

Forensic Science is science related to the law. It is the scientific method of gathering and examining information about the past which is then used in a court of law. It is applied science and consists of a range of different disciplines which often require different underpinning science knowledge. It continues to evolve and is now applicable to crime disruption and crime prevention as well as crime detection and the identification of victims in mass disasters.

The course focuses on the following objectives:

1. Developing an understanding and appreciation for the Forensic Sciences.
2. Brief description of crime scene investigation alongwith its various techniques and significance of physical evidences.
3. Develop an understanding on different types of questioned documents, the types of forgeries and disguise generally encountered.
4. Developing an understanding of handwriting and typewriting alongwith its analysis.

Course Contents:

Module I: Introduction to Forensic Sciences

Brief description of Forensic Sciences, historical development of forensic sciences in India and forensic lab, laws and principles of forensic science, mobile forensic units their distribution in India.

Module II: Crime Scene Investigation

Definition, types- mobile, indoor and outdoor crime scene, various searching techniques used for locating physical evidence at crime scene, recording the scene, reconstruction of crime scene- modus operandi, role of investigating officer.

Module III: Physical Evidences in Forensic Science

Definition, collecting, packaging, preservation and forwarding of evidences, fingerprint its characteristics, classification, developmental techniques- chemical developmental techniques.

Module IV: Introduction to Questioned Documents

Questioned documents, types, disputed documents, security documents, bank notes, tampered documents, age of the documents and ink analysis, examinations of the fake currencies, instrumentations.

Module V: Handwriting and Typewriting Analysis

Handwriting identification forged and disguises handwriting, typewriting identification, general equipments for examinations

Module VI: Tool marks and other impressions

Definitions, types and decipherment of tool marks and techniques; examination of tool marks; introduction to tyre marks: its nature and types, skid marks tread marks; footprints and shoeprints types significance and examinations.

Examination Scheme:

Components	P/S/V	CT	A	C	EE
Weightage (%)	10	10	5	5	70

Text & References:

- Sharma. B.R., Forensic Science in Criminal Investigations and trials (3rd Edn) Universal Law Publishing Co. Ltd
- Nath.S, Fingerprint Identification CRC Press 2nd Edn, 2002
- Fisher, B, Techniques of Crime Scene Investigation 6th Edn CRC Press,
- Albert, S. Osborn, Questioned Documents, 2nd Edn, Universal Law Publishing Delhi, 1998

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OFFENCES AGAINST CHILD AND JUVENILE OFFENCE HUMAN RIGHT LAW

Course Code: LAW2708

Credit Units: 05

Course Objective: To impart knowledge and expertise in legal and social issues relating to juvenile justice system in India, and sensitize about juvenile crimes and justice delivery system.

Course Contents:

Module I: Definition and concepts of term child and Juvenile. Causes of offence against child, International protection to child and convention, Offences against Child, Child abuse, Child labour and forced labour, Kidnapping, abduction, Abetment of suicide of child, Sale of obscene objects to young.

Module II: Concepts of: juvenile in conflict with laws, neglected juvenile, Determining factors of juvenile in conflict with laws: differential association, anomie, economic pressure, peer group influence, gang sub-culture, and class differentials.

Module III: Legislative Approaches, Constitutional provisions, Relevant provisions of the Juvenile Justice (Care and Protection of Children) Act, 2000, Relevant provisions of Protection of Children from Sexual Offences Act, 2012.

Module IV: Child and Criminal Liability, Crimes committed by child, Crimes committed by others in relation to children, Implementation of social policy through criminal sanctions in relation to child, Variation of procedure in case of child offender, Judicial proceedings in criminal cases relating to children, Protection of Children from Sexual Offences.


Module V: Judicial Contribution and Preventive Strategies, Social action litigation concerning juvenile justice, recent judicial decisions, Role of legal profession in juvenile justice system, State welfare programs: health, nutrition, ICWS, grant-in-aid, and compulsory education, Role of community, family, voluntary bodies, and individuals.

Examination Scheme:

Components	P/S/V	CT	C	A	EE
Weightage (%)	10	10	5	5	70

Text & References:

- Bhattacharya, S.K.; Juvenile Justice: An Indian Scenario; Regency Publications
- Kumar, K. and Rani, Punam; Offences Against Children: Socio Legal Perspective; Regency Publications
- Josine Junger-Tas and Decker, Scott H.; International Handbook of Juvenile Justice; Springer
- Dunkel, Frieder; Juvenile Justice Systems in Europe: Current Situation and Reform Developments; Forum Verlag Godesberg


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LAW AND MEDICINE-I

Course Code: LAW2709

Credit Units: 05

Course Objective:

The course aims to provide the students the knowledge about the interrelationship between law and medicine and complex legal and ethical issues involved in the field of medicine and medical profession. The course include the doctor-patient relationship and its legal dimensions, medical negligence, socio-legal issues involved in the new technologies in medical science and biotechnology as well. As medico-legal issues became a consumer issue as well as a fundamental rights violation the course will help the students to have knowledge in laws related to medicine and analyse the issues in a better way.

Course Contents:

Module I: Introduction

Inter-relationship between law and medicine-issues involved and legal control- Doctor-Patient relationship- Constitutional perspective and penal provisions- Indian penal Code- Directive principles- Right to life- Right to health and emergency medical care.

Module II: Regulation of medical and Paramedical profession

Medical profession in India- Para medical profession- Regulatory authorities- Self regulation- medical Ethics- WHO declarations- Declaration of Geneva- Helsinki declaration- Regulatory authorities created by statutes- Regulations under medical Degrees Act, 1916- Pharmacy Act, 1948- Indian medical Councils Act- education regulations- Medical Council of India- Disciplinary Control- Hospital and research centers- Responsibility to patients- Duty to take care- Medical examination- Informed consent- Confidentiality- Access to medical records.

Module III: Liability of Professional Negligence

Medical negligence- Negligence in diagnosis, treatment- Duty to warn- Civil negligence and criminal negligence- Vicarious liability- negligence of students and nurses- Liability of Doctors and Hospitals under the Consumer protection Act, 1986.

Module IV: regulation of Manufacture, Storage and sale of Medicines

Drugs and Cosmetic Act, 1940-Production, storage and sale of drugs- Advertisement drugs and Magic remedies Act, 1954- penalties.-Access to medicine and Public health.

Module V: Medical Science and Technologies

Boitechnology-Bioethics-Genetic Engineering- Cloning-Human genome project- Biomedicine Convention- In vitro fertilization(IVF)- Selective reproduction- Surrogacy- Euthanasia- abortion- Medical termination of pregnancy Act- Indian penal Code-Stem cell therapy and research- Transplantation of Human organs- Organ Transplantation Act, 1994- Human Subjects Research- Helsinki declaration- Schedule Y, Drugs and Cosmetic Act 1940- ICMR Code- AMA code of Ethics- WHO Good Clinical Practices.

Examination Scheme:

Components	P/S/V	CT	C	A	EE
Weightage (%)	10	10	5	5	70

Text & References:

- Vijay Malik – Drug and Cosmetic Act, 1940, Eastern Book Company, 24th Edition, 2014
- Anoop K. Kaushal – Medical Negligence & Legal Remedies, Universal Publishing House, 2nd Edition, 2004
- Dr. Jagdish Singh – Medical negligence Compensation, Bharat Law House, 3rd Edition, 2007

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- P K. Dutta – Drug Control, Eastern Law House, 3rd Edition, 1997.
- Annas, George J. *American Bioethics: Crossing Human Rights and Health Law Boundaries*. New York: Oxford University Press, 2005.
- Annas, George J. Michael A. Gordin. *The Nazi Doctors and the Nuremberg Code: Human Rights in Human Experimentation*. New York: Oxford University Press, 1995.
- Dworkin, Ronald. *Life's Dominion: An Argument about Abortion, Euthanasia, and Individual Freedom*. New York: Alfred A. Knopf, 1993.
- Dr. Lily Srivastava, Law & Medicine (Universal Law Publishing, 2006)
- W. Noel Keyes, Bioethical and Evolutionary Approaches to Medicine and the Law (American Bar Association, 2007)
- Cynthia Ho, Access to Medicine in the Global Economy: International Agreements on Patents and Related Rights (Oxford University Press, 21-Apr-2011)



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TAXATION LAW

Course Code: LAW2802

Credit Units: 05

Course Objective:

Power to tax has been described as the power to destroy. This idea is being floated often whenever the State introduces a new tax. Is this true? Is it not necessary that in order to raise revenue and place the economy on solid foundation, the taxing power should be conferred on the State? The power to tax shall not go unregulated. In this context of a federal structure the distribution of the taxing powers assumes added significance. Obviously, a study of the Constitutional framework on taxation becomes important. Along with this, an analysis of the different laws enacted in exercise of these powers with their safeguards and remedies sheds light on the mechanics of the taxation by the Union and the States.

Course Contents:

Module I: General Principles of Taxation Laws

History and Development of Tax Laws in India, Fundamental Principles relating to Tax Laws, Taxing power and constitutional limitations, Distinction between: Tax, Fee and Cess; Tax avoidance and Tax evasion .

Module II: Basic concepts of Income Tax

Income, Previous Year, assessment Year, Person, Assessee and Total Income, Income not included in the Total Income. Residential status, Clubbing of Income, Tax planning, Rate of Income Tax, Heads of Income, Salaries, Income from House Property, Income from Business or Profession, Capital Gains, Income from Other sources, Deductions under the Income Tax Act, 1961, Income Tax Authorities: Power and Functions, Filing of returns and procedure for assessment, Offences and Penal Sanctions .

Module III: Value Added Tax

Meaning and importance of VAT, Difference between VAT and Sales Tax, West Bengal Value Added Tax Act, 2003, Criticisms and limitations of Vat system.

Module IV: Service Tax

Taxable Service, Meaning and importance of Service Tax, Valuation of Taxable Service, Offences and Penalties.

Examination Scheme:

Components	P/S/V	CT	C	A	EE
Weightage (%)	10	10	5	5	70

Text & References:

- Iyengar, Sampath (1998), Law of Income Tax New Delhi, Bharath Law House.
- Jain, Narayan (2004) How to Handle Income Tax Problems, Book Corporation.
- Palkivala, N.A. (1999), The Law & Practice of Income Tax, Nagpur: Wadha Publication.
- Parameswaran, K. (1987), Power of Taxation under the Constitution, Eastern Book Company.
- Sharma, Remesh (1998), Supreme Court on Direct Taxes, New Delhi: Bharath Law House.
- Singh S.D. (1973), Principles of Law of Sales Tax, Eastern Book Company.
- V. Ramachandran & T.A. Ramakrishnan (eds.) (2000), A.N. Aiyar's Indian Tax Laws, Chennai: Company Law Institute of India Pvt. Ltd.


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LAND LAWS

Course Code: LAW2805

Credit Units: 05

Course Objective:

The legislative power to make laws relating to land and land ceiling is in the state list. Different States have enacted their own laws on this subject. The Constitutional perspectives relating to this subject have to be taught as an essential part of this course. The provisions in the Constitution in Part III, IV and XII as well as those in Schedule VII relating to distribution of legislative powers over land are essentially to be taught with emphasis.

Course Contents:

Module I: Punjab Land Revenue Act 1887 (Applicable over Punjab and Haryana), Definition of Key Words, Revenue Officers: Their Power and Functions, Preparation of Revenue Record: Like Documents of Jamabandi, Girdawari, Mutation, Intkaal, Sirja Nasab (Pedigree Table) Sirja Aze (Map of the Village), Assessment of Land Revenue, Collection of Land Revenue, Concepts & Procedure of Partitions.

Module II: Punjab Land Revenue Act, 1887:

Records-Of-Rights and Annual Records, Collection Of Land Revenue, Recovery of other Demands by Revenue-officers, Partition, **Assessment** and other relevant provisions.

Module III: Haryana Rent Control Act, 1973

Definitions (Sec. 1-4), Rights & Duties of Tenants, Rights and Duties of Landlords, Grounds of Ejectment of Tenants.

Haryana Panchayati Raj Act, 1994 (Sec. 1 to 54) (Chapter 1 to 6) Definition of Key Words, Constitution of Gram Sabha and Gram Panchayat, Gram Panchayat's Duties, Functions and Powers, Finance and Taxation, Control of Gram Panchayat, Sources of Income and Expenditure of Gram Panchayat.

Module IV: Haryana Panchayati Raj Act 1994,

Panchayati Samiti (Chapter 7 To 11) And Sec. 55 To 116) Definition of Key Words, Conduct of Business of Panchayat Samities, Servant of Panchayat Samities, Duties and Powers of Panchayat Samiti, Finance and Taxation, Sources of Income of Panchayat Samiti, Control of Panchayat Samiti

Module V: Delhi Land Laws

Real Estate Development and Apartment ownership

Delhi Apartment Ownership Act, 2009,

Examination Scheme:

Components	P/S/V	CT	A	C	EE
Weightage (%)	10	10	05	5	70

Text & References:

- Law, poverty and development, Prof. M.L. Upadhyay.
- Upendra Baxi, Towards a Sociology of Indian Law, pp. 25-65 (1986)
- Atul Kohli, The state and Poverty in India (1987)
- Francine R. Frankel, India's Political Economy, 1947-77 (1988)
- L.H. Rudolph and S.H. Rudolph, The Political Economy of Lakshmi (1987)
- Mohammad Ghouse, "Nehru and Agrarian reform" in Rajeev Dhavan and Thomas Paul (eds.)
- Nehru and the Constitution (1992), Thripathi
- Walter C. Neale, Developing Rural India Policies and Progress (1990) Allied
- Alice, Jacob, Land Reform and Rural Change 6-19 (1992), Land Reforms in India: a Review.
- IASSI quarterly 1992, Vol. X, Numbers 3 and 4.
- B.R. Beotra, Law of Forests (Central and State) 6th Edition 1999, The Law Book Company
- A. Krishnan, Forest Laws in India, 1998, Asia Law House
- Srivastava, Encyclopedia on forest, 1998, Asia Law House
- Padala Rami Reddy, Forest Laws, 1989, Asia Law House
- Baden Powell, Manual of Jurisprudence for Forests Officers (1982)

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WOMEN AND CRIMINAL LAW

Course Code: LAW2806

Credit Units: 05

Objectives: Women had suffered in the society since centuries and even after 50 years of Adoption of the Constitution, for women, equality appears to be a distant mirage to be reached. Effective political representation of women in Legislature and other forums too has become a difficult proposition to be acceptable. Breach of her personality, through various forms of violence, too has not subsided. The course intends to educate about the legal provisions enacted to ameliorate these situations with special emphasis on Indian Municipal Law, its scope and to evaluate the existing provisions.

Module-I

Women in Pre-Constitution Period: Social and Legal Inequality; Social Reform Movement in India; Legislative response in India. Women & children in Post-Constitution Period, Provisions of Constitution of India Preamble, Art.14, 15, 23, and Part IV Legal Measures in relating to Child Labour Women and Political Representation

Module-II

Different Personal Laws- Unequal Position of Indian Women-Uniform Civil Code; Sex Inequality in Inheritance Rights: Right of Inheritance by birth for Sons and not for Daughters; Inheritance under Christian Law; Inheritance under Muslim Law; Matrimonial Property Law; Right of Women to be Guardian of her minor sons and daughters.

Module-III

Law of Divorce - Christian Law-Discriminatory Provision; Muslim Law- Inheritance divorce. Women and Social Legislation: Dowry Prohibition Law; Sex Determination Test, Law relating to Prevention of Immoral Trafficking in Women Act.

Module-IV

Women and Criminal Law: Adultery; Rape; Outraging the Modesty of Women; Kidnapping; Sati Prohibition Law; Law relating to Domestic Violence; Law relating Eve Teasing; Indecent Representation of Women Act.

Module-V

Women and Employment: Factories Act- Provisions relating to women; Maternity Benefit Act; Equal Remuneration Act; Law Relating to Sexual Harassment at Working Place; N.C.W-Aims, Functions and Performance.

Examination Scheme:

Components	P/S/V	CT	C	A	EE
Weightage (%)	10	10	5	5	70

PRESCRIBED BOOKS:

- Indu Prakash Singh- Women, Law and Social Change in India.
- Paras Dewan- Dowry and Protection to Married Women.
- S.P.Sathe- Towards Gender Justice.
- Dwarka Nath Mitter- Position of Women in Hindu Law
- Shaukat Nasir- Muslim Women and their Rights.

REFERENCE MATERIAL:

- Relevant Provisions of Constitution of India.
- Relevant Provisions of Indian Penal Code.
- S.125, Criminal Procedure Code.
- National Commission on Women Act, 1990.
- Matrimonial Property- Private Members Bill Introduced in Parliament Towards Equality- Report of Committee on the Status of Women (Govt. of India) Chapter IV and Section IV General Conclusions and Recommendations

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PROBATION AND PAROLE

Course Code: LAW2807

Credit Units: 05

Course Objective:

This course will introduce the student to the emerging discipline of community corrections. This alternative has become an integral resource to the criminal justice system.

Course Contents:

Module I: Theories of Punishment: (i) Deterrent Theory (ii) Retributive Theory (iii) Preventive Theory (iv) Reformatory Theory Efficacy of Punishment: Early stages-Medieval Period, Modern or New Penology, Essentials of an ideal system of Penal Policy.

Module II: Concept of Correction Genesis and evolutions, objectives and theories of correction - various types of correctional methods.

Institutional Correction Origin and development of Indian Prison System, daily routine - prison as an institution, scientific classification of prisons and prisoners.

Module III: Treatment of correction of offenders. The need for reformation and rehabilitation of offenders, Undergoing punishment/imprisonment, Classification of offenders through modern diagnostic techniques, The role of psychiatrists and Social workers in the prison., Vocational and religious education and apprenticeship programmes for the offenders, Group counseling & Resocialization programmes, Participation of inmates in community service.

Module IV: Non-Institutional Methods Open air jails, Admonition, fine, probation and parole. Half way houses - organization and significance.

Recent trends in corrections Role of voluntary agencies in prevention of crime and treatment of offenders - Discharged prisoners' aid society. After care and rehabilitation, Need, importance and services in India - Pre-release and premature release., Attitude of the community towards released offender, Prisoner Aid Society and other Voluntary Organization governmental Action.

Module V: The place of probation in penal policy – public participation in probation, Legislations on Parole and probation in India, Probation of Offenders Act, 1958, Section 360 of the Criminal Procedure Code, 1973

Examination Scheme:

Components	P/S/V	CT	C	A	EE
Weightage (%)	10	10	5	5	70

Text & References:

- Martin Wasik, Emmins On Sentencing (1998) 2.
- Hall J., Law, Social Science and Criminal Theory
- J.M.Sethna, Society and the Criminal, 1980
- Siddique, Criminology-Problems and Perspectives, 1997
- Sutherland, E H, Cressey, D R, Criminology A. Siddique, Criminology (1984) Eastern, Lucknow.
- Law Commission of India, Forty-Second Report Ch. 3 (1971)
- K.S. Shukla, "Sociology of Deviant Behaviour" in 3 ICSSR Surveys of Sociology and Social Anthropology 1969-179 (1986)
- Tapas Kumar Banerjee, Background to Indian Criminal Law (1990)
- Bhattacharya S.K. (1986) Probation system in India,
- Mans Publications, New Delhi. 2. Bhattacharya,
- S.K. (1985) Social defence: An Indian perspective, Manas publications.


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FORENSIC SCIENCE-II

Course Code: LAW2808

Credit Units: 05

Course Objective:

Forensic science is science related to the law. It is the scientific method of gathering and examining information about the past which is then used in a court of law. It is applied science and consists of a range of different disciplines which often require different underpinning science knowledge. It continues to evolve and is now applicable to crime disruption and crime prevention as well as crime detection and the identification of victims in mass disasters.

The course focuses on the following objectives:

1. Developing and understanding the concept of forensic anthropology
2. Brief description on the ballistic its analysis and reconstruction
3. Developing an understanding to wounds and its medico-legal aspect.
4. Developing an understanding on explosives and its crime scene investigations.

Course Contents:

Module I: Forensic Anthropology

Definition, scope, and application; time since death: assessing and determining the time and cause of death, study of burned bones and bones fragments; identification.

Module II: Ballistics

Definition, Indian Arms Act, forensic importance, classification of firearms; ammunition; range of fire; firearms injuries, analysis and reconstruction.

Module III: Wounds and its medico-legal aspects

Introduction to wounds; determining the age of the injury and its medico-legal aspect, injuries due to blunt forces, injuries due to sharp forces, miscellaneous injuries.

Module IV: Explosives and Explosion Scene Investigation

Explosive Act: nature and classification, composition and characteristics of explosives, pyrotechnics, IEDs, specific approach to scene of explosion, post-blast residue collection, reconstruction of sequences of events; evaluation and assessment of scene of explosion and its examination.

Module V: Advanced fingerprint and other impression

Fingerprint in personal identification, examination on the basis of poroscopy and its significances; evaluation of fingerprints on the basis of edgescopy and its significance in fingerprint field, Palmer, Planter and other impression its evaluation.

Examination Scheme:

Components	P/S/V	CT	A	C	EE
Weightage (%)	10	10	5	5	70

Text & References:

- Sharma. B.R., Forensic Science in Criminal Investigations and trials (3rd Edn) Universal Law Publishing Co. Ltd
- Nath.S, Fingerprint Identification CRC Press 2nd Edn, 2002
- Fisher, B, Techniques of Crime Scene Investigation 6th Edn CRC Press,
- Albert, S. Osborn, Questioned Documents, 2nd Edn, Universal Law Publishing Delhi, 1998
- James, S. H. and Nordby, J.J (Eds), Forensic Science- An Introduction to Scientific and Investigation Techniques CRC Press, London, 2003.


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LAW AND MEDICINE-II

Course Code: LAW2809

Credit Units: 05

Course Objective:

The course aims to provide the students the knowledge about the interrelationship between law and medicine and complex legal and ethical issues involved in the field of medicine and medical profession. The course include the ethical and legal issues in population control, surrogate motherhood, HIV/AIDS, the rights of the unborn, AID and Law, mental health and medical experimentation on human beings.

Course Contents:

Module I: Population control and community health

Law, Practice and Society- Causes for Population Explosion- National Population Policy, 2000- Terminal methods female sterilization and male sterilization- State Imposed sterilization and its legal validity- Population control and Right to family and Right to privacy.

Module II: Surrogate Motherhood and the Rights of the Unborn

Surrogacy in foreign countries- Motherhood Debated-Legality of contract- problems-Refusal to accept the child-health Tourism and sanctity of woman's life- ICMR Code- The Unborn- Introduction- Right of an Unborn Child-Prenatal Diagnosis (and Amniocentesis)-Miscarriage

Module III: AIDS

Rights, Freedom and duties of HIV/AIDS Patients- Privacy and Public health- Liberty and Security- Movement- Marriage and Finding a family- Right to work- Education for an infected person- Protection of children infected or born to infected parents- Right against degrading Treatment- Equality before law- access to medicine

Module-IV

International Norms- general Provision-Consent-Human Genome-Scientific Research-Donors for Transplantation Purposes-Prohibition of Financial gain and Disposal of a part of the Human Body

Module-V

Mental Health- Historical Background-types of Causes of Mental Illness- Development of the Human being and mental health-Prevention of Mental Illness and Treatment-Alcoholism and Drug Addiction- Mental health Act- Admission and discharge to mental hospital legal issues

Module-VI

Experiments of Human Beings- The concept-Kinds of Experiments-Subject of Experimentation-controls-Clinical Trials-Studies in special Populations-Informed consent-Special Studies of Bioavailability and Bioequivalence-Ethics committee- Stem cell research- International documents and Indian laws-Ethical norms on experimentation

Examination Scheme:

Components	P/S/V	CT	C	A	EE
Weightage (%)	10	10	5	5	70

Text & References:

- Vijay Malik – Drug and Cosmetic Act, 1940, Eastern Book Company, 24th Edition, 2014
- Anoop K. Kaushal – Medical Negligence & Legal Remedies, Universal Publishing House, 2nd Edition, 2004
- Dr. Jagdish Singh – Medical negligence Compensation, Bharat Law House, 3rd Edition, 2007
- P.K. Dutta – Drug Control, Eastern Law House, 3rd Edition, 1997.
- Annas, George J. *American Bioethics: Crossing Human Rights and Health Law Boundaries*. New York:Oxford University Press, 2005.


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- Dworkin, Ronald. *Life's Dominion: An Argument about Abortion, Euthanasia, and Individual Freedom*. New York: Alfred A. Knopf, 1993.
- Dr. Lily Srivastava, Law & Medicine (Universal Law Publishing, 2006)
- W. Noel Keyes, Bioethical and Evolutionary Approaches to Medicine and the Law (American Bar Association, 2007)
- Cynthia Ho, Access to Medicine in the Global Economy: International Agreements on Patents and Related Rights (Oxford University Press, 21-Apr-2011)



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INTELLECTUAL PROPERTY RIGHTS

Course Code: LAW2902

Credit Units: 05

Course Objective:

The course is designed to provide comprehensive knowledge to the students regarding Indian position of the Patent Law (1970), Copy Right Law (1957) and Designs Act of 2000 which invariably form the part of Intellectual Property Law and shall comprise of the following.

The importance of this branch of the law is to be sufficiently realized in the Indian legal education. These areas are now internationally conceptualized as representing intellectual property. It is often the case that while the law of patents and trademarks is referred to as industrial property, the law relating to copyright is named intellectual property. While both these terms could be suitably invoked, we here speak of intellectual property as signifying all the three bodies of the law as well as the law on industrial designs.

Unlike other forms of property, intellectual property refers to regimes of legal recognition of, primarily, the products of the mind or imagination. The subject matter of property relations is here preeminently based on mental labour. The law relating to intellectual property protects the right to mental labour.

The law confers rights of proprietary nature on relative intellectual labour primarily on the basis that it is in the interests of society and state to promote creativeness and inventiveness. Limited monopoly provides incentive for greater inventive and innovative efforts in society. An important aspect of the exploration in this course would be ways in which the laws strike a fair balance between the interests and rights of the intellectual labourers on the one hand and organized industrial enterprises on the other. Another dimension is a study of the ways in which this regime of laws militates against, or favours, communal property in national cultures. As concerns 'modernization' crucial questions arise in the field of copyright protection in computer software and hardware, internet, electronic music and scientific research. Both copyright, trademarks, design and patent law here relate basically to the law of unfair competition and constitute an aspect of consumer protection and welfare not only in the context of national perspectives but also in view of the waves of globalization already set in. Both from the standpoint of human resources development, modernization and justice it is important that the law students get sufficient insights in Intellectual Property Law.

Course Contents:

Module I: Introduction

Intellectual Property, Concept and Philosophy, Need for Private Rights versus Public Interests, Advantages and Disadvantages of IPR.

Module II: Patent

Development of patent law, Rationale for patent protection, Nature and definition, Types of patentable subject matter, Patentability criteria, non-patentable inventions, Rights of patentee, Procedure for granting a patent, Grounds for opposition, Transfer of patent rights, Compulsory Licenses, Acquisition, Surrender, Revocation, restoration, Patent infringement and remedies, Bio patents and software patents, Official Machinery, Controller, Powers and Functions, Patent in pharmaceutical industry, Patent cooperation treaty, Paris convention.

Module III: Copyright

History, Concept of copyright, conditions for grant of copyright, extent of rights exception to copyright protection, fair use provision, assignment and licensing, Compulsory licensing and statutory licensing, Collective administration, Copyright board and office, powers and functions, Moral rights: Neighboring rights; infringement penalties and remedies, Appeals, Berne Convention, Universal Copyright Convention - WIPO Copyright Treaty: WIPO Phonograms and Performances treaty, TRIPS with respect to Copyright and Neighboring rights.

Module IV: Designs, Protection, Historical development, Rationale

Designs Act of 2000: Meaning of Design, Conditions for grant of protection, Ambit of Protection, Exceptions, Registration of Designs, Cancellation, Copyright in Registered Designs, Enforcement, Infringement and remedies, Powers and duties of Controller.

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Module V: Trademarks

Evolution, Functions, Objective, Definition, Kinds of Marks, Domain names, Registration, Concurrent registration, Procedure for registration, Relative and absolute grounds of refusal, opposition and its grounds, Assignment, transmission and licensing of Trademarks, Infringement, Penalties and Remedies, Withdrawal of protection, Passing off, Official machinery for regulation administration and Redressal, Registrar, Difference between Trade Mark, **Trade Secret, Traditional Knowledge** and Geographical Indications, TRIPS on Trademarks, Madrid Agreement for The Repression of False or Deceptive Indications of Source on Goods, 1891- Madrid Agreement for the International Registration of Marks, 1891 and protocol relating to that agreement 1989.

Module VI: Plant Varieties Protection Act, 2001


Objectives, Rationale, Registry, Official machinery, registration, Criteria of fulfillment Exclusions, Benefit sharing, Farmers rights, CommModuley Rights, compulsory license Redressal fora, Appellate tribunal, Infringement, offences and penalties; Geographical indications of Goods (Registration and Protection Act, 1999: History, Definition, Rationale, Functioning, official Machinery, Registry, Rights conferred, Registration Procedure. Redressal Machinery, Appeal, Passing off, Offences, penalties and Procedure.

Examination Scheme:

Components	P/S/V	CT	A	C	EE
Weightage (%)	10	10	05	5	70

Text & References:

- D.P. Mittal (Taxman Publication), Indian Patents Law and Procedure
- B.L. Wadera, Patents, trademarks, copyright, Designs and Geographical Judications.
- P. Narayanan (Eastern Law House), Intellectual Property Law
- W. Cornish (Universal Publication), Intellectual Property Law
- R.K. Nagarjan, Intellectual Property Law
- Ganguli (Tata Megraw), Intellectual Property Rights


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LAW, POVERTY AND DEVELOPMENT

Course Code: LAW2903

Credit Units: 05

Course Objective:

The objective of this paper is to provide an understanding of basic concepts of poverty and development and their relationship with law.

Course Contents:

Module I: Understanding Poverty and Development

Poverty: Meaning and Concept, Relative Dimensions, Measurement and Determinants, Issues related to Poverty in India; Development: Perspectives, Developmental index.

Module II: Constitutional Guarantees for the Poor

Equality and Protective Discrimination, Right to Basic Needs and Welfare, Abolition of Untouchability and Protection of Civil Rights, Right to Development.

Module III: Criminal Justice System and the Poor

Treatment of the poor by Police, Inability to get Bail, Problems of Poor Under trials, Working of free legal aid schemes.

Module IV: Impoverishment of Women, Children and Disabled Persons


Deprivations of women under family laws, Problems of women workers in organized and unorganized sectors, Child labour, Approaches to disability and rights of the disabled persons, Right to education and dignity.

Examination Scheme:

Components	P/S/V	CT	A	C	EE
Weightage (%)	10	10	05	5	70

Text & References:

- Law, Poverty and Development – Upendra Baxi
- State and Poverty in India – Atul Kohli
- The Poverty Question (Search for Solution) – Yogesh Atal
- Poverty, Rural Development and Public Policy - Amarendra


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PROFESSIONAL ETHICS

Course Code: LAW2904

Credit Units: 05

Course Objective:

The Course has been designed to acquaint the students of Law about the Professional Ethics and Professional etiquettes that are essentially significant for an advocate to observe while at the Bar. Accountability and transparency are imperative to the profession. Besides, the conducive and cordial Bar- Bench relations can send a good message concerning the richness of the Legal profession. With this background cue, the course aims at developing insights of the students about the professional parameters.

Course Contents:

Module I: Historical Introduction

Historical introduction to legal profession in India – Barristers, Vakils, High Court Pleaders, Advocates, etc. The All India Bar Committee, 1951 and the passing of Indian Advocates Act, 1961. The Advocates Act 1961: Definitions Section 2, Constitution and function of State Bar Councils, Bar Council of India, Terms of Office, various sub-committees including Disciplinary Committee and the qualification for their membership. Power to make rules Sections 3 to 15 – Chapter –II.

Module II: The Advocate's Act, 1961

The Advocate Act, 1961.

Admission and enrolment of Advocate – Senior and other Advocates,

Common role of Advocates, Qualifications and Disqualifications for enrolment and procedure thereof, Chapter – III Section 16 to 28.

Rights to Practice: Monopoly of representation, Exclusion of advocates from certain cases, self representation by litigants. Chapter IV Secs. 29 to 34.

Professional and other misconduct, Principles for determining misconduct, Disciplinary Committees of State Bar Council and the Bar Council of India,

Punishment of advocates for misconduct, Appeals to the Supreme Court, Chapter – V – Secs. 35 to 44.

Module III: Legal Profession

Nature of Legal Profession, Need for an Ethical Code of Rights: privileges and duties of Advocates, Preparation of a case and fees of an Advocate, under – cutting, Bar against soliciting work and advertisement, Bar against touting, refusal of briefs, accountability to the client, confidentiality communication between Advocates to compromise, Study of Code of Ethics prepared by the Bar Council of India.

Module IV: Contempt of Courts Act, 1971

Contempt of Courts Act, 1971,

What is Contempt? Civil and criminal contempt, punishment for contempt.

Procedures in contempt cases. High Court Rules and the Supreme Court

Rules to regulate contempt proceedings.

Examination Scheme:

Components	P/S/V	CT	C	A	EE
Weightage (%)	10	10	5	5	70

Text & References:

- Sanjeev Rao, Indian Advocates Act, 1971.
- M.P. Jain, Indian Legal History (Chap. On Legal Profession).
- Krishna Murthy Iyer's Book on Advocacy.
- The Contempt of Courts Act, 1971.
- Journal of Bar Council of India.

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PRIVATE INTERNATIONAL LAW

Course Code: LAW2905

Credit Units: 05

Course Objective:

The course equips the student to deal with dispute involving a foreign element in personal, civil and commercial matters *i.e.* increasing in frequency as a result of a globalized economic and social environment.

Course Contents:

Module I: Introduction

Application and subject matter of Private International Law, Distinction with Public International Law, Characterization and theories of characterization, Concept of Renvoi, Application of foreign law, Domicile, Jurisdiction of courts.

Module II: Family Law and Adoptions

Material and formal validity of marriage under Indian and English law, Choice of law and jurisdiction of courts in matrimonial causes: dissolution of marriage, grounds of divorce, restitution of conjugal rights, recognition of foreign judgment, Recognition of foreign adoptions, Adoption by foreign parents, Jurisdiction under Indian and English law.

Module III: Civil and Commercial matters

Tort, Theories of foreign tort, Contract, Theory of Proper Law of Contract, Ascertaining the applicable law, Property.

Module IV: Indian Law relating to foreign judgment

Basis of recognition; Recognition and Enforcement of Foreign Judgments, Finality, Failure, Direct execution of foreign judgments, decrees.

Examination Scheme:

Components	P/S/V	CT	C	A	EE
Weightage (%)	10	10	5	5	70

Text & References:

- Dr. Paras Diwan :Private International Law
- Cheshire : Private International Law
- Morris : Private International Law


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ELECTION LAW

Course Code: LAW2906

Credit Units: 05

Course Objective:

The objective of this paper is to acquaint the students with the election laws governing the elections of the Houses of the Parliament and the State Legislatures as well as to the offices of President and Vice President.

Course Contents:

Module I: Introduction

Election: Meaning and Process, Constitutional Mandate, Laws governing elections, Election disputes, Election to the Offices of the President and Vice President.

Module II: Election Commission

Composition, Functions, Powers; Delimitation of Constituencies, Preparation and Revision of Electoral Rolls.

Module III: Qualifications and Disqualifications of Candidates

Constitutional and Statutory Provisions: Disqualifications of sitting members, Nomination and Candidature, Voters Right to Information; Anti Defection Law (Tenth Schedule to the Constitution of India).

Module IV: Corrupt Practices in the Election Law; Electoral Offences

Examination Scheme:


Components	P/S/V	CT	C	A	EE
Weightage (%)	10	10	5	5	70

Text & References:

- Manual of Election Law in India – Dev Inder
- Chawla's Elections Law & Practice - P.C. Jain & Kiran Jain
- Election Laws and Practice in India- R.N. Choudhry
- Corrupt Practices in Election Law – K.C. Sunny
- How India Votes – Election Laws, Practice and Procedure – V.S. Rama Devi & S.K. Mendiretta
- V.N. Shukla's The Constitution of India – M.P. Singh.

Statutory Reading:

- Relevant Provisions of the Constitution of India
- The Representation of the People Act, 1951.
- The Representation of the People Act, 1950.
- The Presidential and Vice-Presidential Elections Act, 1952
- The Election Commission (Condition of service of Election Commissioners and Transaction of Business) Act, 1991.
- The Delimitation Act, 2002.


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BANKING AND INSURANCE LAWS

Course Code: LAW2907

Credit Units: 05

Course Objective:

This course acquaints students with banking system of India and teaches them the various aspects and rights that exists for them in banking and insurance sector.

Course Contents:

Module I: Banking System in India

Kinds of banks and their functions; Banking Regulation Laws: Reserve Bank of India Act, 1934, Banking Regulation Act, 1949; Relationship between banker and customer: Legal Character, Contract between banker & customer, Banks duty to customers; The Banking Ombudsman Scheme, 1995; Liability under Consumer Protection Act, 1986.

Module II: Lending, Securities and Recovery by Banks

Principles of Lending ; Position of Weaker Sections; Nature of Securities and Risks Involved ; Recovery of debts with and without intervention of courts / tribunal: Recovery of Debts due to Banks and Financial Institutions Act, 1993, Securitisation and Reconstruction of Financial Assets and Enforcement of Security Interests Act, 2002.

Module III: Banking Frauds

Nature of Banking Frauds; Legal Regime to Control Banking Frauds; Recent Trends in Banking: Automatic Teller Machine and Internet Banking, Smart Cards, Credit Cards.

Module IV: Insurance Law

Nature of Insurance Contracts; Kinds of Insurance: Life Insurance, Medi claim, Property Insurance, Fire Insurance, Motor Vehicles Insurance (with special reference to third party insurance; Constitution, Functions and Powers of Insurance Regulatory and Development Authority; Application of Consumer Protection Act, 1986.

Examination Scheme:

Components	P/S/V	CT	C	A	EE
Weightage (%)	10	10	5	5	70

Text & References:

- Banking Law & Negotiable Instruments Act – Sharma and Nainta
- Banking System, Frauds and Legal Control – R.P. Namita
- Law of Insurance – M.N. Mishra
- Handbook of Insurance and Allied Laws – C. Rangarajan
- Banking Law & Practice in India – M.L. Tannan.


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INTERNATIONAL HUMANITARIAN AND REFUGEE LAW

Course Code: LAW2908

Credit Units: 05

Course Objective:

The objective of this paper is to make students aware of the principles of International Humanitarian and Refugee Laws.

Course Contents:

Module I: Historical Development of International Humanitarian Law

History and evolution, Growth, Character of International Humanitarian Law.

Module II: Geneva Conventions, 1949

Geneva Convention I, Geneva Convention II, Geneva Convention III and Geneva Convention IV, 1949, Additional Protocol I to Geneva Conventions, 1977, Additional Protocol II to Geneva Conventions II 1977.

Module III: Enforcement Machinery

War Crimes, Serious breaches of International Humanitarian Law, International Criminal Court (ICC).

Module IV: Refugees under International Law

Who is a refugee?, Convention Relating to the Status of Refugees, 1933, Convention on Status of Refugees, 1951, The 1967 Protocol, The AALCC Principles 1966, The OAU Convention 1969.

Module V: Implementation and Monitoring of the Rights of Refugees

Status of the UNHCR 1950, Cartagena Declaration 1984.

Module VI: Treatment of Refugees under Indian Laws


Draft SAARC Convention.

Examination Scheme:

Components	P/S/V	CT	C	A	EE
Weightage (%)	10	10	5	5	70

Text & References:

- Ingrid Detter, The Law of War, (Cambridge, 2000)
- A. Roberts and R. Guelff, eds., Documents on the Laws of War (Oxford, 2000)
- Legality of the Threat or Use of nuclear weapons, Advisory Opinion, ICJ Reports (1996)
- M.K. Balachandran and Rose Verghese (eds.) – International Humanitarian Law ICRC (1997)
- Ravindra Pratap, “India’s Attitude towards IHL”, in Mani (ed.) International Humanitarian Law in South Asia (Genava: ICRC, 2003)
- Guy S. Goodwin – The Refugee in International Law (Oxford, 2000)
- A. Vibeke Eggli, Mass Refugee Influx and the Limits of Public International Law (The Hague: Nijhoff, 2002).


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CRIMINOLOGY

Course Code: LAW2909

Credit Units: 05

Course Objective:

The course is intended to introduce students to the broad study of criminology. It is to give a broad overview to the scope of criminology, to the ideas which have influenced the area of the subject and to the practical uses and impact to which these have been, or might be put.

Course Contents:

Module I: Introduction to Crime & Criminology

Definition and Scope, Criminology & other Social-Science; Legal, Social and Psychological aspects of crime, Traditional crimes; Organized Crimes, Socio Economic Crimes, Modern Crimes; Corruption, Cyber Crimes Environmental Crimes Terrorism and insurgency ; Specific theories: Classical School and Neoclassical School; Positive School; Cartographic School; Sociological theories : Social Structural Theories and Social Process Theories; Economic Theories of Crime .

Module II: Juvenile Delinquency

Concept & Causes, Pre delinquency stages: Truancy and Vagrancy, Main features of juvenile Justice Act, (New & Old), Institutional Services like Observation homes, Juvenile Homes, Special Homes & Juvenile Aftercare Services.

Module III: Punishment

History & Theories of Punishment, Capital Punishment, Historical Development from Punishment to Correction and Reformation, Prison System In India; Correctional Programmes in jail; Alter care services, Probation & Parole.

Module IV: Impact on Society

Social Disorganization and Social Problems, Victimless Crimes: Alcoholism, Drug Addiction, Beggary, Commercial Sex, Suicide; Crimes related to Family: Dowry death, Domestic Violence, Child Abuse.

Module V: Victimology


Concept, origin & Development, Need to study victims, U.N. Declaration on the basic principles of justice for victims of crimes and abuse of power, Victim's rights in India: Fair Access to Justice, Restitution, Compensation and assistance to victims, Human Rights Protection.

Examination Scheme:

Components	P/S/V	CT	C	A	EE
Weightage (%)	10	10	5	5	70

Text & References:

- Sutherland and Crssey – Criminology
- Ahmed Siddique – Criminology
- Mrs. Vedkumari – Juvenile Justice


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CORRUPTION LAWS

Course Code: LAW2911

Credit Units: 05

Course Objective:

To update the students about corruption laws that has already been formed. The main aim of the course is to make the students aware of the laws prevalent and the legal remedies available

Course Contents:

Module I: Introduction to Corruption Laws

Introduction- definition of corruption,

Genesis of corruption- Historical Background, corruption in ancient time, corruption in Mahabharata need for integrating

Nature of corruption, various types of corruption- in kind, cash or in service Individual Corruption, Institutional Corruption. Why and how of corruption – Nexus between Position of a Public servant and corruption. consequences and ill effects

Module II: Offences by Public Servant

Offences under the Prevention of Corruption Act, 1988,

Corruption by Public servant- Prevention of Corruption Act 1988-

Definition of Public Servant sec 2(cc)

Categories of public servant- person in the pay of the Government- a person in the service of the Government a person remunerated by fees or commission for the performance of any public duty by the Government.

Sec 7: public Servant taking gratifications other legal remuneration in respect of an official act.

Gratification: legal remuneration, meaning of holding out as a Public Servant – whether covered under the Act.

Sec 8: Gratification by person other than public servant – to influence public servant by corrupt or illegal means.

Sec 9: Gratification by person other than Public Servant- to influence public servant- and not by corruptor illegal means.

Sec10, Sec11, Sec 12: Habitual committing of offence under Sec 8, 9, 12, 14.

Sec 15 Attempt

Sec 16 Fine Criteria

Sec 13 Criminal Misconduct by Public Servant.

Bribe giver Guilty or Abetment?

Investigation and Trial under the Act

Sec 17 Persons authorized to investigate.

Sec 19 Sanction for prosecution

Sec 20 presumptions under the Act.

Sec 3, 4, 5: Special Judges Court- procedure and powers of Special Judge.

Module III: Commission of Enquiry Acts

Section 6 Summary Trial. Commission of Enquiry Act 1952

Composition, function and role of CAG

The Central Vigilance Commission

Central Bureau of Investigation its role, function and Jurisdiction.

Proposed Lok Pal Bill ,its various drafts , legality of sting operations , provision relating to corruption cases of judges , Immunity of legislations and parliamentarians . Law on whistle blowers

Module IV: Money Laundering & National Investigative Agency Act

The Prevention of Money Laundering Act 2002, General Principles, Confiscation of Property earned through crime Sec5

Sec 171-B of IPC Bribery – Offences relating to elections.

Sec 171-C

Sec 171- D Undue influence and Impression at election

Sec 171- E Punishment for Bribery

Sec 171- F Punishment for Influence and Personating at an election.

National Investigative Agency Act 2009

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Module V: International Effort

International Efforts

The United Nations Directions

The Convention on Combating Bribery of Foreign Public Officials

UN Convention against Transnational Organized Crime.


UN Convention against Corruption (UNCAC)

Examination Scheme:

Components	P	A	C	CT	EE
Weightage (%)	5	5	10	10	70

Text & References:

- Prevention of Corruption Act, 1988
- Prevention of Money laundering Act, 2002
- National Investigative Agency act, 2009
- Un Conventions


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SUMMER INTERNSHIP EVALUATION-IV

Course Code: LAW2935

Credit Units: 03

It is a mode of Clinical Legal education Specified period to be spent by the student with a law firm/court/Commissions/NGO's and like institutions working with the realm of law or connected therewith. The reports both by the student and the office together with diary where applicable to be certified will be submitted for evaluation

The Internship during the summer break is a compulsory course. There is a Internship Data from where students fill in the details of where they are interning with complete address and phone numbers Customized Legal Reference /Diary is provided to the students on payment. They maintain a day to day record of the work that they do at the place they are interning. They are expected to intern for a minimum 90 days. They submit their completed diary, certificate from the employer and also a report of their experience at work. After submission there is a Viva by concerned faculty. They assess the student on the kind of work they have done during internship, presentation of the work they have done and also on the practical knowledge they have gained

The Paper is marked out of 100 marks. The breakup of the marks is as follows:

1.	Diary submission	25 Marks
2.	Report and certificate	25 Marks
3.	Viva (Panel of External Examiners)	40 Marks
4.	Attendance (Regularity in meeting the supervisor)	10 Marks
	Total	100



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MOOT COURT/ INTERNSHIP

Course Code: LAW2003

Credit Units: 14

Course Objective:

This course relates to litigation advocacy and as such this shall be simulation course that shall have two parts. First part shall focus on preparation for trial and trial strategies. It shall also disseminate techniques of examination-in-chief cross examination and re-examination of witnesses, argumentation in courts, bail application, injunction application, etc. The second part shall focus on writing briefs in civil suits and criminal cases, appellate briefs in civil and criminal cases, and writ matters, memorial writings and arguing before the appropriate forums. The students shall be given a case to argue, that shall help to articulate their argumentative zeal as well as capacity.

Course Contents:

Module I: Moot Court

Bench Memorial, Court Craft: Presentation of case, Interaction with Bench, Question Answer Court etiquette and mannerism section.

Module II: Internship

Specified period to be spent by the student with a law firm/court/Commissions/NGO's and like institutions working with the realm of law or connected therewith. The report and diary to be certified and submitted for evaluation.

Module III: Corporate Legal Training

Corporate communication skills and client interaction and etiquette in corporate law work environment.

Examination Scheme:

Components	P/S/V	CT	A	C	EE
Weightage (%)	10	10	05	05	70


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HUMAN RIGHTS

Programme Structure

Course Code	Course Title	Lectures (L) Hours per week	Tutorial (T) Hours per week	Practical (P) Hours per week	Total Credits
LAW2152	Concept and Theoretical Understanding of Human Rights	3	-	-	3
LAW2252	Systems, Organizations and Instruments of Human Rights	3	-	-	3
LAW2352	Contemporary Human Rights Situations and Issues	3	-	-	3
LAW2452	Specific Themes in Human Rights	3	-	-	3
LAW2552	Legislation Themes in Human Rights	3	-	-	3
LAW2652	Report Writing and Thesis Preparation (Human Rights)	3	-	-	3
	TOTAL				18


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HUMAN RIGHTS

Syllabus - Semester First

CONCEPT AND THEORETICAL UNDERSTANDING OF HUMAN RIGHTS

Course Code: LAW2152

Credit Units: 03

Module-I: Introduction

History of Human Rights-17th-18th century-19th century-20th century- pre world wars- Post world wars- Philosophy of Human rights

Module-II: Principle and Theories of Human Rights

Classification of human rights- Three generations-Nature of Human rights- Legal Theories related to Human Rights- Legal documents related to Human Rights before the Second World War

Module-III: International Protection of Human Rights


Failure of League of Nations- United Nations Organisation- UN Charter- UN system and organs of the UN-Universal Declaration of Human Rights- International Covenant on Civil and Political Rights (ICCPR) - the International Covenant on Economic, Social and Cultural Rights (ICESCR)

Module-IV: Implementation of Human Rights at the International Level

Human Rights Council of the UN- Committees and organs protecting Human Rights- Role of UN General Assembly and Security Council – Individual Communication system

Examination Scheme:

Components	P/S/V	CT	A	C	EE
Weightage (%)	10	10	5	5	70


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Syllabus - Semester Second

SYSTEM, ORGANIZATIONAL AND INSTRUMENTS OF HUMAN RIGHTS

Course Code: LAW2252

Credit Units: 03

Module-I: UN and other Regional Organisation for the Protection of Human Rights

UN system of protection of Human Rights- EU and Human Rights- Protection under the Inter American System- African Charter – Arab Charter- Cultural Relativism and Universalism

Module-II: International Documents Related to Human Rights

Genocide Convention-Convention on the Elimination of All Forms of Discrimination Against Women (CEDAW) - Convention on the Elimination of All Forms of Racial Discrimination (CERD)- Convention on the Rights of Persons with Disabilities (CRPD)- Convention on the Rights of the Child (CRC)-United Nations Convention Against Torture (CAT)- International Convention on the Protection of the Rights of All Migrant Workers and Members of their Families

Module-III: Basic Human Rights under the International Documents


Three generations of Rights- First generation Rights- Right to Equality- Right to life- Right to Speech- Freedom of Religion- Freedom from Torture

Module-IV: Second and Third generations of Rights

Rights related to dignity of individuals- Right to education- Right to food- Right to work-Right to livelihood- Right to Self Determination- Right to development- Rights of Indigenous people

Examination Scheme:

Components	P/S/V	CT	A	C	EE
Weightage (%)	10	10	5	5	70


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Syllabus - Semester Third

CONTEMPORARY HUMAN RIGHTS SITUATIONS AND ISSUES

Course Code: LAW2352

Credit Units: 03

Module-I: Indian Constitution and Human Rights

Concept of State- Concept of Law- Just fair and reasonableness- Fundamental Rights and Human Rights

Module-II: Fundamental Rights and International Covenant on Civil and Political Rights (ICCPR)

Right to Equality- Right to Freedom- - Right to Life- Freedom of Religion- Rights of Minorities- Right to Constitutional Remedies- Judicial pronouncement of the Courts in India

Module-III: Directive principles of State Policy and the International Covenant on Economic, Social and Cultural Rights (ICESCR)

Resources of a country and Implementation of Second Generation Rights- Positive Rights and negative rights- Enumerated Rights and Non Enumerated Rights-Directive principles of State Policy- International Covenant on Economic, Social and Cultural Rights (ICESCR)

Module-IV: Protection of Human Rights in India

Protection of Human Rights Act, 1993- National Human Rights Commission and State Commissions- Woman's Commission- Minority Commission- SC/ST Commission- Police atrocities- Violations against woman and other weaker sections- Role of NGOs- Human Rights education

Examination Scheme:

Components	P/S/V	CT	A	C	EE
Weightage (%)	10	10	5	5	70


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Syllabus - Semester Fourth

SPECIFIC THEMES IN HUMAN RIGHTS

Course Code: LAW2452

Credit Units: 03

Module-I: Morality, Ethics, Religion and Human Rights

Module-II: Terrorism and Human Rights

Module-III: Science and Technology and Human Rights

Module-IV: Human Rights of the Marginalized People

Rights of the Refugees- Prisoners of war- Under trials- Rights of the Differently abled- Sexual Minorities and Human Rights- HIV/AIDS- Access to Medicine- Protection of persons from enforced disappearance- Right against corruption- Right to development-Right to clean Environment

Examination Scheme:

Components	P/S/V	CT	A	C	EE
Weightage (%)	10	10	5	5	70



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Syllabus - Semester Fifth

LEGISLATION THEMES IN HUMAN RIGHTS

Course Code: LAW2552

Credit Units: 03

Module-I: Regional Human Rights Legislations


Module-II: National Human Rights Legislations

Module-III: Role of Judiciary-judicial Activism and P.I.L

Module-IV: Specific Human Rights issues in India and Role of legislation and Judiciary

Examination Scheme:

Components	P/S/V	CT	A	C	EE
Weightage (%)	10	10	5	5	70


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Syllabus - Semester Sixth

REPORT WRITING AND THESIS PREPARATION

Course Code: LAW2652

Credit Units: 03

- 1- Field Report
- 2- Term Paper/ Study Report
- 3- Viva

Examination Scheme:

Components	Field Report	Term Paper/ Study Report	Viva	Total
Weightage (%)	20	50	30	100

References:-

- Agosin, Marjorie, ed. *Women, Gender, and Human Rights: A Global Perspective*. New Brunswick, NJ: Rutgers University Press, 2001.
- Allen, Robin and Rachel Crasnow. *Employment Law and Human Rights*. New York: Oxford University Press, 2002.
- Alston, Philip. *The United Nations and Human Rights: A Critical Appraisal*. Oxford, UK: Clarendon Press, 1992.
- Alston, Philip. *Promoting Human Rights through Bills of Rights: Comparative Perspectives*. New York: Oxford University Press, 2000.
- Alston, Philip, ed. *Labour Rights as Human Rights*. New York: Oxford University Press, 2005.
- Alston, Philip and James Heenan. *Economic, Social and Cultural Rights: A Bibliography*. The Hague: Martinus Nijhoff, 2006.
- Alston, Philip and James Crawford, eds. *The Future of UN Human Rights Treaty Monitoring*. Cambridge, UK: Cambridge University Press, 2000.
- Alston, Philip, Stephen Parker and John Seymour, eds. *Children, Rights and the Law*. New York: Oxford University Press, 1993 (with corrections).
- Alston, Philip and Mary Robinson, eds. *Human Rights and Development: Towards Mutual Reinforcement*. New York: Oxford University Press, 2005.
- Anaya, S. James. *Indigenous Peoples in International Law*. New York: Oxford University Press, 1996.
- Andreassen, Bård A. and Stephen P. Marks, eds. *Development as a Human Right: Legal, Political and Economic Dimensions*. Cambridge, MA: Harvard School of Public Health, François-Xavier Bagnoud Center for Health and Human Rights/Harvard University Press, 2006.
- An-Na'im, Abdullahi A., ed. *Human Rights in Cross-Cultural Perspectives: A Quest for Consensus*. Philadelphia, PA: University of Pennsylvania Press, 1992.
- Annas, George J. *American Bioethics: Crossing Human Rights and Health Law Boundaries*. New York: Oxford University Press, 2005.
- Askin, Kelly D. and Dorean M. Koenig, eds. *Women and International Human Rights Law*, 3 Vols., Ardsley, NY: Transnational Publ., 2000.
- Bernhardt, Rudolf and John Anthony Jolowicz, eds. *International Enforcement of Human Rights*. Berlin: Springer-Verlag, 1987.



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- Broomhall, Bruce. *International Justice & The International Criminal Court: Between Sovereignty and the Rule of Law*. New York: Oxford University Press, 2003.
- Brownlie, Ian and Guy S. Goodwin-Gill, eds. *Basic Documents on Human Rights*. New York: Oxford University Press, 5th ed., 2006.
- Brysk, Alison, ed. *Globalization and Human Rights*. Berkeley, CA: University of California Press, 2002.
- Cassese, Antonio. *Human Rights in a Changing World*. Cambridge, UK: Polity Press, 1990.
- Chandler, David. *From Kosovo to Kabul and Beyond: Human Rights and International Intervention*. London: Pluto Press, 2006 ed.
- Chesterman, Simon. *Just War or Just Peace? Humanitarian Intervention and International Law*. New York: Oxford University Press, 2001.
- Clapham, Andrew. *Human Rights in the Private Sphere*. New York: Oxford University Press, 1994.
- Clapham, Andrew. *Human Rights Obligations of Non-State Actors*. New York: Oxford University Press, 2006.
- Claude, Richard Pierre and Burns H. Weston, eds. *Human Rights in the World Community: Issues and Action*. Philadelphia, PA: University of Pennsylvania Press, 2nd ed., 1992.



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INTELLECTUAL PROPERTY RIGHTS

Programme Structure

Course Code	Course Title	Lectur es (L) Hours per week	Tutorial (T) Hours per week	Practic al (P) Hours per week	Total Credits
LAW2151	Principles of IPR	1	-	4	3
LAW2251	Patent Law and Practices	1	-	4	3
LAW2351	Copyright Law and Practices	1	-	4	3
LAW2451	Trademark Law and Practices	1	-	4	3
LAW2551	Emerging Issues and Challenges	1	-	4	3
LAW2651	Future Aspects of Intellectual Property Rights	1	-	4	3
	TOTAL				18


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INTELLECTUAL PROPERTY RIGHTS

Syllabus - Semester First

PRINCIPLES OF IPR

Course Code: LAW2151

Credit Units: 03

Course Contents

The course is designed to provide comprehensive knowledge to the students regarding the general principles of IPR, Concept and Theories, Criticisms of Intellectual Property Rights, International Regime Relating to IPR

Module I

Introduction to Intellectual Property Rights
Concept and Theories
Kinds of Intellectual Property Rights
Economic analysis of Intellectual Property Rights
Need for Private Rights versus Public Interests
Advantages and Disadvantages of IPR.

Module II

Criticisms of Intellectual Property Rights
Politics of Intellectual Property Rights
Third World Criticisms
Marxist Criticisms

Module III

International Regime Relating to IPR
TRIPS and other Treaties (WIPO, WTO, GATTs)

Examination Scheme

Components	P/S/V	CT	A	C	EE
Weightage (%)	10	10	05	5	70

Text & References:

- D.P. Mittal (Taxman Publication), Indian Patents Law and Procedure
- B.L. Wadera, Patents, trademarks, copyright, Designs and Geographical Judications.
- P. Narayanan (Eastern Law House), Intellectual Property Law
- N.S. Gopalakrishnan & T.G. Agitha, Principles of Intellectual Property (2009), Eastern Book Company, Lucknow


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Syllabus - Semester Second

PATENT LAW AND PRACTICES

Course Code: LAW2251

Credit Units: 03

Course Objective

The course is designed to provide comprehensive knowledge to the students regarding Indian position of the Patent Law (1970), Historical development, Procedure for granting a patent, Infringement.

Module I

Research exemption Introduction to Patents
Overview
Historical development
Concepts, Novelty, Utility
Inventiveness/Non-obviousness

Module II

Patent Act 1970 – amendments of 1999, 2000, 2002 and 2005
Patentable subject matter, Patentability criteria, non-patentable inventions
Pharmaceutical products and process and patent protection
Software Patents
Patenting of Micro-organism

Module III

Rights of patentee
Procedure for granting a patent and obtaining patents
Grounds for opposition
Working of Patents, Compulsory License
Acquisition, Surrender, Revocation, restoration
Transfer of patent rights,

Module IV

Infringement
What Is Infringement? Direct, Contributory, and Induced
How Is Infringement Determined? Who Is an Infringer?
Official Machinery, Controller, Powers and Functions
Defences to Infringement

Examination Scheme

Components	P/S/V	CT	A	C	EE
Weightage (%)	10	10	05	5	70

Text & References:

- Sookman, Computer Law, 1996
- N.S. Gopalakrishnan & T.G. Agitha, Principles of Intellectual Property (2009), Eastern Book Company, Lucknow
- Dr. B.L. Wadhwa, Law Relating to Patent, Trademarks, Copyright & Designs
- P. Narayanan (Eastern Law House), Intellectual Property Law

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Syllabus - Semester Third

COPYRIGHT LAW AND PRACTICES

Course Code: LAW2351

Credit Units: 03

Course Objective

The course is designed to provide comprehensive knowledge to the students regarding Indian position of the Copyright Law, 1957, Historical background and Development of Copyright Law, Infringement.

Module I

Copyright and Neighbouring Rights
Concept and Principles
Historical background and Development of Copyright Law
Leading International Instruments, Berne Convention, Universal Copyright Convention,
International Copyright under Copyright Act
WIPO Phonograms and Performances treaty

Module II

Copyright Act, 1957
Terms of Copyright
conditions for grant of copyright,
extent of rights exception to copyright protection,
fair use provision, assignment and licensing,
Copyright in Literary, Dramatic and Musical ,Works, Sound Recording, Cinematograph
Films,
Copyright in Computer Programme, Author Special Rights, Right of Broadcasting and
performers,

Module III

Copyright Registrar and Copyright Board-Power and Procedure
Copyright Societies,
Ownership, Assignment, Licence, Translation of Copyright,
Compulsory Licences,
Infringement-Criteria of Infringement, Infringement of Copyright-Films,
Literary and Dramatic works, Importation and Infringement.

Examination Scheme

Components	P/S/V	CT	A	C	EE
Weightage (%)	10	10	05	5	70

Text & References:

- P. Narayanan (Eastern Law House), Intellectual Property Law
- W. Cornish (Universal Publication), Intellectual Property Law
- R.K. Nagarjan, Intellectual Property Law
- Ganguli (Tata Megraw), Intellectual Property Rights


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Syllabus - Semester Fourth

TRADEMARK LAW AND PRACTICES

Course Code: LAW2451

Credit Units: 03

Course Objective

The course is designed to provide comprehensive knowledge to the students regarding Indian position of the Trademark Act, 1999, Historical development of the concept of trademark and trademark law, Registration of trademark, Infringement of trademark.

Module I

Historical development of the concept of trademark and trademark law-National and International
Introduction to Trademarks
Need for Protection.
Kinds of trademarks
Concept of Well known trademark

Module II

Registration of trademark
Grounds of refusal of registration
Absolute ground
Relative ground
Procedure of registration of trademark
opposition and its grounds

Module III

Infringement of trademark
Passing off
Deceptive similarity
Defences
Remedies for infringement and passing off
Civil remedies
Criminal remedies

Examination Scheme

Components	P/S/V	CT	A	C	EE
Weightage (%)	10	10	05	5	70

Text & References:

- P. Narayanan (Eastern Law House), Intellectual Property Law
- W. Cornish (Universal Publication), Intellectual Property Law
- R.K. Nagarjan, Intellectual Property Law
- Ganguli (Tata Megraw), Intellectual Property Rights


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Syllabus - Semester Fifth

EMERGING ISSUES AND CHALLENGES

Course Code: LAW2551

Credit Units: 03

Course Objective

The course is designed to provide comprehensive knowledge to the students regarding the effect of IPR especially of patents on emerging issues like public health, climate, Domain Name Disputes and Cyber squatting, Bio piracy etc. and the ways to tackle this problem,

Module I

Public health and Intellectual Property Rights
Case study—Novartis Pharmaceuticals
Bayer Pharmaceuticals

Module II

TRIPS Flexibilities and access to medicine
IPR and Climate change
Patents and Biotechnology

Module III

Traditional knowledge and IPR
Bio piracy
Domain Name Disputes and Cyber squatting

Examination Scheme:

Components	P/S/V	CT	A	C	EE
Weightage (%)	10	10	05	5	70

Text & References:

- Merges, Patent Law and Policy: Cases and Materials, 1996
- Brian C. Reid, A Practical Guide to Patent Law, 2nd Edition, 1993
- Brinkhof (Edited), Patent Cases, Wolters Kluwer
- Prof. Willem Hoyng & Frank Eijssvogels, Global Patent Litigation, Strategy
- Hilary Pearson and Clifford Miller, Commercial Exploitation of Intellectual Property

Status Prescribed :

- The Patent Act, 1970
- The Copyright Act, 1957
- The Trade Marks Act. 1999


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Syllabus - Semester Sixth

FUTURE ASPECTS OF INTELLECTUAL PROPERTY RIGHTS

Course Code: LAW2651

Credit Units: 03

Course Objective

The course is designed to provide comprehensive knowledge to the students regarding the effect of IPR especially of patents on emerging issues like public health, climate, Domain Name Disputes and Cyber squatting, Bio piracy etc. and the ways to tackle this problem,

Module I

Concept of property in Cyberspace

Implications on intellectual property Rights: International & National legal preparedness

Application of copyright Act 1957,

Scope of protection of computer program

Applications of patents to computer technology

Module II

Competition Law and Intellectual Property Rights: Confronting Paradigms

Introduction

What is Competition Policy and Law?

IPRs and IPRs Policy.

Framing the Competition-IPRs Relationship.

Module III

Case study related to both modules.

Examination Scheme:

Components	P/S/V	CT	A	C	EE
Weightage (%)	10	10	05	5	70

Text & References:

- W.R. Cornish, Intellectual Property, Sweet & Maxwell, London (2000)
- Avtar Singh, Competition Law, Eastern Book Company
- Dr. H. K. Saharay, Textbook on Competition Law, Universal Publications
- Brinkhof (Edited), Patent Cases, Wolters Kluwer
- Hilary Pearson and Clifford Miller, Commercial Exploitation of Intellectual Property


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Master of Law (LLM)

FLEXILEARN

-Freedom to design your degree



Programme Structure

Curriculum & Scheme of Examination

2022

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GURUGRAM

A handwritten signature in blue ink, appearing to read 'Anil'.

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A handwritten signature in blue ink, appearing to read 'Manesar'.

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RESEARCH METHOD AND LEGAL WRITING

Course Code: LAW4101

Credit Units: 03

Course Objective:

The main objective of this course is to acquaint the students of Law with the method of social science research. This course is expected to provide the knowledge of technique of selection, collection and interpretation of primary and secondary data in socio –legal research.

Course Contents:

Module-I: Nature and Scope

1. Meaning and Objective of Legal Research.
2. Kinds of Research.
3. Doctrinal and Non-Doctrinal Methods of Research.
4. Stages of Research Process.

Module-II: Research Problem, Hypothesis and Research Design

1. Research Problem- Definition, Determination, Sources of Data.
2. Hypothesis- Meaning and Definition, Characteristics.
3. Research Design- Meaning and Essentials of Research Design; Forms of Research Design.
4. Testing of Hypothesis.
5. Sampling Design- Basic Assumption, Classification.

Module-III: Research Methods and Tools

1. Social and Legal Survey.
2. Case Analysis.
3. Questionnaire Schedule.
4. Observation and Interview.

Module-IV: Tabulation, Analysis, Interpretation, Reporting and Legal Writing

1. Classification and Tabulation of Data.
2. Analysis and Interpretation of Data.
3. Use of Statistical Methods and Computers in Legal Research.
4. Reporting and Method of Citations.
5. Ethics in Research.
6. Foundation of Writing.

Examination Scheme:

Components	P/S/V	CT	C	A	EE
Weightage (%)	10	10	5	5	70

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Text & References:

- Garg,B.L, Karadia, R. Agarwal, F and Agarwal, U.K 2002. An Introduction to Research Methodology, RBSA Publishers.
- Kothari, C.R, 1990. Research Methodology: Methods and Techniques. New Age International
- Sinha, S.C and Dhiman, A.K, 2002. Research Methodology, Ess Publications (2 Volumes)
- Trochim, W.M.K., 2005, Research Methods: The Concise Knowledge base, Atomic Dog Publishing,



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COMPARATIVE PUBLIC LAW OR SYSTEM OF GOVERNANCE

Course Code: LAW4102

Credit Units: 03

Course Objective:

This course focuses on orientation of the students to understand the Constitutional Laws, their concept, constitutionalism and comparative Constitutional Law.

Course Contents:

Module-I: Public Law-Constitution and Administrative Law

1. Concept of Constitution

- Meaning and Idea of Constitution, Nature and Goals.
- Living Constitution.
- Constitution as Supreme Law.

2. Study of Comparative Constitutional Law

- Relevance
- Problems and Concerns in Using Comparison.

3. Constitutionalism

- Concept, Distinction between Constitution and Constitutionalism.
- Essential features of Constitutionalism -Written Constitution, Separation of Powers, Fundamental Rights, Independence of Judiciary and Judicial Review.

Module-II: Constitutional Foundations of Powers

1. Supremacy of Legislature in Law making.

2. Rule of Law

- Dicey's concept of Rule of Law.
- Modern concept of Rule of Law.
- Social and economic rights as part of Rule of Law.

3. Separation of powers

- Concept of separation of powers.
- Checks and balances.
- Separation of powers or separation of functions.

4. Forms of Governments

- Federal and Unitary Forms.
- Features, Advantages and Disadvantages.
- Models of Federalism and Concept of Quasi-federalism.
- Role of Courts in Preserving Federalism.
- Parliamentary and Presidential Forms of Government.

Module-III: Constitutional Review

1. Methods of Constitutional Review

- Judicial and Political Review
- Concentrated and Diffused Review
- Anticipatory and Successive Review

2. Concept and Origin of Judicial Review

3. Limitations on Judicial Review


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Module-IV: Amendment of Constitution

1. Various Methods of Amendment
2. Limitations on Amending Power: Comparative Perspective
3. Theory of Basic Structure: Origin and Development

Examination Scheme:

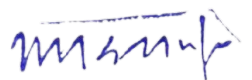
Components	P/S/V	CT	C	A	EE
Weightage (%)	10	10	5	5	70

Text & References:

- Barendt, An Introduction to Constitutional Law (1998)
- Cane, Administrative Law (4th ed 2004)
- Finer, Comparative Government (1970)
- Loughlin, The Idea of Public Law (2003)
- Marks, The Riddle of All Constitutions: International Law, Democracy, and Critique of Ideology (2000)
- Where, Modern Constitutions (2nd ed 1966) Zines, Constitutional Change in the Commonwealth (1991)
- Seervai, Constitution of India (4th Edition)
- Above is a non-exhaustive list of books, which students may find helpful to refer:



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INTELLECTUAL PROPERTY LAW

Course Code: LAW4105

Credit Units: 02

Course Objective

This Course is designed with the objective of acquainting students with the conceptual and operational parameters of Intellectual Property Law, the judicial interpretation and the new and emerging dimensions of the subjects. It also teaches them various aspects and rights that exist for them in emerging Intellectual Property Laws.

Course Contents:

Module-I:

1. Introduction to IPR
 - Introduction to various kinds of Intellectual Property Rights.
 - TRIPS & WTO

Module-II:

1. Patents
 - Meaning of Patents.
 - Subject matter of Patents.
2. Infringement of Patents and Remedies available
 - Patent of Addition, Rights of Patentee.
 - Transfer of Patents, revocation of Patents & leading Case Law.

Module-III:

1. Trademark
 - Introduction meaning and definition of Trademark,
 - Function and essentials of Trademark,
 - Similar and deceptive mark, principles of registration of Trademark,
2. Infringement of Trademark,
3. Passing off, Absolute & Relative Mark of Refusal & Leading Case Laws.

Module-IV:

1. Copyright
 - Meaning and definition of Copyrights.
 - Concept of Author and Owners of Copyrights.
 - Contract of Service and Contract for Service.
 - Infringement Under Section 51 of Copyrights Act 1957.
2. Fair dealing Under section 52.
3. Features of Copyrights and Remedies available & leading Case Laws.
- 4.

Module-V:

1. Trade Secret
 - Meaning of Trade Secret.
 - Definition of Trade Secret and Leading Laws.


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Examination Scheme:

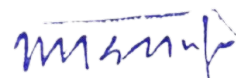
Components	P/S/V	CT	C	A	EE
Weightage (%)	10	10	5	5	70

Text & References:

- Chisum on Patents
- Intellectual Property, Dr. B.L. Wadhera



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FUNDAMENTAL RIGHTS AND DIRECTIVE PRINCIPLES

Course Code: LAW4106

Credit Units: 02

Course Objective:

This paper is designed with a view to educate the pupil about the Constitutional rights, duties and policies of the government underlining the relevant legislations which are having wider ramification on the interpretation of the provisions of the Constitution.

Course Contents:

Module-I: INTRODUCTION

1. Evolution of Fundamental Rights, impact of Universal Declaration of Human Rights and Constitutions of other countries on Fundamental Rights.
2. Concepts of Fundamental Rights, Bill of Rights, Natural Rights and Human Rights.
3. Preamble of the Constitution and its implication with reference to Fundamental Rights, Directive Principles of State Policy, and Fundamental Duties.
4. Definition of State under Art.12, 13 - Inviolability of Fundamental Rights.
5. Doctrine of Waiver, Doctrine of Severability, Doctrine of Eclipse, scope of definition of law under Art.13.

Module-II: RIGHT TO EQUALITY

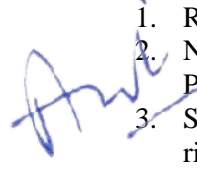
1. Relationship between Articles 14, 15, 16, 17, and 18.
2. Doctrine of Classification, Doctrine of Arbitrariness, Doctrine of Legitimate Expectation, Wendsbury Principle.
3. Prohibited grounds for discrimination (Art.15); special provisions relating to women; protective discrimination in favor of Backward Classes, Scheduled Castes and Scheduled Tribes; Development of case law.
4. Equality of Opportunity in the matters of public employment, reservations in public employment, residence as prerequisite for employment.
5. Untouchability, Abolition of Titles.

Module-III: RIGHT TO FREEDOM, RIGHT AGAINST EXPLOITATION

1. Six fundamental freedoms under Art.19 and reasonable restrictions under Art 19 (2) to (6); test to determine thereasonableness of restrictions; whether restriction includes deprivation and prohibition.
2. Rights of accused; Doctrine of ex-post -facto law; Doctrine of Double Jeopardy; privilege against self- incrimination.
3. Protection of life and personal liberty; right to education; safeguards against ordinary arrest and preventive detention; right against exploitation.
4. Ambit of religious freedom, cultural and educational rights.
5. Right to Constitutional remedies; Fundamental Rights vis-à-vis Armed Forces.
6. Martial Law and Armed Forces Special Powers Act.

Module-IV: DIRECTIVE PRINCIPLES OF STATE POLICY AND FUNDEMENTAL DUTIES

1. Relative importance of Directive Principles of State Policy (DPSP) and Fundamental Rights.
2. Nature of Directive Principles of State Policy; Justifiability of Directive Principles of State Policy.
3. Social security and welfare provisions under Directive Principles of State Policy; economic rights.


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4. Directive Principles of State Policy that were read into Fundamental Rights.
5. Fundamental Duties – evolution, relationship between Fundamental Rights and Duties.

Examination Scheme:

Components	P/S/V	CT	C	A	EE
Weightage (%)	10	10	5	5	70

Text & References:

- H.M. Seervai, Constitutional Law of India – Vol. I & II
- V.N.Shukla , Constitution of India
- Subhash C Jain, The Constitution of India
- D.D. Basu, Commentaries on Constitutional Law of India, Vol. A to E
- M. Hidayatullah (Ed.), Constitution of India
- M.P.Jain, Indian Constitutional Law
- Subba Rao G C V, Indian Constitutional Law
- Pande G S, Constitutional Law of India
- Saharay H K, Constitution of India
- Pylee M.V, Our Constitution, government & politics
- Tope T K, Constitutional Law of India



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INTERNATIONAL & REGIONAL INSTRUMENTS ON CHILD PROTECTION

Course Code: LAW4113

Credit Units: 02

Course Objective: In this Course, students will gain insight relative to the development of this specific Human Rights category, as well as to the evolution of the challenges faced by children over time and society's efforts to respond. They will learn more about global strategies and initiatives that have had success in promoting children's rights and will analyse these strategies throughout the Course. This Course will further provide the necessary tools for understanding the child protection and welfare under International Humanitarian Laws. The goal of the Course is to empower the students for the protection of children through academic training and action.

Course Contents:

Module I: General International Instruments Pertaining to the Rights of the Child

- UN Convention on the Rights of the Child.
- Universal Declaration of Human Rights.
- International Covenant on Civil and Political Rights.
- International Covenant on Economic, Social and Cultural Rights.

Module II: Specific International Instruments

- World Declaration on the Survival, Protection and Development of Children and its Plan of Action adopted at the 1990 World Summit for Children.
- United Nations Guidelines for Prevention of Juvenile Delinquency, 1990 (Riyadh Guidelines).
- United Nations Standard Minimum Rules for the Administration of Juvenile Justice, 1985 (Beijing Rules).
- United Nations Rules for Protection of Juveniles Deprived of their Liberty, 1990.
- International Convention for the Suppression of Traffic in Women and Children, 1921.
- SAARC Convention on Preventing and Combating Trafficking in Women and Children for Prostitution, 2002.

Module III: International Labour Organization Conventions pertaining to the Rights of the Child

ILO Convention on-

- Minimum age.
- Night work of young persons.
- Medical examination of young persons.
- Worst forms of Child Labour.

Module IV: Regional Instruments Pertaining to the Rights of the Child

- European Social Charter. European Convention on the Legal Status of Children Born out of Wedlock, 1975. European Convention on the Recognition and Enforcement of Decisions Concerning Custody of Children and on the Restoration of Custody of Children, 1980.
- American Convention on Human Rights. Additional Protocol to the American Convention on Human Rights in the Field of Economic, Social, and Cultural Rights.
- African Charter on the Rights and Welfare of the Child. African Charter on Human and Peoples' Rights.
- Hague Convention on the Protection of Children and Co-operation in Respect of Inter country Adoption, 1993.


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- Convention on the Civil Aspects of Child Abduction, 1980.

Module V: Protection of Children in International Humanitarian Law

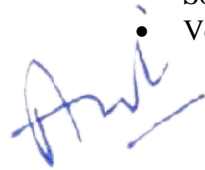
- Protection of children in the Geneva Conventions and their Additional Protocols.
- Special Protection of children, as members of the civilian population.
- Special provisions for protection against the effects of hostilities:
 1. Right to care and aid.
 2. The cultural environment of the child: Fourth Geneva Convention (Article 24 & Article 50), Protocol I (Article 78).
 3. The personal rights and education of children: Fourth Geneva Convention (Article 50), (Article 94), Protocol II for non-international armed conflicts (Article 4, 3, a).
 4. Respect of preferential treatment for children (Article 38).
 5. Rights of arrested, detained or interned children: Fourth Geneva Convention (Article 82-89), the release and repatriation (Article 132) Protocol I (Article 75, 5), (Article 77, 4).
 6. Children and death penalty (Article 68 (4) of the Fourth Geneva Convention Protocol I (Article 77, 5), Protocol II (Article 6, 4).
 7. Orphaned or separated children (Article 24).

Examination Scheme:

Components*	P/S/V	CT	A	CS/AS	EE
Weightage (%)	10	10	5	5	70

Text and References

- S.K. Awasthi & R.P. Kataria (2006), Law relating to Protection of Human Rights, Orient Publishing
- S.K. Kapur (2001), Human Rights under International Law and Indian Law, Central Law
- Bajpai, A. (2003) Child Rights in India: Law, Policy and Practice, New Delhi: Oxford University Press.
- Ghosh, A. (1998) A Primer of the Convention on The Rights of The Child, Calcutta: IPER.
- Bajpai, A, Burra, Neera and Weiner Myron (2006). Born Unfree: Child Labour, Education and the State in India
- Mehendale, A. (2012) Handbook for Local Authorities: on Commissions for Protection of Child Rights and Grievance Redressal, Bangalore: Centre for Child and the Law National Law School of India University.
- Manoharan, A. & Mehendale, A. (2012) Commissions for Protection of Child Rights: Answers to Common Questions Children May Have, Bangalore: Centre for Child and the Law National Law School of India University.
- Agrawal, Babita (2008) Child Labour: Issues, causes and interventions. Mahamaya Publication House.
- Chandru, K., Geetha, R. & Thanikachalam, C. (1998) Child Law in India, Chennai: Indian Council for Child Welfare.
- Kumar, Rajnish, Toiling Children in India: The gender dimension. Vol. 40 International Journal of Social Economics Bindley Emerald 885-897 (2013)
- Verhellen, E. (2006) Convention on the Rights of the Child, London: Garant Publishers.


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NATIONAL AND STATE POLICIES FOR CHILD PROTECTION AND DEVELOPMENT

Course Code: LAW4114

Credit Units: 02

Course Objective: To equip students with the skills of using appropriate knowledge of different child protection policies and services with role and responsibility of different stakeholders. It will further help in developing understanding of students about adoption of child friendly approach and practices among stakeholders.

Course Contents:

Module I: Policies and Schemes for Child Protection and Child Health

- National Policy for Children 1974 and 2013.
- National Charter for Children, 2003.
- Programmes / Schemes for restoring Child Health- Integrated Child Development Services ICDS, Integrated Child Protection Scheme ICPS, Substance Abuse and Mental Health Services Administration (SAMHSA), SAMHSA's SOAR program etc.
- Other National Policies on nutrition, population, education, health etc.
- Sustainable Development Goals on nutrition, population, education, health.

Module II: Child Education

- The Right of Children to Free and Compulsory Education Act, 2009.
 - Philosophy, Objectives and Key Provisions.
 - Challenges in Implementation.
- National Education Policy 2020 (NEP). Online Learning and its Challenges: Measures and Legislations to protect children from online offences such as Bullying, Stalking and Child Pornography etc.
- Other National Policies with implications for Child Development such as Skill Development Programme SABLA, National Child Labour Project Scheme, Single State Authority SSA etc. Essential components of Life Skill Education with adolescents and youth.
- Need and importance of coordination and cooperation between various stakeholders, such as Judiciary, Police, Administration, CSOs, NGOs, Media, Parents and Children themselves.

Module III: Environmental Protection for Child Welfare

- Environment and Child Relationship: Laws and Institutional Practices.
- Factors enabling Healthy Child.
- Judicial Approach.

Module IV: Other Measures for Child Protection

- National Commission for Protection of Child Rights: Services and Programmes for Institutional Care (Child line and Other Outreach Service, Open Shelter, Residential Care)
 - i. Principles and Process.
 - ii. Roles of each stakeholder and child participation.
 - iii. Challenges in Implementation and Interface with Juvenile Justice (Care and Protection of Children) Act, 2015.
 - iv. Child Participation.
- Allied Welfare Policies: National Institute of Public Cooperation and Child Development; Central Adoption Resource Authority) CARA and State Adoption Resource Agency SARA.

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Examination Scheme:

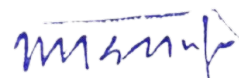
Components*	P/S/V	CT	A	CS/AS	EE
Weightage (%)	10	10	5	5	70

Text and References:

- Gangrade, K. D. (2001) Working with Community at the Grassroot level: Strategies and Programmes, New Delhi: Radha Publications.
- Dayaram (2011) School Management Committee and the Right to Education Act 2009, New Delhi: American India Foundation.
- Dabir, N.; Kashyap, L.; Bajpai, A. (et al) (2010) Saarathi Manual for Training of Frontline Workers in Child Development Agencies, UK: Kusuma Trust.
- GoI (Undated) School Education, Ministry of Human Resource Development, Government of India (Web)
- Munro, E. (2002) Effective Child Protection London: Sage
- Kabeer, N. et al (Ed.) (2003) Child Labour and the Right to Education in South Asia; Needs Versus Rights? New Delhi: Sage.
- SCF (2005) Child Rights Programming: How to apply rights-based approaches to programming, A Handbook for International Save the Children Alliance Members, II Ed. Lima-Peru: Save the Children.
- GoI (2012) The CPCR Act 2005 and Rules 2006. The Bare Act with Short Notes. Delhi: Universal Law Publishing Co. Pvt. Ltd
- Kumari, V. & Brooks, S.L. (2004) Creative Child Advocacy: Global Perspectives, New Delhi: Sage.



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DISSERTATION

Course Code: LAW4237

Credit Units: 03

Research Dissertations:

- (a) Dissertations are in the nature of monographs based on students' own research work under their respective Guides.
- (b) Length of Dissertations should be between 100-125 pages (typed in 12 points, double-spaced, on A-4 size paper, hard-bound).
- (c) Title-page of the Dissertation should mention its title followed by the words dissertation submitted to amity law school in partial fulfillment of the requirement for the degree of Master of Laws and should bear the students name and year of submission.
- (d) Contents-page of the Term Paper should give its chapter-plan consisting of proper headings and sub-headings. This will be followed by a Preface.
- (e) Each chapter of the Dissertation should begin on a fresh page and references in the prescribed style (given below) for each chapter should be given at the end of that chapter.
- (f) Table of Statutes, Table of Cases and Bibliography must be given in the Dissertation after the last chapter.

Assessment Scheme:

Dissertation

Continuous Evaluation: Based on the oral presentations [three], regularity and records etc. – 30%

Final Evaluation: Based on contents and layout of the report, conceptual framework, objectives and methodology and implications and conclusions. – 70%

Term Paper: Continuous Evaluation based on chapter-plan, general approach and two presentations – 30%

Final Evaluation: Based on the organization of the paper, objectives, comprehensiveness of the research, flow of the ideas, relevance of the material used. – 70%

Text & References:

- Books: DW Bowett, *Law of International Institutions*, 4thed, Delhi 2003, pp 11-13.
- Articles: GC Wadhwa, „Latest Trends in International Law“, *Delhi Law Review* 2 (1992) p 223
- Reports: National Human Rights Commission, *Annual Report 1996-97*, p 212
- Codes & Acts: Hindu Marriage Act 1955, Sec. 14
- Cases: Sarla Mudgal v Union of India AIR 1995 SC 337

* To avoid repetition of references learn to use expressions like *ibid* and *id at....* &, *supra* and *infra*, etc. Your Dissertation Guide will explain to you how to use these expressions.

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COMPETITION LAW

Course Code: LAW4202

Credit Units: 02

Course Objectives:

Competition Law course provides a conceptual understanding and in-depth knowledge of the Competition Act, 2002 and the regulatory framework concerning anti competitive agreements, abuse of dominant position and cartelization and other related matters that try to curb competition in India.

Course Contents:

Module-I: Introduction

1. Basic economic and legal principles.
2. Restraint of Trade Under Indian Contract Act.
3. Monopolistic Trade Practices, Restrictive Trade Practices.

Module-II: Development of Law from MRTP to Competition Act, 2002

1. Aims, Objective and salient features.
2. Comparison between MRTP Act & Competition Act.
3. Anti-Competitive Agreement, Abuse of Dominant Position, Combination.

Module-III: Competition Commission of India

1. Structure and function of Competition Commission of India.
2. Regulatory role.

Module-IV: Competition Appellate Tribunal

1. Composition, functions, powers & procedure.
2. Award Compensation, Power to punish for contempt, Execution of orders

Module-V: IPRs and Competition Law

1. Concept of IPRs, Transaction Involving IPRs, Licensing IPRs, Protection offered by IPRs,
2. Territorial restraints

Examination Scheme:

Components	P/S/V	CT	A	C	EE
Weightage (%)	10	10	5	5	70

Text & References:

- Competition Act 2002
- Security Contract (Regulation) Act 1956
- SEBI Act 1992
- Depositories Act 1996
- Foreign Trade (Development & Regulation) Act 1992


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INTERNATIONAL TRADE LAW

Course Code: LAW4203

Credit Units: 02

Course Objective:

This course aims to introduce the students to the specialized discipline of International Trade Law. It will acquaint the students with the basic aspects of International Trade Law including the WTO and its different principles and agreements.

Course Contents:

Module-I: INTRODUCTION TO INTERNATIONAL TRADE LAW

1. Meaning of International Trade Law.
2. Scope and subject covered under international Trade Law.

Module-II: Payment for International Sales

1. Letters of Credit, Bills of Exchange
2. Their functions and connected issues.

Module-III: World Trade organization (WTO) and General Agreement Tariffs and Trade (GATT) Background of formation of WTO, role of WTO in International Trade, Difference of GATT and WTO, Structure of WTO

1. Basic Principles: MFN Treatment, National Treatment and Non Discrimination and Exception to MFN.
2. Tariff and Bindings, Regional Trade Agreements, Escape clause, safeguard measures, quantitative restrictions, antidumping and counter-veiling duties.

Module-IV: International Trade Financing

1. Trade related investment measures (TRIMS).
2. General agreement on trade in services (GATS).
3. Trade related aspects on intellectual property rights (TRIPS).

Module-V: International Commercial Arbitration

1. Concept of Commercial Arbitration among different Countries.
2. Relation between India and World with regard to International Commercial Arbitration and its Legal effects.

Examination Scheme:

Components	P/S/V	CT	A	C	EE
Weightage (%)	10	10	5	5	70

Text & References

- Basic texts of GATT and WTO
- Jackson, John, H (1997) Law of International Trading System, The MIT Press
- Jackson, John, H (1997) World trade and Law of GATT, The MIT Press
- Dam, K.W (1970) the GATT Law and International Economic Organisation, Chicago University Press


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- Koul, A.K (2001) World Trade Organisation Satayam Publication
- Internet Sources www.wto.org, www.uncitral.org
- Text of the Indian Arbitration and Conciliation Act, 1996



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BANKING & INSURANCE LAW

Course Code: LAW4205

Credit Units: 02

Course Objective:

This course is designed with the objective of acquainting students with the conceptual and operational parameters of Banking law and Insurance Law, the judicial interpretation and the new and emerging dimensions of both Insurance as well as Banking sector. It also teaches the students the various aspects and rights that exist in the Banking and Insurance sector.

Course Contents:

Module-I: Banking System in India

1. Banking Regulation Laws: Reserve Bank of India Act, 1934, Banking Regulation Act, 1949.
2. Kinds of Banks and their functions; Relationship between banker and customer: Legal Character, Contract between banker & customer, Banks duty to customers.
3. The Banking Ombudsman Scheme, 1995 and the Liability under Consumer Protection Act, 1986.

Module-II: Lending, Securities and Recovery by Banks

1. Principles of Lending; Position of Weaker Sections.
2. Nature of Securities and Risks Involved.
3. Recovery of debts with and without intervention of courts / tribunal: Recovery of Debts due to Banks and Financial Institutions Act, 1993. Set up of Bank Debt Recovery Tribunals.

Module-III: Banking Frauds

1. Nature of Banking Frauds; Legal Regime to Control Banking Frauds;
2. Recent Trends in Banking: Automatic Teller Machine and Internet Banking, Smart Cards, Credit Cards.

Module-IV: Insurance Law

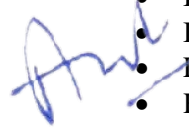
1. Nature of Insurance Contracts.
2. Kinds of Insurance:
 - Life Insurance, Medi claim, Property Insurance, Fire Insurance, Motor Vehicles Insurance (with special reference to third party insurance).
3. Insurance Regulatory And Development Authority Act, 2000;
 - Constitution, Functions and Powers of Insurance Regulatory and Development Authority;
4. Foreign Direct Investment (FDI) in Insurance sector and the Application of Consumer Protection Act, 1986.

Examination Scheme:

Components	P/S/V	CT	C	A	EE
Weightage (%)	10	10	5	5	70

Text & References:

- Banking Law & Negotiable Instruments Act – Sharma and Nainta
- Banking System, Frauds and Legal Control – R.P. Namita
- Law of Insurance – M.N. Mishra
- Handbook of Insurance and Allied Laws – C. Rangarajan
- Banking Law & Practice in India – M.L. Tannan.


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ADMINISTRATIVE LAW

Course Code: LAW4206

Credit Units: 02

Course Objective:

This course introduces students to various aspects of Administrative Law by examining the interaction between Public Administration and the Law. The main objectives of this course are to enable the students to:

- Understand the basic nature of Public Administration, the Courts, and Administrative Law.
- Be able to distinguish between Rulemaking, Adjudication, and Judicial Review.
- Be familiar with how Legislative and Judicial values have been infused in the Administrative State.
- Understand the implications and importance of Administrative discretion.

Course Contents:

Module-I:

1. Evolution and significance of Administrative Law in various systems of governance-from ancient to modern.
2. Doctrine of Separation of Powers: Comparative survey-Common Law and Continental System: England, USA, France and India from Rigidity to Flexibility.
3. Rule of Law: Changing dimensions, Regulation of administrative process.

Module-II:

1. Delegated Legislation: Problems, Process and Control.
2. Judicial Review of Delegated Legislation.

Module-III:

1. Processual Fairness: Evolution and Significance of Natural Justice:
 - a) England: Judicial Process, Doctrine of fairness and doctrine of legitimate expectation.
 - b) U.S.: Due process and judicial decision.
 - c) India : Through judicial decision-Doctrine of Fairness (Art.14, 19, 21).
2. Doctrine of Legitimate Expectation, Privilege against disclosure, official secrecy, Access to information and Right to Information Act.


Module-IV:

1. Global Administrative Law: Meaning, Scope and Relevance.
2. Global Administrative Law Challenges: Constitutional Issues/ Judicial Review.
3. Increased role of Global Institutions like UN, IMF, WB, WTO etc (Transparency, Accountability & Democracy).

Module-V:

1. Control on Maladministration: Ombudsman, Commissions of Inquiry, Vigilance Commissions.
2. Investigative Agencies: The CBI, Inquiries by Legislative Committee, Legislative control, Judicial Inquiries.

Examination Scheme:


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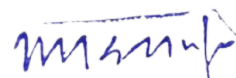
Components	P/S/V	CT	C	A	EE
Weightage (%)	10	10	5	5	70

Text & Reference Books

- Pater H. Schunk, Foundation of Administrative Law, 1994
- Friedman, The State and Rule of law in a mixed Economy.
- Ivor Jennings, Law & the Constitution
- Schwartz and Wade, Legal Control of Government
- De Smith, Judicial Review of Administrative Action, 1998
- D.D.Basu, Comparative Administrative Law, 1998
- K.S.Shukla and S.S.Singh, LokAyukta: A Socio-Legal Study, 1988
- Jain & Jain, Principles of Administrative Law



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RELIGION DIVERSITY & LAW

Course Code: LAW4207

Credit Units: 02

Course Objective:

The course aims at imparting knowledge as well as an understanding about the multifarious nature of culture and religion in the Indian society in relation to the legal and Constitutional system of India. Basically, this course seeks to sensitize students about the existing nexus between law, religion and culture.

Course Contents:

Module-I: Introduction

1. Law: concept and significance.
2. Religion: role and significance.
3. Culture: forms and contribution.
4. Effect of culture and tradition on law: Law as an instrument of social change.

Module-II: Relationship between Law, Religion and Culture

1. Relationship between religion, culture and law.
2. Religion as a tool of unity and diversity.
3. Right to Freedom of Religion and legal reforms on secular lines; Status of languages in India: recognized and official languages; Status of marginalized communities in India; Constitutional guarantees to linguistic minorities.

Module-III: Law, Diversities and Contemporary Social Problems

1. Fundamentalism, Communalism and Terrorism.
2. Secularism, Formation of Linguistic states, Constitutional policies on language.
3. Marginalized communities and protective discrimination and affirmative action policies.
4. Role of the Constitution in preserving unity; Judicial trends.

Module-IV: Alternative Approaches

1. Jurisprudence of Sarvodaya and the role of Mahatma Gandhi.
2. Role of Vinobha Bhave and Jayaprakash Narayan.
3. Socialist thought on Law and Justice; Indian Marxist critiques on Law and Justice
4. Alternate social movements.
5. Alternative Dispute Resolution; Lok Adalats and contemporary movements.

Examination Scheme:

Components	P/S/V	CT	C	A	EE
Weightage (%)	10	10	5	5	70

Text & Reference Books:

- Galanter, Marc; Law and Society in Modern India; Oxford University Press
- Lingat, Robert; The Classical Law of India; Oxford University Press
- Baxi, Upendra; The Crisis of the Indian Legal System; Vikas Publishing House
- Basu, Durga Das; Introduction to the Constitution of India; LexisNexis

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- Bhandari, M.K.; Basic Structure of Indian Constitution: A Critical Reconsideration; Deep and Deep Publication
- Robinson, Rowena; Sociology of Religion in India; Sage Publications
- Bhat, Ishwara; Law and Social Transformation; Eastern Book Company
- Tripathi; Law and Social Change: Indo-American Reflections; Indian Law Institute



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MEDIA LAW

Course Code: LAW4208

Credit Units: 02

Course Objective:

This course discusses the principles of media law as they apply to the work of media and communications professionals in a variety of fields. Understanding the current and evolving state of media law is a challenging task, therefore this course will introduce students to the study of legal and ethical issues in the media. Students will develop an understanding and appreciation of these issues and the ability to analyze the important legal and ethical issues involved with the mass media industry.

Course Contents:

Module-I: Media & Public Policy

I. Disseminating the facets of Media

1. Understanding the concept of Media
2. History of Media Theories of Media
3. Evolution of Media
1. Media Legislation - British experience
2. Media Legislation in U.S.
3. Media Legislation in Indian Context
1. Freedom of Expression in Indian Constitution
2. Interpretation of Media freedom
3. Issues of Privacy
4. Right to Information
5. Case studies on Media and Free expression

Module-II: Media - Regulatory Framework

1. Legal Dimensions of Media
2. Self Regulation & Other Issues

Module-III: Convergence & New Media

1. Understanding Broadcast Sector
2. Legislative efforts on Broadcast sector
3. Opening of Airwaves
4. The New Media of Internet

Module-IV: Media – Advertisement & Law

1. Concept of Advertisement
2. Advertisement & Ethics
3. Advertisement Act of 1954

Examination Scheme:

Components	P/S/V	CT	C	A	EE
Weightage (%)	10	10	5	5	70

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Text & Reference Books:

- N. Grover: Press and the Law.
- Basu: Laws of Press in India.
- K. S. Padhy: Battle for Freedom of Press in India.
- S. K. Aggarwal: Media and Ethics.
- M.P.Jai, Constitutional Law of India (1994) Wadhwa
- H.M.Seervai, Constitutional Law of India Vol.I (1991) Tripathi, Bombay
- Rajeev Dhavan “On the Law of the Press in India” 26 J.I.L.I. 288 (1984)
- Rajeev Dhavan, “Legitimizing Government Rhetoric : Reflections on Some Aspects of the Second Press Commission” 26 J.I.L.I. 391 (1984)
- Soli Sorabjee, Law of Press Censorship in India (1976)
- Justice E.S. Venkatramaiah, Freedom of Press : Some Recent Trends (1984)
- D.D. Basu, The Law of Press of India (1980)



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INTERNATIONAL CRIMINAL LAW

Course Code: LAW4209

Credit Units: 02

Course Contents:

Module I: Notion and General Features of the International Criminal Law

- 1.1. History of International Criminal Law.
- 1.2. Sources of the International Criminal Law
 - a. Treaty of Versailles,
 - b. Nuremberg & Tokyo Trials
 - c. Genocide Convention, 1948,
 - d. Geneva Convention, 1949, ILC Draft Code of Crimes against the Peace and Security
 - e. of Mankind
- 1.3. International Criminal Law and National Legal Systems.

Module II: Criminal Jurisdiction of States. Immunities

- 2.1. Mutual Legal Assistance in Criminal Matters and Extradition.
- 2.2. International Criminal Justice. International Criminal Courts and Tribunals
- 2.3 Individual Criminal Responsibility in International Criminal Law

Module III: International Crimes

- 3.1 War Crimes
- 3.2 Crimes against Humanity
- 3.3 Genocide
- 3.4 Crime of Aggression

Module IV: International criminal procedure

- 4.1 Penalties and Sentencing
- 4.2 Alternatives to International Criminal Justice
- 4.3 Future of International Criminal Justice

MODULE V: Some Practical Cases

Libyan Crisis

Essential Readings:

- Koenig, N., 2014. Between conflict management and role conflict: the EU in the Libyan crisis. European security, 23(3), pp.250-269.
- Koenig, N., 2011. The EU and the Libyan crisis—in quest of coherence?. The international spectator, 46(4), pp.11-30.
- Omorogbe, E.Y., 2012. The African Union, responsibility to protect and the Libyan crisis. Netherlands International Law Review, 59(2), pp.141-163.

Addl. Suggested Readings:

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- Pedde, N., 2017. The Libyan conflict and its controversial roots. European view, 16(1), pp.93- 102.
- Morana, W., 2020. The OSCE and the Libyan Crisis: Challenges and Opportunities for Comprehensive Security in the Mediterranean. Security and Human Rights, 30(1-4), pp.23- 38.
- Lounnas, D., 2018. The Libyan Security Continuum: The Impact of the Libyan Crisis on the North African/Sahelian Regional System. Middle East and North Africa Regional Architecture (MENARA) Working Papers, (15)

Syrian Crisis

Essential Readings:

- Yazgan, P., Utku, D.E. and Sirkeci, I., 2015. Syrian crisis and migration. Migration Letters, 12(3), pp.181-192.
- Cousins, S., 2015. Syrian crisis: health experts say more can be done. The Lancet, 385(9972), pp.931-934.
- Khashanah, K., 2014. The Syrian Crisis: a systemic framework. Contemporary Arab Affairs, 7(1), pp.1-21.

Addl. Suggested Readings:

- Li, X. and Li, D., 2014. Can night-time light images play a role in evaluating the Syrian Crisis?. International Journal of Remote Sensing, 35(18), pp.6648-6661.
- Hinnebusch, R. and Zartman, I.W., 2016. UN mediation in the Syrian crisis: from Kofi Annan to Lakhdar Brahimi. Raymond Hinnebusch, I. William Zartman, et al., "UN Mediation in the Syrian Crisis: From Kofi Annan to Lakhdar Brahimi," New York: International Peace Institute.
- Berti, B., 2015. The Syrian refugee crisis: Regional and human security implications. Strategic Assessment, 17(4), pp.41-53.

Russia Ukraine War

Essential Readings:

- Liadze, I., Macchiarelli, C., Mortimer-Lee, P. and Juanino, P.S., 2022. The economic costs of the Russia-Ukraine conflict. NIESR Policy Paper, 32.
- Tosun, O.K. and Eshraghi, A., 2022. Corporate decisions in times of war: Evidence from the RussiaUkraine conflict. Finance Research Letters, 48, p.102920.
- Ibendahl, G., 2022. The Russia-Ukraine Conflict and the Effect on Fertilizer.

Addl. Suggested Readings:

- Berninger, M., Kiesel, F. and Kolaric, S., 2022. Should I stay or should I go? Stock market reactions to companies' decisions in the wake of the Russia-Ukraine conflict.
- Stock market reactions to companies' decisions in the wake of the Russia-Ukraine conflict (April 20, 2022).
- Yousaf, I., Patel, R. and Yarovaya, L., 2022. The reaction of G20+ stock markets to the Russia Ukraine conflict. Available at SSRN.

Examination Scheme:

Components	P/S/V	CT	C	A	EE
Weightage (%)	10	10	5	5	70

POLICE LAW AND ADMINISTRATION

Course Code: LAW4210

Credit Units: 2

Course Objective:

The objective of this paper is to discuss about the Administration, Function, Duties and Problems of the Police. This paper also discusses the general laws governing police and the various reforms done to strengthen them.

Course Contents:

Module I - Police Administration and Management:

- Development of Police Force in India
- Hierarchical Structure of Police Force
- Code of Conduct for the Police
- Police Commissions

Module II – Introduction and Overview of Police Law:

- The Police Act, 1861
- The Police Act, 1949
- Other Specific Legislations

Module III – Functions, Duties and Problems of Police:

- Prevention of Offences
- Arrest and Release of Accused
- Investigation and Enquiry into Offences
- Frisking and Interrogation of Offenders or Suspects
- Search and Seizure
- Identification of Criminals and Crime Prone Area
- Police – Public Relations
- Forensic Science and Evidence

Module IV – Judicial Trends and Police Reforms:

- Constitution of the State Security Commission
- Separation of Investigation Staff from Law and Order Staff
- Constitution of a Police Establishment Board
- Constitution of Police Complaints Authority
- Establishment of a National Security Commission

Learning Outcome:

Students will able to

- Understand the basic knowledge about the police administration.
- Analyze the functions and duties of police authorities.
- Know about the measures taken by the state and National Security Commission.
- Determine the relationship of Police and Society.

Examination Scheme:

Components	P/S/V	CT	A	C	EE
Weightage (%)	10	10	5	5	70

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Text and References:

- Dr. Vijay Pal Singh: Law of Confession in India and Poison Tree Principle Published by Bright Law House.
- Dr. Vijay Pal Singh: Law Relating to Dying Declaration in India Published by Bright Law House.
- Dr. N. Maheshwara Swamy: Criminology and Criminal Justice System, Asia Law House.
- Arvind Verma & K.S. Subramanian: Understanding the Police in India, Lexis Nexis.
- B.L. Babel: Rajasthan Police Act & Rule.
- Swanson, C., Territo, L., & Taylor, R. (2016). Police Administration: Structures, Processes and Behaviour (9th ed.). Upper Saddle River, NJ: Pearson Publishing.
- Diaz, S.M., (1976), *New Dimensions to the Police Role and Functions in India*, Published by the National Police Academy, Hyderabad.
- Nehad Ashraf, (1992), *Police and Policing in India*, Common Wealth Publishers, New Delhi.
- Parmar M.S., (1992), *Problems of Police Administration*, Reliance Publishing House, New Delhi.



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CORPORATE CRIMES OR WHITE-COLLAR CRIMES

(Fundamental principles fundamental rights & directive principle)

Course Code: LAW4211

Credit Units: 02

Course Brief:

The increase in white-collar crime has presented unique issues for the criminal justice system. This course exposes students to nontraditional violent and nonviolent crimes that have significant physical, fiscal, and social costs. The study of white-collar crime has challenged commonly accepted explanations of crime and has introduced new complexities at all levels of the criminal justice system; including, widespread victimization, difficulties in crime discovery, ambiguous legal definitions, corporate and individual deterrence, and perceived disparities in sanctioning.

Learning Objectives:

This course provides Student with an understanding of the

- (1) issues and varieties of white-collar crime;
- (2) applicable theories and research;
- (3) intricacies in detecting, prosecuting and sentencing white-collar offenders; and
- (4) an overview of corporate crime and professional deviance

Learning Outcome:

Students will gain knowledge on: —

- Concept of White-Collar Crime.
- White Collar crimes prevalent in India and Legislative remedies

Course Contents:

Module – I Introduction

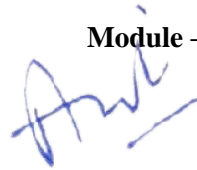
- 1.1 Nature, Concept & Scope of White-Collar Crime.
- 1.2 Classification of White-Collar Crime.
- 1.3 Sutherland's view on White Collar Crime.
- 1.4 Criticism of Sutherland's view on White Collar Crime.
- 1.5 White Collar Crime in India:-
 - 1.5.1 Hoarding, Black-marketing & Adulteration.
 - 1.5.2 Tax evasion.
 - 1.5.3 White collar crime in different professions – Medical, Engineering, Legal, Educational Institutions.
 - 1.5.4 Cyber Laws & Cyber Crimes

Module – II Corporate Crime

- 2.1 White collar crime in Business.
- 2.2 Fraud as defined under Company's Act, 2013.
- 2.3 Prosecution and Penalties.

Module – III Remedies to combat White Collar crime

- 3.1 White collar crime vs. Traditional crime.
- 3.2 Judicial response to White collar crime.
- 3.3 Remedial measures to curb White Collar Crimes.


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Module – IV Bribery and Anti Corruption Laws

4.1 The Prevention of Corruption Act, 2018

- 4.1.1 Salient features of the Act.
- 4.1.2 Offences committed by Public Servant & bribe giver.
- 4.1.3 Sanction for Prosecution.
- 4.1.4 Presumption where public servant accepts gratification.
- 4.1.5 Prosecution and Penalties.

4.2 Comparative Analysis of the Prevention of Corruption Act, 2018 with Foreign Corrupt Practices Act, 1977, USA and Bribery Act, 2010, UK.

4.3 Extra-territorial Reach of these Acts'

Module – V The Prevention of Money Laundering Act, 2002

- 5.1 Salient features of the Act.
- 5.2 Definition & Scope of Money Laundering.
- 5.3 Survey, Search & Seizure, Attachment.
- 5.4 Powers to arrest under the Act.
- 5.5 Adjudication by the Adjudicating authorities & Special Courts.
- 5.6 Obligation of banking companies, financial institutions and Intermediaries.
- 5.7 Comparative analysis of Laws dealing with Prevention of Money Laundering across USA, UK, Singapore with Laws in India.

Examination Scheme:

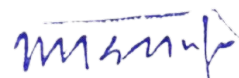
Components	P/S/V	CT	C	A	EE
Weightage (%)	10	10	5	5	70

Text & References:

- S.P. Singh, Socio- Economic Offences (1st Ed., 2005, Reprint 2015)
- Ahmed Siddiqui, Criminology: Problems and Perspectives (4th Ed., 1997)
- Seth and Capoor, Prevention of Corruption Act with a treatise on Anti- Corruption Laws (3rd Ed., 2000)
- C. Mehanathan, Law on Prevention of Money Laundering in India (2014)
- N.V Paranjape, Criminology, Penology with Victimology, 16th Ed., 2014, Central Law Publications



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CIVIL LAWS FOR CHILD RIGHTS

Course Code: LAW4212

Credit Units: 02

Course Objective: The upbringing of children is the responsibility of a nation as they behold the future of the nation. Irrespective of a child's circumstances, abandoned, neglected, or surrendered, every single child should get proper facility of living. To uphold every child's rights and to promote their best interests many Legislations have been enacted (Adoption Laws, Maintenance Laws, Labour Laws etc) which provide all the rights, privileges and responsibilities and a better standard of living for them. The nucleus of this Course is to elucidate upon all such Laws.

Course Contents:

Module I: Adoption& Maintenance

- Meaning of Adoption. Adoption in India. Procedure for Adoption.
- Adoption in Hindus (Pre & Post Hindu Adoption and Maintenance Act, 1956).Adoption under Juvenile Justice Act, 2015.
- Central Adoption Resource Authority and Inter-Country Adoption.
- Concept of Maintenance. Maintenance under Criminal Procedure Code, 1973.
- Maintenance under Hindu Personal Law (Hindu Adoption and Maintenance Act, 1956 & Hindu Marriage Act, 1955) and Muslim Personal Law.

Module II: Guardianship

- Meaning of Guardianship
- Guardianship under Hindu Law (Pre-1956 Act, Hindu Minority and Guardianship Act, 1956).
- Guardianship under Muslim Personal Law.
- Guardianship under other Religions- Guardians and Wards Act, 1890.

Module III: Marriage

- Marriage of a Minor under different Personal Laws.
- Option of Puberty.
- Child Marriage Restraint Act, 1929.
- Prohibition of Child Marriage Act, 2006.

Module IV: Property Rights

- Need for Property Rights of a child.
- Property Rights of a Child under Hindu Law.
- Property Rights of a Child under Muslim Law.

Module V: Labour Laws

- Child Labour (Prohibition & Regulation) Act, 1986.
- Factories Act, 1948 (Sections 22, 23, 27), **Domestic Workers (Registration Social Security and Welfare) Act, 2008** (Section 14).
- The Beedi and Cigar Workers (Conditions of Employment) Act, 1966 (Section 24), **Plantation Labour Act, 1951** (Section 25).


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Examination Scheme:

Components	P/S/V	CT	A	CS/AS	EE
Weightage (%)	10	10	5	5	70

Text & Reference Books:

- Agarwala, R.K. (2016). *Hindu Law*, Allahabad: Central Law Agency.
- Diwan, Dr. P. (2016). *Muslim Law in Modern India*, Allahabad: Allahabad Law Agency.
- Sinha, Dr. R.K. (2016). *Muslim Law*, Allahabad: Central Law Agency, 6th Ed.
- Myneni, Dr. S. R. (2018). *Hindu Law (Family Law-I)*, Hyderabad: Asia Law House.
- Mulla, D.F. (2018). *Hindu Law*, New Delhi: Lexis Nexis, 23rd Ed.
- Sagade, J. (2012). *Child Marriage in India: Socio-Legal and Human Rights Dimensions*, New Delhi: Oxford University Press India.



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CRIMES AGAINST CHILDREN

Course Code: LAW4213

Credit Units: 02

Course Objective: The study of Criminal Law is incomplete without discussing the crimes related to vulnerable sections of society like women and children. It is important to address this social concern in order to have a holistic approach towards Criminal Law. Children are considered an important asset of a nation as the future depends on how they mature and develop. In the present times, protection of children from all kinds of exploitation and abuses (sexual molestation, child marriage, child prostitution, child pornography and child labour etc.) has become the main objective of our society. This Course will focus on articulating different Laws which help in protecting the childhood so as to have a better understanding of the provisions helping in providing the basic necessities and protecting them. To achieve this aim, this Course has been introduced wherein a 360-degree approach has been taken to study the crimes and offences against children.

Course Contents:

Module I: Nature & Concept

- Definition of a Child (as per various Acts).
- Incidence of Crime against children in India.
- Classification of Offences against a Child.

Module II: Crimes against Children under Indian Penal Code, 1860

- Offences affecting Life (Sections 302, 304, 305, 307, 315, 316, 317).
- Kidnapping & Abduction (Sections 363, 363A, 364, 364A, 365, 366, 366A, 366B, 367, 368, 369, 372, 373).
- Sexual Offences (Sections 354, 354A-D, 376, 376A, 376AB, 376C, 376D, 376DA, 376DB, 377, 509).

Module III: Protection of Children from Sexual Offences Act, 2012 (POCSO)

- Objectives of the Act.
- Penetrative Sexual Assault, Aggravated Penetrative Sexual Assault, Sexual Assault, Aggravated Sexual Assault, Sexual Harassment. Using Child for Pornographic Purposes.
- Abetment of an Attempt to Commit an Offence.
- Procedure for Reporting of Cases and Recording Statement of the Child.
- Special Courts.

Module IV: Other Legislations w.r.t. to Offences against Children

- Prohibition of Child Marriage Act, 2006 (Section 9, 10, 11, 15).
- Juvenile Justice (Care and Protection of Children) Act, 2015 (Sections 74-89).
- Immoral Traffic (Prevention) Act, 1956 & Transplantation of Human Organs Act, 1994.
- Child Labour (Prohibition & Regulation) Act, 1986 (Sections 14, 15).
- Information Technology Act, 2000 (Sections 66A, 67, 67A, 67).

Examination Scheme:

Components*	P/S/V	CT	A	CS/AS	EE
Weightage (%)	10	10	5	5	70

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Text & Reference Books:

- Chatterjee, Dr. S.K. (2018). *Offences against Children and Juvenile Offence*, Allahabad: Central Law Publications.
- Joshi, N. (2021). *Protection of Children from Sexual Offences Act, 2012*, New Delhi: Kamal Publishers.
- Narayana, Justice P.S. (2018). *Commentary on The Protection of Children from Sexual Offences Act, 2012*, Delhi: Universal Law Publishing.
- Manjula, Dr. S.R. & Deepa, T.N. (2018). *The Children and Laws in India with Reference to POCSO Act, 2012*, Chennai: Notion Press.



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Bachelor of Architecture

FLEXILEARN

-Freedom to design your degree



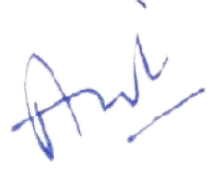
Programme Structure

Curriculum & Scheme of Examination

2022

AMITY UNIVERSITY HARYANA

GURUGRAM


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	ARCHITECTURAL GRAPHICS SKILLS-I (ARC2104)	L	T	S	P	C
Version 1.1	Date of Approval:	1	0	2	0	3
Pre-requisites/Exposure	Architectural Design- I					
Co-requisites	Basic Design & Visual Arts					

Catalog Description

The aim of this course is to provide the students with the basic tools and techniques for free hand drawing and technical drawings. The subject covers concept of scales and lettering and familiarize them with planar and solid geometry to conceptualize the 3D forms in to 2D with the help of Orthographic Projections of Planes and Solids including sections of solids as well.

Course Objectives

The objective of this course is

- To familiarize the students with various drawing tools and accessories used in drafting and lettering techniques to produce and visualize geometrical composition and form.
- To provide a clear understanding about the scale measurement; plane geometry, solid geometry and projections used as drawing technique.

Course Outcomes

On completion of this course, the students will be able to

CO1: Draw free hand drawing and lettering.

CO2: Project points, lines and planes in different positions in 1st angle projection system.

CO3: Project regular rectilinear and circular solids in different positions.

CO4: Apply their knowledge in making sections, intersections and interpretations of solids.

Modules	Blooms level*	Number of hours
MODULE 1: Free Hand Drawing and Lettering Free hand and mechanical lettering cycle.	L1	6
MODULE 2: Basic Technical Drawing Concept and types of line, Division of lines and angles, Drawing polygons, Inscribing and circumscribing circles in polygons, Drawing geometrical curves helix, Conoid etc.	L1, L2	6
MODULE 3: Orthographic Projections- Planes and Solids Definition, Meaning and concept, Planes of Projections, First angle projections, Projection of points, Lines and planes in different positions. Projection of regular rectilinear and circular solids (prisms, pyramids, cones, cylinders, spheres etc.) in different positions. Sections of regular rectilinear and	L1, L2, L3	18

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circular solids (prisms, pyramids, cones, cylinders, spheres etc) in varying conditions of sectional plane.		
MODULE 4: Solid Geometry Construction of section, Intersection and interpenetration of solid.	L1, L2, L3	6

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation*

Text Books:

- Bhatt, N.D. (53rd Edition 2014). Engineering Drawing: Charotar Publishing House Pvt. Ltd.
- Dhawan, R.K.(3rd Revised Edition 2006). A textbook of Engineering Drawing (In First Angle Projection): S Chand & Company.
- Ramsey & Sleeper. (Sixth Edition 1970). Architectural Graphic Standards: John Wiley & Sons.
- Shah, P.J. (Revised Edition 2013). Textbook of Engineering Drawing: S Chand (G/L) & Company Ltd.

References:

- Ching, Francis D.K. (6th Edition 2015). Architectural Graphics: John Wiley & Sons.
- Ganesan, R., & Devarajan, V. (1998). Intersecting features extraction from 2D orthographic projections. CAD Computer Aided Design, 30(11), 863–873. [https://doi.org/10.1016/S0010-4485\(98\)00043-8](https://doi.org/10.1016/S0010-4485(98)00043-8)
- Williams, E. (2001). Lettering. Eurostitch Magazine, 9(51), 28–29. https://doi.org/10.1007/978-94-010-2948-3_17

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Evaluation Scheme								Total Marks	Credits	Duration of Exam (hr)
Internal Assessment				External Assessment						
CT		TA	A	Total	ESE	ESJ	Total			
I	II									
10	10	25	5	50	50	0	50	100	3	3

CT: Class Test; TA: Total Assessment; A: Attendance; ESE: End Semester Examination; ESJ: End Semester Jury

CO, PO and PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	3	--	--	--	1	--	--	2	--	--	--	-	1	2	-	--
CO2	3	--	--	--	1	--	--	2	--	--	--	-	1	2	-	--
CO3	2	--	--	--	2	--	--	1	--	--	--	-	1	2	-	--
CO4	2	--	--	--	2	--	--	1	--	--	--	-	1	2	-	--

1: strongly related, 2: moderately related and 3: weakly related



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	VISUAL ARTS-I (ARC2105)	L	T	S	P	C
Version 1.1	Date of Approval:	1	0	2	0	3
Pre-requisites/Exposure	Architectural Design- I					
Co-requisites	Carpentry & Model Making					

Catalog Description

The aim of this course is to provide practical learning in creative thinking. The course intends to build student interest in think creative and express freedom of expression in Art, Paintings, and model making. The design and creative thinking course helps analyse complex shapes, design and application of colour.

Course Objectives

The objective of this course is

- To understand the elements and principles of Basic Design as the building blocks of creative design through exercises that will develop the originality, expression, skill and creative thinking.
- To familiarize with principles and theories of arts and architectural composition
- To develop presentation skills, visual expression and representation, imaginative thinking and creativity through free hand sketching and painting on various mediums and materials.
- To familiarize students with the grammar of art by involving them in a series of free hand exercises both indoor and outdoor to understand form, proportion, scale, etc.

Course Outcomes

On completion of this course, the students will be able to

CO1: Create 2d, 3D Graphic forms, size, and their proportions

CO2: Create object based painting and develop creative art forms

CO3: Apply architectural graphics skills and improve presentation skills

CO4: Create life-long connection in one's pursuit for painting and other art forms

Modules	Blooms level*	Number of hours
MODULE 1: Free Hand Sketching Warm-up module for students to gain exposure to the importance of sketching and drawings in architecture. Free hand still life sketching of composition of solids, cubes, cylinders etc. Study of light, shade and shadow. Free hand sketching in pencil of elements of scale like trees, shrubs, human, figures, vehicles etc. Indoor and Outdoor Sketching.	L1, L2, L3	9
MODULE 2: Live Sketching Live sketching in pencil of elements of scale like trees, shrubs, human, figures, vehicles etc. Indoor and Outdoor Sketching.	L1, L2, L3	9

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MODULE 3: Colour Theory and Colour Wheel Properties of colour – Colour schemes – Types of colours -primary, secondary and tertiary colours. Application and visual effects of colour.	L1, L2, L3, L4	9
MODULE 4: Color Course Introduction to Hue, Tint, Tone and Shades. Exercises for the same to study their impacts on still objects, buildings, etc	L1, L2, L3, L4	9

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation*

Text Books

- Pen & Ink Drawing: A Simple Guide by Book by Alphonso Dunn

Reference Books

- Ching, F. (1975). Architectural Drafting. In Architectural Graphics (pp. 15–19). Elsevier. <https://doi.org/10.1016/b978-0-85139-066-6.50005-5>
- Guptill, a L., & Meyer, S. E. (1997). Rendering in Pen and Ink. Proceedings of the 23rd annual conference on Computer graphics and interactive techniques SIGGRAPH 96 (Vol. 30, pp. 469–476). Retrieved from <http://portal.acm.org/citation.cfm?doid=237170.237287>
- Pencil Points reader: a journal for the drafting room, 1920-1943. (2004). Choice Reviews Online, 42(02), 42-0757-42-0757. <https://doi.org/10.5860/choice.42-0757>
- The American Institute of Architects. (2010). Architectural Graphic Standards for Residential Construction, 2nd Edition. American Institute of Architects, 1–720.

Modes of Evaluation: Quiz/Assignment/ Seminar/Practical

Examination Scheme:

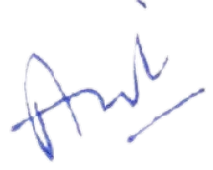
Evaluation Scheme								Total Marks	Credits	Duration of Exam (hr)
Internal Assessment					External Assessment					
CT		TA	A	Total	ESE	ESJ	Total			
I	II									
10	10	75	5	100	0	0	0	100	3	0

CT: Class Test; TA: Total Assessment; A: Attendance; ESE: End Semester Examination; ESJ: End Semester Jury

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	2	1	-	-	-	-	-	-	-	-	-	-	1	-	-	-
CO2	2	1	-	-	-	-	-	-	-	-	-	-	1	-	-	-
CO3	2	1	-	-	-	-	-	-	-	-	-	-	1	-	-	-
CO4	2	1	-	-	-	-	-	-	-	-	-	-	1	-	-	-

1: strongly related, 2: moderately related and 3: weakly related


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	STRUCTURE - I (ARC2109)	L	T	S	P	C
Version 1.1	Date of Approval:	2	0	0	0	2
Pre-requisites/Exposure						
Co-requisites	Building Materials & Construction Technology – I					

Catalog Description

The aim of this course is to enable students to understand various principles of strength of materials. The course covers Engineering mechanics, stress and strain of beams, shear force and bending moment theory. The subject will be taught in congruence with the Design studio, and assignments for the subject will be linked to the design exercises to achieve higher level of learning and understanding the practical application of the same.

Course Objectives

The objective of this course is

- To introduce the structural system in a building with all the basic components.
- To understand the functions of various elements and building technologies used in various types of buildings.
- To study of stresses and strains and their effect in various elements.
- To give an introduction to the basic principles governing structural systems.
- To introduce basic prefab and high-rise structure.

Course Outcomes

On completion of this course, the students will be able to

CO1: Explain basics of engineering mechanics

CO2: Define stresses and strains with their effects in various elements

CO3: Explain force and bending moment diagrams.

CO4: Understand prefab and high-rise building structure.

Modules	Blooms level*	Number of hours
MODULE 1: Engineering mechanics Introduction , force, resultant force, parallelogram ,triangle, and polygon law of forces, system of forces, Lami's theorem, moment of forces, parallel forces , couple , center of gravity , moment of inertia, friction , angle of friction, angle of repose, basics of pulley centripetal and centrifugal force, super elevation ,work, power, energy. Frame- perfect and imperfect frame, motion of a lift, lifting machine	L1, L2	06
MODULE 2: Stress and strain Introduction, direct stress and strain , shear stress and strain, stress strain diagram for mild steel, young's modulus , poisson's ratio, shear modulus, bending equation for beam in simple bending volumetric strain, bulk modulus, stress in bass of varying section, shear stress diagram, stresses in composite bass, flinched beams, stresses due to change in temperature, principal of superposition,	L1, L2	06

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principal stress and strain , Mohr's circle of stresses , resilience.		
MODULE 3: Shear Force and bending moment diagram, theory of yielding and failure Types Of Beams, Supports, Loadings, Assumption Of Theory Of Bending ,SFD And BMD, Material Failure, Structural Failure, Max Principal Stress (Rankine's theory), Max Principle Stress (Saint-Venant's principle), Maximum Shear Stress , Total Strain Energy Theory , Shear And Distortion Strain (von Mises and Hencky)	L1, L2	06
MODULE 4: Design principles and elementary concept for building construction systems Design principles of RCC beams and slabs. Construction system: reinforced concrete, pre-stressed concrete and prefab system and modular co-ordination. Load action and high-rise buildings, various structural systems for high rise buildings.	L1, L2	06

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation*

Text Books

- Arya, C. (2009). Eurocode 3: Design of steel structures. In Design of Structural Elements (pp. 375–433). CRC Press. <https://doi.org/10.1201/b18121-13>
- Emmitt, S., & Gorse, C. (2014). Barry's Advanced Construction Of Buildings Third edition. John Wiley & Sons, Ltd (Vol. 28, p. 581).
- Salvadori, M., & Heller, R. (1986). Structure In Architecture: The Building Of Buildings, Third Edition. Struct in Archit, The Build of Build, Third Ed. Prentice-Hall Inc.

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- Oppermann, R. H. (1941). Strength of materials, part I, elementary theory and problems. Journal of the Franklin Institute, 231(1), 96. [https://doi.org/10.1016/s00160032\(41\)90378-](https://doi.org/10.1016/s00160032(41)90378-)
- Von Glasersfeld, E. (2009). A model for the construction of elementary concepts (pp. 45– 50). AIP Publishing. <https://doi.org/10.1063/1.58258>

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Evaluation Scheme								Total Marks	Credits	Duration of Exam (hr)
Internal Assessment					External Assessment					
CT		TA	A	Total	ESE	ESJ	Total			
I	II									
10	10	25	5	50	50	0	50	100	2	3

CT: Class Test; TA: Total Assessment; A: Attendance; ESE: End Semester Examination; ESJ: End Semester Jury

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	2	-	-	1	-	-	-	1	-	-	-	2	2	1	-	-
CO2	2	-	-	1	-	-	-	1	-	-	-	2	2	1	-	-
CO3	2	-	-	1	-	-	-	1	-	-	-	2	2	1	-	-
CO4	2	-	-	1	-	-	-	1	-	-	-	2	2	1	-	-

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	ARCHITECTURAL GRAPHICS SKILLS-II (ARC2204)	L	T	S	P	C
Version 1.1	Date of Approval:	1	0	2	0	3
Pre-requisites/Exposure	Architectural Graphics Skills-I					
Co-requisites	Architectural Design-II, Basic Design and Visual Arts-II					

Catalog Description

The aim of this course is to provide the theoretical, practical and pictorial aspect of the architectural drawings to the students. The subject covers concepts of metric drawings and development surfaces familiarize them with isometric and axonometric views and development of the surfaces of basic forms. The subject will be taught in congruence with the design studio, and assignments for the subject will be linked to the design exercises to achieve higher level of learning and understanding the practical application of the same.

Course Objectives

The objective of this course is:

- To familiarize the students with theoretical, practical and pictorial aspects of architectural drawings.
- To develop the perception and presentation of simple architectural forms and buildings.
- To introduce the development of the basic forms in architecture.
- To equip the students with visualization and surface development of complex forms.

Course Outcomes

On completion of this course, the students will be able to

CO1: Recognize the need to combine the use of manual drawing tools and techniques for drafting and freehand drawing for architectural design communication.

CO2: Produce 3- Dimensional Architectural drawings and forms by using drawings/sketching and manual techniques.

CO3: Produce surface development of the simple geometric forms.

CO4: Produce and visualize the surface development of the complex architectural forms.

Modules	Blooms level*	Number of hours
MODULE 1: Introduction to Metric Drawing Types, uses and advantages, Isometric, Axonometric and Pictorial views, Metric Drawing and projection and their Dimensioning, Metric of plane figures composed of straight lines, Metric of circles, Metric of simple and complex block.	L1, L2, L3	6
MODULE 2: Isometric and Axonometric Drawings Preparation of Isometric and Axonometric views of the 3d composition of simple geometric forms, architectural manifestation and exploded Isometric of furniture and architectural plans.	L2, L3, L4	12
MODULE 3: Development of Surfaces of simple form	L1, L2, L3	12

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Development of surfaces of cubes, prisms, cylinders, pyramids, cones and spheres.		
MODULE 4: Development of Surfaces of complex composition of form Development of surfaces of composition of cubes, prisms, cylinders, pyramids, cones and spheres.	L3, L4, L5	6

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation*

Text Books

- Bhatt, N.D. (53rd Edition 2014). Engineering Drawing: Charotar Publishing House Pvt. Ltd.
- Dhawan, R.K.(3rd Revised Edition 2006). A textbook of Engineering Drawing (In First Angle Projection): S Chand & Company.
- Ramsey & Sleeper. (Sixth Edition 1970). Architectural Graphic Standards: John Wiley & Sons.
- Shah, P.J. (Revised Edition 2013). Textbook of Engineering Drawing: S Chand (G/L) & Company Ltd.

References

- Ching, Francis D.K. (6th Edition 2015). Architectural Graphics: John Wiley & Sons.
- Ganesan, R., & Devarajan, V. (1998). Intersecting features extraction from 2D orthographic projections. CAD Computer Aided Design, 30(11), 863–873. [https://doi.org/10.1016/S0010-4485\(98\)00043-8](https://doi.org/10.1016/S0010-4485(98)00043-8)
- Williams, E. (2001). Lettering. Eurostitch Magazine, 9(51), 28–29. https://doi.org/10.1007/978-94-010-2948-3_17

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Evaluation Scheme								Total Marks	Credits	Duration of Exam (hr)
Internal Assessment				External Assessment						
CT		TA	A	Total	ESE	ESJ	Total			
I	II									
10	10	25	5	50	50	0	50	100	3	3

CT: Class Test; TA: Total Assessment; A: Attendance; ESE: End Semester Examination; ESJ: End Semester Jury

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	3	--	2	--	1	--	--	3	3	--	--	-	1	2	--	--
CO2	3	--	2	--	1	--	--	3	3	--	--	-	1	2	--	--
CO3	2	--	2	--	1	--	--	3	3	--	--	--	1	2	--	--
CO4	2	--	2	--	1	--	--	3	3	--	--	--	1	2	--	--

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	VISUAL ARTS – II (ARC2205)	L	T	S	P	C
Version 1.1	Date of Approval:	1	0	1.5	1	3
Pre-requisites/Exposure	Visual Arts – I					
Co-requisites	Architectural Design - II					

Catalog Description

The aim of this course is to provide practical learning in creative thinking. The course intends to build student interest in think creative and express freedom of expression in Art, Paintings, and model making. The design and creative thinking course helps analyze complex shapes, design and application of colour.

Course Objectives

The objective of this course is to

- To introduce Art and appreciation its philosophies.
- To develop sensitivity towards sculpture and mural as an integral part of architecture.
- To familiarize with principles and theories of arts and architectural composition.
- To utilize the skills for rendering and paintings.

Course Outcomes

On completion of this course, the students will be able to

CO1: Create 2d, 3D Graphic forms, size, and their proportions

CO2: Create art forms with different mediums

CO3: Apply rendering techniques for indoor and outdoor painting.

CO4: Create life-long connection in one's pursuit for painting and other art forms

Modules	Blooms level*	Number of hours
MODULE 1: Art and Philosophy An introduction to the basic formal concepts in the two-dimensional arts and the principles of aesthetic organization. Using Shapes to construct aesthetically pleasing compositions	L1, L2, L3	9
MODULE 2: 2D Compositions An introduction to the basic formal concepts in the two-dimensional arts and the principles of aesthetic organization. Using Shapes to construct aesthetically pleasing composition	L1, L2, L3	9
MODULE 3: Rendering Rendering techniques, dot rendering, point rendering of still and live objects	L1, L2, L3, L4	9
MODULE 4: Painting Different types of painting styles and their masters and philosophy, Indoor and	L1, L2, L3, L4	9

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outdoor painting – Exercise involving Water colour – Water soluble colour pencil – Tempra – Acarali – Water soluble oil colour – Oil colour – Pen and ink – Brush – Air brush – Mixed mediums – Study of multi-colour and 3D effects from nature and built environment		
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*Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

- Pen & Ink Drawing: A Simple Guide by Book by Alphonso Dunn

Reference Books

- Ching, F. (1975). *Architectural Drafting*. In *Architectural Graphics* (pp. 15–19). Elsevier. <https://doi.org/10.1016/b978-0-85139-066-6.50005-5>
- Guptill, a L., & Meyer, S. E. (1997). *Rendering in Pen and Ink. Proceedings of the 23rd annual conference on Computer graphics and interactive techniques SIGGRAPH 96* (Vol. 30, pp. 469–476). Retrieved from <http://portal.acm.org/citation.cfm?doid=237170.237287>
- Pencil Points reader: a journal for the drafting room, 1920-1943. (2004). *Choice Reviews Online*, 42(02), 42-0757-42-0757. <https://doi.org/10.5860/choice.42-0757>
- The American Institute of Architects. (2010). *Architectural Graphic Standards for Residential Construction*, 2nd Edition. *American Institute of Architects*, 1–720.

Modes of Evaluation: Quiz/Assignment/ Seminar/Practical

Examination Scheme:

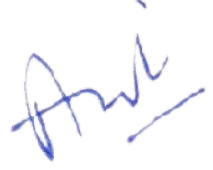
Evaluation Scheme								Total Mark s	Credits	Duration of Exam (hr)
Internal Assessment					External Assessment					
CT		TA	A	Total I	ESE	ESJ	Total			
I	II									
10	10	75	5	100	0	0	0	100	3	0

CT: Class Test; TA: Total Assessment; A:Attendance; ESE: End Semester Examination; ESJ: End Semester Jury

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	2	1	--	--	--	--	--	--	--	--	--	--	1	--	--	--
CO2	2	1	--	--	--	--	--	--	--	--	--	--	1	--	--	--
CO3	2	1	--	--	--	--	--	--	--	--	--	--	1	--	--	--
CO4	2	1	--	--	--	--	--	--	--	--	--	--	1	--	--	--

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	STRUCTURE – II (ARC2209)	L	T	P	S	C
Version 1.1	Date of Approval:	2	0	0	0	2
Pre-requisites/Exposure	Structure – I					
Co-requisites	Building Materials & Construction Technology – II					

Catalog Description

The aim of this course is to enable students to understand various principles of strength of materials especially in case of beams, columns and trusses. The course covers deflection of beams, forces in members of truss, condition of equilibrium and displacement methods. The subject will be taught is congruence with the Design studio, and assignments for the subject will be linked to the design exercises to achieve higher level of learning and understanding the practical application of the same.

Course Objectives

The objective of this course is

- To understand the basic principles of structural system so that it forms the basis for study of structural design.
- To help students to understand the basic principles of structural behavior and requirements of buildings with emphasis laid on the principles of various load distribution in beams and columns.
- To understand the basic principles of structural mechanics that would be pertinent to simple design elements and understanding the structural behavior of buildings.

Course Outcomes

On completion of this course, the students will be able to

CO1: Calculate deflection of beams through analytical method.

CO2: Analyze the resolution of forces as well as various study of various theorem related to equilibrium.

CO3: Explain force and bending moment diagrams.

CO4: Calculate deflection in beams and trusses through graphic and conjugate method.

Modules	Blooms level*	Number of hours
MODULE 1: Deflection of Beams Equation for deflection of beams, formula for maximum deflection under various loading conditions, shear stress in shaft, stiffness of a spring- leaf and helical spring. Column and struts – effective length, buckling load, short or long column, slenderness ratio, Rankine's formula, Euler's formula, dams and retaining walls, Rankine's theory for active earth pressure	L1, L2	6
MODULE 2: Forces in Members Of Trusses Types of Trusses, Method of Section, Method of Joint, Analytical Method, Graphical Method, Analysis of Plane Trusses and Space Trusses	L1, L2	6
MODULE 3: Statically Determinate and In-determinate Structures	L1, L2	6

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Condition of equilibrium, compatibility conditions, simple and compound systems, linear and nonlinear systems, sway and sinking, analysis of statically determinate formulas.		
MODULE 4: Displacements – Geometric Methods Deflected shapes, moment area method, conjugate beam method, deflection of trusses – graphical method.	L1, L2	6

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation*

Text Books

- Arya, C. (2009). Eurocode 3: Design of steel structures. In Design of Structural Elements (pp. 375–433). CRC Press. <https://doi.org/10.1201/b18121-13>
- Emmitt, S., & Gorse, C. (2014). Barry's Advanced Construction Of Buildings Third edition. John Wiley & Sons, Ltd (Vol. 28, p. 581).
- Salvadori, M., & Heller, R. (1986). Structure In Architecture: The Building Of Buildings, Third Edition. Struct in Archit, The Build of Build, Third Ed. Prentice-Hall Inc.

References

- Oppermann, R. H. (1941). Strength of materials, part I, elementary theory and problems. Journal of the Franklin Institute, 231(1), 96. [https://doi.org/10.1016/s00160032\(41\)90378-](https://doi.org/10.1016/s00160032(41)90378-)
- Von Glasersfeld, E. (2009). A model for the construction of elementary concepts (pp. 45– 50). AIP Publishing. <https://doi.org/10.1063/1.58258>

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

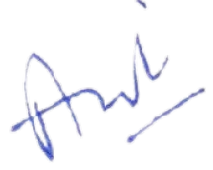
Evaluation Scheme								Total Marks	Credits	Duration of Exam (hr)
Internal Assessment					External Assessment					
CT		TA	A	Total I	ESE	ESJ	Total			
I	II									
10	10	25	5	50	50	0	50	100	2	3

CT: Class Test; TA: Total Assessment; A: Attendance; ESE: End Semester Examination; ESJ: End Semester Jury

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	--	--	--	1	--	--	--	1	--	--	--	2	2	1	--	--
CO2	--	--	--	1	--	--	--	1	--	--	--	2	2	1	--	--
CO3	--	--	--	1	--	--	--	1	--	--	--	2	2	1	--	--
CO4	--	--	--	1	--	--	--	1	--	--	--	2	2	1	--	--

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	ARCHITECTURAL GRAPHICS SKILLS-III (ARC2304)	L	T	S	P	C
Version 1.1	Date of Approval:	1	0	2	0	3
Pre-requisites/Exposure	Architectural Graphic Skills – II					
Co-requisites	Architectural Design – III					

Catalog Description

The aim of this course is to develop essential manual skills such as proficiency in drawing, largely used as primary mode of communication of ideas in architectural design. Students will be introduced to a variety of tools and techniques for visual expression with emphasis on manual drawing. Architectural Graphics-II introduces advanced techniques for architectural drawing such as perspective projection, mix-media renderings etc. The course would help students identify suitable methods of representation and methods in different built environment scenarios.

Course Objectives

The objective of this course is

- To familiarize the students with One Point Perspective visualization of architectural drawing.
- To familiarize the students with Two Point Perspective visualization of architectural drawing.
- To introduce a variety of tools and techniques for visual expression with emphasis on manual drawing.
- To introduce the geometrical method of producing shadows in Architectural Drawings.

Course Outcomes

On completion of this course, the students will be able to

CO1: Recognize the need to combine the use of manual drawing tools and techniques for drafting architectural design communication.

CO2: Apply the projected drawing method of exterior and interior perspective

CO3: Render the drawings in different mediums.

CO4: Draw views demonstrating the play of light and shadows.

Modules	Blooms level*	Number of hours
MODULE 1: One Point Perspective Drawing One perspectives of combination of geometrical forms, Building exterior and interior perspectives.	L3, L4	12
MODULE 2: Two Point Perspective Drawing Two perspectives of combination of geometrical forms, Building exterior and interior perspectives. Introduction to three-point perspective and basic exercises based on the same	L3, L4	12
MODULE 3: Rendering	L4, L5	6

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Rendering perspectives in different media (Dry and water based color and ink etc.). Presentation techniques in different types of rendering and materials. Variation in color/ ink, as per light position. Use of basic plantation, vehicles etc to introduce scale to building perspectives.		
MODULE 4: Sciography Values in shades and shadows, constructing plan shadows (point, line and plane), Constructing shadows in elevations (Point, line and Plane). Short- cut methods for constructing shadows. Introduction of sciography in perspective drawings.	L4,L5	6

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation*

Text Books:

- N D Bhatt,(2014).Engineering Drawing,(Plane and solid geometry),Delhi, Charotar Publishing house.

References

- Francis D.K. Ching (1979),Architecture: Form, Space and Order, John Wiley& Sons Publication
- Heller Robert and Salvadori Mario (1975),Structure in Architecture, Englewood Cliffs, N.J.Prentice-Hall
- Parmar V.S.(1973), Design Fundamental in Architecture, Somaiya Publications

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Evaluation Scheme								Total Mark s	Credit s	Duration of Exam (hr)
Internal Assessment					External Assessment					
CT		TA	A	Total	ESE	ESJ	Total			
I	II									
10	10	25	5	50	50	0	50	100	3	3

CT: Class Test; TA: Total Assessment; A:Attendance; ESE: End Semester Examination; ESJ: End Semester Jury

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1	--	3	--	--	--	2	--	--	--	--	--	1	2	--	--
CO2	1	--	2	--	--	--	--	--	--	--	--	--	1	2	3	--
CO3	1	--	2	--	--	--	--	--	--	--	--	--	1	2	3	--
CO4	1	--	3	--	--	--	--	--	--	--	--	--	1	2	3	--

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	VISUAL ARTS – III (ARC2305)	L	T	S	P	C
Version 1.1	Date of Approval:	1	0	1.5	1	3
Pre-requisites/ Exposure	Visual Arts – II					
	Architectural Design - III					

Catalog Description

The aim of this course is to provide practical learning in creative thinking. The course intends to build student interest in think creative and express freedom of expression in Art, Paintings, and model making. The design and creative thinking course helps analyse complex shapes, design and application of colour.

Course Objectives

The objective of this course is

- To introduce the concept of perspectives and perspective drawings.
- To develop architectural skills of perspectives
- To familiarize with principles and theories of arts and its appreciation techniques.
- To introduce the concept of shades and shadows in architecture drawing.

Course Outcomes

On completion of this course, the students will be able to

CO1: Appreciate art and art works and re-create them in form of logos, symbols, etc.

CO2: Create perspectives for surroundings and buildings

CO3: Understand the importance of shading devices in architecture

CO4: Understand the role of shades and shadows in building construction

Modules	Blooms level*	Number of hours
MODULE 1: Art Appreciation Graphic representations – Visual composition and Abstraction- Exercises involving Logo design, collage, calligraphy and printing.	L1, L2, L3	9
MODULE 2: Perspective (Free-Hand) Free-hand perspective drawing and rendering of imagined objects, in pencil and pen/ink. One and two point perspective drawings of solids and of different room interiors.	L1, L2, L3	9
MODULE 3: Perspective (Free-Hand) Free-hand perspective drawing of complex composition of solids. One and two point perspective view of the exterior of the building with understanding of the basic human proportion and scale. Introduction to three point perspective.	L1, L2, L3, L4	9
MODULE 4: Sciography Values in shades and shadows, Constructing plan shadows (point, line and	L1, L2, L3, L4	9

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plane), Constructing shadows in elevations (Point, line and Plane). Short- cut methods for constructing shadows Presentation techniques in different types of rendering techniques and materials.		
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*Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

- Pen & Ink Drawing: A Simple Guide by Book by Alphonso Dunn

Reference Books

- Ching, F. (1975). Architectural Drafting. In Architectural Graphics (pp. 15–19). Elsevier. <https://doi.org/10.1016/b978-0-85139-066-6.50005-5>
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- Pencil Points reader: a journal for the drafting room, 1920-1943. (2004). Choice Reviews Online, 42(02), 42-0757-42–0757. <https://doi.org/10.5860/choice.42-0757>
- The American Institute of Architects. (2010). Architectural Graphic Standards for Residential Construction, 2nd Edition. American Institute of Architects, 1–720.

Modes of Evaluation: Quiz/Assignment/ Seminar/Practical

Examination Scheme:

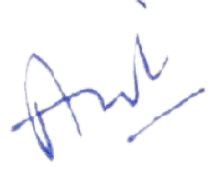
Evaluation Scheme								Total Marks	Credits	Duration of Exam (hr)
Internal Assessment					External Assessment					
CT		TA	A	Total I	ESE	ESJ	Total I			
I	II									
10	10	75	5	100	0	0	0	100	3	0

CT: Class Test; TA: Total Assessment; A:Attendance; ESE: End Semester Examination; ESJ: End Semester Jury

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	2	1	--	--	--	--	--	--	--	--	--	--	1	--	--	--
CO2	2	1	--	--	--	--	--	--	--	--	--	--	1	--	--	--
CO3	2	1	--	--	--	--	--	--	--	--	--	--	1	--	--	--
CO4	2	1	--	--	--	--	--	--	--	--	--	--	1	--	--	--

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	STRUCTURE - III (ARC2308)	L	T	S	P	C
Version 1.1	Date of Approval:	3	0	0	0	3
Pre-requisites/Exposure	Structure – II					
Co-requisites	Building Materials & Construction Technology – III					

Catalog Description

The aim of this course is to understand the ground situation before preparing an architectural design of any type of structure. In this course basic principles of structural mechanics that would be pertinent to simple design elements and understanding the structural behavior of buildings. The survey maps will be foundation documents for selection of technique of design based on ground elevation and contour pattern of proposed site. This subject covers the conceptual theory and practical application of surveying and leveling on ground with help of various survey concepts, techniques, methods and instruments.

Course Objectives

The objective of this course is

- To understand an informal choice regarding the most appropriate structural system for the building design due to different types of loading.
- To provide a basic understanding about the structural modeling and research techniques in the field of Architecture.
- To understand the role of surveying and leveling in architecture and will be introduced to the techniques and equipment's for land surveying.

Course Outcomes

On completion of this course, the students will be able to

CO1: Explain the calculation of concentrated loads

CO2: Define the basis of arches and cables

CO3: Analyze Frame – With Lateral Translation and With No Lateral Translation of Joints by Slope deflection method and Moment deflection method

CO4: Explain frames with and without lateral translation of joints

Modules	Blooms level*	Number of hours
MODULE 1: Loads and spans Introduction, single concentrated load, udl longer than the span, UDL shorter than the span, two concentrated spans, series of concentrated loads, equivalent UDL	L1, L2	6
MODULE 2: Arches and Cables Basis of arches, cables and suspension in bridges, basic concept, frames with and without lateral translations of joints, general case – 1 story column slender in height and bases fixed or hinged.	L1, L2	8
MODULE 3: Slope deflection method and Moment distribution Method	L1, L2	14

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Slope Deflection Method and Moment Distribution Method, Development of Slope Deflection, Equation, Analysis Of Frame – With Lateral Translation And With No Lateral Translation Of Joints. MDM- Development of Method, Analysis Of Frames With Lateral Translation And With No Lateral Translation Of Joints, Symmetrical Frames, Multi Storey Frames, No Shear Moment Distribution		
MODULE 4: Kani's Method Basic concept, frames with and without lateral translation of joints, general cases, story column unequal in height and bases fixed or hinged	L1, L2	8

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation*

Text Books

- Arya, C. (2009). Eurocode 3: Design of steel structures. In Design of Structural Elements (pp. 375–433). CRC Press. <https://doi.org/10.1201/b18121-13>
- Emmitt, S., & Gorse, C. (2014). Barry's Advanced Construction Of Buildings Third edition. John Wiley & Sons, Ltd (Vol. 28, p. 581).
- Salvadori, M., & Heller, R. (1986). Structure In Architecture: The Building Of Buildings, Third Edition. Struct in Archit, The Build of Build, Third Ed. Prentice-Hall Inc.
- Oppermann, R. H. (1941). Strength of materials, part I, elementary theory and problems. Journal of the Franklin Institute, 231(1), 96. [https://doi.org/10.1016/s00160032\(41\)90378-](https://doi.org/10.1016/s00160032(41)90378-)
- Von Glasersfeld, E. (2009). A model for the construction of elementary concepts (pp. 45– 50). AIP Publishing. <https://doi.org/10.1063/1.58258>

References

- Guo, Y., Du, Q., Luo, Y., Zhang, W., & Xu, L. (2008). Application of augmented reality GIS in architecture. In The International Archives of Photogrammetry, Remote Sensing and Spatial Information Sciences (Vol. XXXVII, pp. 331–336). ISPRS.
- Kilford, W. K. (1979). SURVEYING FOR ENGINEERS. Survey Review, 25(192), 94–96. <https://doi.org/10.1179/sre.1979.25.192.94>

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Evaluation Scheme								Total Marks	Credits	Duration of Exam (hr)
Internal Assessment					External Assessment					
CT		TA	A	Total I	ESE	ESJ	Total			
I	II									
10	10	25	5	50	50	00	50	100	3	3

CT: Class Test; TA: Total Assessment; A: Attendance; ESE: End Semester Examination; ESJ: End Semester Jury

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	--	--	--	1	2	--	--	1	--	--	--	3	2	1	--	--
CO2	--	--	--	1	2	--	--	1	--	--	--	3	2	1	--	--
CO3	--	--	--	1	2	--	--	1	--	--	--	3	2	1	--	--
CO4	--	--	--	1	2	--	--	1	--	--	--	3	2	1	--	--

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	SURVEYING AND LEVELLING (ARC2313)	L	T	S	P	C
Version 1.1	Date of Approval:	1	0	1.5	1	3
Pre-requisites/Exposure	Structure – II					
Co-requisites	Structure – III					

Catalog Description

The aim of this subject is to make students understand the ground situation before preparing an architectural design of any type of structure. The survey maps will be foundation documents for selection of technique of design based on ground elevation and contour pattern of proposed site. This subject covers the conceptual theory and practical application of surveying and leveling on ground with help of various survey concepts, techniques, methods and instruments. The subject will be taught is congruence with the Design studio, and assignments for the subject will be linked to the design exercises to achieve higher level of learning and understanding the practical application of the same.

Course Objectives

The objective of this course is

- To understand the role of surveying and leveling in architecture
- To introduce the techniques and equipment for land surveying.
- To understand the practical surveying in the field.

Course Outcomes

On completion of this course, the students will be able to

- CO1:** Enable the students to understand land topography and its connection with surveying & leveling exercises.
- CO2:** Enable the students to understand the primary basic surveying techniques adopted in past years.
- CO3:** Enable the students to understand essentials parameters (basic and advanced) of leveling with various instruments & methods and concept of contouring.
- CO4:** Enable to do contour and slope analysis for a building.

Modules	Blooms level*	Number of hours
MODULE 1: Introduction to surveying Introduction to surveying, its practicality in the profession. Classification of various survey instruments, techniques & equipment. Reading of survey maps, understanding of features and undulations of ground. Scaling of survey measurements and errors in surveying. Concept of trigonometry, traversing & tachometry in surveying.	L1, L2	04
MODULE 1: Measurements Measurements in horizontal plane, linear measurements with chain & tape, setting-out & survey stations, survey accessories, survey lines, open & closed traverse, chaining & offsetting, direct & indirect ranging, log-books, field boundaries, field area estimation. Chain Surveying: Principles of survey, equipment required selection of station, methods of taking offsets. Compass	L1, L2	09

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Surveying: The prismatic compass, its construction and uses and other types of compasses.		
MODULE 3: Basic and advanced surveying techniques Plane table surveying (equipment, methods, advantage & disadvantage, errors etc.), Theodolite Surveying (temporary & permanent adjustment, measuring of magnetic bearings, horizontal & vertical angles and Theodolite traverse & balancing closing error). Tachometric surveying (general instruments, different systems of tachometric measurements, stadia method). The concept of total station survey and its multi-functioning in surveying. Introduction to Use of DGPS, automated & digital surveying, G.P.S, Aerial Photography, etc.	L1, L2	14
MODULE 4: Contours and Slope Analysis Contouring methods & equipment, contour intervals, direct & indirect methods of contouring, block contour surveys, profile levelling, longitudinal & traverse cross sections, and gradients. Measurements along sloping landforms, principles, definitions, methods, instruments required for simple & differential levelling.	L1, L2	09

*Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books & References

- Clancy, J. (2013). *Site Surveying and Leveling*. Site Surveying and Leveling. Routledge. <https://doi.org/10.4324/9780080928487>.
- Ježko, J. (2014). Calibration of Surveying Instruments and Tools – Means to the Quality Increase of Deformation Measurements. *Journal of Sustainable Mining*, 13(4), 17–22. <https://doi.org/10.7424/jsm140404>
- Zhang, L., Mao, Q., Li, Q., & Zhang, P. (2014). An accuracy-improvement method for GPS/INS kinematic leveling for use in linear engineering surveying projects. *Measurement: Journal of the International Measurement Confederation*, 54, 22–30. <https://doi.org/10.1016/j.measurement.2014.03.026>

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Evaluation Scheme								Total Marks	Credits	Duration of Exam (hr)
Internal Assessment				External Assessment						
CT		TA	A	Total I	ESE	ESJ	Total			
I	II									
10	10	25	5	50	50	0	0	100	3	0

CT: Class Test; TA: Total Assessment; A: Attendance; ESE: End Semester Examination; ESJ: End Semester Jury

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	--	2	--	3	--	--	--	2	1	--	2	--	2	1	3	--
CO2	--	2	--	3	--	--	--	2	1	--	2	--	2	1	3	--
CO3	--	2	--	3	--	--	--	2	1	--	2	--	2	1	3	--
CO4	--	2	--	3	--	--	--	2	1	--	2	--	2	1	3	--

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	STRUCTURE - IV (ARC2409)	L	T	S	P	C
Version 1.1	Date of Approval:	3	0	0	0	3
Pre-requisites/Exposure	Structure –III					
Co-requisites	Structure – V					

Catalog Description

The aim of this course is to enable students to understand various principles of strength of materials especially in case of beams, columns and trusses. The course covers deflection of beams, forces in members of truss, condition of equilibrium and displacement methods.

Course Objectives

The objective of this course is

- To understand rational basis of the design of reinforced concrete members and structures through advanced materials and structural behavior.
- To enable students to undertake problems, identify, formulate and solve the critical thought, rational inquiry and self-directed learning.

Course Outcomes

On completion of this course, the students will be able to

CO1: Describe the building materials used in construction such as cement, fine and coarse aggregate, reinforcement, etc.

CO2: Design a slab for given building floor for different end support conditions.

CO3: Design a column for given axial load and moments.

CO4: Develop understanding about complex foundations and the construction techniques involved.

Modules	Blooms level*	Number of hours
MODULE 1: Material and Design Method Cement, Fine and Coarse Aggregate, Water, Admixtures, Reinforcements, Properties and Tests For Concrete, WSM Vs LSM, Soil Mechanics, Basis Of Soil Properties, Soil Type, Bearing Capacity, Terzaghi's And Skempton's Formula.	L1, L2	09
MODULE 2: Beams and Slabs Using LSM and WSM Singly Beam, Doubly Beams, T, L Beams, Slabs – Rectangle, Circular, One Way, Two Way, Flat. Using IS 456:2000 And SP -16, Continuous Beams and Slabs.	L1, L2	09
MODULE 3: Column and Footing Short column and long column, minimum eccentricity, column subjected to combined axial load, uniaxial bending and biaxial bending, design of footing.	L1, L2	09
MODULE 4: Pile and Raft Foundation Design Of RCC Piles, Pile Caps, Raft Foundation (Theory)	L1, L2	09

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**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation*

Text Books

- Arya, C. (2009). Eurocode 3: Design of steel structures. In Design of Structural Elements (pp. 375–433). CRC Press. <https://doi.org/10.1201/b18121-13>
- Emmitt, S., & Gorse, C. (2014). Barry's Advanced Construction Of Buildings Third edition. John Wiley & Sons, Ltd (Vol. 28, p. 581).
- Salvadori, M., & Heller, R. (1986). Structure In Architecture: The Building Of Buildings, Third Edition. Struct in Archit, The Build of Build, Third Ed. Prentice-Hall Inc.

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- Oppermann, R. H. (1941). Strength of materials, part I, elementary theory and problems. Journal of the Franklin Institute, 231(1), 96. [https://doi.org/10.1016/s00160032\(41\)90378-](https://doi.org/10.1016/s00160032(41)90378-)
- Von Glasersfeld, E. (2009). A model for the construction of elementary concepts (pp. 45– 50). AIP Publishing. <https://doi.org/10.1063/1.58258>

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

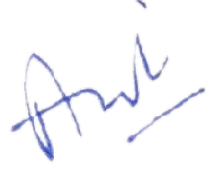
Evaluation Scheme								Total Marks	Credits	Duration of Exam (hr)
Internal Assessment					External Assessment					
CT		TA	A	Total I	ESE	ESJ	Total			
I	II									
10	10	25	5	50	50	0	50	100	3	3

CT: Class Test; TA: Total Assessment; A:Attendance; ESE: End Semester Examination; ESJ: End Semester Jury

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	2	--	--	1	--	--	--	1	--	--	--	2	2	1	--	--
CO2	2	--	--	1	--	--	--	1	--	--	--	2	2	1	--	--
CO3	2	--	--	1	--	--	--	1	--	--	--	2	2	1	--	--
CO4	2	--	--	1	--	--	--	1	--	--	--	2	2	1	--	--

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	COMPUTER APPLICATION - I (ARC2413)	L	T	S	P	C
Version 1.1	Date of Approval:	2	0	0	2	3
Pre-requisites/Exposure	Architectural Graphic Skills					
Co-requisites	Architectural Design –IV					

Catalog Description

The aim of this course is to understand the available software technologies and their applications in Architectural Designs. In order to enable students to use computer systems, software's and hardware, teaching necessary digital skills are important aspect of the course. This course will help learners to prepare presentation drawings, generating 2D and rendered views in a short time. This would finally help them in Design studio to develop conceptual as well as final Plan.

Course Objectives

The objective of this course is

- To introduce the students with the Photo editing software.
- To develop theoretical understanding of AutoCAD and its relevance in Architecture.
- To practice various commands of the Autocad.

Course Outcomes

On completion of this course, the students will be able to

CO1: Develop understanding of minimum system requirements and computer aided drafting

CO2: Comprehend Photoshop and its parameter as tools and its application in architecture

CO3: Comprehend computer aided drafting and its parameter as tools and its application in architecture

CO4: Evaluate CAD techniques for quicker methods and presentation skills

Modules	Blooms level*	Number of hours
MODULE 1: Introduction to Use of Photo Editing Software Introduction to Photo editing, montaging as well as preparation of 2-D presentations.	L1, L2	2
MODULE 2: Workshop on Photo Editing Software Practice on Photo editing as well as preparation of 2-D presentations on Photoshop.	L1, L2	6
MODULE 3: Introduction to Auto Cad (2-D) Software Introduce to the drafting software for the graphic design, building planning. Explain the various ways to deal with the graphic drawings. Introduce to 2D-3D drawing concepts. Students learn the ability to Drafting, Editing and modification work to be done in the graphic presentation. Practice on the various AutoCAD commands through software User Interface. Conduct 2D Skills Workshop to train the students. Introduce to the draft skills and minimize errors in the presentation skills.	L1, L2, L3	8

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MODULE 4:Workshop on 2D drafting Practice on the various Auto Cad commands through software User Interface. Conduct 2D Skills Workshop to train the students. Introduce to the Modelling skills and minimize errors in the presentation skills.	L4, L5, L6	20
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**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation*

Texts

- George Omura, Brian C. Benton. (2018). Mastering AutoCAD 2019 and AutoCAD LT 2019. Syvex.

References

- Byrnes, D. (2010). AutoCAD 2011 for Dummies. Wiley Publishing, Inc (pp. 1–512).
- Finkel, R. (2005). Operating systems. In Computers, Software Engineering, and Digital Devices (pp. 18-1-18–18). CRC Press. <https://doi.org/10.5117/mab.47.21471>
- Lampson, B. W. (1983). Hints for computer system design. In Proceedings of the 9th ACM Symposium on Operating Systems Principles, SOSP 1983 (pp. 33–48). Association for Computing Machinery, Inc. <https://doi.org/10.1145/800217.806614>
- Subscribe to various Microsoft online free services, <https://www.microsoft.com/en-in>

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Evaluation Scheme								Total Mark s	Credit s	Duration of Exam (hr)
Internal Assessment					External Assessment					
CT		TA	A	Total	ESE	ESJ	Total			
I	II									
10	10	25	5	50	0	50	50	100	3	3

CT: Class Test; TA: Total Assessment; A:Attendance; ESE: End Semester Examination; ESJ: End Semester Jury

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1	--	3	--	1	--	--	--	--	--	--	-	1	2	-	--
CO2	1	--	1	--	1	--	--	--	--	--	--	-	1	2	-	--
CO3	2	--	1	--	1	--	--	--	3	2	--	-	1	2	-	--
CO4	2	--	1	2	1	--	--	--	3	2	--	-	1	2	-	--

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	VISUAL ARTS – IV (ARC2414)	L	T	S	P	C
Version 1.1	Date of Approval:	1	0	1.5	1	3
Pre-requisites/Exposure	Visual Arts – III					
Co-requisites	Architectural Design - IV					

Catalog Description

The aim of this course is to provide practical learning in creative thinking. The course intends to build student interest in think creative and express freedom of expression in Art, Paintings, and model making. The design and creative thinking course helps analyse complex shapes, design and application of colour.

Course Objectives

The objective of this course is

- To Create 2d, 3D Graphical forms in form of sculptures, murals, etc.
- To study the principles and understand the importance of audio visuals and photography in presenting architectural drawings.

Course Outcomes

On completion of this course, the students will be able to

CO1: Create 2d, 3D Graphic forms, size, and their proportions

CO2: Create sculptural art forms with different mediums

CO3: Apply photography techniques for better presentations

CO4: Understand the importance of ergonomics in designing

Modules	Blooms level*	Number of hours
MODULE 1: 3D Compositions Basic components of 3-dimensional art, including subject, form, and content. Discussions centered on 3-dimensional design and concepts	L1, L2, L3	9
MODULE 2: Sculpture Different types of Sculpture, their masters and philosophy. Live scale murals and their uses in building with examples.	L1, L2, L3	9
MODULE 3: Photography and Audio-Visual Presentation Importance of photography, angles, views in field of art and architecture. Techniques to combine photography and audio into audio-visual presentations using softwares or in form of animated magazine.	L1, L2, L3, L4	9
MODULE 4: Ergonomics and Furniture Design Golden mean ratio, Principles of ergonomics and its importance in history of architecture. Studying furniture design through examples from Schools of Architecture. Exercises incorporating both terminologies.	L1, L2, L3, L4	9

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*Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

- Photography and audio-visual book; available on http://www.easdivalencia.com/download/international/incoming/educational_offer/Photography_and_audiovisual.pdf

Reference Books

- Of visual and audiovisual aids in the foreign language; by Englewood. Cliffs, N. J.: Prentice Hall, 1966. Fenton, D. X.. Better Photography for Amateurs. 3rd ed. New York;
- Ching, F. (1975). *Architectural Drafting*. In *Architectural Graphics* (pp. 15–19). Elsevier. <https://doi.org/10.1016/b978-0-85139-066-6.50005-5>
- Guptill, a L., & Meyer, S. E. (1997). *Rendering in Pen and Ink. Proceedings of the 23rd annual conference on Computer graphics and interactive techniques SIGGRAPH 96* (Vol. 30, pp. 469–476). Retrieved from <http://portal.acm.org/citation.cfm?doid=237170.237287>
- Pencil Points reader: a journal for the drafting room, 1920-1943. (2004). *Choice Reviews Online*, 42(02), 42-0757-42–0757. <https://doi.org/10.5860/choice.42-0757>
- The American Institute of Architects. (2010). *Architectural Graphic Standards for Residential Construction*, 2nd Edition. *American Institute of Architects*, 1–720.

Modes of Evaluation: Quiz/Assignment/ Seminar/Practical

Examination Scheme:

Evaluation Scheme								Total Marks	Credits	Duration of Exam (hr)
Internal Assessment					External Assessment					
CT		TA	A	Total	ESE	ESJ	Total			
I	II									
10	10	75	5	100	0	0	0	100	3	0

CT: Class Test; TA: Total Assessment; A:Attendance; ESE: End Semester Examination; ESJ: End Semester Jury

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	2	1	--	--	--	--	--	--	--	--	--	--	1	--	--	--
CO2	2	1	--	--	--	--	--	--	--	--	--	--	1	--	--	--
CO3	2	1	--	--	--	--	--	--	--	--	--	--	1	--	--	--
CO4	2	1	--	--	--	--	--	--	--	--	--	--	1	--	--	--

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	STRUCTURE - V (ARC2509)	L	T	S	P	C
Version 1.1	Date of Approval:	3	0	0	0	3
Pre-requisites/Exposure	Structure – IV					
Co-requisites	Building Materials & Construction Technology – V					

Catalog Description

The aim of this course is to enable students to design steel structures and also an overview of alternative building materials. The course covers knowledge of materials such as cement, aggregate, grades of concrete, steel structures. The course would enable students to design simple RCC structures and their basic components, viz, columns, beams, slabs and staircases. This course covers staircase design, retaining wall, portal frames, masonry structures, pre-stressed and post stressed concrete.

Course Objectives

The objective of this course is

- To understand the analysis of in-determinant structures and their use in field in greater depth.
- To design different types of staircase with various materials.
- To make students aware of column footing.

Course Outcomes

On completion of this course, the students will be able to

CO1: Design a dogleg staircase for given stair well space in residential or public building. **CO2:** Explain the alternatives of long span structures.

CO3: Apply composite materials for masonry works.

CO4: Summarize the conceptual idea behind the development of pre-stressed structural component for general use.

Modules	Blooms level*	Number of hours
MODULE 1: Design of Staircase and Retaining Wall General Features, Types of Staircase, Distribution of Loading on Stairs, Wall Proportions, Design Principles, Counterfort Retaining Walls.	L1, L2	09
MODULE 2: Portal Frames Design of Portal Frames with Hinged Base, Design of Portal Frames with Fixed Base, Structural Analysis and Design of Grid Floor, Slab Culvert Rectangular – Beam Deck.	L1, L2	09
MODULE 3: Masonry Structures Introduction, Masonry Walls, Design of Wall and Column Footing	L1, L2	09
MODULE 4: Design principles and high-rise structures Elements of Pre-Stressed and post tensioning Concrete, Principles and System, Loss, Analysis and Design of Pre-Stress and post tensioned Beam.	L1, L2	09

*Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

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Text Books

- Arya, C. (2009). Eurocode 3: Design of steel structures. In Design of Structural Elements (pp. 375–433). CRC Press. <https://doi.org/10.1201/b18121-13>
- Emmitt, S., & Gorse, C. (2014). Barry's Advanced Construction Of Buildings Third edition. John Wiley & Sons, Ltd (Vol. 28, p. 581).
- Salvadori, M., & Heller, R. (1986). Structure In Architecture: The Building Of Buildings, Third Edition. Struct in Archit, The Build of Build, Third Ed. Prentice-Hall Inc.
- Oppermann, R. H. (1941). Strength of materials, part I, elementary theory and problems. Journal of the Franklin Institute, 231(1), 96. [https://doi.org/10.1016/s00160032\(41\)90378-](https://doi.org/10.1016/s00160032(41)90378-)
- Von Glasersfeld, E. (2009). A model for the construction of elementary concepts (pp. 45– 50). AIP Publishing. <https://doi.org/10.1063/1.58258>

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- Roeder, C. W., & MacRae, F. A. (1997). Steel structures. Advances in Earthquake Engineering (Vol. 3, pp. 533–561). Computational Mechanics Publ. <https://doi.org/10.1201/9781420037135.ch1>
- Solanki, H., & Gogate, A. (1998). Flanged deep beams. In Reinforced Concrete Deep Beams. Spon Press. <https://doi.org/10.4324/9780203034880.ch5>
- Venkatarama Reddy, B. V. (2004, October 10). Sustainable building technologies. Current Science

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

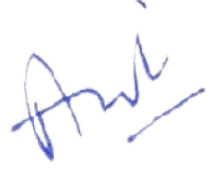
Evaluation Scheme								Total Marks	Credits	Duration of Exam (hr)
Internal Assessment					External Assessment					
CT		TA	A	Total I	ESE	ESJ	Total			
I	II									
10	10	25	5	50	50	0	50	100	3	3

CT: Class Test; TA: Total Assessment; A: Attendance; ESE: End Semester Examination; ESJ: End Semester Jury

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	2	--	--	1	--	--	--	--	--	--	--	--	2	1	--	--
CO2	2	--	--	2	--	--	--	--	--	--	--	--	--	1	--	--
CO3	--	3	--	1	--	--	--	--	--	--	--	--	--	1	--	--
CO4	2	--	--	2	--	--	--	--	--	--	--	--	3	1	--	--

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	COMPUTER APPLICATIONS- II (ARC2513)	L	T	S	P	C
Version 1.1	Date of Approval:	2	0	0	2	3
Pre-requisites/Exposure	Computer Applications - I					
Co-requisites	Landscape Design					

Catalog Description

The aim of this subject is to introduce techniques for further refinement of computer generated graphics covered in the previous semester. In addition to that, this course also trains students for developing photorealistic modeling using popular software in the field of architecture. Advanced technologies and concepts using computers as an essential tool are also introduced such as Building Information Modeling. This course equips students with soft skills which increase their productivity and expression in design related subjects.

Course Objectives

The objective of this course is

- To introduce and make students learn about graphic presentation tools
- To introduce Sketch up as 3D drafting software.
- To introduce Revit as 3D drafting software and its allied rendering plugins.

Course Outcomes

On completion of this course, the students will be able to

CO1: Prepare building design through sketch up software..

CO2: Prepare building design through revit software.

CO3: Render the drawings in various rendering plugins.

CO4: Train others in various types of softwares such as revit, sketch up.



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Modules	Blooms level*	Number of hours
MODULE 1:Introduction to SketchUp (3-D) Software Introduce to the Sketch up 3D software for the graphic design, building planning. Explain the various ways to deal with the graphic drawings. Introduce to 3D drawing concepts. Students learn the ability to Model, Editing and modification work to be done in the graphic presentation.	L1, L2	12
MODULE 2:Introduction to Revit (3-D) Software Introduce to the Revit 3D software for the graphic design, building planning. Explain the various ways to deal with the graphic drawings. Students learn the ability to Building Information Modeling.	L4, L5, L6	8
MODULE 3:Introduction to Rendering Plugins Introduce to the Lumion and Twilight Render software for the Rendering.	L1, L2	4
MODULE 4:Workshop Practice on the various Revit and Sketch Up commands through software User Interface. Conduct 3D Skills Workshop to train the students. Introduce to the Modelling skills and minimize errors in the presentation skills.	L4, L5, L6	12

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation*

Text & Reference Books

- Brewster, R. (2014). Paint.NET - Free Software for Digital Photo Editing. [Http://www.getpaint.net/index.html](http://www.getpaint.net/index.html) (Accessed June 2015).
- Khan, E., Reinhard, E., Fleming, R., & Bühlhoff, H. (2005). Image-based material editing. In ACM SIGGRAPH 2005 Sketches, SIGGRAPH 2005 (p. 148). Association for Computing Machinery, Inc. <https://doi.org/10.1145/1187112.1187291>
- Kholgade, N., Simon, T., Efros, A., & Sheikh, Y. (2014). 3D object manipulation in a single photograph using stock 3D models. In ACM Transactions on Graphics (Vol. 33). Association for Computing Machinery. <https://doi.org/10.1145/2601097.2601209>.
- Kirk, D. S., Sellen, A. J., Rother, C., & Wood, K. R. (2006). Understanding photowork. In Conference on Human Factors in Computing Systems - Proceedings (Vol. 2, pp. 761–770). <https://doi.org/10.1145/1124772.1124885>

Modes of Evaluation: Assignment/Written Examination

Examination Scheme:

Evaluation Scheme								Total Mark s	Credit s	Duration of Exam (hr)
Internal Assessment					External Assessment					
CT		TA	A	Total	ESE	ESJ	Total			
I	II									
10	10	25	5	50	0	50	50	100	3	0

CT: Class Test; TA: Total Assessment; A: Attendance; ESE: End Semester Examination; ESJ: End Semester Jury

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CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	--	3	--	--	2	--	--	--	-	-	--	-	3	1	-	--
CO2	--	2	--	--	1	--	--	-	-	-	--	-	2	1	-	--
CO3	--	2	--	--	1	--	--	-	-	-	--	-	2	1	-	--
CO4	--	3	--	--	1	--	--	--	-	-	--	-	2	1	-	--

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	PEOPLE CULTURE AND BUILT ENVIRONMENT- I (ARC2519)	L	T	S	P	C
Version 1.1	Date of Approval:	3	0	0	0	3
Pre-requisites/ Exposure	History of Architecture, Architectural Design – III					
Co-requisites	Theory of Architecture					

Catalog Description

The objective of this course is to offer opportunities in specialized or advance learning in psychological and sociological aspects which are of concern to Architecture. The courses will generally be conducted in the seminar/studio mode to encourage research, exploration and skill developments. The aim of this course is to provide students the exposure to understanding society and various built forms produced by society. The course will also provide the students hands-on cultural, sociological and psychological studies of the built environment. The course contents to be followed will be developed by course teachers based on the resources at hand and opportunities for cross fertilization with other courses. The course would be conducted through literature survey, case studies, site visits, community surveys and hands on projects. During the course the students will be working on a live project in groups which are preferably interdisciplinary.

Course Objectives

The objective of this course is

- To understand the basic principles of psychology, sociology and culture of settlement.
- The course intends to study and understand the typical components of city in order to appreciate how these elements contribute to the quality of life of urban communities.
- To familiarize students with decisive strategies that brings inclusivity and equality in the designs of built forms.
- To develop interdisciplinary understanding and sensitivities of future architects.

Course Outcomes

On completion of this course, the students will be able to

CO1: Develop a relationship between man and his larger social environment, with special emphasis on aspects that are likely to affect intervention in or creation of, the built environment (predominantly urban)

CO2: Develop a language and vocabulary for discussions/ analysis on the sociological/ psychological dimensions of architecture.


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Modules	Blooms level*	Number of hours
MODULE 1: Introduction to Psychology, Sociology and Built Environment Basic introduction to various critical social aspects; Role of psychology in architecture; Role of sociology in built environment; Determinants of sociology- social structure, social status, social control, social institutions, social mobility; Inclusive Built Environment; Barrier free designs and built environments; Various case studies related to gender and architecture, community development- community response towards development strategy etc.	L1, L2	18
MODULE 2: Project Work Selection and understanding of case study; Formulation of Aim and Objectives, Collection of data through primary and secondary sources; Conducting survey; Database development using relevant and advance software; Qualitative and quantitative data analysis; Report writing and presentations.	L4, L5, L6	18

*Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books/References

- Cragun R.T. (2006). Introduction to Sociology, Wikibooks.
- Giddens, A (2006) Sociology, Polity Press, Cambridge (UK)
- Lynch, K. (1960) The Image of the City, Joint Centre Publication, USA
- Oomen T.K. and Venugopal C.N. (2004), Sociology, Eastern Book Company.
- Porteous, Douglas, J. (1977), Environment Behaviour: Planning and Everyday Urban Life, Addison Wesley
- Sinha A. (2013) "An India for Everyone: A Path of Inclusive Development, Harpercollins
- Steve Barkan (2010), Sociology: Understanding and Changing the Social World, Flat World Reference Books
- Tejchman A. (2016) "The Politics of Inclusive Development", Palgrave Macmillan.

Modes of Evaluation: Presentation/Assignment/Class Test /Written Examination

Examination Scheme:

Evaluation Scheme								Total Marks	Credits	Duration of Exam (hr)
Internal Assessment					External Assessment					
CT		TA	A	Total I	ESE	ESJ	Total			
I	II									
10	10	25	5	50	0	50	50	100	3	0

CT: Class Test; TA: Total Assessment; A: Attendance; ESE: End Semester Examination; ESJ: End Semester Jury

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CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO 3	PSO 4
CO 1	2	1	1	2	1	1	2	1	1	2	-	2	-	-	1	1
CO 2	2	3	1	2	1	1	2	3	3	1	-	1	-	-	1	1

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	ECOLOGY, ENVIRONMENT AND SUSTAINABLE DEVELOPMENT – I (ARC2520)	L	T	S	P	C
Version 1.1	Date of Approval:	3	0	0	0	3
Pre-requisites/ Exposure	Environmental Sciences, Building Services-1, Building Services-2					
Co-requisites	Architectural Design, Building Services-3					

Catalog Description

The objective of this course is to offer opportunities in specialized or advance learning in ecology, environment and sustainable aspects which are of concern to Architecture. The course will generally be conducted in the seminar/studio mode to encourage research, exploration and skill developments. The aim of this course is to provide students the exposure to understanding ecology and various environmental problems faced by settlements. The course will also provide the students hands-on ecological and environmental studies of built environment. The course contents to be followed will be developed by course teachers based on the resources at hand and opportunities for cross learning with other courses. The course would be conducted through literature survey, case studies, site visits, community surveys and hands on projects. During the course the students will be working on a live project in groups which are preferably interdisciplinary.

Course Objectives

The objective of this course is

- To understand the basic principles of ecology, environment and sustainable development.
- The course intends to study and understand the different components of city in order to understand how these elements contribute to environment quality.
- To establish the significance of the ecological issues, their impact and initiatives to address the same in the built environs to achieve sustainable development.
- To develop interdisciplinary understanding and sensitivities of future architects.

Course Outcomes

On completion of this course, the students will be able to

CO1: Develop a relationship between man and ecology, will understand critical environmental issues and need to address the m by using advanced technology.

CO2: Produce reports and presentation.

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Modules	Blooms level*	Number of hours
MODULE 1: Introduction to Ecology, Environment and Sustainable Development Basic introduction to ecology; Interrelation between natural and built environment; Importance of environment sustainability in built environment; Energy conservation, renewable sources: wind, solar, geo-thermal, bio-fuels; Materials minimizing, recycling, reducing energy content, etc; Other environmental issues related to solid waste management, water resources, air quality, storm water drainage etc; Various case studies related to traditional / vernacular buildings and settlements demonstrating relationship between climate, local material resources and settlement/ building forms.	L1, L2	18
MODULE 2: Project Work Selection and understanding of case study; Formulation of Aim and Objectives, Collection of data through primary and secondary sources; Conducting survey; Database development using relevant and advance software; Qualitative and quantitative data analysis; Report writing and presentations.	L4, L5, L6	18

*Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books/References

- Bakari, Mohamed El-Kamel (2017). The Dilemma of Sustainability in the Age of Globalization: A Quest for a Paradigm of Development. New York: Lexington Books. ISBN 978-1498551397
- Blewitt, J. (2008). Understanding Sustainable Development. London: Earthscan. pp. 21–24. ISBN 978-1-84407-454-9.
- Fulekar, M. H., Pathak, B., Kale, R. K. (2014) Environment and Sustainable Development' Springer Nature; ISBN-10: 8132211650; ISBN-13: 978-8132211655
- Goudie, Andrew (2000). The Human Impact on the Natural Environment. Cambridge, Massachusetts: This MIT Press. pp. 203–239. ISBN 0-262-57138-2.
- James, Paul (2014). Urban Sustainability in Theory and Practice. doi:10.4324/9781315765747. ISBN 978-1-315-76574-7.
- James, Paul; Magee, Liam (2016). "Domains of Sustainability". In A. Farazmand (ed.). Global Encyclopedia of Public Administration, Public Policy, and Governance. Springer.
- Modak, P. (2017) Environmental Management Towards Sustainability, CRC Press, ISBN-10: 9781498796248
- Odum, E. P. (1971). Fundamentals of Ecology (Third ed.). New York: Saunders. ISBN 0-7216-6941-7.
- Porteous, Douglas, J. (1977), Environment Behaviour: Planning and Everyday Urban Life, Addison Wesley
- Thangavel, P., Sridevi, G. (2015) Environmental Sustainability, Springer Nature, ISBN-10: 9788132220558
- Walker, Brian and Salt, David (2006) Resilience Thinking: Sustaining ecosystems and people in a changing world. Island Press. p. xiii. ISBN 978-1597260930.
- Wandenberg, JC (August 2015). Sustainable by Design. Amazon. p. 122. ISBN 978-1516901784

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Modes of Evaluation: Presentation/Assignment/Class Test /Written Examination

Examination Scheme:

Evaluation Scheme								Total Marks	Credits	Duration of Exam (hr)
Internal Assessment					External Assessment					
CT		TA	A	Total I	ESE	ESJ	Total			
I	II									
10	10	25	5	50	0	50	50	100	3	0

CT: Class Test; TA: Total Assessment; A: Attendance; ESE: End Semester Examination; ESJ: End Semester Jury

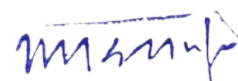
CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3	PSO 4
CO 1	2	1	1	2	1	1	2	1	1	2	-	2	-	-	1	1
CO 2	2	3	1	2	1	1	2	3	3	1	-	1	-	-	1	1

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	COMPUTER APPLICATIONS & ADVANCE TECHNOLOGIES – I (SMART BUILDINGS) (ARC2521)	L	T	S	P	C
Version 1.1	Date of Approval:	3	-	-	-	3
Pre-requisites/Exposure	Architecture Design, Building Services					
Co-requisites	Advanced Architecture Design, Building Services					

Catalog Description

Security of the building and safety of personal have become important aspects now. The aim of this subject is to familiarize students with the concept of Smart buildings which has become very important today and in the near future. Through the modules, the students are introduced to the components of smart buildings and various smart materials used in architecture. In addition to this, the students also will be introduced to the current and future trends in smart building construction.

Course Objectives

The objective of this course is

- To familiarize what Smart buildings are and its importance in today's life.
- To understand the various components and materials related to Smart buildings.
- To be able to keep up with the current and future trends and challenges faced in the development of Smart building services.

Course Outcomes

On completion of this course, students will be able to

CO1: Develop a basic understanding of Smart buildings and its components

CO2: Explain various smart materials and their application

CO3: Analyze the market trends of smart building services

CO4: Apply the knowledge of smart buildings in their design

Modules	Blooms level*	Number of hours
MODULE 1: Introduction to Smart Buildings Introduction to what is smart building, Terms and definition, Purpose, Building performance, User experience	L1, L2	7
MODULE 2: Components of Smart Building Key requirements for Smart Building, Building Automation Hardware: controllers, sensors, actuators, communication network	L1, L2, L3	10
MODULE 3: Smart Materials Introduction to smart materials in architecture, Property-changing materials, Energy-exchanging materials, Bidirectional energy-exchanging materials, Application of smart materials in architecture	L3, L4	12

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MODULE 4: Current and future Trends Understanding the current and future trends of smart building technologies in Residential sector	L4, L5, L6	7
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**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation*

Text Books/ References

- Smart Buildings by Jim Sinopoli, Butterworth-Heinemann imprint of Elsevier, 2nd ed., 2010.
- Understanding Building Automation Systems (Direct Digital Control, Energy Management, Life Safety, Security, Access Control, Lighting, Building Management Programs) by Reinhold A. Carlson, Robert A. Di Giandomenico, pub. by R.S. Means Company, 1991.
- Shengwei Wang, Intelligent buildings and building automation, Spon Press, 2010
- Intelligent Building Systems by Albert Ting-Pat So, WaiLok Chan, Kluwer Academic publisher, 3rd ed., 2012.
- Derek Clements-Croome, Intelligent Buildings: Design Management and Operation, 2004.
- Design of Special Hazards and Fire Alarm Systems by Robert Gagnon, Thomson Delmar Learning; 2nd edition, 2007.
- HVAC Controls and Systems by Levenhagen, John I. Spethmann, Donald H., McGraw-Hill Pub.
- HVAC Control in the New Millennium by Hordeski, Michael F, Fairmont press, 2001.
- Process Control- Instrument Engineers Handbook by Bela G. Liptak, Chilton book co.

Modes of Evaluation: Assignment/ Presentation/ Literature Study/ Sheet Work

Examination Scheme:

Evaluation Scheme								Total Marks	Credits	Duration of Exam (hr)
Internal Assessment					External Assessment					
CT		TA	A	Total I	ESE	ESJ	Total			
I	II									
10	10	25	5	50	0	50	50	100	3	0

CT: Class Test; TA: Total Assessment; A: Attendance; ESE: End Semester Examination; ESJ: End Semester Jury

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1	--	--	--	1	2	--	--	--	--	--	--	--	1	--	--
CO2	1	--	--	--	1	2	--	--	--	--	--	--	--	1	--	--
CO3	1	--	3	--	1	2	--	--	--	--	--	--	--	1	--	--
CO4	1	--	--	--	1	2	--	--	--	--	--	--	--	1	--	--

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	STRUCTURE - VI (ARC2609)	L	T	S	P	C
Version 1.1	Date of Approval:	3	0	0	0	3
Pre-requisites/Exposure	Structure – V					
Co-requisites	Building Materials & Construction Technology – VI					

Catalog Description

The aim of this course is to enable students to design simple RCC structures and their basic components viz, columns, beams, slabs and staircases. This course will help student to understand RCC structures and its application in consecutive design project. The course covers limit state method and working stress method, partial safety factor, stress and strain relationship for concrete and steel, design of simply reinforced L&T beams, RCC columns and beams, foundation and footings.

Course Objectives

The objective of this course is

- To understand the analysis of intermediate structures and their use in field in greater depth.
- To design simple elevated water tanks
- To understand the application of RCC structure in consecutive design project.

Course Outcomes

On completion of this course, the students will be able to

- CO1:** Describe Three Moment theorem and their application in fixed and continuous beams. **CO2:** Analyze the structural geometry based on strength and stability criteria.
- CO3:** Design the effective use of structural systems for complex architectural need.
- CO4:** Design the effective use of Truss structure for residential and commercial purpose.

Modules	Blooms level*	Number of hours
MODULE 1: Theory of Beams and Frames Continuous beams, curved beams, portal frames, multistory building frames.	L1, L2	9
MODULE 2: Elevated Water Tanks Introduction of Tanks, Conical or Funnel Shaped Tanks.	L1, L2	9
MODULE 3: Shells and Floors Shells, Hyperbolic, Parabolic, Folded Plates, Grid or Coffered Floors, Girders.	L1, L2	9
MODULE 4: Truss Design principles of Truss Roof, Truss for Residential use, Truss for commercial use, Truss for long span structure like Railway shed, hanger etc.	L1, L2	9

*Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

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Text Books

- Arya, C. (2009). Eurocode 3: Design of steel structures. In Design of Structural Elements (pp. 375–433). CRC Press. <https://doi.org/10.1201/b18121-13>
- Emmitt, S., & Gorse, C. (2014). Barry's Advanced Construction Of Buildings Third edition. John Wiley & Sons, Ltd (Vol. 28, p. 581).
- Salvadori, M., & Heller, R. (1986). Structure In Architecture: The Building Of Buildings, Third Edition. Struct in Archit, The Build of Build, Third Ed. Prentice-Hall Inc.

References

- Oppermann, R. H. (1941). Strength of materials, part I, elementary theory and problems. Journal of the Franklin Institute, 231(1), 96. [https://doi.org/10.1016/s00160032\(41\)90378-](https://doi.org/10.1016/s00160032(41)90378-)
- Von Glasersfeld, E. (2009). A model for the construction of elementary concepts (pp. 45– 50). AIP Publishing. <https://doi.org/10.1063/1.58258>

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

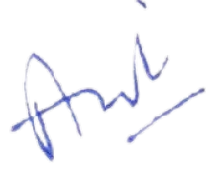
Evaluation Scheme								Total Marks	Credits	Duration of Exam (hr)
Internal Assessment					External Assessment					
CT		TA	A	Total I	ESE	ESJ	Total			
I	II									
10	10	25	5	50	50	0	50	100	3	3

CT: Class Test; TA: Total Assessment; A: Attendance; ESE: End Semester Examination; ESJ: End Semester Jury

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	2	--	--	1	--	--	--	1	--	--	--	2	2	1	--	--
CO2	2	--	--	1	--	--	--	1	--	--	--	2	2	1	--	--
CO3	2	--	--	1	--	--	--	1	--	--	--	2	2	1	--	--
CO4	2	--	--	1	--	--	--	1	--	--	--	2	2	1	--	--

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	SITE PLANNING AND LANDSCAPE (ARC2617)	L	T	S	P	C
Version 1.1	Date of Approval:	1	0	1.5	1	3
Pre-requisites/Exposure	Architectural Design - IV					
Co-requisites	Architectural Services - III					

Catalog Description

The aim of this course is to make the students understand the role of landscape architecture in the creation of better environments. This course shall have a direct application in the design studio of the same semester as well as in the Thesis. The course covers basic introduction to landscape architecture, landscape graphics, planting design. This course will help students to understand the concepts of landscape architecture and to study and analyze site in relation to landscape design and be able to design and detail various architectural and planning landscape projects.

Course Objectives

The objective of this course is

- To understand various types of Landscape and the role of natural and manmade landscape for Land Development;
- To provide different methods for site planning at regional and micro level;
- To understand landscape design as an allied field of architecture and planning;
- To understand process of landscape design for small and large areas.

Course Outcomes

On completion of this course, the students will be able to

CO1: Explain the role and scope of Landscape architect.

CO2: Identify the development processes and cycles in the urban landscapes.

CO3: Conduct a landscape analysis and evaluate it with required functions.

CO4: Develop a site plan with landscape design and relate with environment and ecology.

Modules	Blooms level*	Number of hours
MODULE 1: Elements and History of Landscape Study of Landscape elements such as land, vegetation, water, earth & climate, Natural & manmade elements, etc. Principles of landscape design such as unity, simplicity, variety, balance, proportion, sequence, etc. Social and economic factors. Psychological considerations of spaces and enclosures. History of Landscape Architecture including natural & cultural factors of the place, development of landscape architecture through history in different parts of the world such as China, Japan, Europe, Italy, France, England, Persia, Egypt, Greece, Rome. Study of landscape architecture in Medieval period in India such as Mughal. Modern & Contemporary Landscape architecture. Cultural aspects of the landscape architecture with contextual understanding.	L1, L2, L3	9
MODULE 2: Hardscapes, Softscapes and Urban Landscape	L1, L2,	9

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Hardscapes - pergolas, garden furniture, fences, rocks, masonry, paving & surfacing, roads & parking lots, walks & plazas; Softscapes such as plantation, turfing, water features. Design criteria for landscape design such as visual, functional, micro-climatic, ecological and aesthetic. Basic horticultural idea about plants, plant selection, planting design and care of plants; Urban Landscape - Characteristics and components of open space patterns in towns and cities (traditional and contemporary) basic types: streets, squares, plazas, gardens, ghats and maidans, public parks at district, local and neighbourhood levels; park systems; landscape design related to land-use, circulation networks and activity; street furniture as a component of urban landscape.	L3	
MODULE 3: Landscape Design and Services Macro and micro-climatic considerations in landscape architecture. Effect of climate on landscape and various components of landscape on the microclimate. Landscape Services & Sustainability: Introduction; Outdoors lighting, surface water drainage, irrigation, soil management techniques.	L1, L2, L3	9
MODULE 4: Landscape Aspects of Site Planning Principles of understanding and evaluating and existing landscape; development as a response to constraints and opportunities offered by the site; the landscape concept and open space structure as a basic component of the site plan; The role of vegetation: environmental benefits, functional requirements, aesthetic considerations; typical situations and criteria for design with plants and selection of species; grading; in relation to existing contours, plinth levels, road alignment and storm water drainage; principles of cut and fill.	L1, L2, L3	9

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation*

Text Books

- Marsh, M. William, (2010). Landscape Planning Environmental Applications;
- Booth, Norman K., Basic Elements of Landscape Architectural Design;
- J.O. Symonds, Landscape Architecture;
- J.O. Symonds, Architecture-A manual of site planning and design;
- John I. Motloch, Introduction to Landscape Design;
- J. E. Ingels, Landscaping – Principles and Practice;
- Walker and Theodore, Planting Design

Reference Books

- J.O. Symonds, Earthscape; Theory in Landscape Architecture: A Reader (Penn Studies in Landscape Architecture);
- Landscape as Urbanism: A General Theory by Charles Waldheim;
- Cliff Tandy, Handbook of Urban Landscape; M. Bring, Japanese Gardens: Design & Meaning
- Conan, M., & Conan, M. (2000). Environmentalism in landscape architecture. Library (Vol. 22). Retrieved from http://books.google.com/books?hl=en&lr=&id=wr385lQxrbsC&oi=fnd&pg=PA1&dq=Environmentalism+in+landscape+architecture&ots=hMCOKluPkW&sig=iFCLKXFB_aH6CX6q1w26O1Aj4PU
- Laurie, M. (1986). An introduction to landscape architecture. Second edition. An Introduction to Landscape Architecture. Second Edition.

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- Vernon, S. (2013). Landscape Architect's Pocket Book. Landscape Architect's Pocket Book. Routledge. <https://doi.org/10.4324/9780203568705>
- Starke, B. (2016). Landscape Architecture: A Manual of Environmental Planning and Design. McGraw Hill (Vol. 86, pp. v-vi). McGraw-Hill Education. <https://doi.org/10.1080/02681307.2016.1252112>
- Clayden, A., & Osmundson, T. (2001). Roof Gardens: History Design and Construction. Garden History, 29(2), 226. <https://doi.org/10.2307/1587387>
- Thacker, C., & Keswick, M. (1979). The Chinese Garden: History, Art and Architecture. Garden History, 7(1), 20. <https://doi.org/10.2307/1586713>
- Smith, L. S., & Fellowes, M. D. E. (2013, July 1). Towards a lawn without grass: The journey of the imperfect lawn and its analogues. Studies in the History of Gardens and Designed Landscapes. <https://doi.org/10.1080/14601176.2013.799314>
- Mannion, A. M. (1999). Modern trends in ecology and environment, R.S. Ambasht (1998) - Book review. Journal of Ecology, 87(1), 176.

Modes of Evaluation: Quiz/Assignment/ Seminar/Practical

Examination Scheme:

Evaluation Scheme								Total Marks	Credits	Duration of Exam (hr)
Internal Assessment					External Assessment					
CT		TA	A	Total	ESE	ESJ	Total			
I	II									
10	10	25	5	50	50	0	50	100	3	3

CT: Class Test; TA: Total Assessment; A: Attendance; ESE: End Semester Examination; ESJ: End Semester Jury

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	3	2	--	--	1	--	--	--	--	--	2	--	1	2	--	--
CO2	2	2	--	--	1	--	--	--	--	--	2	--	1	2	--	--
CO3	2	2	--	--	1	--	--	--	--	--	2	--	1	3	--	--
CO4	2	2	--	--	1	--	--	--	--	--	2	--	1	2	--	--

1: strongly related, 2: moderately related and 3: weakly related

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	PEOPLE CULTURE AND BUILT ENVIRONMENT- II (ARC2620)	L	T	S	P	C
Version 1.1	Date of Approval:	3	0	0	0	3
Pre-requisites/Exposure	History of Architecture, Architectural Design – III					
Co-requisites	Theory of Architecture					

Catalog Description

The objective of this course is to offer opportunities in specialized or advance learning in psychological and sociological aspects which are of concern to Architecture. The courses will generally be conducted in the seminar/studio mode to encourage research, exploration and skill developments. The aim of this course is to provide students the exposure to understanding society and various built forms produced by society. The course will also provide the students hands-on cultural, sociological and psychological studies of the built environment. The course contents to be followed will be developed by course teachers based on the resources at hand and opportunities for cross fertilization with other courses. The course would be conducted through literature survey, case studies, site visits, community surveys and hands on projects. During the course the students will be working on a live project in groups which are preferably interdisciplinary.

Course Objectives

The objective of this course is

- To understand the basic principles of psychology, sociology and culture of settlement.
- The course intends to study and understand the typical components of city in order to appreciate how these elements contribute to the quality of life of urban communities.
- To familiarize students with decisive strategies that brings inclusivity and equality in the designs of built forms.
- To develop interdisciplinary understanding and sensitivities of future architects.

Course Outcomes

On completion of this course, the students will be able to

CO1: Develop a relationship between man and his larger social environment, with special emphasis on aspects that are likely to affect intervention in or creation of, the built environment (predominantly urban)

CO2: Develop a language and vocabulary for discussions/ analysis on the sociological/ psychological dimensions of architecture.


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Modules	Blooms level*	Number of hours
MODULE 1: Introduction to Psychology, Sociology and Built Environment Basic introduction to various critical social aspects; Role of psychology in architecture; Role of sociology in built environment; Determinants of sociology- social structure, social status, social control, social institutions, social mobility; Inclusive Built Environment; Barrier free designs and built environments; Various case studies related to gender and architecture, community development- community response towards development strategy etc.	L1, L2	8
MODULE 2: Project Work Selection and understanding of case study; Formulation of Aim and Objectives, Collection of data through primary and secondary sources; Conducting survey; Database development using relevant and advance software; Qualitative and quantitative data analysis; Report writing and presentations.	L4, L5, L6	16

*Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books/References

- Cragun R.T.(2006). Introduction to Sociology, Wikibooks.
- Giddens, A (2006) Sociology, Polity Press, Cambridge (UK)
- Lynch, K. (1960) The Image of the City, Joint Centre Publication, USA
- Oomen T.K. and Venugopal C.N. (2004), Sociology, Eastern Book Company.
- Porteous, Douglas, J. (1977), Environment Behaviour: Planning and Everyday Urban Life, Addison Wesley
- Sinha A. (2013) "An India for Everyone: A Path of Inclusive Development, Harpercollins
- Steve Barkan (2010), Sociology: Understanding and Changing the Social World, Flat World Reference Books
- Tejchman A. (2016) "The Politics of Inclusive Development", Palgrave Macmillan.

Modes of Evaluation: Presentation/Assignment/Class Test /Written Examination

Examination Scheme:

Evaluation Scheme								Total Marks	Credits	Duration of Exam (hr)
Internal Assessment					External Assessment					
CT		TA	A	Total I	ESE	ESJ	Total			
I	II									
10	10	25	5	50	0	50	50	100	3	0

CT: Class Test; TA: Total Assessment; A:Attendance; ESE: End Semester Examination; ESJ: End Semester Jury

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CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	2	1	1	2	1	1	2	1	1	2	-	2	-	-	1	1
CO2	2	3	1	2	1	1	2	3	3	1	-	1	-	-	1	1

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	ECOLOGY, ENVIRONMENT AND SUSTAINABLE DEVELOPMENT – II (ARC2621)	L	T	S	P	C
Version 1.1	Date of Approval:	3	0	0	0	3
Pre-requisites/Exposure	Environmental Sciences, Building Services-1, Building Services-2					
Co-requisites	Architectural Design, Building Services-3					

Catalog Description

The objective of this course is to offer opportunities in specialized or advance learning in ecology, environment and sustainable aspects which are of concern to Architecture. The course will generally be conducted in the seminar/studio mode to encourage research, exploration and skill developments. The aim of this course is to provide students the exposure to understanding ecology and various environmental problems faced by settlements. The course will also provide the students hands-on ecological and environmental studies of built environment. The course contents to be followed will be developed by course teachers based on the resources at hand and opportunities for cross learning with other courses. The course would be conducted through literature survey, case studies, site visits, community surveys and hands on projects. During the course the students will be working on a live project in groups which are preferably interdisciplinary.

Course Objectives

The objective of this course is

- To understand the basic principles of ecology, environment and sustainable development.
- The course intends to study and understand the different components of city in order to understand how these elements contribute to environment quality.
- To establish the significance of the ecological issues, their impact and initiatives to address the same in the built environs to achieve sustainable development.
- To develop interdisciplinary understanding and sensitivities of future architects.

Course Outcomes

On completion of this course, the students will be able to

- CO1:** Develop a relationship between man and ecology, will understand critical environmental issues and need to address the m by using advanced technology.
- CO2:** Produce reports and presentation.


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Modules	Blooms level*	Number of hours
MODULE 1: Introduction to Ecology, Environment and Sustainable Development Basic introduction to ecology; Interrelation between natural and built environment; Importance of environment sustainability in built environment; Energy conservation, renewable sources: wind, solar, geo-thermal, bio-fuels; Materials minimizing, recycling, reducing energy content, etc; Other environmental issues related to solid waste management, water resources, air quality, storm water drainage etc; Various case studies related to traditional / vernacular buildings and settlements demonstrating relationship between climate, local material resources and settlement/ building forms.	L1, L2	8
MODULE 2: Project Work Selection and understanding of case study; Formulation of Aim and Objectives, Collection of data through primary and secondary sources; Conducting survey; Database development using relevant and advance software; Qualitative and quantitative data analysis; Report writing and presentations.	L4, L5, L6	16

*Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books/References

- Bakari, Mohamed El-Kamel (2017). The Dilemma of Sustainability in the Age of Globalization: A Quest for a Paradigm of Development. New York: Lexington Books. ISBN 978-1498551397
- Blewitt, J. (2008). Understanding Sustainable Development. London: Earthscan. pp. 21–24. ISBN 978-1-84407-454-9.
- Fulekar, M. H., Pathak, B., Kale, R. K. (2014) Environment and Sustainable Development' Springer Nature; ISBN-10: 8132211650; ISBN-13: 978-8132211655
- Goudie, Andrew (2000). The Human Impact on the Natural Environment. Cambridge, Massachusetts: This MIT Press. pp. 203–239. ISBN 0-262-57138-2.
- James, Paul (2014). Urban Sustainability in Theory and Practice. doi:10.4324/9781315765747. ISBN 978-1-315-76574-7.
- James, Paul; Magee, Liam (2016). "Domains of Sustainability". In A. Farazmand (ed.). Global Encyclopedia of Public Administration, Public Policy, and Governance. Springer.
- Modak, P. (2017) Environmental Management Towards Sustainability, CRC Press, ISBN-10: 9781498796248
- Odum, E. P. (1971). Fundamentals of Ecology (Third ed.). New York: Saunders. ISBN 0-7216-6941-7.
- Porteous, Douglas, J. (1977), Environment Behaviour: Planning and Everyday Urban Life, Addison Wesley
- Thangavel, P., Sridevi, G. (2015) Environmental Sustainability, Springer Nature, ISBN-10: 9788132220558
- Walker, Brian and Salt, David (2006) Resilience Thinking: Sustaining ecosystems and people in a changing world. Island Press. p. xiii. ISBN 978-1597260930.
- Wandenberg, JC (August 2015). Sustainable by Design. Amazon. p. 122. ISBN 978-1516901784

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Modes of Evaluation: Presentation/Assignment/Class Test /Written Examination

Examination Scheme:

Evaluation Scheme								Total Marks	Credits	Duration of Exam (hr)
Internal Assessment					External Assessment					
CT		TA	A	Total I	ESE	ESJ	Total			
I	II									
10	10	25	5	50	0	50	50	100	3	0

CT: Class Test; TA: Total Assessment; A:Attendance; ESE: End Semester Examination; ESJ: End Semester Jury

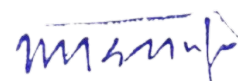
CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	2	1	1	2	1	1	2	1	1	2	-	2	-	-	1	1
CO2	2	3	1	2	1	1	2	3	3	1	-	1	-	-	1	1

1: strongly related, 2: moderately related and 3: weakly related



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	COMPUTER APPLICATIONS AND ADVANCE TECHNOLOGIES-II (AR-VR ARCHITECTURE) (ARC2622)	L	T	S	P	C
Version 1.1	Date of Approval:	1	0	0	4	3
Pre-requisites/Exposure	Architectural Graphic Skills					
Co-requisites	Architectural Design, Building Materials and Construction Technology					

Catalog Description

The aim of this course is to covers the technical and experiential design foundation required for the implementation of immersive environments in current and future virtual, augmented and mixed reality platforms. The curriculum covers a wide range of literature and practice starting from the original Computer Science and HCI concepts following the evolution of all supporting technologies including visual displays for VR, AR and MR, motion tracking, interactive 3D graphics, multimodal sensory integration, immersive audio, user interfaces, IoT, games and experience design.

Course Objectives

The objective of the course is

- To establish and cultivate a broad and comprehensive understanding of this rapidly evolving and commercially viable field of Computer Science
- To prepare the student for participating in the production of highly integrative immersive applications, immersive social platforms, cross disciplinary academic research projects and leading developments in Medical, Industrial and Manufacturing R&D.
- To work in collaborative group projects and develop working prototypes, demo experiences, immersive platforms, unique controllers and new innovative technologies.

Course Outcomes

On completion of this course, the students will be able to

- CO1:** Understand visual displays for VR, AR and MR, motion tracking, interactive 3D graphics, multimodal sensory integration, immersive audio, user interfaces, IoT, games and experience design.
- CO2:** Work on highly integrative immersive applications, immersive social platforms, cross disciplinary academic research projects and leading developments in Medical, Industrial and Manufacturing R&D.
- CO3:** Analyze inside-out camera tracking
- CO4:** Understand and prepare 3D rendering for immersive environment.

Modules	Blooms level*	Number of hours
Module 1: Introduction to Immersive Technologies	L1, L2, L3	8
A Brief History of Virtual Reality.		

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<ul style="list-style-type: none"> • The five Classic Components of a VR System. • Early Commercial VR Technology. • VR, AR, MR, xR: similarities and differences. • Current trends and state of the art in immersive technologies, developing platforms and consumer devices. • The future of human experience. 		
Module 2: The Human behind the lenses <ul style="list-style-type: none"> • Human Perception and Cognition • The Human Visual System • The Human Auditory System • The Human Vestibular System Physiology, Psychology and the Human Experience <ul style="list-style-type: none"> • Adaptation and Artefacts • Ergonomics • Ethics • Scientific Concerns VR Health and Safety Issues <ul style="list-style-type: none"> • Effects of VR Simulations on Users • Cybersickness, before and now • Guidelines for Proper VR Usage User Centered Design, User Experience and an Ethical Code of Conduct	L1, L2, L3, L4	10
Module 3: Camera tracking Inside-Out Camera tracking <ul style="list-style-type: none"> • Depth Sensing • Microsoft HoloLens • Vrvana Totem • Low cost AR and MR systems • Mobile Platforms Full-Body tracking <ul style="list-style-type: none"> • Inverse & Forward Kinematics • Kinect • Intel Realsense • Full body inertial tracking • Ikinema • Holographic Video 	L1, L2, L3, L4	8
Module 4: 3D Rendering for Immersive Environments Rendering Architecture <ul style="list-style-type: none"> • Graphics Accelerators • 3D Rendering API's, OpenGL, DirectX, Vulkan, Metal • Best practices and Optimization techniques Distributed VR Architectures <ul style="list-style-type: none"> • Multi-pipeline Synchronization • Co-located Rendering Pipelines • Distributed Virtual Environments 	L1, L2, L3, L4	10

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation*

Primary Resource

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- Kelly S. Hale (Editor), Kay M. Stanney (Editor). 2014. Handbook of Virtual Environments: Design, Implementation, and Applications, Second Edition (Human Factors and Ergonomics)
 - ISBN-13: 978-1466511842. Amazon

Other Resources:

- Michael Madary and Thomas K. Metzinger. 2016. Real Virtuality: A Code of Ethical Conduct. Recommendations for Good Scientific Practice and the Consumers of VR-Technology. *Frontiers in Robotics and AI* 3, February: 1–23. <http://doi.org/10.3389/frobt.2016.00003>
- Jason Jerald. 2015. The VR Book: Human-Centered Design for Virtual Reality. Association for Computing Machinery and Morgan & Claypool Publishers.
- <http://doi.org/10.1145/2792790>
- Tony Parisi. 2015. Learning Virtual Reality
- ISBN: 9781491922828
- Alva Noe. 2004. Action in Perception.
- ISBN: 9780262640633
- Paul Dourish. 2001. Where the Action Is.
- ISBN: 9780262254151
- Philippe Fuchs - Appropriate use of VR headsets <http://worldvrforum.com/product/appropriate-use-virtual-reality-head/>
- Michael Heim. 1994. The Metaphysics of Virtual Reality.
- <http://doi.org/10.1093/acprof:oso/9780195092585.001.0001>
- Char Davies. 1998. OSMOSE: Notes on being in Immersive virtual space. *Digital Creativity* 9, 2: 65–74. <http://doi.org/10.1080/14626269808567111>

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Evaluation Scheme								Total marks	Credits	Duration of Exam (hr)
Internal Assessment					External Assessment					
CT		TA	A	Total	ESE	ESJ	Total			
I	II									
10	10	25	5	50	0	50	50	100	3	0

CT: Class Test; TA: Total Assessment; A: Attendance; ESE: End Semester Examination; ESJ: End Semester Jury

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	2	-	--	--	2	--	--	--	--	--	--	--	3	1	--	--
CO2	3	-	--	--	1	--	--	--	--	--	--	--	2	1	--	--
CO3	3	-	--	--	2	--	--	--	--	--	--	--	2	1	--	--
CO4	2	-	--	--	1	--	--	--	--	--	--	--	2	1	--	--

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	STRUCTURE - VII (ARC2703)	L	T	S	P	C
Version 1.1	Date of Approval:	3	0	0	0	3
Pre-requisites/Exposure	Structure – VI					
Co-requisites	Building Materials & Construction Technology – VII					

Catalog Description

The aim of this course is to enable students to design simple steel structures and their basic components. The fundamental aspects of analysis and design and also discusses the practical requirements such as safety, feasibility and economy of steel structures. The subject will be taught in congruence with the Design studio, and assignments for the subject will be linked to the design exercises to achieve higher level of learning and understanding the practical application of the same.

Course Objectives

The objective of this course is

- To understand the design of steel structures.
- To learn the behavior and design of structural steel components (members and connections in two - dimensional (2D) truss and frame structures)
- To gain an educational and comprehensive experience in the design of simple steel structures.

Course Outcomes

On completion of this course, the students will be able to

CO1: Design building structure.

CO2: Design simple connections, rivets, welds, bolts and pins.

CO3: Design column base and footing.

CO4: Design beams and gantry girders.

Modules	Blooms level*	Number of hours
MODULE 1: Design Principles Introduction to Design Specification for Steel Members, Bolted Connections, Welded Connections.	L1, L2, L3	9
MODULE 2: Structural Connections Beam to beam connections, beam to column connection, bolted bracket connection, welded crane bracket connection.	L1, L2, L3	9
MODULE 3: Shear Force and bending moment diagram, theory of yielding and failure Design Of Laced Column, Battened Column, Design Of Slab Base And Gusseted Base.	L1, L2, L3	9
MODULE 4: Design principles and high-rise structures Laterally restrained beam, gantry girder, plate girder with -thick web plate and thin web plate. Design of steel roof truss and tubular truss.	L1, L2, L3	9

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**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation*

Text Books

- Arya, C. (2009). Eurocode 3: Design of steel structures. In Design of Structural Elements (pp. 375–433). CRC Press. <https://doi.org/10.1201/b18121-13>
- Coutie, M. G. (1997). Structural and stress analysis. Engineering Structures, 19(1), 92. [https://doi.org/10.1016/s0141-0296\(97\)81457-5](https://doi.org/10.1016/s0141-0296(97)81457-5)
- Cowin, S. C. (2001). Mechanics of materials. In Bone Mechanics Handbook, Second Edition (pp. 6-1-6–24). CRC Press.
- Emmitt, S., & Gorse, C. (2014). Barry's Advanced Construction Of Buildings Third Edition. John Wiley & Sons, Ltd (Vol. 28, p. 581).
- Guadagnini, M. (2008, May). Mechanics of Composite Materials: Preface. Mechanics of Composite Materials, 44(3), 197–198. <https://doi.org/10.1007/s11029-008-9011-3>
- Oppermann, R. H. (1941). Strength of materials, part I, elementary theory and problems. Journal of the Franklin Institute, 231(1), 96. [https://doi.org/10.1016/s00160032\(41\)90378-2](https://doi.org/10.1016/s00160032(41)90378-2)

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- Baig, M. N., Fan, J., & Nie, J. (2006). Strength of concrete filled steel tubular columns. Tsinghua Science and Technology, 11(6), 657–666. [https://doi.org/10.1016/S1007-0214\(06\)70248-6](https://doi.org/10.1016/S1007-0214(06)70248-6)
- Megson, T. H. G. (2005). Analysis of Statically Indeterminate Structures. In Structural and Stress Analysis (pp. 467–547). Elsevier. <https://doi.org/10.1016/b978-0750662215/50017-5>
- Salvadori, M., & Heller, R. (1986). Structure In Architecture: The Building Of Buildings, Third Edition. Struct in Archit, The Build of Build, Third Ed. Prentice-Hall Inc.
- Structural modeling and analysis. (1998). Choice Reviews Online, 35(07), 35-3890-35– 3890. <https://doi.org/10.5860/choice.35-3890>
- von Glasersfeld, E. (2009). A model for the construction of elementary concepts (pp. 45– 50). AIP Publishing. <https://doi.org/10.1063/1.58258>

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination Examination Scheme:

Evaluation Scheme								Total Marks	Credits	Duration of Exam (hr)
Internal Assessment					External Assessment					
CT		TA	A	Total I	ESE	ESJ	Total			
I	II									
10	10	25	5	50	50	0	50	100	3	3

CT: Class Test; TA: Total Assessment; A: Attendance; ESE: End Semester Examination; ESJ: End Semester Jury

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	--	--	--	1	3	--	--	1	--	--	--	--	3	1	--	--
CO2	--	--	--	1	3	--	--	1	--	--	--	--	3	1	--	--
CO3	--	--	--	2	3	--	--	1	--	--	--	--	2	1	--	--
CO4	--	--	--	2	3	--	--	1	--	--	--	--	2	1	--	--

1: strongly related, 2: moderately related and 3: weakly related

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	RESEARCH METHODOLOGY (ARC2705)	L	T	S	P	C
Version 1.1	Date of Approval:	2	0	0	0	2
Pre-requisites/Exposure	Research - I					
Co-requisites	Building Material and Construction Technology-VI					

Catalog Description

The aim of this course is to prepare students for writing a paper based on secondary research and literature review and its oral and visual presentation. Students would be able to identify and go in depth into specific and appropriate aspects relating to the discipline of architecture and discuss how it is reflected in the realm of design.

Students learn how to research a subject area through readings; learn description, analysis and synthesis of readings; citation of authors in their writing. The importance of the course is also in understanding what constitutes plagiarism research writing and in imbibing the ethics of publication. Literature review is seen as the first step in preparation of understanding research methods.

Course Objectives

The objective of this course is

- To introduce research work to the students
- To identify a specific aspect relating to the discipline of architecture.
- To conduct a research

Course Outcomes

On completion of this course, the students will be able to

CO1: Identify area of research for thesis

CO2: Identify a research problem, formulation of hypothesis and organize a study based on literature survey

CO3: Apply research methods in case study and analyze the data collected from different sources

CO4: Develop ethics of publication

Modules	Blooms level*	Number of hours
MODULE 1: Identifying research topic, Research Gap and Project Formulation Choose any topic of the interest in consultation to the faculty concern; Research Question – Investigation Question – Measurement Issues – Hypothesis – Qualities of a good Hypothesis –Null Hypothesis & Alternative Hypothesis. Hypothesis Testing – Logic & Importance.	L1, L2, L3	6
MODULE 2: Literature Review Review of research paper, books, journals etc related to the topic	L1, L2, L3	6

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MODULE 3: Surveys, Data Collection and Data Analysis Questionnaire to be prepared and Surveys to be conducted related to research. Other related data to be collected from appropriate resources. Collected data to be analysed using proper software. frequency tables, bar charts, pie charts, percentages etc	L1, L2, L3, L4	6
MODULE 4: Paper Writing Research paper writing in appropriate format. Ethical issues related to publishing, Plagiarism and Self-Plagiarism to be checked	L1, L2, L3	6

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation*

Text Books

- Kothari, C.R. (1985). Research Methodology, Delhi: New Delhi International Publishers

Reference Books

- Sagar ,Linkan (2019). 3D Max 2019 Training Guide, New Delhi: BPB Publication
- Sagar ,Linkan, (2019). Revit 2019 Architecture Training Guide. New Delhi: BPB Publication.
- Lorraine Farrelly Nicola Crowson. (2014). Representational Techniques for Architecture (Basics Architecture). (2nd Revised edition). Bloombury.
- M.C. Trivedi. (2009). Computer Graphics & Animation. (First edition). Jaico Publishing House.

Modes of Evaluation: Quiz/Assignment/ Seminar/Practical

Examination Scheme:

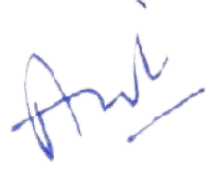
Evaluation Scheme								Total Marks	Credits	Duration of Exam (hr)
Internal Assessment					External Assessment					
CT		TA	A	Total	ESE	ESJ	Total			
I	II									
10	10	75	5	100	0	0	0	100	2	0

CT: Class Test; TA: Total Assessment; A:Attendance; ESE: End Semester Examination; ESJ: End Semester Jury

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	--	1	3	2	--	--	--	--	--	--	--	--	1	3	--	3
CO2	--	2	2	3	--	--	--	--	--	--	--	--	1	2	--	2
CO3	--	2	1	3	--	--	--	--	--	--	--	--	1	2	--	2
CO4	--	3	2	2	--	--	--	--	--	--	--	--	2	2	--	2

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	LEED LAB – I (ARC2717)	L	T	S	P	C
Version 1.1	Date of Approval:	2	0	0	0	2
Pre-requisites/Exposure	Architectural Design- VI					
Co-requisites	Architectural Design – VII					

Catalog Description

The aim of this course is to provide fundamental knowledge about natural and built environment. And also introduces fundamental concepts to understand environmental processes. The curriculum further incorporates understanding in relation to Indian context. Course will be interdisciplinary and flexible.

Course Objectives

The objective of this course is

- To acquaint the student with the factors to be taken into consideration
- To understand the applications of an intelligent building.
- To familiarize the students to the Green Building rating systems, design processes, regulations and prevailing best practices

Course Outcomes

On completion of this course, the students will be able to

CO1: Define the fundamental of green building design.

CO2: Identify the role of USGBC, GBCI and their structure.

CO3: Identify the criteria for the selection of site

CO4: Review the fundamental concepts of waste management system.

Modules	Blooms level*	Number of hours
MODULE 1: Introduction to Green Building & Green Building Rating Systems Introduction to Course, Syllabus and assessment, Fundamental concepts of Green Building Design and Sustainability. Green Rating regime and their scope (regional and global), Policies and legislations	L1, L2	6
MODULE 2: LEED Lab & Processes LEED Systems: Organization, fundamentals & Role USGBC/GBCI, Structure of LEED rating (credit, prerequisites and requirements) and Impact categories, LEED Certification & registration process, What, How and where to collect data for LEED certification	L1, L2, L3	6
MODULE 3: Site, Location and Transportation Scope and criterion of sustainable site, Transport and resource footprint	L1, L3, L4	6
MODULE 4: Buildings Material and Resources	L1,	6

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Fundamental concepts (LCA), Waste management, 3Rs and Health), Procurement, declarations and documentations of Materials according to requirement of LEED certification	L3,L4	
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**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation*

Text Books:

- Altomonte, S., & Schiavon, S. (2013). Occupant satisfaction in LEED and non-LEED certified buildings. *Building and Environment*, 68, 66–76. <https://doi.org/10.1016/j.buildenv.2013.06.008>
- Azhar, S., Carlton, W. A., Olsen, D., & Ahmad, I. (2011). Building information modeling for sustainable design and LEED ® rating analysis. *Automation in Construction*, 20(2), 217–224. <https://doi.org/10.1016/j.autcon.2010.09.019>
- Leed. (2014). Reading for the R and D Community, 56(3), 25–27. https://doi.org/10.1007/978-90-313-9258-2_26

References:

- Newsham, G. R., Mancini, S., & Birt, B. J. (2009). Do LEED-certified buildings save energy? Yes, but... *Energy and Buildings*, 41(8), 897–905. <https://doi.org/10.1016/j.enbuild.2009.03.014>
- Suzer, O. (2015). A comparative review of environmental concern prioritization: LEED vs other major certification systems. *Journal of Environmental Management*, 154, 266–283. <https://doi.org/10.1016/j.jenvman.2015.02.029>

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

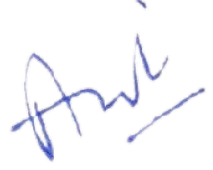
Evaluation Scheme							Total Mark s	Credit s	Duration of Exam (hr)	
Internal Assessment				External Assessment						
CT		TA	A	Total	ESE	ESJ				Total
I	II									
10	10	25	5	50	50	0	50	100	2	3

CT: Class Test; TA: Total Assessment; A: Attendance; ESE: End Semester Examination; ESJ: End Semester Jury

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	-	-	2	--	3	1	2	-	-	-	--	-	2	-	1	--
CO2	-	-	2	--	3	1	2	-	-	-	--	-	2	-	1	--
CO3	-	-	2	--	3	1	2	-	-	-	--	-	2	-	1	--
CO4	-	-	2	-	3	1	2	-	-	-	-	-	2	-	-	2

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	INTERIOR DESIGN (ARC2718)	L	T	S	P	C
Version 1.1	Date of Approval:	1	0	2	0	3
Pre-requisites/Exposure	Architectural Design - IV					
Co-requisites	Architectural Design - V					

Catalog Description

The aim of this course is to make students understand the application of design principles in interiors. The subject Interior Design is a specialized course offered in architecture which deals with functionality, safety and provides an aesthetically pleasing space for users. This semester will deal with minute details and construction techniques involved in interior design. The subject will also be integrated with a small component of design exercise with the current or previous semester design works. The course will include several exercises in relation to sit visits, market surveys, presentation, reports, etc.

Course Objectives:

The objective of this course is

- To equip the students with varied aspects of theory and practice of Interior Design, and develop skills to deal with diverse interior spaces.
- To understand qualities of spaces and develop their skills in designing for functional and meaningful interior space.
- To initiate students into theory and practice of Interior design.
- To merge theoretical and practical knowledge of interior design of a building.

Course Outcomes:

On completion of this course, the students will be able to

CO1: Apply elements of interior design in their design process.

CO2: Explain the application of design principles in interiors.

CO3: Create interior design model with the help of furniture, lighting fixtures, furnishings, paintings, sculptures, etc.

CO4: Design modern interiors using modern materials and techniques.

Modules	Blooms level*	Number of hours
MODULE 1: Introduction and basic principles of design Purpose, scope, objectives, history and importance of Interior Design. Elements and principles of interior design and their application in the context of buildings. Aesthetic order, functional Value and Psychological impact of various elements of Interior Design. Application of Colour, Texture, Landscaping, Artificial and Natural Lighting in the Building interiors.	L1, L2	9
MODULE 2: Principles and Elements of Interior Design Elements of Interior Design, Role in interiors. Space making elements like wall, column, partition screen, floor, furniture, interior landscaping etc., their design	L2, L3, L4	9

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value, colour theories and schemes, light		
MODULE 3: Understanding Furniture work and furnishings in Interior Understanding furniture layout, furniture design with the construction technique, types of furniture and their usage, construction materials and fabrics used in furniture designing, cost estimation, understanding works of great masters. Furniture, Furnishings, Fabrics, Murals, Paintings, Sculpture, Lighting Fixtures, Floor coverings, Wall coverings and related materials. Study of furniture designs, Built-in furniture, Movable furniture, Modular furniture.	L2, L3, L4	9
MODULE 4: Modern trends in Interior design Understanding and designing modern interiors using modern materials and techniques. Study Report of an existing DESIGN PROJECT. Space organization in interiors--presentation of the complete interior scheme of a given projects such as Library, Public Halls, Conference Room, Commercial buildings etc.	L4, L5, L6	9

***Bloom's Level:** L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books/References:

- Beecher, M. A., & Pile, J. (2002). *A History of Interior Design*. APT Bulletin, 33(1), 57. <https://doi.org/10.2307/1504797>
- Demirbaş, Ö. O. (2017). *The Fundamentals of Interior Design*. The Design Journal, 20(4), 537–542. <https://doi.org/10.1080/14606925.2017.1325635>
- Di Cintio, L. (2019). *Design activism*. In *The Interior Architecture Theory Reader* (pp. 376–384). Routledge. <https://doi.org/10.4324/9781315693002-44>
- Hayles, C. S. (2015). *Environmentally sustainable interior design: A snapshot of current supply of and demand for green, sustainable or Fair Trade products for interior design practice*. International Journal of Sustainable Built Environment, 4(1), 100–108. <https://doi.org/10.1016/j.ijbsbe.2015.03.006>
- Margolin, V., & Margolin, S. (2002). A “Social Model” of Design: Issues of Practice and Research. *Design Issues*, 18(4), 24–30. <https://doi.org/10.1162/074793602320827406>
- Merrell, P., Schkufza, E., Li, Z., Koltun, V., & Agrawala, M. (2011). *Interactive Furniture Layout Using Interior Design Guidelines*. ACM Transactions on Graphics, 30(4), 1–10. <https://doi.org/10.1145/2010324.1964982>
- Stoddart, A. (2012). *Interior design*. Nature Materials, 11(10), 829–829. <https://doi.org/10.1038/nmat3445>
- Ulrich, R. S. (1991). *Effects of Interior Design on Wellness*. Journal of Health Care Interior Design.
- Ulrich, R. S. (1991). *Effects of interior design on wellness: theory and recent scientific research*. Journal of Health Care Interior Design : Proceedings from the ... Symposium on Health Care Interior Design. Symposium on Health Care Interior Design.

Modes of Evaluation: Assignment/ Case Study/ Market Survey/ Presentation/ Written Examination

Evaluation Scheme								Total Marks	Credits	Duration of Exam (hr)
Internal Assessment					External Assessment					
CT		TA	A	Total	ESE	ESJ	Total			
I	II									
10	10	25	5	50	0	50	50	100	3	0

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CT: Class Test; TA: Total Assessment; A: Attendance; ESE: End Semester Examination; ESJ: End Semester Jury

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	3	-	-	--	1	--	--	--	--	-	2	-	2	3	--	1
CO2	2	-	-	--	1	--	--	--	-	-	2	-	2	3	--	1
CO3	2	-	-	--	2	--	--	--	-	-	1	-	2	3	--	1
CO4	2	-	-	-	1	-	-	-	-	-	2	-	2	2	-	1

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	SPECIFICATION, ESTIMATION AND VALUATION (ARC2720)	L	T	S	P	C
Version 1.1	Date of Approval:	3	0	0	0	3
Pre-requisites/Exposure	Building Materials & Construction Technology - V, Workshop Practice & Site Exposure					
Co-requisites	Building Material and Construction Technology-VI					

Catalog Description

The aim of this course is to make students familiar with the theory and practice of specifications and estimation, and quantity surveying; along with its importance in the field of building construction. The process of writing specification document for materials, labour, budgets and; estimating the cost and time of construction works shall be covered. The preparation of bill of quantities, optimum resource consumptions and introduction to BIS and other standardized institutions is also a part of the course.

Course Objectives

The objective of this course is

- To develop a real-time judgment of quantity surveying, details specifications, estimations and valuation
- To develop skill for precise and approximate estimations and be able to estimate and specify quantities of various items of material and work involved in architectural and planning projects

Course Outcomes

On completion of this course, the students will be able to

CO1: Discuss the importance and usage of specification, estimation, valuation and depreciation

CO2: Describe the detailed specification of various common building materials

CO3: Execute and implement the appropriate methods for preparing the estimates.

CO4: Compare, evaluate and interpret the building typologies for doing the valuation.

Modules	Blooms level*	Number of hours
MODULE 1: Introduction Why the knowledge of quantity surveying and specifications is necessary for architects and planners? Significance and methods of writing specifications, classifications of specifications, sources of specifications; Types and methods of cost estimation for different types of projects, rates and sources of rates for different components of projects; Cost Index.	L1, L2, L3	9
MODULE 2: Specification Specifications for common building materials and building trades, earthwork, structure (framing), flooring, stonework, plasters, waterproofing of basements and terraces, roofing, doors and windows, elevators. Site development and earth	L1, L2, L3	9

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works; Water supply network and distribution systems; Sewer systems; Electrical and telephone networks; Landscaping, roads, pathways, boundary wall, pools, lighting.		
MODULE 3: Estimating Calculation of plinth area, floor area, carpet area and circulation area, Preliminary estimates- plinth area rates and cost indices, Detailed estimate-modes of measurement, taking off quantities from drawings, Bill of Quantities (BOQ) and Bill of Materials (BOM), Deriving rates for items from labour and material costs based on CPWD Schedule of Rates, scheduled and non-scheduled items, Establishing market rates. Cost estimation and determination of rates for different types of housing; Cost estimation and determination of rates of works involved in the infrastructure services (roads, water supply, sewer systems, etc.); Costing procedure for different land use categories, development works, interest on investment, and phasing.	L1, L2, L3	9
MODULE 4: Valuation Value and purpose of valuation; Definition and importance of valuation of land and buildings; Factors affecting property and land value at a city and clarity level; Legal, fiscal and administrative measures of land value; Sinking fund; Betterment; Scrap value, salvage value, outgoings; Capitalized value of buildings; appreciation, depreciation and their types, methods of calculating depreciation.	L1, L2, L3	9

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation*

Text Books

- Deshpande, G. B. &Nayak, J. P. (2018). Quantity Suveying, Contracts and Tenders. NiraliPrakashan.
- Gangrade, Mukesh N. (2018). Estimating and Costing. NiraliPrakashan.
- Kohli, R. C. (2013). A Textbook of Estimating, Costing & Accounts. S. Chand.
- Rosen, Harold J. &Kalin, Mark. (2010),Construction Specifications Writing: Principles and Procedures, John Wiley& Sons Publication.

Reference Books

- Aigner, Dennis, Lovell, C. A. Knox & Schmidt, Peter. (1977). Formulation and estimation of stochastic frontier production function models. Journal of Econometrics, 6(1), 21-37.[https://doi.org/10.1016/0304-4076\(77\)90052-5](https://doi.org/10.1016/0304-4076(77)90052-5)
- Arthanareswaran, R. (2015). A course material on Estimation and Quantity Surveying.
- Can, Ayse. (1992). Specification and estimation of hedonic housing price models. Regional Science and Urban Economics, 22(3), 453-474.[https://doi.org/10.1016/0166-0462\(92\)90039-4](https://doi.org/10.1016/0166-0462(92)90039-4)

Modes of Evaluation: Quiz/Assignment/ Seminar/Practical



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Examination Scheme:

Evaluation Scheme								Total Marks	Credits	Duration of Exam (hr)
Internal Assessment					External Assessment					
CT		TA	A	Total	ESE	ESJ	Total			
I	II									
10	10	25	5	50	50	0	50	100	3	3

CT: Class Test; TA: Total Assessment; A: Attendance; ESE: End Semester Examination; ESJ: End Semester Jury

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1	2	1	2	--	--	--	--	--	--	2	--	1	2	--	3
CO2	1	2	1	2	--	--	--	--	--	--	2	--	1	2	--	2
CO3	1	2	1	2	--	--	--	--	--	--	2	--	1	2	--	2
CO4	1	2	1	1	2	--	--	--	--	--	2	--	2	2	--	2

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	PEOPLE CULTURE AND BUILT ENVIRONMENT- III (ARC2721)	L	T	S	P	C
Version 1.1	Date of Approval:	3	0	0	0	3
Pre-requisites/Exposure	History of Architecture, Architectural Design – III					
Co-requisites	Theory of Architecture					

Catalog Description

The objective of this course is to offer opportunities in specialized or advance learning in psychological and sociological aspects which are of concern to Architecture. The courses will generally be conducted in the seminar/studio mode to encourage research, exploration and skill developments. The aim of this course is to provide students the exposure to understanding society and various built forms produced by society. The course will also provide the students hands-on cultural, sociological and psychological studies of the built environment. The course contents to be followed will be developed by course teachers based on the resources at hand and opportunities for cross fertilization with other courses. The course would be conducted through literature survey, case studies, site visits, community surveys and hands on projects. During the course the students will be working on a live project in groups which are preferably interdisciplinary.

Course Objectives

The objective of this course is

- To understand the basic principles of psychology, sociology and culture of settlement.
- The course intends to study and understand the typical components of city in order to appreciate how these elements contribute to the quality of life of urban communities.
- To familiarize students with decisive strategies that brings inclusivity and equality in the designs of built forms.
- To develop interdisciplinary understanding and sensitivities of future architects.

Course Outcomes

On completion of this course, the students will be able to

CO1: Develop a relationship between man and his larger social environment, with special emphasis on aspects that are likely to affect intervention in or creation of, the built environment (predominantly urban)

CO2: Develop a language and vocabulary for discussions/ analysis on the sociological/ psychological dimensions of architecture.

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Modules	Blooms level*	Number of hours
MODULE 1: Introduction to Psychology, Sociology and Built Environment Basic introduction to various critical social aspects; Role of psychology in architecture; Role of sociology in built environment; Determinants of sociology- social structure, social status, social control, social institutions, social mobility; Inclusive Built Environment; Barrier free designs and built environments; Various case studies related to gender and architecture, community development- community response towards development strategy etc.	L1, L2	18
MODULE 2: Project Work Selection and understanding of case study; Formulation of Aim and Objectives, Collection of data through primary and secondary sources; Conducting survey; Database development using relevant and advance software; Qualitative and quantitative data analysis; Report writing and presentations.	L4, L5, L6	18

*Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books/ References

- Cragun R.T. (2006). Introduction to Sociology, Wikibooks.
- Giddens, A (2006) Sociology, Polity Press, Cambridge (UK)
- Lynch, K. (1960) The Image of the City, Joint Centre Publication, USA
- Oomen T.K. and Venugopal C.N. (2004), Sociology, Eastern Book Company.
- Porteous, Douglas, J. (1977), Environment Behaviour: Planning and Everyday Urban Life, Addison Wesley
- Sinha A. (2013) "An India for Everyone: A Path of Inclusive Development, Harpercollins
- Steve Barkan (2010), Sociology: Understanding and Changing the Social World, Flat World Reference Books
- Tejchman A. (2016) "The Politics of Inclusive Development", Palgrave Macmillan.

Modes of Evaluation: Presentation/Assignment/Class Test /Written Examination

Examination Scheme:

Evaluation Scheme								Total Marks	Credits	Duration of Exam (hr)
Internal Assessment					External Assessment					
CT		TA	A	Total I	ESE	ESJ	Total			
I	II									
10	10	25	5	50	0	50	50	100	3	0

CT: Class Test; TA: Total Assessment; A: Attendance; ESE: End Semester Examination; ESJ: End Semester Jury

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CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	2	1	1	2	1	1	2	1	1	2	-	2	-	-	1	1
CO2	2	3	1	2	1	1	2	3	3	1	-	1	-	-	1	1

1: strongly related, 2: moderately related and 3: weakly related



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	ECOLOGY, ENVIRONMENT AND SUSTAINABLE DEVELOPMENT – III (ARC2722)	L	T	S	P	C
Version 1.1	Date of Approval:	3	0	0	0	3
Pre-requisites/Exposure	Environmental Sciences, Building Services-1, Building Services-2					
Co-requisites	Architectural Design, Building Services-3					

Catalog Description

The aim of this course is to offer opportunities in specialized or advance learning in ecology, environment and sustainable aspects which are of concern to Architecture. The course will generally be conducted in the seminar/studio mode to encourage research, exploration and skill developments. The aim of this course is to provide students the exposure to understanding ecology and various environmental problems faced by settlements. The course will also provide the students hands-on ecological and environmental studies of built environment. The course contents to be followed will be developed by course teachers based on the resources at hand and opportunities for cross learning with other courses. The course would be conducted through literature survey, case studies, site visits, community surveys and hands on projects. During the course the students will be working on a live project in groups which are preferably interdisciplinary.

Course Objectives

The objective of this course is

- To understand the basic principles of ecology, environment and sustainable development.
- The course intends to study and understand the different components of city in order to understand how these elements contribute to environment quality.
- To establish the significance of the ecological issues, their impact and initiatives to address the same in the built environs to achieve sustainable development.
- To develop interdisciplinary understanding and sensitivities of future architects.

Course Outcomes

On completion of this course, the students will be able to

- CO1:** Develop a relationship between man and ecology, will understand critical environmental issues and need to address the m by using advanced technology.
- CO2:** Produce reports and presentation.

Modules	Blooms level*	Number of hours
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MODULE 1: Introduction to Ecology, Environment and Sustainable Development Basic introduction to ecology; Interrelation between natural and built environment; Importance of environment sustainability in built environment; Energy conservation, renewable sources: wind, solar, geothermal, bio-fuels; Materials minimizing, recycling, reducing energy content, etc; Other environmental issues related to solid waste management, water resources, air quality, storm water drainage etc; Various case studies related to traditional / vernacular buildings and settlements demonstrating relationship between climate, local material resources and settlement/ building forms.	L1, L2	18
MODULE 2: Project Work Selection and understanding of case study; Formulation of Aim and Objectives, Collection of data through primary and secondary sources; Conducting survey; Database development using relevant and advance software; Qualitative and quantitative data analysis; Report writing and presentations.	L4, L5, L6	18

*Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books/References

- Bakari, Mohamed El-Kamel (2017). *The Dilemma of Sustainability in the Age of Globalization: A Quest for a Paradigm of Development*. New York: Lexington Books. ISBN 978-1498551397
- Blewitt, J. (2008). *Understanding Sustainable Development*. London: Earthscan. pp. 21–24. ISBN 978-1-84407-454-9.
- Fulekar, M. H., Pathak, B., Kale, R. K. (2014) *Environment and Sustainable Development* Springer Nature; ISBN-10: 8132211650; ISBN-13: 978-8132211655
- Goudie, Andrew (2000). *The Human Impact on the Natural Environment*. Cambridge, Massachusetts: This MIT Press. pp. 203–239. ISBN 0-262-57138-2.
- James, Paul (2014). *Urban Sustainability in Theory and Practice*. doi:10.4324/9781315765747. ISBN 978-1-315-76574-7.
- James, Paul; Magee, Liam (2016). "Domains of Sustainability". In A. Farazmand (ed.). *Global Encyclopedia of Public Administration, Public Policy, and Governance*. Springer.
- Modak, P. (2017) *Environmental Management Towards Sustainability*, CRC Press, ISBN-10: 9781498796248
- Odum, E. P. (1971). *Fundamentals of Ecology* (Third ed.). New York: Saunders. ISBN 0-7216-6941-7.
- Porteous, Douglas, J. (1977), *Environment Behaviour: Planning and Everyday Urban Life*, Addison Wesley
- Thangavel, P., Sridevi, G. (2015) *Environmental Sustainability*, Springer Nature, ISBN-10: 9788132220558
- Walker, Brian and Salt, David (2006) *Resilience Thinking: Sustaining ecosystems and people in a changing world*. Island Press. p. xiii. ISBN 978-1597260930.
- Wandenberg, JC (August 2015). *Sustainable by Design*. Amazon. p. 122. ISBN 978-1516901784

Modes of Evaluation: Presentation/Assignment/Class Test /Written Examination

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Examination Scheme:

Evaluation Scheme								Total Marks	Credits	Duration of Exam (hr)
Internal Assessment				External Assessment						
CT		TA	A	Total I	ESE	ESJ	Total			
I	II									
10	10	25	5	50	0	50	50	100	3	0

CT: Class Test; TA: Total Assessment; A: Attendance; ESE: End Semester Examination; ESJ: End Semester Jury

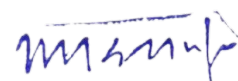
CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	2	1	1	2	1	1	2	1	1	2	-	2	-	-	1	1
CO2	2	3	1	2	1	1	2	3	3	1	-	1	-	-	1	1

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	COMPUTER APPLICATIONS AND ADVANCE TECHNOLOGIES – III (BIM) (ARC2723)	L	T	S	P	C
Version 1.1	Date of Approval:	1	0	0	4	3
Pre-requisites/Exposure	Architectural Graphic Skills					
Co-requisites	Architectural Design, Building Materials and Construction Technology					

Catalog Description

This course covers Building Information Modeling (BIM), including its use and application for small- and large-scale building construction projects. Students will learn terminology associated with buildings, the theory and evolution of BIM, and how to develop BIM models using Autodesk Revit. As time allows, this course will also cover selected topics on how BIM is used to help prepare or feed into key project items, such as cost estimation, architectural renderings, interference checking, and modeling of energy consumption.

Course Objectives

The objective of this course is

- To assess the viability of a project and detect possible design errors
- To enhance project performance and produce better outcomes.
- To help construction manager to gather data and information from the relevant disciplines and communicate them more effectively
- To understand Revit interface and function

Course Outcomes

On completion of this course, the students will be able to

CO 1: Be able to compare, including advantages and disadvantages of BIM vs. 2D and 3D CAD

CO 2: Explain the challenges and roadblocks still facing the use of BIM.

CO 3: Comprehend the details of BIM and its role and application in the construction industry

CO 4: Create plans, sections, details, schedules, staircase, cover page

Modules	Blooms level*	Number of hours
Module 1: Introduction <ul style="list-style-type: none"> • Introduction to BIM • BIM vs. 3D CAD • Introduction to Revit interface and Function • Building design process and roles of owners, managers, designers, engineers, and contractors/ sub-contractors 	L1, L2, L3	8
Module 2: BIM Concepts <ul style="list-style-type: none"> • How can BIM be a part of the building design process? • Evolution and development of BIM & object-based parametric modelling 	L1, L2, L3	8

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<ul style="list-style-type: none"> BIM platforms 		
Module 3: Autodesk Revit <ul style="list-style-type: none"> Model navigation Architecture Modelling Adding Elevations and Gridlines Creating wall, adding doors and windows Creating floor, staircase, shaft opening, roof Adding furniture components 	L1, L2, L3, L4	10
Module 4: Modelling Output <ul style="list-style-type: none"> Annotations and Tagging Labelling and Tagging Dimensioning Room Tag Creating door and window schedule Creating schedule of accommodation 	L1, L2, L3	10

*Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

- The Impact of Building Information Modelling – By Ray Crotty*
- A Practical guide to adopting BIM in construction projects- by Bimal Kumar*

Reference Books

- BIG BIM little bim- by Finith Jernigan*
- The BIM manager's handbook- By Dominik Holzer*
- Building Information Modeling For Dummies- By Stefan Mordue, Paul Swaddle, David Philp*

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Evaluation Scheme								Total marks	Credits	Duration of Exam (hr)
Internal Assessment				External Assessment						
CT		TA	A	Total	ESE	ESJ	Total			
I	II									
10	10	25	5	50	0	50	50	100	5	0

CT: Class Test; TA: Total Assessment; A: Attendance; ESE: End Semester Examination; ESJ: End Semester Jury

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	2	-	--	--	2	--	--	--	--	--	--	--	3	1	--	--
CO2	3	-	--	--	1	--	--	--	--	--	--	--	2	1	--	--
CO3	3	-	--	--	2	--	--	--	--	--	--	--	2	1	--	--
CO4	2	-	--	--	1	--	--	--	--	--	--	--	2	1	--	--

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	STRUCTURE - VIII (ARC2815)	L	T	S	P	C
Version 1.1	Date of Approval:	3	0	0	0	3
Pre-requisites/ Exposure	Structure – VII					
Co-requisites						

Catalog Description

The aim of this course is to enable students to design advanced structures system and their basic components. This subject covering three major different types of structures i.e. Pneumatic structure, Geodesic Dome and Bridges. The fundamental aspects of analysis and design and also discusses the practical requirements such as safety, feasibility and economy these structures. Along this some iconic examples as a case study will also cover in this course. The subject will be taught in congruence with the Design studio, and assignments for the subject will be linked to the design exercises to achieve higher level of learning and understanding the practical application of the same.

Course Objectives

The objective of this course is

- To understand the design of Pneumatic structures.
- To learn the behavior and design of Geodesic Dome.
- To understand the design of Bridges.
- To gain an educational and comprehensive experience with the various types of Iconic Structure.

Course Outcomes

On completion of this course, the students will be able to

CO1: Design Pneumatic structures.

CO2: Design Geodesic Dome structures.

CO3: Design various types of Bridges.

CO4: Understanding of different types of modern and contemporary iconic buildings.

Modules	Blooms level*	Number of hours
MODULE 1: Pneumatic Structure Introduction to Design Specification for Pneumatic Structure, Design principles, Components, Limitations in Design, Economic parameters, Case Studies.	L1, L2, L3	9
MODULE 2: Geodesic Dome Introduction to Design Specification for Geodesic Dome, Design principles, Components, Limitations in Design, Economic parameters, Case Studies.	L1, L2, L3	9
MODULE 3: Space Frames Introduction to Design Specification for Space Frames, Design principles, Components, Limitations in Design, Economic parameters, Case Studies.	L1, L2, L3	9

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MODULE 4: Modern & Contemporary Structures Case studies of different Indian buildings structure like Hall of nation, STC building, Lotus temple, Cricket Stadium Ahmedabad etc, Case Studies of various International buildings structure like Eiffel tower, Louvere, Guggenheim Museum, Burj Khalifa, Habitat 67, Dupli Casa etc. (at least 10 different typology building structures Indian and Internationally focused on mainly roof system.	L1, L2, L3	9
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**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation*

Text Books

- Herzog, Thomas (1976). Pneumatic Structures: A Handbook of Inflatable Architecture, Oxford University Press
- Otto, Frei (1967). Tensile Structures Volume One: Pneumatic Structures (v. 1), The MIT Press Ltd; 1st Printing edition
- Chen, Wai -Fah, Duan, Lian (2014). Bridge Engineering: Substructure Design, CRC Press.
- Loon, VamBorin, (1999). Geodesic Domes: Demonstrated, Tarquin Publications

References

- Arya, C. (2009). Eurocode 3: Design of steel structures. In Design of Structural Elements (pp. 375–433). CRC Press. <https://doi.org/10.1201/b18121-13>
- Coutie, M. G. (1997). Structural and stress analysis. Engineering Structures, 19(1), 92. [https://doi.org/10.1016/s0141-0296\(97\)81457-5](https://doi.org/10.1016/s0141-0296(97)81457-5)
- Cowin, S. C. (2001). Mechanics of materials. In Bone Mechanics Handbook, Second Edition (pp. 6-1-6–24). CRC Press.
- Emmitt, S., & Gorse, C. (2014). Barry's Advanced Construction Of Buildings Third Edition. John Wiley & Sons, Ltd (Vol. 28, p. 581).
- Guadagnini, M. (2008, May). Mechanics of Composite Materials: Preface. Mechanics of Composite Materials, 44(3), 197–198. <https://doi.org/10.1007/s11029-008-9011-3>
- Oppermann, R. H. (1941). Strength of materials, part I, elementary theory and problems. Journal of the Franklin Institute, 231(1), 96. [https://doi.org/10.1016/s00160032\(41\)90378-2](https://doi.org/10.1016/s00160032(41)90378-2)

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Evaluation Scheme								Total Marks	Credits	Duration of Exam (hr)
Internal Assessment					External Assessment					
CT		TA	A	Total I	ESE	ESJ	Total			
I	II									
10	10	25	5	50	50	0	50	100	3	3

CT: Class Test; TA: Total Assessment; A: Attendance; ESE: End Semester Examination; ESJ: End Semester Jury

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CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	--	--	--	1	3	--	--	1	--	--	--	--	3	1	--	--
CO2	--	--	--	1	3	--	--	1	--	--	--	--	3	1	--	--
CO3	--	--	--	2	3	--	--	1	--	--	--	--	2	1	--	--
CO4	--	--	--	2	3	--	--	1	--	--	--	--	2	1	--	--

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	TOWN PLANNING (ARC2816)	L	T	S	P	C
Version 1.1	Date of Approval:	2	0	0	0	2
Pre-requisites/ Exposure	History of Architecture – III					
Co-requisites	Building Bye-laws					

Catalog Description

The aim of this course is to familiarize the students with Planning concepts and process in urban and regional planning. The course provides insights into ancient Town Planning to the contemporary best practices. The aim is to familiarize the students with the process of evolution of cities, concepts related to humanitarian planning processes and skill development to identify planning issues in existing areas and develop solutions at basic levels. The subject will be taught in congruence with the Design studio and assignments for the subject will be linked to the design exercises to achieve higher level of learning and understanding the practical application of the same

Course Objectives

The objective of this course is to

- To familiarize the students with Planning concepts and process in Urban and Regional Planning.
- To understand the various elements, classifications and typology of humans settlements.
- To develop research interest in the theory of urban planning and development studies.

Course Outcomes

On completion of this course, the students will be able to

CO1: Define the various elements, classification and typology of planning

CO2: Define types of settlements based on different criteria and different parameters.

CO3: Review the condition of development/status of urbanization.

CO4: Classify constituents of town or city and develop different type of Plans.

Modules	Blooms level*	Number of hours
MODULE 1: Introduction to Planning and its concepts Definitions, planning as hierarchical process, essential features of planning, town planning as a practice, Regional Planning, Rural Planning, Transport Planning, Housing. Various Roles that Planners Play- in Development Authority. Planning concepts and their relevance to Indian Planning practice in respect of Ebenezer Howard – Garden city concepts and contents – Patrick Geddes – Conservative surgery – case study – C.A. Perry – Neighborhood concept Le Corbusier – concept and case studies	L1, L2	5
MODULE 2: Classification and history of Cities Definitions of urbanization such as world cities, city-regions, global cities; Census definitions such as Class-I, Class-III cities. Example of good planned cities and their planner. Analysis of old– Egyptian, Mesopotamian, Greek,	L1, L2	5

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Roman, Renaissance, and Modern cities - Garden cities, Chandigarh etc.		
MODULE 3: Planning process and standards Identification of values, norms, goals and objectives, methodology of plan formulation, site selection, land use mapping, population projection, calculation of housing and community services, calculation and laying of physical infrastructure, public participation, plan visioning exercise, community dispute resolution as per URDPFI guidelines	L1, L2	6
MODULE 4: Types of Plans and modern approach Comprehensive plans, development plans, local plans, district plans, public participation, people and plans, regional planning, Five Year Plans, District Development Plans, Regional Plans, Master Plans, Strategic Plans, Zonal Plans, Urban Renewal Plan – Meaning, Redevelopment, Rehabilitation and Conservation – JNNURM, SEZ – case studies. Introduction, Benefits and Planning components of Green City (e.g. Vancouver), Compact City (e.g. Sky city, China) and Smart City (e.g. Malta)	L1, L2	8

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation*

Text Books

- Arthur B. Gallion et.al, (1957), Urban Pattern, The Urban Pattern- City Planning and Design: Publication Van Nostrand
- Binode Dutt (1925), Town Planning in Ancient India
- C. A. Doxiadis (1971), Ekistics: An Introduction to the Science of Human Settlements, Discussions On Ekistics: Nature, Man, Shells, Society, Networks. Summary Of The Athens Ekistics: Jstor
- G.K. Hiraskar (20th Edition, 2017), Fundamentals of Town Planning: Dhanpat Rai Publications
- URDPFI Guidelines (2014): Government of India

Reference Books

- Bradshaw, M. (1988). Cities for people. Town & Country Planning, 57(4), 114–116. <https://doi.org/10.5860/choice.48-4292>
- G. Cherry (1999), Social Town Planning, ISBN 0-415-17241-1, Taylor & Francis e Library, 2001
- Howard, E. (2013). Garden cities of To-morrow. Garden Cities of To-Morrow (pp. 1–168). Taylor and Francis. <https://doi.org/10.4324/9780203716779>
- J. B. Mcloughlin (1969), Urban and Regional Planning – A System Approach: New York, Praeger
- Lewis Kebble (1969), Principles and practice of Town and Country Planning: Estate Gazette, UK

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination


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Examination Scheme:

Evaluation Scheme								Total marks	Credit s	Duration of Exam (hr)
Internal Assessment					External Assessment					
CT		TA	A	Total	ESE	ESJ	Total			
I	II									
10	10	25	5	50	50	0	50	100	2	3

CT: Class Test; TA: Total Assessment; A: Attendance; ESE: End Semester Examination; ESJ: End Semester Jury

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	-	-	--	2	3	2	--	--	--	--	--	--	3	--	--	1
CO2	-	-	--	3	2	1	--	--	--	--	--	--	2	--	--	1
CO3	-	-	--	2	1	1	--	--	--	--	--	--	2	--	--	1
CO4	-	-	--	3	3	2	--	--	--	--	--	--	2	--	--	1

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	LEED LAB-II (ARC2817)	L	T	P	S	C
Version 1.1	Date of Approval:	2	0	0	0	2
Pre-requisites/Exposure	LEED Lab – I					
Co-requisites	Architectural Design – VIII					

Catalog Description

The aim of this course is to provide fundamental knowledge about natural and built environment. And also introduces fundamental concepts to understand environmental processes. The curriculum further incorporates understanding in relation to Indian context. Course will be interdisciplinary and flexible.

Course Objectives

The objective of this course is

- To understand the concept of an Energy and climate
- To understand the importance of Water Efficiency
- To familiarize the students with LEED Arc

Course Outcomes

On completion of this course, the students will be able to

CO1: Define basic concepts of building loads, energy efficiency, environmental concern

CO2: Prepare a documentation plan of water efficiency.

CO3: Calculate the indoor environmental quality for comfort and health.

CO4: Define basic concepts for building data analysis and prepare a report on environment impact on built up area.

Modules	Blooms level*	Number of hours
MODULE 1: Energy and Climate Basic concepts I (Building loads, Energy efficiency, Environmental concerns), Basic concept II (Electrical systems, Visual & thermal comfort and other concepts), Energy commissioning & performance management Energy audit process, equipment and tools	L1, L2	6
MODULE 6: Water Efficiency Water use pattern, source and conservation scope (including water harvesting and treatment), Water flow, fixtures and plumbing networks and water efficient appliances, Water Audit: Performance management and monitoring, LEED requirement and documentation plan	L1, L2, L3	6
MODULE 7: Indoor Environment & Human Comfort Fundamentals of Indoors environmental quality (ventilation, air quality, indoor emission, green cleaning) Health and occupational comfort (Natural lighting, Thermal, Quality view & assessment-survey)	L1, L3, L4	6

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MODULE 4: LEED Arc and Project Communication Basic concepts and pre-requisites, Buildings Data Analysis, Demonstration of input Data in Arc Platform and create output result for the 5 sustainability indicators. Environmental/Building codes, Impact of built environment, sustainable & regional design Project Documentation follow-up	L1, L3,L4	6
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**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation*

Text Books:

- Altomonte, S., & Schiavon, S. (2013). Occupant satisfaction in LEED and non-LEED certified buildings. Building and Environment, 68, 66–76. <https://doi.org/10.1016/j.buildenv.2013.06.008>
- Azhar, S., Carlton, W. A., Olsen, D., & Ahmad, I. (2011). Building information modeling for sustainable design and LEED ® rating analysis. Automation in Construction, 20(2), 217–224. <https://doi.org/10.1016/j.autcon.2010.09.019>
- Leed. (2014). Reading for the R and D Community, 56(3), 25–27. https://doi.org/10.1007/978-90-313-9258-2_26

References:

- Newsham, G. R., Mancini, S., & Birt, B. J. (2009). Do LEED-certified buildings save energy? Yes, but... Energy and Buildings, 41(8), 897–905. <https://doi.org/10.1016/j.enbuild.2009.03.014>
- Suzer, O. (2015). A comparative review of environmental concern prioritization: LEED vs other major certification systems. Journal of Environmental Management, 154, 266–283. <https://doi.org/10.1016/j.jenvman.2015.02.029>

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Evaluation Scheme							Total Mark s	Credit s	Duration of Exam (hr)	
Internal Assessment				External Assessment						
CT		TA	A	Total	ESE	ESJ				Total
I	II									
10	10	25	5	50	50	0	50	100	2	3

CT: Class Test; TA: Total Assessment; A: Attendance; ESE: End Semester Examination; ESJ: End Semester Jury

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	-	-	2	--	3	1	2	-	-	-	--	-	2	-	1	--
CO2	-	-	2	--	3	1	2	-	-	-	--	-	2	-	1	--
CO3	-	-	2	--	3	1	2	-	-	-	--	-	2	-	1	--
CO4	-	-	2	-	3	1	2	-	-	-	-	-	2	-	1	-

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Anil

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	DISSERTATION (ARC2837)	L	T	S	P	C
Version 1.1	Date of Approval:	2	1	3	0	6
Pre-requisites/Exposure	Research - I					
Co-requisites	Research - II					

Catalog Description

The aim of this course is to enable students to establish a strong theoretical foundation, clarity of thought and also to orient the students to structured research in a focused manner. The process of study shall enable students to conduct in depth analysis and objective research on a topic of their interest. Students may be encouraged to select the topic which may eventually culminate in the Architectural Design Thesis in the subsequent semester.

Course Objectives

The objective of this course is

- To enable students to establish a strong theoretical foundation, clarity of thought.
- To orient the students to structured research in a focused manner.
- To enable students to conduct in depth analysis and objective research on a topic of their interest.
- To select the topic this may eventually culminate in the Architectural Design Thesis in the subsequent semester.

Course Outcomes

On completion of this course, the students will be able to

CO1: Identify area of research for thesis

CO2: Identify a research problem, formulation of hypothesis and organize a study based on literature survey

CO3: Apply research methodology, tools and techniques to conduct a research

CO4: Present the research work carried out in a report format.

Modules	Blooms level*	Number of hours
MODULE 1: Selection of Topic Students may choose a topic of their interest, related to Architecture and allied subjects; stating proper justification	L1, L2, L3	6
MODULE 2: Background study/ Literature Review and Case Studies Review of research paper, books, journals etc related to the topic. Studying, analysing and interpreting various similar case studies, nationally and internationally	L1, L2, L3	6
MODULE 3: Research Design Data Collection, Data Analysis and Data Interpretation; the extensive methodology to be adopted for conducting the research along with various tools and techniques	L1, L2, L3, L4	12
MODULE 4: Presentation Presenting the research work done on identified topic which may eventually	L1, L2, L3	48

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culminate in the Architectural Design Thesis of the subsequent semester. Students can thus utilise this as an opportunity for pre-Thesis study, amounting to literature review and relevant case studies which are otherwise required for Thesis.		
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*Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

- Kothari, C.R. (1985). *Research Methodology*, Delhi: New Delhi International Publishers

Reference Books

- Dwyer, M. (1995). A guide to the Harvard referencing system. *British Journal of Nursing* (Mark Allen Publishing), 4(10), 599–602. <https://doi.org/10.12968/bjon.1995.4.10.599>
- Hofstee, E. (2006). The Harvard Referencing System. In *Constructing a Good Dissertation A Practical Guide to Finishing a Master's, MBA or PhD on Schedule* (p. 300). Retrieved from <http://www.exactica.co.za/dn/exactica-book-harvard-referencing.pdf>
- Mühl, J. K. (2014). Research methodology. In *Contributions to Management Science* (pp. 75–100). Springer. https://doi.org/10.1007/978-3-319-04069-1_4
- Peffer, K., Tuunanen, T., Rothenberger, M. A., & Chatterjee, S. (2007). A design science research methodology for information systems research. *Journal of Management Information Systems*, 24(3), 45–77. <https://doi.org/10.2753/MIS0742-1222240302>
- Soediono, B. (1989). Dissertation: Assessment of bookkeeping practices and its relevance. *Journal of Chemical Information and Modeling*, 53(June), 160. <https://doi.org/10.1017/CBO9781107415324.004>

Modes of Evaluation: Quiz/Assignment/ Seminar/Practical

Examination Scheme:

Evaluation Scheme								Total Marks	Credits	Duration of Exam (hr)
Internal Assessment					External Assessment					
CT		TA	A	Total	ESE	ESJ	Total			
I	II									
10	10	25	5	50	0	50	50	100	6	0

CT: Class Test; TA: Total Assessment; A: Attendance; ESE: End Semester Examination; ESJ: End Semester Jury

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	2	1	3	2	1	--	2	--	2	1	--	2	1	3	--	3
CO2	2	2	2	3	2	--	2	--	2	2	--	2	1	2	--	2
CO3	2	2	1	3	1	--	2	--	2	1	--	2	1	2	--	2
CO4	2	3	2	2	1	--	2	--	2	1	--	2	2	2	--	2

1: strongly related, 2: moderately related and 3: weakly related

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	PEOPLE CULTURE AND BUILT ENVIRONMENT- IV (ARC2818)	L	T	S	P	C
Version 1.1	Date of Approval:	3	0	0	0	3
Pre-requisites/ Exposure	History of Architecture, Architectural Design – III					
Co-requisites	Theory of Architecture					

Catalog Description

The objective of this course is to offer opportunities in specialized or advance learning in psychological and sociological aspects which are of concern to Architecture. The courses will generally be conducted in the seminar/studio mode to encourage research, exploration and skill developments. The aim of this course is to provide students the exposure to understanding society and various built forms produced by society. The course will also provide the students hands-on cultural, sociological and psychological studies of the built environment. The course contents to be followed will be developed by course teachers based on the resources at hand and opportunities for cross fertilization with other courses. The course would be conducted through literature survey, case studies, site visits, community surveys and hands on projects. During the course the students will be working on a live project in groups which are preferably interdisciplinary.

Course Objectives

The objective of this course is

- To understand the basic principles of psychology, sociology and culture of settlement.
- The course intends to study and understand the typical components of city in order to appreciate how these elements contribute to the quality of life of urban communities.
- To familiarize students with decisive strategies that brings inclusivity and equality in the designs of built forms.
- To develop interdisciplinary understanding and sensitivities of future architects.

Course Outcomes

On completion of this course, the students will be able to

CO1: Develop a relationship between man and his larger social environment, with special emphasis on aspects that are likely to affect intervention in or creation of, the built environment (predominantly urban)

CO2: Develop a language and vocabulary for discussions/ analysis on the sociological/ psychological dimensions of architecture.

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Modules	Blooms level*	Number of hours
MODULE 1: Introduction to Psychology, Sociology and Built Environment Basic introduction to various critical social aspects; Role of psychology in architecture; Role of sociology in built environment; Determinants of sociology- social structure, social status, social control, social institutions, social mobility; Inclusive Built Environment; Barrier free designs and built environments; Various case studies related to gender and architecture, community development- community response towards development strategy etc.	L1, L2	8
MODULE 2: Project Work Selection and understanding of case study; Formulation of Aim and Objectives, Collection of data through primary and secondary sources; Conducting survey; Database development using relevant and advance software; Qualitative and quantitative data analysis; Report writing and presentations.	L4, L5, L6	16

*Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books/ References

- Cragun R.T. (2006). Introduction to Sociology, Wikibooks.
- Giddens, A (2006) Sociology, Polity Press, Cambridge (UK)
- Lynch, K. (1960) The Image of the City, Joint Centre Publication, USA
- Oomen T.K. and Venugopal C.N. (2004), Sociology, Eastern Book Company.
- Porteous, Douglas, J. (1977), Environment Behaviour: Planning and Everyday Urban Life, Addison Wesley
- Sinha A. (2013) "An India for Everyone: A Path of Inclusive Development, Harpercollins
- Steve Barkan (2010), Sociology: Understanding and Changing the Social World, Flat World Reference Books
- Tejchman A. (2016) "The Politics of Inclusive Development", Palgrave Macmillan.

Modes of Evaluation: Presentation/Assignment/Class Test /Written Examination

Examination Scheme:

Evaluation Scheme								Total Marks	Credits	Duration of Exam (hr)
Internal Assessment					External Assessment					
CT		TA	A	Total I	ESE	ESJ	Total			
I	II									
10	10	25	5	50	0	50	50	100	3	0

CT: Class Test; TA: Total Assessment; A: Attendance; ESE: End Semester Examination; ESJ: End Semester Jury

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CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	2	1	1	2	1	1	2	1	1	2	-	2	-	-	1	1
CO2	2	3	1	2	1	1	2	3	3	1	-	1	-	-	1	1

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	ECOLOGY, ENVIRONMENT AND SUSTAINABLE DEVELOPMENT - IV (ARC2819)	L	T	S	P	C
Version 1.1	Date of Approval:	3	0	0	0	3
Pre-requisites/ Exposure	Environmental Sciences, Building Services-1, Building Services-2					
Co-requisites	Architectural Design, Building Services-3					

Catalog Description

The objective of this course is to offer opportunities in specialized or advance learning in ecology, environment and sustainable aspects which are of concern to Architecture. The course will generally be conducted in the seminar/studio mode to encourage research, exploration and skill developments. The aim of this course is to provide students the exposure to understanding ecology and various environmental problems faced by settlements. The course will also provide the students hands-on ecological and environmental studies of built environment. The course contents to be followed will be developed by course teachers based on the resources at hand and opportunities for cross learning with other courses. The course would be conducted through literature survey, case studies, site visits, community surveys and hands on projects. During the course the students will be working on a live project in groups which are preferably interdisciplinary.

Course Objectives

The objective of this course is

- To understand the basic principles of ecology, environment and sustainable development.
- The course intends to study and understand the different components of city in order to understand how these elements contribute to environment quality.
- To establish the significance of the ecological issues, their impact and initiatives to address the same in the built environs to achieve sustainable development.
- To develop interdisciplinary understanding and sensitivities of future architects.

Course Outcomes

On completion of this course, the students will be able to

- CO1:** Develop a relationship between man and ecology, will understand critical environmental issues and need to address the m by using advanced technology.
- CO2:** Produce reports and presentation.

Modules	Blooms level*	Number of hours
MODULE 1: Introduction to Ecology, Environment and Sustainable Development Basic introduction to ecology; Interrelation between natural and built environment; Importance of environment sustainability in built	L1, L2	8

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environment; Energy conservation, renewable sources: wind, solar, geo-thermal, bio-fuels; Materials minimizing, recycling, reducing energy content, etc; Other environmental issues related to solid waste management, water resources, air quality, storm water drainage etc; Various case studies related to traditional / vernacular buildings and settlements demonstrating relationship between climate, local material resources and settlement/ building forms.		
MODULE 2: Project Work Selection and understanding of case study; Formulation of Aim and Objectives, Collection of data through primary and secondary sources; Conducting survey; Database development using relevant and advance software; Qualitative and quantitative data analysis; Report writing and presentations.	L4, L5, L6	16

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation*

Text Books/References

- Bakari, Mohamed El-Kamel (2017). The Dilemma of Sustainability in the Age of Globalization: A Quest for a Paradigm of Development. New York: Lexington Books. ISBN 978-1498551397
- Blewitt, J. (2008). Understanding Sustainable Development. London: Earthscan. pp. 21–24. ISBN 978-1-84407-454-9.
- Fulekar, M. H., Pathak, B., Kale, R. K. (2014) Environment and Sustainable Development' Springer Nature; ISBN-10: 8132211650; ISBN-13: 978-8132211655
- Goudie, Andrew (2000). The Human Impact on the Natural Environment. Cambridge, Massachusetts: This MIT Press. pp. 203–239. ISBN 0-262-57138-2.
- James, Paul (2014). Urban Sustainability in Theory and Practice. doi:10.4324/9781315765747. ISBN 978-1-315-76574-7.
- James, Paul; Magee, Liam (2016). "Domains of Sustainability". In A. Farazmand (ed.). *Global Encyclopedia of Public Administration, Public Policy, and Governance*. Springer.
- Modak, P. (2017) Environmental Management Towards Sustainability, CRC Press, ISBN-10: 9781498796248
- Odum, E. P. (1971). Fundamentals of Ecology (Third ed.). New York: Saunders. ISBN 0-7216-6941-7.
- Porteous, Douglas, J. (1977), Environment Behaviour: Planning and Everyday Urban Life, Addison Wesley
- Thangavel, P., Sridevi, G. (2015) Environmental Sustainability, Springer Nature, ISBN-10: 9788132220558
- Walker, Brian and Salt, David (2006) Resilience Thinking: Sustaining ecosystems and people in a changing world. Island Press. p. xiii. ISBN 978-1597260930.
- Wandenberg, JC (August 2015). Sustainable by Design. Amazon. p. 122. ISBN 978-1516901784

Modes of Evaluation: Presentation/Assignment/Class Test /Written Examination


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Examination Scheme:

Evaluation Scheme								Total Marks	Credits	Duration of Exam (hr)
Internal Assessment				External Assessment						
CT		TA	A	Total I	ESE	ESJ	Total			
I	II									
10	10	25	5	50	0	50	50	100	3	0

CT: Class Test; TA: Total Assessment; A: Attendance; ESE: End Semester Examination; ESJ: End Semester Jury

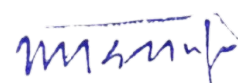
CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	2	1	1	2	1	1	2	1	1	2	-	2	-	-	1	1
CO2	2	3	1	2	1	1	2	3	3	1	-	1	-	-	1	1

1: strongly related, 2: moderately related and 3: weakly related



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	COMPUTER APPLICATIONS AND ADVANCE TECHNOLOGIES – IV (SOFTWARES) (ARC2820)	L	T	S	P	C
Version 1.1	Date of Approval:	1	0	0	4	3
Pre-requisites/Exposure	Architectural Graphic Skills					
Co-requisites	Architectural Design, Building Materials and Construction Technology					

Catalog Description

The aim of this subject is to introduce popular 3D modelling and photorealistic rendering softwares to precisely communicate their designs. The students will learn how to develop an interactive, adapting model, controlled by a few chosen design parameters and capable of generating a wide range of design variants. Using these softwares, the students will explore designing, visualizing and documentation of their design projects thereby increasing their productivity and expression.

Course Objectives

The objective of this course is

- To introduce the software Lumion 3D to students to make their models more interactive.
- To introduce Grasshopper modelling software.
- To introduce the BIM software ArchiCAD.
- To help the students communicate their design ideas graphically using 3d softwares and rendering tools.

Course Outcomes

On completion of this course, the students will be able to

CO1: Create flexible, parametric models for architectural design exploration

CO2: To develop a 2D building model in ArchiCAD and document the project

CO3: Create realistic settings and views of their design project

CO4: Create a walkthrough of their project

Modules	Blooms level*	Number of hours
MODULE 1: Introduction to Lumion 3D Loading existing project scene in Lumion 3D, settings window, creating and saving new project scene, getting familiar with the interface	L1, L2	4
MODULE 2: Building the exterior scene and Working with Layers Creating and modifying terrain, Blending the model with terrain, landscaping, adding furniture and humans, creating new layers, and editing the layers, controlling the layer visibility, Manipulating and Controlling Lumion, Animating, Scene creation and Rendering in Lumion content	L1, L2, L3, L4	8

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MODULE 3: Grasshopper Introduction to Grasshopper, Grasshopper objects, coordination systems, data matching, data structure, Parameters and components, functions and transformations, importing geometry from Rhinoceros into grasshopper, data trees, introduction to Galapagos Module for optimisation and evolution	L1, L2, L3, L4	12
MODULE 4: ArchiCAD Introduction to BIM, ArchiCAD, Interface of ArchiCAD, Navigation in ArchiCAD, Creation and placement of external and internal structures, modification, merging files, dimensioning, rendering and lay outing	L1, L2, L3	12

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation*

Textbooks/References:

- Barry, R. (1999). The Construction of Buildings Vol. 2. 5th Ed. New Delhi: East-West Press.
- Cardoso Ciro (2015). Lumion 3D Best Practices: Packt
- Cardoso Ciro (2014). Mastering Lumion 3D: Packt
- Bachman David (2017). Grasshopper: Visual Scripting for Rhinoceros 3D. US: Industrial Press Inc.
- MacKenzie.H.Scott, Rendek.Adam (2015). ArchiCAD 19- The Definitive Guide: Packt Publishing

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

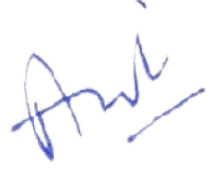
Evaluation Scheme								Total Mark s	Credit s	Duration of Exam (hr)
Internal Assessment				External Assessment						
CT		TA	A	Total	ESE	ESJ	Total			
I	II									
10	10	25	5	50	50	0	50	100	3	0

CT: Class Test; TA: Total Assessment; A: Attendance; ESE: End Semester Examination; ESJ: End Semester Jury

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1	--	3	--	1	--	--	--	--	--	--	-	1	2	-	--
CO2	1	--	1	--	1	--	--	--	--	--	--	-	1	2	-	--
CO3	2	--	1	--	1	--	--	--	3	2	--	-	1	2	-	--
CO4	2	--	1	2	1	--	--	--	3	2	--	-	1	2	-	--

1: strongly related, 2: moderately related and 3: weakly related


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	PRACTICAL TRAINING (ARC2937)	L	T	S	P	C
Version 1.1	Date of Approval:	0	0	0	0	14
Pre-requisites/Exposure	Architectural Design – VIII					
Co-requisites	NA					

Catalog Description

The aim of the 'Practical Training' is to enable the students to gain the kind and range of practical experience which will prepare them for their likely responsibilities, immediately after qualifying B. Arch. Course. The trainee student has the responsibility to use his/her own initiative in making the best use of the opportunities which he gets during training period and prepare himself/herself for profession. The core of the professional training is architectural one. Student is expected to get well versed with the realm of architectural discipline ranging from generation of idea, preparation of drawings to the final execution of design on site. A Training Manual shall provide the details of the expected outline of work and other procedures.

• **Mandatory Requirements:** Student shall have to undergo Professional Training for a period of at least 06 months

Course objectives

The objective of this course is

- To expose the students to the practical environment and works by working under an Architect.
- To gain a practical knowledge and involved in all aspects of office works.
- To design for situation specific problems.

Course Outcomes

On completion of this course, the students will be able to

CO1: Formulate and theorize the principles into practices.

CO2: Apply the professional aspects of an architecture office/company and the multiple issues in conception, preparation and execution of project on a site.

CO3: Develop a skill that helps to adapt to fit special requirements.

Examination Scheme:

Evaluation Scheme								Total Marks	Credits	Duration of Exam (hr)
Internal Assessment					External Assessment					
CT		TA	A	Total	ESE	ESJ	Total			
I	II									
0	0	0	0	0	0	1400	1400	1400	14	-

CT: Class Test; TA: Total Assessment; A: Attendance


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	ARCHITECTURAL THESIS (ARC2037)	L	T	S	P	C
Version 1.1	Date of Approval:	2	6	10	0	18
Pre-requisites/ Exposure	Professional Practice- II					
Co-requisites	Architectural Design – VIII					

Catalog Description

The aim of this course is to provide an opportunity to the students to handle a complete design project. Project Thesis is the final stage of learning Architectural Design. With the help of a thesis project, students are expected to demonstrate the understanding of a systematic design process which includes identification of project requirements, site study and analysis, case studies, programming, schematic design and Design Development. It provides the students with an opportunity to culminate the nine semesters of architectural education by demonstrating the body of knowledge and skills gained during their education and the professional training.

Course objectives

The objective of this course is

- To prepare a student to independently handle and present all aspects of an architectural design, from its evolution to final solution in totality.
- To understand the importance of the evolutionary stages of a design process and various techniques required for a successful presentation of an architectural design.
- To develop in students the ability to handle specific aspects / thrust area of design relevant to the topic.

Course Outcomes

On completion of this course, the students will be able to

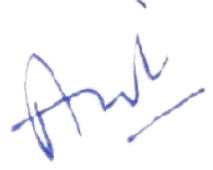
CO1: Design a Thesis project responsive to the contextual and program requirements.

CO2: Evaluate data and information gathered from primary and secondary data collection

CO3: Combine the systematic methodology from various stages of study and analysis in design process towards culmination of an informed design.

CO4: Produce detail estimation and specification data of a building unit.

CO5: Demonstrate the ideas clearly using detailed physical model.


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Text Books/ References:

- Ablamowicz, R. (2007). *An abstract of the thesis of. Young* (Vol. c, pp. 105–106).
- Agarwal, S3. S., Yadav, P. P., Chavali, K. H., & Kumar, L. (2011). How to write a thesis? *National Journal of Physiology, Pharmacy and Pharmacology*, 1(2), 86–90. https://doi.org/10.5005/jp/books/12140_6
- Evans, D., Gruba, P., & Zobel, J. (2014). *How to Write a Better Thesis. How to Write a Better Thesis*. Springer International Publishing. <https://doi.org/10.1007/978-3-319-04286-2>
- Vasaiely, P. (2010). Bachelor Thesis. *Applied Sciences*, 16(February), 1–106. <https://doi.org/10.1053/j.sodo.2009.12.005>

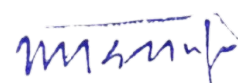
Modes of Evaluation: Quiz/ Case Study/ Literature Study/ Presentation/ Report Submission**Examination Scheme:**

Evaluation Scheme								Total Marks	Credits	Duration of Exam (hr)
Internal Assessment				External Assessment						
P			R	Total	ESE	ESJ	Total			
I	II	III								
200	200	200	200	800	0	1000	1000	1800	18	NA

P: Presentation; R: Report; ESE: End Semester Examination; ESJ: End Semester Jury



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	PROFESSIONAL PRACTICE (ARC2001)	L	T	S	P	C
Version 1.1	Date of Approval:	4	0	0	0	4
Pre-requisites/Exposure	Town Planning					
Co-requisites	Architectural Thesis					

Catalog Description

This course aim is to provide the foundation, knowledge and skills needed to professional practice. It is designed to build understanding of the complex interactions and uncertainties of the professional practice. It provides students with the essential knowledge components of role of COA, IIA, Uttar Pradesh architect association, Architects Act 1972, Tendering & Contract and Valuation. It also develops an appreciation of the skills and tasks inherent in development Conditions of engagement of Architect – Duties, Responsibilities, Liabilities of the profession, scale of charges, mode of payment etc. Clauses governing conduct of professional practice

Course Objectives

The objective of this course is

- To understand the role of Professional bodies.
- To acquaint the students with the responsibility, scale of charges and Architect's conduct in Architectural practice.
- To understand the office and administration of an Architect's office, Tenders and contracts.
- To analyze judicial process involved in arbitration.

Course Outcomes

On completion of this course, the students will be able to

CO1: Gain a comprehensive understanding of the Professional Practice in India.

CO2: Explain different role of Architect's Act 1972 in professional conduct and all the work related to scales of charges.

CO3: Compare and float tenders and contract for the Architectural project.

CO4: Compare difference between Arbitration, Conciliation and Mediation.

Modules	Blooms level*	Number of hours
MODULE 1: Role of professional bodies Role of different bodies i.e. COA, IIA, Uttar Pradesh Architect Association, their working constitution and bye-laws, categories of membership and election procedures.	L1, L2	6

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MODULE 2: Architect's Act 1972 & Office and administration Detail study of the Act and procedures of membership. Office set up and administration, Filing and recording, nature of partnership, registration of firm and dissolution, copy rights of drawings, practice procedures and conduct etc. Conditions of engagement of Architect, discuss the Duties, Responsibilities, Liabilities of the Architect profession, Fee (scale of charges), mode of payment etc. Clauses governing conduct of professional practice.	L1, L2,	12
MODULE 3: Tendering and Contract Tendering - Types of tenders and tender documents, tender drafts notices, Inviting Tenders, Procedure of opening and selection process and report of owner. Contract – Types, conditions of contract – Earnest money, Security deposit, Retention money, Mobilization fund, Bank Guarantee, Architect's Instructions, Defects, Certificates and payments, Penalties, Insurance, Liquidated damages, Termination of contract, breach of contract.	L1, L2, L3	15
MODULE 4: Arbitration Introduction, Techniques, elements and factors affecting valuation, Methods, Types – renewal or lease/ extension of lease, standard rent, easement right, dilapidation, Property valuation techniques, circle rate analysis, comparable cost of sale. Share knowledge on the concept of property purchase and mortgage, Goods and Service Tax, Capital gain tax, wealth tax, property tax and other taxes etc. Arbitration, Arbitrator, nature of arbitration, appointment, conduct, powers and duties of arbitrator and umpire amended from time to time. Procedure of arbitration. Mediation & Reconciliation	L1, L2, L3	15

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation*

Text Books

- Chitkara K.K. (1998). Construction Project Management, New Delhi: Tata McGraw- Hill Company Limited
- Deobhakta Madhav, Deobhakta Meera (2007), Architecture Practice in India, Delhi: Council of Architecture Gazette of India (1972). The Architects Act, 1972, Delhi

Reference Books

- Patil, B.S. (2015), Civil Engineering Contracts and Estimates, Delhi: Orient Blackswan Private Ltd
- Ramaswamy, (2016), Contract and their management, New York: LexisNexis

Modes of Evaluation: Assignment/ Written Examination

Examination Scheme:

Evaluation Scheme								Total Marks	Credits	Duration of Exam (hr)
Internal Assessment					External Assessment					
CT		TA	A	Total	ESE	ESJ	Total			
I	II									
10	10	25	5	50	50	0	50	100	4	3

CT: Class Test; TA: Total Assessment; A: Attendance; ESE: End Semester Examination; ESJ: End Semester Jury

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CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3	PSO4
CO1	--	--	--	--	--	--	--	--	--	1	1	--	--	--	1
CO2	--	--	--	--	--	--	--	--	--	1	1	--	--	--	1
CO3	--	--	--	--	--	--	--	--	--	1	1	--	--	--	1
CO4	--	--	--	--	--	--	--	--	--	1	1	--	--	--	1

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	CAREER DEVELOPMENT (ARC2002)	L	T	S	P	C
Version 1.1	Date of Approval:	2	0	0	0	2
Pre-requisites/Exposure	Professional practice					
Co-requisites						

Catalog Description

The aim of this course is to enable students to understand future after completing architecture study. It also includes knowledge the legal and regulatory body. The subject will be taught in a way so that they are able to build a concrete portfolio, and assignments for the subject will be linked to the design presentation exercises to achieve higher level of representation in real world.

Course Objectives

The objective of this course is

- To introduce the scope after completing architecture.
- To understand the functions of various national and international regulatory bodies.
- To study the cyber security.
- To provide portfolio development.

Course Outcomes

On completion of this course, the students will be able to

CO1: Explain career after completing architecture.

CO2: Define national and international regulatory bodies.

CO3: Explain cyber security and its role in architectural field.

CO4: Understanding of portfolio development.

Modules	Blooms level*	Number of hours
MODULE 1: Introduction to area of specialized course Architecture, Scope for architecture stream, careers in govt. sector and private sector for architects, higher education in different fields (i.e. planning, construction, management, conservation, software development and analysis etc.) Research in different specialized area.	L1, L2, L3	6
MODULE 2: International Architecture Practice and role of regulatory Role of different bodies i.e. COA, IIA, their working constitution and bye-laws, categories of membership and election procedures. Introduce to the relevant Act and procedures of membership. Conditions of engagement of Architect, discuss the Duties, Responsibilities, Liabilities of the Architect profession, Fee (scale of charges), mode of payment etc.	L1, L2, L3	6

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MODULE 3: Cyber security Introduction to information systems, Need for Information security, Threats to Information Systems, Information Assurance, Cyber Security, and Security Risk Analysis. Security Policies, WWW policies, Email Security policies, Policy Review Process-Corporate Policies, Information Security Standards-ISO, IT Act, Copyright Act, Patent Law, IPR. Cyber Laws in India; IT Act 2000 Provisions, Intellectual Property Law: Copy Right Law, Software License.	L1, L2, L3	6
MODULE 4: Portfolio development Analyse, critically evaluate and articulate assessments of their own design works. Composition, Colour schemes, Sizes, Sequences, Software, Logo and style development	L1, L2, L3	6

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation*

Text Books

- Charles P. Pfleeger, Shari LawrancePfleeger, “Analysing Computer Security ”, Pearson Education India.
- Dr. Surya PrakashTripathi, RitendraGoyal, Praveen kumarShukla ,”Introduction to Information Security and Cyber Law” Willey Dreamtech Press.
- Schou, Shoemaker, “ Information Assurance for the Enterprise”, Tata McGraw Hill. CHANDER, HARISH,”
- V.K. Pachghare, “Cryptography and information Security”, PHI Learning Private Limited, Delhi India.
- Chitkara K.K. (1998). Construction Project Management, New Delhi: Tata McGraw- Hill Compony Limited
- Deobhakta Madhav, Deobhakta Meera (2007), Architecture Practice in India, Delhi: Council of Architecture
- Gazette of India (1972). The Architects Act, 1972, Delhi
- Gutman, R., & Haviland, D. (1992). The Architect’s Handbook of Professional Practice. Journal of Architectural Education (1984-), 45(2), 122. <https://doi.org/10.2307/1425280>

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- Baka, J. (2013). The Political Construction of Wasteland: Governmentality, Land Acquisition and Social Inequality in South India. Development and Change, 44(2), 409–428. <https://doi.org/10.1111/dech.12018>
- LARR. The Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act, 2013, The Gazette of India Extraordinary § (2013). Ministry of Law and Justice, Government of India. Retrieved from [https://dolr.gov.in/sites/default/files/Right to Fair Compensation and Transparency in Land Acquisition%2C Rehabilitation and Resettlement Act%2C 2013.pdf](https://dolr.gov.in/sites/default/files/Right%20to%20Fair%20Compensation%20and%20Transparency%20in%20Land%20Acquisition%20Rehabilitation%20and%20Resettlement%20Act%202013.pdf)
- Narain, V. (2009). Growing city, shrinking hinterland: Land acquisition, transition and conflict in peri-urban Gurgaon, India. Environment and Urbanization, 21(2), 501–512. <https://doi.org/10.1177/0956247809339660>
- Raghuram, G., & Sunny, S. (2015). The Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement (Amendment) Ordinance, 2015. Research and Publications Of Indian Institute of Management, 2013(July), 51.
- Requirements, D., & Amendment, T. (2010). the Gazette of India. DisClosure, 2011(2), 1–216.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

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Examination Scheme:

Evaluation Scheme								Total marks	Credits	Duration of Exam (hr)
Internal Assessment				External Assessment						
CT		TA	A	Total	ESE	ESJ	Total			
I	II									
10	10	25	5	50	0	50	50	100	2	0

CT: Class Test; TA: Total Assessment; A: Attendance; ESE: End Semester Examination; ESJ: End Semester Jury

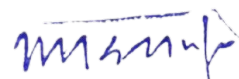
CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	--	--	--	--	--	1	--	--	--	2	3	1	3	--	1	2
CO2	--	--	--	--	--	2	--	--	--	1	1	1	3	--	1	2
CO3	--	--	--	--	--	1	--	--	--	2	1	1	3	--	1	2
CO4	--	--	--	--	--	2	--	--	--	1	2	1	3	--	1	2

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	UNDERSTANDING CULTURAL LANDSCAPES FOR URBAN RENEWAL AND CONSERVATION (ARC2003)	L	T	S	P	C
Version 1.1	Date of Approval:	3	0	0	0	3
Pre-requisites/Exposure						
Co-requisites						

Catalog Description

The aim of this course is to understand the definition and concept of Culture Landscapes for urban renewal and conservation. It explain the culture of landscape to renewal/redevelopment of the existing environment and its surrounding to sustain the better quality of life though proper plan or documentation. This course has explained about the cultural heritage conservation particularly heritage site. It also deals about the urban area development through the literature study of Renewal, Redevelopment Revitalization and Rejuvenation. In this course, development approaches are comprises of social, environment and economy dimensions. The learning and outcome of this course is exploring in the field of Culture Landscapes, Heritage site and Urban Environment aspects in order to plan for development. The students must learn through literature review of research articles, professional documents, books related to urban renewal. It needs to carry out the field work and preparing the development report in this particular subject.

Course Objectives

The objectives of this course are

- To assess the urban renewal/redevelopment approaches at old city and historical sites in the context of having better access to services and sustainable urban development.
- To critically analyze the best practices of urban re-development for furthering utilization and formulation of a redevelopment plan.

Course Outcomes

At the end of this course, students will be able to

CO1: Digest and apply the knowledge of development approaches such as urban renewal/redevelopment/revitalization/rejuvenation.

CO2: To prepare the detail report and presentation on a given project related to urban renewal and urban re-development.

Modules	Blooms level*	Number of hours
MODULE 1: Introduction of Cultural Landscape for Urban Renewal and Conservation. Introduction to definition and concept of Cultural Landscape, Urban Renewal, and Conservation, Development Approaches of Old City, A brief history of the landscape concept, Principle for Conservation and Renewal of decay areas within City Area, Principles and methods for the assessment of	L1, L2	12

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the cultural landscape, Landscape resources, management and planning structure, Mechanism for Development of Historical Area includes the Environment, Social, Culture and Economic aspect; Infrastructure and Services Facilities System of Old Area within City. Governance System and Planning aspect to build new Plan. Case Studies of various Plan and Documents for Renewal and Redevelopment in Developed Countries and Development Nations particularly Indian cities context.		
MODULE 2: Project Work Selection of Study Areas, Literature Review, Formulation of Aim and Objectives through Proper Scientific Approaches, Collection of data through various techniques such as primary and secondary sources; Conducting survey (Focus Group Discussion, Households Survey etc), Documentation; Develop the data Base to Analyze the relevant by using the advance software; Analyze the Qualitative and quantitative approaches and formulating the new plan through scientific manner and; Report writing and presentations.	L4, L5, L6	24

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation*

Text Books

- Ken Taylor., The Historic Urban Landscape Paradigm and Cities as Cultural Landscape, Landscape Research, 41 (4): 1-10, 2016
- R. Pickard., Management of European Historic Centres, E&FN SPON, Londra 2000
- N. Mitchell, Rössler M., Tricaud P.M., World Heritage Cultural landscapes, A handbook

References

- C. Sauer, The Morphology of Landscape, University of California Publications in Geography, 1925
- Lawrence W.C. Lai., Frank T. Lorne., Sustainable Urban Renewal and Built Heritage
- Conservation in a Global Real Estate Revolution, Sustainability., 11 (580), 2019

Modes of Evaluation: Presentation/Assignment/Class Test /Written Examination

Examination Scheme:

Evaluation Scheme								Total Marks	Credits	Duration of Exam (hr)
Internal Assessment					External Assessment					
CT		TA	A	Total I	ESE	ESJ	Total			
I	II									
10	10	25	5	50	0	50	50	100	3	0

CT: Class Test; TA: Total Assessment; A: Attendance; ESE: End Semester Examination; ESJ: End Semester Jury

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1	1	1	--	--	1	1	--	--	2	1	--	1	--	1	2
CO2	1	1	2	--	--	--	--	--	--	--	--	--	1	2	--	--

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	SMART CITIES AND SMART TECHNOLOGIES (ARC2004)	L	T	S	P	C
Version 1.1	Date of Approval:	3	0	0	0	3
Pre-requisites/ Exposure						
Co-requisites						

Catalog Description

The aim of this course is to introduce the students to smart cities concepts and solutions with their specific planning needs and priorities and the implication on development in these areas. The courses will generally be conducted in the seminar/studio mode to encourage research, exploration and skill developments. The focus of the course will be on **exploring the role of technology and data in cities, and learn how you can participate in the creation of smart cities**. This course will provide the student's hands-on experience on smart city planning that required a different planning process in a built environment. The course contents to be followed will be developed by course teachers based on the resources at hand and opportunities for interdisciplinary learning. The course would be conducted through literature survey, case studies, site visits, and hands on experimentations. During the course the students will be working on live projects in groups which are preferably interdisciplinary.

Course Objectives

The objective of this course is

- To investigate, analyze and explore Smart City concepts and solutions important for urban development sectors
- To learn about state-of-the-art strategies for effectively managing the transition from legacy infrastructures to smart urban systems.

Course Outcomes

On completion of this course, the students will be able to

CO1: Comprehend the concept, challenges and solutions for smart cities planning

CO2: Prepare the detail report and presentation on a given project related to Special area planning.

Modules	Blooms level*	Number of hours
MODULE 1: Introduction to Smart Cities Concept and analysis of smart technologies Introduction to smart cities, the city as a system of systems, smart citizens, Infrastructure, technology and data, Innovation and enterprise, smart leadership and strategy, standards and capacity building, smart measurement, and learning. Case Studies of various smart cities in Indian and international context.	L1, L2	12

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MODULE 2: Project Work Selection and understanding of case study; Formulation of Aim and Objectives, Collection of data through primary and secondary sources; Conducting survey; Database development using relevant and advance software; Qualitative and quantitative data analysis; Report writing and presentations.	L4, L5, L6	24
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**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation*

Text Books

- Smart Cities & Urban Development in India, N. Mani, New Century Publications
- Smart Cities Unbundled, Sameer Sharma, Bloomsbury India
- The Smart City Transformations: The Revolution of The 21st Century, Amitabh Satyam, Bloomsbury India
- Introduction to Smart Cities, Anil Kumar, Pearson India

References

- Smart Technologies, K. Worden, World Scientific Publishing Co Pte Ltd
- Smart Technologies for Smart Governments, Manuel Pedro Rodríguez Bolívar, Springer Publications
- Advanced Technology for Smart Buildings, James M. Sinopoli, Artech House Publishers

Modes of Evaluation: Presentation/Assignment/Class Test /Written Examination

Examination Scheme:

Evaluation Scheme								Total Marks	Credits	Duration of Exam (hr)
Internal Assessment					External Assessment					
CT		TA	A	Total I	ESSE	ESJ	Total			
I	II									
10	10	25	5	50	0	50	50	100	3	0

CT: Class Test; TA: Total Assessment; A: Attendance; ESE: End Semester Examination; ESJ: End Semester Jury

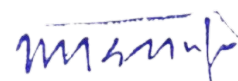
CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1	1	1	--	--	1	1	--	--	2	1	--	1	--	1	2
CO2	1	1	2	--	--	--	--	--	--	--	--	--	1	2	--	--

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	TRANSIT ORIENTED DEVELOPMENT (ARC2005)	L	T	S	P	C
Version 1.1	Date of Approval:	3	0	0	0	3
Pre-requisites/Exposure						
Co-requisites						

Catalog Description

The aim of this course is to introduce the students to transit oriented development concepts and solutions with their specific planning needs and priorities and the implication on development in urban transportation sectors. The courses will generally be conducted in the seminar/studio mode to encourage research, exploration and skill developments. The focus of the course will be on **exploring the role of TOD and learn how this can be implemented**. This course will provide the students hands-on experience on planning for TOD that required a different planning process in a built environment. The course contents to be followed will be developed by course teachers based on the resources at hand and opportunities for interdisciplinary learning. The course would be conducted through literature survey, case studies, site visits, and hands on experimentations. During the course the students will be working on live projects in groups which are preferably interdisciplinary.

Course Objectives

The objective of this course is

- To investigate, analyze and explore TOD concepts and solutions important for urban transportation sectors
- To develop interdisciplinary understanding and sensitivities of future planners.

Course Outcomes

On completion of this course, the students will be able to

CO1: Comprehend the concept, challenges and solutions for TOD planning

CO2: Prepare the detail report and presentation on a given project related to TOD planning.

Modules	Blooms level*	Number of hours
MODULE 1: Introduction and Planning of TOD Introduction to TOD, need of transit-oriented development, Factors driving the trend, components of TOD, Principles, Benefits, government policies, Case Studies of various TOD's in Indian and international context.	L1, L2	12


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MODULE 2: Project Work Selection and understanding of case study; Formulation of Aim and Objectives, Collection of data through primary and secondary sources; Conducting survey; Database development using relevant and advance software; Qualitative and quantitative data analysis; Report writing and presentations.	L4, L5, L6	24
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**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation*

Text Books

- Transit Oriented Development: Making it Happen (Transport and Mobility), John L. Renne, Carey Curtis, Routledge; 1 edition (25 June 2009)
- Transit Oriented Development and Sustainable Cities: Economics, Community and Methods (Transport, Mobilities and Spatial Change), Richard D. Knowles, Fiona Ferbrache, Edward Elgar Pub (June 28, 2019)
- Financing Transit-Oriented Development with Land Values: Adapting Land Value Capture in Developing Countries (Urban Development), Hiroaki Suzuki, Jin Murakami, Yu-Hung Hong, Beth Tamayose, World Bank Publications (15 January 2015)

References

- Transit Oriented Development: Guide for Practitioners, Queensland. Department of Infrastructure and Planning, Queensland Department of Infrastructure and Planning, 2010
- Urban Transformation: Transit Oriented Development and the Sustainable City, by Ronald A. Altoon, James C. Auld, Images Publishing Dist Ac (November 16, 2011)

Modes of Evaluation: Presentation/Assignment/Class Test /Written Examination

Examination Scheme:

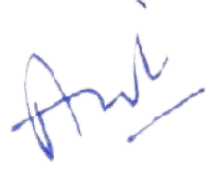
Evaluation Scheme								Total Marks	Credits	Duration of Exam (hr)
Internal Assessment					External Assessment					
CT		TA	A	Total I	ESE	ESJ	Total			
I	II									
10	10	25	5	50	0	50	50	100	3	0

CT: Class Test; TA: Total Assessment; A: Attendance; ESE: End Semester Examination; ESJ: End Semester Jury

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1	1	1	--	--	1	1	--	--	2	1	--	1	--	1	2
CO2	1	1	2	--	--	--	--	--	--	--	--	--	1	2	--	--

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Programme Structure

Curriculum & Scheme of Examination

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	GEO-INFORMATICS FOR PLANNING-I (PLN2211)	L	T	S	P	C
Version 1.1		2	1	0	0	3
Pre-requisites/Exposure	Basic Computer Applications					
Co-requisites	Planning and Design Lab – II					

Catalog Description

This course gives exposure to the students about Remote Sensing and Geographic Information System (GIS) along with its application in spatial planning. The knowledge acquired in this subject can also be used by the students in their thesis exercises as well as it can also help them in getting jobs after the completion of the course.

Course Objectives

The objectives of this course are

- To study the concepts of Remote Sensing and photo interpretation as well as their uses in Spatial Planning
- To study planning information systems in India and its applications in planning.

Course Outcomes

On completion of this course, the students will be able to

CO1: Explain the basic principles of Remote Sensing.

CO2: Describe the photo-interpretation and use the knowledge in their studio exercises.

CO3: Demonstrate planning information system.

CO4: Explain the relationship between Human settlements and Planning Information System.

Modules	Blooms level*	Number of hours
MODULE 1: Remote Sensing and Photo Interpretation Remote Sensing: Definition, aerial and satellite remote sensing; Aerial photo-interpretation, qualitative and quantitative elements of photo-interpretation; Satellite remote sensing, geo-stationary and sun-synchronous satellites, principles of electro-magnetic radiations, resolutions; Introduction to digital image processing; salient features of popular remote sensing satellites; Applications in planning along with laboratory exercises	L1, L2	6
MODULE 2: Photogrammetry Limitations of traditional surveys in planning; Photogrammetry as an alternative tool for surveying; Aerial photographs, and their classification; Principles of stereoscopic vision; Basic instruments like Stereopair, Pocket and Mirror Stereoscopes, Parallax Bars; Principles of photogrammetry, Measurement of heights and depths; Introduction to digital photogrammetry.	L1, L2, L3	10
MODULE 3: Planning Information Systems Systems approach to planning as basis for planning information systems; Systems, hierarchy, types; Data and information, value of information, information flows and loops; Information sharing and security; Information systems, types, limitations; New sources of data such as big data and real data.	L3, L4	10
MODULE 4: Human Settlements and Planning Information Systems	L1, L2	10

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Information needs, scales and levels of human settlements; Preconditions for using planning information systems; Introduction to various planning information systems; Introduction to spatial data infrastructure; Planning information systems in India: NNRMS, NUIS, National Urban Observatory, Municipal information systems, land information systems, cadastre systems; Tools for spatial data handling; Introduction to GIS; BHUVAN; Agencies responsible for generating spatial data.		
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**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books/ References

- Victor Mesev (2007). *Integration of GIS and Remote Sensing*. John Wiley Publishing
- Harsan Karimi (2009). *Handbook of Research on Geo- informatics*, IGI Global Publishing
- Yeung, C.P.L.A. (2007). *Concept and Techniques of GIS*. Prentice Hall Publishing
- Nath & Pandey, *Geo-informatics for decentralized planning and governance*, Rawat Publishing
- Wilson, J.P. (2008). *Handbook of GIS*. Blackwell Publishing

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:


Components	Internal Assessment						ESE
	CT-1	CT-2	HA	S/P	CE	A	
Weightage (%)	10	10	10	10	05	05	50

CT: Class Test, HA: Home Assignment, S/P: Seminar/Presentation, CE: Continuous Evaluation, A: Attendance; ESE: End Semester Examination, ESJ: End Semester Jury

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PSO 1	PSO 2	PSO 3	PSO 4
CO 1	1	1	--	--	--	--	--	--	--	--	--	1	1	--	--
CO 2	1	1	--	2	--	--	--	--	--	--	--	1	1	--	--
CO 3	1	1	--	2	--	--	--	--	--	--	--	1	1	1	--
CO 4	1	1	1	2	--	--	--	--	--	--	--	1	1	1	--
CO 5	1	1	1	2	--	--	--	--	--	--	--	1	1	1	--

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	PLANNING AND DESIGN LAB-II (SITE PLANNING AND URBAN NEIGHBOURHOOD PLANNING) (PLN2208)	L	T	S	P	C
Version 1.1		0	0	10	0	10
Pre-requisites/ Exposure	Planning and Design Lab I					
Co-requisites	Planning Communication					

Catalog Description

This studio intends to develop vocabulary in planning and develop an ability to observe, record and present data in meaningful ways with the purpose of understanding planning issues. It also intends to develop skills of designing townships.

Course Objectives

The objectives of this course are

- To do area Appreciation of a Neighbourhood and design a township or site.
- To learn about the Neighbourhood planning

Course Outcomes

On completion of this course, the students will be able to

CO1: Explain the basic terminologies in planning.

CO2: Apply data collection methods in field surveys.

CO3: Identify ways in which we observe, record and present data in meaningful ways.

CO4: Demonstrate familiarity with the functioning of a neighbourhood and a site through processes of experiential learning

Modules	Blooms level*	Number of hours
MODULE 1: Neighbourhood study Preparation of Base Maps at the levels of Site, Area, Zone, City, Region, etc.; Preparation of Key Maps; Through land use case studies, students are expected to develop understanding of basic principles of land use planning such as categorization, hierarchy, permissibility, compatibility, etc. and supporting infrastructure required for various land uses.	L1, L2	30
MODULE 2: Analysis Students are expected to apply data collection methods learnt in Planning Techniques class including primary surveys to understand different activities, socio-economic conditions, and infrastructure availability.	L1, L2	30
MODULE 3: Site Planning Designing, Preparation and Presentation of Drawings Design and preparation of plan, sections and elevation of low rise and high-rise apartments taking into account the building bye-laws and zoning regulations; Preparation of presentation drawings. Introduction to the working drawings; Preparation of plans, sections, elevations, and important details of an apartment unit. Site analysis, development standards and preparation of the design brief for various considerations for site layout, conceptual approach to	L1, L3, L4	30

site planning.		
MODULE 4: Appreciation Studies Layouts and Area Analysis Preparation of preliminary layout and area analysis; Final layout showing the circulation and basic infrastructure. Rough costing of the scheme, and preparation of the model to an appropriate scale.	L1, L3, L6	30

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

- LaGro, J.A. Jr. (2013) *Site Analysis: Informing Context-Sensitive and Sustainable Site Planning and Design*, Third Edition, Wiley International, New York.
- Lynch, K. (1984) *Site Planning*, Third Edition MIT Press, USA.
- McHarg, I. (2008) *Design with Nature*, Twenty Fifth Edition, Wiley International, New York.
- Russ, T. (2009) *Site Planning and Design Handbook*, Second Edition, McGraw Hill, New York.

Reference Books

- Sheth, A., and Panchal, N. and Patel, S.B. (2007) *Urban Layouts, Densities and the Quality of Urban Life, Economic and Political Weekly* Vol. 42, No. 26, pp. 2725-2736.
- Vidyarthi, S. (2015) *One Idea Many Plans: An American City Design Concept in Independent India*, Routledge, New York

Modes of Evaluation: Assignment/Case Study/ Presentation/Written Examination

Examination Scheme:


Components	Internal Assessment						ESJ
	R-I	R-II	R-III	Report	CE	A	
Weightage (%)	50	50	50	40	05	05	200

R: Review, CT: Class Test, HA: Home Assignment, S/P: Seminar/Presentation, CE: Continuous Evaluation, A: Attendance; ESE: End Semester Examination, ESJ: End Semester Jury

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1	--	--	1	2	--	--	--	2	1	--	--	1	2	1	1
CO2	1	2	1	1	2	--	1	--	1	1	--	--	2	1	2	1
CO3	1	2	1	2	2	--	1	--	1	1	--	--	2	1	2	1
CO4	1	1	1	2	--	1	1	--	--	2	--	--	1	1	2	2

1: strongly related, 2: moderately related and 3: weakly related


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	TECHNIQUES OF PLANNING II (PLN2303)	L	T	S	P	C
Version 1.1		2	1	0	0	3
Pre-requisites/Exposure	Techniques of Planning- I					
Co-requisites	Demography and Urbanization					

Catalog Description

The Course aims to study advanced planning techniques. This course give exposure to the students about the techniques for understanding various phenomenon in planning. The course aims to make students aware about the plan preparation techniques in urban as well as regional planning. Formulation of spatial standards in planning has also been focused upon. The course also briefs about applications of advanced techniques used in planning.

Course Objectives

The objectives of this course are

- To understand Advanced Planning Techniques.
- To develop the ability to professionally examine the Urban and Regional Planning Issues.

Course Outcomes

On completion of this course, the students will be able to

CO1: Explain the Locational attributes of activity/population and urban structure.

CO2: Explain spatial standards for residential, industrial, commercial and recreational areas and their importance in planning.

CO3: Discuss the methodology of Master and Regional Plan.

CO4: Describe retail location analysis, industrial location analysis, gravity analysis etc.

Modules	Blooms level*	Number of hours
MODULE 1: Data Analysis, reasoning, and relationships Data tabulation: Statistical methods, frequency distribution, classification, mean, median, mode, correlation; Content analysis: discourses and narratives; Land use classification systems; Planning standards, population, and economic analysis; Land suitability analysis, housing analysis, and development of indicators.	L1, L2, L4	10
MODULE 2: Techniques for Plan Preparation Types and levels of plans, hierarchy of plans, planning process; Forecasting techniques, extrapolation techniques, cohort component techniques, economic analysis techniques; Goal formulation; Developing planning standards; Urban growth models and their uses in forecasting.	L1, L4	8
MODULE 3: Methods of Plan Evaluation Cost benefit analysis, planning balance sheet, logical framework approach; Plan evaluation techniques; Purpose of models, types of decision models, linear programming models, threshold analysis; Agent based decision models, multi-criteria decision models; Plan monitoring and outcome evaluation techniques.	L1, L2	10
MODULE 4: Public Participation Techniques	L1, L3,	8

Purposes of participation; Types and methods of participation; Challenges and issues in the use of participatory methods in planning.	L4	
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*Bloom's Level:

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Textbooks

- Kelley R.M. (1988) *Planning Techniques (Basic and Advanced)*, Kelley Communication Development, Indiana University Press, Bloomington, Indiana.
- Jepson, E.J. and Jerry W. (2016) *Fundamentals of Plan Making: Methods and Techniques*, Routledge, New York.
- Field, B. and MacGregor, B.D. (2018) *Forecasting Techniques for Urban and Regional Planning*, Taylor and Francis Group, London.
- Klosterman R.E. (1990) *Community Analysis and Planning Techniques*, Rowman and Littlefield Publishers, Lanham, Maryland.
- Hughes, J.T. and Kozlowski, J. (1968). Threshold Analysis – An Economic Tool for Town and Regional Planning, *Urban Studies*, Vol No.5, No.2, pp. 132-143.
- Rondinelli, D.A. (1973). Urban Planning as Policy Analysis Management of Urban Change, *Journal of the American Institute of Planners*, Vol. 39, No. 1, pp. 13 – 22.

Reference Books

- Bracken, I. (1999). *Urban Planning Methods: Research and Policy Analysis*, London: Methuen Publications.
- Field, B. and MacGregor, B.D. (1992). *Forecasting Techniques for Urban and Regional Planning*, Abingdon: Routledge Publication.
- Hazra, S.K. and Chaudhary, A.K. (2012). *Workshop Technology Vol. II*. New Delhi: Asian Book Comp.

Modes of Evaluation: Presentation/Assignment// Written Examination

Examination Scheme:


Components	Internal Assessment						ESE
	CT-1	CT-2	HA	S/P	CE	A	
Weightage (%)	10	10	10	10	05	05	50

CT: Class Test, HA: Home Assignment, S/P: Seminar/Presentation, CE: Continuous Evaluation, A: Attendance; ESE: End Semester Examination, ESJ: End Semester Jury

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1	1	1	--	--	--	1	--	2	--	--	--	1	1	1	--
CO2	1	1	1	2	--	--	1	2	2	--	--	--	1	1	1	--
CO3	1	1	1	1	--	--	1	2	1	--	--	--	1	1	1	--
CO4	1	1	2	2	--	--	2	1	1	--	--	--	1	1	1	--

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	TRAFFIC AND TRANSPORTATION PLANNING-I (PLN2306)	L	T	S	P	C
Version 1.1		3	0	0	0	3
Pre-requisites/Exposure	Techniques of Planning I& II					
Co-requisites	Planning and Design Lab III					

Catalog Description

This course aims at to study essential components of traffic and transportation planning including field surveys, facility design and traffic management. The course gives a brief on prediction of usage demand in future travel and to ensure all the necessary facilities and services to cater to that demand. Transport planning is highly essential in shaping cities, enabling economic activities, promoting community interaction, and enhancing quality of life. It is also essential for sustainable development and ensuring safe accessibility at various levels for all individuals.

Course Objectives

The objectives of this course are

- To familiarize students about different Transport Systems and Road Capacity.
- To provide basic Concepts for Designing Transport Facilities and Traffic Management Systems.

Course Outcomes

- On completion of this course, the students will be able to
- **CO1:** Explain road safety and design standards for roads and intersections
- **CO2:** Conduct transport related survey
- **CO3:** Describe the Pedestrian circulation, traffic signals and Road Marking
- **CO4:** Describe the road accidents and rules and regulation pertaining to road safety

Modules	Blooms level*	Number of hours
MODULE 1: Introduction to Road Safety and Design standards for roads and Intersections Road as an active space, Types of Users, User Behaviour; Need of road safety, Accidents sign, concept of civic sense and its relationship to road safety; Road classification, Design of Roads: Right of way, Carriageway, Median, Shoulders, Sidewalk, Lanes, Curbs, Camber, etc.; Types of road intersections, basic forms of at-grade Junctions, Grade separated Junctions, Design and spatial standards for Traffic Islands, Turning Radius, Pedestrian Crossings, Diverging, Merging and Weaving Traffic, location and design for traffic signals;	L1, L2	9
MODULE 2: Transport Surveys Uses and applications of transport surveys; Methods of conducting, analysing and presenting transport surveys such as traffic volume survey, speed studies, pedestrian and walkability studies, PT and IPT studies, parking studies, and origin and destination survey.	L1, L2, L4	9

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MODULE 3: Pedestrian Circulation, Traffic Signals and Road Marking Pedestrian cross-sectional element: Street furniture and landscaping; pedestrian infrastructure, norms, standards and guidelines; Pedestrian friendly design and planning principles; Traffic Signs: Typology, Principles and Standards- Location, Height and Maintenance; Road Marking: Typology, Material, Colour, and Typography of the markings; Traffic Signals: Introduction, advantages and disadvantages, Signal Indications	L1, L2, L4	9
MODULE 4: Road Accidents and Regulations Nature and Types of Road Accidents, Fatality Rates, Collision Diagrams, and Traffic management measures; Indian Motor Vehicles Act, Traffic Rules and Regulations, National Road Safety Policy, National Urban Transport Policy, Comprehensive Mobility Plan, Case studies	L1, L2	9

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books/

- Kadiyali, L.R.(1999). Traffic Engineering and Transport Planning, Delhi : Khanna Publishers.
- Saxena, S.C. (2014). Textbook Of Highway And Traffic Engineering, Delhi : CBS Publishers and Distributors.
- Taylor, M.A.P and Bonsall, P.W. (1996). Understanding Traffic Systems: Data Analysis and Presentation, Abingdon, Routledge Publishers.
- URDPFI, (2014), Standards and Guidelines and Guidelines on Transportation, Delhi : ITPI.

Reference Books

- Buchanan, C. (1963), Traffic in Towns, HMSO.
- OECD, (1975). Better Towns with Less Traffic
- IRC, Publication on Standards and guidelines.

Modes of Evaluation: Assignment/Case Study/ Presentation/Class Test/Written Examination Examination Scheme:


Components	Internal Assessment						ESE
	CT-1	CT-2	HA	S/P	CE	A	
Weightage (%)	10	10	10	10	05	05	50

CT: Class Test, HA: Home Assignment, S/P: Seminar/Presentation, CE: Continuous Evaluation, A: Attendance; ESE: End Semester Examination, ESJ: End Semester Jury

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1	1	1	1	--	--	2	--	1	--	--	--	1	1	2	--
CO2	1	1	1	1	1	--	2	--	1	--	--	--	1	1	1	--
CO3	1	1	1	1	2	--	2	--	1	--	--	--	1	1	1	--
CO4	1	1	2	2	1	--	1	--	1	--	--	--	1	1	1	--

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	PLANNING AND DESIGN LAB-III (VILLAGE PLANNING) (PLN2307)	L	T	S	P	C
Version 1.1		0	0	10	0	10
Pre-requisites/Exposure	Planning and Design Lab I and II					
Co-requisites	Traffic and Transportation Planning-I					

Catalog Description

Village study would involve an analysis of a rural settlement by comprehending social, economic, physical and political aspects. This exercise would also focus on the understanding of the history of a village and its people, basis of spatial organisation of a village and its transformations over the years. The study would also involve understanding of land administration in the village. This would further include understanding of land between abadi area and revenue boundary of a village. Lastly, a study of government schemes for the entire village would be undertaken. Students would be expected to develop sensitivity to development issues in a rural settlement.

Course Objectives

The objectives of this course are

- To understand the history of a village and its people, basis of spatial organization of a village and its transformations over the years.
- to learn techniques for analyzing the village and addressing the rural issues
- To understand key techniques for management and enhancement of village development

Course Outcomes

On completion of this course, the students will be able to

CO1: Explain the village with respect to its history and origin

CO2: Conduct the surveys required for planning of a village

CO3: Analyze a village based on the data availability

CO4: Evaluate a village and propose a suggestive measure for proper development

Modules	Blooms level*	Number of hours
Module 1: Introduction to RADPFI Need of RADPFI guidelines, Aim and Objectives, Scope and Application, Plan Formulation framework, Legislative Process, Spatial Approach to rural Planning	L1, L2	30
Module 2: Rural Infrastructure Planning Landuse, Norms and Standard: Habitat planning, road infra., social facilities, water supply, sanitation, solid and liquid waste management	L1, L4	30
Module 3: Site selection Literature Review, Case study Presentation, Regional setting of selected village, Data Collection through Survey: Primary and Secondary	L1, L6	30
Module 4: Data Analysis Data Analysis, Proposal and Report	L1, L4	30

*Bloom's Level:

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

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- Manual – Integrated Village Planning and Development; Ministry of Panchayati Raj, Govt. of India [<http://www.undp.org/content/dam/india/docs/DG/preparation-ofmanual-for-planning-integrated-village-development.pdf>]
- Saansad Adarsh Gram Yojana (SAGY) – Guidelines Dept. of Rural Development, MoRD, Govt. of India [pib.nic.in/archieve/others/2014/.../d2014101101.pdf]
- Saansad Adarsh Gram Yojana : Sankalan – Initiatives in SAGY Gram Panchayats Dept. of Rural Development, MoRD, Govt. of India, NIRD & PR, Hyderabad
- Pradhan Mantri Adarsh Gram Yojana (PMAGY) – Guidelines Ministry of Social Justice & Empowerment, Govt. of India [<http://socialjustice.nic.in/writereaddata/UploadFile/pmagy%20guidelines-revised-2015-english.pdf>]

Modes of Evaluation: Assignment/Case Study/ Presentation/Written Examination

Examination Scheme:


Components	Internal Assessment						ESJ
	R-I	R-II	R-III	Report	CE	A	
Weightage (%)	50	50	50	40	05	05	200

R: Review, CT: Class Test, HA: Home Assignment, S/P: Seminar/Presentation, CE: Continuous Evaluation, A: Attendance; ESE: End Semester Examination, ESJ: End Semester Jury

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	2	1	1	--	--	--	1	--	1	--	--	--	1	1	1	--
CO2	1	1	1	2	--	--	1	--	1	--	--	--	1	1	1	--
CO3	1	1	1	2	--	--	1	--	1	--	--	--	1	1	1	--
CO4	1	1	1	2	--	--	2	--	1	--	--	--	1	1	2	--

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	PLANNING PRACTICE-I (PLN2402)	L	T	S	P	C
Version 1.1		2	1	0	0	3
Pre-requisites/Exposure	Planning Theory – I, Techniques of Planning – I					
Co-requisites	Planning Theory - II					

Catalog Description

The aim of this course is to Study Development Regulations and the role of various Agencies in the practice of Urban and Regional Planning. This course objective to provide the foundation, knowledge and skills needed to work in planning Organisation. It is designed to build understanding of the complex interactions and uncertainties of the development process.

Course Objectives

The objectives of this course are

- To understand the roles of Central Town and Country Planning Organization; State Town and Country Planning Departments / Directorates; Development Authorities and Local Bodies in Urban and Regional Plan formulation and implementation.
- Identify the agencies that involves in planning process and development plan, execution and operation and maintenance
- To understand Type and Role of Private Sector Participation in Spatial Planning Practice.

Course Outcomes

On completion of this course, the students will be able to

CO1: Explain the role of planning organization and their policies

CO2: Identify the functions and jurisdictions of development authorities

CO3: Explain different development regulations with the help of NBC & URDPFI

CO4: Explain the role and need of coordination in planning

Modules	Blooms level*	Number of hours
MODULE 1: Planning as a Profession Definition of profession; Planning as a profession and Role of a Planner in society, different roles of planner in practice; Planner in relation with other professions	L1, L2	10
MODULE 2: Nature of Planning Practice Nature of planning practice in general and in Indian context; Changing global context and planning practice; Evolution of planning in India	L1, L2	8
MODULE 3: Framework of Planning Practice Legal framework for planning in India, planning and development organisations at Central, state and local level; planning practice in private sector; Scope of work in planning practice, fees and other terms and conditions of planning work.	L1, L2,	10
MODULE 4: Planning Practice Cases This unit would focus on developing a critical reasoning and communication skills through study of planning cases including planning permissions, court	L1, L2, L5	8

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cases, attending public meetings etc., application of concepts of previous units through study of planning practice; documentation of cases.		
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*Bloom's Level:

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

- Town and Country Planning Organization (2018): *Policy for Capacity Building of Officers of Town & Country Planning Department*, Haryana, Government of Haryana
- TCPO, (2016): *Model Building Bye-Law*, Town and Country Planning Organization, Ministry of Urban Development, Delhi
- AITP Reading Material on *Environmental Planning and Design*, Prof A. K. Maitra , SPA Delhi

Reference Books

- CPCB Guidelines for Bio-Technologies for Treatment of Wastes and Cleaner Technologies - Issue and Options
- Exploring Possibilities of Achieving Sustainability in Solid Waste Management, Ramachandra T.V. and Saira Varghese K., Indian Journal of Environmental Health, 45 (4):255-264, 2003

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:


Components	Internal Assessment						ESE
	CT-1	CT-2	HA	S/P	CE	A	
Weightage (%)	10	10	10	10	05	05	50

CT: Class Test, HA: Home Assignment, S/P: Seminar/Presentation, CE: Continuous Evaluation, A: Attendance; ESE: End Semester Examination, ESJ: End Semester Jury

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1	1	--	--	--	1	--	--	--	--	--	1	1	--	--	--
CO2	1	1	--	--	--	1	--	1	--	--	--	1	1	--	1	1
CO3	1	1	1	--	--	--	--	--	--	--	--	--	1	--	1	1
CO4	1	1	--	--	--	1	--	--	--	--	--	1	1	--	--	--
CO5	1	1	1	--	--	--	--	--	1	--	1	1	1	--	1	1

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	TRAFFIC AND TRANSPORTATION PLANNING-II (PLN2403)	L	T	S	P	C
Version 1.1		3	0	0	0	3
Pre-requisites/Exposure	Traffic and Transportation Planning I					
Co-requisites	Planning and Design Lab – IV (Transportation Planning)					

Catalog Description

The aim of this course is to provide exposure to the students to essential understanding Transportation System for the development of particular specific location and society. This course will enable the students with development of transportation management system. Economic relevance and different types of policies related to City Planning. Students will be able to apply or reference these techniques in their planning studios in each of the semesters for major and minor planning exercise.

Course Objectives

The objectives of this course are to

- Learn the fundamentals of urban form and structure.
- Get familiar with different types of surveys used in transportation planning.
- Equip students with role of economic evaluation in any transport development.
- Learn the impacts of the transport development on environment.
- Acquire know-how to develop new policies and transportation management plan effectively.

Course Outcomes

On completion of this course, the students will be able to

CO1: Define different types of Urban Structure and Transportation System.

CO2: Provide an overview about the Comprehensive Transport Planning.

CO3: Utilize their knowledge in conduction role of Economic Evaluation

CO4: Incorporate the impact of Transport on Environment.

Modules	Blooms level*	Number of hours
MODULE 1: Transport Policy Evolution of transport policy in India, current transport policy in India, Asian perspective on transport policy; Interactions between transport and other policy areas; Land use and transport policies: Translation of national policy in city and local level plans.	L1, L2, L3	9
MODULE 2: Urban Transport System Urban form and transport systems; Impact of land use on transport and vice versa; Transport and quality of life planning for transport in cities and towns; Data requirements and planning techniques, travel behavior and its determinants, choice modelling, influencing travel behavior, land use transport models for cities; Provision of new mass transit in cities; Specific challenges of small towns and big cities; Roles and responsibilities of various agencies; Provision for freight transport.	L1, L2, L3	9
MODULE 3: Regional Transport System Planning for regional transport systems; Data requirements and planning	L3, L4, L5, L6	9

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techniques; Importance of accessibility in regional transport planning; Indicators of accessibility to basic services; Planning parameters for road, rail, air and water transport systems; Locational parameters for regional transport nodes; Roles and responsibilities of various agencies.		
MODULE 4: Transport Economics Pricing and funding of transport services and systems; Socio-economic appraisal of transport projects; Techniques for estimating direct and indirect road user costs benefits; Monetization of costs and benefits; Investment criteria and public private partnerships in the transport sector.	L3, L4, L5, L6	9

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

- Sarkar, P.K., Maitri, Vinay, Joshi, G.J., (2014). Transportation Planning: Principles, practices and Policies, PHI publishers New Delhi, India
- Victor, Dr. D Johnsan, (2012). Urban Transportation: Planning, Operation and Management, PHI Publishers New Delhi, India
- Kadiyali L. R.,(2018), Traffic Engineering and Transport Planning, Khanna Publishers, New Delhi

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:


Components	Internal Assessment						ESE
	CT-1	CT-2	HA	S/P	CE	A	
Weightage (%)	10	10	10	10	05	05	50

CT: Class Test, HA: Home Assignment, S/P: Seminar/Presentation, CE: Continuous Evaluation, A: Attendance; ESE: End Semester Examination, ESJ: End Semester Jury

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1	1	--	1	--	--	--	--	--	--	--	--	2	--	1	--
CO2	1	1	--	1	--	--	--	--	--	--	--	--	2	--	1	--
CO3	1	1	--	1	--	--	--	--	--	--	--	--	2	--	1	--
CO4	1	1	--	1	--	--	--	--	--	--	--	--	2	--	1	--

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	PLANNING AND DESIGN LAB-IV (LAND USE AND TRANSPORT PLANNING) (PLN2407)	L	T	S	P	C
Version 1.1		0	0	10	0	10
Pre-requisites/Exposure	Planning and Design Lab I and II					
Co-requisites	Traffic and Transportation Planning-I					

Catalog Description

With a mix of field visits and studio classes involving theory, the main objective of this subject is to teach students about techniques and methods of traffic and transportation planning required for the preparation of traffic circulation plan and mobility plan.

Course Objectives

The objectives of this course are

- To appreciate the difference between travel demand and transport supply.
- to learn techniques for assessment, mitigation and management of traffic impact of current and proposed development.
- To understand key techniques for management and enhancement of transport supply.

Course Outcomes

On completion of this course, the students will be able to

CO1: Describe the different classifications of roads in urban and rural areas.

CO2: Conduct the surveys required for planning of a transportation system.

CO3: Layout the road network for designing the cities

CO4: Evaluate an area with respect to circulation plan with the help of surveys and geometric design

Modules	Blooms level*	Number of hours
Module 1: Area Mobility Plan with an objective to promote and make way for sustainable mobility patterns, improve accessibility and promote live ability. Travel Patterns Study involves analysis of the mobility profile of residents and workers within an area, modes used, trip lengths, trip purpose, etc. Origin destination survey includes analysis by comparing travel patterns with socio economic condition, housing typologies and private vehicle ownership. This will also include public opinion on traffic, noise, accessibility and local environment.	L1, L2	30
Module 2: Assessment of Travel Demand involves understanding of basic techniques for assessment of traffic impact of existing uses; Surveys and analysis related to traffic generation rates and patterns, parking demand, non-motorized traffic, traffic conditions on surrounding roads and intersections; Basic principles of travel demand modeling could be used to simulate scenarios to test how change in the intensity of use of land could impact traffic in an area.	L1, L4	30
Module 3: Transport Supply Analysis will diagnose the key transportation issues in an area by undertaking studies for analysing traffic volume, journey	L1, L6	30

speed, parking, pedestrian movement and access to public transport. A study about the adequacy of transport infrastructure vis-à-vis travel demand studies undertaken earlier.		
Module 4: Impact of transport on local environment involves analysis of noise, emissions, safety and quality of life; Developing indicators; Consideration of the needs of excluded groups such as children, elderly and women; Development of strategies consisting of planning, design and management measures.	L1, L4	30

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

- Kardiyali, L.R. (2011). Traffic and Transport Planning, New Delhi: Khanna Publishers.
- Khanna, S.K (2011). Highway Engineering, Roorkee: Nem Chand & Brothers.

Reference Books

- Flaherty, O. (2006). Transport Planning and Traffic Engineering.
- Klosterman, R.E. (1990). Community Analysis and Planning Techniques, Lanham: Rowman & Littlefield Publishers.

Modes of Evaluation: Assignment/Case Study/ Presentation/Written Examination

Examination Scheme:


Components	Internal Assessment						ESJ
	R-I	R-II	R-III	Report	CE	A	
Weightage (%)	50	50	50	40	05	05	200

R: Review, CT: Class Test, HA: Home Assignment, S/P: Seminar/Presentation, CE: Continuous Evaluation, A: Attendance; ESE: End Semester Examination, ESJ: End Semester Jury

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	2	1	1	--	--	--	1	--	1	--	--	--	1	1	1	--
CO2	1	1	1	2	--	--	1	--	1	--	--	--	1	1	1	--
CO3	1	1	1	2	--	--	1	--	1	--	--	--	1	1	1	--
CO4	1	1	1	2	--	--	2	--	1	--	--	--	1	1	2	--

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	REAL ESTATE DEVELOPMENT AND MANAGEMENT (PLN2411)	L	T	S	P	C
Version 1.1		3	0	0	0	3
Pre-requisites/Exposure	Housing and Community Planning					
Co-requisites	Planning and Design Lab – VI					

Catalog Description

This course objective to provide the foundation, knowledge and skills needed to work in real estate sector. It is designed to build understanding of the complex interactions and uncertainties of the development process. It provides students with the essential knowledge components of economics, valuation, planning, law, and regeneration and sustainability principles. It also develops an appreciation of the skills and tasks inherent in development projects, including community participation, satisfying the statutory planning considerations, undertaking the necessary financial appraisals, and achieving funding to make it happen.

Course Objectives

The objectives of this course are

- Introduce the basic Definitions and Concepts of Real Estate Planning and Management.
- Provide a basic understanding of Real Estate Markets.

Course Outcomes

On completion of this course, the students will be able to

CO1: Explain the term land economics and evaluate the process and cost of development.

CO2: Describe the Heterogeneity and imperfections of land and valuation of real property

CO3: Identify the location of specific uses and urban development programme

CO4: Analyze the real estate development through case studies

Modules	Blooms level*	Number of hours
MODULE 1: Developments of Land and Real Property Economic concepts of land, objectives and scope of land economics; relevance for spatial planning; economic principles of land uses; economic rent, land use and land values, market mechanism and land use pattern. Process, cost of development, source of finance, and financial calculation for real estate developer. Real Property Markets Heterogeneity and imperfections, valuation of real property -principles and practices; private ownership and social control of land; disposal of land; land development charges and betterment levy; land use restrictions, compensation and requisition taxation of capital gain on land versus public ownerships, economic aspects of land policies at various levels of decision making. Factors Influencing Locational Decisions Analysis of location of specific uses like residential, industrial, commercial and institutional in the light of location theories in intra-regional and inter-regional context; Techniques of cost benefit analysis of urban development programme.	L1, L2	10
MODULE 2: Project Work	L1, L2	26

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Selection and understanding of case study by reviewing case studies from India and abroad on projects of various types covering different levels of planning and practical exercises on Environmental Impact Assessments. Formulation of aim and objectives, Collection of data through primary and secondary sources; Conducting survey; Database development using relevant and advance software; Qualitative and quantitative data analysis; Report writing and presentations.		
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**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

- Sharma, Y. (2019). *Real Estate and Estate Planning*, Delhi : Prabhat Publication
- Mittal, S. (2018). *The ABC of Real Estate in India*, Chandigarh :White Falcon Publishing
- Jain, G.(2017). *Real Estate Investment & Financial Analysis*, Delhi:Anupam Printers and Publishers
- Baum, A. (2015). *Real Estate Investment: A Strategic Approach*, London: Routledge publisher

Reference Books

- Prabhu, R. (2017). *The Real Estate (Regulation and Development) Rules 2017*, Maharsatra, MahaSeva
- Daithankar, J. (2016). *SAP Flexible Real Estate Management*, Berlin: Springer Publication

Modes of Evaluation: Assignment/Case Study/ Presentation/Class Test/Written Examination

Examination Scheme:


Components	Internal Assessment						ESJ
	CT-1	CT-2	HA	S/P	CE	A	
Weightage (%)	-	-	-	40	05	05	50

CT: Class Test, HA: Home Assignment, S/P: Seminar/Presentation, CE: Continuous Evaluation, A: Attendance; ESE: End Semester Examination, ESJ: End Semester Jury

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1	--	1	--	--	1	2	--	--	1	--	--	1	--	1	2
CO2	1	1	2	--	--	--	1	--	--	1	--	--	1	--	1	--
CO3	1	1	--	--	1	2	1	1	--	--	--	--	1	--	1	2
CO4	1	1	--	--	1	--	1	1	--	2	--	--	1	--	1	2

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	ECOLOGY, ENVIRONMENT AND RESOURCE DEVELOPMENT AND MANAGEMENT (PLN2511)	L	T	S	P	C
Version 1.1		3	0	0	0	3
Pre-requisites/Exposure	Environmental Studies-I & II					
Co-requisites	Planning and Design Lab- V					

Catalogue Description

The aim of this course is to provide exposure to the students to basic concepts of ecology, ecosystems, environment and Resource Development. This course will enable the students a thorough understanding of all the theories and definitions of terms relating to ecology and environment in planning and their usage in urban and regional planning. The students will know about the impact of development on environment and its significance in planning.

Course Objectives

The objectives of this course are

- To understand various types of components in Ecology, Environment.
- To the role of Ecology and Environment for the resource development and management.
- To enhance the knowledge for EIA. (Environment Impact Assessment)

Course Outcomes

On completion of this course, the students will be able to

CO1: Define the meaning and scope of ecology and identification of ecological parameters for planning at different levels.

CO2: Understand the ecosystem and its relevance to environment in planning.

CO3: Understand the concept of environmental impact assessment and its role in planning and development.

CO4: Learn the various environmental policies in planning.

Modules	Blooms level*	Number of hours
Module 1: Comprehending Ecology Meaning and scope of ecology; Evolution of ecology, components of nature and basic concepts and processes of ecology; Resources and human settlements' impact on advanced agricultural methods, urbanization and industrialization of nature; Urban ecosystem approach, its evolution and significance; Soil, water, land, vegetation and energy resources and their development and management; Defining ecologically sensitive areas, ESA as a resource for development; Impact of development on coastal areas, forests, hills and river ecology; Legislation and policies for the management of ecologically sensitive regions; Case studies for the management of ecologically sensitive areas in India.	L1, L2, L3	8
Module 2: Quantitative Ecology Introduction to quantitative ecology; Identification of ecological parameters for planning at different levels like site planning, settlement planning and regional planning; Data needs and formats for data collection; Types of analysis required for evolving ecological parameters; Ecological footprints and carrying capacity.	L1, L2, L3	9

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Module 3: Climate Change Cities and climate change; Impact of built environment and transportation on greenhouse gas emissions; Role of planning in climate change mitigation and adaptation; Management tools for sustainable retrofitting infrastructure; Critical review of policies and regulations in India regarding climate change; Examples of climate change plans where mitigation and adaptation strategies are translated into concrete actions; Emerging technologies; National policy framework on climate change, carbon credits and trade, carbon footprints.	L1, L2, L3	9
Module 4: Resource Planning Development and Management Endowments, types of resources, exhaustive and renewable resources development; Utilization and conservation of national, technological and human resources; Resource management, recycling of resources and resource equilibrium; Water resource management, waste land management; Rural industrialization and use of non-conventional energy in rural development; Major resource development programmes in India; Case studies of resource development projects in agriculture, forestry, minerals, water, etc.	L1, L2, L3	10

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

- Kumar, Pranav. (2017). Fundamentals of Ecology and Environment. *Pathfinder Publication*.
- Sharma, P. D. (2017). Ecology and Environment. *Rastogi Publications*.
- Raman, N. S., Gajbhiye, A. R. & Khandeshwar, S. R. (2019). Environmental Impact Assessment. *Dreamtech Press*.

Reference Book

- Schneider, David C. (1994). Quantitative Ecology Spatial and Temporal Scaling. *Academic Press Inc*.
- Royle, J. Andrew & Dorazio, Robert M. (2009). Conceptual and philosophical considerations in ecology and statistics. *Hierarchical Modelling and Inference in Ecology*, 1-26.
<https://doi.org/10.1016/B978-0-12-374097-7.00003-X>

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	Internal Assessment						ESE
	CT-1	CT-2	HA	S/P	CE	A	
Weightage (%)	10	10	10	10	05	05	50

CT: Class Test, HA: Home Assignment, S/P: Seminar/Presentation, CE: Continuous Evaluation, A: Attendance; ESE: End Semester Examination, ESJ: End Semester Jury

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1	1	--	--	--	--	--	--	--	--	2	--	--	--	1	--
CO2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CO3	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CO4	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

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	PLANNING AND DESIGN LAB - V (SUB CITY PLAN) (PLN2507)	L	T	S	P	C
Version 1.1		0	0	10	0	10
Pre-requisites/Exposure	Planning and Design Lab I, II, III & IV					
Co-requisites	Planning Legislation, PMUS					

Catalog Description

This studio provides a link between site level and city level plans. This level details out land allocations and planning proposals given in statutory plans at the city level. It should help students to see interrelations amongst different sectors at the city level and how these need to be translated through detailed plans so as to achieve city level statutory plan objectives.

Course Objectives

The objectives of this course are

- To study plan preparation and its relationship of higher order plan with lower order plans such as Master Plan with Zonal Plan and Area Plan.
- To develop the lower order plan within the framework of Master Plan.

Course Outcomes

On completion of this course, the students will be able to

CO1: Describe the different approaches in plan making; the concepts of master plan, comprehensive development plan - the structure plan, the sector plan, the area/ zonal plan, and other types of plan making processes and relationship among plans.

CO2: Evaluate a master plan, zonal plan or any area plan.

CO3: Use the relevant planning standards for different land uses for area planning.

CO4: Prepare methodology and collect data for site planning such as land use survey, household's survey etc., and analyze the data for area plan.

Modules	Blooms level*	Number of hours
MODULE 1: Approaches to Plan Making and Relationship among Plans The different approaches to plan making; the concepts of master plan, comprehensive development plan - the structure plan, the sector plan, the area/ zonal plan, and other types of plan making processes, Relationship of higher order plans with lower order plans	L1, L2	16
MODULE 2: Framework for Zonal Plans The approach to developing the area/ zonal plan within the framework of Master Plan.	L2, L3, L4	15
MODULE 3: Planning Standards The study and development of the relevant planning standards for different land uses	L4, L5	15
MODULE 4: Zonal Plans / Area Plans Detailing of specific sites in the proposed Zonal Plans / Area Plans, covering different land uses.	L5, L6	50

*Bloom's Level

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L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books / References

- MoUD, (2015): *Urban and Regional Development Plans Formulation and Implementation* (URDPFI) Vol. 1, Ministry of Urban Development, Government of India, Delhi
- MoUD, (2015): *Urban and Regional Development Plans Formulation and Implementation* (URDPFI) Vol. II A and Vol. IIB, Appendices to URDPFI Guidelines, 2014, Ministry of Urban Development, Government of India, Delhi

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:


Components	Internal Assessment						ESJ
	R-I	R-II	R-III	Report	CE	A	
Weightage (%)	50	50	50	40	05	05	200

R: Review, CT: Class Test, HA: Home Assignment, S/P: Seminar/Presentation, CE: Continuous Evaluation, A: Attendance; ESE: End Semester Examination, ESJ: End Semester Jury

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PSO 1	PSO 2	PSO 3	PSO 4
CO 1	1	1	--	--	--	--	--	--	--	--	--	1	1	--	--
CO 2	1	1	--	--	--	--	--	--	--	--	--	1	1	--	--
CO 3	1	1	1	1	--	--	--	--	--	--	--	1	1	--	--
CO 4	1	1	1	1	1	1	1	1	1	1	--	1	1	1	--

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	PROFESSIONAL TRAINING– I (PLN2508)	L	T	S	P	C
Version 1.1		0	0	0	0	3
Pre-requisites/Exposure	Planning and Design Lab I, II, III & IV					
Co-requisites	Planning and Design Lab – V					


Catalog Description

Each student shall undertake Mandatory Training in a planning (or related) office during summer vacation between the Sixth and Seventh semester. The period of Training will be eight weeks. The exact period and place of training will be decided in consultation with the Co-ordinator-in-charge of training. The objective of Training is to expose the students to live planning projects and working environment at planning offices. The students are required to submit a 'Satisfactory' certificate from the relevant Planning Office after completion of training. The student will also submit a Report highlighting the Profile of the Planning Office, its organization, key work areas, etc; Introduction to the project(s) worked upon during training; planning brief; methods employed; and planning -design solutions / proposals. The students will also be required to present their work through drawings / visuals, power point presentations in the form of a Seminar to the faculty and students of the Department over the seventh semester, as per directions of the Co-ordinator-in-charge of training.

Course Objectives

The objectives of this course are

- To understand the profile of the Planning Office / Planning Authority / Local Body / Planning Professional.
- To participate in a Live Project of Planning Office / Planning Authority / Local Body / Planning Professional


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	DISASTER RISK MANAGEMENT AND CLIMATE CHANGE ADAPTATIONS (PLN2509)	L	T	S	P	C
Version 1.1		3	0	0	0	3
Pre-requisites/Exposure	Ecology, Environment and Resource Development and Management					
Co-requisites	Planning and Design Lab – VI					

Catalog Description

This course aims at developing a systematic understanding for identifying, assessing and reducing the risks of disaster. It helps in assessing physical, socio-economic and environmental vulnerabilities and mitigation mechanisms for various types of disasters. The course also aims at giving a general understanding of climate change and strategies for mitigating the effects of climate change.

Course Objectives

The objectives of this course are

- To understand the basic concepts of disaster management.
- To understand disaster management mechanisms; disaster risk mitigation; and post disaster measures
- Explain the fundamentals of climate change science.
- Present the international climate change legal and policy framework and explain key issues under negotiation.

Course Outcomes

On completion of this course, the students will be able to

CO1: Explain the concepts, prevention strategies and post disaster management for various types of disasters.

CO2: Describe the role of government authorities and others organizations in disaster management

CO3: Explain the basic concepts of climate change science and analyse different climate change scenarios and their implications

CO4: Explain the importance and mechanisms of adaptation in preparing for and coping with climate change

Modules	Blooms level*	Number of hours
MODULE 1: Basic Concepts of Disaster Management Disaster –related terms, definitions, concepts; Types and classifications of disasters- causes and consequences; Overview of disasters across the world; Disaster management cycle, Phases of disasters; Disaster Vulnerability: physical vulnerability, socio-economic vulnerability, environmental vulnerability; Disaster Risk Mapping; Emergency phase of disasters; Disaster Rescue and Relief; Post disaster recovery and rebuilding process Disaster Management Mechanisms Recent initiatives at national and state level; Kyoto Framework of disaster mitigation and management; Disaster Management Act – national and states; Roles and Responsibilities of National Disaster Management Authority, State Disaster Management Authorities, District Disaster Management Authorities; Various role players in disaster management – NGOs / CBOs and Armed Forces; Community Based Disaster Preparedness (CBDP); Physical planning	L1, L2	10

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and disaster management plans; Applications of Remote sensing and GIS in disaster management. Climate Change Adaptations Introduction to the concept of climate change adaptation; Assessing climate vulnerability; Introduction to linkages between climate change adaptation and development; Important international adaptation initiatives and programmes; International climate change negotiations; The 4 United Nations Framework Convention on Climate Change (UNFCCC); The Kyoto Protocol and its associated bodies		
MODULE 2: Project Work Selection and understanding of case study by reviewing case studies from India and abroad on projects of various types covering different levels of planning and practical exercises on Environmental Impact Assessments. Formulation of aim and objectives, Collection of data through primary and secondary sources; Conducting survey; Database development using relevant and advance software; Qualitative and quantitative data analysis; Report writing and presentations.	L1, L2,	26

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

- Christian N. Madu, (2017). *Handbook of Disaster Risk Reduction & Management: Climate Change And Natural Disasters*
- Damon P Capolla, (2007). *Introduction to international Disaster Management: Butterworth Heinemann*
- Klijn, F.(2012). *Comprehensive Flood Risk Management: Research for Policy and Practice*
- Wisner, B., Blaikie, P. M., Cannon, T., Davis, I. (2004) 'At Risk: Natural Hazards, People's Vulnerability and Disasters' Psychology Press, ISBN 0415252164, 9780415252164

References

- Blaikie, P., Cannon, T., Davis, I. and Wisner, B. (1994), 'At Risk: Natural Hazards, People's Vulnerability and Disasters', Routledge, London
- Cannon, T. (2000). Vulnerability Analysis in Disasters. In: D. Parker, ed., Floods, pp. 43-55. London
- Coburn, A. and Spence, R., (2002) 'Earthquake Protection', John Wiley & Sons, Ltd, England
- Dowrick, D. (2003) 'Earthquake Risk Reduction', John Wiley & Sons, Ltd, England.
- George D Haddow and Jane A Bullock, (2006). *Introduction to Emergency Management: Elsevier Butterworth Heinemann*
- IISD, UNITAR & UNEP (2009). IEA Training Material: Vulnerability and Climate Change Impact Assessment for Adaptation.
- NDMA, (2007-11). *Disaster Management Guidelines: New Delhi*
- UNDP (2004) 'Reducing Disaster Risk: A Challenge for Development' United Nations Development Programme, ISBN 92-1-126160-0 Available: http://www.undp.org/cpr/whats_new/rdr_english.pdf
- UNEP & UNDP (2011). Mainstreaming Climate Change Adaptation into Development Planning: A Guide for Practitioners

Modes of Evaluation: Presentation/Assignment/Class Test /Written Examination

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Examination Scheme:


Components	Internal Assessment						ESJ
	CT-1	CT-2	HA	S/P	CE	A	
Weightage (%)	-	-	-	40	05	05	50

CT: Class Test, HA: Home Assignment, S/P: Seminar/Presentation, CE: Continuous Evaluation, A: Attendance; ESE: End Semester Examination, ESJ: End Semester Jury

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1	1	1	--	--	1	1	--	--	2	1	--	1	--	1	2
CO2	1	1	2	--	--	--	--	--	--	--	--	--	1	2	--	--

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	INFOGRAPHIC AND STORYTELLING TECHNIQUES (PLN2513)	L	T	S	P	C
Version 1.1		3	0	0	0	3
Pre-requisites/Exposure	Planning and Design Lab I, II, III & IV					
Co-requisites	Planning and Design Lab V					

Catalog Description

The aim of this course is to offer opportunities and skill set in effective infographics and storytelling techniques. This particular subject will be greatly useful in planning and producing effective studio sheets. The courses will generally be conducted in the seminar/studio mode to encourage research, exploration and skill developments. The focus of the course will evolving rationale thinking capabilities of the students with respect to delivering students' findings/insights and the best presentation method. The course would be conducted through literature survey, case studies, and hands on exercises with available infographic software in the university. During the course, students will be working in interdisciplinary groups. In this course, students will discuss how to incorporate a story in their presentation to help them capture the attention of the audience. They will be able to choose and apply the most effective analytical method for delivering their insights/ideas. They will incorporate data visualization best practices and use tips and tricks when presenting at various platforms to decision makers and stakeholders.

Course Objectives

The objectives of this course are

- To equip students with effective utilization of infographic techniques.
- To demonstrate effective presentation skills and deliver insights

Course Outcomes

On completion of this course, the students will be able to

CO1: Apply story telling techniques in planning studio presentations.

CO2: Synthesize research findings and develop effective insights

Modules	Blooms level*	Number of hours
MODULE 1: Synthesizing the Findings and Deriving the Insights Synthesizing findings of student research and derive valid/actionable insights, Finding story in the data, Shaping it to contribute to a compelling research presentation, Providing actionable comparisons, Weighing the pros and cons, Deriving insights to address a problem/problems, Methods for developing research-based recommendations, testing and refining ideas. Techniques of reviewing the essential sections of various reports, designing visualizations of data, Understanding the requisite for targeting specific audience, Applying storytelling strategies, Recognize the drawbacks of poor data visualization.	L3, L4 L5	12

MODULE 2: Project Work Selection and understanding of case study; Formulation of Aim and Objectives, Collection of data through primary and secondary sources; Conducting survey; Database development using relevant and advance software; Qualitative and quantitative data analysis; Report writing and presentations.	L4, L5, L6	24
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**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

- Cairo, A. (2012). Chapter 1 Introduction Infographics and Visualization. *Functional Art - Infographics and Visualization and Exploration*.
- Walter, E., & Gioglio, J. (2014). *The Power of Visual Storytelling: How to Use Visuals, Videos, and Social Media to Market Your Brand. Inside Market Data* (p. 256).
- Tong, C., Roberts, R., Borgo, R., Walton, S., Laramie, R. S., Wegba, K., ... Ma, X. (2018). Storytelling and visualization: An extended survey. *Information (Switzerland)*, 9(3). <https://doi.org/10.3390/info9030065>

References

- Cairo, A. (2012). Infographics and Visualization and exploration. *The Functional Art*, 15–25. Retrieved from <http://www.thefunctionalart.com/>
- Smiciklas, M. (2012). *The Power of Infographics: Using Pictures to Communicate and Connect with Your Audience. The power of infographics* (pp. 1–17). <https://doi.org/10.4324/9780203075609>

Modes of Evaluation: Presentation/Assignment/Class Test /Written Examination

Examination Scheme:


Components	Internal Assessment						ESJ
	CT-1	CT-2	HA	S/P	CE	A	
Weightage (%)	-	-	-	40	05	05	50

CT: Class Test, HA: Home Assignment, S/P: Seminar/Presentation, CE: Continuous Evaluation, A: Attendance; ESE: End Semester Examination, ESJ: End Semester Jury

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1	1	1	--	--	1	1	--	--	2	1	--	1	--	1	2
CO2	1	1	2	--	--	--	--	--	--	--	--	--	1	2	--	--

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	ECO-TOURISM (PLN2514)	L	T	S	P	C
Version 1.1		3	0	0	0	3
Pre-requisites/Exposure	Disaster Risk Management and Climate Change Adaptation					
Co-requisites	Planning and Design Lab V					

Catalog Description

The aim of this course is to offer the principles of planning for eco-tourism in the context of sustainable tourism development. The courses will generally be conducted in the seminar/studio mode to encourage research, exploration and skill developments. The focus of the course is getting the insights of relationships between tourism and environment, tourism and urban development, tourism and economic development. In this course, students will be able to grasp planning requirements for developing sustainable eco-tourism hubs and circuits. They will be able to incorporate community needs and sustainable eco-tourism requirements in planning process. The course would be conducted through literature survey, case studies, site visits, community surveys and hands on experimentations. During the course the students will be working on live projects in groups which are preferably interdisciplinary.

Course Objectives

The objectives of this course are

- To apply planning strategies and tools with reference to sustainable tourism development.
- To grasp the role of public and private sector as well as community participation in eco-tourism planning and development

Course Outcomes

On completion of this course, the students will be able to

CO1: Apply concept of eco-tourism for sustainable tourism development.

CO2: Identify and plan eco-tourism hubs and circuits.

Modules	Blooms level*	Number of hours
MODULE 1: Introduction and Planning for Eco-Tourism Definitions, scope, nature, key determinants, characteristics; problems and prospects of eco-tourism; eco-tourism hubs in India; impacts of eco-tourism in developed and developing regions; relationship between tourism and urban development, relationship between tourism and economic development, relationship between tourism and environment; concept of carrying capacity and its significance in eco-tourism. Circuit identification and destination planning; assessment of infrastructure requirement for eco-tourism planning; analysing tourism impacts in transforming local livelihood and lifestyle; role of Government institutions and agencies in eco-tourism development.	L3, L4 L5	12

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MODULE 2: Project Work Selection and understanding of case study; Formulation of Aim and Objectives, Collection of data through primary and secondary sources; Conducting survey; Database development using relevant and advance software; Qualitative and quantitative data analysis; Report writing and presentations.	L4, L5, L6	24
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**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

- Cohen, E. (1978). The impact of tourism on the physical environment. *Annals of Tourism Research*, 5(2), 215–237. [https://doi.org/10.1016/0160-7383\(78\)90221-9](https://doi.org/10.1016/0160-7383(78)90221-9)
- Dávid, L. (2011). Tourism ecology: Towards the responsible, sustainable tourism future. *Worldwide Hospitality and Tourism Themes*, 3(3), 210–216. <https://doi.org/10.1108/1755421111114217>
- Ghasemi, M., & Hamzah, A. (2014). An Investigation of the Appropriateness of Tourism Development Paradigms in Rural Areas from Main Tourism Stakeholders' Point of View. *Procedia - Social and Behavioral Sciences*, 144, 15–24. <https://doi.org/10.1016/j.sbspro.2014.07.269>

References

- Jaini, N., Anuar, A. N. A., & Daim, M. S. (2012). The practice of sustainable tourism in ecotourism sites among ecotourism providers. *Asian Social Science*, 8(4), 175–179. <https://doi.org/10.5539/ass.v8n4p175>
- Stakeholders, E. (1994). The Component of Successful Ecotourism. In *UNEP Division of Technology, Industry and Economics* (pp. 33–59).
- Wiltshier, P., Clarke, A., Adebayo, A., Robinson, P., & Oriade, A. (2019). Community-based tourism. In *Community-Based Tourism in the Developing World* (pp. 98–112). Routledge. <https://doi.org/10.4324/9781351026383-8>

Modes of Evaluation: Presentation/Assignment/Class Test /Written Examination

Examination Scheme:

Components	Internal Assessment						ESJ
	CT-1	CT-2	HA	S/P	CE	A	
Weightage (%)	-	-	-	40	05	05	50

CT: Class Test, HA: Home Assignment, S/P: Seminar/Presentation, CE: Continuous Evaluation, A: Attendance; ESE: End Semester Examination, ESJ: End Semester Jury

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1	1	1	--	--	1	1	--	--	2	1	--	1	--	1	2
CO2	1	1	2	--	--	--	--	--	--	--	--	--	1	2	--	--

1: strongly related, 2: moderately related and 3: weakly related

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	PLANNING AND DESIGN LAB – VI (MASTER DEVELOPMENT PLAN) (PLN2607)	L	T	S	P	C
Version 1.1		0	0	10	0	10
Pre-requisites/Exposure	Planning and Design Lab – V					
Co-requisites	Metropolitan Planning, Development and Management					

Catalog Description

The aim of this course is to impart knowledge and Hands-on Skills for Conducting various Field Surveys; Analysis Data and preparation of Urban Development Plans. This course will also focus on various types and hierarchy of Urban Plans, their Characteristics and Contents. It will also help students to evolve Development Policies; Land Use Plan, priorities and Implementation Mechanism for a selected Urban Area.

Course Objectives

The objectives of this course are

- To introduce different parameters of UDP.
- To collect necessary data from their field visit and surveys.
- To use different methods to conduct survey and also to learn different ways to do data analysis.
- To have a different perception and understanding to how local people are approaching development plan.

Course Outcomes

On completion of this course, the students will be able to

CO1: Describe the contents of various types of development plans and prepare questionnaire required for Urban Development plan preparation.

CO2: Conduct the survey and collect data from their respective sectors.

CO3: Evaluate the area based on the data collected

CO4: Propose the policy based guidelines and recommendation for further development.

Modules	Blooms level*	Number of hours
Module 1: Studying Development Plans and Gathering Secondary Source Information for a Selected City The study shall involve understanding of contents of various types of development plans and explore their foci; Identification and preparation of secondary source information of the towns or cities selected for the study.	L1, L2	21
Module 2: Organization of Field Surveys Visit to the case study area, collection of primary and secondary data and information on various aspects such as demography, social, economic, housing, transportation, etc.; conduct of primary and secondary surveys.	L2, L3, L4	15
Module 3: Analysis and Synthesis Analysis and synthesis of data and information collected on various aspects; projections of population and workforce; trends and issues identification.	L4, L5	40
Module 4: Plan, Policies and Proposals Preparation of policies and proposals with different scenarios and	L5, L6	20

identification of priorities and action areas; phasing and monitoring; governance structures for implementation; land use plan and the plan document.		
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**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books/ References

- Government of India. (1996). UDPFI Guidelines, ITPI, New Delhi
- Dr. L.R. Kadiyali (2016). *Transportation Engineering*, Khanna Publishing
- Delhi Development Authority. (2010). *Master Plan for Delhi 2021*
- CIDCO. (2008). *Navi Mumbai Development Plan*

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:


Components	Internal Assessment						ESJ
	R-I	R-II	R-III	Report	CE	A	
Weightage (%)	50	50	50	40	05	05	200

R: Review, CT: Class Test, HA: Home Assignment, S/P: Seminar/Presentation, CE: Continuous Evaluation, A: Attendance; ESE: End Semester Examination, ESJ: End Semester Jury

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1	1	1	1	--	1	--	--	--	--	--	1	1	1	--	--
CO2	1	1	--	--	1	--	--	--	--	--	--	--	1	1	--	--
CO3	1	1	1	1	1	--	--	--	--	--	--	1	1	1	1	1
CO4	1	1	1	1	1	--	--	--	1	--	--	1	1	1	1	1

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	BIG DATA AND DATA ANALYSIS (PLN2614)	L	T	P	S	C
Version 1.1	Date of Approval:	3	0	0	0	3
Pre-requisites/Exposure	PMIS					
Co-requisites	PDL VI					

Catalog Description

This course provides a basic introduction to big data and linking it with urban and regional planning, development, management, and policy making. The objective of the course is to familiarize students with big data analysis as a tool for making maps. The course also provides a basic introduction about the process of data acquisition and analytics associated with urban areas. Through this course students will explore big data in the context of smart cities and regions with the help of real-world examples. This incorporates practical exercises to familiarize students with the format of big data. It also provides a first hands-on experience to the students in handling and analysing large, complex data structures.

Course Objectives

The objectives of this course are

1. As technologies are getting embedded in the built environments, in this context, the major objective of this course is to understand the role and application of big data in urban and regional planning
2. To provides hands-on experience in handling and analyzing large data sets.

Course Outcomes

On completion of this course, the students will be able to

CO1: Understand the utility of big data in Planning and identify tools for making maps.

CO2: Understand the software for handling large data sets and explore big data in the context of Smart cities.

Modules	Blooms level*	Number of hours
MODULE 1: Big data, data acquisitions, analytics and Mapping the City Defining big data and what makes it 'big'; Emergence of data science and big data; its importance and utility in planning; Characteristics of big data; Links between big data, urban and regional planning, development, management and policy making. Different tools for making maps with big data; Map online programs and open spatial data and its uses; Geographic information systems software for mapping; and Identification of winners and losers in the big data system. Understanding open data platforms; Generators of big data; Handling large datasets, cloud database system; Cleaning data, SQL, introduction to R or other software for urban data analysis. Explore big data in the context of smart cities; Learning use of real-time data collection and use; Interactive data visualization in the context of smart cities and regions.	L1, L2, L3	12

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MODULE 2: Project Work Selection and understanding of case study; Formulation of Aim and Objectives, Collection of data through primary and secondary sources; Conducting survey; Database development using relevant and advance software; Qualitative and quantitative data analysis; Report writing and presentations.	L4, L5, L6	24
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**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Text Books

1. Jain, V.K. (2018) Big Data and Hadoop, Khanna Book Publishing Co., New Delhi.
2. Carta, S. (2019) Big Data, Code and the Discrete City, Shaping Public Realms, Routledge, London.
3. Desouza, K. and Smith, K. (2016) Big Data and Planning, PAS Report 585, American Planning Association, Washington, D.C. 57.
4. Townsend, A.M. (2013) Smart Cities: Big Data, Civic Hackers, and the Quest for a New Utopia, W.W. Norton and Company, London.
5. Offenhuber, D. and Ratti, C. (eds.) (2014) Decoding the City: Urbanism in the Age of Big Data, Birkhauser Verlag AG.

References

1. Manovich, Lev. (2012). Trending: The Promises and the Challenges of Big Social Data. Debates in the Digital Humanities, edited by Matthew K. Gold. The University of Minnesota Press.
2. Cate, Fred H. (2014). The Big Data Debate. Science 346(6211): 818-818.
3. Dutcher, Jenna. (2014). What is Big Data? UC Berkeley Data Science Blog.
4. Karsten Donnay. (2017). Big Data for Monitoring Political Instability. International Development Policy 8.1 (Online).

Mode of Evaluation: Presentation/Assignment/Class Test /Written Examination

Examination Scheme:


Components	CT-1	CT-2	HA	S/P	CE	A	ESE
Weightage (%)	-	-	-	90	05	05	-

CT: Class Test, HA: Home Assignment, S/P: Seminar/Presentation, CE: Continuous Evaluation, A: Attendance; ESE: End Semester Examination.

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1	1	1	--	--	1	1	--	--	2	1	--	1	--	1	2
CO2	1	1	2	--	--	--	--	--	--	--	--	--	1	2	--	--

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	PROJECT FORMULATION, APPRAISAL AND MANAGEMENT (PLN2711)	L	T	S	P	C
Version 1.1		3	0	0	0	3
Pre-requisites/Exposure	Real Estate Planning and Management, Planning and Management of Utilities and Services					
Co-requisites	Planning and Management of Informal Sector					

Catalogue Description

The aim of this course is to provide exposure to the students to basic concepts of project planning, appraisal and management. This course will enable the students a thorough understanding of all the theories and definitions of terms relating to project planning and management and their usage in urban and regional planning. The students will know about the impact of project appraisal, formulation and management and its significance in planning.

Course Objectives

The objectives of this course are

- To study the project formulation and appraisal and management
- To study the project planning and implementation
- To study the project evaluation

Course Outcomes

On completion of this course, the students will be able to

CO1: Define the meaning and scope of project formulation, appraisal and management in planning.

CO2: Understand the process of project formulation and appraisal in planning.

CO3: Understand the process of project implementation and monitoring in planning.

CO4: Learn the process of project evaluation.

Modules	Blooms level*	Number of hours
Module 1: Introduction to Project Formulation, Appraisal and Management The concept of projects, Importance of project formulation, Project formulation: definition, objectives; Stages of project formulation and their significance; Methodology for project identification and formulation; Feasibility studies, input analysis, financial cost-benefit analysis, social-cost benefit analysis; Project appraisal and report.	L1, L2, L3	7
Module 2: Project Appraisals Need for project appraisal; Project formulation: definition, objectives; Stages of project form Network analysis; CPM, PERT, resource leveling and allocation, time-cost trade off aspects; Bar charts, Milestones, Standard oriented cost control techniques; Techno-economic analysis of projects; appraisal and management; reasons for shortfall in its performance; scientific management, life cycle of project; detailed project report, and feasibility studies; techniques of financial appraisal, payback period, IRR, DCF, NPV, CBR.	L1, L2, L3	12
Module 3: Project Implementation and Monitoring Project implementation, stages of implementation, Teamwork, actors in project implementation; Project monitoring: meaning objectives and significance; Monitoring techniques: integrated reporting, Milestones, time and cost overrun and under runs, unit index techniques.	L1, L2, L3	9
Module 4: Project Evaluations	L1, L2,	8

Project evaluation: meaning, objectives, scope, stages, approach and steps, Life of a project; Techniques of project evaluation: input analysis, financial cost-benefit analysis, social-cost benefit analysis; case studies in urban and regional development projects.	L3	
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**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

- Chandra, Prasanna. (2017). Projects: Planning, Analysis, Selection, Financing, Implementation, and Review. *McGraw Hill Education*.
- Kerzner, Harold. (2012). Project Management: A Systems Approach to Planning, Scheduling and Controlling. *Wiley*.

Reference Book

- IES Master Team. (2019). ESE 2020 – Basics of Project Management. *IES Master Publication*.
- Padalkar, Milind & Gopinath, Saji. (2016). Six Decades of project management research: Thematic trends and future opportunities. *International Journal of Project Management*, 34(7), 1305-1321. <https://doi.org/10.1016/j.ijproman.2016.06.006>
- Shenhar, Aaron J. & Dvir, Dov. (2007). Project Management Research – The Challenge and Opportunity. *Project Management Journal*, <https://doi.org/10.1177%2F875697280703800210>

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:


Components	Internal Assessment						ESE
	CT-1	CT-2	HA	S/P	CE	A	
Weightage (%)	10	10	10	10	05	05	50

CT: Class Test, HA: Home Assignment, S/P: Seminar/Presentation, CE: Continuous Evaluation, A: Attendance; ESE: End Semester Examination, ESJ: End Semester Jury

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1	1	-	1	-	--	--	--	--	--	--	-	1	-	1	--
CO2	1	1	-	2	-	--	--	--	--	--	--	-	1	-	1	--
CO3	1	1	-	1	-	--	--	2	--	--	1	-	1	-	1	--
CO4	1	1	-	-	-	--	--	1	--	--	1	1	1	-	1	--

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	PLANNING AND DESIGN LAB - VII (REGIONAL PLAN) (PLN2706)	L	T	S	P	C
Version 1.1		0	0	10	0	10
Pre-requisites/Exposure	Fundamentals of Urban and Regional Planning, Introduction to Regional Planning					
Co-requisites	Planning Thesis					

Catalog Description

This course gives exposure to the students about the preparation of regional plans. They will be aware of the process for preparing checklist for data collection as well as conducting field visits and various methods to collect primary as well as secondary data collection. Students need to do data synthesis, analysis, finding of potentials & issues and drawing conclusions. They need to suggest strategies and proposals as per the findings. At the end they also need to submit a detailed report on District Development plan.

Course Objectives

The objectives of this course are

- To understand Role and Relevance of Regional Planning in general and the Context of 73rd and 74th CAA in particular.
- To study District / Metropolitan Area / Regional Development Policies and Land Utilization Plan along with Phasing, Monitoring Mechanism, and Governance Structure for Implementation

Course Outcomes

On completion of this course, the students will be able to

CO1: Describe the various types of regional plans and their linkages with higher and lower order plans and constitutional provisions.

CO2: Utilise the primary and secondary data obtained through field visit, for the sectoral and spatial planning; detailed data analysis.

CO3: Evaluate the present their data analysis and drawn inferences

CO4: Prepare proposals as per the identified thrust areas and potential of the study area along with a detailed report of District development plan.

Modules	Blooms level*	Number of hours
MODULE 1: Context of Regional Plans and Constitutional Provisions Role and relevance of regional planning at district or block level for regional planning, critical appraisal of district or block level plans; Understanding the contents of various types of regional plans and their linkages with higher and lower order plans; District planning in the context of 73rd and 74th Constitution Amendment Acts; District Planning Committees (DPCs); Metropolitan Planning Committees (MPCs) and Ward Committees	L1, L2	15
MODULE 2: Organization of Field Surveys Formulation of goals, objectives, methodologies; identification of data and sources of information; Collection of secondary and primary data for sectoral and spatial planning; detailed data analysis.	L2, L3, L4	15
MODULE 3: Analysis and Synthesis	L4, L5	40

Identification of development issues, potential thrust areas and constraints: sectoral and spatial; designing of alternative planning strategies, settlement patterns and development strategies; Sectoral and spatial prioritization, phasing, financial plans, institutional mechanisms, legislative framework, management plans.		
MODULE 4: Plan, Policies and Proposals Preparation of Regional Plan Document along with drawings, etc; Preparation of policies and proposals with different scenarios and identification of priority areas; phasing and monitoring; governance structures for implementation; regional land utilization plan and the plan document	L5, L6	26

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

- Planning Commission. (2006) Manual of Integrated District Planning. Planning Commission, New Delhi
- SPA, B. (2018) Coimbatore Regional Development Plan-2038. School of Architecture and Planning, Bhopal,

References

- Gupta, K.K. and Tyagi, V.C. (1992) Working with Maps. 105, printing group, Survey of India, DST, Govt. of India
- Cooper, H. (1998) Synthesizing Research: A Guide for Literature Review.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:


Components	Internal Assessment						ESJ
	R-I	R-II	R-III	Report	CE	A	
Weightage (%)	50	50	50	40	05	05	200

R: Review, CT: Class Test, HA: Home Assignment, S/P: Seminar/Presentation, CE: Continuous Evaluation, A: Attendance; ESE: End Semester Examination, ESJ: End Semester Jury

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PSO 1	PSO 2	PSO 3	PSO 4
CO 1	1	1	--	--	--	--	--	--	--	--	--	1	1	--	--
CO 2	1	1	--	--	--	--	--	--	--	--	--	1	1	--	--
CO 3	1	1	--	--	--	--	--	--	--	--	--	1	1	--	--
CO 4	1	1	1	1	1	1	1	1	1	--	--	1	1	1	--

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	PROFESSIONAL TRAINING– II (PLN2707)	L	T	P	C
Version 1.1		0	0	0	3
Pre-requisites/Exposure	Urban Governance, Urban Finance, Urban Management – I				
Co-requisites	Planning and Design Lab – VII (Regional Planning)				


Catalog Description

Each student shall undertake Mandatory Training in a planning (or related) office during summer vacation between the Sixth and Seventh semester. The period of Training will be eight weeks. The exact period and place of training will be decided in consultation with the Co-ordinator-in-charge of training. The objective of Training is to expose the students to live planning projects and working environment at planning offices. The students are required to submit a ‘Satisfactory’ certificate from the relevant Planning Office after completion of training. The student will also submit a Report highlighting the Profile of the Planning Office, its organization, key work areas, etc; Introduction to the project(s) worked upon during training; planning brief; methods employed; and planning -design solutions / proposals. The students will also be required to present their work through drawings / visuals, power point presentations in the form of a Seminar to the faculty and students of the Department over the seventh semester, as per directions of the Co-ordinator-in-charge of training.

Course Objectives

The objectives of this course are

- To understand the profile of the Planning Office / Planning Authority / Local Body / Planning Professional.
- To participate in a Live Project of Planning Office / Planning Authority / Local Body / Planning Professional


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	DISSERTATION (PLN2737)	L	T	S	P	C
Version 1.1		1	0	0	2	3
Pre-requisites/Exposure	Technical Report Writing, Training Seminar I, II					
Co-requisites	Thesis					

Catalog Description

The aim of the course is to study the technical aspect of report writing and role of methodology in research. This course gives an idea of writing skills. The course will introduce the students to all types of technical, scientific and legal writings. The course will enable the students to conduct systematic research and write technical reports.

Course Objectives

The objectives of this course are

- To introduce students to basic literature, research process, techniques and colloquial arguments, so as to help them finalize a topic for their thesis in the subsequent semester.
- To understand the types of reports and style of writing technical reports
- To understand the methods used for conducting research.
- To know about presentation of research.

Course Outcomes

On completion of this course, the students will be able to

CO1: Explain differences between different writing formats for reports.

CO2: Explain important elements to give a comprehensive understanding of purpose of report.

CO3: Describe the differences between different writing styles for articles, papers and other texts.

CO4: Explain the basis for selecting appropriate research method and criteria for a good research design.

Modules	Blooms level*	Number of hours
MODULE 1: Thesis Programming Identification of topic of interest having relevance to planning profession, integration and application of the learnt research process to the pre-thesis work. Planning colloquium: Exposure to the colloquial arguments by the stakeholders, decision makers, urban managers, advocates, technocrats, user groups, etc. Based on the inputs from the colloquial arguments, the topics shall be finalized for thesis in the subsequent semester.	L1, L2	6
MODULE 2: Research Techniques Data collection and analysis: Sample determination, data tabulation (coding, de-coding, etc.), quantitative and qualitative data analysis. Introduction to advanced statistical techniques such as, decision trees, factor analysis, fuzzy logic, multiple regression, multi variance, cobweb, logit and probit models, etc. Testing of hypothesis: Statistical hypothesis, simple and composite tests of significance, null hypothesis, types of errors, level of significance, critical region, chi-square distribution, goodness of fit, applications in planning.	L1, L2	6

MODULE 3: Research Process Problem identification, formulation of problem statement, literature review, working hypothesis, research brief, research methodology, sample determination, data collection and analysis, report structuring.	L1, L2, L6	6
MODULE 4: Research Methodology Intuition and research; Scientific research, need for scientific approach to research; Research methods; Hypotheses, testing of hypotheses; Reporting of research; Research in planning.	L1, L4, L5	6

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books/

- Kothari. C.R. (2009), Research Methodology, New Age International Publisher.
- Kumar R. (2005). Research Methodology, Sage Publication Ltd., New Delhi.

Reference Books

- Allwood, J., Anderson, L.G. and Dahl, O. (1992). Logic of Linguistics, Cambridge University, Press, Cambridge.
- Riordan, D. and Pauley, S.E. (2013). Technical Report Writing Today, 10th edition, Cengage Learning, Boston.

Modes of Evaluation: Group Discussions, Report Submission and Presentation, Literature Review, Referencing, Understanding of Components, Writing Style

Examination Scheme:


Components	Internal Assessment						ESE
	CT-1	CT-2	HA	S/P	CE	A	
Weightage (%)	10	10	10	10	05	05	50

CT: Class Test, HA: Home Assignment, S/P: Seminar/Presentation, CE: Continuous Evaluation, A: Attendance; ESE: End Semester Examination, ESJ: End Semester Jury

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1	1	1	1	--	--	2	--	--	--	--	--	1	2	--	--
CO2	1	2	1	1	--	--	2	--	--	--	--	--	1	2	--	--
CO3	1	1	1	1	--	--	2	--	--	--	--	--	1	2	--	--
CO4	1	1	1	1	--	--	2	--	--	--	--	--	1	2	--	--

1: strongly related, 2: moderately related and 3: weakly related


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	SMART CITIES AND ADVANCED TECHNOLOGIES FOR EMERGING PLANNING ISSUES (PLN2714)	L	T	S	P	C
Version 1.1		3	0	0	0	3
Pre-requisites/Exposure	Development, Management and Finance, Infrastructure Planning					
Co-requisites	Public Policy in Planning, Urban Governance					

Catalog Description

The aim of this course is to introduce the students to smart cities concepts and solutions with their specific planning needs and priorities and the implication on development in these areas. Besides, this course also offers opportunities in specialized or advance learning in emerging spatial planning issues and planners need to give special attention to them while preparing the plans. The courses will generally be conducted in the seminar/studio mode to encourage research, exploration and skill developments. The course will provide the students hands-on experience of infrastructural, environmental problems emerging in a city. The course contents to be followed will be developed by course teachers based on the resources at hand and opportunities for interdisciplinary learning. The course would be conducted through literature survey, case studies, site visits, community surveys and hands on experimentations. During the course the students will be working on live projects in groups which are preferably interdisciplinary.

Course Objectives

The objective of this course is

- To grasp Smart city concept as well as understanding emerging challenges in a city/region and finding out ways to resolve them.
- To develop interdisciplinary understanding and sensitivities of future planners.

Course Outcomes

On completion of this course, the students will be able to

CO1: Apply smart city planning as well as critically analyze emerging multifaceted planning issues and technology-based solution to address them.

CO2: Prepare the detail report and presentation on a given project with an emphasis on smart solutions in order to achieve the goal of sustainable development.

Modules	Blooms level*	Number of hours
MODULE 1: Smart Cities, Advance Technologies and Emerging Planning Issues Introduction to smart cities, the city as a system of systems, smart citizens, Infrastructure, technology and data, Innovation and enterprise, smart leadership and strategy, standards and capacity building, smart measurement, and learning. Case Studies of various smart cities in Indian and international context. Challenges and problems faced by Mega city and its region, Issues-rapid unplanned growth, urban sprawl, infrastructure related issues such as	L1, L2	12

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shortage of Water Supply, Public transport, Parking Issue, Shortage of housing, Solid waste management, environmental issues such as deforestation, land conversion, depletion of ground water etc. Advanced Solution- Advanced Transport Planning system, Smart Mobility, Application technology for improving agriculture productivity, Rain water harvesting, green roofs Sustainable housing affordability, Zero-carbon city, Use of Information and Communication Technology in Planning and Governance- E- Governance, E-Planning, Case studies covering various planning issues at different level of Planning		
MODULE 2: Project Work Selection and understanding of case study; Formulation of Aim and Objectives, Collection of data through primary and secondary sources; Conducting survey; Database development using relevant and advance software; Qualitative and quantitative data analysis; Report writing and presentations.	L4, L5, L6	24

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

- Dash, R. Environmental Sustainability Index for Indian States 2009 Informing Environmental Action. Chenna: Centre for Development Finance, Institute for Financial Management and Research.
- GRIHA. (2010). National Rating System, 'GRIHA' Green Rating for Integrated Habitat Assessment, An evaluation tool to help design, build, operate and maintain a resource-efficient built environment, GRIHA manual Volume 1. TERI Press, New Delhi: Ministry of New and Renewable, Energy, Government of India and The Energy and Resources Institute.
- Girardet, H. _1990.. The metabolism of cities. In: Cadman, D.and Payne, G. _eds. _1990.. The Living City: Towards a Sustainable Future London: Routledge.
- Smart Cities Unbundled, Sameer Sharma, Bloomsbury India
- The Smart City Transformations: The Revolution of The 21st Century, Amitabh Satyam, Bloomsbury India

References

- Basiago, A. D. _1996.. The search for the sustainable city in20th century urban planning. The Environmentalist, 16
- Douglas, I. Urban ecology and urban ecosystems: understanding the links to human health and well-being.Curr. Opine. Environ. Sustain. 2012, 4, 385–392.
- Smart Technologies, K. Worden, World Scientific Publishing Co Pte Ltd
- Smart Technologies for Smart Governments, Manuel Pedro Rodríguez Bolívar, Springer Publications

Modes of Evaluation: Presentation/Assignment/Class Test /Written Examination

Examination Scheme:

Components	Internal Assessment						ESJ
	CT-1	CT-2	HA	S/P	CE	A	
Weightage (%)	-	-	-	40	05	05	50

CT: Class Test, HA: Home Assignment, S/P: Seminar/Presentation, CE: Continuous Evaluation, A: Attendance; ESE: End Semester Examination, ESJ: End Semester Jury

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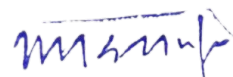
CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1	1	1	--	--	1	1	--	--	2	1	--	1	--	1	2
CO2	1	1	2	--	--	--	--	--	--	--	--	--	1	2	--	--

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	SUSTAINABLE CITIES AND REGIONS (PLN2718)	L	T	S	P	C
Version 1.1		3	0	0	0	3
Pre-requisites/Exposure	DISSERTATION					
Co-requisites	PDL IV					

Catalog Description

The primary purpose of this subject is to understand that complex relationships exist between cities and the regions and natural environments on which they rely. This course focuses on how to examine such relationships and how they impact upon urban, suburban, rural and regional dwellers at different scales in the 21st century. Students will learn about the major challenges currently faced by urban areas around the world – including poverty, unemployment, poor housing infrastructure, and constraints on productivity – and the extraordinary potential of these areas to enable change in the future.

Course Objectives

The objectives of this course are

- To understand urban sustainability, measures of sustainability, and elements and intersectionality of Sustainable Development Goals.
- To focus on effective governance in order to ensure sustainability of a city and a region.

Course Outcomes

On completion of this course, the students will be able to

CO1: Identify the measures of urban sustainability

CO2: Demonstrate knowledge and skills to plan for sustainable development of a city or a region.

Modules	Blooms level*	Number of hours
MODULE 1: Planning and Measuring Sustainability Starting with Brundtland report, different perspectives on urban and regional sustainability; Economic development and sustainability; Healthy city; Dimensions and components of sustainable urban and regional development; Elements of a new and improved paradigm of sustainability; Green cities, growing cities, just cities; Urban planning and the contradictions of sustainable development; Environmental justice and the sustainable city; Understanding urban and regional sustainability indicators; Sustainability assessment with a focus on community interests, etc.; Sustainability indicators used by a city of your choice. Genesis, history, and limits of carrying capacity; Urban ecological footprints, planning with ecological footprints; Governance and local sustainability; Problematizing the politics of sustainability; New politics of sustainability fixes; Environment and the entrepreneurial city: searching for the urban ‘sustainability fix’; Third wave sustainability; Sustainability schizophrenia or actually existing sustainability: toward a broader understanding of the politics and promise of local sustainability; Alternative routes to the sustainable city with examples. Understanding New Urban Agenda, Sustainable Development Goals, Paris Agreements; India’s position of these global agreements; Industrial ecology, planning for eco-industrial parks, drivers and limitations for the successful	L1, L2	12

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development and functioning of eco-industrial parks; SEZs, and development of ports, airports and road and rail based corridors.		
MODULE 2: Project Work Selection and understanding of case study; Formulation of Aim and Objectives, Conducting community participation exercises in small groups with varied stakeholders, Organising consultative meetings, Focus group discussion, Preparing small scale project with the help of local community and demonstration of the same. Collection of data through primary sources; Conducting survey; Database development; Qualitative and quantitative data analysis; Report writing and presentations.	L1, L2, L4	24

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books/

- Adriano, B., Daniele, V., Pierre, L., and Simona, C. (eds.) (2017) *Smart and Sustainable Planning for Cities and Regions: Results of SSPCR 2017*, Springer, Switzerland.
- Barbara, N. (2019) *Sustainable Pathways for our Cities and Regions, Planning within Planetary Boundaries*, Routledge, New York.
- Chapple, K. (2015) *Planning Sustainable Cities and Regions: Towards More Equitable Development*, Routledge, New York.
- Hildebrand, F. and Paul, Y. (2007) *Visions of Sustainability: Cities and Regions*, Taylor and Francis, London.
- Mcgranahan, G., Schensul, D. and Singh, G. (2016) Inclusive Urbanization: Can the 2030 Agenda be delivered without it, *Environment and Urbanization*, Vol. 28, No. 1, pp. 13-34.
- Watson, V. (2016) Locating planning in the New Urban Agenda of the

Modes of Evaluation: Assignment/Case Study/ Presentation/Class Test/Written Examination Examination Scheme:


Components	Internal Assessment						ESJ
	CT-1	CT-2	HA	S/P	CE	A	
Weightage (%)	-	-	-	40	05	05	50

CT: Class Test, HA: Home Assignment, S/P: Seminar/Presentation, CE: Continuous Evaluation, A: Attendance; ESE: End Semester Examination, ESJ: End Semester Jury

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	2	2	1	--	--	1	1	--	--	2	1	--	1	--	1	2
CO2	1	2	2	--	--	--	--	--	--	--	--	--	1	2	--	2

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	PLANNING PRACTICE-II (PLN2802)	L	T	S	P	C
Version 1.1		3	0	0	0	3
Pre-requisites/Exposure	Real Estate Planning and Management, Project Formulation, Appraisal and Management					
Co-requisites	Human Values in Planning, Planning Thesis					

Catalog Description

The aim of this course is to study role and responsibilities of Professional Planner and to attain the knowledge of project formulation, valuation and conditions of engagement and scale of professional charges. This course objective to provide the foundation, knowledge and skills needed to work in planning organisation. It is designed to build understanding of the complex interactions and uncertainties of the development process.

Course Objectives

The objectives of this course are

- Understand the roles of planner for plan and development in India cities and towns
- Identify the agencies that involves in planning process and development plan, execution and operation and maintenance
- Understand the need of Valuation, Methods of Real Property Valuation, Contract Documents and Project Formulation

Course Outcomes

On completion of this course, the students will be able to

CO1: Explain the role and responsibility of planners as decision maker.

CO2: Evaluate the scale of charges for different plans prepared at different levels

CO3: Describe the heterogeneity and imperfections of land and methods of valuation in real property

CO4: Describe the process involved in project formulation

Modules	Blooms level*	Number of hours
Module 1: Role of Planner Planner's input as professional at various levels and organizations, his role in decision making processes, relevant issues: generalists vs. specialists, professionals vs. technocrats, planner as decision maker vs. advisor to decision maker, relationship with client, developers, institutions and contractors; relationship with other experts such as engineers, architects, sociologists, economist, lawyers, etc; for specialized studies related to planning.	L1, L2	8
Module 2: Organization, Scope and Scale of Charges Aims and objectives of professional institutes, sister bodies; professional roles and responsibilities of planning consultants; professional ethics; responsibilities towards clients, fellow professionals and general public; Scope of services for different projects like master plan for urban area, zonal / district plan, sector / neighbourhood; layout, group housing schemes, commercial centers, industrial estates, etc; Consultancy agreements and safeguards; Fees and scales of professional charges, competitions and	L1, L2	8

Module 3: Valuation and Methods of Real Property Valuation Fundamentals of valuation, Purpose of valuation; Valuation for wealth & income tax, capital gains tax, property & gift tax etc, ownership of land, compound interest theory, calculating of present value, concepts of economic rents and social rents, property taxes, sinking fund, annuity, depreciation, valuation tables; Legislative framework-rent control, easements and their effects on properties; Income capitalization methods, land and building method and other methods of valuation;	L1, L2, L3	12
Module 4: Contract Documents and Project Formulation Tenders, contracts, arbitration, schedule of rates for construction; Materials, labor and equipment for land development, unit and mode of measurements, rate analysis; Formulations of project proposals and outline; Preparation of and response to Notice Inviting Tenders, Expression of Interest, Terms of Reference, Penalty clauses, etc.	L1, L2	8

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

- Gary Hack, E. L. (2009). *Local Planning: Contemporary Principles and Practice*. Intl City County Management Assn.
- ITPI. (1995). *Conditions of Engagement of Professional Services and Scale of Professional Fees and Charges*. ITPI.
- PMBOK Guide" by the Project Management Institute (PMI)
- K. Nagarajan (2004). *Project Management*. New Age International
- Joshua Kahr, M. C. (2005). *Real Estate Market Valuation and Analysis*. John Wiley & Sons; Har/Cdr edition.
- Wyatt, P. (2013). *Property Valuation*. Wiley-Blackwell; 2nd edition.

Reference Books

- AITP Reader on Ecology & Resource Development, AITP
- AITP Reading Material on Environmental Planning and Design, Prof A. K. Maitra , SPA Delhi
- Evaluating Sustainable Development in the Built Environment, Brandon P.S., WILEYBLACKWELL Pub., UK
- Mahyar Ardeshiri and Ali Arddesiri, (2011): *Sprawl or Compact City: The Role of Planners in Urbanization Processes in Developing Countries*, Research Gate,
- TCPO, (2014): *Urban Greening Guidelines*, 2014, Town and Country Planning Organization, Ministry of Urban Development, Government of India, Delhi
- The Economics of Low Carbon Cities: A Mini-Stern Review for the Leeds City Region, Andy Gouldson et al., The Centre for Low Carbon Futures Partnership, University of Hull, University Of Leeds

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	Internal Assessment						ESE
	CT-1	CT-2	HA	S/P	CE	A	
Weightage (%)	10	10	10	10	05	05	50

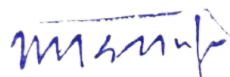
CT: Class Test, HA: Home Assignment, S/P: Seminar/Presentation, CE: Continuous Evaluation, A: Attendance; ESE: End Semester Examination, ESJ: End Semester Jury

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1	1	--	--	--	1	--	--	--	--	--	1	1	--	--	--
CO2	1	1	--	--	--	1	--	1	--	--	--	1	1	--	1	1
CO3	1	1	1	--	--	--1	--	--	--	--	--	--1	1	--	1	1
CO4	1	1	1	--	--	--	--	--	1	--	1	1	1	--	1	1

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	PLANNING THESIS (PLN2837)	L	T	S	P	C
Version 1.1		0	0	0	0	18
Pre-requisites/ Exposure	PDL VII, PDLVI, PDL V					
Co-requisites	Human Values in Planning, Planning Practice - II					

Catalog Description

The aim of this course is to Equip Students to Conduct Independent Research. This course will help students of identifying his or her own area of interest; able to explore a subject in depth; manage a research project; define a suitable question and use the appropriate research tools. This course will also contribute to the standards for academic writing. Each student of Bachelor of Planning is required to prepare a thesis on the subject of his / her choice, concerning urban, regional or rural planning. The topic shall be approved by the concerned department. Thesis will provide an opportunity to the student to conduct independent research by using the skills of analysis and synthesis learnt through various theory and practical courses. Thesis will be completed under the guidance of an approved research supervisor allotted by the Department. Thesis will be prepared by the student as per Thesis Manual prepared by the Department. The students will be required to present thesis orally, graphically and through written report. The student will also be required to present her thesis before the external jury appointed by the concerned University /Institute / School.

Course Objectives

The objectives of this course are

- To study and understand the scientific research method to carry out proper research to solving issues and problems in the context of urban and regional area.
- To study and learns the details research methodology such literature, cases study area, data collection, data analysis and result/finding particularly in urban / regional areas for addressing issues and problems and its challenges.
- To study and learns the formulation of policies, plan, suggestion / recommendation based on the research work.

Course Outcomes

On completion of this course, the students will be able to

CO1: Identify the need of their dissertation and formulate the aim and objectives respectively.

CO2: Organize field surveys and collect data from their related fields.

CO3: Analyze the data collected and find the gap .

CO4: Propose and recommend for the gap identified.

Module	Blooms level*	Number of hours
Module 1: Need for the Study and Methodology and Literature Research Clear goals and objectives along with scope of each objective should be outlined before establishing the need for conducting a research study; Substantive limitations of the research work should also be stated. Previous published work on the subject area has to be critically examined for finding out existing thought processes of other authors and trends (proper acknowledgements by authors).	L2,L3	-
Module 2: Field Surveys Depending on the research topic, field surveys have to be designed and field	L4, L5, L6	

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work has to done after conducting appropriate sample surveys.		
Module 3: Synthesis of Data and Information and Findings Field data and information and literature research findings should be synthesized to make final arguments and identification of planning issues.	L4, L5, L6	-
Module 4: Proposals and Recommendations Final, specific planning proposals and recommendations should be made at various geographical levels. Proposals should directly emanate from analysis and should not be generalized. Thesis should contain a list of references as per international practice.	L4, L5, L6	-

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books / References

- C.R. Kothari, (2004): Research Methodology, New Age International (P) Limited Publications, Delhi
- Shanti Bhushan Mishra and Shashi Alok., (2017): Hand Book of Research Methodology, GateResearch
- Chinelo Lgwenagu, (2016): Fundamental of Research Method and data collection, British Council, Research Gate
- Jennifer Mason, (2002): Qualitative Researching, 2nd edition, SAGE Publications, London

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:


Components	Internal Assessment									ESJ
	R-I	R-II	R-III	R-IV	R-V	R-VI	Report	CE	A	
Weightage (%)	50	50	75	75	75	75	90	05	05	300

R: Review, CT: Class Test, HA: Home Assignment, S/P: Seminar/Presentation, CE: Continuous Evaluation, A: Attendance; ESE: End Semester Examination, ESJ: End Semester Jury

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1	1	1	1	--	--	1	--	--	--	--	1	1	--	1	--
CO2	1	1	1	1	--	--	1	--	--	--	--	1	1	--	1	--
CO3	1	1	1	1	--	--	1	--	--	--	--	1	1	--	1	--
CO4	1	1	1	1	--	--	1	--	--	--	--	1	1	--	1	--

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DISASTER MANAGEMENT AND SUSTAINABLE BUILT ENVIRONMENT

Programme Structure-2021

Course Code	Course Title	Lecture (L) Hours /Week	Tutorial (T) Hours /Week	Practical (P) Hours/Week	Total Credits
DSM2151	Introduction to Disaster Management	2	1	-	3
DSM2251	Resilience Building for Built Environment	2	1	-	3
DSM2351	Emergency Management	2	1	-	3
DSM2451	Rehabilitation Reconstruction and Recovery	2	1	-	3
DSM2551	Climate Change Adaptations and Sustainable Development	2	1	-	3
DSM2651	Geoinformatics in Disaster Management	2	1	-	3
	TOTAL				18


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DISASTER MANAGEMENT AND SUSTAINABLE BUILT ENVIRONMENT

Syllabus - Semester First

INTRODUCTION TO DISASTER MANAGEMENT

Course Code: DSM2151

Credit Units: 03

Course Overview

The aim of the course is to provide broad understanding about the disasters and its management systems. The course will familiarize the students with concepts and approaches pertaining to disaster management and its relationship with development. The course will provide the understanding on how to assess disaster risk. Student will also learn about the government interventions in the field of Disaster Management.

Course Contents:

Module-I: Introduction to Disasters

Concepts, and definitions (Disaster, Hazard, Vulnerability, Resilience, Risks) Disasters: Classification, Causes, Impacts- Differential impacts-in terms of caste, class, gender, age, location, disability. Global trends in disasters urban disasters, pandemics, complex emergencies, Climate change.

Module-II: Approaches to Disaster Management

Disaster cycle- its analysis, Phases, Culture of safety, prevention, mitigation and preparedness, community based disaster risk reduction, Structural- nonstructural measures, roles and responsibilities of community, Panchayati Raj Institutions/ Urban Local Bodies, States, Centre, and other stake-holders.

Module-III: Inter-relationship between Disasters & Development

Factors affecting vulnerabilities, differential impacts, impact of development projects such as dams, embankments, changes in Land-use etc., climate change adaptation, relevance of indigenous knowledge, appropriate technology and local resources.

Module-IV: Disaster Risk Management in India

Hazard and Vulnerability profile of India; Components of Disaster Relief: Water, Food, Sanitation, Shelter, Health, Waste Management, Institutional arrangements (Mitigation, Response and Preparedness, DM Act and Policy, Other related policies, plans, programmes and legislation)

Examination Scheme:

Components	CT	HA	C	V	A	EE
Weightage (%)	10	5	5	5	5	70

(C - Case Discussion/ Presentation; HA - Home Assignment; V - Viva; CT- Class Test; A - Attendance; EE - End Semester Examination)


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Learning Outcomes

At the end of the course, the students will be able to

- Understand the concept of disaster management and measures to be taken at different stages of disaster management.
- Train on various aspects of disaster management.
- Appreciate the impact of development in the context of disaster management.
- Recognize the scenario of disaster management at various levels such as global, national and regional level.
- Learn vulnerability reduction strategies

Learning Methods

Videos and quizzes through the on-line Learning Management System (LMS); Classroom learning through an experienced Facilitator/Faculty on campus (Videos, In-class Activities, Outbound Activities); Assignments and Presentations.



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Syllabus - Semester Second

RESILIENCE BUILDING FOR BUILT ENVIRONMENT

Course Code: DSM2251

Credit Units: 03

Course Overview

The course is intended to provide various dimensions of disasters caused by nature and induced by human activities and their effects on built environment. The course will introduce different forms of disasters. The course will also help in providing the comprehensive knowledge on nature of disaster, characteristics, and how to mitigate the risk involved with such disasters through several case studies across India.

Course Contents

Module-I: Geological Disasters (earthquakes, landslides, avalanches)

Mechanism, patterns, destruction style, effect on built environment, strategies for mitigation, retrofitting, damage prevention, case studies.

Module-II: Hydrological Disasters (Floods, Cyclones and Tsunamis)

Mechanism, patterns, destruction style, effect on built environment, strategies for mitigation, retrofitting, damage prevention, case studies.

Module-III: Manmade Disasters (CBRN-Chemical, Biological, Radiological and Nuclear)

Mechanism, patterns, destruction style, effect on built environment, strategies for mitigation, retrofitting, damage prevention, case studies.

Module-IV: Other disasters (Fires, accidents, pandemics)

Mechanism, patterns, destruction style, effect on built environment, strategies for mitigation, retrofitting, damage prevention, case studies.

Examination Scheme:

Components	CT	HA	C	V	A	EE
Weightage (%)	10	5	5	5	5	70

(C - Case Discussion/ Presentation; HA - Home Assignment; V - Viva; CT- Class Test; A - Attendance; EE - End Semester Examination)

Learning Outcomes

At the end of the course, the students will be able to:

- Develop an in-depth understanding on nature and characteristics of nature and manmade disaster.
- Learn about the challenges and risks occurred during disasters with the help of case studies.
- Formulate mitigation strategies for risk reduction and damage prevention.

Learning Methods

Videos and quizzes through the on-line Learning Management System (LMS); Classroom learning through an experienced Facilitator/Faculty on campus (Videos, In-class Activities, Outbound Activities); Assignments and Presentations.

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Syllabus - Semester Third

EMERGENCY MANAGEMENT

Course Code: DSM2351

Credit Units: 03

Course Overview

The course will train the students about how to respond to a disaster in a city or a village so as to restore normalcy at the earliest. The course will provide necessary skills for search, rescue and evacuation operations. This course will also focus on significance of relief distribution and emergency medical facilities during disaster emergencies.

Course Contents

Module-I: Understanding Emergency Management

Types of activities and assistance during disaster emergencies; stakeholders; coordination with multiple agencies; time management and planning; maintenance of law and order; maintenance of records; Emergency communication.

Module-II: Search and Rescue (SAR) Operations

Significance of SAR; Need for SAR; Techniques for SAR; Organizations trained for SAR; Community Training.

Module-III: Relief Distribution

Significance of Relief Distribution; Need for Relief Distribution; Setting up temporary relief distribution camps, Techniques for Relief Distribution; Organizations trained for Relief Distribution; Community Training

Module-IV: Emergency Medical Care

Need for emergency medical care; Planning for medical care; Requirements of temporary medical camps; training of manpower; maintenance of records.

Examination Scheme:

Components	CT	HA	C	V	A	EE
Weightage (%)	10	5	5	5	5	70

(C - Case Discussion/ Presentation; HA - Home Assignment; V - Viva; CT- Class Test; A - Attendance; EE - End Semester Examination)

Learning Outcomes

At the end of this course, the students will be able to:

- Understand the role of multiple agencies, time management, communication during disaster emergencies.
- Practice to respond to a disaster so as to reestablish normalcy at the earliest.
- Acquire the skills and knowledge related to search, rescue and evacuation operations through project work.


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- Learn the importance of relief distribution and medical care as a part of emergency management.

Learning Methods

Videos and quizzes through the on-line Learning Management System (LMS); Classroom learning through an experienced Facilitator/Faculty on campus (Videos, In-class Activities, Outbound Activities); Assignments and Presentations.



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Syllabus - Semester Fourth

REHABILITATION RECONSTRUCTION AND RECOVERY

Course Code: DSM2451

Credit Units: 03

Course Overview

The course will provide an outline on the need and importance of disaster recovery and its planning. The course will familiarize the students about numerous techniques and guidelines for reconstructions after disasters. This course will provide the learning on aspects pertaining to livelihood restoration during rehabilitation process. Student will get to know about BBB (Build Back Better) strategy which is crucial for future disasters and concept of resilient recovery through this course.

Course Contents

Module-I: Damage Assessment for Recovery

Damage Assessment- Post Disaster Damage assessment; estimated damage assessment; Nature and damage to houses and infrastructure due to different disasters; Need and importance of disaster recovery; Planning for disaster recovery.

Module-II: Reconstructions after Disasters

Significance of reconstruction; Guidelines for Disaster resistant constructions; traditional techniques; Speedy Reconstructions- Essential services, social infrastructures, Immediate shelters/camps, Contingency plans for reconstructions.

Module-III: Socio-economic Rehabilitation

Livelihood restoration; Development towards creation of long-term job opportunities and livelihood options; Various initiatives and policies for socio-economic rehabilitation; Case studies.

Module-IV: Building Back Better (BBB)

Origin of BBB strategy; BBB and preparedness for future disasters; Concepts for resilient recovery; roles and relationships of multilateral agencies like UN, World Bank etc in recovery process; Government's role in BBB; Stimulation of local economies.

Examination Scheme:

Components	CT	HA	C	V	A	EE
Weightage (%)	10	5	5	5	5	70

(C - Case Discussion/ Presentation; HA - Home Assignment; V - Viva; CT- Class Test; A - Attendance; EE - End Semester Examination)

Learning Outcomes

At the end of the course, the students will be able to:

- Prepare a damage assessment framework for managing disaster recovery.
- Review guidelines for disaster resistant constructions and contingency plans for reconstructions.
- Formulate their own strategies related to creation of long-term employment opportunities for displaced people.

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- Learn about the BBB strategy and its implementation in order to stimulate local economics.

Learning Methods

Videos and quizzes through the on-line Learning Management System (LMS); Classroom learning through an experienced Facilitator/Faculty on campus (Videos, In-class Activities, Outbound Activities); Assignments and Presentations.



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Syllabus - Semester Fifth

CLIMATE CHANGE ADAPTATIONS AND SUSTAINABLE DEVELOPMENT

Course Code: DSM2551

Credit Units: 03

Course Overview

This course focuses on creating safe and sustainable built environment for disaster prone settlements. The course will provide an overview of climate change issue and its interrelationship between climate change adaptation and development. Student will be able to learn about the principles of sustainability while providing solutions to the environmental problems of cities such as pollution, degradation of natural resources and various critical issues.

Course Contents:

Module-I: Climate Change

Origin and evolution of the earth's atmosphere; Overview of key concepts – weather and climate; Climatic classification; Climatic variability - temperature, rainfall, wind speed & direction; Effect of various anthropogenic activities on earth's atmosphere.

Module-II: Climate Change Adaptation and Mitigation

Linkage between climate change adaptation and development; International adaptation initiatives and programs; Definitions of mitigation and overview of emissions levels and mitigation targets per country; Climate vulnerability; Exposure sensitivity and adaptive capacity of society; Role of forests and trees outside forests in climate change resilience and adaptation.

Module-III: Introduction to sustainable development of regions

Scope & definitions; Goals; Principles of sustainable development; Environment ethics; Quality of life, Sustainable building designs and practices; Sustainable infrastructure- water supply, solid waste management, transportation; Green buildings and rating systems; Vernacular architecture and sustainability

Module-IV: Sustainable Development and International Contribution

Environmental movements; Global policies for sustainable development – world summits; Conventions and agreements.

Examination Scheme:

Components	CT	HA	C	V	A	EE
Weightage (%)	10	5	5	5	5	70

(C - Case Discussion/ Presentation; HA - Home Assignment; V - Viva; CT- Class Test; A - Attendance; EE - End Semester Examination)

Learning Outcomes

At the end of the course, the students will be able to:

- Identify key drivers that contribute for enhancing the problem of climate change.
- Understanding for providing sustainable solutions for the emerging challenges related to environment and economic growth.

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- Understand the contribution of international agencies for the protection of environment and natural resources

Learning Methods

Videos and quizzes through the on-line Learning Management System (LMS); Classroom learning through an experienced Facilitator/Faculty on campus (Videos, In-class Activities, Outbound Activities); Assignments and Presentations.



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Syllabus - Semester Sixth

GEOINFORMATICS IN DISASTER MANAGEMENT

Course Code: DSM2651

Credit Units: 03

Course Overview

The aim of the course is to study the concept of Remote Sensing, Geographical Information System and its applications in the field of Disaster Management. These tools and techniques will assist the students in preparing the spatial database and mapping of the affected area. This course will provide an opportunity to the students for handling various components of spatial modeling digital elevation models, overlay functions etc in the Geographical Information System.

Course Contents:

Module-I: Fundamentals of Remote Sensing

Concept, types and applications of remote sensing (RS); Types of required spatial data; raster and vector data structures; Types of Resolutions; Elements of Image Interpretation, practical exercise on Image Interpretation.

Module-II: Fundamentals of Geographic Information Systems

Definition, concept, significance, components of spatial data base: Types and representations; Applications of GIS in disaster management; Spatial data creation and checking - base maps and thematic maps; Geo-referencing

Module-III: Practical Exercises

Spatial interpretation in GIS; Software Demonstration; Geo-referencing, digitization and geo-database generation; Creating and editing vector data; Attribute data management; Linking of non-spatial data with spatial data, Use of Web GIS; Base map preparation.

Module-IV: Spatial Modelling and Thematic Mapping in GIS

Analysis in GIS: Query and retrieval, buffer and proximity analysis, spatio-temporal analysis, contour generation and Digital Elevation Modelling (DEM)

Examination Scheme:

Components	CT	HA	C	V	A	EE
Weightage (%)	10	5	5	5	5	70

(C - Case Discussion/ Presentation; HA - Home Assignment; V - Viva; CT- Class Test; A - Attendance; EE - End Semester Examination)

Learning Outcomes

At the end of the course, the students will be able to:

- Familiarize with the concept of Remote sensing and its applications required for image interpretation.
- Learn Geographical Information System software for creating spatial database on disasters affected area.
- Linking the non-spatial data with spatial data through practical exercises.

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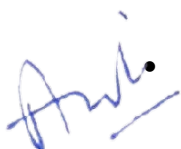
- Conduct spatio-temporal analysis in GIS and develop a GIS based decision support for disaster risk reduction.

Learning Methods

Videos and quizzes through the on-line Learning Management System (LMS); Classroom learning through an experienced Facilitator/Faculty on campus (Videos, In-class Activities, Outbound Activities); Assignments and Presentations.

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- Leick, A, Lev Rapoport and Dmitry Tatarnikov. GPS Satellite Surveying, 4th Edition, John Wiley & Sons, 2015.
- Rao, G.S. Global Navigation Satellite Systems- With Essentials of Satellite Communications, Tata McGraw Hill Education Private Limited, New Delhi, 2010


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Programme Structure

Curriculum & Scheme of Examination

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	PLANNING TECHNIQUES AND COMPUTER APPLICATIONS (PLN4103)	L	T	P	S	C
Version 1.1	Date of Approval:	1	0	2	0	2
Pre-requisites/Exposure	Techniques of Planning I & II (B.Plan.)					
Co-requisites	Computer Aided Design (CAD) in Planning(B.Plan.)					

Catalog Description

The aim of this course is to introduce and be familiar with techniques used for planning at various stages from preliminary to advanced. Students will learn appropriate data mining for their studio exercises, pre-preparation for planning field visits and selecting analysis techniques. Appropriate Software applications in CAD and GIS are also part of the course. They will be able to apply excel, CAD and GIS in their planning studio. At the end of the course student should be able to use all the learnt techniques in respective planning studio works.

Course Objectives

The objective of this course is

- To prepare students for planning studio exercise by providing them significant base of planning techniques.
- To equip students with key skill set for conducting field visits, data collection and analysis.

Course Outcomes

On completion of this course, the students will be able to

CO1: Explore and use various planning information systems available.

CO2: Prepare base maps on scales for their studio exercise and to do effective pre-field visit planning.

CO3: Apply excel and CAD techniques in planning studios.

CO4: Perform basic analysis and map preparations in GIS.

Modules	Blooms level*	Number of hours
MODULE 1: Information Systems for Planning and Literature Review Introduction to Basic Terminologies used in Planning; Definition and components of Information System in Planning; Data warehousing and Data mining for Planning; various data sources like, National Urban Information System – Bhuvan, Natural Resource Data Management System, National Sample Survey (NSSO), Directorate of Economics and Statistics, Census of India, National Family Health Survey (NRHS), Central Pollution Control Boards reports, Indian Metrology Department, World Bank Open Data; Introduction and utilisation of spatial standards-URDPFI; Components and Techniques of literature review; Finding useful insights from the literature review; Exercises on inscribing and presenting reviewed literature	L1, L2 L3	9
MODULE 2: Base map Preparation, Scales, and Survey Techniques Base map Preparation: Representation of Spatial Data; Choice of Appropriate Scales: Graphical, Linear and Areal Scales; Contents of Base Maps at Various Scales; Maps as a representation of reality, Elements of	L1, L2 L3	9

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Maps; Choice of appropriate scales for region and settlement level plans, town development plans, zonal development plans, layout plans, Setting of Goals and Objectives; Methodologies for Preparation of Urban and Regional Development Plans, Data requirements for urban and regional planning; Sources of data; methods of data collection, Validity and reliability of data, Questionnaire design, measurement scales and their applications, sampling techniques, types of surveys; Techniques of conducting surveys for land use; Techniques for conducting regional surveys. Plan Implementation Techniques; Selecting appropriate Indicators; Preparation of Checklist for data collection; Preparation of good Questionnaire; Data coding and methods for data analysis.		
MODULE 3: Computer Applications in Planning Computer Applications for Data Collection and Analysis: Tools of Analysing Different Types of Data; Use of Excel Software for Analysing Data; Tabulation of data, graphical presentation of data; Preparing pie diagrams, histograms, bar charts, normal, colour, black and white presentation techniques; Basic discipline of presenting illustrations; Presentation of spatial data, analysis and proposals. Applications of Features of Excel- Basic and Selected Advanced Features; CAD Applications for Base Map preparation: Applications of CAD tools- drawing, editing, modifying, layer management etc.; Scaling Drawings and Images; Plotting and Printing technicalities.	L1, L2 L3	9
MODULE 4: Introduction to Geoinformatics Image Interpretation – Qualitative and Quantitative Elements; Resolutions – Spatial, Temporal, Spectral, Radiometric; Geo-Rectification – Coordinate System, Selection of Ground Control Points (GCPs), Geo-Referencing and Map Projections; Geometric Distortions, Spatial Data Presentation Techniques: Layout Preparation – Grids, Legend, Symbolology; Printing – Sheet, Size, Scale.	L1, L2 L3	9

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

- Government of India (2008), NSDI Metadata standard-NNRMS Secretariat, Department of Space, India.
- Wang X., Rainer A. and Hofe, V. (2007) Research Methods in Urban and Regional Planning, Springer, Berlin.

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- Shade, J. (2010). Software for data analysis. *Journal of Applied Statistics*, 37(8), 1421–1422. <https://doi.org/10.1080/02664760902899790>

Modes of Evaluation: Presentation/Assignment/Class Test /Written Examination

Examination Scheme:


Components	CT-1	CT-2	HA	S/P	CE	A	ESE
Weightage (%)	10	10	10	10	05	05	50

CT: Class Test, HA: Home Assignment, S/P: Seminar/Presentation, CE: Continuous Evaluation, A: Attendance; ESE: End Semester Examination.

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1	2	1	2	--	--	1	--	--	--	--	--	1	--	2	--
CO2	1	2	1	2	--	--	1	--	--	--	--	--	1	--	2	--
CO3	1	2	1	2	--	--	1	--	--	--	--	--	1	--	2	--
CO4	1	2	1	2	--	--	1	--	--	--	--	--	1	--	2	--

1: strongly related, 2: moderately related and 3: weakly related


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	INFRASTRUCTURE PLANNING AND MANAGEMENT (PLN4104)	L	T	P	S	C
Version 1.1	Date of Approval:	2	1	0	0	2
Pre-requisites/Exposure	Infrastructure Planning, Development and Management (B.Plan)					
Co-requisites	-					

Catalog Description

The course would include three sub-components of infrastructure and utility Planning i.e. Physical Infrastructure, Social Infrastructure and Transportation. The aim of this course is on principles of design of utilities and services in urban and regional context and familiarising with Indian standards. The course will focus on acquainting students to assess infrastructure planning techniques and their utilisation in planning studios. The objective of Transportation Planning module is to provide basic information on transportation issues. Students will be familiarized with (i) geometric design of road networks and (ii) traffic characteristics. Techniques of data collection and analysis would be taught as part of this course.

Course Objectives

The objective of this course is

- To familiar with infrastructure and its sub-sector Planning.
- To utilize the knowledge in physical planning studios.

Course Outcomes

On completion of this course, the students will be able to

CO1: Comprehend concept of infrastructure planning and its relevance in physical planning.

CO2: Identify and project the demand and spatial need of physical infrastructure

CO3: Assess the need for social infrastructure for sustainable and inclusive planning.

CO4: Review prevalent policies, projects and missions pertaining to various infrastructure services.

Modules	Blooms level*	Number of hours
MODULE 1: Introduction to Infrastructure Planning Importance of Infrastructure, objectives of the utilities, services planning and implications on public health and environment; Economic-introduction to policies and programmes in infrastructure planning; issues and concerns of maintaining the utilities and services, need and importance of service level benchmarks of water supply, sanitation, sewage, solid waste and transportation; Impact of technology on infrastructure, Green infrastructure and its significance.	L1, L2 L3	9
MODULE 2: Physical Infrastructure Role of physical planner in planning of utilities and services; water supply distribution system-Water supply systems, networks, mapping, sources and water requirement for various land uses; Factors affecting water demand; Storage facilities and distribution systems; Innovative Methods and successful urban water supply system practices; Water programmes and policies; Storm water drainage system- Storm water drainage networks, and network mapping; Estimations of sewer generation and network	L1, L2 L3	9

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requirements; sewerage system- General considerations and principle of sanitation and sewerage systems; Sewage disposal and treatment methods; Open defecation; Innovative approaches of sewage disposal in urban areas and low cost appropriate technologies for sanitation; solid waste management- Classification and Characteristics of Solid Wastes; Methods for waste Collection, Storage, transportation and disposal; Processing and Treatment of Solid Wastes; Land Filling methods of Solid Waste Management; electricity distribution system.		
MODULE 3: Social Infrastructure Types of social infrastructure; Health care-essential service, availability, access and utilisation, Planning norms and space standards, public and private institutions, policies, national Rural Healthcare Mission, Hierarchy of health care establishments, educational institutions, standards, policies, rights to education (RTE); Public and community spaces-recreational, safety and security – fire management. Amenities for urban and rural settlements; Significance of education and health infrastructure in planning; Locating education and health facilities; Understanding scalogram and other techniques	L1, L2 L3	9
MODULE 4: Policies, Programmes and Projects Understanding prevalent policies, projects and missions, for example, JnNURM, AMRUT, HRIDAY, Smart Cities Mission, etc.; Norms and standards for different types of infrastructure; Nature and content of infrastructure in development plans at different geographical levels; Making assessment of infrastructure requirements in plans.	L1, L2 L3	9

*Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

- Broaddus, A., & Cervero, R. (2019). Transportation planning. In *The Routledge Handbook of International Planning Education* (pp. 253–264). Taylor and Francis.
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Modes of Evaluation: Presentation/Assignment/Class Test /Written Examination

Examination Scheme:

Components	CT-1	CT-2	HA	S/P	CE	A	ESE
Weightage (%)	10	10	10	10	05	05	50

CT: Class Test, HA: Home Assignment, S/P: Seminar/Presentation, CE: Continuous Evaluation, A: Attendance; ESE: End Semester Examination.

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1	2	1	2	--	--	--	--	--	--	--	--	1	--	2	--
CO2	1	2	1	2	--	--	--	--	--	--	--	--	1	--	2	--
CO3	1	2	1	2	--	--	--	--	--	--	--	--	1	--	2	--
CO4	1	2	1	2	--	--	--	--	--	--	--	--	1	--	2	--

1: strongly related, 2: moderately related and 3: weakly related


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	HOUSING AND ENVIRONMENTAL PLANNING (PLN4105)	L	T	P	S	C
Version 1.1	Date of Approval:	2	1	0	0	2
Pre-requisites/Exposure	Housing and Community Planning (B.Plan.)					
Co-requisites	Ecology, Environment and Resource Development and Management (B.Plan.)					

Catalog Description

The aim of this course to two-fold, i) Housing ii) Environment.

Housing: First segment is to impart knowledge and skills to create an efficient housing/neighborhood planning which gives equal access to housing for everyone. At the end of the course students will be able to identifies the gaps, problems in providing housing for all. They will be able to focus on various dimensions of housing sector and create efficient and sustainable residential structures and neighborhood designs.

Environment: Second Segment deals with environment and its planning which aims to initiate the students to a discreet understanding of the environment and its interactions with human settlements. All social, cultural and technological activities being carried by human beings have profound influence on the environment. This course will enable a thorough understanding and utilization of all these aspects.

Course Objectives

The objective of this course is

- To provide a basic understanding of Housing at the Neighborhood and City level and to create an ability to work on the Housing Sector in Town Planning System.
- To grasp the role of public and private sector as well as community participation in eco-tourism planning and development

Course Outcomes

On completion of this course, the students will be able to

CO1: Apply varied housing concepts in neighbourhood and urban planning.

CO2: Analyse policy and governance framework with reference to housing sector.

CO3: Justify the relevance of ecology, ecosystem and environment in planning.

CO4:Utilise acquired knowledge to conceptualise and to create sustainable planning designs.

Modules	Blooms level*	Number of hours
MODULE 1: Concept of Housing with reference to Planning Significance of housing in economic and social development; Basic Terms in housing, Housing development process; Current Issues in Housing in urban and rural India: Public Health and Safety Related Issues in Housing, houselessness in India, old housing,Shift of Housing from Social Sector to Private Sector Participation Housing Design - Housing Typology, Housing Layouts, Housing Density, Community Facilities, Public and Private Sector Housing Development, Social Aspects of Housing, Built Environment and Human Behaviour, Housing Norms and Standards Housing for the Poor-Issues in Slums and Squatter Settlements; Government Initiatives for Providing Housing, Housing Demand- Housing Need Assessment, Estimating and Forecasting Housing Requirements (Qualitatively and	L1, L2 L3	9

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Quantitatively); Understanding Current Methods of Housing Demand Assessment,		
MODULE 2: Housing Policies and Institutional Framework Understanding Five Year Plans with respect to Housing Policy, National Housing Policy- Review, Policy Framework for Urban and Rural Housing, Comparative Policy Analysis; Rental Housing in India: An Overview, Household Affordability and Concept and performance of Affordable Housing in India, Affordable Housing Policy 2009, Affordable Housing in Public Private Participation, Emerging thoughts. Case Studies of Neighbourhood Planning in Indian and Global Context. Current Practices and Upcoming Initiatives; Role of Informal Sector in Housing Stock, Economy, Commercial Activities, Etc.; Implications in Physical Planning, Informal Sector Housing and Basic Needs - Lack of Essential Infrastructure; Poor Condition of Existing Services; Identification of Basic Needs; Provision for Various Target Groups; Standards for Basic Needs; Investment for Housing; Essential Components; Ownership and Tenure Security; Service Delivery - Gaps in Existing Institutional Systems of Delivery; Sustainable Development Goals with reference to Housing for All.	L1, L2 L3	9
MODULE 3: Environmental Components and Resources Environmental resources and ecosystem services; Fundamentals of Ecosystem-Its Structure and Function; Consumption, conservation and recycling of resources; Man, and Environment interrelations; Changing Perspectives in Man-Environment Relationship with Focus on Issues of Population, Urbanization, Resource Depletion and Pollution; Concept of Ecology; Urban ecosystem approach, evolution and significance; Introduction to quantitative ecology, Identification of ecological parameters for planning at different levels, Site planning, Settlement planning, Regional planning. Data needs, formats for data collection Types of analysis required to evolve ecological parameters; Environmental impact assessment, Methods and their appraisal. preparation and analysis of resource inventories and resource matrices; Environmental Degradation (Environmental Concerns and Challenges) and Its Impact on Various Ecosystems.	L1, L2 L3	9
MODULE 4: Environmental Planning Planning for Global and Local environmental concerns; Planning for Environmentally Sensitive Zones (Resources Availability, Settlements Pattern, Problems and Potentials, Regulating Mechanisms for Development); Development, utilization and conservation of resources, resource planning, integrated resource planning approach; Resource regions, their problems and potentials; Resource management, traditional and contemporary approaches. Resource development in India, some selected areas (energy, water, manpower, etc.); Carrying Capacities in environmental context; Tools and Techniques for Environmental Planning and Management- Brief Introduction to Environmental Impact Assessment, Strategic Environment Assessment and Environmental Management Plans; Providing brief about environmental policies; Green Agenda and Global environmental movements; Government's 8 missions under the National Action Plan on Climate Change	L1, L2 L3	9

*Bloom's Level:

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

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Text Books

- Jain, A.K. (2019) Housing for all, Khanna Book Publishing Co., New Delhi.
- Cedric, P. (1990) Housing and Urbanisation: A Study of India, Sage, London.
- Kohli, V.K. (2007) Housing Finance Agencies in India, Deep and Deep, New Delhi.
- Jenkins, P., Smith, H. and Wang, Y.P. (2007) Planning and Housing in the Rapidly Urbanizing World, Routledge, London
- Choguill, C. L. (2008). Developing sustainable neighbourhoods. *Habitat International*, 32(1), 41–48. <https://doi.org/10.1016/j.habitatint.2007.06.007>
- Department of Planning and Infrastructure: WA Planning Commission. (2009). Liveable neighbourhoods. *World Transport Policy and Practice*, 7(January), 38–43.
- Glaeser, E. L., Gyourko, J., & Saks, R. E. (2006). Urban growth and housing supply. *Journal of Economic Geography*, 6(1), 71–89. <https://doi.org/10.1093/jeg/lbi003>
- Haffner, M., & Heylen, K. (2011). User costs and housing expenses. towards a more comprehensive approach to affordability. *Housing Studies*, 26(4), 593–614. <https://doi.org/10.1080/02673037.2011.559754>
- Steele, M. (2012). Housing statistics. In *International Encyclopedia of Housing and Home* (pp. 620–626). Elsevier. <https://doi.org/10.1016/B978-0-08-047163-1.00639-1>
- Turner, A. (1980). Community development. *The Cities of the Poor; Settlement Planning in Developing Countries*, 35–64. https://doi.org/10.5005/jp/books/12932_9
- Wachter, S.M. and Birch, E.L. (2008) Growing Greener Cities: Urban Sustainability in the Twenty First Century, University of Pennsylvania Press, Philadelphia, PA.
- Whitehead, M. (2014) Environmental Transformation: A Geography of the Anthropocene, Routledge, New York.

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- Dempsey, N. (2008). Quality of the built environment in urban neighbourhoods. *Planning Practice and Research*, 23(2), 249–264. <https://doi.org/10.1080/02697450802327198>
- Johnson, H. (2001). Voices of the poor. Can anyone hear us? *Journal of International Development*, 13(3), 377–379. <https://doi.org/10.1002/jid.793>
- Saxena, A. (2013). Understanding Inequalities: Stratification and Differences. *INTERNATIONAL SOCIOLOGY*.
- Winston, N., & Pareja Eastaway, M. (2008). Sustainable housing in the urban context: International sustainable development indicator sets and housing. *Social Indicators Research*, 87(2), 211–221. <https://doi.org/10.1007/s11205-007-9165-8>

Modes of Evaluation: Presentation/Assignment/Class Test /Written Examination

Examination Scheme:

Components	CT-1	CT-2	HA	S/P	CE	A	ESE
Weightage (%)	10	10	10	10	05	05	50

CT: Class Test, HA: Home Assignment, S/P: Seminar/Presentation, CE: Continuous Evaluation, A: Attendance; ESE: End Semester Examination.

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CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	2	2	1	2	2	1	1	--	--	--	--	--	1	2	2	--
CO2	2	2	1	2	2	1	1	--	--	--	--	--	1	2	2	--
CO3	2	2	1	2	2	1	1	--	--	--	--	--	1	2	2	--
CO4	2	2	1	2	2	1	1	--	--	--	--	--	1	2	2	--

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	PLANNING STUDIO-I (AREA PLANNING, VILLAGE DEVELOPMENT PLAN) (PLN4108)	L	T	P	S	C
Version 1.1	Date of Approval:	2	0	0	8	10
Pre-requisites/Exposure	Planning and Design Lab – V (Area Planning)					
Co-requisites	-					

Catalog Description

The planning studio is an introductory studio for giving basic idea related to urban and regional planning studios. It aims to bring students of diverse backgrounds to a common platform and develop the essential skills of planning amongst the students opting for different specializations of planning. The objective of the studio is to introduce the general concepts associated with physical planning and develop the skills of data collection, data analysis, spatial representation, documentation as well as written and verbal communication. Students will be able to apply the knowledge gained through theoretical subjects in their studio planning.

Course Objectives

The objective of this course is


- To relate theoretical knowledge of planning with planning practices.
- To conceptualize and prepare development plan for the given levels.

Course Outcomes

On completion of this course, the students will be able to

CO1: Preparation of Area Plan/Zonal Plan in urban context.

CO2: Preparation of Village Development Plan.


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Modules	Blooms level*	Number of hours
<p>MODULE 1: Area Planning (Urban Context)</p> <p>The assignment would identify different urban zones based on land use characteristics and could also include predefined ‘zones’ for zonal plans. The objective of this exercise would be to learn various methods of surveying to collect different types of data and represent and interpret them to give meaningful observations on the planning and development of the area.</p> <p>Thrust of the exercise would be on:</p> <ul style="list-style-type: none"> • Understanding the zone in the context of the city. • Mapping of Regional Networks and Linkages • Preparation of Base Map of the area through primary surveys and updating secondary data • Socio-economic profiling of the area through surveys • Physical and Social infrastructure mapping • Gap Analysis and issue identification • Formulation of broad outlines of Intervention Strategies and Development Blueprint. 	L4, L5 L6	60
<p>MODULE 2: Rural Planning</p> <p>The main goal of the assignment is to expose students to the life and living in rural area as it is different from urban areas. This would help in conceptualising the integration of urban and rural areas for regional planning. Students will undertake study of a particular village in groups and conduct a primary survey on demographic profile, household income level, socio-cultural practices, etc. Information about development programmes shall be collected and resource mapping will be done. This exercise will aim at improving the understanding about the requirements of different categories of rural population. Conducting the primary survey will provide exposure to research methodology, techniques of data collection, data processing and analysis.</p> <p>Thrust of the exercise would be on:</p> <ul style="list-style-type: none"> • Understanding the socio-economic aspects of the rural settlement • Importance of location, spatial and economic linkages of the village. • Explaining the social and physical infrastructure of the village. • Understanding the availability and usage of local resources. • Exposure to government programmes and institutional mechanism working for rural • planning and development • Identifying the present problems and future possibilities in the village. • Proposing a strategy of improvement in the condition and development of the villages. 	L4, L5 L6	60

*Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

- Broadus, A., & Cervero, R. (2019). Transportation planning. In *The Routledge Handbook of International Planning Education* (pp. 253–264). Taylor and Francis.
<https://doi.org/10.4324/9781315661063-22>

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- Criqui, L. (2015). Infrastructure urbanism: Roadmaps for servicing unplanned urbanisation in emerging cities. *Habitat International*, 47, 93–102. <https://doi.org/10.1016/j.habitatint.2015.01.015>
- Loucks, D. P., & van Beek, E. (2017). *Water Resource Systems Planning and Management*. *Water Resource Systems Planning and Management*. Springer International Publishing. <https://doi.org/10.1007/978-3-319-44234-1>
- Parkin, J., & Koorey, G. (2012). Network planning and infrastructure design. In *Transport and Sustainability* (Vol. 1, pp. 131–160). Emerald Group Publishing Ltd. [https://doi.org/10.1108/S2044-9941\(2012\)0000001008](https://doi.org/10.1108/S2044-9941(2012)0000001008)

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- Allen, P. M. (2012). *Cities and regions as self-organizing systems: Models of complexity*. *Cities and Regions as Self-Organizing Systems: Models of Complexity* (pp. 1–309). Taylor and Francis. <https://doi.org/10.4324/9780203990018>
- Andersson, E., Barthel, S., Borgström, S., Colding, J., Elmqvist, T., Folke, C., & Gren, Å. (2014). Reconnecting cities to the biosphere: Stewardship of green infrastructure and urban ecosystem services. *Ambio*, 43(4), 445–453. <https://doi.org/10.1007/s13280-014-0506-y>
- Rinne, M. (2004). Technology roadmaps: Infrastructure for innovation. *Technological Forecasting and Social Change*, 71(1–2), 67–80. <https://doi.org/10.1016/j.techfore.2003.10.002>
- Thomé, A. M. T., Ceryno, P. S., Scavarda, A., & Remmen, A. (2016, December 15). Sustainable infrastructure: A review and a research agenda. *Journal of Environmental Management*. Academic Press. <https://doi.org/10.1016/j.jenvman.2016.09.080>

Modes of Evaluation: Presentation/Assignment/Class Test /Written Examination

Examination Scheme:

Components	P -1	P -2	S	R	CE	A	ESE
Weightage (%)	50	50	60	20	15	05	200

CT: Class Test, HA: Home Assignment, S/P: Seminar/Presentation, CE: Continuous Evaluation, A: Attendance; ESE: End Semester Examination.

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1	1	1	2	1	1	1	1	1	1	1	1	--	1	1	--
CO2	1	1	1	2	1	1	1	1	1	1	1	1	--	1	1	--
CO3	1	1	1	2	1	1	1	1	1	1	1	1	--	1	1	--
CO4	1	1	1	2	1	1	1	1	1	1	1	1	--	1	1	--

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	ECO-TOURISM (PLN4111)	L	T	S	P	C
Version 1.1		1	0	0	2	2
Pre-requisites/Exposure	Disaster Risk Management and Climate Change Adaptation					
Co-requisites	Planning and Design Lab V					

Catalog Description

The aim of this course is to offer the principles of planning for eco-tourism in the context of sustainable tourism development. The courses will generally be conducted in the seminar/studio mode to encourage research, exploration and skill developments. The focus of the course is getting the insights of relationships between tourism and environment, tourism and urban development, tourism and economic development. In this course, students will be able to grasp planning requirements for developing sustainable eco-tourism hubs and circuits. They will be able to incorporate community needs and sustainable eco-tourism requirements in planning process. The course would be conducted through literature survey, case studies, site visits, community surveys and hands on experimentations. During the course the students will be working on live projects in groups which are preferably interdisciplinary.

Course Objectives

The objectives of this course are

- To apply planning strategies and tools with reference to sustainable tourism development.
- To grasp the role of public and private sector as well as community participation in eco-tourism planning and development

Course Outcomes

On completion of this course, the students will be able to

CO1: Apply concept of eco-tourism for sustainable tourism development.

CO2: Identify and plan eco-tourism hubs and circuits.

Modules	Blooms level*	Number of hours
MODULE 1: Introduction and Planning for Eco-Tourism Definitions, scope, nature, key determinants, characteristics; problems and prospects of eco-tourism; eco-tourism hubs in India; impacts of eco-tourism in developed and developing regions; relationship between tourism and urban development, relationship between tourism and economic development, relationship between tourism and environment; concept of carrying capacity and its significance in eco-tourism. Circuit identification and destination planning; assessment of infrastructure requirement for eco-tourism planning; analysing tourism impacts in transforming local livelihood and lifestyle; role of Government institutions and agencies in eco-tourism development.	L3, L4 L5	12

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MODULE 2: Project Work Selection and understanding of case study; Formulation of Aim and Objectives, Collection of data through primary and secondary sources; Conducting survey; Database development using relevant and advance software; Qualitative and quantitative data analysis; Report writing and presentations.	L4, L5, L6	24
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**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

- Cohen, E. (1978). The impact of tourism on the physical environment. *Annals of Tourism Research*, 5(2), 215–237. [https://doi.org/10.1016/0160-7383\(78\)90221-9](https://doi.org/10.1016/0160-7383(78)90221-9)
- Dávid, L. (2011). Tourism ecology: Towards the responsible, sustainable tourism future. *Worldwide Hospitality and Tourism Themes*, 3(3), 210–216. <https://doi.org/10.1108/1755421111114217>
- Ghasemi, M., & Hamzah, A. (2014). An Investigation of the Appropriateness of Tourism Development Paradigms in Rural Areas from Main Tourism Stakeholders' Point of View. *Procedia - Social and Behavioral Sciences*, 144, 15–24. <https://doi.org/10.1016/j.sbspro.2014.07.269>

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- Jaini, N., Anuar, A. N. A., & Daim, M. S. (2012). The practice of sustainable tourism in ecotourism sites among ecotourism providers. *Asian Social Science*, 8(4), 175–179. <https://doi.org/10.5539/ass.v8n4p175>
- Stakeholders, E. (1994). The Component of Successful Ecotourism. In *UNEP Division of Technology, Industry and Economics* (pp. 33–59).
- Wiltshier, P., Clarke, A., Adebayo, A., Robinson, P., & Oriade, A. (2019). Community-based tourism. In *Community-Based Tourism in the Developing World* (pp. 98–112). Routledge. <https://doi.org/10.4324/9781351026383-8>

Modes of Evaluation: Presentation/Assignment/Class Test /Written Examination

Examination Scheme:

Components	Internal Assessment						ESJ
	CT-1	CT-2	HA	S/P	CE	A	
Weightage (%)	-	-	-	40	05	05	50

CT: Class Test, HA: Home Assignment, S/P: Seminar/Presentation, CE: Continuous Evaluation, A: Attendance; ESE: End Semester Examination, ESJ: End Semester Jury

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1	1	1	--	--	1	1	--	--	2	1	--	1	--	1	2
CO2	1	1	2	--	--	--	--	--	--	--	--	--	1	2	--	--

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	TRANSPORTATION PLANNING AND MANAGEMENT (PLN4211)	L	T	P	S	C
Version 1.1	Date of Approval:	2	1	0	0	2
Pre-requisites/Exposure	Traffic and Transportation Planning – I & II(B.Plan.)					
Co-requisites	Planning and Design Lab – II& II					

Catalog Description

The aim of this course is to introduce to the students of planning with the integration of transportation planning and its interface of land use planning. Another objective is to ensure that students have a sound understanding of the key issues affecting the planning, management and financing of public transport in developed and developing countries. At the end of the course, students will be able to analyse on transport related plans and policies.

Course Objectives

The objective of this course is

- To equip students with an integration of transportation planning and its interface of land use planning.
- To prepare students to analyze the key issues affecting the planning, management and financing of public transport.

Course Outcomes

On completion of this course, the students will be able to

CO1: Define the concept of Land use-transport integration and sustainable transport planning and its relevance in Indian Context

CO2: Apply transport planning process while preparing transport plans.

CO3: Calculate External Cost of Urban Transportation and plan for urban and regional freight

CO4: Utilize transport planning software and financing of TOD Projects.

Modules	Blooms level*	Number of hours
MODULE 1: Land use- transport Integration and Sustainable Transport Planning Introduction to transport and travel; Understanding travel from the mobility, economic, social-psychologist, time/space perspective; Introduction to four stage modelling; land use and transportation integration- definitions, land use transport cycle, importance of accessibility; Factors affecting and tools for land use-transport integration; Key elements of integration; Integrating land use and transport in the planning process; traffic generation rates of different land use; Land development impact on traffic congestion on road segments, intersections and parking, impact on public transportation, pedestrian traffic and safety, Demand and Supply of Transport; Congestion pricing, transport Pricing, Basic transport economic Model Role of NHAI in regional transport. Understanding Sustainable Development and Sustainable Transport, Environment and Social Progress; Indicators of Progress,	L1, L2 L3	9

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Development Control and Travel Planning.		
MODULE 2: Transportation Planning Process Area Delineation, Zoning (TAZ); Four Stage Planning Process: Trip Generation, Trip Distribution, Trip Assignment and Modal Split; Principles of transport infrastructure planning and design of roads and intersections, street infrastructure elements; Parking facilities; and Principles of traffic management, Traffic Management- Signal design; Phasing and Time cycles; Principles of one-way system design; Pedestrianization and non-motorized transportation- Issues, policies and case studies; Towards more inclusive cities; Comprehensive Mobility Plan.	L1, L2 L3	9
MODULE 3: External Cost of Urban Transportation and Freight Transport Introduction to External Cost of Urban Transportation: Issues, Level of Service and Transport Pricing, Congestion Pricing, Policy Issues, Emission Standards and Energy Policy; Transport planning policies of central and state governments; National Urban Transport Policy 2006; Pricing and Revenue in Transport- Pricing; Revenue and Forecasting; Willingness to Pay. Introduction to Freight Transport- differences from passenger transport; location choice of transport hubs in relation to regional distribution linkages, Regional Transport Issues: Intercity Connectivity; Urban –Rural Linkages and Road Hierarchy; Road and Rail as Competing/Complementary Modes; Highway Standards in Indian Context.	L1, L2 L3	9
MODULE 4: Software Applications and Projects Software Applications: E.G. Cube 6- Network Coding, Creation of Models, Data Base and Scenarios in Cube Base, Cube Voyager Modelling Functions; Urban Land Use & Transportation Planning Applications. Transit Oriented Development- Definition, concepts and key components; Principles of TOD, planning norms and standards of TOD, pre-requisites of TOD, financing of TOD projects, role of stakeholders.	L1, L2 L3, L4	9

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

- Kadiyali, L.R. (2017) Transport Engineering, Khanna Book Publishing Co., New Delhi.
- Saxena, S.C. (1989) A Course in Traffic Planning and Design, Dhanpat Rai and Sons, New Delhi.
- Sarkar, P.K., Maitri, V. and Joshi, G.J. (2014) Transportation Planning: Principles, Practices and Policies, Prentice Hall India Learning Private Limited, New Delhi.
- Verma, A. and Ramanayya, T.V. (2014) Public Transport Planning and Management in Developing Countries, CRC Press, Taylor and Francis Group, London
- Curtis, C. (2008). Planning for sustainable accessibility: The implementation challenge. *Transport Policy*, 15(2), 104–112. <https://doi.org/10.1016/j.tranpol.2007.10.003>
- Morris, J. M., Dumble, P. L., & Wigan, M. R. (1979). Accessibility indicators for transport planning. *Transportation Research Part A: General*, 13(2), 91–109. [https://doi.org/10.1016/0191-2607\(79\)90012-8](https://doi.org/10.1016/0191-2607(79)90012-8)
- Rodrigue, J. P., Comtois, C., & Slack, B. (2016). *The geography of transport systems*. The Geography of Transport Systems (pp. 1–440). Taylor and Francis. <https://doi.org/10.4324/9781315618159>

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- Scott, D. M., Novak, D. C., Aultman-Hall, L., & Guo, F. (2006). Network Robustness Index: A new method for identifying critical links and evaluating the performance of transportation networks. *Journal of Transport Geography*, 14(3), 215–227. <https://doi.org/10.1016/j.jtrangeo.2005.10.003>

Reference Books

- Banister, D. (2008). The sustainable mobility paradigm. *Transport Policy*, 15(2), 73–80. <https://doi.org/10.1016/j.tranpol.2007.10.005>
- Curtis, C., & Scheurer, J. (2017). Performance measures for public transport accessibility: Learning from international practice. *Journal of Transport and Land Use*, 10(1), 93–118. <https://doi.org/10.5198/jtlu.2016.683>
- Lucas, K. (2012). Transport and social exclusion: Where are we now? *Transport Policy*, 20, 105–113. <https://doi.org/10.1016/j.tranpol.2012.01.013>
- May, A. D. (2015). Encouraging good practice in the development of Sustainable Urban Mobility Plans. *Case Studies on Transport Policy*, 3(1), 3–11. <https://doi.org/10.1016/j.cstp.2014.09.001>
- Parkin, J., & Koorey, G. (2012). Network planning and infrastructure design. In *Transport and Sustainability* (Vol. 1, pp. 131–160). Emerald Group Publishing Ltd. [https://doi.org/10.1108/S2044-9941\(2012\)0000001008](https://doi.org/10.1108/S2044-9941(2012)0000001008)

Modes of Evaluation: Presentation/Assignment/Class Test /Written Examination

Examination Scheme:

Components	CT-1	CT-2	HA	S/P	CE	A	ESE
Weightage (%)	10	10	10	10	05	05	50

CT: Class Test, HA: Home Assignment, S/P: Seminar/Presentation, CE: Continuous Evaluation, A: Attendance; ESE: End Semester Examination.

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1	2	1	2	--	--	--	--	--	--	--	--	1	--	2	--
CO2	1	2	1	2	--	--	--	--	--	--	--	--	1	--	2	--
CO3	1	2	1	2	--	--	--	--	--	--	--	--	1	--	2	--
CO4	1	2	1	2	--	--	--	--	--	--	--	--	1	--	2	--

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	DEMOGRAPHY AND QUANTITATIVE ANALYSIS (PLN4212)	L	T	P	S	C
Version 1.1	Date of Approval:	2	1	0	0	2
Pre-requisites/Exposure	Planning Studio II nd and III rd Sem.					
Co-requisites	Statistical Data Analysis Software (Elective)					

Catalog Description

The course consists of two parts of Demography and Statistics, dealing with each independently and as well as connecting the applications of statistics to demography.

Demography: The aim of the section on Demography is to provide the students with an understanding of basic concepts on demography. This course would make the students aware of the importance of population geography in economic development, the various theories that explain the growth of population in a country and demographic techniques applied. The course aims to help students identify appropriate sources of data, perform basic demographic analyses using various techniques and ensure their comparability across populations. The student will also be able to produce population projections and interpret the information gathered by the different demographic methods.

Quantitative Methods: The emphasis of the section on Statistics shall be on conceptual underpinnings of statistics with a focus on defining different statistical tools indispensable for urban planning. In view of the course according more emphasis on inferential statistics than descriptive statistics, the objective of the course will be to introduce the most useful and commonly employed statistical tools and discuss the conditions under which use of those tools is appropriate. The course has been so designed as to train the students interpret the results of an analysis to provide insight into the answer to the problem at hand. Use of SPSS is also included in the program, but will be taught separately as an elective subject in second semester itself.

Course Objectives

The objective of this course is

- To overview concepts of demography and its relation as well as utilization in planning.
- To demonstrate various methods for quantitative/demographic data analysis.

Course Outcomes


On completion of this course, the students will be able to

CO1: Acquire knowledge on demographic parameters used in planning.

CO2: Appreciate demographic theories, trends and impacts of migration as well as project population.

CO3: Use statistical methods of data analysis which are utilised in planning.

CO4: Apply statistical sampling techniques and advanced data analysis methods.


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Module	Blooms level*	Number of hours
Module 1: Demography and Planning Distribution and Density of Population - Measures of Population Distribution and Concentration; Factors Affecting Population Distribution and Density; World Population Distribution; Density Distribution in India Population Change - Fertility and Its Measures; Mortality and Its Measures; Mobility; Factors Affecting Population Change; Determinants of Fertility and Mortality.	L1, L2, L3	9
Module 2: Demographic Theories, Migration, Population Composition and Projections Demographic Transition Theory; Some Population Theories (Overview only); Migration - Types of Migration; Determinants of Migration; Migration Models; Population Composition - Age and Sex Composition and Its Determinants; Age Pyramids; Working Force and Its Determinants; Composition of Work Force and Occupational Composition; Population Projections – Assumptions, Methods, Techniques.	L1, L2, L3	9
Module 3: Quantitative Methods-I Measures of Central Tendency and Dispersion - Arithmetic Mean; Weighted Mean; Geometric and Harmonic Mean; Median and Mode; Variance and Standard Deviation; Time Series and Forecasting - Trend Analysis - Cyclical Variation, Seasonal Variation, Irregular Variation; Various Methods in Time Series Analysis – Moving Average, Ratio to Trend, Link Relative and Residual; Factor Analysis - Principal Component Analysis	L1, L2, L3	9
Module 4: Quantitative Methods-II Probability Distribution and Sampling Distribution - Use of Expected Value in Decision Making; Binomial, Poisson and Normal Distribution (only application); Determination of Sample Size and Types of Sampling; Sampling Distribution (concept only); Design of Experiments (concept only); Correlation and Regression - Two Variable versus Multiple Linear Regression; Simple and Multiple Correlation; Estimation of Parameters – The Method of Ordinary Least Squares; Hypothesis Testing, Goodness of Fit; Applications of Features of Excel for statistical analysis.	L1, L2, L3	9

*Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

- Burch, T. K. (2017). Fundamentals of Demographic Analysis: Concepts, Measures, and Methods. *Canadian Studies in Population*, 44(1–2), 121. <https://doi.org/10.25336/p6tw25>
- Schabenberger, O., & Gotway, C. A. (2017). *Statistical methods for spatial data analysis. Statistical Methods for Spatial Data Analysis* (pp. 1–488). CRC Press. <https://doi.org/10.1201/9781315275086>
- Yusuf, F., Swanson, D. A., & Martins, J. M. (2014). *Methods of demographic analysis. Methods of Demographic Analysis* (Vol. 9789400767843, pp. 1–310). Springer Netherlands. <https://doi.org/10.1007/978-94-007-6784-3>

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Reference Books

- Chi, G., & Zhu, J. (2008, February). Spatial regression models for demographic analysis. *Population Research and Policy Review*. <https://doi.org/10.1007/s11113-007-9051-8>
- Wachter, K. W. (2015). *Essential Demographic Methods*. *Essential Demographic Methods*. Harvard University Press. <https://doi.org/10.4159/9780674369757>

Modes of Evaluation: Presentation/Assignment/Class Test /Written Examination

Examination Scheme:

Components	CT-1	CT-2	HA	S/P	CE	A	ESE
Weightage (%)	10	10	10	10	05	05	50

CT: Class Test, HA: Home Assignment, S/P: Seminar/Presentation, CE: Continuous Evaluation, A: Attendance; ESE: End Semester Examination.

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1	2	2	2	--	2	--	--	--	--	--	--	1	--	2	--
CO2	1	2	2	2	--	2	--	--	--	--	--	--	1	--	2	--
CO3	1	2	2	2	--	2	--	--	--	--	--	--	1	--	2	--
CO4	1	2	2	1	--	2	--	--	--	--	--	--	1	--	2	--

1: strongly related, 2: moderately related and 3: weakly related


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	PLANNING STUDIO-II – URBAN PLANNING (PLN4206)	L	T	P	S	C
Version 1.1	Date of Approval:	2	0	0	8	10
Pre-requisites/Exposure	Planning Studio I					
Co-requisites	-					

Catalog Description

The studio is designed to expose the students to issues of urban planning and equip them with knowledge and techniques to enable them to analyse urban situations and develop logical decision making processes to address the complex overlays of conceptualisation, implementation and finance. The studio is designed to study one particular urban area and analyse its issues and develop spatial plans with thrust on critical sectors. It focuses on the preparation of integrated development plan for a selected urban area analysing all aspects of physical planning including socio-economic factors and physical infrastructure and also formulation of methods of implementation and projectisation. The course deliverables would be designed based on specific projects undertaken, keeping in mind the overall objective of the course.

Course Objectives

The objective of this course is

- To relate theoretical knowledge of planning with urban planning practices.
- To conceptualize and prepare an urban development plan for the given study area.

Course Outcomes

On completion of this course, the students will be able to

CO1: Applying learnt planning concepts for the conceptualization and designing of an urban plan.

CO2: Present and document meaningful inferences and strategies/proposals for sustainable urban development.

Modules	Blooms level*	Number of hours
MODULE 1: Pre-Field visit Stage Identification of an urban area; Identification and Formulation of Planning Objectives for the project; Field Visit and Survey of the study area. Data collection through primary and secondary surveys.	L3, L4 L5	40
MODULE 2: Post-Field visit Stage Analyses and presentation of data and information; Review of Planning Objectives post data analysis; Redefining objectives; Planning for urban area and its region (structure plan / development plan) with emphasis on: Land use, transportation networks and Infrastructure networks; Preparation of Detailed Project Report (case specific); Identification and Detailing of Action Area, Local Area plans or Project Plans (case specific); Plan Implementation strategies: Stake holder participation, project funding options; Implementation strategies including urban governance and management issue.	L3, L4 L5	80

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**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Essential Elements/Deliverables:

- Defining characteristics of identified areas
- Case study and literature review of planning concepts and norms for the selected area/special area
- Formulation of Aim, Objectives and Methodology
- Selection of site and collection data (field trip of 1-week duration)
- Data analysis and presentation
- Outline framework of development – sectoral and spatial
- Implementation framework – capital investment and funding methods
- Governance and management aspects.

Text Books

- Bureau of Indian Standards (2005) National Building Code of India, Bureau of Indian Standards, New Delhi
- Delhi Development Authority (2007) Master Plan for Delhi, 2021, DDA, New Delhi.
- Singh V., Ahmed A., Sharma Y. (2020) Unified Building Bye-Laws for Delhi 2016, Society for Fundamental Research and Development, New Delhi.
- Ministry of Urban Development (1996) The Urban Development Plan Formulation and Implementation (UDPFI) Guidelines, Government of India, New Delhi.
- Ministry of Urban Development (2015) The Urban and Regional Development Plan Formulation and Implementation (URDPFI) Guidelines, Government of India, New Delhi.
- Flood, J. (1997). Urban and housing indicators. *Urban Studies*, 34(10), 1635–1665. <https://doi.org/10.1080/0042098975385>
- De Freitas, E. L. H., & De Melo Bueno, L. M. (2018, May 1). Participatory processes for preparation of Urban Plans and Zoning: Recent experiences innovations. *Urbe*. Editora CHAMPAGNAT. <https://doi.org/10.1590/2175-3369.010.002.ao09>
- Medrano, L., & Spinelli, J. (2014). Urban policies and projects for social housing in central areas.
- Huxley, M. (2009). Planning, Urban. In *International Encyclopedia of Human Geography* (pp. 193–198). Elsevier Inc. <https://doi.org/10.1016/B978-008044910-4.01097-X>
- The case of the Habitasampa competition (São Paulo, Brazil). *Habitat International*, 42, 39–47. <https://doi.org/10.1016/j.habitatint.2013.10.004>

References

- Allen, P. M. (2012). *Cities and regions as self-organizing systems: Models of complexity*. *Cities and Regions as Self-Organizing Systems: Models of Complexity* (pp. 1–309). Taylor and Francis. <https://doi.org/10.4324/9780203990018>
- Berghöfer, A. A., Gettkant, A., Lossack, H., Mayer, C., Prem, I., Riha, K., ... Wittmer, H. (2012). Integrating Ecosystem Services into Development Planning A stepwise approach for practitioners based on the TEEB approach. *Environment and Climate Change Department, Deutsche Gesellschaft Für Internationale*
- GOI. (2010). *The Gazette of India. DisClosure* (Vol. 2011, pp. 1–216). <https://doi.org/http://www.indianemployees.com/uploads/documents/042015/1428239209-16-92.pdf>
- Planning, S. (1996). Statewide Planning Goals & Guidelines. *Development*, 97310(Dlcd), 1–77.

Modes of Evaluation: Presentation/Assignment/Class Test /Written Examination

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Examination Scheme:


Components	P -1	P -2	S	R	CE	A	ESE
Weightage (%)	50	50	60	20	15	05	200

CT: Class Test, HA: Home Assignment, S/P: Seminar/Presentation, CE: Continuous Evaluation, A: Attendance; ESE: End Semester Examination.

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1	1	1	2	1	1	1	1	1	1	1	1	--	1	1	--
CO2	1	1	1	2	1	1	1	1	1	1	1	1	--	1	1	--
CO3	1	1	1	2	1	1	1	1	1	1	1	1	--	1	1	--
CO4	1	1	1	2	1	1	1	1	1	1	1	1	--	1	1	--

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	SPECIAL AREA PLANNING (PLN4213)	L	T	P	S	C
Version 1.1	Date of Approval:	1	0	2	0	2
Pre-requisites/Exposure	Introduction to Regional Planning					
Co-requisites	Metropolitan Planning, Development and Management					

Catalog Description

The aim of this course is to introduce the students to various Special Areas with their specific planning needs and priorities and the implication on development in these areas. The courses will generally be conducted in the seminar/studio mode to encourage research, exploration and skill developments. The focus of the course will be on studying the need and process required for special area planning. This course will provide the students hands-on experience Special area that required a different planning process in a built environment. The course contents to be followed will be developed by course teachers based on the resources at hand and opportunities for interdisciplinary learning. The course would be conducted through literature survey, case studies, site visits, and hands on experimentations. During the course the students will be working on live projects in groups which are preferably interdisciplinary.

Course Objectives

The objective of this course is

- To familiarize students with planning process required for special area in Indian context.
- To develop interdisciplinary understanding and sensitivities of future planners.

Course Outcomes

On completion of this course, the students will be able to

CO1: Appreciate the need, planning process and legislation required for special area planning

CO2: Prepare the detail report and presentation on a given project related to Special area planning.

Modules	Blooms level*	Number of hours
MODULE 1: Introduction to SAP and its Management Special Areas under consideration would include Formal and Functional Regions (Hill Areas, Coastal Areas, Desert Areas, Special Economic Zones, Port City, Aerotropolis, Medi-City, Knowledge City, TOD etc.), Types of special areas and their defining characteristics, Legislations and norms for Special Area Development in the Indian context, Capital investment and funding methods, public private partnerships in development process, Governance and Management aspects, Case Studies of various typologies of Special Area Development Plans in Indian and international context.	L1, L2, L3	12
MODULE 2: Project Work Selection and understanding of case study; Formulation of Aim and Objectives, Collection of data through primary and secondary sources; Conducting survey; Database development using relevant and advance software; Qualitative and quantitative data analysis; Report writing and presentations	L4, L5, L6	24

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**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Text Books

- Development of Hill Areas, Dobha G.L, Concept Publishing
- Environmental Problems of Coastal Areas in India, Sharma Vinod, Bookwell
- Integrated Development of Hill Districts in India: Issues and Approaches, Gupta, R.C., SPACE
- Special Economic Zones In India, P. K. Manoj, Serials Publications

References

- Aerropolis: The Way Well Live Next, John Kasarda, Allen Lane
- Environmental act in India, Ruma Chatterjee, Oxford University Press
- CRZ Regulations, 2011, MoEF

Modes of Evaluation: Presentation/Assignment/Class Test /Written Examination

Examination Scheme:

Components	CT-1	CT-2	HA	S/P	CE	A	ESE
Weightage (%)	-	-	-	90	05	05	-

CT: Class Test, HA: Home Assignment, S/P: Seminar/Presentation, CE: Continuous Evaluation, A: Attendance; ESE: End Semester Examination.

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1	1	1	--	--	1	1	--	--	2	1	--	1	--	1	2
CO2	1	1	2	--	--	--	--	--	--	--	--	--	1	2	--	--

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	BIG DATA AND DATA ANALYSIS (PLN4216)	L	T	P	S	C
Version 1.1	Date of Approval:	1	0	2	0	2
Pre-requisites/Exposure	Demography and Quantitative Analysis					
Co-requisites	Planning and Design Lab -V & VI					

Catalog Description

This course provides a basic introduction to big data and linking it with urban and regional planning, development, management, and policy making. The objective of the course is to familiarize students with big data analysis as a tool for making maps. The course also provides a basic introduction about the process of data acquisition and analytics associated with urban areas. Through this course students will explore big data in the context of smart cities and regions with the help of real-world examples. This incorporates practical exercises to familiarize students with the format of big data. It also provides a first hands-on experience to the students in handling and analysing large, complex data structures.

Course Objectives

The objectives of this course are

- As technologies are getting embedded in the built environments, in this context, the major objective of this course is to understand the role and application of big data in urban and regional planning
- To provides hands-on experience in handling and analyzing large data sets.

Course Outcomes

On completion of this course, the students will be able to

CO1: Understand the utility of big data in Planning and identify tools for making maps.

CO2: Understand the software for handling large data sets and explore big data in the context of Smart cities.

Modules	Blooms level*	Number of hours
MODULE 1: Big data, data acquisitions, analytics and Mapping the City Defining big data and what makes it 'big'; Emergence of data science and big data; its importance and utility in planning; Characteristics of big data; Links between big data, urban and regional planning, development, management and policy making. Different tools for making maps with big data; Map online programs and open spatial data and its uses; Geographic information systems software for mapping; and Identification of winners and losers in the big data system. Understanding open data platforms; Generators of big data; Handling large datasets, cloud database system; Cleaning data, SQL, introduction to R or other software for urban data analysis. Explore big data in the context of smart cities; Learning use of real-time data collection and use; Interactive data visualization in the context of smart cities and regions.	L1, L2, L3	12

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MODULE 2: Project Work Selection and understanding of case study; Formulation of Aim and Objectives, Collection of data through primary and secondary sources; Conducting survey; Database development using relevant and advance software; Qualitative and quantitative data analysis; Report writing and presentations.	L4, L5, L6	24
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**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Text Books

- Jain, V.K. (2018) Big Data and Hadoop, Khanna Book Publishing Co., New Delhi.
- Carta, S. (2019) Big Data, Code and the Discrete City, Shaping Public Realms, Routledge, London.
- Desouza, K. and Smith, K. (2016) Big Data and Planning, PAS Report 585, American Planning Association, Washington, D.C. 57.
- Townsend, A.M. (2013) Smart Cities: Big Data, Civic Hackers, and the Quest for a New Utopia, W.W. Norton and Company, London.
- Offenhuber, D. and Ratti, C. (eds.) (2014) Decoding the City: Urbanism in the Age of Big Data, Birkhauser Verlag AG.

References

- Manovich, Lev. (2012). Trending: The Promises and the Challenges of Big Social Data. Debates in the Digital Humanities, edited by Matthew K. Gold. The University of Minnesota Press.
- Cate, Fred H. (2014). The Big Data Debate. Science 346(6211): 818-818.
- Dutcher, Jenna. (2014). What is Big Data? UC Berkeley Data Science Blog.
- Karsten Donnay. (2017). Big Data for Monitoring Political Instability. International Development Policy 8.1 (Online).

Mode of Evaluation: Presentation/Assignment/Class Test /Written Examination Examination Scheme:

Components	CT-1	CT-2	HA	S/P	CE	A	ESE
Weightage (%)	-	-	-	90	05	05	-

CT: Class Test, HA: Home Assignment, S/P: Seminar/Presentation, CE: Continuous Evaluation, A: Attendance; ESE: End Semester Examination.

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1	1	1	--	--	1	1	--	--	2	1	--	1	--	1	2
CO2	1	1	2	--	--	--	--	--	--	--	--	--	1	2	--	--

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	RESEARCH METHODOLOGY AND THESIS PLANNING (PLN4310)	L	T	P	S	C
Version 1.1	Date of Approval:	1	0	0	2	2
Pre-requisites/Exposure	Technical Report Writing and Research Methodology (B.Plan.)					
Co-requisites	Planning Thesis					

Catalog Description

The aim of this course is to introduce students to literature review, research processes, techniques and colloquial arguments, so as to help them finalise a topic for their thesis in the subsequent semester. Two seminars would be conducted in the course of the semester to initiate the process of literature review related to student areas of interest culminating in selection of an appropriate thesis topic. Students will also be taught reference management software-Mendeley as a part of this course.

Course Objectives

The objective of this course is

- To equip students with good research qualities and ethics.
- To prepare students to plan their thesis in an effective manner well in advance.

Course Outcomes

On completion of this course, the students will be able to

CO1: Absorb basic qualities and requirement of a good research.

CO2: Use research communication Techniques.

CO3: Develop their thesis with a good research design.

CO4: Present two seminars based on the proposed research conceptual plan.

Modules	Blooms level*	Number of hours
MODULE 1: Introduction to Research and Research Ethics Definition of Research, types, Basics of academic and applied research; Different Approaches to research; Elements of research: epistemology, theoretical perspective, methods, methodology; Justification of Choice and use of Methods and Methodology; Paradigms in Research. Knowledge on act of plagiarism; Prior permission and intimation from the source; Time management in research; Conduct of interview, asking right question, confidentiality, elimination of researcher biases; Role and Responsibility of Researcher. What is an argument, argument structure and identification, validity and strength of arguments?	L1, L2 L3	6


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MODULE 2: Research Communication Research vocabulary, Reading- notes taking, material organisation, indexing; Technical Writing- Content synthesising, paraphrasing, citation and referencing; APA referencing system, Use of Mendeley in Reference Management; Academic writing-Research Proposal, Synopsis, Abstract writing, Report Writing and mapping, Writing style - introductory, developmental, transitional and concluding paragraphs, linguistic unity, coherence and cohesion, descriptive, narrative, expository and argumentative writing, Proofreading and editing; Presentation: effective content structuring, oral communication, voice modulation, body language, audio-visual aids, handouts.	L1, L2 L3	6
MODULE 3: Developing Thesis <ul style="list-style-type: none"> • Identification of topic of interest having relevance to planning profession, integration and application of the learnt research processes to the pre-thesis work • Book reviews and journal article compilation to establish the body of work existing in the selected area of work. Preliminary literature review for identification of research gaps. detail literature reviews to understand the current state of knowledge around a particular topic. • Collection of data and opinions by the stakeholders, decision makers, urban managers, advocates, technocrats, user groups, etc. on the topic selected. • Based on the literature review and inputs from the colloquial arguments, the topics shall be finalised for thesis in the subsequent semester. • Selection of study area, identification of extent and spread of intervention; collection of data for preparation of base map. • Development of research objectives, research methods relevant for individual topic and work methodology. Identification of data sources. • Data collection and analysis: sample determination, data tabulation (coding, de-coding, etc.), quantitative and qualitative data analysis. Appropriate and relevant data analysis methods would need to be studied by individual students based on thesis topic and research area. 	L3, L4 L5	12
MODULE 4: Professional Practice Finalisation of topic; formulation of problem statement, literature review, working hypothesis, research brief, research methodology, sample determination, data collection and analysis, report structuring. The student will be required to make two seminar presentations and submit a report at the end of the semester which will qualify as the literature review and research methodology component of his/her thesis in the forthcoming semester.	L3, L4 L5	12

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

- Machi, L.A. and McEvoy, B.T. (2012) The Literature Review, Six Steps to Success, Sage, New Delhi.

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- Condry, R. (2004). Writing Your Thesis. *The British Journal of Sociology*, 55(4), 597–598. https://doi.org/10.1111/j.1468-4446.2004.00040_9.x
- Shanti Bhushan Mishra and Shashi Alok., (2017): Hand Book of Research Methodology, GateResearch
- Taylor, G. (2009). *A Student's Writing Guide: How to Plan and Write Successful Essays. Social Sciences* (p. 266). Retrieved from <http://www.cambridge.org/9780521729796>
- Wentz, E. A. (2017). *How to Design, Write, and Present a Successful Dissertation Proposal. How to Design, Write, and Present a Successful Dissertation Proposal*. SAGE Publications, Ltd. <https://doi.org/10.4135/9781506374710>

Reference Books

- American Psychological Association. (2010). *APA Sixth Edition. Intellectual Property* (Vol. 1968, p. 272). <https://doi.org/10.1006/mgme.2001.3260>
- ChineloLgwenagu, (2016): Fundamental of Research Method and data collection, British Council, Research Gate
- Jennifer Mason, (2002): Qualitative Researching, 2nd edition, SAGE Publications, London
- Neville, C. (2007). The complete guide to referencing and avoiding plagiarism. *Open University Press*, 27–41. <https://doi.org/10.1016/B978-0-08-100072-4.00007-1>

Modes of Evaluation: Presentation/Assignment/Class Test /Written Examination

Examination Scheme:

Components	CT-1	CT-2	HA	S/P	CE	A	ESE
Weightage (%)	10	-	10	70	05	05	-

CT: Class Test, HA: Home Assignment, S/P: Seminar/Presentation, CE: Continuous Evaluation, A: Attendance; ESE: End Semester Examination.

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1	1	1	1	--	--	2	--	--	--	--	--	1	2	--	--
CO2	1	2	1	1	--	--	2	--	--	--	--	--	1	2	--	--
CO3	1	1	1	1	--	--	2	--	--	--	--	--	1	2	--	--
CO4	1	1	1	1	--	--	2	--	--	--	--	--	1	2	--	--

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	PLANNING STUDIO-III – REGIONAL PLANNING (PLN4307)	L	T	P	S	C
Version 1.1	Date of Approval:	2	0	0	8	10
Pre-requisites/Exposure	Planning Studio I& II					
Co-requisites	-					

Catalog Description

The course aims to understand the theoretical basis for various concepts and analytical tools of Regional Planning and learn the practice of regional planning in the Indian context. Elements of settlement system in the regional context are also incorporated in this course. The course provides an in-depth understanding of the issues of regional development, regional disparity and the need for balanced regional development in the context of globalization and rapid economic transformations in the country. Regional policies and sectoral policies are also discussed. Metropolitan regions, districts as planning regions and rural planning issues are discussed in the wider spectrum of holistic regional planning and development. Students will be able to apply the knowledge gained through theoretical subjects in their studio planning.

Course Objectives

The objective of this course is

- To relate theoretical knowledge of planning with regional planning practices.
- To conceptualize and prepare regional development plan for the given study area.


Course Outcomes

On completion of this course, the students will be able to

CO1: Applying learnt planning concepts for the conceptualization and designing of a regional plan.

CO2: Present and document meaningful inferences and strategies/proposals for sustainable regional development.

Modules	Blooms level*	Number of hours
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MODULE 1: Concept of Regional Planning <ul style="list-style-type: none"> • Concept of Region: Region Types and Regionalization; Concept of Regional Planning: Nature, Objectives, Levels and Aims • Elements of Settlement System: Function, Spacing, Linkage, Settlement Pattern and Factors Responsible Thereof; Potentials and Centrality of Settlements • Regional Inequalities – Growth, Density and Spatial Inequalities of Population Distribution, Spatial Patterns and Characteristics of Occupational Types; Regional Planning Policies and Its Relevance • Introduction to Economic and Regional Growth Processes: Some Approaches of Rostow, Hirschman, Myrdal, Friedman, Haggerstand; Concept of Growth Centres, Growth Pole, Service Centre and Agro-Politan District and their Application in India • Regional Development Strategies: Centralized and Decentralized; Regional Planning Process: Location of New Regional Economic Activities; Tools and Techniques of Regional Analysis • Metropolitan Regions: Concept of Degree of Primacy, Area of Influence, Service Area; City Regions and Delineation Techniques; Centralization and Decentralization Processes • Concepts of Ring and Satellite Towns, Counter-Magnets; Forms and Concepts for Metropolitan Planning and Development 	L2, L3 L4	40
MODULE 2: Governance Mechanism and Implementation <ul style="list-style-type: none"> • District Planning Process: Identification of Plan Objectives; Collection, Classification and Analysis of Data; Norms and Standards for District Planning; Components of District Planning in the Context of 73rd CAA, 1992, Planning Process Under District Planning. • Committee, Metropolitan Planning Committee; Plan Implementation: Five Year Plans and Rural Development; Planning Process, Policies and Programmes at National, State, Regional and District Levels; Planning, Development, Implementing and Monitoring Organizations and Agencies: National and State. • Concepts of Rural Area and Rural Development; Scope of Rural Development; Causes of Rural Backwardness; Historical Evolution of Rural Development and Rural Settlement Pattern in Indian Context; Economic Issues of Rural Development - Differentiating Economic Growth and Economic Development; Rural Jobs and Income Sources; Rural Economic Policy. • Infrastructure and Plan Implementation; Tools and Constraints in the Implementation of Plans in Terms of Administration; Schemes, Programmes, Policies for development of regions, districts, villages and cities; Selected Case Studies in Indian Context. 	L2, L3 L4	80

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Essential Elements/Deliverables:

- Defining characteristics of identified areas
- Case study and literature review of planning concepts and norms for the selected area/special area
- Formulation of Aim, Objectives and Methodology
- Selection of site and collection data (field trip of 1 week duration)
- Data analysis and presentation
- Outline framework of development – sectoral and spatial

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- Implementation framework – capital investment and funding methods
- Governance and management aspects.

Text Books

- Misra, R.P. (ed.) (1992) Regional Planning Concepts Techniques Policies and Case Studies, Concept Publishing, New Delhi.
- Sundaram, K.V. (1978) Urban and Regional Planning in India, Vikas Publishing, New Delhi.
- Hall, P. and Tewdwr-Jones, M. (2010) Urban and Regional Planning, Routledge, London.
- Berghöfer, A. A., Gettkant, A., Lossack, H., Mayer, C., Prem, I., Riha, K., ... Wittmer, H. (2012). Integrating Ecosystem Services into Development Planning A stepwise approach for practitioners based on the TEEB approach. *Environment and Climate Change Department, Deutsche Gesellschaft Für Internationale Zusammenarbeit (GIZ) GmbH Registered. Bonn and Eschborn, Germany*, 82.
- Houghton, G., & Counsell, D. (2004). Regions and sustainable development: Regional planning matters. *Geographical Journal*, 170(2), 135–145. <https://doi.org/10.1111/j.0016-7398.2004.00115.x>
- Seo, J. K. (2009). Balanced national development strategies: The construction of Innovation Cities in Korea. *Land Use Policy*, 26(3), 649–661. <https://doi.org/10.1016/j.landusepol.2008.08.014>
- Zarenda. (2013). South Africa's National Development Plan and its implications for regional development. *Tralac Working Paper No.D13WP01/2013*, (June), 1–17. <https://doi.org/10.1093/jb/mvp206>

References

- Allen, P. M. (2012). *Cities and regions as self-organizing systems: Models of complexity*. *Cities and Regions as Self-Organizing Systems: Models of Complexity* (pp. 1–309). Taylor and Francis. <https://doi.org/10.4324/9780203990018>
- McGee, G., Cullen, A., & Gunton, T. (2010). A new model for sustainable development: A case study of The Great Bear Rainforest regional plan. *Environment, Development and Sustainability*, 12(5), 745–762. <https://doi.org/10.1007/s10668-009-9222-3>
- GOI. (2010). *The Gazette of India. DisClosure* (Vol. 2011, pp. 1–216). <https://doi.org/http://www.indianemployees.com/uploads/documents/042015/1428239209-16-92.pdf>

Modes of Evaluation: Presentation/Assignment/Class Test /Written Examination

Examination Scheme:

Components	P -1	P -2	S	R	CE	A	ESE
Weightage (%)	50	50	60	20	15	05	200

CT: Class Test, HA: Home Assignment, S/P: Seminar/Presentation, CE: Continuous Evaluation, A: Attendance; ESE: End Semester Examination.

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1	1	1	2	1	1	1	1	1	1	1	1	--	1	1	--
CO2	1	1	1	2	1	1	1	1	1	1	1	1	--	1	1	--
CO3	1	1	1	2	1	1	1	1	1	1	1	1	--	1	1	--
CO4	1	1	1	2	1	1	1	1	1	1	1	1	--	1	1	--

1: strongly related, 2: moderately related and 3: weakly related

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	SMART CITIES AND ADVANCED TECHNOLOGIES FOR EMERGING PLANNING ISSUES (PLN4312)	L	T	P	S	C
Version 1.1		1	0	2	0	2
Pre-requisites/Exposure	Development, Management and Finance, Infrastructure Planning					
Co-requisites	Public Policy in Planning, Urban Finance					

Catalog Description

The aim of this course is to introduce the students to smart cities concepts and solutions with their specific planning needs and priorities and the implication on development in these areas. Besides, this course also offers opportunities in specialized or advance learning in emerging spatial planning issues and planners need to give special attention to them while preparing the plans. The course will generally be conducted in the seminar/studio mode to encourage research, exploration and skill developments. The course will provide the students hands-on experience of infrastructural, environmental problems emerging in a city. The course contents to be followed will be developed by course teachers based on the resources at hand and opportunities for interdisciplinary learning. The course would be conducted through literature survey, case studies, site visits, community surveys and hands on experimentations. During the course the students will be working on live projects in groups which are preferably interdisciplinary.

Course Objectives

The objective of this course is

- To grasp Smart city concept as well as understanding emerging challenges in a city/region and finding out ways to resolve them.
- To develop interdisciplinary understanding and sensitivities of future planners.

Course Outcomes

On completion of this course, the students will be able to

CO1: Apply smart city planning as well as critically analyze emerging multifaceted planning issues and technology-based solution to address them.

CO2: Prepare the detail report and presentation on a given project with an emphasis on smart solutions in order to achieve the goal of sustainable development.

Modules	Blooms level*	Number of hours
MODULE 1: Smart Cities, Advance Technologies and Emerging Planning Issues Introduction to smart cities, the city as a system of systems, smart citizens, Infrastructure, technology and data, Innovation and enterprise, smart leadership and strategy, standards and capacity building, smart measurement, and learning. Case Studies of various smart cities in Indian and international context. Challenges and problems faced by Mega city and its region, Issues-rapid unplanned growth, urban sprawl, infrastructure related issues such as shortage of Water Supply, Public transport, Parking Issue, Shortage of	L1, L2, L3	12

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housing, Solid waste management, environmental issues such as deforestation, land conversion, depletion of ground water etc. Advanced Solution- Advanced Transport Planning system, Smart Mobility, Application technology for improving agriculture productivity, Rain water harvesting, green roofs Sustainable housing affordability, Zero-carbon city, Use of Information and Communication Technology in Planning and Governance- E- Governance, E-Planning, Case studies covering various planning issues at different level of Planning		
MODULE 2: Project Work Selection and understanding of case study; Formulation of Aim and Objectives, Collection of data through primary and secondary sources; Conducting survey; Database development using relevant and advance software; Qualitative and quantitative data analysis; Report writing and presentations.	L4, L5, L6	24

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation*

Text Books

- Dash, R. Environmental Sustainability Index for Indian States 2009 Informing Environmental Action. Chenna: Centre for Development Finance, Institute for Financial Management and Research.
- GRIHA. (2010). National Rating System, 'GRIHA' Green Rating for Integrated Habitat Assessment, An evaluation tool to help design, build, operate and maintain a resource-efficient built environment, GRIHA manual Volume 1. TERI Press, New Delhi: Ministry of New and Renewable, Energy, Government of India and The Energy and Resources Institute.
- Girardet, H. _1990.. The metabolism of cities. In: Cadman, D.and Payne, G. _eds. _1990.. The Living City: Towards a Sustainable Future London: Routledge.
- Smart Cities Unbundled, Sameer Sharma, Bloomsbury India
- The Smart City Transformations: The Revolution of The 21st Century, Amitabh Satyam, Bloomsbury India

References

- Basiago, A. D. _1996.. The search for the sustainable city in20th century urban planning. The Environmentalist, 16
- Douglas, I. Urban ecology and urban ecosystems: understanding the links to human health and well-being.Curr. Opine. Environ. Sustain. 2012, 4, 385–392.
- Smart Technologies, K. Worden, World Scientific Publishing Co Pte Ltd
- Smart Technologies for Smart Governments, Manuel Pedro Rodríguez Bolívar, Springer Publications

Modes of Evaluation: Presentation/Assignment/Class Test /Written Examination


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Examination Scheme:


Components	CT-1	CT-2	HA	S/P	CE	A	ESE
Weightage (%)	-	-	-	90	05	05	-

CT: Class Test, HA: Home Assignment, S/P: Seminar/Presentation, CE: Continuous Evaluation, A: Attendance; ESE: End Semester Examination.

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1	1	1	--	--	1	1	--	--	2	1	--	1	--	1	2
CO2	1	1	2	--	--	--	--	--	--	--	--	--	1	2	--	--

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	SUSTAINABLE CITIES AND REGIONS (PLN4315)	L	T	S	P	C
Version 1.1		1	0	0	2	2
Pre-requisites/Exposure	Regional Planning and Development, Planning History and Theory					
Co-requisites	Infrastructure Planning					

Catalog Description

The primary purpose of this subject is to understand that complex relationships exist between cities and the regions and natural environments on which they rely. This course focuses on how to examine such relationships and how they impact upon urban, suburban, rural and regional dwellers at different scales in the 21st century. Students will learn about the major challenges currently faced by urban areas around the world – including poverty, unemployment, poor housing infrastructure, and constraints on productivity – and the extraordinary potential of these areas to enable change in the future.

Course Objectives

The objectives of this course are

- To understand urban sustainability, measures of sustainability, and elements and intersectionality of Sustainable Development Goals.
- To focus on effective governance in order to ensure sustainability of a city and a region.

Course Outcomes

On completion of this course, the students will be able to

CO1: Identify the measures of urban sustainability

CO2: Demonstrate knowledge and skills to plan for sustainable development of a city or a region.

Modules	Blooms level*	Number of hours
MODULE 1: Planning and Measuring Sustainability Starting with Brundtland report, different perspectives on urban and regional sustainability; Economic development and sustainability; Healthy city; Dimensions and components of sustainable urban and regional development; Elements of a new and improved paradigm of sustainability; Green cities, growing cities, just cities; Urban planning and the contradictions of sustainable development; Environmental justice and the sustainable city; Understanding urban and regional sustainability indicators; Sustainability assessment with a focus on community interests, etc.; Sustainability indicators used by a city of your choice. Genesis, history, and limits of carrying capacity; Urban ecological footprints, planning with ecological footprints; Governance and local sustainability; Problematizing the politics of sustainability; New politics of sustainability fixes; Environment and the entrepreneurial city: searching for the urban ‘sustainability fix’; Third wave sustainability; Sustainability schizophrenia or actually existing sustainability: toward a broader understanding of the politics and promise of local sustainability; Alternative routes to the sustainable city with examples. Understanding New Urban Agenda, Sustainable Development Goals, Paris Agreements; India’s position of these global agreements; Industrial ecology, planning for eco-industrial parks, drivers and limitations for the successful	L1, L2	12

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development and functioning of eco-industrial parks; SEZs, and development of ports, airports and road and rail based corridors.		
MODULE 2: Project Work Selection and understanding of case study; Formulation of Aim and Objectives, Conducting community participation exercises in small groups with varied stakeholders, Organising consultative meetings, Focus group discussion, Preparing small scale project with the help of local community and demonstration of the same. Collection of data through primary sources; Conducting survey; Database development; Qualitative and quantitative data analysis; Report writing and presentations.	L1, L2, L4	24

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books/

- Adriano, B., Daniele, V., Pierre, L., and Simona, C. (eds.) (2017) *Smart and Sustainable Planning for Cities and Regions: Results of SSPCR 2017*, Springer, Switzerland.
- Barbara, N. (2019) *Sustainable Pathways for our Cities and Regions, Planning within Planetary Boundaries*, Routledge, New York.
- Chapple, K. (2015) *Planning Sustainable Cities and Regions: Towards More Equitable Development*, Routledge, New York.
- Hildebrand, F. and Paul, Y. (2007) *Visions of Sustainability: Cities and Regions*, Taylor and Francis, London.
- Mcgranahan, G., Schensul, D. and Singh, G. (2016) Inclusive Urbanization: Can the 2030 Agenda be delivered without it, *Environment and Urbanization*, Vol. 28, No. 1, pp. 13-34.
- Watson, V. (2016) Locating planning in the New Urban Agenda of the

Modes of Evaluation: Assignment/Case Study/ Presentation/Class Test/Written Examination Examination Scheme:


Components	Internal Assessment						ESJ
	CT-1	CT-2	HA	S/P	CE	A	
Weightage (%)	-	-	-	40	05	05	50

CT: Class Test, HA: Home Assignment, S/P: Seminar/Presentation, CE: Continuous Evaluation, A: Attendance; ESE: End Semester Examination, ESJ: End Semester Jury

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	2	2	1	--	--	1	1	--	--	2	1	--	1	--	1	2
CO2	1	2	2	--	--	--	--	--	--	--	--	--	1	2	--	2

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	PLANNING LEGISLATION AND PROFESSIONAL PRACTICE (PLN4403)	L	T	P	S	C
Version 1.1	Date of Approval:	2	1	0	0	2
Pre-requisites/Exposure	Planning Legislation (B.Plan)					
Co-requisites	Planning Practice I & II, Human Values in Planning (B.Plan)					

Catalog Description

The aim of this course is to introduce the significance of planning laws, legislations, acts, regulations and professional practices in planning. As students are passing out after this semester, therefore, the relevance of this subject becomes very crucial at this stage. At the end of the course student will be able to utilise the learnt skills of planning legislations and professional practice in their career.

Course Objectives

The objective of this course is

1. To prepare students to deal with legal dimensions of planning.
2. To equip students with professional planning ethics to transform them into committed and responsible future planner.

Course Outcomes

On completion of this course, the students will be able to

CO1: Grasp basic legal terminologies for enhanced understanding of legislation.

CO2: Comprehend land related legislations as well as getting an enriched knowledge of Urban and Regional planning Acts.

CO3: Analyze environmental planning regulations and laws.

CO4: Absorb professional planning ethics/values and transforming into a professional planner.

Modules	Blooms level*	Number of hours
MODULE 1: Basic Terminologies and Legislation The meaning, significance and objectives of planning legislation; Evolution of planning legislation and overview; Concept of Law; Sources of law; meaning of the term of law, legislation, ordinance, bill act, regulations and bye-laws; doctrine of separation of powers; judiciary, legislature and executive-rule of law, Judicial precedents; PIL; significance of law and its relationship to urban planning; Indian Constitution.	L3, L4 L5	9


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MODULE 2: Land related Legislation, Urban and Regional Planning Acts Land Acquisition Act 1894; Betterment charges and compensation provisions in planning law; Legislation controlling use of land, ULCRA; Tools of development control-zoning, sub-division regulations, building regulations, model building byelaws, Special regulations like TDR, Rent Control Acts; Apartment Ownership Acts; Transfer of Property Right Act; The estate duty Act; Easement Act; Slum improvement and clearance Act, Indian Contract Act; Arbitration and conciliation Act Municipal Acts; Improvement Trust and Development Authority Acts; Model town and Country planning Acts; Legislations relating to urban art commissions; 73 rd and 74 th Constitutional Amendments; Cooperative Societies Act; Special Purpose Legislations viz; Special Economic Zones Act; Special Investment Region Act.	L3, L4 L5	9
MODULE 3: Environmental Legislations Evolution of environmental Law in India; Law of Torts; the first environmental law; Pollution control Act- air, water and environmental protection acts; Forest and wildlife acts; other important international environmental laws; Hazardous waste management and handling rules/biomedical rules/solid waste management rules; Environment tribunal act; Archaeological sites and remains of national importance; Conservation of natural resources including mining and forestry acts; MOEF guidelines and notifications.	L3, L4 L5	9
MODULE 4: Professional Practice Role of a Planner; relationship with client, developers, institutions contractors and experts; Role and responsibilities of planning consultants, professional ethics, code of conduct and scale of professional charges; Role in interdisciplinary groups; Formulation of project proposal and outlines; consultancy agreements, contracts and inviting tenders; Nature of Engagements, agreements and safeguards, completion and copyrights; Aims and Objectives of the professional institute.	L3, L4 L5	9

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

- Campbell, H., & Marshall, R. (1998). Acting on principle: dilemmas in planning practice. *Planning Practice and Research*, 13(2), 117–128. <https://doi.org/10.1080/02697459816139>
- Kulshreshtha, S.K. (2012) Urban and Regional Planning in India - A Handbook of Professional Practice, SAGE Publications India Private limited, New Delhi

References

- Dwivedi, S. K., & Kashyap, P. K. (2013). Environmental Protection Law and Policy in India. *SSRN Electronic Journal*. <https://doi.org/10.2139/ssrn.2266021>
- Sivaramakrishnan, K. (2011). Environment, law, and democracy in India. *Journal of Asian Studies*, 70(4), 905–928. <https://doi.org/10.1017/S0021911811001719>

Suggested Readings of Bare Acts

- Town and Country Planning Act (any State Act)
- Model Municipal Act, Ministry of Urban Development, Government of India

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- Nagar Raj Act (any State Act)
- Environment Protection Act (Central Act)
- Mining and Forestry Act (Central Act)
- Building Byelaws (any State Act)
- Apartment Ownership Act (any State Act)
- Development Authority Act (any State Act)
- Water Bodies Conservation Act (any State Act)

Modes of Evaluation: Presentation/Assignment/Class Test /Written Examination

Examination Scheme:

Components	CT-1	CT-2	HA	S/P	CE	A	ESE
Weightage (%)	10	10	10	10	05	05	50

CT: Class Test, HA: Home Assignment, S/P: Seminar/Presentation, CE: Continuous Evaluation, A: Attendance; ESE: End Semester Examination.

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1	1	--	--	--	--	--	--	--	--	--	1	1	--	--	1
CO2	1	1	--	2	--	--	--	--	2	--	--	1	1	--	1	1
CO3	1	1	--	2	--	--	--	--	2	--	--	1	1	--	1	1
CO4	1	1	--	2	--	--	--	--	2	--	--	1	1	--	1	1

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	PLANNING THESIS (PLN4437)	L	T	P	S	C
Version 1.1	Date of Approval:	2	0	0	16	18
Pre-requisites/Exposure	Planning Studio I, II & III					
Co-requisites	All Theory and Elective Subjects					

Catalog Description

The aim of thesis is to develop independent critical thinking and design/research abilities and apply the knowledge gained, skills developed and professionalism inculcated over the last three semesters in an exercise of own interest and significant complexity. The thesis project is to be undertaken independently by each student on a topic of his/her choice related to urban and regional planning, selected and approved by the faculty during the previous semester as part of course requirements of the subject seminar. The students' needs to present and defend their thesis research work in periodic juries conducted by the department as well as in the external jury appointed by the University/School. They are also expected to write a thesis report with the constant guidance of respective guides. Students will submit the same before external jury in a hard bound prescribed format, given by the department.

Course Objectives

The objective of this course is

- To utilize acquired knowledge in planning and reviewed literature for conceptualizing and pursuing good research.
- To provide viable solutions to the undertaken research problem and document the entire work.

Course Outcomes

On completion of this course, the students will be able to

CO1: Conceptualise a rationale research problem and creating a good research Design.

CO2: Drawing meaningful insights as well as communicate and document practical ideas to solve the selected problem.

Module	Blooms level*	Number of hours
Module 1: Research Problem and Research Design <ul style="list-style-type: none"> • Conceptualization of Research problem for Thesis work. • Background and Need of the study area. • Rigorous Literature review • Formulation of Aim and objectives. • Writing objective based Research Questions. • Constructing Research Methodology. • Designing Analytical Framework. • Sampling and Sample selection. • Preparations of Check list and Questionnaire. • Methods of data collection. 	L3, L4, L5	26

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Module 2: Data Analysis, Proposals and Report Writing <ul style="list-style-type: none"> Processing and Interpretation of data. Data Analysis. Findings and Results. Identification of Issues Conclusions. Formulation of policies/Proposal Plans. Strategies and Recommendations. Suggestion for Future Research, if any Report Writing. 	L4, L5, L6	190
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*Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

- Evans, D., Gruba, P., & Zobel, J. (2014). *How to Write a Better Thesis. How to Write a Better Thesis*. Springer International Publishing. <https://doi.org/10.1007/978-3-319-04286-2>
- Condry, R. (2004). Writing Your Thesis. *The British Journal of Sociology*, 55(4), 597–598. https://doi.org/10.1111/j.1468-4446.2004.00040_9.x
- Shanti Bhushan Mishra and Shashi Alok., (2017): Hand Book of Research Methodology, GateResearch
- Wentz, E. A. (2017). *How to Design, Write, and Present a Successful Dissertation Proposal. How to Design, Write, and Present a Successful Dissertation Proposal*. SAGE Publications, Ltd. <https://doi.org/10.4135/9781506374710>

Reference Books

- American Psychological Association. (2010). *APA Sixth Edition. Intellectual Property* (Vol. 1968, p. 272). <https://doi.org/10.1006/mgme.2001.3260>
- ChineloLgwenagu, (2016): Fundamental of Research Method and data collection, British Council, Research Gate
- Jennifer Mason, (2002): Qualitative Researching, 2nd edition, SAGE Publications, London
- Neville, C. (2007). The complete guide to referencing and avoiding plagiarism. *Open University Press*, 27–41. <https://doi.org/10.1016/B978-0-08-100072-4.00007-1>
- Taylor, G. (2009). *A Student's Writing Guide: How to Plan and Write Successful Essays. Social Sciences* (p. 266). Retrieved from <http://www.cambridge.org/9780521729796>

Modes of Evaluation: Presentation/Assignment/Class Test /Written Examination

Examination Scheme:

Components	P -1	P -2	S	R	CI	A	ESE
Weightage (%)	100	100	100	50	45	05	400

P: Presentation, S: Seminar (Internal Jury), R: Report, CI: Class Interaction (continuous evaluation by guide), A: Attendance; ESE: End Semester Examination.

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1	1	1	1	1	1	1	1	1	1	1	2	1	1	1	1
CO2	1	1	1	1	1	1	1	1	1	1	1	2	1	1	1	1

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APPAREL MERCHANDISING

(Skill Track)

Programme Structure

Course Code	Course Title	Lectures (L) Hours per week	Tutorial (T) Hours per week	Practical (P) Hours per week	Total Credits
VFD2151	Introduction to Apparel Merchandising	1	-	4	3
VFD2251	Apparel Market Research & Product Analysis	1	-	4	3
VFD2351	Vendor Management & Product Evaluation	1	-	4	3
VFD2451	Prototype Preparation & Merchandise Plan	1	-	4	3
VFD2551	Pre-Production Management	1	1	2	3
VFD2651	Shipment & Documentation Management	1	-	4	3
	TOTAL				18

- Eligible for appearing assessment of Qualifications pack-occupational standards for a merchandiser (sub sector-Apparel) according to National Occupational Standards, NSQF level 5, approved by National Skill Development Corporation (NSDC)



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APPAREL MERCHANDISING

Syllabus - Semester First

INTRODUCTION TO APPAREL MERCHANDISING

Course Code: VFD2151

Credit Units: 03

Course Objective:

This course helps the students to get a preview to develop merchandising skills for apparel products. This course covers the basic knowledge of fashion; textile and apparel industry, Safety Management and introduction to merchandizing,

Course Contents:

Module-I: Fashion Terminology

The Language of fashion – Introduction to fashion concept; Definitions and meaning, Classification, Style, Change, Acceptance, Taste, Look, Trends, Season; Color, Texture, Fit, Comfort, Brand or Designer Label, Fashion cycles. **Adoption Theories** – Trickle down, Trickle up, Trickle-across and Laver's law. **Fashion clothing categories, Styling & Size range** - Women's wear, Men's wear Children's wear

Module-II: Introduction to Textiles

Textile fibers & Yarns - Definition & classification. **Woven fabrics** - Classification, fabric properties and identification of fabrics types. **Knit fabrics** – Classification, fabric properties and identification of fabrics types. **Textile processing** – Introduction to Dying, Printing and Finishing. **Care symbols & Labeling.**

Module-III: The Overview of Apparel Industry & Apparel Production

Apparel industry - Major segments; **Organizational structures** - Structure of Export house, Buying house and Domestic companies, Buyer's classification and buying network in exports. Sources of fabric buying and selling of finished fabric. **Apparel construction techniques** - Introduction to Drafting & Pattern making. **Machinery & Equipment** - Cutting, sewing, finishing, washing, stain removal, embellishment. **Production methodology** - Assembly line, individual garment manufacturing, job work, quality checkpoints. **Design & Tech-pack** - Introduction & Definition. Labelling & Packing.

Module-IV: Workplace Safety Management Practices

Health and safety instructions – Importance of sound health, hygiene and good habits. Ill-effects of alcohol, tobacco and drugs.. Occupational health and safety risks. Signage related to health and safety. Personal protective equipments & its use. Method of write report on the hazards and risks / threats faced at workplace. event of a mock drills, evacuation procedures, accident, emergency or fire **Environmental management system (EMS)** - EMS procedures. Proper disposal system for waste and by-products. Identification, handling and storage of hazardous substances.

Module-V: Basics of Apparel Merchandising

Introduction, Functions and role of Merchandiser, Merchandising Process, Meaning and Need for quality control in Merchandising process.

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Examination Scheme:

Components	A	L	CT	EE
Weightage (%)	05	10	15	70

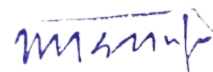
(A-Attendance; L- Learning Assignments; CT-Class Test; EE-End Semester Examination)

Text & References:

- Gini Stephens Frings (1999). Fashion: From concept to consumer, Prentice-Hill Inc.
- Kadolph Sara,J (2009). Textiles, Pearson
- Leila Aitken. Step by step dress making course
- Fuller, C., & Vassie, L. H. (2004). Health and safety management: principles and best practice. Pearson Education.



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Syllabus - Semester Second

APPAREL MARKET RESEARCH AND PRODUCT ANALYSIS

Course Code: VFD2251

Credit Units: 03

Course Objective:

This course focuses on the awareness about apparel business plans, market target is and design brief. Scopes of this course include Market trend assessment, Determine design brief, Identification of Design brief and analyze.

Course Contents:

Module-I: Assessment of Market Trends

Research on market trends - Conduct research on target market, materials, trims, better or new sources / suppliers for procurement; **Design review** - Review previous designs & samples developed by the business to assess relevance to current design/samples;

Module-II: Determination of Key Criteria for Design Brief

Identify processes - Identify business processes and client goals; Identify Quality standards for designs, Identify budget, cost points and timing constraints, **Tech-pack review** - Check the Tech-pack received and identify it with the design brief given by the designer and also checked if all specifications are there in the tech-pack, If not clarify and modify if needed.

Module-III: Organizational Context & Technical Knowledge

Organizational processes - Organization's policies, procedures, guidelines and standards for dealing with buyers/clients, Recognizing and adapting to cultural differences in the workplace, including modes of behavior and interactions, Production capacity and processes of business are identified. Systematically work completion with attention to detail without damage to goods and equipment. Awareness of Intellectual Property rights, **Technical processes** - Garment construction techniques and processes, Detailed knowledge of a range of fabrics and trims, An understanding on the cost process involved in making an apparel, Vendors, Compliance Standards.

Examination Scheme:

Components	A	L	CT	EE
Weightage (%)	05	10	15	70

(A-Attendance; L- Learning Assignments; CT-Class Test; EE-End Semester Examination)

Text & References:

- A J Chuter, Introduction to clothing production management
- B S Jolly, Law, Ethics & Communication- FOR CA-IPCC, Tata McGraw-Hill Education
- Design Research: Methods and Perspectives, edited by Brenda Laurel
- Gini Stephens Frings (1999): Fashion: From concept to consumer, Prentice-Hill Inc.
- Grace I kunz, Merchandising: Theory, Practice and Principles
- John Donnellan , Merchandise Buying and Management.
- P Narayan, Intellectual Property Rights

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Syllabus - Semester Third

VENDOR MANAGEMENT AND PRODUCT EVALUATION

Course Code: VFD2351

Credit Units: 03

Course Objective:

This course is aimed to understand the merchandiser's way to set the objectives to develop the product given following the work flow and the norms required. This course covers preparation of Bill of Materials, Identification of Vendor or Supplier and Evaluation of different parameters.

Course Contents:

Module-I: Vendor Identification.

Vendor database - Method of Identify the vendors for initial development and confirmation on bulk if approved, Method of update the Vendor database, **Swatches collection** - Collect all kind of relevant swatches to meet the design brief from fabrics to trims and get confirmation on the same.

Appropriateness of Tech-pack - Method of appropriate personnel are consulted with to confirm feasibility.

Module-II: Preparation & Evaluation of the Bill of Material (BOM)

Bill of Material (BOM) – Procedure and Method of preparation a well formed BOM (Bill of Material) for each of the styles in the collection. Method of specify all that is required like the raw material, parts, quantities of each needed to manufacture the end product. **Primary costing** - Method of initial costing of the sampling derived. **Consumption identification** - Appropriate personnel identified for the consumption to be made for making, **Follow up Procedures** - Required involvement of patternmaker and tailor, Determination of monitoring procedures and checking points, follow-ups with IE Department and calculation of the SAM (Standard Allowed Minute) of the sample. **TNA (Time and Action) calendar** – Method of TNA (Time and Action) calendar preparation made with the estimated details got to fix on the delivery date after confirmation on the sample.

Module-III: Organizational Context & Technical Knowledge

Organizational processes – Understand the protocol to obtain more information on work related tasks. Understand the limits of merchandiser's role and responsibilities in relation to IT service requests or incidents and reporting structure. **Technical processes** - Understand how to use equipment, templates and processes for preparing the tech-pack., understand the fabrics and garments that require stitching by hand or machine stitching. Understand Sewing and Pattern making techniques to put across ideology the tailor master to make the same, Understand concepts of product and pricing life cycle, Procedure for Pricing and costing.

Examination Scheme:

Components	A	L	CT	EE
Weightage (%)	05	10	15	70

(**A**-Attendance; **L**- Learning Assignments; **CT**-Class Test; **EE**-End Semester Examination)

Text & References:

- A J Chuter, Introduction to clothing production management.
- Gini Stephens Frings (1999): Fashion: From concept to consumer, Prentice-Hill Inc.
- Grace I kunz, Merchandising: Theory, Practice and Principles..
- V.D Dudeja, Professional Management of Fashion Industry.

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Syllabus - Semester Fourth

PROTOTYPE PREPARATION AND MERCHANDISE PLAN

Course Code: VFD2451

Credit Units: 03

Course Objective:

This course helps the students to learn how to develop the samples against the design brief for analyzing and getting it confirmed for bulk production as well as how to plan and process for production. The scope of this course is Prototype Preparation and Merchandise plan.

Course Contents:

Module-I: Prototype Preparation

Specification sheet follow-ups - Procedure of check the specification sheet prepared in accordance with standard format. Preparation, coordination and confirmation of pattern cutting, detailed drawings and mini- markers. Preparation, coordination and confirmation of patterns developed are according to the shrinkage report, tested and received. Procedure and method of checking of assembled garments according to specifications sheet and accepted garment assembly techniques. **Prototype test report** – Procedure and method of Prototype sent for test report either according to company norms or as per the buyers standards requested.

Module-II: Merchandise Plan.

Buyer approval process - Preparation, coordination and confirmation Prototype checked with design team and sent to buyer for approval and accordingly changes done if any and confirmed for production. Size sets approved internally. **P.O (Purchase Order) & P.I (Performa Invoice)** - Procedure and Method of raise and receive P.O (Purchase Order) & P.I (Performa Invoice) after confirmation on the costing to buyer and vendor. **Approval and updating of work sheets** - Procedure and method of approval and updating of all the work sheets, like the trims sheet, fabric sheet, consumption sheet (fabric and thread) this also includes in tech-pack, if any. Procedure and method of actual TNA updating that sent for approval.

Examination Scheme:

Components	A	L	CT	EE
Weightage (%)	05	10	15	70

(A-Attendance; L- Learning Assignments; CT-Class Test; EE-End Semester Examination)

Text & References:

- A J Chuter, Introduction to clothing production management
- Design Research: Methods and Perspectives, edited by Brenda Laurel
- Gini Stephens Frings (1999): Fashion: From concept to consumer, Prentice-Hill Inc.
- Grace I kunz, Merchandising: Theory, Practice and Principles
- Harry B. Watton (1992.). New Product Planning, Prentice Hall Inc.
- John Donnellan , Merchandise Buying and Management.
- Lynda Gamans, Retailing Principles
- Maria Constantino, Fashion Marketing and PR
- Nicholas Alexander, international Retailing

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Syllabus - Semester Fifth

PRE-PRODUCTION MANAGEMENT

Course Code: VFD2551

Credit Units: 03

Course Objective:

This course focuses on the method of organizes and coordinates the pre-production meeting and a well prepared pre-production file.

Course Contents:

Module-I: Updating Time & Action Calendar (TNA)

Time & Action Calendar (TNA) Follow-ups- Procedure and method of updated on the TNA prepared. Procedure and method of coordination with all departments in the organization. Procedure and method of check on mainly with status on the warehouse to know if the raw materials, trims and all necessary ordered are getting in-house on time.

Module-II: Preparation of pre-production file and pre-production meeting (PPM)

Pre-production file - Procedure and method of create a good and accurate and pre-production file. - Procedure and method of create Trims and accessories card, Procedure and method of create a card that contained all the approved swatches / lab dips and samples with strike offs etc. Procedure and method of maintaining the file with the tech-pack, production order sheet with size break up, cut plan and mini marker, packaging specification, washing instruction (if any), Test report, TNA Chart and important mail conversations etc. **Pre-production meeting** - Procedure and method of clarifies and address any potential issues if any at the pre-production meeting. Procedure and method of identify any other issues, raised if any from the other department personnel attending the meeting. Procedure and method of handling to sort out issue based PPM meeting, if any. Procedure and method of prepare minutes of the PPM meeting.

Module-III: Applied Learning Assignments. (Practical)

The students will have to prepare a pre-production file for the part of their study. Each student has to submit their file in a standard format guided by the faculty for the final evaluation. The students are asked to give a brief oral presentation with 'Power Point' to the class about their understanding. The submission of pre-production file and presentation will be part of student's internal examination scheme.

Examination Scheme:

Components	A	L	Practical	EE
Weightage (%)	05	10	15	70

(A-Attendance; L- Learning Assignments; CT-Class Test; EE-End Semester Examination)

Text & References:

- A J Chuter, Introduction to clothing production management
- B. Rao (2009). Business Ethics & Professional Values, Excel Books India.
- B S Jolly, Law, Ethics & Communication- FOR CA-IPCC, Tata McGraw-Hill Education
- Design Research: Methods and Perspectives, edited by Brenda Laurel
- Gini Stephens Frings (1999): Fashion: From concept to consumer, Prentice-Hill Inc.
- Grace I kunz, Merchandising: Theory, Practice and Principles
- Harry B. Watton (1992.). New Product Planning, Prentice Hall Inc.
- Herta A. Murphy (1990), Effective Business Communications, McGraw-Hill Ryerson, Limited.
- John Donnellan , Merchandise Buying and Management.

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Syllabus - Semester Sixth

SHIPMENT & DOCUMENTATION MANAGEMENT

Course Code: VFD2651

Credit Units: 03

Course Objective:

This course is aimed to understand how the merchandiser coordinates with the factory to check on the smooth running of it to meet the delivery line. This course discuss about hoe the merchandiser handles the program during shipment while the quality check is done and all approved.

Course Contents:

Module-I: Buying House Coordination

Buyer Coordination - Procedure and method of coordinate with buyer or buying house if any clarification is required that is if any issue raised during production is not well identified internally. **QA or 3rd Party QA** - Procedure and method of coordinating with buying house QA or 3rd Party QA for initial/mid and final inspection of shipment. Procedures and methods of inspection

Module-II: Coordination and Management of Shipment

Execution of orders - Procedure and method of check execution of orders whether it is running on time. **Shipping and Documentation** - Procedure of shipping and documentation. Method of coordination with shipping and documentation department for forwarding approved shipment. Procedure and method of closely work with logistics and help shipping department with timely information of packing reports for preparation of shipping documents.

Module-III: Industrial Visits

The students will have to visit various export and buying houses for the part of their study.

The students are asked to give a brief oral presentation with 'Power Point' to the class about their Understanding. They have to explain, what kind of knowledge they want to develop in the field of merchandizing and a debate will follow as well. The submission of industrial visit report and presentation will be part of student's internal examination scheme.

Examination Scheme:

Components	A	L	CT	EE
Weightage (%)	05	10	15	70

(A-Attendance; L- Learning Assignments; CT-Class Test; EE-End Semester Examination)

Text & References:

- A J Chuter, Introduction to clothing production management
- Gini Stephens Frings (1999): Fashion: From concept to consumer, Prentice-Hill Inc.
- Grace I kunz, Merchandising: Theory, Practice and Principles
- Harry B. Watton (1992.). New Product Planning, Prentice Hall Inc.
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Programme Structure Curriculum & Scheme of Examination 2022

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COMPUTER APPLICATIONS

Course Code: FST2103

Credit Units: 02

Course Objective:

This course introduces students with computer and its importance in the present world. Fundamentals of computers are learnt through lectures and practical assignments. Different applications of computers are used to make them skilled.

Course Content:

Module I : Overview of the working of a computer

Basic concepts in stored program execution, Input, output, storage devices, RAMS, ROM etc.

Module II : History of computers and its emergence

Module III : Working knowledge of Microsoft Word & Excel

Module III : Working knowledge of PowerPoint and learn making presentation in PPT

Examination Scheme:

Components	A	H	CT	EE
Weightage (%)	05	10	15	70

(A-Attendance; H -Home Assignment; CT-Class Test; EE-End Semester Examination)


Text & References:

Text:

- Winifred Aldrich, CAD in Clothing and Textiles

References:

- Triedman and Cullan , Colour Graphic
- B.B. Publications Introduction to Computers


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PATTERN MAKING & DRAFTING-II

Course Code: FST2202

Credit Units: 02

Course Objective: This part of pattern making course enables to Develop an about the details of construction and understanding the patterns of kids wear and it's variation. This course gives the full knowledge of different type of collars and sleeves.

Course Content:

Module I: Collars

Drafting and adaptation of various collars - Peter Pan Collar – Flat and raised, Cape collar, Sailor's collar, Convertible collar, Mandarin collar

Module II: Sleeves

Drafting of different type of Sleeves –Plain sleeve, puff gathered top and bottom, bell sleeve, bishop sleeve, Cap sleeve. Flared Sleeve, Magyar Sleeve Balloon Sleeve, Petal Sleeve, Leg-o- mutton sleeve, Kimono& Raglan

Module III: Petticoat

Drafting of petticoat – A- Line, Straight, 6 panels

Module IV: Project

Kids wear Project- To develop an understanding of the fashion design process along with kids wear segments. Developing a design brief and a range of kids wear for different age groups.

Submission of Practical Work records (Compulsory)

Course Evaluation:

Components	A	H	R	EE
Weightage (%)	5	10	15	70

A: Attendance, H: Home Assignment, R: Practical work records, EE: End Semester Examination;

Text Books

- Bina Ablang& Kathleen Maggio. UK October 2008/US August 2008. *Integrating Draping, Drafting & Drawing*. Fairchild Books
- Nora. M. MacDonald. UK December 2009/US October 2009. *Principles of Flat PatternDesign 4th edition*. Fairchild Books

Reference Books

- Ernestine Kopp., Lee Gross. Beatrice Zelin & VittorinaRolfo. UK January 1991/US September 1991. *How to draft basic patterns*. Fairchild Books
- Helen Joseph-Armstrong. UK April 2013/US February 2013. *Draping for Apparel Design*. Fairchild Books.
- Bernard Zamkoff& Jeannie Price. UK August 2009/ US June 2009. *Basic PatternSkills for Fashion Design*. Fairchild Books
- BrunellaGiannangeli. December 2010... *Couture unfolded: Innovative pleats, folds& draping in Fashion Design*. Promopress Bilingual Edition

- Winfred A, Metric Pattern Cutting for children's wear and baby wear, 2011, New Delhi, Wiley.
- Peacock John, Children's costume- The complete historical source book, 2009, London, Thames and Hudson.



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GARMENT CONSTRUCTION-I

Course Code: FST2203

Credit Units: 02

Course Objective: The course enables to develop an understanding of the garments of kids wear and its variation. This course gives the full knowledge of different type of collars and sleeves.

Course Contents:

Module I: Collars Peter Pan collar – Flat and raised, Cape collar, Sailor's collar, Convertible collar, Chinese/Mandarin Collar. Construction and adaptation of various collars

Module II: Sleeves

Plain sleeve, puff gathered top and bottom, bell sleeve, bishop sleeve, Cap sleeve, Flared Sleeve, Magyar Sleeve, Balloon Sleeve, Petal Sleeve, and Leg-o- mutton sleeve. Construction of different type of Sleeves

Module III: Petticoat

Types of Petticoat-A- Line, Straight, 6 Panels, Construction of petticoat

Module IV: Project Kids wear

Submission of Practical Work records (Compulsory)

Course Evaluation:

Components	A	H	R	EE
Weightage (%)	5	10	15	70

A: Attendance, H: Home Assignment, R: Practical work records, EE: End Semester Examination;

Text Books

- Bina Abbing & Kathleen Maggio. UK October 2008/US August 2008. *Integrating Draping, Drafting & Drawing*. Fairchild Books
- Milva Fiorella Di Lorenzo. UK November 2009/US September 2009. *Tailoring Technique's for Fashion*. Fairchild Books.
- Zoya Nudelman. UK August 2009/US June 2009. *The Art of Couture Sewing*. Fairchild Books.
- Annette Fischer. UK November 2008/US December 2008. *Basic Fashion Design 03-Construction*. Ava Publishing.

Reference Books

- Mary Ruth Shields. UK October 2010/US August 2010. *Industry Clothing Construction Methods*. Fairchild Books.
- Pamela Powell. UK September 2010/US July 2010. *Tailored Fashion Design*. Fairchild Books.
- Amaden-Crawford, Crawford. UK September 2014. *Fashion Sewing- Introductory Technique's*. Fairchild Books.
- Janace. E. Bubonia. UK December 2014/US October 2014. *Apparel Quality- A Guide to Evaluating Sewn Products*. Fairchild Books.
- Raul Jewel. Publishing year unknown. *Encyclopedia of Dress Making*. Publisher unknown.


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COMPUTER-AIDED DESIGN-I

Course Code: FST2204

Credit Units: 01

Course Objective:

This course focuses on the usage of Usage of computers in Fashion & Apparel Industry

Course Content:

Module I	:	Corel Draw - Tool Introduction and usage.
Module II	:	Functions of tools and its usage.
Module III	:	Figure Drawing - Block figure and Flesh figure
Module IV	:	Working with layouts
Module V	:	Creating Prints and textures
Module VI	:	Tutorials

Examination Scheme:

Components	A	H	CT	EE
Weightage (%)	05	10	15	70

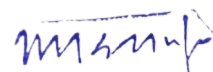
(A-Attendance; H -Home Assignment; CT-Class Test; EE-End Semester Examination)

Text & References:

- Winifred Aldrich, CAD in Clothing and Textiles



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FABRIC ARTISTRY & EMBROIDERY

Course Code: FST2205

Credit Units: 02

Course Objective

The students will develop a thorough understanding of various techniques used to impart various decorative skills on fabric through practical exercises.

Course Contents:

Module I : Introduction to fabric decoration.

Embroidery - Basic stitches- Running, Back stitch, split stitch, Simple couching, Stem, Satin, Cross, Blanket and Crossed buttonhole Closed buttonhole, Framed, Buttonhole, Chain, Feather, Fly, Herring bone, French knot bullion. **Transferring and Tracing techniques of Designs** - Practical exercise.

Module II : Techniques of thread embroidery

Mirror Work - Mirror work places of India, Types of mirrors, stitches and designs. **Bead Works** – Definition, Bead work places of India, Articles, materials and stitches used for bead work. **Metal thread embroidery** - Definition, Metal thread embroidery places of India, Articles, materials and stitches used for Metal thread embroidery. **Smocking** – Definition, stitches used for smocking – Honey comb smocking.

Module III : Lace Work, Appliqué Work & Quilting

Lace Work – Types of hand and machine made laces, Attaching laces to fabrics; **Appliqué Work** - Definition and Traditional examples- Raw edge appliqué, Satin stitched appliqué, Couched appliqué, Buttonhole appliqué, Chain stitched appliqué, Lined appliqué, Patch Work. **Quilting** – Definition and Traditional examples – Kantha and Sujni – executing various designs using running stitch.

Module IV : Basic Hand Stitches

Hand Stitches - Running stitch, Basting, Gathering, Overcasting, Fagoting, and Hemming.

Module V : Basics of Fabric Embellishment. (Theory)

Constructed Artistry - Yarn design, Weave design, Knitwear design; **Dye & Print Artistry** - Tie & Dye, Batik, Stencil, Screen, Block Printing. **Indian Hand-Painted Artistry** – Pichvai of Rajasthan, Pad of Rajasthan, Kalamkari of Andhra Pradesh, Patachitra of Orissa.

Submission of practical work records - (Compulsory)

Examination Scheme:

Components	A	H	R	V	EE
Weightage (%)	05	05	15	05	70

(A - Attendance; H -Home Assignment; R- Practical work records; V- Viva voce, EE-End Semester Examination)

References:

- Creative Publishing, Miunozota, Colour and Design on Fabric (Singer Design), 2000.
- The Buttrick Co. NY, USA, Buttrick Dressmaking, 1940.
- Janet Maigh, Crazy Patch Work, Collins and Brown, London, 1998.
- Morrel Anna, Techniques of Indian Embroidery, BT Batsford Ltd; London, 1994
- Jacquie Wilson, Handbook of textile design, Woodhead Publishing Limited England, 2001
- Langerford A Kadolpher S, Textiles Printine Hall, N.J. Ohio, 1998.

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FASHION- BUSINESS LAWS, ETHICS AND COMMUNICATION

Course Code: FDT2208

Credit Units: 03

Course Objective:

Whatever may be the nature of a given society, the contractual relations, as are obtained in that society, are governed by certain principles which are more or less of a general and basic nature. In India these general principles are included in the statute of the Indian Contract Act, 1872. This course is designed to acquaint a student with the conceptual and operational parameters of these various general principles of contractual relations. Further to teach methods- to handle Fashion law clients including designers, fashion houses, distributors, manufacturers, modeling agencies, retailers, and photographers and make legal contracts with them and work as professionals in the field of fashion law, intellectual property, fashion business and finance, international fashion trade, government regulations. Lastly to teach business ethics and communication skills among students.

Course Contents:

Module I: Fashion Business Laws

Indian Contract Act, 1872: Definitions (S.2): Agreement, Kinds of Agreements, Contract Kinds of Contracts: Valid, Void, Voidable, Contingent and Quasi Contract and E-Contract, Distinguish between Agreement and Contract; Offer or Proposal- Definition, Essentials of Valid proposal or offer, Counter offer, Standing or Open offer, Distinguish between offer and Invitation to offer, Acceptance- Definition, Essentials of a Valid Acceptance, Promise, Communication of Offer and Acceptance and Revocation, Capacity to contract (Ss. 10-12), Consent and Free Consent (Ss. 13-22), Consideration (S.2 and 25) and Void Agreements (Ss.24-30).

Special Contracts: Law of Indemnity and Guarantee (Ss. 124-125, Ss-126-129, 132- 147). Law of Bailment and pledge (Ss.148, 152-154, 162, 172, 178, 178A & 179), Law of Agency (S.182-185 & 201-209 only).

Module II: Sale of Goods Act, 1931 and Negotiable Instruments Act, 1881

Introduction, Definitions (Sec-2), Formalities of the Contract of Sale (Ss.4-10), Distinction between 'Sale' and Agreement of Sell, Conditions and Warranties (11-17), Transfer of Property as between the Seller and the Buyer, Rights of an Unpaid Seller (Secs. 45-54).

Meaning and Characteristics of Negotiable Instrument, Operational Rules of Evidence– Presumptions, Classifications of Negotiable Instruments; Meaning of Cheque, Types of Cheque and Penalties in case of Dishonor of certain cheques, Distinguish between Cheque and Bill of Exchange, (Secs: 6, 123-131A, 138-147).

Module III: Business Ethics and Business Communications

Introduction to Business Ethics-The nature and purpose of ethics and morals for organizational interests; Ethics and Conflicts of Interests; Ethical and Social Implications of business policies and decisions; Corporate Social Responsibility; Ethical issues in Corporate Governance.

Communication in Business Environment-Business Meetings – Notice, Agenda, Minutes, Chairperson's speech; Press releases, Corporate announcements by stock exchanges; Reporting of proceedings of a meeting.

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Examination Scheme:

Components	P	CT	A	EE
Weightage (%)	10	15	5	70

(A-Attendance; P-Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination; PT- Portfolio)

Text Books

- PC Tulsiyan- Business Laws
- Avtar Singh - Indian Contract Act
- Bangia - Law of Contract and Specific Relief
- S.K Kapoor, Law of Contract
- Narayan, Intellectual Property Rights

Reference Books

- Anson - Law of Contract
- Pollock and Mulla - Indian Contract Act
- Cheshire and Fifoot - Law of Contract.



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FASHION ART ILLUSTRATION AND MODEL DRAWING-III

Course Code: FST2301

Credit Units: 02

Course Objective: The Course enables to further enhance the designing skills of the students and help them in designing more formal and high fashion garments. The students will also be working in their own stylized form with respective themes.

Course Contents:

Module-1: Optical illusions

Module-2: Male block figures (front, side, $\frac{3}{4}$, back)

Module-3: Male flesh figures (front, side, $\frac{3}{4}$, back)

Module-4: Rendering of male Croquis with different color mediums (Staedtlers pencils, water colors, poster paints)

Module-5: Designing of casual wear for females with background

Module-6: Designing of executive wear for females with background

Module-7: Designing of sportswear for females with background

Module-8: Designing of resort wear for females

Submission of practical work records - (Compulsory)

Course Evaluation:

Components	A	H	R	EE
Weightage (%)	05	10	15	70

(A - Attendance; H -Home Assignment; R- Practical work records; EE-End Semester Examination)

Text &References:

Text Books:

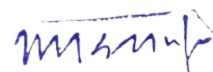
- Kathryn McKelvey, Fashion Source Book

References:

- BinaAbling, Fashion Model Drawing
- Patrick John Ireland, Introduction to Fashion Design
- Patrick John Ireland, Encyclopaedia of Fashion Detail, Batsford, 1987



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ADVANCE PATTERN MAKING-I

Course Code: FST2302

Credit Units: 02

Course Objective: The course enables students to learn about details of construction of patterns women's garments like sari blouse and its variation, kurta, salwar etc. The course gives the full knowledge of dart manipulation. The students learn to interpret design and create the patterns for that design.

Course Contents:

Module I: Master Patterns

Adult Bodice block (front & back), Plain sleeve, Skirt (front & back)

Module II: Dart Manipulation

Introduction the slash and spread technique; Suppression positions; Single dart series- common dart position and shaped darts; Two dart series; Form of suppression: dart folds, dart tucks, gathers, pleats, flares etc; Development of styles through dart manipulation –connecting darts to create seam lines; style development.

Module III: Torso, Princess line foundation

Module IV: Sari Blouse

Drafting of four dart, princess-panel, yoke band, katori cut blouses

Module V: Kurta& Salwar

Drafting of Kurtas: Straight, A-Line, Kalidar and Umbrella Kurta; Drafting of Salwar: Plain and Patiala

Module VI Project - Indian Traditional wear project

Research on market, trends, Forecasts, brands for specific Indian wear ensembles, details, trims and finishes client research. Design Realization of one chosen ensemble from a range of five.

Submission of practical work records - (Compulsory)

Course Evaluation:

Components	A	H	R	EE
Weightage (%)	5	10	15	70

A: Attendance, H: Home Assignment, R: Practical work records, EE: End Semester Examination;

Text Books

- Bina Abbing & Kathleen Maggio. UK October 2008/US August 2008. *Integrating Draping, Drafting & Drawing*. Fairchild Books
- Nora. M. MacDonald. UK December 2009/US October 2009. *Principles of Flat Pattern Design 4th edition*. Fairchild Books
- Aldrich W, Metric Pattern cutting for women's wear, 5th Edition, 2008, Oxford, Blackwell.
- Joseph Armstrong, Pattern making for Fashion Design, IV Edition, 2013, New Delhi, Pearson.

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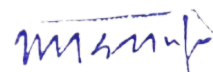
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Reference Books

- Ernestine Kopp., Lee Gross. Beatrice Zelin&Vittorina Rolfo. UK January 1991/US September 1991. *How to draft basic patterns*. Fairchild Books
- Helen Joseph-Armstrong. UK April 2013/US February 2013. *Draping for Apparel Design*. Fairchild Books.
- Bernard Zamkoff& Jeannie Price. UK August 2009/ US June 2009. *Basic Pattern Skills for Fashion Design*. Fairchild Books
- Brunella Giannangeli. December 2010... *Couture unfolded: Innovative pleats, folds& draping in Fashion Design*. Promopress Bilingual Edition
- Steven, S. *Illustrating Fashion: Concept to Creation*, 2010. New York, Fairchild Books.
- Tain, L. *Portfolio Presentation for Fashion Designers* 1998. New York, Fairchild Books.



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GARMENT CONSTRUCTION-II

Course Code: FST2303

Credit Units: 02

Course Objective: The course enables students to learn about details of construction. It's important and most commonly worn women's garments like sari blouse and its variation, kurta, salwar etc. This course gives the full knowledge of dart manipulation. The students learn to interpret design and create the pattern for that design.

Course Content:

Module I: Master Patterns

Adult Bodice block (front & back), Plain sleeve, Skirt (front & back)

Module II: Dart Manipulation

Introduction the slash and spread technique; Suppression positions; Single dart series- common dart position and shaped darts; Two dart series; Form of suppression: dart folds, dart tucks, gathers, pleats, flares etc.; Development of styles through dart manipulation –connecting darts to create seam lines; style development.

Module III: Construction of Torso & Princess line foundation

Module IV: Sari Blouse

Introduction & Construction of Sari Blouses – four dart, princess-panel, yoke band, katori cut

Module V: Kurta & Salwar

Introduction & Construction of Kurta- Straight, A-Line, Kalidhar and Umbrella Kurta; **Salwar-** Plain and Patiala salwar

Module VI: Project - Indian Traditional wear project

Submission of Practical Work records (Compulsory)

Course Evaluation:

Components	A	H	R	EE
Weightage (%)	5	10	15	70

A: Attendance, H: Home Assignment, R: Practical work records, EE: End Semester Examination;

Text Books

- Bina Abbing & Kathleen Maggio. UK October 2008/US August 2008. *Integrating Draping, Drafting & Drawing*. Fairchild Books
- Milva Fiorella Di Lorenzo. UK November 2009/US September 2009. *Tailoring Technique's for Fashion*. Fairchild Books.
- Zoya Nudelman. UK August 2009/US June 2009. *The Art of Couture Sewing*. Fairchild Books.
- Annette Fischer. UK November 2008/US December 2008. *Basic Fashion Design 03-Construction*. Ava Publishing.


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Reference Books

- Julie Cole & Sharon Czachor. UK July 2014/US June 2014. Professional Sewing Techniques for Designers. Fairchild Books 2nd edition.
- Amaden-Crawford, Crawford. UK September 2014. *Fashion Sewing- Introductory Technique's*. Fairchild Books.
- Janace. E. Bubonia. UK December 2014/US October 2014. *Apparel Quality- A Guide to Evaluating Sewn Products*. Fairchild Books.
- *Classic Tailoring Technique's- A Construction Guide for Women's Wear*. Fairchild Books.



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APPAREL PRODUCTION

Course Code: FST2306

Credit Units: 02

FST2306	Apparel Production	L	T	P	C
Version 1.1	Date of Approval: July 2021	1	-	2	2
Pre-requisites/Exposure	NIL				
Co-requisites	NIL				

Catalog Description

This course enables and builds people to understand completely about apparel production in terms of machinery and equipment. Production methodology helps to understand the concept of assembly line, garment manufacturing, and quality checkpoints in production line.

Course Objectives

- The objective of this course is to Make students aware of the methods of apparel production. Its provide knowledge regarding machinery, equipment's, production methodology, Garment cost

Course Outcomes

On completion of this course, the students will be able to

- CO1. Understand the methods of apparel production.
- CO2. Learn production planning and control, quality assurance and production methodology.
- CO3. Understand the concept of labeling and packaging in apparels.
- CO4. Write the cost sheet in terms of garment costing.

Modules	Blooms Slevel*	Number of hours
Modules I : Introduction to Indian Apparel Industry : Organizational structure and sectors of the garment industry, apparel product types, developments in recent years, opportunities and challenges in Indian apparel sector, over view of global apparel industry, major trends in international apparel technological concepts.	L1,	10
Modules II: Machinery and Equipment This unit includes machinery and equipment related to cutting, sewing, finishing, washing, stain removal and embellishment.	L1,L3	10
Modules III: Production & Workroom management : Pre production process: Tech pack analysis, sampling, pattern and marker preparation, fabric and accessory procurement, sample types, approvals. Garment production: Sequence of production operations for shirts, trousers, jackets, skirts and vests.	L1,L2,L3	10
Module IV– Production Management and Material Planning & Allocation Meaning and need for production	L2,L3,L6	10

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management; Types of production- Job Batch and mass production. Material planning and allocation; Process planning and process sheet; Job Production control		
Module V–Garment Costing	L4,L6	5

Bloom's Level

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

1. Giglio and berks fashion production terms Greg hazer fantastic fit for everybody; Helen gover AK fashion buying.

Reference Books

1. AJ Shooter introduction to Ooh clothing production management apparel online apparel views clothesline Moda Vogue simplicity.
Submission of Practical Work records (Compulsory)

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

Relationship between the Course Outcomes (COs , Programme Outcomes (POs) and Program Specific Outcomes

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	2	1	1	1	3	1	1	1	2	2	3	1	3	3	3	3	3
CO2	2	1	1	1	3	1	1	1	1	1	3	1	3	3	3	3	3
CO3	2	1	1	1	3	1	1	1	2	3	3	1	2	2	2	2	2
CO4	2	1	1	1	3	1	1	1	1	1	3	1	1	1	1	1	1

1: strongly related, 2: moderately related and 3: weakly relate



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COMPUTER-AIDED MANUFACTURING (CAM)

Course Code: FST2309

Credit Units: 03

Course Objective:

This module makes the student know-how the Computer Applications in the Fashion & Apparel Industry.

Course Content:

Module I	:	Adobe Photoshop - Functions of Tools & Working on layers
Module II	:	Photo-editing & its usage
Module III	:	Demo on 'TUKA cad' Module
Module IV	:	Mode conversation through editing
Module V	:	Demo on 'Opti Tex'
Module VI	:	Rendering & filter effects along tutorials

Examination Scheme:

Components	A	H	CT	EE
Weightage (%)	05	10	15	70

(A-Attendance; H -Home Assignment; CT-Class Test; EE-End Semester Examination)

Text & References:

Text:


- Corel DRAW 11 for Windows: Visual Quick start Guide
- Jim X. Chen, Guide to Graphics software
- David Huss, Gary W. Priester ,Corel DRAW Studio Techniques, McGraw-Hill Osborne Media, 1998
- CorelDraw 10 for Windows: Visual Quick Start Guide.
- Linnea Dayton, Cristen Gillespie, The Photoshop Cs/Cs2 Wow!

References:

- Illustrated Encyclopedia of Costume and Fashion,
- Jill B. Treadwell, Edited: Donald Treadwell, Public Relations Writing: Principles in Practice, SAGE, 2004



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PROJECT PRESENTATION

Course Code: FST2332

Credit Units: 03

Guidelines for the project

The purpose of this project is to help students to learn the procedure of doing research on a subject of their interest related to fashion field and then analyse & evaluate it in a presentable manner. They will have to submit a report and will have to give presentation for the same. This project will be conducted during their summer break.

In general, the File should be comprehensive and include:

- A short account of the activities that were undertaken as part of the project.
- A statement about the extent to which the project has achieved its stated objectives.
- A statement about the outcomes of the evaluation and dissemination process engaged in as part of the project.
- Any problems that have arisen and may be useful to document for future reference.

Project Report

The project report is the final research report that the student prepares on the project he chose. Following components should be included in the project report:

- **Title or Cover Page:** Title Page should contain Project Title; Student's Name; Programme; Year and Semester and Name of the Faculty Guide
- **Acknowledgement(s):** Acknowledgement to any advisory or financial assistance received in the course of work may be given. It is incomplete without student's signature.
- **Abstract:** A good abstract should be straight to the point; not too descriptive but fully informative. First paragraph should state what was accomplished with regard to the objectives. The abstract does not have to be an entire summary of the project, but rather a concise summary of the scope and results of the project. It should not exceed more than 1000 words.
- Table of Contents
- Introduction
- Materials and Methods
- Result and Discussions
- Conclusions & Recommendations
- Implications for Future Research
- References

The Layout Guidelines for the Project File & Project Report

- A4 Size Paper
- Font: Arial (10 points) or Times New Roman (12 points)
- Line spacing: 1.5
- Top and bottom margins: 1 inch/2.5 cm; left & right margins: 1.25 inches/ 3 cm

Assessment Scheme:

Continuous Evaluation: 40% (Based on punctuality, regularity of work, adherence to plan and methodology, refinements etc.)

Final Evaluation: 60% (Based on the Documentation in the file, Final report, analysis and results, achievement of objectives, presentation/viva)

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FASHION ART ILLUSTRATION AND MODEL DRAWING-IV

Course Code: FST2401

Credit Units: 02

Course Objective: The study of this course develops the student's ability to design for different category of people: casual and formal. This focuses on designing of a garment according to requirement of the industry keeping in mind the forecast of the season. After the students learn the draping of male figure and move to stylized sketching using different color mediums. Students will be able to work on theme boards, mood boards & color boards.

Course Contents:

Module-1: Draping of male figures.

Module-2: Uses of textures in male's apparel (leather, denim, knits etc.)

Module-3: Designing of wedding collection- males & females.

Module-4: Designing of night wear.

Module-5: Designing of uniforms- air lines, hotel staff and industries.

Module-6: Inspirational and innovative designing

Submission of practical work records - (Compulsory)

Course Evaluation:

Components	A	H	R	EE
Weightage (%)	05	10	15	70

(A - Attendance; H -Home Assignment; R- Practical work records; EE-End Semester Examination)

Text & References:

Text Books:

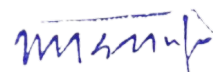
- Mc Kenzie, Best in sports wear design
- Lisa Light, Destination Bride, F+W Media, 2005

References:

- Patrick John Ireland, Introduction to fashion design
- Sharon Lee Tate, Inside fashion design, Pearson Education India, 2004
- Fashion design and illustrations
- Patrick John Ireland, Encyclopedia of fashion detail, Batsford, 1987



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ADVANCE PATTERN MAKING-II

Course Code: FST2402

Credit Units: 01

Course Objective: The course enables students to learn about details of construction of pattern for important and most commonly worn women's garments like trousers, skirt and its variation, shirt's etc. This course gives the full knowledge of cuffs, plackets and belts. The students learn to interpret design and create the pattern for that design.

Course Content:

Module I: Basic methods and techniques

Basic yokes and cowls, Basic Bodice Contouring: Corset, Strapless Foundation.

Module II: Developing pattern for various Styles

Dresses with seam lines, co-ordinates and dresses without seam lines.

Module III: Skirt Variations

Circular Skirt, Semi Circular Skirt, Four Gore Skirt, Eight Gore Skirt, Princess Line Skirt, Skirt with Flounce, Skirt with Inverted Pleats, Skirt with Box Pleats, Skirts with Knife Pleats and Skirt with Yoke Skirt with Set in Pleats.

Module IV: Executive wear

Drafting of basic trouser block and its variation.

Drafting of shirt (basic and slim fit) with cuffs and collars.

Module V: Drafting of corporate wear and Semi Couture Women's Evening Wear Project -

Research on market, trends, Forecasts, brands for specific, details, trims and finishes, client research, fabric sourcing and surface development Design Realization of one chosen ensemble from a range of five.

Submission of Practical Work records (Compulsory)

Course Evaluation:

Components	A	H	R	EE
Weightage (%)	5	10	15	70

A: Attendance, H: Home Assignment, R: Practical work records, EE: End Semester Examination;

Text Books

- Bina Abbing & Kathleen Maggio. UK October 2008/US August 2008. *Integrating Draping, Drafting & Drawing*. Fairchild Books
- Nora. M. MacDonald. UK December 2009/US October 2009. *Principles of Flat Pattern Design 4th edition*. Fairchild Books
- Aldrich W, Metric Pattern cutting for women's wear, 5th Edition, 2008, Oxford, Blackwell.
- Joseph Armstrong, Pattern making for Fashion Design, IV Edition, 2013, New Delhi, Pearson.


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Reference Books

- Ernestine Kopp., Lee Gross. Beatrice Zelin&Vittorina Rolfo. UK January 1991/US September 1991. *How to draft basic patterns*. Fairchild Books
- Helen Joseph-Armstrong. UK April 2013/US February 2013. *Draping for Apparel Design*. Fairchild Books.
- Bernard Zamkoff& Jeannie Price. UK August 2009/ US June 2009. *Basic Pattern Skills for Fashion Design*. Fairchild Books
- Brunella Giannangeli. December 2010... *Couture unfolded: Innovative pleats, folds& draping in Fashion Design*. Promopress Bilingual Edition
- Steven, S. *Illustrating Fashion: Concept to Creation*, 2010. New York, Fairchild Books.
- Tain, L. *Portfolio Presentation for Fashion Designers* 1998. New York, Fairchild Books.



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GARMENT CONSTRUCTION-III

Course Code: FST2403

Credit Units: 01

Course Objective: The course enables students to learn about details of construction and its important and most commonly worn women's garments like trousers, skirts, shirt's etc. This course gives the full knowledge of cuffs, plackets and belts. The students learn to interpret design and create the pattern for that design.

Course Contents:

Module I: Garment construction methods and techniques

Basic yokes and cowls, Basic Bodice Contouring: Corset, Strapless Foundation.

Module II: Basic Shirt and Slim fit with cuffs and collars.

Module III: Skirt variations

Skirt/Cascades Variation, Gathered Flared, Circular, Handkerchief and Godets etc

Module IV: Basic Trouser and its Variation

Module V: **Project –I:** Evening gown

Project –II: Corporate wear

Submission of Practical Work records (Compulsory)

Course Evaluation

Components	A	H	R	EE
Weightage (%)	5	10	15	70

A: Attendance, H: Home Assignment, R: Practical work records, EE: End Semester Examination;

Text Books

- Bina Abbing & Kathleen Maggio. UK October 2008/US August 2008. *Integrating Draping, Drafting & Drawing*. Fairchild Books
- Milva Fiorella Di Lorenzo. UK November 2009/US September 2009. *Tailoring Technique's for Fashion*. Fairchild Books.
- Zoya Nudelman. UK August 2009/US June 2009. *The Art of Couture Sewing*. Fairchild Books.
- Annette Fischer. UK November 2008/US December 2008. *Basic Fashion Design 03-Construction*. Ava Publishing.

Reference Books

- Mary Ruth Shields. UK October 2010/US August 2010. *Industry Clothing Construction Methods*. Fairchild Books.
- Pamela Powell. UK September 2010/US July 2010. *Tailored Fashion Design*. Fairchild Books.
- Julie Cole & Sharon Czachor. UK July 2014/US June 2014. *Professional Sewing Techniques for Designers*. Fairchild Books 2nd edition.
- Amaden-Crawford, Crawford. UK September 2014. *Fashion Sewing- Introductory Technique's*. Fairchild Books.
- Janace. E. Bubonia. UK December 2014/US October 2014. *Apparel Quality- A Guide to Evaluating Sewn Products*. Fairchild Books.
- *Classic Tailoring Technique's- A Construction Guide for Women's Wear*. Fairchild Books.
- Raul Jewel. Publishing year unknown. *Encyclopedia of Dress Making*. Publisher unknown.

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COMPUTER-AIDED DESIGN (CAD)-III

Course Code: FST2404

Credit Units: 02

Course Objective:

This study will introduce the student the usage of computer software in different areas of Fashion Designing & Technology.

Course Content:

Module I	:	Illustrator: Tool Introduction and usage
Module II	:	Functions of tools & creating objects
Module III	:	Reach ERP
Module IV	:	Setting up artwork: Transparency, Gradients and patterns
Module V	:	Dobby/Jacquard
Module VI	:	Working on Color separation (2 D)

Examination Scheme:

Components	A	H	CT	EE
Weightage (%)	05	10	15	70

(A-Attendance; H -Home Assignment; CT-Class Test; EE-End Semester Examination)

Text & References:

Text:

- Corel Draw 11 for Windows: Visual Quick Start Guide
- From Sue Chastain, your guide to Graphics software
- David Huss, Gary W. Priester, Corel Draw Studio Techniques.
- Corel Draw 10 for Windows: Visual Quick Start Guide.
- Linnea Dayton, Cristen Gillespie, The Photoshop Cs/Cs2 Wow!

References:

- Femina - Magazine.
- Elle – Magazine.
- Donald, Illustrated Encyclopedia of Costume and Fashion Public Relations Writing: Principles Practice



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VISUAL MERCHANDISING

Course Code: FST2408

Credit Units: 03

Course Objective:

Skill development in the creation of showroom or retail store window/interior displays that sell merchandise. Study of the basic techniques of store planning, mannequin dressing, alternate form design, and display space conceptualization and implementation

Course Contents:

Module I: Introduction to Visual Merchandising (VM): Introduction, Objectives, Concept of Visual Merchandising, Objectives of Visual Merchandising, Growth of Visual Merchandising, Visual Merchandising in India, Scope of visual merchandising in India, Visual Merchandising as a Support for Positioning Strategy, Prospects of Visual Merchandising, Challenges in Visual Merchandising, The common challenges, Ways to overcome the visual merchandising challenges

Module II: The Merchandise Mix: Introduction, Objectives, Concept of Merchandise Mix, Merchandise line, The Assortment of Products, Assortment strategy, Merchandise Mix of Show Off, Role of a merchandiser, Other Atmospherics in Merchandising, Colour scheme, Lighting

Module III: Store Management in Merchandising: Introduction, Objectives, Types of Stores, Location of a Store, Types of retail locations, Planning a Store Layout, Various Types of Store Layouts, Grid layout, Forced-path layout, Free-form layout, Boutique layout, Combined layout, Store Space Allocation, Heads of space allocation in a store, Managing Customer Navigation in a Store, General Rules of Customer Traffic in a Store, The Loop for Guiding the Shoppers through a Store

Module IV: Store Design and Display: Introduction, Objectives, Concept of Store Design and Display, Objectives of store design, Purpose and importance of display, Rules of display planning, Display Settings, Store Design, Exterior of a store, Interior of a store, Window displays, Merchandise Presentation Strategies, Colour blocking, Other techniques of merchandise placement, Physical materials used to support the display, Components of display, Some Useful Display Fixtures, Shelves, Gondolas, Round racks, Four ways, Saccades and fixation, Replenishes, Planogramming

Module V: Store Image & Security: Introduction, Objectives, Concept of Image Mix, Elements of Image Mix, Merchandise, Fixtures, Sound/Music, Odour, Visuals, Employees, Elements that Levy Negative Impact on Shoppers, Change of Image, Security Issues

Module VI: Managing Communication for a Retail Store Offering: Introduction, Objectives, Marketing Communication, Thematic Communication, Methods of Communication, Graphics, Signage

Module VII: The Present and Future of Visual Merchandising: Introduction, Objectives, Visual Merchandising at Different Stores, Apparel store, Furniture store, Gift store, Future Prospects of Visual Merchandising



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Examination Scheme:

Components	A	H	CT	EE
Weightage (%)	05	10	15	70

(A-Attendance; H -Home Assignment; CT-Class Test; EE-End Semester Examination)

Text & References:**Text:**

- Judith Bell and Kate Ternus , Silent Selling
- Sarah Bailey and Jonathan Baker, Visual Merchandising for Fashion

References:

- Martin M Pegler, Visual Merchandising and Display



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TERM PAPER

Course Code: FST2431

Credit Units: 02

Objective:

The objective of this course is to judge the understanding as well as application of the knowledge gained by the students. The aim of the term paper is to provide the students with an opportunity to further enhance their knowledge in a sector of their choice by undertaking a significant practical unit of examining and analyzing various aspects of business management at a level commensurate with the learning outcomes of the various courses taken up them in the ongoing semester.

A term paper is primarily a record of intelligent reading in several sources on a particular subject. The students will choose the topic at the beginning of the session in consultation with the faculty assigned. At least one middle level or senior level person of a company from the chosen sector may be interviewed face to face

Guidelines:

1. The term paper will be related to the contemporary business issue and the topic will be given by the department.
2. The presentation of the term paper is scheduled to be held before the commencement of Semester examinations.
3. The paper will carry 100 marks that will be marked on the basis of understanding and organization of content based on the literature review. The Bibliography shall form an important part of the paper.

Examination Scheme:

Organization and relevance of content	Literature Review	Bibliography	Total
40	40	20	100



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WORKSHOP

Course Code: FST2433

Credit Units: 01

OBJECTIVES:

A workshop is primarily an activity based academic event that is organized to provide the students a one to one and hands on experience on any aspect of their learning. The communication in a workshop has to be necessarily two ways. The trainer has to make sure that the aspects covered are practically practiced by the participants. The student will choose the option of workshop from amongst their concentration electives. The evaluation will be done by Board of examiners comprising of the faculties.

GUIDELINES FOR WORKSHOP

The procedure for earning credits from workshop consists of the following steps:

1. Relevant study material and references will be provided by the trainer in advance.
2. The participants are expected to explore the topic in advance and take active part in the discussions held
3. Attending and Participating in all activities of the workshop
4. Group Activities have to be undertaken by students as guided by the trainer.
5. Evaluation of workshop activities would be done through test and quiz at the end of the workshop.
6. Submitting a write up of at least 500 words about the learning outcome from the workshop.

METHODOLOGY

The methodology followed at the workshop could be based on any one or more of the following:

- Case Study
- Business Game
- Simulation
- Group Activity
- Role Play
- Business Planning
- Quiz

Examination Scheme:

Attendance	Active Participation	Multiple Choice Questions / Quiz	Solving the Case Assignment / Write up	Total
10	30	30	30	100



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FASHION ART ILLUSTRATION AND MODEL DRAWING-V

Course Code: FST2501

Credit Units: 02

Course Objective: The Course helps the students design accessories for different segment of people, along with their display and story board.

Course Contents:

Module-1: Designing of range of ties and stoles.

Module-2: Designing of accessories- head gears, belts, bags etc.

Module-3: Fashion illustration with different mediums- charcoal pencils, glitters, poster colors, staedtlers, 3-d material etc.

Module-4: Fashion illustration with different techniques- tissue paper and blow Ink color.

Submission of practical work records - (Compulsory)

Course Evaluation:

Components	A	H	R	EE
Weightage (%)	05	10	15	70

(A - Attendance; H -Home Assignment; R- Practical work records; EE-End Semester Examination)

Text & References:

Text Books:

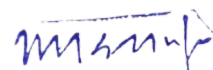
- Phyllis Tortora, The Fairchild Encyclopedia of Fashion Accessories

References:

- Patrick John Ireland, Encyclopedia of fashion detail, Batsford, 1987
- Kathryn McKelvey, Fashion Design Process
- Hamiyn, Key Moments in Fashion
- Gavin Waddell, How Fashion Work



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GARMENT CONSTRUCTION-IV

Course Code: FST2502

Credit Units: 01

Course Objective: The course enables students to learn about details of grading in construction and its important and most commonly worn women's garments like trousers, skirt and its variation, shirt's etc. The students learn to interpret design and create the pattern for that design.

Course Content

Module I: Construction of Different Grades Garments

Basic Bodice Block, Sleeves, Skirts, Trouser, collars, jackets

Module II: Project - Research on market, trends, Forecasts, brands for specific Indian wear ensembles, details, trims and finishes client research. Design Realization of one chosen ensemble from a range of five.

Theme –

- Bridal Wear
- Formal wear
- Maternity Wear
- Beach wear
- Night wear
- Executive Wear
- Street Wear
- Casual Wear

Submission of Practical Work records (Compulsory)

Course Evaluation:

Components	A	H	R	EE
Weightage (%)	5	10	15	70

A: Attendance, H: Home Assignment, R: Practical work records, EE: End Semester Examination;

Text Books

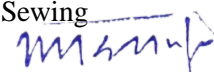
- Bina Abbing & Kathleen Maggio. UK October 2008/US August 2008. *Integrating Draping, Drafting & Drawing*. Fairchild Books
- Milva Fiorella Di Lorenzo. UK November 2009/US September 2009. *Tailoring Technique's for Fashion*. Fairchild Books.
- Zoya Nudelman. UK August 2009/US June 2009. *The Art of Couture Sewing*. Fairchild Books.
- Annette Fischer. UK November 2008/US December 2008. *Basic Fashion Design 03-Construction*. Ava Publishing.

Reference Books

- Mary Ruth Sheilds. UK October 2010/US August 2010. *Industry Clothing Construction Methods*. Fairchild Books.
- Pamela Powell. UK September 2010/US July 2010. *Tailored Fashion Design*. Fairchild Books.
- Julie Cole & Sharon Czachor. UK July 2014/US June 2014. *Professional Sewing Techniques for Designers*. Fairchild Books 2nd edition.



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- Amaden-Crawford, Crawford. UK September 2014. *Fashion Sewing- Introductory Technique's*. Fairchild Books.
- Janace. E. Bubonia. UK December 2014/US October 2014. *Apparel Quality- A Guide to Evaluating Sewn Products*. Fairchild Books.
- *Classic Tailoring Technique's- A Construction Guide for Women's Wear*. Fairchild Books.
- Raul Jewel. Publishing year unknown. *Encyclopedia of Dress Making*. Publisher unknown.



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COMPUTER AIDED DESIGN (CAD)-IV

Course Code: FST2503

Credit Units: 02

Course Objective:

This module will make the student use Fashion studio for compilation of portfolio for Graduation Design Collection undergoing various processes.

Course Contents:

Module I	:	Tools Introduction and usage
Module II	:	Cleaning & Selection of fabric
Module III	:	Color Reduction
Module IV	:	Texture Mapping.
Module V	:	Mood board & Color board
Module VI	:	Draping

Examination Scheme:

Components	A	H	CT	EE
Weightage (%)	05	10	15	70

(A-Attendance; H -Home Assignment; CT-Class Test; EE-End Semester Examination)

Text & References:

Text:


- Winifred Aldrich, CAD in Clothing and Textiles
- Alison Beazley and Terry Bond, Computer Aided Pattern Design and Product Development

References:

- Bina Abbing, Advanced Fashion Sketchbook
- Pepin Press, Ikat Patterns



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PATTERN DRAPING

Course Code: FST2504

Credit Units: 01

Course Objective:

After the students have a thorough knowledge of flat pattern-making and its application they are now introduced to the concept of three dimensional process of pattern making by draping the material on to the mannequin.

Course Contents:

Module I	:	Introduction Equipments needed, grain, seam allowances, preparation of fabric, dress form.
Module II	:	Basic patterns Basic bodice (front & back), Basic skirt (front & back), Basic sleeve
Module III	:	Variations in necklines, armholes, waistlines, princess bodice and boned bodice
Module IV	:	Creating patterns by dart manipulations Multiple darts, Dart tucks, Gathers, Pleats, Flare, Style lines and control seams
Module V	:	Style lines and control seams Use of style lines, Cowls and twists in bodice, Midriff & yoke styles
Module VI	:	Variations in skirts Variation of the basic skirt, flared, pegged, paneled, gathered, gored and pleated, Peplums- flared and gathered
Module VII	:	Collars The Mandarin collar, Convertible Collar, Peter Pan collar, Shawl collar, Notched Collar
Module VIII	:	Sleeves - The Dolman sleeve, Raglan and Kimono sleeve
Module IX	:	The Shift A Line, Tent, Blouson, Use of Facings, Closures and Pockets
Module X	:	Final Presentation

Submission of practical work records - (Compulsory)

Examination Scheme:

Components	A	P	R	EE
Weightage (%)	05	10	15	70

(A - Attendance; P - Presentation; R- Practical work records; EE-End Semester Examination)

Text & References:

Text:

- Jaffe and Rellis, Draping for Fashion Design
- Connie Amaden- Crawford, The Art of Fashion Draping

References:

- Natalie Bray, Dress Fitting

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PATTERN GRADING

Course Code: FST2505

Credit Units: 01

Course Objective:

After the knowledge of flat pattern making the students now learn how to increase or decrease any pattern in proportion.

Course Contents:

Module I	:	Introduction to Grading History, Sizes & Measurement Sizes & Development, Importance of grading, Methods of grading- Stack and Track methods, Different types of grading- horizontal, vertical and diagonal
Module II	:	The Master Grades Grading of adult bodice block- front and back, Inset and grown on sleeves
Module III	:	Grading of collar s and lapels Tailored lapel, Tailored Collar, Shawl Collar
Module IV	:	Grading of skirts Fitted skirt block-front and back, flared skirts, skirt variations, Grading of Sheeth Block
Module V	:	Grading of Trouser Block Basic Block; Trouser variation
Module VI	:	Grading of Jacket Paneled, Box and double breasted jackets
Module VII	:	Computerized Grading Technology

Examination Scheme:

Components	A	H	R	EE
Weightage (%)	05	10	15	70

(A - Attendance; H -Home Assignment; R- Practical work records; EE-End Semester Examination)

Text & References:

Text:

- Gerry Cooklin, Pattern Grading for Women's Clothes
- Gerry Cooklin, Pattern Grading for Men's Clothes
- Gerry Cooklin, Garment Technology for Fashion Designers

References:

- Natalis Bray, More Dress Pattern Designing



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FASHION MERCHANDIZING-II

Course Code: FST2506

Credit Units: 3

Course Objective:

Understand the relevance in functions of merchandising process they are taught the skills related to Sourcing developing and presenting product lines vendor and customer relationship and export documentation.

Module I: Organizational Structures

Structure of export house, buying house and domestic companies, Buyer's classification and buying network in exports

Module II: Marketing and merchandising concepts: - Study of fashion principles and fashion cycle, Fad etc., Fashion movement. Study of domestic and international markets

Module III: Environment and segmentation of fashion: -Market segments and target markets,

Module IV: Developing & presenting product lines: -This includes traditional line planning contemporary line planning

Module V: Merchandising systems - Wholesaling & retailing

Module VI: Customer vendor relationship: - This includes concept of customer service role of personal selling purpose, Online & offline wholesaling & retailing system.

Module VII: Strategies and decisions: - This includes pricing strategies promotional strategies Sourcing of raw material

Module VIII: Financial aspect of merchandising

Submission of Practical work records - (Compulsory)

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

A: Attendance, CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination


Text Books and Reference Books:

Text Books

- John Donnellan; Merchandising theory practice and principles
- Merchandise buying and Management; Grace I kunz.

Reference Books

- Mike easy fashion marketing Maria constantino fashion marketing and PR
- Nicholas Alexander International retailing
- VD dudeja professional management of fashion industry
- Lynda gamans; retailing principles


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QUALITY CONTROL & PRODUCTION MANAGEMENT-II

Course Code: FST2507

Credit Units: 03

FST2507	QUALITY CONTROL & PRODUCTION MANAGEMENT-II	L	T	P	C
Version 1.1	Date of Approval: July 2021	2	1	0	3
Pre-requisites/Exposure	NIL				
Co-requisites	NIL				

Catalog Description

Analyse, synthesis and demonstrate the basic decision-making, production, and creative processes involved in the conversion of materials to finished textile/apparel products and be familiar with the various production systems with respect to quality and able to Identify and discuss concept of apparel machinery Conceptualize the understanding of Production management

Course Objectives

- This subject provides a detailed knowledge to students regarding the quality aspects, production, planning and control, maintenance of equipment, material handling, utilization of resources etc of a garment so that the quality and cost both are in an equilibrium.

Course Outcomes

On completion of this course, the students will be able to:

- Conceptualize the understanding of Production management
- Examine the different standards applicable to industry Learn about the workroom management.
- Identify and discuss concept of apparel machinery
- Analyse the basic decision-making, production, and creative processes involved in the conversion of materials to finished textile/apparel products and be familiar with the various production systems with respect to quality.

Course Content

Modules	Blooms level*	Number of hours
Module I: Quality Control and Standards Introduction to quality control and standards: Evolution of quality, quality planning, quality control, quality assurance Quality Management System- Organizing, planning and implementation. Quality standards: importance, benefits, levels and sources of standards- ISO, AATCC, ASTM, BS, BIS, DIN.	L1, L2	6
Module II: Eco Management Eco management of textile and apparel industry: Global scenario, eco textiles, eco standards and certifications - ISO 14000, Eco-mark, OekoTex 100 standards, GOTS, OHSAS, Green label, Green Seal. Eco specifications and restrictions in apparels and textiles:	L1, L2	6

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Module III: Inventory Control and Cost Estimation Need and advantages of inventory control; introduction and functions of cost estimation, estimation procedure, elements of cost and ladder of costs, method of calculating depreciation, overhead expenses and distribution of overhead expenses	L1, L5	7
Module IV: Various Production Systems Study various production systems with respect to quality. Eg. Lean, Sigma, 5S etc.	L1, L2	10
Module V: Care, Labelling and Packaging Labelling: Introduction, labelling parameters, fibre content, care labelling and flammability, wash care labels, Packing: Function and scope of packing, packing methods, instructions, materials, weight, ratio, and labelling considerations for shipment by air and sea, packing marks, warehousing - assortment and storage methods	L1, L3	7

***Bloom's Level:**

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Textbooks & Reference

1. David H, "ISO 9000 quality system handbook", Butterworth publishing, New Delhi, 2006.
2. Juran J M and Gryna, F M, "Quality Planning and Analysis - From Product Development through Use", Tata McGraw Hill Publishing Limited, New Delhi, 2001.
3. Pradeep V Mehta, "Managing Quality in Apparel Industry", NIFT publication.
4. Sara J Kadolph, "Quality Assurance for Textiles and Apparels", Fairchild publications, 2nd Edition, 2007.
5. Saville, B.P. "Physical testing of textiles", Woodhead Publishing Ltd and CRC Press LLC, 1999

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Relationship between the Course Outcomes (COs), Programme Outcomes (POs) and Program Specific Outcomes

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	-	2	3	1	1	3	3	2	1	1	1	1	1	1	3	1	1
CO2	3	2	3	1	2	3	3	1	2	1	2	1	2	1	3	2	1
CO3	3	2	-	1	3	3	3	3	1	1	1	2	3	1	2	3	1
CO4	3	2	-	1	4	3	3	1	2	1	1	2	1	1	2	1	1

1: strongly related, 2: moderately related and 3: weakly relate

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FASHION FORECASTING

Course Code: FST2508

Credit Units: 03

Course Objective:

The students are made to start their work with the collection of data regarding fashion forecasting, trend analysis and presentations. They are then made to forecast the fashion trend and dictate fashion in their very own way.

Course Contents:

Module-I : Concept of fashion forecasting (Theory)

Awareness of fashion fairs and fashion centers, Knowledge of creative writing, Reading of fashion forecast magazine, Sources of information, Role of Exhibitions and Fashion shows

Module-II : Fashion Forecasting Process (Theory)

Market Research- Consumer research, Shopping, Sales records; **Evaluating the collections**- Similar Ideas indicate fashion trends, Trends for target market; **Fashion services** – Collection reports, Trend books, consulting, Color services, Television/Video services, News letter services, Web sites, Directories and reference books, Fashion Magazines and news papers, Catalogs. **Design Sources**- Historic inspirations, Folk influences, Vintage clothing shops, Museums, Libraries and bookstores, Arts, Fabrics/Textiles, Travel, Form follows function, The street scene, The turn of the century, innovations and technologies.

Module-III : Applied Learning Assignments. (Practical)

- | | | |
|------------------------------------|---|---|
| Market Research | - | On site visits to fashion retailers and cloth markets and study the market trends and collect various cloth samples, catalogs etc. |
| Forecasting Exploration | - | Students will explore a variety of sources like Magazines, News papers, Internet sites and in-site, their market research reports etc. to become familiar with apparel, textile, color, style, and general culture and consumer forecasting resources. Each student will identify and report trends found to class. |
| Preparation of story boards | - | Students will prepare story boards for specific target. |
| Presentation of designs | - | Students will prepare fashion forecast for different seasons. |
| Final Presentation | - | Each student have to submit their Research file in a standard format guided by the faculty for the final evaluation. |


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Examination Scheme:

Components	A	CD	A & F	P	Viva	Total
Weightage (%)	10	20	20	25	25	100

(A - Attendance, CD - Concept Development, A & F - Analysis & Findings, P – Presentation)

References:

- Gini Stephens Frings (1999): Fashion: From concept to consumer, Prentice-Hill Inc.
- Tracy Diane and Tom Cassidy, Colour Forecasting
- Kathryn Mc Kelvey, Fashion Design Process, Innovation and Practice

List of Magazines

Apparel online, Fiber 2 Fashion, Cosmopolitan. Marie Claire, Elle, Vogue, Harper's Bazaar, In Style, Glamour, Lucky, Allure, W Magazine.



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CRAFT DOCUMENTATION (ORGANIZATIONAL PROJECTS)

Course Code: FST2535

Credit Units: 06

Objective

The objective of this programme is to bring about the transformational change from a practical application of the learned knowledge in real time corporate world and industry towards laying a focused and insightful planning for a strong foundation towards understanding and contributing towards Indian crafts.

Methodology

- Market Visit
- Field Trip
- Documentation and Presentation
- Scope and Final Presentation

Guidelines

- The Craft Documentation is scheduled between 4th and 5th semester.
- CD is a complete practical training programme with study of each and every aspects of the organization, and the training experience should be submitted as Organizational Project Report.
- There are two guides will be associate with CD. Faculty Guide for overall guidance and Company Guide for monitoring the SIP students in respective departments of the allocated company.
- Every student should attend the company allocated to him/her regularly and complete the project on given time lines. Disciplinary action will be initiated if any student is found to be absenting himself/herself without the permission from company guide / Faculty guide / HOS.
- Student in organizational Project (OP) / CD are the role ambassadors of Amity University Haryana (AUH). They carry the brand image of AUH and should always show high level of dignity at the work place.
- Every student is expected to carry a pen, notepad daily to the company where he/she assigned the project and should always note down the progress of him/her along with daily dosage of work schedule.
- The students in the OP/CD can be meeting the faculty guide in between the programme with prior permission from the company guide. Such cases the company guide should be inform to faculty guide/HOS
- The students by virtue of his/her carelessness fail to do the project, will not be awarded the graduation certificate and also kept out-of-placement services.

FINAL RECORD PREPARATION FORMAT

(Summary of Organizational Project Report content)

1. Cover Page
2. Inner cover page
3. Company Certificate
4. Amity University Haryana Certificate
5. Table of contents / Index
6. Acknowledgement
7. Declaration
8. Executive Summery
9. Introduction


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- Brief on the Industry
- Brief on the Company
- 10. Project Objective
 - Primary and Secondary
- 11. Methodology
- 12. Scope of the study
- 13. Significance of the study
- 14. Project Analysis
 - Work Done Analysis
 - Research Methodology analysis
- 15. Tabulation and Graphical Representation
- 16. Inference from Study
- 17. Contributions
- 18. Learning's
- 19. Suggestions
- 20. Conclusions
- 21. Achievements (In case of any appreciation letter, stipend achievement letter, Photographs on the significant occasions or any others)
- 22. Reference
- 23. Annexure.
- Language of Project Report and Viva-Voce Examination may be English. There will be an evaluation by a jury comprising of external experts and internal faculty guide from the department.
- Failure to submit the Project Report in proper manner / without company certificate / AUH certificate or failure to appear at the Viva-voce Examination will be treated as "Absent" in the Examination.

Examination Scheme:

Evaluation Components	OPR				A	P	V	Total Weightage (%)
	Internal Evaluation		External Evaluation					
Project Analysis	10	20	15	30	10	20	20	100
Conclusion & Recommendations	10		15					

(OPR - Organizational Project Report, A - Attendance, P – Presentation, V – Viva voce)



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FASHION PROMOTION

Course Code: FST2512

Credit Units: 01

Course objective:

This course describes various types of fashion promotion with procedures and its relation to store needs and target customers.

Course Contents:

Module I : Fashion- Sales Promotion.

Sales promotion – Objectives, Fast sales boost, Encourage Trial, Encourage repeat purchases, Simulate purchase of large stocks, Gain distribution and shelf space. **Promotion Techniques- Consumer Promotion-** Money off, Bonus packs, Premiums, Free samples, Coupons, Competitions, Draws; **Trade Promotions** – Price discounts, Free goods, Competitions, Allowances. **Evaluating sales promotion** – Pretesting research, Post testing research. **Promotional Aids** – Personal appearances, Designer Trunk shows, In-store clinics, Merchandise representatives, Videos, Image books, Display fixtures, Radio scripts and TV commercials, Glossy photographs, Hangtags. Fashions promote associations, Fashion awards.

Module II : Fashion -Advertising.

Define advertising objectives –Position the offering, Create awareness, Stimulate trail, Remind the rain force, Provide support for sales force, correcting misconceptions. **Advertising Strategy** – Identify and understand the target audience, Establish advertising spend, Massage decisions. **Advertising Media** – The term ‘Media’, Print Media - Types, Methods of advertising, advantages and disadvantages; Electronic Media - Types, Methods of advertising, advantages and disadvantages. **Kinds of advertising-** Image advertising, Item advertising, Promotional advertising. **Advertising Department** – Art, Copy, Production, traffic. **Advertising Agencies.**

Module III : Fashion – Public Relations.

Public relations – Introduction; **Functions of public relations** – Facilitates company’s overall operations, Aids promotion, Helps tracking social and environmental issues, Ensure customer’s satisfaction, Attracting and retaining talented employees, Give benefits to stake holders , Develop reputation of the organization, Responds effectively to negative publicity. **Publicity** – Task of publicity department, **Characteristics of publicity** – Credible message, No media cost, Loss of control of publication, Loss of control of content, Loss of control of timing. **Publicity Campaigns** – Press package, Individual approaches. **Special events** - Fashion shows – Formal fashion shows, Designer trunk shows, Department fashion shows, Informal fashion shows.

Module IV : Applied Learning Assignments.

1. Visit any department store and observe the various techniques of sales promotion activities and make a report.
2. Search through various news papers and magazines and analyze the coverage of advertising campaigns of different large chain store / fashion brand. Clip the stores advertisements and find the, name, trade mark, manufacturer and store specialties and locations.


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Examination Scheme:

Components	A	L	CT	EE
Weightage (%)	05	10	15	70

(**A**-Attendance; **L**- Learning Assignments; **CT**-Class Test; **EE**-End Semester Examination)

Text & References:

- Jay Diamond, Ellen Diamond, Fashion Advertising and Promotion, Fairchild Books, 1999
- Gini Stephens Frings (1999): Fashion: From concept to consumer, Prentice-Hill Inc.
- Kotler Philip & Armstrong, Gary, Marketing: An Introduction, Pearson Education.
- Stanton, William J. et al, Fundamentals of Marketing, McGraw-Hill Publishing Co. Ltd.
- Phyllis Tortora, The Fairchild's Dictionary of Fashion
- S. A Hussain, Variety- Fashion for Freedom
- Belch, Advertising And Promotion, Tata McGraw-Hill Education, 2003



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THE BUSINESS OF LUXURY FASHION

Course Code: FST2513

Credit Units: 01

Course objective:

This course aims to give students a deeper understanding of the luxury sector & reveal the importance of the profession in the contemporary world.

Course Contents:

Module I : Introduction to Luxury Fashion.

Luxury- Concept, Definition in economics, Origins of luxury fashion, Market characteristics
Conspicuous consumption – Definition and theory, **Socio-economic significance** - Status symbol, Consumerism, Life style and culture. **Luxury and Ethics** - Accessible luxury, Intangible luxury. Sustainable luxury: social luxury guilt-free, luxury, sweatshop-free clothing.

Module II : The Luxury Fashion Consumer & Buying Behavior

Consumer Behavior – Introduction, Models of Consumer Behavior; **Buying Behavior** - Introduction, The consumer purchase-decision process; **Cross-Cultural Behavior** - Economic, demographic and socio-cultural trends and consumer; Globalization of consumer markets and international marketing implications. Luxury consumer market indicators.

Module III : Luxury Retail Design and Atmosphere

Luxury retail - Location, Store concept, Retail extension, Product merchandizing design, New selling techniques, Designer outlet shopping. **Store planning and Design** – Store Image, Target consumers, Seasonal Visual Merchandising, Windows, Interiors, **Shopping as entertainment**.

Module IV : The Art of Creating and Managing Luxury Fashion Brands

Branding – Defining a luxury brand, Branding benefits, **Luxury fashion branding strategy development** - Brand concept, Brand identity, Brand awareness, Brand positioning, Brand loyalty, Brand equity, Brand value; **The luxury fashion marketing strategy** - The product, Pricing, The place of distribution, Promotion, The celebrity connection, People, Positioning. **Building a Brand or Designer Name** – Multi products – Secondary lines, New product divisions, Size ranges, Accessory collections; Licensing, Joint ventures, Exporters, Manufacturers as Retailers – Factory outlet stores, In-store boutiques, Catalogs, Televisions, and Internet sales. Franchising, Leased Departments, Consignment stores Jobbers.

Module V : Global Nature of Fashion Business.

Introduction to international Fashion business – Importance, Nature and scope, Modes of entry into International Business Internationalization process and managerial implications, Multinational Corporations and their involvement, Agreement on Textiles and Clothing (ATC) ; **The luxury fashion business strategy model**- Definition, The business strategy modeling process.



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Examination Scheme:

Components	A	H	CT	EE
Weightage (%)	05	10	15	70

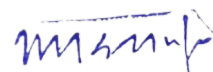
(A-Attendance; H -Home Assignment; CT-Class Test; EE-End Semester Examination)

Text & References:

- Uche Okonkwo, Luxury Fashion Branding: Trends, Tactics, Techniques, Palgrave Macmillan, 2007,
- Bennet, Roger, International Business, Financial Times, Pitman Publishing, London, 1999.
- Gini Stephens Frings, Fashion: From concept to consumer, Prentice-Hill Inc. 1999
- Berry, C.J. The idea of luxury –A conceptual and historical investigation, Cambridge University Press.
- Kotler Philip & Armstrong, Gary, Marketing: An Introduction, Pearson Education.
- Stanton, William J. et al, Fundamentals of Marketing, McGraw-Hill Publishing Co. Ltd.
- Phyllis Tortora, The Fairchild's Dictionary of Fashion



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COUTURE DESIGN

Course Code: FST2514

Credit Units: 01

Course Objective:

This course offers students the opportunity to enhance their skills to the segment of the fashion industry known as the Couture /High fashion / Designer label market. This is an applied learning course and students need to experience this with concerned faculty experts.

Course Contents:

Module I : Introduction to Couture Design. (Theory)

Couture – Definition, Origin of Couture, Function of couture, Chambre Syndicale de la Haute Couture, **Couture Design Concept** - High-End Luxury, Luxury Sociology and Ceremonies, Concept of ‘made-to-measure’ clothing; **Designer Clothing** - Definition, Concept, Designer Label, Designer Brands. Key Concept Innovation & Development of couture design. Study of Indian couture designers and International couture designers

Module II : Couture Decorative Techniques & Embellishments. (Practical)

Expands knowledge of the couture by exploring various decorative techniques, Apply glass seed beads, sequins, pearls, and faux gems on different types of fabrics. Create embellishments such as flowers and frog closures from fabric and ribbons, hand embroider original designs, and learn the arts of quilting, cartridge pleating, and quilting

Module III : Couture Apparel Design - Advanced Illustration Techniques. (Practical)

Study the muscular and skeletal functions of the human body and their relationships to the design and creation of haute couture apparel, visualizing how anatomy and aesthetics form the basis of designing a haute couture collection. Become proficient in the translation of ideas via the fashion design sketch and further develop a personal drawing style and various apparel silhouettes.

Module IV : Couture Apparel Design - Advanced pattern Making & Sewing Techniques (Practical)

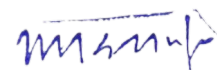
Skill development in taking body measurements; Developing custom fittings for customized patterns; In depth coverage of the process of transferring a custom body fitted canvas to a couture or designer dress form and padding it for custom sizing; The sewing techniques practiced in the finest haute couture ateliers around the world.; Learn couture techniques in couture fabric selection, proper cutting procedures, hand stitching, seam and hem finishes, pocket construction, inner construction methods pressing, and finishing.

Module V : Haute Couture Portfolio - Applied Learning Assignments.

Write a short description of a person, which include age, build, job, place of residence, interests, and lifestyle. Consider that, this person will be the typical customer. Determine the price range and style range according to the customer life style. Designing a personal collection based on a theme: determine and carry out all the stages of product development from the design to the completed prototype. Apply knowledge of the couture to design, drape, fit, and construct. Develop styles and images through fabric sourcing, market research, and inspirational research for the project.



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Examination Scheme:

Components	A	L	CT	EE
Weightage (%)	05	10	15	70

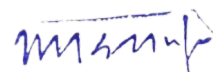
(**A**-Attendance; **L**- Learning Assignments; **CT**-Class Test; **EE**-End Semester Examination)

References:

- Caroline Rennolds Milbank, Couture, the great designers, Stewart, Tabori & Chang, 1985
- Claire B. Shaeffer, Couture Sewing Techniques, Taunton Press, 2011
- Berry, C.J; The idea of luxury – a conceptual and historical investigation, Cambridge University Press.
- Phyllis Tortora, The Fairchild's Dictionary of Fashion
- Gini Stephens Frings (1999): Fashion: From concept to consumer, Prentice-Hill Inc.



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RETAIL MERCHANDISING AND MANAGEMENT

Course Code: FST2601

Credit Units: 03

Course Objective: The objective of the course is providing insights on retail operations. This will enable the students to become good retail planners and decision makers and help focus on change and adaption to change

Module I: Introduction to retail: retail in India; retail models and theories of retail development; understanding the retail consumers; ethical issues in retailing

Module II: Retail marketing strategy; retail franchising; retail store location and site selection; retail store design and visual merchandising; customer relationship management in retailing

Module III: Basics of retail merchandising; the process of retail merchandising; the method of merchandise, Procurement; retail pricing and evaluating merchandise performance; retail communication mix

Module IV: Retail store operations; servicing the retail customers; retail human resource management; financial aspects of retail management; retail information system; supply chain management in retailing


Module V: Evolution of E-commerce industry and role of e-commerce in fashion retail

Examination Scheme:

Components	A	CS	CT	EE
Weightage (%)	05	10	15	70

References:

- Pradhan, Swapna; **Retailing Management**; Tata McGraw Hill; New Delhi
- Bajaj, Chetan, Tuli, Rajnish and Srivastava, Nidhi; **Retail Management**; OUP; New Delhi
- Berman, Barry & Evans, Joel R.; **Retail Management – A strategic approach**; Pearson Education/Prentice Hall of India; New Delhi
- Levy, Michael & Weitz, Barton A.; **Retailing Management**; Tata McGraw Hill; New Delhi
- Newman, Andrew J. & Cullen, Peter; **Retailing – Environment and Operations**; Thomson Asia Pvt. Ltd.; New Delhi
- Dunne, Patrick M., Lusch, Robert F & Griffith, David A.; **Retailing**; Thomson Asia Pvt. Ltd; ND
- Lamba, A.J.; **The Art of Retailing**; Tata McGraw Hill; New Delhi


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ENTREPRENEURSHIP

Course Code: FST2604

Credit Units: 03

Course Objective:

Identify and apply the elements of entrepreneurship and to entrepreneurial processes. Recognize the importance of entrepreneurship and identify the profile of entrepreneurs and their role in economic growth. Use the entrepreneurial mind-set and behave responsibly and ethically in their roles as entrepreneurs. To enable them to identify the opportunities in apparel, textile and Accessories

Course Contents:

Module I : Introduction to Entrepreneurship: What is Entrepreneurship, Why Entrepreneurship, Characteristics of Entrepreneur & Entrepreneurship

Module II : Importance of Entrepreneurship: Importance of Entrepreneurship, Common Myths about Entrepreneurship

Module III : Entrepreneurial Opportunities and Enterprise Creation

Sensing Entrepreneurial Opportunities, Environment Scanning, Market Assessment, Identification of Entrepreneurial Opportunities

Module IV: Enterprise Planning and Resourcing: Business Planning - Preparation of a Project Report, Resource Assessment -Financial and Non – Financial, Fixed and Working Capital Requirement, Funds, Flows, Profit Ratios, Break Even Analysis etc., Mobilising Resources - Sources and Means of Fund, Facilities and Technologies for starting an Enterprise. Organising/Production of goods and services- quality, quantity and flow of inputs.

Module V: Supply Chain and Logistics: What is supply chain? What is the role and importance of Supply chain and logistics in fashion industry? Various challenges faced by fashion industry due to constraints in infrastructure of India


Examination Scheme:

Components	A	CS	CT	EE
Weightage (%)	05	10	15	70

(A-Attendance; CS-Case Study; CT-Class Test; EE-End Semester Examination)

References:

- Steve Mariotti, Entrepreneurship
- Peter F Drucker, Innovation and Entrepreneurship
- Bruce R. Barringer & R. Duane, Entrepreneurship: Successfully launching New Ventures Ireland, Pearson publication, 2008


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DESIGNING AND DEVELOPMENT OF FASHION ACCESSORIES

Course Code: FST2606

Credit Units: 01

Course Objective: Students will be able to learn about different types of accessories that are relevant to fashion industry

Course Contents:

Module I: Introduction to fashion accessories, Types of accessories

Module II: Functional and decorative importance of accessories

Module III: Designing and developing accessories: Sketching and rendering of headgear, hand wear, foot wear and hand bags (3 each) (Construction of any one)

Module IV: Sketching and rendering of belts, gloves and (construction of any one), Sketching of Indian jewellery- Mughal Jewellery, Thewa, Kundan Jewellery, Temple Jewellery, Sketching of accessories on women and men's croqui (2 each) Jewellery designing based on theme. (with Concept Board)

Examination Scheme:

Components	A	CS	CT	EE
Weightage (%)	05	10	15	70

(A-Attendance; CS-Case Study; CT-Class Test; EE-End Semester Examination)

References:

- John Peacock, Fashion Accessories: The Complete 20th Century Sourcebook
- Julia Kuo, 20 Ways to Draw a Dress and 44 Other Fabulous Fashions and Accessories



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PROJECT (CONCENTRATION ELECTIVES)

Objectives

1. To understand the relationship of forecasting to product development and the need for forecasting knowledge for all aspects of apparel and textile businesses.
2. Integrate consumer, aesthetic and quantitative trend information into the product development process.
3. Engineer new value into an existing product or line while holding costs.

This course is a 'team project' integrated with Concentration Electives -1. The team size should be minimum of two. The team has to be choosing any one of the project from the following:

Course Code:	Concentration Electives -2	Credit Units:
FST2607	Sportswear Design and Development	03
FST2608	Costume Design pertaining to performing arts.	03
FST2609	Functions of Indian Buying Houses/Agents – A study	03

Project Guideline

- Students' team has to complete the project through various research methods.
- **Research Project Idea Generation:** current (or perennial) problems and controversies in the apparel field with relevant chosen topic. This method allows historians the opportunity to explain how the current situation came about and to analyze contributing factors to the problem. To find perennial problems in the apparel industry, search through apparel-related journals. Based on this analysis, formulate the purpose of a potential research study. Think about WHY this topic is important to study (the "so what" question). Summarize the points (research question/purpose; why significant; brief literature review) in a one page outline – Design Brief. Critically think about the purpose of your research study.
- **The Final Research Paper:** This will include the updated sections: introduction, literature review/background, methods, and results with discussion, conclusion and ideas for future research. Students should include images as well as a complete reference list. All citations should comply with requirements for submitting a paper.
- **Professional Presentation:** Students will prepare a PowerPoint presentation for a maximum of 15 minutes (about 15-20 slides) including: introduction, brief literature review, methods, results and discussion, and conclusion. Images should be embedded within the PPT.

Project Evaluation

- There will be an evaluation by a jury comprising of external experts and a committee of internal faculties from the department. Failure to submit the portfolio with final products or failure to appear at the Viva-voce Examination will be treated as "Absent" in the Examination.


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Evaluation Components	R A				A	P	V	Total Weightage (%)
	Internal Evaluation		External Evaluation					
Portfolio Presentation	10	20	15	30	10	20	20	100
Products Presentation	10		15					

(R A– Research & Analysis, A - Attendance, P – Presentation, V – Viva voce)



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FIELD TRIP/VISIT DOCUMENT EVALUATION

Course Code: FST2702

Credit Units: 04

Course Objective: Students will get the practical exposure by visiting the field/market and need to submit a report on basis of that.

Course Content: Self study and practical observation by student in the industry.

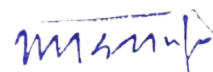
Teaching Tools:

Self Study, Observation

Learning outcome: Students are exposed to practical aspects of the functional areas of fashion industry and expected to learn the work-flow of fashion business



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COMPUTER-AIDED DESIGN (CAD) - V

Course Code: FST2703

Credit Units: 03

Course Objective: Student will learn to present their learning during graduation project via help of coral draw

Module: Application of Coral Draw to enhance the learning in the industry and use of computer systems to assist in the creation, modification, analysis, or optimization of those designs

Examination Scheme:

Components	A	H	CT	EE
Weightage (%)	05	10	15	70


(A-Attendance; H -Home Assignment; CT-Class Test; EE-End Semester Examination)

Text & References:

- Winifred Aldrich, CAD in Clothing and Textiles



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GRADUATION DESIGN COLLECTION

Course Code: FST2704

Credit Units: 10

Course Objective:

This programme focuses on the design and construction of the fashion garments for the partial fulfillment of the degree of B.Sc. in Fashion Design & Technology.

This course is practical application of creativity, Innovation, discovery, and expression in aesthetic or artistic design through the development of innovative garments that employ unique and sculptural shapes. The course will be assessed through critique and evaluation of design project in each topic area. Project components include inspirational research and development of aesthetic direction, ideation and sketching, garment construction and project presentation of the collection at a fashion show before and invited trade audience.

Course Methodology : Research Project & Product Development

Aim : To developing ideas from paper to object, theory to practice, and fabric to garment.

The projects taken up and have to develop through the following stages:

- 1. Fashion Market Study** - Fashion market research information helps the students to understand what, where, and why consumers are buying across all retail channels. It combines point-of-sale (POS) market tracking with consumer panel insights so students can stay on top of fashion industry trends and effectively connect with the fashion consumer.
- 2. Field trip / Visit** - The students will have the opportunity to create or styles a collection of designs based on various design inspirations and trends, and learn how to put together presentation boards and portfolio pages.
- 3. Portfolio Development** - A portfolio is a collection of work that shows an applicant's skills and knowledge across a number of projects or studies. It is a visual representation of interests, exploration, experimentation, development and final pieces. So fashion portfolio is a critically important tool for successfully applying for additional education opportunities or landing your first internship or entry level job. It reflects your professional skills and best work.
- 4. Digital Design Techniques & Presentation** - Include Computer-generated (CAD) mood, color, textile, fashion plate, and flat drawing pages as separate pages or in combinations, these demonstrate the designer's skills with CAD programs. Pages should be all portraits or all landscape orientation, with a few exceptions if needed, to allow for easy viewing by interviewers.
- 5. Range Development** – The students will explore what makes a good range, taking into account customers, competitors, price points, fabrics, core items and seasonal specials.
- 6. Final presentation** - Fashion show.


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Project Evaluation

- There will be an evaluation by a jury comprising of external experts and a committee of internal faculties from the department. Failure to submit the portfolio with final products or failure to appear at the Viva-voce Examination will be treated as “Absent” in the Examination.

Evaluation Components	R A				A	P	V	Total Weightage (%)
	Internal Evaluation		External Evaluation					
Portfolio Presentation	10	20	15	30	10	20	20	100
Products Presentation	10		15					

(R A– Research & Analysis, A - Attendance, P – Presentation, V – Viva voce)



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GRADUATION PROJECT

Course Code: FST2837

Credit Units: 16

Course objective: To provide an opportunity to students to apply and relate the concepts and theoretical inputs from various contextual studies offered in Fashion Design programme. To involve the students in the day to day activities of the functional areas of fashion industry and familiarize the practical aspects of the same.

Course Content:

Week 1 – Week 16: Self study and practical observation by student in the industry.

Week 17: Internal Jury

Week 18: External Jury

Teaching Tools:

Self Study, Observation

Learning outcome: Students are exposed to practical aspects of the functional areas of fashion industry and expected to learn the operational methodology of exploring business opportunities, solving problems and making decisions

Parameters to be considered in External Jury:

- Title of the Project
- Objective
- Research Methodology and Design
- Appropriateness of data
- Scope and coverage of the survey
- Comprehension and analysis
- Findings and recommendations
- Innovative approach to the industrial problems

Parameters to be considered in internal Jury:

- Title page
- Objective
- Report framework and methodology
- Context and analysis
- Comprehension and interpretation
- Findings and recommendations
- Report presentation
- Meeting the time requirements of DP schedule

Examination Scheme:

Evaluation Components	PA		Total Weightage (%)
	Internal Evaluation	External Evaluation	
Project Evaluation	50	50	100

(PA – Project & Analysis)


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Programme Structure Curriculum & Scheme of Examination 2022

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TECHNICAL DRAWING & ILLUSTRATIONS

(Practical)

Course Code: IND2202

Credit Units: 02

Course Objective:

Basic technical drawing is essential as drawing is the language of designer. This course aims to enhance knowledge and any skill related in engineering drawing. More importantly, this course develops the ability to read drawing increases the productivity of a person besides enhancing confidence to perform task competently.

Course Contents:

(NB: Submission of Practical work record / Portfolio / Sketch Book is compulsory for all Modules and will be part of the Final Course Evaluation)

Module I : Introduction to Technical Drawing & Illustrations

Importance of Engineering drawing; Method of folding of Engineering drawing sheets as per BIS SP: 46-2003; Drawing Instruments and their Standard uses. **Drawing of Lines:** Definition, types and applications in Drawing as per BIS SP: 46-2003; Classification of lines (Hidden, Centre, construction, Extension, Dimension, Section); Drawing lines of given length (Straight, curved); Drawing of parallel lines, perpendicular line; Methods of Division of line segment. **Lettering & Numbering as per BIS SP46-2003:** Single Stroke, Double Stroke, inclined, Upper case and Lower case. **Sizes and Layout of Drawing Sheets:** Basic principle of Sheet Size, Designation of sizes, Selection of sizes, Title Block, its position and content, Borders and Frames (Orientation marks and graduations), Grid Reference, Item Reference on Drawing Sheet (Item List);

Module II : Free hand drawing of Geometrical Figures & Perception

Free hand drawing of Lines, polygons, ellipse, etc.; **Geometrical figures** and blocks with dimension; Transferring measurement from the given object to the free hand sketches. Depth **Perception:** Binocular disparity, Monocular cues- Interposition - Atmospheric Perspective- Texture Gradient -Depth Perception through Linear or one point Perspective - Linear or one point Perspective - Two-point Perspective - Three-point Perspective -Three perspective angles for clear visual understanding-Eye level; **Free Hand sketch of products** :Automobiles, electronic gadgets, furniture etc.

Module III : Technical Drawing of Geometrical Figures & Dimensioning:

Definition, nomenclature and practice of Angle: Measurement and its types, method of bisecting; Triangle -different types; Rectangle, Square, Rhombus, Parallelogram; Circle and its elements. Drawing of Solid figures (Cube, Cuboids, Cone, Prism, Pyramid, Frustum of Cone and Pyramid.) with dimensions. Dimensioning: Definition, types and methods of dimensioning (functional, non-functional and auxiliary); Types of arrowhead; Leader Line with text.

Module IV : Method of presentation of Engineering Drawing

Pictorial View; Orthogonal View; Isometric view

Module V : Symbolic Representation (As per BIS SP:46-2003)

Fastener (Rivets, Bolts and Nuts); Bars and profile sections;Weld, brazed and soldered

joints; Electrical and electronics element; Piping joints and fittings

Course Evaluation:

Components	A	H	CT	EE
Weightage (%)	05	10	15	70
(A-Attendance; H -Home Assignment; CT-Class Test; EE-End Semester Examination)				

Text & References:

1. Madsen, David A. Engineering drawing and design. Cengage Learning, 2001.
2. Goetsch, David L., William Chalk, and John A. Nelson. Technical drawing. Cengage Learning, 2000.
3. Agrawal, Basant, and C. M. Agrawal. Engineering Drawing. McGraw-Hill Education, 2014.
4. Knowlton, Kenneth W.,. Technical freehand drawing and sketching. Glencoe/McGraw-Hill School Pub Co, 1977.
5. Pipes, Alan. Drawing for designers. Laurence King Publishing, 2007.
6. Cooper, Douglas. Drawing and perceiving; John Wiley & Sons, 2007.



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DESIGN STUDIO-II (PHOTOGRAPHY & VIDEOGRAPHY)

(Studio)

Course Code: IND2204

Credit Units: 02

Course Objective:

The aim of this course is to develop knowledge, skills and understanding of Photography, Video and Digital imaging that enables students to gain an increasing accomplishment and independence in their representation of ideas in the fields of Design. This course enhances the students to visualize the concept of digital platform and various methods of image capture.

Course Contents:

(NB: Submission of Practical work record / Portfolio / Sketch Book is compulsory for all Modules and will be part of the Final Course Evaluation)

Frame work for skill development in Photography, Video and Digital imaging.

Photography, Video and Digital imaging is encourage creative and systematic investigation of formal and conceptual issues in the field of design and act as a tool of inspiration. Studies of Photography, Video and Digital imaging is required different philosophical views and frameworks of belief that affect interpretations of meaning and value. They are:

1. **The subjective frame** — *Personal experience*: This is about deeply felt and sensory experience, intuition and imagination in relation to the inter-subjective experiences afforded to artists and audiences.
2. **The cultural frame** — *Cultural and social meaning*: This is to represent the collective interests of, cultural groups, ideologies, classes, political groups, genders, and spiritual and secular beliefs, events and objects in relation to the social perspective of the community out of which it grows.
3. **The structural frame** — *Communication and the systems of signs*: This is the representation of the visual language as a symbolic system. A system of relationships between signs and symbols that are read and understood by artists and audiences who are able to decode the texts in terms of the relationships of symbols used to refer to the world. Through this system, ideas are circulated and exchanged.
4. **The postmodern frame** — *Ideas that challenge mainstream values of histories*: This is about texts' that reconfigure and question previous texts and current narratives. These are woven together through such things as irony, parody and quotation through critique, exposing the patterns of authority and the assumptions of mainstream values to reveal inconsistencies, uncertainties and ironies.

Module I : Photography & Digital Imaging

Different types of camera (DSLR) - Study of apertures, shutter speed and ISO. - Understanding white balance in DSLR their control - Understanding Focus: Depth of Field, Focal Length. - Types of Lens available: Zoom lens and Macro.-Use of tripod stand, study of panning tilt head. - Taking photographs: Outdoor and indoor subjects on films. - Photographing a subject with different lenses. - Types of lights: use of bounce and reflected lights. - Handling movie and video cameras.

Practice: Indoor & Outdoor shoot.


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Module : Videography
II

Types of cameras: HD. - Types of Framing: Framing, Angle of Framing, Aspect Ratio, Level of Framing, Canted Framing, and Following. - Use of White balance and their purpose. - Types of Shot, Reframing, and Point-Of-View shot, Scale, Extreme long shot, Long shot, Medium long shot, Medium Close-up, Close-up, and Extreme Close-up. - Working with Chroma-Green/Blue Screen. - Working with Audio, Capturing Audio while shooting, Recording Audio with HDSLR Video Camera, Importance of Audio while shooting.


Practice: Indoor & more on practical training like outdoor shoot with available lights

Course Evaluation:

Components	A	H	PR	EE
Weightage (%)	05	10	15	70
(A - Attendance; H - Home Assignment; PR - Practical work Record; EE - End Semester Examination)				

Text & References:

1. Busch, David D. David Busch's Mastering Digital SLR Photography. Cengage Learning, 2011.
2. Garrett, John, and Graeme Harris. Collins Complete Photography Course. HarperCollins UK, 2010.
3. Krause, Jim. Photo idea index. How Books, 2005.
4. Martin, Jerry; Active Video: A Teaching Tool for Every Classroom; Good Year Books, 1998
5. Goodman, Robert M., and Patrick J. McGrath. Editing digital video. McGraw-Hill, 2002.
6. Barrett, Colin. Digitalvideo for Beginners: A Step-by-step Guide to Making Great Home Movies. Lark Books, 2005.


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TYPOGRAPHY EXPLORATION

(Practical)

Course Code: IND2207

Credit Units: 01

Course Objective:

The objectives of this course into equip students with aesthetic and conceptual problem solving skills in various areas of design that develops the skills in craftsmanship, professionalism, and composition as well as work habits. This course introduces the language of type, its practical use and historical grounding.

Course Contents:

(NB: Submission of Practical work record / Portfolio / Sketch Book is compulsory for all Modules and will be part of the Final Course Evaluation)

Description:

Typography is, quite simply, the art and technique of arranging type. It's central to the work and skills of a designer and is about much more than making the words legible. Every designer needs to understand typography. Designing a typeface can be a long journey so it's prudent to have a clear vision of its purpose. You might begin with something purely self-expressive. However, the usual practice is to create a typeface in response to a brief. The students have to be follow the weekly assignments that will be graded on completion basis.

Module I : Introduction to Lettering & Typography

Introduction to Typography. - Historical Perspective. - Anatomy of Letter Form – Typeface Classification: Usage and context. - Setting Text. - Digital Typography.-

Module II : Lettering & Typography Design

The Grid Document Design. - Design Alphabets. - Typography and Logo Design. - Typography at rice. - Kinetic Typography. - Ambigrams

Module III : Typographic Visualization (Self-study / Assignment)

Develop and submit a Typography Portfolio with previous selected class assignments and various creative ideas that include:

Visualize the meaning of a word, using only the graphic elements of the letters forming the word, without adding any outside parts; Typographic Poster Design - Create a poster for Print magazines based on any theme or requirement; Calligami - Refer various origami methods – Inspire from Specific form to create own typeface; Magazine layout with Typography; Book Cover layout with Typography.

The design should be own interpretation of the words, showing the origin of the text, the tone and whether agree with it or not. The methods of typography generation are entirely up to the student, they can be traditional, experimental, found, photographed made, but they must all be different from each other.

Course Evaluation:

Components	A	H	PR	EE
Weightage (%)	05	10	15	70
(A - Attendance; H - Home Assignment; PR - Practical work Record; EE - End Semester Examination)				

Text & References:

1. Graham, Lisa. Basics of design: Layout & Typography for beginners. Cengage Learning, 2005.
2. Craig, James, and I.K Scala. Designing with Type: the essential guide to typography. Watson-Guptill, 2012.
3. Craig, James. Designing with type: A basic course in typography. Watson-Guptill, 1999.
4. Saltz, Ina. Typography essentials: 100 design principles for working with type. Rockport Pub, 2011.
5. Heller, Steven, and Louise Fili. Shadow Type: Classic Three-dimensional Lettering. Thames & Hudson, 2013.
6. Bringhurst, Robert. The elements of typographic style. Vol. 127. Point Roberts: Hartley & Marks, 1992.
7. Lewis, John. Typography: design and practice. Jeremy Mills Publishing, 2007.
8. Heller; Stop, Think, Go, Do: How Typography and Graphic Design Influence Behavior. RockportPublication; 2012



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INTRODUCTION TO PROTOTYPING TECHNIQUES

(Practical)

Course Code: IND2208

Credit Units: 03

Course Objective:

This course is the continuation but further advanced from the last semester. The aim of this course is to introduce various design and prototyping techniques in action and spot various materials and processes. Audio-visual and workshop equipment has to be used to conduct this course.

Course Contents:

(NB: Submission of Practical work record / Portfolio / Sketch Book is compulsory for all Modules and will be part of the Final Course Evaluation)

Module I : Introduction to Prototyping (Theory)

Introduction to Product Prototyping; Prototypes in a product design process; Design parameters; Manufacturing materials & processes; Transforming ideas into product prototypes; Human Factors and Ergonomics consideration in prototyping; Advantages of Rapid prototyping; Prototyping Processes;

Module II : Prototype Techniques and Orientation (Practical)

Pre-Activity Description:

Begin brainstorming with words and quick sketches – Use of Sketch book and several sticky notes - Use specific STUs “Situation, Task, and User – Use Investigating Questions: How would it look? What size would it be? What would be its features? Would these vary, depending on the target audience? - Capture the Challenge - Ideas recorded in paragraphs to begin a first draft of a design description- Make brainstorming poster (The way of developed ideas) - From initial sketches or outlines to generate more detailed sketches of envisioned prototypes - Finalize the prototype sketches in scale - Review the sketches and critique - labeling them with dimensions and materials.

Activity Description - Topics covered:

- Prototyping Techniques in -Clay, Metal, Wood, Plastics, Ceramics, Composites etc.
- Finishing Techniques.

Post-Activity Description:

User Testing: Is the prototype functional? What works? What does not work? Is the prototype used to explore several design alternatives? What improvements could be made?

Discussion: the factors for final production - evaluating costs, time to build, material function and actual environmental impact.

Course Evaluation:

Components	A	H	PR	EE
Weightage (%)	05	10	15	70
(A - Attendance; H - Home Assignment; PR - Practical work Record; EE - End Semester Examination)				

Text & References:

1. Hallgrimsson, Bjarki. Prototyping and Model making for Product design. Laurence King Publ., 2012.
2. Fishwick, Paul A. Simulation model design and execution: building digital worlds. Prentice Hall PTR, 1995.
3. Ashby, Michael F., and Kara Johnson. Materials and design. Butterworth-Heinemann, 2013.
4. Eppinger, Steven D., and Karl T. Ulrich. "Product design and development. 1995
5. Norman, Donald A. The design of everyday things: Revised and expanded edition. Basic books, 2013.
6. Bryden, Douglas. CAD and rapid prototyping for product design. Laurence King Publ., 2014.
7. Trudeau, Norman. Professional model making, Watson-Guptill Publications, 1995.
8. Simonds, Ben. Blender master class: a hands-on guide to modeling. No Starch Press, 2013.
9. Carson, I. I., and S. John. "Introduction to modeling and simulation. Winter Simulation Conference, 2004.
10. Hutchings, Pat, ed. From idea to prototype. AAHE Teaching Initiative, American Association for Higher Education, 1995.



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SEMINAR / WORKSHOP / GUEST LECTURE FOR SKILL DEVELOPMENT

Course Code: IND2233

Credit Units: 01

Course Objective:

This course aims to judge the understanding as well as application of the knowledge gained by the students. The students have to be participated either Seminar (1) or Workshop (2) to earn the credit. Guest lecture (3) is addition to this for enhancing their knowledge by examining and analysing various aspects of design.

1. SEMINAR

The seminars intended to equip the students with some knowledge in areas which are not covered otherwise in the curriculum, but topics which are of interest or currently significant. The students need to find few topics with the help of faculties. They have to review various literatures, books, journals, internets, etc.

Points to be covered:

- Effective methods of literature review & Methods of bibliography writing.
- Enable open discussion between students and the subject experts.
- Students are encouraged to test their knowledge and to listen to other's points of view.
- Develop effective communication and presentation techniques for seminar presentation.
- Effective presentation techniques & Develop efficiency in group discussions.

Major Themes for Seminar:

Role of a designer in a project. - Relation of a designer with other consultants. - Design as a response to social and technological forces. - User participation in design. - Design and sustainability. - Various environmental and social issues and design.

Evaluation Scheme:

Components	Organisation and Relevance of content	Literature Review	Bibliography	Presentation	Total
Weightage (%)	30	30	20	20	100

2. WORKSHOP

Objectives:

A workshop is primarily an activity based academic event that is organized to provide the students a one to one and hands on experience on any aspect of their learning. Workshop is undertaking a significant practical unit of examining and analyzing various aspects of design at a level commensurate with the learning outcomes of the various courses taken up them in the ongoing semester. The communication in a workshop has to be necessarily two ways. The trainer has to make sure that the aspects covered are practically practiced by the participants. The student will choose the option of workshop from amongst their concentration electives. The evaluation will be done by jury of examiners comprising of the faculties.

Major Themes for Workshop are: -

Brainstorming./Design problem solving techniques./ Design Process. / Visual thinking./ Design

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thinking./ Design Research techniques. / Effective prototyping./ Craft making. / Story telling. / Print making./ Textile Block Printing.

Guidelines for Workshop :

The procedure for earning credits from workshop consists of the following steps:

- Relevant study material and references will be provided by the trainer in advance.
- The participants are expected to explore the topic in advance and take active part in the discussions held
- Attending and Participating in all activities of the workshop
- Group Activities have to be undertaken by students as guided by the trainer.
- Evaluation of workshop activities would be done through test and quiz at the end of the workshop.
- Submitting a write up of at least 500 words about the learning outcome from the workshop.

Methodology

The methodology followed at the workshop could be based on any one or more of the following methods:

Case Study /Group Activity. /Role Play. / Business Planning./Quiz.

Evaluation Scheme:

Components	A	AP	MCQ	Solving the case/ Assignment / Write up	Total
Weightage (%)	10	30	30	30	100

(A - Attendance; AP - Active Participation; MCQ - Multiple Choice Questions)

3. GUEST LECTURE

Eminent subject experts from the field may be invited to deliver the lectures on different topics of their choice and share their experience with the students



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INTERIOR DESIGN MATERIALS & APPLICATIONS

(Theory)

Course Code: IND2302

Credit Units: 02

Course Objective:

The objective of this course is to explore the diversity of interior building and finish materials, expanding the opportunities for creative design solutions. This course familiarizes the students to learn the technical vocabulary and scientific concepts associated with procedures used for their fabrication, testing and evaluation.

Course Contents:

Module I : Masonry

Mud, bricks; building tiles: roof, floor and wall tiles, stones, clay, lime, sand, mortars, cement and aggregates, concrete, gypsum based plaster etc.

Module II : Wood & Timbers

Wood as a building material: Identification, selection, application, types of wood, Commercial Classification, Nomenclature, Structure, Anatomy and Ultra structure, Conversion figure and natural defects, Availability of wood products, Wood based panels such as Plywood, MDF, HDF, Particle board, pre laminated boards etc. – their properties, process of manufacture, tools and technology of its application and quality assessment; Finishes to reconstituted wood: Lamination, Polishing etc. Various insulating materials, their properties and applications; Surface finishes for wood products and derivatives etc., Coatings: clear and pigmented finishes technical or protective coatings etc. Timber, cane, bamboo – characteristics of good timber, defects, applications of timber like joints, floors, openings, staircases, roof forms, etc. Finishes in timber like flooring, paneling, etc. Finishes to timber.

Module III : Paints, Varnishes & Adhesives

Paints: Protective coating paints, types of paints – water paints, distempers, cement based paints, emulsion paints, anti-corrosive paints etc. - Composition, functions, preparation and application method, painting on different surfaces, defects in painting; **Varnishes** : Oil and spirit; various types – French polish, damp proofing finishes etc. and methods of application. **Adhesives:** Natural and Synthetic, their varieties, thermoplastic and thermosetting adhesives, epoxy resin. Method of application, bond strength etc.

Module IV : Glass and Glass Products

Composition and fabrication of glass, classification, types of glass- wired glass, fiber glass, rock wool, laminated glass, glass concrete blocks - their properties and uses in buildings. Commercial forms available – their physical and behavioral properties, tools and technology of its application in built forms. Materials and workmanship specifications

Module V : Traditional & Rural Materials

Roof: Details of pitched roof and hipped roof with pan tiles and Mangalore tiles. Details of madras terrace roof for small and medium span. **Foundation and walls:** foundation and wall in stone masonry (Random rubble, SR & Ashlar) foundation and walls in stabilized mud and Compact earth blocks, various types of details for walls with bamboo and casuarinas Roofs in rural materials: Details of thatched roof with casuarinas/ bamboo / CEB frame work; Details of palm and hay roof with casuarinas / bamboo/ CEB.


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Course Evaluation:

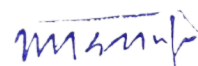
Components	A	H	CT	EE
Weightage (%)	05	10	15	70
(A-Attendance; H -Home Assignment; CT-Class Test; EE-End Semester Examination)				

Text & References:

1. Mehta, Madan, Building construction: Principles, materials, and systems. Pearson Prentice Hall, 2008.
2. Herzog, Thomas, et al. Timber construction manual. Walter de Gruyter, 2004.
3. Seethalakshmi, K. K., et al. Bamboos of India: A compendium. Vol. 17. Brill, 1998.
4. PratapRao, M; Interior Design Principles & Practice; Standard Publishers, 2009.
5. Godsey, Lisa. Interior design materials and specifications. A&C Black, 2012.
6. Stanley; Complete Painting; 2007
7. Mark Dixon, House Painting: Inside and Out; Taunton Press; 1997
8. Binggeli, Corky. Materials for interior environments. John Wiley & Sons, 2008.
9. Godsey, Lisa. Interior design materials and specifications. A&C Black, 2012.



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ELEMENTS OF INTERIOR SPACE PLANNING & SCALING

(Practical)

Course Code: IND2303

Credit Units: 02

Course Objective:

This course provides a specific design methodology for understanding the nature of spaces, scales and space within a space along with elements and organization. The aim of the course is to impart an understanding of perception of interior space through architectural elements.

Course Contents:

(NB: Submission of Practical work record / Portfolio / Sketch Book is compulsory for all Modules and will be part of the Final Course Evaluation)

Module I : Interior Ergonomics

Average measurements of human body in different postures – its proportion and graphic representation, application in the design of simple household and furniture. Role of mannequins in defining spatial parameter of design. Basic human functions and their implications for spatial planning. Minimum and optimum areas for various functions. Preparing user profile, bubble and circulation diagrams.

Module II Introduction to Interior design Methodology

Detailed study of spaces such as living, dining, bedrooms, kitchen, toilet etc. including the furniture layout, circulation, clearances, lighting and ventilation, etc. Case study of existing house and analysis of the spaces.

Module III : Visual analysis of Designed Spaces

Spaces noted for comfort and spatial quality; analysis of solid and void relations, positive and negative spaces. Integration of spaces and function in the design of Bus shelter, Milk booth, Watchman's cabin, traffic police kiosk, flower stall, ATM center, etc.

Module IV : Interior Design: Symbols & Representation


Representation of building elements, openings, materials, accessories etc., terminology and abbreviations used in architectural presentation; representation of landscape elements such as trees, indoor plants, planters, hedges, foliage, human figures in different postures, vehicles, street furniture etc.; by using different media and techniques and their integration to presentation drawings.

Module V : Measuring and Drawing to Scale

scales and construction of scales, simple objects, furniture, rooms, doors and windows etc. in plan, elevation and section etc. reduction and enlargement of drawings.

Module VI : Interior Geometry

Study of points, lines and planes leading to simple and complex solid geometrical forms. Orthographic projections of points, lines, first angle projections of planes and solids, sections of solids, development of surfaces of solids and intersections of solids. Use of geometry in buildings - isometric, axonometric, and oblique views. Working with models to facilitate visualization.


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Course Evaluation:

Components	A	H	CT	EE
Weightage (%)	05	10	15	70

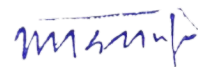
(A-Attendance; H -Home Assignment; CT-Class Test; EE-End Semester Examination)

Text & References:

1. Karlen Mark; Space planning Basics, Van Nostrand Reinhold, New York, 1992.
2. Joseph D Chiara; Time Saver standards for Interior Design & space planning, McGraw Hill professional, 2001.
3. Francis.D. Ching & Corky Bingelli, Interior Design Illustrated, 2nd edition, Wiley publishers, 2004.
4. Julius Panero, Human Dimension & Interior Space, Watson – Guptill, 1979.
5. Stephen Klimment, Architectural Sketching and Rendering, Watson Guptill, 1984.
6. Ivo.D. Drpic, Sketching and Rendering of Interior Space, Watson- Guptill, 1988.
7. Maureen Mitton, Interior Design Visual Presentation, Wiley publishers, 2007
8. Shah, M.G., Building Drawing, Tata McGraw Hill Pub., Delhi, 2000.
9. Gill, P.S.T.B. of Geometrical Drawing, 3rd ed. Dewan Suhil Kumar Kataria, Ludhiana, 1986.



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LIGHTING & COLOUR IN INTERIORS

(Theory)

Course Code: IND2307

Credit Units: 02

Course Objective:

This course provides knowledge of the various types of lightings to effectively communicate their designs and understand the effect of various lights on colours and textures. The aim of this course is to equip the students to understand and successfully apply lighting techniques with colour effects.

Course Contents:

Module I : Introduction To Day Lighting

Lighting and vision; Nature of light – Wavelength, Photometric quantities – intensity, Flux, illumination and luminance, visual efficiency, sources of light, day light factor concept, design sky concept, day lighting requirements.

Module II Artificial Lighting

Electric lamps – incandescent, fluorescent, sodium vapour, mercury, halogen and neon. Different types of lights in interior and exterior - task lighting, special purpose lighting. Calculation of artificial lighting, guidelines for lighting design, Glare in artificial lighting; Color characteristics of artificial lighting, integration of day lighting with artificial lighting, lighting controls, intelligent building systems for lighting, switches, dimmers.

Module III : Effect of Colour In Lighting

Colour and light, colour and surface qualities, color and distances and scales. Problems with colour. Use of colour in various functional contexts – Residential interiors, Non Residential interiors. Use of color in special situations – out door/indoor spaces, accessories, art works etc.

Module IV : Luminaires& Fixtures

Definition, different luminaires for lighting, lighting control system- benefits & application, Impact of lighting, fixture types - free standing or portable, fixed, light fixture control; Floor, table and desk, wall mounted, ceiling units, built in lighting, miscellaneous types, decorative lighting, spot lighting, task lighting, underwater lighting, etc.; Lighting accessories- switches, sockets, fused connection units, lamp holders, ceiling roses etc.

Module V : Study of Lighting Concepts(Self-study / Assignment)

Study of projects based on different lighting concepts used in interiors and exteriors and survey of lamps available in the market with cost and technical specifications.

Course Evaluation:

Components	A	H	CT	EE
Weightage (%)	05	10	15	70
(A-Attendance; H -Home Assignment; CT-Class Test; EE-End Semester Examination)				


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Text & References:

1. Moore Fuller, Concepts and practice of Architectural Day lighting, Van Nostrand Reinhold co., New York, 1985.
2. David Egan. M. Concepts in Architectural lighting McGraw Hill Book company, New York, 1983.
3. John.F. Pile, Interior Design, 2nd edition, illustrated, H.N.Abrams, 1995.
4. Randall whitehead; Lighting design, source book.
5. Torquil Barker; Concepts of lighting, Lighting design in Architecture.



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INTERIOR DESIGN STUDIO-I

(Studio - Graphics)

Course Code: IND2309

Credit Units: 02

Course Objective:

The objective of this course is to develop understanding of the scale, function and options existing when designing small-scale spaces in residences. This studio course provides the interaction of two-and three-dimensional design of residential interiors.

Course Description

In the studio, the learning process is learning by doing. The core part of this course incorporates exercises to develop manual and digital presentation skills in order to present design ideas and solutions. Every module is blended with hand on sketches as well as application of basic computer graphics. Each student has to maintain a sketchbook compulsorily. Process sketches are scanned and integrated into the final presentation by PPT. A hard copy of Design Studio Portfolio submission is compulsory.

Course Contents:

(NB: Submission of Practical work record / Portfolio / Sketch Book is compulsory for all Modules and will be part of the Final Course Evaluation)

Module I : Interior Design Studio Process

1. Design Objectives:

Function; Cost Effectiveness; Durability, Maintainability; Compatibility; Design; Creativity; Flexibility; Timelessness.

2. Design Approach:

Programming: Functional Requirements, Understanding the User's Needs; Concept Development: Physical and Behavioral Requirements, Space Planning, Architectural Design, Color Concept, Material Selection;

3. Design Development & Presentation:

Design Narrative; Design Illustration; Color and Material Selection; Furnishings Selection; Concept Presentation- use of visual presentation materials, including renderings, floor plans, perspectives, finish and furniture boards, for the user / Client to gain a clear understanding of the design.

4. Design Execution:

Statement of Work, Architectural Floor Plan, Finish Schedule and Color Legend, Finish Floor Plan, Elevations, Sections, and Details, Miscellaneous Drawings, Furniture Floor Plan, Installation Plans, Furnishings Specifications, Furnishings Cost Estimates, Furnishings Order Form

Module II : Studio Project -1: Basic Residential Interior.

Use Module –I parameters and design Residential facilities, i.e. family housing and unaccompanied personnel housing (dormitories). Holistic concepts in residential interiors – ability to integrate various individual spaces into one theme – treatment of patios, courtyards, verandahs & other semi sheltered spaces – integration of built form and open spaces.

While the overall wear of finishes is reduced in family housing units, they still contain areas fitting all three categories of use:

- **Heavy-use areas:** Entrance foyers, kitchens, bathrooms, stairwells, and laundry areas.

- **Medium-use areas:** Corridors, hallways, dayrooms, family living, dining rooms and kids room, Home Theater.
- **Light-use areas:** Bedrooms.

Module II : Studio Project -2: Different Types of House Designs (Self-study / Assignment)

Study, Identify the difference and Design of:


Affordable House, Small house, Simplex Houses, Duplex House, Luxury Home, Double and Triple Story House, Multi Family House, Bungalow house, Farm house, Traditional houses, House Designs with garage, various Flats and Apartments, Villa, etc.

Course Evaluation:

Components	A	H	CT	EE
Weightage (%)	05	10	15	70
(A-Attendance; H -Home Assignment; CT-Class Test; EE-End Semester Examination)				

Text & References:

1. Linda O'Shea, ; The Interior Design Reference & Specification Book; Rockport Publishers; 2013
2. Interior Design; The New Freedom, Barbara LeCromstein, Rizzoli International Publications, New York, 1982.
3. Interior Colour by Design, Jonathan Poore, Rockport Publishers, 1994.
4. Worldwide Interiors – International Federation of Interior Architects & Designers, Rikuyo-Sha, Japan, 1987.
5. Simon Dodsworth Cardoso; The Fundamentals of Interior Design
6. Karlen Mark, Space planning Basics,
7. Maureen Mitton, Interior Design Visual Presentation
8. Carol Simpson, Estimating for Interior Designers


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INTERIOR WORKSHOP PRACTICE-I

(Practical)

Course Code: IND2310

Credit Units: 02

Course Objective:

The course is intended to provide information on working with Wood and Bamboo which are among the major materials used in the interiors. This course aims to understanding the material and tools by making objects which allow students to explore the forms, surfaces, textures and patterns. Explore different joinery and support conditions.

Course Contents:

(NB: Submission of Practical work record / Sketch Book is compulsory for all Modules and will be part of the Final Course Evaluation)

Module I : Introduction to Safe Workshop Practice

General safety precaution inside the workshop: Suitable clothing - Eye Protection - Hearing Protection – Footwear - Dust Masks – Safe handling of Tools – Electric safety - Responsibility of individual.

Module II : Study of Hand Tools and Measuring Instruments.

Fitting Shop: Holding tools; Marking and measuring tools; Cutting tools; Finishing tools; Miscellaneous tools; Safe practice; Models for preparation.

Module III : Working with Wood and Wood Products

Understanding of wood as building material, finishing material for surfaces and as furniture material. The wood material parameters; Wooden joinery and its strength. Wood polishes and other finishes; color and surface quality; The safe and efficient use of the tools of the trade, Hand tools, portable power tools, Stationary power tools, Materials, Hardware. Safe working practices in a workshop. Joineries in wood – lap, butt, dowel, tenon& mortise, dovetail, etc. Exercises in plywood joinery; Wooden Paneling & Cladding; Wooden Flooring.

Module IV : Working with Bamboo & Cane

Bamboo / Cane and their products to understand material parameters. Bamboo and cane joinery and its strength. Polishes and other finishes


Module V : Carpentry

Introducing the techniques of planning, chiseling & jointing in timber to learn the use of hand tools.

Introduction to Timber; Marking and measuring tools; Holding tools; Planning tools; Cutting tools; Drilling and boring tools; Miscellaneous tools; Wood joints; Safe practice; Exercise involving the design of simple furniture and making a model of the same.

Module VI : Industrial Visit.

Visit various timber industries, furniture manufactures and wood craft centers. Learn, absorb and recognize different stages of timber processing, manufacturing different types of natural wood, interior decoration elements, several models of doors and windows, pieces of furniture and wood works.


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Course Evaluation:

Components	A	H	CT	EE
Weightage (%)	05	10	15	70
(A-Attendance; H -Home Assignment; CT-Class Test; EE-End Semester Examination)				

Text & References:

1. BENN, The book of the House, Ernest Benn Limited, London
2. Janssen, Constructional Drawings & Architectural models, Karl Kramer Verlag Stuttgart, 1973.
3. Harry W.Smith, The art of making furniture in miniature, E.P.Dutton Inc., New York, 1982.
4. Carol Stangler, The crafts and art of Bamboo, Rev. updated edition, Lark books, 2009.
5. Dr. Angelika Taschen, Bamboo style: Exteriors, Interiors, Details, illustrated edition, 2006.
6. Lonnie Bird, Jeff Jewitt, Taunton's Complete Illustrated Guide to Woodworking, Taunton, 2005.
7. Peter Korn, Wood working Basics : Mastering the essentials of craftsmanship, Taunton , 2003.
8. Albert Jackson & David Day, The complete manual of wood working, knopf publishers, 1996.



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ADVANCED INTERIOR DESIGN MATERIALS & APPLICATIONS

(Theory)

Course Code: IND2402

Credit Units: 03

Course Objective:

This course expose the students to different materials of construction, progressively and to enable them to represent the different interior components through relevant drawings. The objective of this course is to familiarize the students of Interior Design on material and construction methodology.

Course Contents:

Module I : Rubber & Plastics

Natural rubber, latex, coagulation, vulcanizing and synthetic rubber- properties and application. Adhesives – Natural and Synthetic, their varieties, thermoplastic and thermosetting adhesives, epoxy resin. Method of application, bond strength etc. Types, thermosetting and thermo plastics, resins, common types of moldings, fabrication of plastics, polymerization and condensation. Plastic coatings, reinforced plastic, plastic laminates – properties, uses and applications

Module II : Metals

Steel, Iron, Aluminium, Bronze, Brass, Copper – Alloys, Characteristics, Form and uses, Properties, Definition of terms, Methods of working with metals, Fixing and joinery in metals, Finishing and treatment to metals. Application of metals to build form and interiors - Special doors and windows, Ventilators – Sliding, Sliding and folding, Revolving, Pivoted, Rolling, Collapsible, Dormer, Skylights, Clerestory etc.

Module III : Fabrics and other Furnishing Materials

Fibers, Textiles, Fabric treatments, Carpets, Durries, Tapestries, Drapery, Upholstery, Wall coverings, etc. – Properties, Uses and application in the interiors. Other materials such as Cork, Leather, Paper, Rexene etc. – Their properties, uses and applications in the interiors. A brief overview of Green materials.

Module IV : Thermal Insulation And Acoustics Insulation Materials

Thermal insulation: Heat transfer heat gain/ loss by materials - vapour barriers and rigid insulations, blanket, poured and reflective insulation – Properties and uses of Spun glass, Foamed glass, Cork, Vegetable fibers, Gypsum, Plaster of Paris, Hydride Gypsum. **Acoustics:** Definition of sound and noise, Reverberation time echo, Sound, Foci. **Acoustics insulation:** Porous, Baffle and Perforated materials such as Acoustic plastic, Acoustic tiles, wood, partition board, fiber board, cork, quilts and mats – their properties and uses – current developments. **Applications:** Applications of insulations in seminar hall, theater and cold storage.

Module V : Interior Components

Doors: Braced, panel flush doors, carved entrance doors and partially glazed doors. **Windows:** casement window (without mullion), bay window, & French window. **Ventilator:** louvered & top hung ventilator. **Showcase & shelf:** TV shelf, showcase & room divider, dressing ward robe. **Cupboard & Cabinets:** kitchen cupboard & wall cabinets. **Partitions:** simple paneled and glazed partitions – fixed sliding, folding, sliding & folding. **Shelves:** Show room shelves, Counters, cabinets, and storage. **Falls Ceiling:** Falls ceiling of interior spaces using Wood panels, Glass, Thermacol, Gypsum board, Plaster of Paris, Aluminum strips & Perforated metal sheets.


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Course Evaluation:

Components	A	H	CT	EE
Weightage (%)	05	10	15	70
(A-Attendance; H -Home Assignment; CT-Class Test; EE-End Semester Examination)				

Text & References:

1. Mehta, Madan, Building construction: Principles, materials, and systems. Pearson Prentice Hall, 2008.
2. Godsey, Lisa. Interior design materials and specifications. A&C Black, 2012.
3. Bindra, S.P. and Arora, Building Construction: Planning Techniques and methods of Construction
4. J. Rosemary Riggs; Materials and Components of Interior Architecture
5. R.Chudley – Building Construction Handbook – BLPD, London 1990.
6. S.C.Rangwals – Engineering materials – Charotar Publishing, Anand.



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ESTIMATION, COSTING & PROJECT MANAGEMENT

(Theory)

Course Code: IND2404

Credit Units: 02

Course Objective:

This course aims to equip the students to prepare the Estimate in order to foresee the cost of the work or to implement an interior design project & also to monitor / control project cost. Also, this course exposes the students to the currently prevalent techniques in the planning, programming and management of a project.

Course Contents:

Module I : Introduction To Estimation

Estimation – definition, purpose, types of estimate, and procedure for Estimating the cost of work in order to implement an interior design project or to make products related to interior design like furniture, artifacts etc.

Module II : Rate Analysis & Estimation Format

Rate Analysis – definition, method of preparation, quantity & labor estimate for woodwork, steelwork, Aluminum work, glass & its rate for different, thickness & sections, finishing (enamel paint, duco paints, melamine, DU coats, Hand polishing, veneering and laminating) for walls & ceilings. Electrical & plumbing products, wiring, ducting etc., and laying of tiles & wall paneling in the estimate format of the project.

Module III : Detailed Estimate

Detailed Estimate – data required, factors to be considered, methodology of preparation, abstract of Estimate, contingencies, labor charges, bill of quantities, different methods of estimate for interior design works, methods of measurement of works.

Module IV : Costing of Fixtures & Fittings

Cost of the following items: Luminaries, Fan, Cables, Switches etc.; Tiles in skirting & dado, Cement plaster, Wood, Steel & Aluminum, Painting to walls : Cement paint, Oil paints , Distemper, Acrylic emulsion, Enamel paint; painting to joinery, Varnishing, French polishing, Plumbing equipments: Piping, Shower panels ,Cubicles, Tubs, Jacuzzis, Taps, Motors, Fountains, False ceiling of Aluminum panels, Steel & Wooden frame work, Thermosol etc. Wall paneling of tiles, Partitions made of materials like Aluminum, Wood, Steel etc.

Module V : Introduction To Specification

Specification: Definition, Purpose, Procedure for writing specification for the purpose of calling tenders, Types of specification. Specification for different item related to interior design project – woodwork for furniture window frames & pelmets, Partitions etc. Materials like steel aluminum glass of various kind. Wall paneling & false ceiling of materials like Aluminum, Steel, Wood, Electrical, Plumbing, Air-conditioning & Firefighting equipments.

Module VI : Project Management

Introduction: Project planning and project scheduling and project controlling, Role of Decision in project management, Method of planning and programming, Human aspects of


project management, work breakdown structure, Life cycle of a project, disadvantages of traditional management system; Event, activity, dummy, network rules, graphical guidelines for network, numbering of events; **Critical Path Method And Pert Analysis:** CPM network analysis & PERT time estimates, time computation & network analysis; **project time reduction and optimization:** Project cost, Indirect project cost, direct project cost, slope of the direct cost curve, total project cost and optimum duration, contracting the network for cost optimization, steps in cost-time optimization; **project updating and allocation:** When to update? Data required for updating, steps in the process of updating; Resource usage profile: Histogram, Resource smoothing and Resource leveling, Computer applications in project management

Course Evaluation:

Components	A	H	CT	EE
Weightage (%)	05	10	15	70
(A-Attendance; H -Home Assignment; CT-Class Test; EE-End Semester Examination)				

Text & References:

1. M. Chakraborti, .Estimation, Costing, Specification and Valuation in Civil engineering.
2. Dr. B.C.Punmia et al. Project planning and control with PERT and CPM, Laxmi Publications,
3. S. C. Rangwala, Elements of Estimating and costing, Charoter publishing House, Anand, India, 1984
4. R.A. Burgess and G.White, Building production and project Management, The construction press, London, 1975
5. Jerome D.Wiest, A Management Guide to PERT, CPM, prentice Hall of India Pub, Ltd., New Delhi, 1982


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INTERIOR DESIGN STUDIO-II (Studio-Graphics)

Course Code: IND2406

Credit Units: 03

Course Objective:

This course focuses on planning a designing of a working space. Each module is designed as a studio project and students will learn the fundamentals of the various types of working environment and how to design a functional and aesthetically appealing working space.

Course Description

In the studio, the learning process is learning by doing. The core part of this course incorporates exercises to develop manual and digital presentation skills in order to present design ideas and solutions. Every module is blended with hand on sketches as well as application of basic computer graphics. Each student has to maintain a sketchbook compulsorily. Process sketches are scanned and integrated into the final presentation by PPT. A hard copy of Design Studio Portfolio submission is compulsory

Course Contents:

(NB: Submission of Practical work record / Portfolio / Sketch Book is compulsory for all Modules and will be part of the Final Course Evaluation)

Module I : Studio Project -1:OfficeInterior.

Office facilities generally have the highest concentration of occupants. These areas vary from home offices, to open-bay work spaces filled with conventional and modular furniture, to large systems furniture (pre-wired) installations. The interior plans are either closed plan office or Open plan. office

Most administrative facilities will contain some combination of the three types depending on the functions performed by the occupants, as well as physical constraints of the facilities.

- **Heavy-use areas** - Entrances, foyers, lobbies, main circulation corridors, stairwells, elevators, rest rooms, large conference or meeting rooms, snack bars, and media production areas.
- **Medium-use areas** - Internal circulation, staff office areas, and small conference rooms.
- **Light-use areas** - Commanders' suites and private conference areas.

Type of offices:

- Professional offices: Law, Accounting, stockbrokers, Real estate brokers etc.
- Corporate and Executive offices: Any size of office for any kind of business other than professional office that involved a corporate identity.

Module II Studio Project -2: Institutional Interiors

Institutional interior design involves in depth programming, planning, design, and management of space used by public and private organizations. The student needs to recognize the emotional content and public response and familiar with the very specific needs and requirements associated with Institutional interiors

Educational Institutions:

Educational facilities include grade and high schools for dependent children, specialized training facilities (such as simulators), professional and technical classrooms, and centers for college extension program.

- **Heavy-use areas:** Entrances foyers, Cafeteria, Rest rooms, Fitness areas, Technical classrooms.
- **Medium-use category:** Administrative offices, conference rooms, most other classrooms, Labs and corridors.
- **Light-use:** Principals' offices and commanders' suites.

Module III Studio Project -2: Other Institutions(Self-study / Assignment)

Government offices; Banks, Daycare centers, Religious centers, Fire and Police stations, Courts, Public Libraries etc.

Course Evaluation:

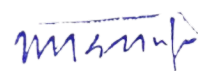
Components	A	H	CT	EE
Weightage (%)	05	10	15	70
(A-Attendance; H -Home Assignment; CT-Class Test; EE-End Semester Examination)				

Text & References:

1. Designs for 20th century Interiors – Fiona Leolie, VH Publications, London, 2000.
2. Interior Design; The New Freedom, BarbaralecDiamondstein, Rizzoli International Publications, New York, 1982.
3. Interior Colour by Design, Jonathan Poore, Rockport Publishers, 1994.
4. Worldwide Interiors – International Federation of Interior Architects & Designers, Rikuyo-Sha, Japan, 1987.
5. Simon Dodsworth Cardoso; The Fundamentals of Interior Design
6. Karlen Mark, Space planning Basics,
7. Maureen Mitton, Interior Design Visual Presentation
8. Carol Simpson, Estimating for Interior Designers



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INTERIOR WORKSHOP PRACTICE-II (Practical)

Course Code: IND2407

Credit Units: 03

Course Objective:

The course provides an understanding of comparative analysis of various metals and their design parameters facilitating usage in the interiors. The aim of this course is to introduce various methods of working with metals with an exposure to fixing, joinery and treatment.

Course Contents:

Module I: Working with various Metals

Types of metals, Properties of metals, Definitions of terms with reference to properties and uses of metals, Various methods of working with metals, Fixing and joinery in metals, Finishing and treatment of metals., Finishes on metals; Standard specifications; Metals in built form activity: Horizontal, vertical and inclined surfaces - in interior environment elements- Products and furniture forms- Doors, windows, Jalties, Railing, stair etc. Metals and other materials – Form and joinery.

Module II: Metals: Fabrication

Cutting, Planning, Drilling and lathing of steel sections used in furniture. Aluminum sections and their use in doors, windows, and partitions.

Module III: Welding

Introduction; Arc welding; Welding tools; Techniques of welding; Types of joints; Welding positions; Advantages& disadvantages of arc welding; Safe practice.

Module IV: Industrial Visit.

Visit various Forging and Stamping Industries, Architectural and Structural Metals Manufacturing, Fabricated Metal Product Manufacturing like Aluminum fabrication, steel fabrication, etc. Learn, absorb and recognize different stages of metal processing, manufacturing different types of metals, interior decoration elements, several models of doors and windows, pieces of furniture and welding works. Visit Glass industries and understand the manufacturing process and glass fabrication.

Module V: Project

Design and make any one product .The product will be in metal to be constructed in workshop supported with design concept , detailed drawings ,joinery details and techniques .

Course Evaluation:

Course Evaluation:

Components	A	H	CT	EE
Weightage (%)	05	10	15	70
(A-Attendance; H -Home Assignment; CT-Class Test; EE-End Semester Examination)				

Text & References:

- Pete Silver et al – Fabrication, the designers guide – Architectural press, London 2006.
- Albert C Smith - Architectural model as machine – Architectural press, oxford 2004.
- John .F. Pile, Interior Design, Harry. N Abrams, Inc. New York; 1995.
- Ron Fournier, Metal Fabricators Handbook, Rev. Illustrated edition, HP Books, 1990.
- Stanford Hohauser, Architectural and Interior models, Van Nostrand Reinhold, 1970.


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SEMINAR / GUEST LECTURE / WORKSHOP FOR SKILL DEVELOPMENT

Course Code: IND2433

Credit Units: 04

Course Objective:

The aim of this course is to develop various research skills to the student. They also expose to write a paper and present in a seminar. The workshops and guest lecturers aim to develop practical solutions in the field of interior design with more idea generations and innovations. The students have to be participated either Seminar (1) or Workshop (2) to earn the credit. Guest lecture (3) is addition to this for enhancing their knowledge by examining and analysing various aspects of design.

SEMINAR

Each student would be required to select one of the below subjects and present a written paper (essay) and present in the seminar. This should be based on extensive literature reviews, case studies, interviews (wherever possible), etc. The student may choose any area of interest in consultation with the concerned faculty for research. The study would be presented as a term paper with supporting illustrations. It will be periodically reviewed and presented as a seminar for final assessment.

Suggested areas for research:

1. Studies of Indian art & craft. Influence of location, tradition, culture and socio-economic development on art & craft in rural & urban India. Suggest suitable changes in technology to improve the products so as to make it acceptable in today's context.
2. Studies of the work of different interior designers through observation, interview and research. Understanding of the concepts of space, structure, organization, symbolism, form, colour, modes of presentation etc.

Evaluation Scheme:

Components	Organisation and Relevance of content	Literature Review	Bibliography	Presentation	Total
Weightage (%)	30	30	20	20	100

WORKSHOP

Objectives:

A workshop is primarily an activity based academic event that is organized to provide the students a one to one and hands on experience on any aspect of their learning. Workshop is undertaking a significant practical unit of examining and analyzing various aspects of design at a level commensurate with the learning outcomes of the various courses taken up them in the ongoing semester. The communication in a workshop has to be necessarily two ways. The trainer has to make sure that the aspects covered are practically practiced by the participants. The student will choose the option of workshop from amongst their concentration electives. The evaluation will be done by jury of examiners comprising of the faculties.

Major Themes for Workshop are: -

Decorative accessories in interiors / Occupant health & safety in interiors / Signage & Graphics - Optical

Illusions - Modular Co-ordinations. / Kitchen & Bath design - Storage design. / New materials and application in Interior Design.

Guidelines for Workshop :

The procedure for earning credits from workshop consists of the following steps:

- Relevant study material and references will be provided by the trainer in advance.
- The participants are expected to explore the topic in advance and take active part in the discussions held
- Attending and Participating in all activities of the workshop
- Group Activities have to be undertaken by students as guided by the trainer.
- Evaluation of workshop activities would be done through test and quiz at the end of the workshop.
- Submitting a write up of at least 500 words about the learning outcome from the workshop.

Methodology

The methodology followed at the workshop could be based on any one or more of the following methods:

Case Study /Group Activity. /Role Play. / Business Planning. /Quiz.

Evaluation Scheme:

Components	A	AP	MCQ	Solving the case/ Assignment / Write up	Total
Weightage (%)	10	30	30	30	100

(A - Attendance; AP - Active Participation; MCQ - Multiple Choice Questions)

GUEST LECTURE

Eminent subject experts from the field may be invited to deliver the lectures on different topics of their choice and share their experience with the students

DESIGN THINKING & CREATIVE PROBLEM SOLVING

(Theory & Activities)

Course Code: IND2501

Credit Units: 03

Course Objective:

The objective of this course is to develop deep insights about design thinking. This course provides the ability to gain about users to define and re-frame problems, and to generate solutions or alternative approaches towards design and innovation.

Course Contents:

Module I : Design Thinking Process

Stages of thinking: The design process; Stage 1- Define ; Stage 2- Research ; Stage 3- Ideate ; Stage 4- Prototype ; Stage 5- Select ; Stage 6- Implement ; Stage 7- Learn. **Research:** Identifying drivers; Information gathering; Target groups; Samples and feedback. **Idea generation:** Basic design directions; Themes of thinking; Inspiration and references; Brainstorming ; Value ; Inclusion; Sketching; Presenting ideas. **Refinement:** Thinking in images; Thinking in signs; Appropriation; Humour ; Personification; Visual metaphors ; Modification; Thinking in words; Words and language; Type 'faces'; Thinking in shapes; Thinking in proportions ; Thinking in colour. **Prototyping:** Developing designs; 'Types' of prototype; Vocabulary. **Implementation:** Format; Materials; Finishing; Media; Scale; Series/Continuity.

Module II : Exploring Creativity

Definitions of creativity, Understanding components of creativity, Theories of creativity, Goals and objectives, Value judgments, Defining problems, Information gathering, Creative incubation, Creative thinking and creative process. Tools and techniques of creativity : Mind mapping, Brain storming with related stimuli and unrelated stimuli, Positive techniques for creativity, Creative pause, Focus, Challenge, Alternatives, Concepts, Provocation, Movement, Setting up provocations, Sensitizing techniques, Group or individual techniques. Simple design exercises.

Module III : Design Problems and Solutions

Definitions of problem solving; Formulation of problems, Nature of creative design problems, Design goals. Problem statements; Brain writing with unrelated stimuli, Idea mapping, Random input, Story boarding exercises, Problem solving techniques: Divide and conquer, Hill climbing strategy, Means - Ends analysis, Trial and error, Brain storming, Morphological analysis, Method of focal objects, Steps developed by Polya, Dekker, De Bono, Research, Analogy, Reduction (Complexity), TRIZ, Halpern's techniques etc; Creative solutions applicable to designs; Conceptual design, Embodiment design, Detail design, Iterations; Simple Design exercises;

Course Evaluation:

Components	A	H	CT	EE
Weightage (%)	05	10	15	70
(A-Attendance; H -Home Assignment; CT-Class Test; EE-End Semester Examination)				

Text & References:

1. Liedtka, Jeanne, and Tim Ogilvie. Designing for growth; Columbia University Press, 2011.

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2. Liedtka, Jeanne, Solving problems with design thinking; Columbia University Press, 2013.
3. John Heskett, Design: A Very Short Introduction, Oxford University Press, 2005.
4. Jon Kolko, Exposing The Magic of Design; Oxford University Press, 2011.
5. Nigel Cross; Developments in Design Methodology, John Wiley & Sons, 1984
6. Mitchell, C. Thomas. Redefining designing: From form to experience. New York: Van Nostrand Reinhold, 1993.
7. Noone, Donald.J, Creative Problem solving, Hauppauge, 1993.
8. De Bono, Edward, Serious Creativity; Harper Collins publishers, 1992.
9. Peterson, Bryan. Design basics for creative results. Adams Media, 2003.
10. Casper, Steven, Eds. Innovation and Institutions; Edward Elgar Publishing, 2005.



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REVITALIZATION OF ARTS & CRAFTS

(Documentation Project)

Course Code: IND2502

Credit Units: 01

Course Objective:

This course aims a detailed study of the characteristics of Indian arts and crafts and its application in the interiors that provides an understanding of the role of revitalization of Art/craft form in interior spaces through a project assignment.

Course Contents:

(NB: Submission of Project Report is compulsory for this course and will be part of the Final Course Evaluation)

Module I : Introduction to Creative Arts and Crafts in India

Creative arts and crafts in India and its application in interior design; Materials; Art movements through history; Traditional arts and crafts of India; Folk arts of India; Traditional arts and crafts of various states of India.

Module II : Project Assignment

Description:

The project will consist of a general to the crafts traditions of India, details about the crafts, their classifications, regional distribution etc. that will applicable to art in interior spaces such as –Residence, Reception, Lobby spaces, Theme Boutiques, Hotel, Restaurants, etc. This project will necessarily be a scientific, methodical documentation of a particular craft tradition prevalent in the region, which will have the following core issues in the background:

Philosophy and Aesthetics - Materials, Processes and Techniques - Environment and Resource management – Social structures - Economy & Marketing – International examples.

Project Objective:

Document people, life, culture and craft and understand the materials, tools, technology, processes and forms. Suggest suitable changes in technology to improve the products so as to make it acceptable in today's context.

Procedure:

Select one of the art / craft form with the consultation of the faculty. Discuss about the crafts traditions practiced in the region, their history, distribution etc. along with faculty. Collect all information available through various sources including library, internet and resource persons. To avail comprehensive data on various aspects of the crafts, students may develop an interview schedule and decide on number of crafts persons to be interviewed, which all places they will be visiting etc. Faculty must equip the students on interaction with craftsperson and other people from the community, type of language they should use, how to be polite with them and while handling their materials etc. Students can buy some of the objects from craftsperson, take photographs after seeking their permission, make drawings, etc. which later on they can use in PPT presentation along with submission of final project report. The students can also make a short documentary film basis on their research for their final presentation.

Requirements:

- The work will be periodically reviewed.
- The study has to be presented in the form of a 'Documentation Report' with illustrations /images as a seminar for final Course Evaluation.
- The students are asked to give a brief oral presentation with 'Power Point' to the class about their

research.

- They have to explain, what kind of interests they want to develop in the research and a debate will follow as well.
- The submission of project assignment file and presentation will be part of student's Examination Scheme.
- The students will have to visit various craft places and museums for the part of their research.
- There will be an evaluation by a jury comprising of external experts and internal faculty guide from the department.
- Failure to submit the Project Report or failure to appear at the Viva-voce Examination will be treated as "Absent" in the Examination.

Course Evaluation:

Components	Conceptual Framework	Viva-Voce	Presentation	EE
Weightage (%)	40	40	20	100
(EE-End Semester Examination)				

Resources :

1. Publication on Traditional Arts and Crafts on India, Ministry of Handicrafts Development, Govt. of India.
2. Edith Thomory, A History of fine arts in India and the west, Orient Longmann publishers Pvt. Ltd, New Delhi.
3. AditiRanjan, M. P. Ranjan; Handmade in India; Abbeville Press, 2009.



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INTERIOR SAFETY SYSTEMS AND BUILDING MANAGEMENT

(Theory)

Course Code: IND2503

Credit Units: 02

Course Objective:

The objective of this course is a detailed study of, designs that eliminate or reduce hazards in the workplace to prevent mishaps and provide good indoor quality. This course also covers to make understanding of disaster management, seismic design principles and various building management systems.

Course Contents:

Module I : Safety Management.

Scope of Environmental safety; Need for public awareness; Elements of a safety and health management system applicable to interiors in the terms of design, components and selection of material; Interior structure and responsibilities; Interior designer responsibilities, Individual responsibilities, Safety Consultation; Minimum safety requirements for building interiors.

Module II : Health and Safety Aspects

Define the term 'accident'; Reasons accidents inside the buildings; The factors of slips, trips and falls in the workplace and methods to prevent them; Dealing with electric shock; Methods for electrical safety; Types of health hazards; Common hazardous substances and the routes of entry; Health and safety aspects of the interiors structure; Design layout and services; Types of injuries; Define 'first aid' and practical training on 'first aid'

Module III : Dealing of Fire Fighting Services

Mechanism of fire spread in building and prevention; Fire safety standards; Concepts in fire protection; Firefighting installation and requirements; Heat sensitive detectors; Smoke detectors; Automatic water sprinkler system; Foam systems; Fire proof materials for Interiors: Fabricated fire proof boards; Calcium silicate, Gypsum, Vermiculite, and Perlite boards; Fire protection of structural elements: Wooden, Steel, RCC, and Plastic structures; Fire and life safety requirements in different groups of buildings; Define LPG; Characteristics of LPG; LPG Installation; LPG - rules of usage; Dealing LPG in case of leakage; Dealing in the event of accident.

Module IV : Disaster Management & Seismic Design Principles

Emergency planning: on-site and off-site; Need of a plan, possible approach, and objectives of emergency plan. On-site emergency planning, formulation of the plan and emergency services; Identification of resources, actions and duties, emergency procedure; Mock drills. Concept of seismic design.

Module V : Building Management

Fundamentals for interior and exterior treatments: Termite proofing, Waterproofing, Acoustics, Thermal comfort, Fire protection. Factors influencing choice of treatments: Climate, Cost, and Age. Vertical transportation systems: Lifts & Escalators : Definition, Location, Arrangement, Structure; Security and safety systems.

Module VI : Design for Fragile Population/ People with Special Needs

Fragility: Understanding Fragility, Synonyms for Fragile population in Design Industry, Universal and Barrier -free design, Physical accessibility standards for Barrier free environment, Space planning for people with special needs.


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Course Evaluation:

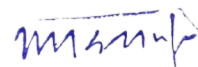
Components	A	H	CT	EE
Weightage (%)	05	10	15	70
(A-Attendance; H -Home Assignment; CT-Class Test; EE-End Semester Examination)				

Text & References:

- Hughes, Phil, and Ed Ferrett. Introduction to health and safety at work. Routledge, 2011.
- Binggeli, Corky. Building systems for interior designers. John Wiley & Sons, 2003.
- Vinod Kr. Sharma; Disaster Management, IIPA, New Delhi.
- Jain, Virander K. Fire safety in buildings. Taylor & Francis, 2007.
- Derek Clements-Croome, Derek J. Croome, Intelligent buildings, Thomas Telford Books, London, 2004.
- C.V.R Murthy, Andrew Charlson. "Earthquake design concepts", NICEE, IIT Kanpur, 2006.
- Edward Steinfeld and Jordana L. Maisel, Universal Design – Creating Inclusive Environments, 2012
- 8 .Guidelines and space standards for Barrier free built environment for Disabled and Elderly Persons, 1998



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TEXTILE IN INTERIORS

(Theory)

Course Code: IND2504

Credit Units: 02

Course Objective:

The objective of this course is to familiarize the students of Interior Design on textile materials used in interior. This course helps to gain knowledge and understanding of the functional and aesthetic requirements of textiles for a range of applications.

Course Contents:

Module I : Introduction To Fabrics

Fabric, yarn and fiber structure, Fabric structure- woven- warp, weft, selvedge, knitted- course, non-woven, Fabric types and classification- woven, including plain, twill, satin, Jacquard, crepe and pile weaves, Knitted- including single knit, double knit, tricot knit, pile knit, lace and net, Non-woven-including felts webs and films, identification and properties of fabrics, yarns and fibers.

Module II : Textile Design Applicable to Interiors

Development of textile design in different cultures from primitive art to contemporary designs. Criteria of design of the elements and principles of textile design. Application of elements and principles of design across a range of textiles. Describe and analyze elements and principles of design -furnishings, textile arts. Functional and aesthetic requirements and features of textile range. Analysis of a motif, developing repeat as a basic unit of design.

Module III : Colour on Fabrics

Fabric coloration and decoration- Dying and Printing; Principles of applying color to fabrics. Textile arts and crafts in interiors, traditional and modern materials and methods. Preparing samples on tie and die printing, batik printing, appliqué, macramé and braiding.

Module IV : Textile Materials for Interiors.

Miscellaneous materials such as cork, leather, paper, Rexene etc. – their properties, uses and applications in the interiors. A brief overview of Green materials. Jute or hessian – dyed jute fabric and its applications – various kinds of processed leather, its application in interior design.

Module V : Home Furnishings

Furnishings-Classification; Types of curtain; Curtain construction; Selection criteria relation to backgrounds in walls; Floors and ceilings; Slip covers; Cushion covers; Bed linen and table linen; Floor coverings -rugs and carpets, types selection; Care and maintenance; Installation of floor coverings.

Course Evaluation:

Components	A	H	CT	EE
Weightage (%)	05	10	15	70
(A-Attendance; H -Home Assignment; CT-Class Test; EE-End Semester Examination)				

Text & References:

1. Inside today's home, Faulkner, R. and Faulkner 1987, Rinehart Winston, New York
2. Interior Design & Decoration, Sherril Whiton, Prentice Hall
3. Introduction to home furnishings, Stepat, D.D, 1991, The Macmillan Company, New York.
4. The themes and Hudson manual of textile printing, Storeyjoyce, 1992, London
5. Colour in interior Design Jhon, F.P, 1997, McGraw Hill Company
6. Materials for Interior Environments, Corky Bingelli, John Wiley and Sons, 2007
7. Fabrics: A guide for architects and Interior Designers, Marypaul Yates, Norton publishers, 2002.
8. June Fish, Designing and printing textiles, Crowood press, 2005



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INTERIOR DESIGN STUDIO-III

(Studio-Graphics)

Course Code: IND2506

Credit Units: 02

Course Objective:

Retail design is a very specialized discipline due to the heavy demands placed on retail space. The objective of this course is to introduce the basics of designing for Retail interiors and to develop skills required for the same that can apply into various interior design projects.

Course Description

In the studio, the learning process is learning by doing. The core part of this course incorporates exercises to develop manual and digital presentation skills in order to present design ideas and solutions. Every module is blended with hand on sketches as well as application of basic computer graphics. Each student has to maintain a sketchbook compulsorily. Process sketches are scanned and integrated into the final presentation by PPT. A hard copy of Design Studio Portfolio submission is compulsory.

Course Contents:

(NB: Submission of Practical work record / Portfolio / Sketch Book is compulsory for all Modules and will be part of the Final Course Evaluation)

Module I : Studio Project -1 : Malls and Shopping Centers

The structure of retail space creates the constraints of the overall design. In retail one hundred percent of the space must be utilized and have a purpose. The floor plan creates the circulation which then directly controls the direction of the traffic flow based on the studied psychology of consumer movement pattern within a retail space. Circulation is important because it ensures that the consumer moves through the store from front to back, guiding them to important displays and in the end to the cashier. The basic store layouts and circulation plans that all provide a different experience:

- **Design Planning for Retail Activity:**

Straight plan - Pathway plan - Diagonal plan- Curved plan - Varied plan - Geometric plan

- **Design Elements:**

Ergonomics in Retail interiors; Types of Shop layouts; Modular units; Materials used in counters, shelves, worktops, their comparative study. Lighting & colour scheme – Natural & Artificial light. Design of commercial ambience.

- **Visual Merchandising Display Techniques:**

The art of selling-displays/products/marketing, design of display units, design of boutiques, showrooms; Product display: Windows displays / Internal displays / Hierarchy of product display / Power of visual communication / Graphics; Theme displays. Exhibition spaces: Display for exhibition, Lighting design for commercial spaces: Task; Display, Atmospheric, Focal lighting; Coloring commercial spaces: Coding & Decoding. Visual branding of the store.

Module II : Studio Project -2 : Other Retail formats (Self-study / Assignment)

Study, Identify the difference and Design of:

Traditional mom and pop stores, kiosks, Convenience store, Department stores, Super markets and hyper markets, Speciality stores, Off-price retailers, Catalogue showroom, Gift shops, Tradeshowrooms, etc.

Course Evaluation:

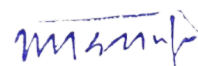
Components	A	H	CT	EE
Weightage (%)	05	10	15	70
(A-Attendance; H -Home Assignment; CT-Class Test; EE-End Semester Examination)				

Text & References:

1. Mesher, Lynne. Basics Interior Design 01: Retail Design. Vol. 1. Ava Publishing, 2010.
2. Spencer, Dale. Interior Design: Interior Design ideas for Retail Design. Venus Content Providers, 2015.
3. Interior Colour by Design, Jonathan Poore, Rockport Publishers, 1994.
4. Piotrowski, Christine M. Becoming an interior designer: a guide to careers in design. John Wiley & Sons, 2008..
5. Morgan, Tony. Visual merchandising: Window and in-store displays for retail. Laurence King Publishers, 2008.
6. Simon Dodsworth Cardoso; The Fundamentals of Interior Design
7. Karlen, Mark. Space planning basics. John Wiley & Sons, 2009.
8. Mitton, Maureen. Interior design visual presentation, John Wiley & Sons, 2012.
9. Carol Simpson, Estimating for Interior Designers.



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COMPUTER AIDED INTERIOR DESIGN & DRAFTING

(Studio based Practical)

Course Code: IND2507

Credit Units: 03

Course Objective: The main objective of this course is to construct drawings and design objects of interior spaces with special emphasis on presentation, visualization of interiors, rendering techniques using AutoCAD and Revit Architecture. This course enhances the students to use CAD that automates design & drafting task so that creating and revising drawing becomes easy.

Course Contents: (NB: Submission of Practical work record / Graphic Portfolio is compulsory for all Modules and will be part of the Final Course Evaluation)

Module I : Starting AutoCAD Introduction to AutoCAD, AutoCAD : System requirements, AutoCAD screen, Command entry, Setting up of page size, Starting drawings from scratch, Creating and using templates, Opening a drawing, Saving the drawing & Exit from AutoCAD.

Module II : Using Co-ordinate systems. The UCS, Working with Cartesian and Polar coordinate systems, Using displays with shortcuts, Setting up the drawing environment, Setting the paper size, Setting units, Grid limits, Drawing limits, Snap controls, Use of paper space and Model space, Drawing tools.

Module III : Setting up the Drawing Environment Basic commands dealing with drawing properties: Layer control, Change properties, Line weight control, etc. Inquiry methods: Using data base information for objects, Calculating distance, Angle, Areas etc.

Module IV : Dimensioning commands and blocks Dimensioning the objects in linear, Angular fashions along with quick time dimensioning etc. Creating and working with blocks, Creating symbols, Use of blocks in creating a layout, of an area.

Module V : Orientation towards 3D 2D to 3D conversion, Perspective view, Walk through the layout, Solid modeling : Concepts behind solid modeling, Composite solids creation and Modification, Solids display and Inquiry. Rendering and Presentation. Printing and plotting.

Module VI :

- Introduction to Basics of Photoshop.
- Basics of Rendering in Photoshop
- Editing and modification of images in Photoshop
- Planning Interface
- Annotations & Dimensions
- Page Layout & Printing

Course Evaluation:

Components	A	H	CT	EE
Weightage (%)	05	10	15	70
(A-Attendance; H -Home Assignment; CT-Class Test; EE-End Semester Examination)				

Text & References:

- Douglas Seidler, Digital drawing for designers: A visual guide to AutoCAD 2011. Fairchild Publications, 2010.
- Byrnes, David, and Bill Fane. AutoCAD 2013 for dummies. John Wiley & Sons, 2012.
- Feng, Jin, and Jiang Lu. Basic AutoCAD for Interior Designers Using 2007. Prentice-Hall, Inc., 2007.

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- Beverly,L.K ; James,M.K, Auto CAD for Interior Design and Space Planning (3rd Ed.) Prentice Hall; 1998.
- Dean Muccio, AutoCAD 2015 for the Interior Designer: AutoCAD for Mac and PC, SDC Publications, 2014.
- Adobe Photoshop Classroom In A Book : Andrew Faulkner and Conrad Chavez, 2020.



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INTERIOR SPACE MODELING WORKSHOP-I

(Practical)

Course Code: IND2508

Credit Units: 02

Course Objective:

The Model-making is also part of the act of designing as assisting the designer's ability to pre-visualize. The objective of this course is to enhance the students to basics of model making with various materials and acquisition of hands on experience in model - building.

Course Description

Model-making is a very practical subject, in that it involves the handling of materials to produce a physical outcome. It could be taught purely from that practical standpoint. Focusing on the materials and tools needed, and the methods or techniques employed to make specific things. Generating the idea through freehand sketching is important in model making. The initial sketches are compulsory for students to pre-visualization before starting the model making. The number of freehand sketches should use and select one for further technical sketching. All models are built to a predetermined scale. As with measured drawings, the level of realism depends on the scale. For example, a model at scale 1:5, should display a lot more details than a model at scale 1:50. It is also best practice to include a support for the model, either in the form of a single piece of board to will keep it sturdy, makes it easier to carry and view at different angle.

Course Contents:

(NB: Submission of Practical work record / Sketch Book is compulsory for all Modules and will be part of the Final Course Evaluation)

Module I : Introduction to Model Making

Introduction to model making: Concepts; Need; Role of scale models in design; Various materials used for model making; General practices; Understanding of various tools and machines, Best practices and skills involved in operating the tools.

Module II : Model Making Exercises

- **Hand Building Techniques:**

Making a box with a lid- hollowing out, pinch pots – making a bowl, coiling – making a cylindrical pot, slab- building – making a cube shaped box, hand building with clay strips- making a vase. Introduction to block models of buildings involving the usage of various materials like Thermocol, Soap/Wax, Boards, Clay etc.;

- **Working in Scale:**

Design and make the models of: Interior building components: Steps or stairs; Rakes or ramps; Doors; Windows; Floorboards etc. *Furniture:* Dining / Table chair; Sofa; Barstool; Armchair; Table; Beds; Shelves; Cabinets; Kitchen Appliances; Mattresses.

Tools and Materials:

- **Measurements/Rulers:** Architectural Scale; Rulers; Triangular Rule;
- **Pens:** Sharp Pencil; Double-side Marker: Fine and Ultra-fine; Micron Pens 01, 03, and 08; Thick Marker;
- **Cutting Tool:** Snap-off Blade; Utility Knife; Scissors, Cutting Mat
- **Glues:** Rubber Cement Glue; Quick Dry Glue; Glue Gun; Transparent Cello Tape;



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- **Board materials:** Thin Black and White Foam Board; Thick Black and White Foam Board; Chip Board; Thin Plywood; Clear Sheet Print.

Procedure:

Get an idea – Make number of initial freehand sketches - Select one for the finalization- Prepare base for models using wood or boards- Prepare tools and materials - Select a scale of model - Floor Plan and Section Cut Drawing - Add dimensions to drawing - Make sure safety as first concern while cutting - Cut - Labeling cut pieces - Keeping track of what is being glued to where - Getting and keeping right angles - Glue each pieces - Build interiors and structural model separately - Add colors and textures to finishing the model.

Course Evaluation:

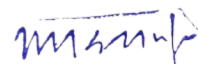
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(A-Attendance; H -Home Assignment; CT-Class Test; EE-End Semester Examination)				

Text & References:

1. Mitton, Maureen. Interior design visual presentation. John Wiley & Sons, 2012.
2. Jannsen, Constructional Drawings & Architectural models, Karl Kramer Verlag Stuttgart, 1973.
3. Harry W.Smith, The art of making furniture in miniature, E.P.Dutton Inc., New York, 1982.
4. Magret Jacque. The Aesthetic Experiences: An anthropologist looks at the Visual Art.
5. Tapert, Annette, Swid Powell: Objects by Architects, Rizzoli, New York, 1990.



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INTEGRATED PROJECT WORK

(Project)

Course Code: IND2532

Credit Units: 04

Course Objective:

The student will be required to produce a project feasibility report for the specific design undertaken in the design studio. This course aims to sensitize the student to the technical and socio-economic feasibility of the design project.

Course description:

This course for analyzing a design project for technical and socio-economic feasibility. The student has to submit a project feasibility report on the project done in the design studio including previous semesters by integrating the knowledge and skills acquired from all the subjects studied till date.

- Environmental impact assessment of the project following the standards and specifications.
- Socio-economic appraisal of the project and the design considering factors such as behavioral aspects, security considerations, costs for different user groups, aesthetic preferences etc.
- Technical feasibility – through execution and detailing of different spaces and elements of design, checking the feasibility of layout for service systems and specifications.
- Costing of the project – bill of quantities, schedule of rates, specifications etc. economic viability and financial viability.
- Space planning aspects/ issues – user activity spaces, access to physically challenged, fire safety, other services, green rating etc.

The Steps of the Project Report

- Step I:**
- Suitability of the topic.
 - Relevance of the topic
 - Time available at the disposal.
 - Feasibility of data collection within the given time limit.
 - Challenges involved in the data collection

Step II: Finalisation of the Topic and preparation of Project Proposal in consultation with the Supervisor.

Step III: Collection of information and data relating to the topic and analysis of the same.

- Step IV:**
- Writing the report dividing it into suitable chapters, viz.,
 - Chapter 1: Introduction,
 - Chapter 2: Conceptual Framework
 - Chapter 3: Analysis & Findings
 - Chapter 4: Conclusion and Recommendations.

- Step V:**
- The following documents are to be attached with the Final Project Report.
 - Bonafide Certificate cum Report Evaluation (From Faculty Guide & Internal and External Examiner)
 - Student's declaration.


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Evaluation Method for Dissertation Report:**Chapter Scheme for the Training Report.****Marks Distribution.**

Overall Report Format / Layout	: 05
Chapter 1. The Introduction	: 10
Chapter 2. Conceptual Framework,	: 20
Chapter 3. The Conceptual Framework	: 15
Chapter 4. Research Methodology, Data Analysis & Interpretations.	: 10
Chapter 5. Conclusion and Recommendations	: 10
Total	: 70

Procedure for evaluation:

- Submission of project feasibility report, Presentation of project feasibility report & Viva-voce
- The project feasibility report will be reviewed by a jury consisting of external and internal examiner to be appointed by the Department / University. Failure to submit the Seminar Report or failure to appear at the Viva-voce Examination will be treated as “Absent” in the Examination.

Course Evaluation:

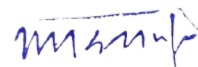
Components	Project Report	Viva-Voce	Presentation	Total
Weightage (%)	70	20	10	100

References:

1. Earl Hall, Juliane Johnson; Integrated Project Management; Prentice Hall, 2002
2. American Institute of Architects; The Architecture Student's Handbook of Professional Practice, John Wiley & Sons, 2011
3. Project Management Institute; A Guide to the Project Management Body of Knowledge (PMBOK® Guide); Project Management Institute, Incorporated, 2013



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MARKETING & ENTREPRENEURSHIP DEVELOPMENT

(Theory)

Course Code: IND2602

Credit Units: 01

Course Objective:

The objective of this course is to develop conceptual understanding of marketing and acquaint the students with various aspects of entrepreneurship business.

Course Contents:

Module I : Introduction to Marketing

Marketing: Nature & Scope of Marketing, Concepts – Production, Product, Selling, Marketing & Societal marketing, Marketing environment **Market segmentation:** need, concept, nature, basis & strategies, mass marketing vs. Segmentation. **Marketing mix:** 4ps of products & 7ps of services, components & factors affecting.

Module II : Understanding Customers

Consumer decision making process (Five step model), Factors affecting buying behaviour, Purchase behaviour, Buyer's role.

Module III : Introduction to Services Marketing

Services: Introduction, Role, characteristics and classifications of services, Goods Vs. Services,; **Services marketing:** Role of marketing in services, Service marketing mix, Service marketing triangle **Service quality:** Quality and productivity, Quality gaps and their closing; **Service delivery:** Managing demand and capacity, Importance of employees, Intermediaries and customer participation in effective delivery, Channel selection **Marketing strategies for service marketing:** Segmentation, Targeting and Positioning, Differentiation, Life cycle, Pricing and Market communication

Module IV : Entrepreneurship Development


Meaning, Definition, Concept, Evolution of Entrepreneurship, Characteristics and Skills of Entrepreneurship, Concepts of Intrapreneurship, Entrepreneur Vs. Intrapreneur, Entrepreneur Vs. Entrepreneurship, Entrepreneur Vs. Manager, Role of Entrepreneurship in Economic Development, Women Entrepreneurship: Meaning, Characteristic features, Women Entrepreneurship in India.

Module V : Role of Government in promoting Entrepreneurship

MSME policy in India, District Industries Centers (DIC), Small Industries Service Institute (SISI), Entrepreneurship Development Institute of India (EDII), National Institute of Entrepreneurship & Small Business Development (NIESBUD), National Entrepreneurship Development Board (NEDB), Financial Support System: Forms of Financial support, Long term and Short term financial support, Sources of Financial support and Financial Institutions, Investment Institutions.

Module VI : Project Identification

Assessment of viability, formulation, evaluation, financing, field-study and collection of information, preparation of project report, demand analysis, material balance and output methods, benefit cost analysis, discounted cash flow, internal rate of return and net present value methods.


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Course Evaluation:

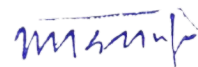
Components	A	H	CT	EE
Weightage (%)	05	10	15	70
(A-Attendance; H –Home Assignment; CT-Class Test; EE-End Semester Examination)				

Text & References:

1. Kotler, Philip, and Gary Armstrong. Principles of marketing. Pearson Education, 2010.
2. Gandhi, J. C. Marketing: A Managerial Introduction. Tata McGraw-Hill, 1991.
3. Peter, J. Paul, Consumer behavior and marketing strategy. London: McGraw-Hill, 1999.
4. Zeithaml, “Services marketing: Integrating customer focus across the firm.” 2006.
5. Sahai; Entrepreneurship; Excel Books India, 2008
6. Tiwari, Anshuja. Entrepreneurship Development in India. Sarup& Sons, 2007.
7. Das, Keshab, ed. Micro and Small enterprises in India: The Era of reforms. Routledge, 2011.
8. Nagarajan, K.; Project Management; New Age International, 2004



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PROFESSIONAL PRACTICE & OFFICE MANAGEMENT

(Theory)

Course Code: IND2603

Credit Units: 01

Course Objective:

The course objective is to develop legal, technical and financial aspects of Interior Design practice and management skills for professional practice. This course provides an overview of rules and regulations in Interior Design practice and technicalities of code of conduct in professional practice.

Course Contents:

Module I : Role of Interior Designer in Society

Interior Design Profession as compared to other professions. Difference between profession and business; Organizations related to interior design profession. Interior Designers approach to works, ways of getting works: types of works, works partly executed by other Interior Designers. : various precautions to be taken before taking up the work, conditions of engagement between interior Designer and client: commencement of work.

Module II : Attributes of professional practice.

Professional behavior, Ethics, Types of clients, Contracts, Tenders, Arbitration etc. as defined in terms of Interior Design field and current day context. Career opportunities, styles of interior design practice, relationship between client and professional, type of fees, process of fees negotiations, billing methods, tax liabilities, contracts – types of contracts – item rate, labour, lumpsum, cost plus percentage etc.

Module III : Designer's Tasks

Preparation of drawings; Interior Designer's relation with other parties connected with works such as client, contractor, sub-contractors, consultants and authorities. IIDD Code of professional conduct: scale of charges: units and mode of measurements, clerk of work and his duties, inspection of work, certificate of payment to contractor, bill of quantities, schedule of rates, tenders, public, limited and negotiated tender documents and allied formalities. Preliminary knowledge of Consumer protection Act and other related acts on Interior Designers.

Module IV : Office Management

Planning and Scheduling Office Work: Office routine, work flow and office manual. Staff structure, Filing of records, Correspondence and Drawings, Maintenance of accounts, Studio Management, Meeting: Meetings with special reference to agenda, Quorum, Motions, Resolutions, Drafting and writing of minutes. Presentations in meetings,. Dealing with financial institutions; Role and functions; Types of financial institutions.

Module V : Visiting An Interior Designer's Office(Self-study / Assignment)

Gain practical knowledge of role of consultants and coordination between different consultants on a project. A report to be prepared by each student after visiting an interior designer's office.

Course Evaluation:

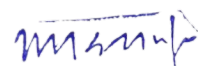
Components	A	H	CT	EE
Weightage (%)	05	10	15	70
(A-Attendance; H –Home Assignment; CT-Class Test; EE-End Semester Examination)				

Text & References:

1. Indian Institute of Architects. H.B. Professional Practice, The Architects pub. Bombay.
2. Namavati. H. Roshan. Professional Practice. 8th ed, Lakshani Book Depot, Bombay, 2001.
3. Christine .M. Piotrowski , Professional practice for Interior Designers, 3rd edition, Wiley and sons, 2001.
4. Cindy Coleman, Interior Design Handbook practice, McGraw Hill professional, isted, 2001
5. Ronald Veitch, Professional practice for Interior Designers, Peguis Publishers, Limited, 1987.
6. Balachandran, Sarojini. Customer-driven services management. SAGE Publications India, 2004.
7. Balachandran, V., and V. Chandrasekaran. Office management. Tata McGraw-Hill Education, 2009.
8. Knackstedt, Mary V. The Interior Design Business Handbook; John Wiley & Sons, 2002.



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INTERIOR DESIGN STUDIO-IV (Studio-Graphics)

Course Code: IND2604

Credit Units: 02

Course Objective:

It involves the study of user types, user behavior concepts relevant to Health Care & Hospitality interiors. Students will learn the fundamentals of the various types of working environment and how to design a functional and aesthetically.

Course Description

In the studio, the learning process is learning by doing. The core part of this course incorporates exercises to develop manual and digital presentation skills in order to present design ideas and solutions. Every module is blended with hand on sketches as well as application of basic computer graphics. Each student has to maintain a sketchbook compulsorily. Process sketches are scanned and integrated into the final presentation by PPT. A hard copy of Design Studio Portfolio submission is compulsory.

Course Contents:

(NB: Submission of Practical work record / Portfolio / Sketch Book is compulsory for all Modules and will be part of the Final Course Evaluation)

Module I : Studio Project -1 : Health Care Interiors

Design Medical facilities include Medical centers, Hospitals, Clinics, and Pharmacies.

- **High volume traffic areas:** Patient waiting areas, administrative and doctors' offices, etc.
- **Medium-use areas:** Corridors, wet areas (kitchens, toilets, etc.) and chemicals.
- **Light-use areas:** Medical conference rooms. Wet areas and chemicals.
- Study, design and detailing of special acoustics and functional materials and furniture detailing.

Module II : Studio Project -2 : Hospitality –Lodging

Design Lodging includes transient lodging facilities of all types: Quarters for visiting personnel, as well as temporary living facilities for families arriving at or leaving a base.

- **Heavy-use areas:** Registration desks, Lobbies, Entrance foyers, Stairwells, Elevators, and corridors, Wet areas such as Laundry rooms, Snack rooms, and Rest rooms.
- **Medium-use areas:** Management and Administrative offices.
- **Light-use areas:** Bedrooms, Suites, etc.
- Study, design and detailing of various work spaces, interactions zones.

Module III : Studio Project -3 : Hospitality –Food Service

Design Food Service facilities: The most areas in food service facilities are considered heavy-use because they are subject to high traffic and frequent food and beverage spills.

- **Heavy-use areas:** Dining halls, Flight kitchens, Open mess facilities, Clubs, Snack bars, and Cafeterias.
- **Medium-use areas:** Management and administrative areas.
- **Light-use areas:** Special/private dining areas.

Course Evaluation:

Components	A	H	CT	EE
Weightage (%)	05	10	15	70
(A-Attendance; H –Home Assignment; CT-Class Test; EE-End Semester Examination)				

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Text & References:

1. Linda O'Shea, ; The Interior Design Reference & Specification Book; Rockport Publishers; 2013
2. Interior Design; The New Freedom, Barbara LeCampionstein, Rizzoli International Publications, New York, 1982.
3. Interior Colour by Design, Jonathan Poore, Rockport Publishers, 1994.
4. Worldwide Interiors – International Federation of Interior Architects & Designers, Rikuyo-Sha, Japan, 1987.
5. Simon Dodsworth Cardoso; The Fundamentals of Interior Design
6. Karlen Mark, Space planning Basics,
7. Maureen Mitton, Interior Design Visual Presentation
8. Carol Simpson, Estimating for Interior Designers



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COMPUTER AIDED INTERIOR DESIGN & VISUALIZATION

(Studio based Practical)

Course Code: IND2605

Credit Units: 03

Course Objective:

The objective of this course is to provide the students an opportunity for understanding the technological implication of 3D design. This course provides the visual context of design concepts for a more effective design validation and visual communication using Autodesk 3D Max and Google Sketch up.

Course Contents:

(NB: Submission of Practical work record / Graphic Portfolio is compulsory for all Modules and will be part of the Final Course Evaluation)

Module I : Introduction to 3D Max

Defining 3D graphics, Understanding 3D space, 3D Objects Co-ordinate systems, Modeling concepts, Spline based modeling, Mesh modeling, Parametric modeling, Working with splines, Extrude, Lathe, Bevel, Loft, Basic editing methods, Boolean.

Module II : 3D Modeling

Polygon modeling, Furniture modeling using polygon etc.

Module III : Introduction to Material Textures and Maps

Introduction to texturing, Standard materials and shades, Creating uniform textures, Working on sofa, Floor, Glass and metal materials, Editing UV co-ordinates.

Module IV : Digital Lighting

Introduction to digital lighting, Light theory, Creating 3 point lighting system in 3D graphics, Exposure controls, Basic lights and photometric lights, Light effects. Cameras.

Module V : Animation Fundamentals

Key frame animation, Animating along trajectories, Modifying animation using function curves, Understanding the basic principles of animation like weight and squash & stretch etc., Animating cameras.

Module VI : Introduction to Google Sketch up.

- **The fundamental tools:** Lines, Rectangles, and Circles, Move, Rotate and Offset, Push, Pull and Follow Me;
- **Understanding How Sketch Up Works:** Groups vs. Components, Creating and editing Groups, Creating and editing components;
- **Textures and Materials:** Applying colors and materials, Creating materials, Exporting images;
- **Sandbox Tools:** Creating landscaping, Importing trees;
- **Importing CAD files and Real World Modeling:** Good layer management, Cleaning up CAD files, Turning 2-D into 3-D.

Course Evaluation:

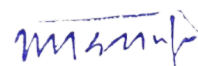
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Text & References:

1. 3D Max Design Tutorials, Autodesk, www.autodesk.com
2. Gerhard, Mark, and Jeffrey Harper. Mastering Autodesk 3ds Max Design 2011. John Wiley & Sons, 2010.
3. Prof. Sham Tickoo, 3Ds Max 5 For Animators, Interior Decorators & Arch, Dreamtech Press, 2003
4. Murdock, Kelly L. 3ds Max 2009 bible. Vol. 560. John Wiley & Sons, 2008.
5. Joe Zeh, Sketchup 2013 for Beginners, F & W Media Incorporated, 2014.
6. Brixius, Laurent. Google Sketch Up Workshop. Taylor & Francis, 2010.
7. Stine, Daniel John, Interior Design Using Hand Sketching, SketchUp and Photoshop. SDC Publications, 2011.
8. Daniel John Stine, Google Sketch Up 8 for Interior Designers, SDC Publications, 2012



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INTERIOR SPACE MODELING WORKSHOP-II

(Practical)

Course Code: IND2606

Credit Units: 02

Course Objective:

This course is continuation of the Interior Space Modeling Workshop – I. This course aims to enhance the student's ability to represent their own ideas in three dimensional forms and communicate these with potential clients. During the course each student will build an archive of complete models using different materials and techniques which will lead to the realization of a project using the knowledge and skills acquired during the previous semesters.

Course Description

Model-making is a very practical subject, in that it involves the handling of materials to produce a physical outcome. It could be taught purely from that practical standpoint. Focusing on the materials and tools needed, and the methods or techniques employed to make specific things. Generating the idea through freehand sketching is important in model making. The initial sketches are compulsory for students to pre-visualization before starting the model making. The number of freehand sketches should use and select one for further technical sketching. All models are built to a predetermined scale. As with measured drawings, the level of realism depends on the scale. It is also best practice to include a support for the model, either in the form of a single piece of board to will keep it sturdy, makes it easier to carry and view at different angle.

Course Contents:

(NB: Submission of Practical work record / Sketch Book is compulsory for all Modules and will be part of the Final Course Evaluation)

Module I : Detailed Modeling

Making detailed models which includes the representation of various building elements like:

Walls, Columns, Steps, Windows/glazing, Sunshades, Handrails using materials like Mountboard, Snowwhite board, acrylic sheets; Representing various surface finishes like brick/stone representation, stucco finish etc.; Various site elements – Contour representation, Roads/Pavements, Trees/Shrubs, Lawn, Water bodies, Street furniture, Fencing etc.

Module II : Models of Structural Design

Making models of the various structural systems used in Interior / buildings like:

Space frames: using Match sticks, wires; Different forms of shell roofs using POP, Clay, Soap; Tensile structures using fabric.

Module III : Buildings & Interior Space Modeling Project (Self-study / Assignment)

Making models of the various interior spaces such as:

- Residences
- Offices
- Retail Spaces
- Recreational Spaces
- Scaled models of furniture.


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Course Evaluation:

Components	A	H	CT	EE
Weightage (%)	05	10	15	70
(A-Attendance; H –Home Assignment; CT-Class Test; EE-End Semester Examination)				

Text & References:

1. Mitton, Maureen. Interior design visual presentation. John Wiley & Sons, 2012.
2. Jannsen, Constructional Drawings & Architectural models, Karl Kramer Verlag Stuttgart, 1973.
3. Harry W.Smith, The art of making furniture in miniature, E.P.Dutton Inc., New York, 1982.
4. Magret Jacque. The Aesthetic Experiences: An anthropologist looks at the Visual Art.
5. Tapert, Annette, Swid Powell: Objects by Architects, Rizzoli, New York, 1990.



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SEMINAR / GUEST LECTURE / WORKSHOP FOR SKILL DEVELOPMENT

Course Code: IND2633

Credit Units: 04

Course Objective:

This course provides a research orientation to the subjects related to interior design. The objective of this course is to develop the capacity of students to undertake research of subjects related to interior design. The students have to be participated either Seminar (1) or Workshop (2) to earn the credit. Guest lecture (3) is addition to this for enhancing their knowledge by examining and analysing various aspects of design.

1. SEMINAR

To present seminars supported by graphical presentation and documentation of research done.

Major Themes for Seminar:

Building Information Modeling (BIM). / Theory of Interior space. / Interior Design language of various cultures. / Influence of Fashion in Interior designing. / Use of rural technology in interiors.

Evaluation Scheme:

Components	Organisation and Relevance of content	Literature Review	Bibliography	Presentation	Total
Weightage (%)	30	30	20	20	100

2. WORKSHOP

Objectives:

A workshop is primarily an activity based academic event that is organized to provide the students a one to one and hands on experience on any aspect of their learning. Workshop is undertaking a significant practical unit of examining and analyzing various aspects of design at a level commensurate with the learning outcomes of the various courses taken up them in the ongoing semester. The communication in a workshop has to be necessarily two ways. The trainer has to make sure that the aspects covered are practically practiced by the participants. The student will choose the option of workshop from amongst their concentration electives. The evaluation will be done by jury of examiners comprising of the faculties.

Major Themes for Workshop are: -

Graphics and space transformation. / Color and light interaction to change space. / Eco-friendly furniture. / Effective visualization by using Computer graphics. / Study on textures and interior materials. / Effective model making of interior spaces.

Guidelines for Workshop :

The procedure for earning credits from workshop consists of the following steps:

- Relevant study material and references will be provided by the trainer in advance.
- The participants are expected to explore the topic in advance and take active part in the discussions held
- Attending and Participating in all activities of the workshop
- Group Activities have to be undertaken by students as guided by the trainer.

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- Evaluation of workshop activities would be done through test and quiz at the end of the workshop.
- Submitting a write up of at least 500 words about the learning outcome from the workshop.

Methodology

The methodology followed at the workshop could be based on any one or more of the following methods:

Case Study / Group Activity. / Role Play. / Business Planning. / Quiz.

Evaluation Scheme:

Components	A	AP	MCQ	Solving the case/ Assignment / Write up	Total
Weightage (%)	10	30	30	30	100

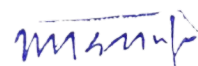
(A - Attendance; AP - Active Participation; MCQ - Multiple Choice Questions)

3. GUEST LECTURE

Eminent subject experts from the field may be invited to deliver the lectures on different topics of their choice and share their experience with the students



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FURNITURE ERGONOMICS & DESIGN

(Studio based Practical)

Course Code: IND2607

Credit Units: 03

Course Objective:

Ergonomics is an integral part of design, manufacturing, and use. This course aims a better understanding of ergonomics applied to furniture design that related end-user needs.

Course Contents:

(NB: Submission of Practical work record / Sketch Book is compulsory for all Modules and will be part of the Final Course Evaluation)

Module I : Anthropometric Measurements

Introduction; Percentile Humans; Anthropometric Databases; Anthropometric Resources.

Module II : Common Workplace Postures & Motions

Standing; Sitting; Reaching; Moving; Good and Bad Zones; Repetitive Motions

Module III : Ergonomics Applied To Furniture Design

Study of Anthropometry & Design criteria involved in the design of:

- Chairs, Tables.
- Sofa, Settee, Couch, etc.
- Cot, Bedside lockers, Wardrobes
- Cupboards, Shelves
- Bunk beds, Study table
- Display furniture

Module IV : Universal Design Considerations

Wheelchairs; Crutches, Canes, and Walkers; Knobs, Handles, and Controls; Access Ramps and Stairs; Resources on Universal Design.

Course Evaluation:

Components	A	H	CT	EE
Weightage (%)	05	10	15	70
(A-Attendance; H-Home Assignment; CT-Class Test; EE-End Semester Examination)				

Text & References:

1. Kroemer, Karl HE, Ergonomics: how to design for ease and efficiency. Pearson College Division, 2001.
2. Jerzy Smardzewski; Furniture Design; Springer, 2015
3. The Encyclopedia of Furniture, Joseph Aronson, Crwon Publishers, New York
4. Interior Design & Decoration, SherrilWhiton, Prentice Hall
5. Office Furniture, Susan S.Szenasy, Facts on file Inc, New York
6. Interior Design Course, Mary GilliatCoyran, Octopus Ltd., London
7. Time Saver Standards for Interior Design, Joseph De Chiara, McGraw Hill, New York.
8. Lueder, Rani, and Valerie J. Berg Rice, eds. Ergonomics for Children; CRC Press, 2007.

FURNITURE CONSTRUCTION AND DETAILING

(Theory & Practical)

Course Code: IND2609

Credit Units: 03

Course Objective:

The course provides a framework to analyze and design furniture forms scientifically and sensitizes the students visual perception of furniture as a single form and as a system in a given interior space.. This course aims to familiarize the students of Interior Design on materials used in furniture and its design, construction and detailing

Course Contents:

(NB: Submission of Practical work record / Portfolio / Sketch Book is compulsory for all Modules and will be part of the Final Course Evaluation)

Module I : Introduction to Furniture

Definition, Furniture categories, exploration of the idea of furniture, Role of furniture in interior design, Various stylistic transformations. Furniture designers and movements. Analysis of furniture in terms of human values, Social conditions, Technology and design criteria.

- **Design Practice: Measured** drawing of a piece of furniture: plan, elevation and drawings on full scale.

Module II : Functional and Formal issues in Furniture Design

Study and evaluation of popular dictums such as “Form follows function”, Form and function are one”, “God is in Details” etc. Human factors, engineering and ergonomic considerations: principles of universal design and their application in furniture design.

Module III : The Basics of Furniture Construction & Tools

Furniture Measurements and methods; Furniture material: Timber and Plywood, Detailed construction drawings & explaining construction and material finishes, Layout and machining plans; Fabrication: Stapling, Gluing; Furniture Joinery: screw joinery, nail joinery, Mortise & Tenon joints, Dovetail joints, Dowel joints, Edge joints. Furniture Construction: Drawers, Cadenza, Dining chairs, Sofa, Settee, Cots detail. Preparation for finishing, Other construction Techniques: Injection Molding, Investment casting, Sheet metal work, Die casting, Blow molding, Vacuum - forming etc.

- **Design Practice: Visit** various furniture manufacturers. Study and absorb different manufacturing methods. Take the photographs / Video; make sketches and notes for references.

Module IV : Seating Design & Storage Systems

Types of seating focus on: Functionality, Aesthetics, Style, Human factors and ergonomics, cost. *Storage Systems*: Functional analysis of storage systems, Deriving types of cabinets needed for interior spaces: Kitchen cabinets, Wardrobes Closets, Book cases, Show cases, Display systems etc. *Modular kitchens*: components, Construction, Layouts, Car case, Hardware selection, Fixing details, Finishes and Special types such as Tall units, Grain trolleys, and Carousels fold outs, etc.


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- **Design Practice:** A detailed project involving the design of a small kitchen using modular components.

Module V : Modular approach to furniture design (Self-study / Assignment)

Study and inspire modern furniture designers such as Ward Bennet, Alvar Aalto, Owen Jones, Florence Knoll, Mies van der Rohe, George Nelson, Henri van de Velde, Hans Wegner etc. Survey & study various styles, systems and products available in the market. Design furniture, based on ergonomics, materials, working parameters and visual perception. Draw details and models along with a measure drawing, including plan elevations, sections. Make details of the same cost criteria of design & mass production of furniture forms. Make a full size prototype of the same. Submit the study in a portfolio form and present in PPT as well. The portfolio should contain evidence of each stage of the process starting from Inspiration and survey to photograph of final prototypes, including sketches and technical drawings.

Course Evaluation:

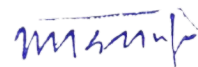
Components	A	H	CT	EE
Weightage (%)	05	10	15	70
(A-Attendance; H -Home Assignment; CT-Class Test; EE-End Semester Examination)				

Text & References:

1. Aronson, Joseph. The encyclopedia of furniture. Clarkson Potter, 1965.
2. Joyce, Ernest, and Alan Peters. Encyclopedia of furniture making. Sterling Publishing Company, Inc., 2000.
3. Jim Postell, Furniture Design, Wiley publishers, 2007.
4. Habegger, Jerryll, and Joseph H. Osman. Sourcebook of modern Furniture. WW Norton & Company, 2005.
5. Lovell, Sophie. Limited Edition: Prototypes, One-Offs and Design Art Furniture. Walter de Gruyter, 2009.



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SUSTAINABLE INTERIOR DESIGN & MATERIALS

(Theory)

Course Code: IND2610

Credit Units: 03

Course Objective:

Careful selection of environmentally sustainable building materials is the easiest way for architects to begin incorporating sustainable design principles in buildings. This course helps the students to understand the sustainable interior materials and methods.

Course Contents:

Module I : Bio Climatic Design Concepts

Environmental Impacts and Sustainable Design Strategies: Natural Resource Depletion, Energy Use, Pollution; The Designer's Role beyond Design and Construction. **The principles of Life Cycle Design;** Phases of Building Materials, Life-cycle Assessment (LCA); Life-cycle Inventory (LCI); **LCA in Practice:** EIE, BEES; **Assessments tools:** BREEAM, SBTool, LEED, Eco Profile, Promise, Green Mark of Buildings, Green Star, CASBEE. **Certification Systems:** First party, Second party and Third party; **Third-party Certification Organizations:** The Forest Stewardship Council (FSC), Green guard Environmental Institute (GEI), Green Seal, Inc., and Scientific Certification Systems (SCS); The Carpet and Rug Institute (CRI); Resilient Floor Covering Institute (RFCI).

Module II : Sustainable Interior Materials Selection

Criteria: Indoor Air Quality (IAQ); Reusable or Renewable Resources; Energy Efficiency; Water Conservation. **Features:** Pollution prevention; waste reduction; recycled content; embodied energy; Natural materials; Minimal construction waste; Locally produced materials; Non- or less-toxic materials; Durable materials; Rapidly Renewable Materials; Low Maintenance; Reusability; Recyclability; Biodegradability; **Harmful chemicals that can affect air quality in interior spaces:** Volatile Organic Compounds (VOCs); Brominated flame retardants, Halogenated plastics, Bisphenol A, Heavy metals, Toxic solvents in finishes and sealants, Formaldehyde.

Module III : Key Sustainable Interior Materials and Methods

Bricks & Blocks: Recycled concrete bricks, Adobe bricks, Stabilized earth blocks, Compressed sand bricks, Hydra form bricks, Fly Ash Bricks, Wool Bricks; Wood Materials: **Engineered wood:** Plywood, Oriented strand board, Glued laminated timber (glulam), Laminated veneer lumber, Cross-Laminated Timber, Parallel strand lumber, Finger-jointed lumber, I-joists and wood I-beams, Roof trusses and floor trusses, Certified Wood; **Site and Landscaping:** Landscape pavers made from recycled plastic, Recycled asphalt and bitumen, Expanded polystyrene (EPS) foam; **Foundations:** rigid plastic foam, Concrete blocks with foam inserts; **Flooring:** Bamboo flooring, Cork flooring, Eco-friendly linoleum flooring; **Structural Framing:** Wood and steel open-web joist; **Roofing:** Solar Tiles Roofing, Sustainable Concrete, Fiber-resin composition roofing tiles, integrated sheathing and insulation, pre-tapered for flat roofs, Weatherproof shingles manufactured from recycled aluminum alloys; **Structural Envelopes:** Super-insulated stress-skin panels; Earth bag construction; **Insulation:** Homasote fiberboard, Cotton insulation, Hemp based products, Blown insulation; **Interior Finishes:** wallpapers, recycled gypsum board or wallboard, Natural Fiber


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Reinforced Plastics, Casein paint, Sisal wall coverings, recycled burlap or virgin jute fiber carpet, recycled wool carpet, recycled ground-up tire rubber; **Plumbing:** Low flow shower heads, Solar hot water, Vacuum-assisted toilets; **Ventilation:** Heat-recovery ventilator, Triple-Glazed [(low-emissivity (low-E) glass] Windows.

Course Evaluation:

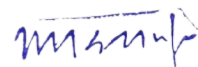
Components	A	H	CT	EE
Weightage (%)	05	10	15	70
(A-Attendance; H -Home Assignment; CT-Class Test; EE-End Semester Examination)				

Text & References:

1. Kim, Jong-Jin; Qualities, Use, and Examples of Sustainable Building Materials, CSS, University of Michigan, 1998.
2. Binggeli, Corky. Materials for interior environments. John Wiley & Sons, 2008.
3. American Institute of Architects; Environmental Resource Guide Subscription. Washington: AIA; 1992.
4. Sassi, P Strategies for Sustainable Architecture; New York, Taylor and Francis, 2006
5. Spiegel, Ross; Green building materials: a guide to product selection and specification. John Wiley & Sons, 2010.
6. Yudelson, Jerry. The green building revolution. Island Press, 2010.
7. Martha Maeda, The Complete Guide to Green Building & Remodeling Your Home, Atlantic Publishing Co. 2011
8. Giudice, Fabio, Product design for the environment: a life cycle approach. CRC press, 2006.



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DESIGN RESEARCH METHODS & PRESENTATION TECHNIQUES

(Theory)

Course Code: IND2702

Credit Units: 03

Course Objective:

The intention of this course is to introduce and initiate research thinking and to initiate the dissertation project. This course equips the student with adequate architectural design research methods for the realization of dissertation concept.

Course Contents:

Module I : Research

Introduction, Definition, Need, Aims, Importance, Scope, Classifications, Types, Characteristics, and Research Process.

Module II : Research Design

Meaning, Need, Types, Factors Affecting, Basic Purpose, and Principles.

Module III : Data Collection

Meaning, Need, Main Terminologies Used In Data Collection Population, Sample, Parameter, Variables, Etc., Types Of Data, Methods, Sources Of Various Types Of Data, Methods Of Data Collection: Observation Method, Interview Method, Data Collection Through Questionnaires, Collection Of Data Through Schedules, Case Study.

Module IV : Data Analysis

Meaning, Need, Classification; *Only define and understand the Meaning of:* Tabulation, Array, Range, Frequency Distribution, Presentation of Data-Graphic, Histogram, Polygon, Ogive, Measurement of central tendency- Mean, Mode, Median, Dispersion / Skewness, Correlation and Regression Analysis of two variables, Characteristics, Types, Values of, Formulae for calculation etc.

Module V : Interpretation

Meaning, Definition, Significance, Techniques. Report Writing: Meaning, Significance, Steps, Types, Findings, Suggestions, Conclusion.

Module VI : Research Procedures.

Recognize philosophical implications; Formalize research: Identifying and defining the problem- Questions need to be documented in relation to such issues in interior design as: time, cost, safety, materials, processes, function, appearance, and ergonomics, etc.; Conduct literature reviews; Select appropriate research methodology; Understanding of research design parameters; Procedures to collect, analyze, interpret the data; Present information through a report.

Module VII : Design phases.

Research and produce Design Specifications; Sketch ideas and concepts; Develop detailed design; Produce a digital design presentation file for the final design; Make an oral presentation on their design.


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Module VIII : Research Presentation Techniques: Interrelated components.

1. Research Report Presentation: Dissertation components, Writing styles appropriate to research design, Style manuals, & Ethical considerations.
2. Design Presentation: Design Journal, Digital Design Presentation; Oral Presentation.

Course Evaluation:

Components	A	H	CT	EE
Weightage (%)	05	10	15	70
(A-Attendance; H -Home Assignment; CT-Class Test; EE-End Semester Examination)				

Text & References:

1. Laurel, Brenda. Design research: Methods and perspectives. MIT press, 2003.
2. Kothari, C. R. *Research methodology: Methods and techniques*. New Age International, 2004.
3. Gupta, S. P., and M. P. Gupta. *Business statistics*. Sultan Chand & Sons, 2010.
4. Sanoff, Henry. *Visual research methods in design*. John Wiley & Sons Incorporated, 1991.
5. Snyder, James C., ed. *Architectural research*. Vol. 6. Van Nostrand Reinhold Company, 1984.
6. McMillian, J; Research in education: A conceptual introduction , HarpersCollins College Publishers; NY; 1997



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INTERIOR DESIGN - DISSERTATION

(Research)

Course Code: IND2737

Credit Units: 06

Training Objective:

The Interior Design Dissertation is one of the components of Interior Design Project. The core idea behind this course is to develop research aptitude of students and motivate students to involve in individual research and methodology. This course aims to train them in handling research projects independently to further their intellectual and personal development in the chosen field. The project can be defined as a scholarly inquiry into a problem or issues, involving a systematic approach to gathering and analysis of information / data, leading to production of a structured report.

SESSIONS –I : PRE- DISSERTATION SEMINAR

The Pre- Dissertation Seminar provides students with a framework to understand some emerging concepts in Interior and projects of design complexity and equip the student with adequate Interior design research methods for the realization of thesis concept. During the Pre-Thesis Seminar, the subject of the thesis is developed and the project articulated. The Pre-Thesis Seminar should be conducted before the research work start. It is advised to conduct group-wise for the deep and healthy discussions.

Guidelines:

- Each student should submit minimum of 2 topics related to the research.
- Students are encouraged to pre-consult faculties in the department to choose and finalized their research topic.
- Each faculty can guide minimum of 3 students, depends the availability of facilities and no. of students in the class.
- The students should present their research topics / areas in the Pre-Thesis Seminar.
- A panel of faculty members has to judge the students' presentation and feasibility of research in the proposed topics.
- The individual faculty members of the panel can be selected the student with their preliminary choice of topic for further guidance through this process.

Points to be covered:

- Clear understanding of difference between design thesis and design studio.
- Selection of topics for Interior design thesis.
- Dissertation topics based on building typologies, Preparation of synopsis, Methodology of design.
- Emerging concepts in interiors due changes in social, economic, technological variables.
- Review of design projects related to real world instances and relevant to community at large.
- Review of projects of design complexity, involving themes, sub themes and interior expression.
- Research in Interior design: Tools and Methods required handling a Dissertation project.
- Scientific methods of research with special emphasis on interior design research methods.
- Interior enquiry visual, observations, questionnaire formats of enquiry, literature Review and case studies.

SESSIONS -II : DISSERTATION REPORT WRITING

Points to be considered:

- Suitability of the topic.
- Relevance of the topic.
- Time available at the disposal & Feasibility of data collection within the given time limit.


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- Challenges involved in the data collection (time & cost, possibility of getting responses, etc.)

Guidelines:

- The research problem: what is a research problem? How to raise the problem? How to state the problem?
- Spotting the research problem from the inconsistencies and contradictions that one observes in life.
- Library search for thesis and dissertations.
- Topic defense: Final selection of the topic most preferred by student.
- Writing the thesis using the American Psychological Association (APA) style.
- Defense of the chosen topic.
- Writing the bibliography of the proposed thesis in the APA style.
- Formation of dissertation Proposal / Synopsys.
- The parts of the dissertation proposal: Chapter and its sections
- Writing Chapter 1. The Introduction / Research background
- Writing Chapter 2. The Review of Related Literature
- Writing Chapter 3. The Conceptual Framework
- Writing Chapter 4. Research Methodology
- Writing Chapter 5. Data Analysis & Interpretations.
- Writing Chapter 6. Summary, Conclusions, Discussion, and Recommendations Results, conclusion, etc.
- Writing the other parts of the dissertation.
- Completing the dissertation & Final presentation.

Note: – The relevant Sketches, Technical drawings, Photograph of scale models / Prototypes, etc. can be included in the report.
(PTO....)

SESSIONS - : ORGANIZATION OF THE DISSERTATION REPORT (....continuation)
III

- Front Page
- Bonafide Certificate cum Report Evaluation (From Faculty Guide & Internal and External Examiner)
- Declaration
- Acknowledgement
- Abstract
- Table of Contents
- List of Tables (optional)
- List of Figures (optional)
- Body Structure of the Dissertation
 - Chapter 1. The Introduction / Research background
 - Chapter 2. The Review of Related Literature
 - Chapter 3. The Conceptual Framework
 - Chapter 4. Research Methodology
 - Chapter 5. Data Analysis & Interpretations.
 - Chapter 6. Results, Discussion, Conclusions and Recommendations, etc.
- Bibliography
- Appendix

SESSIONS - : PRESENTATION & EVALUATION
IV

Evaluation Method for Dissertation Report:**Chapter Scheme for the Training Report.****Marks Distribution.**

Overall Report Format / Layout	: 05
Chapter 1. The Introduction / Research background	: 10
Chapter 2 The Review of Related Literature	: 20
Chapter 3 The Conceptual Framework	: 15
Chapter 4, 5 Research Methodology, Data Analysis & Interpretations.	: 10
Chapter 6. Results, Discussion, Conclusions and Recommendations.	: 10
Total	: 70

Report Format and Layout :

A4 size has to be used with a good quality paper (minimum 80 gsm). Margins: 1.5 inches on the left-hand side, about 0.75 inches at right-hand side (the outer edge); and 1 inch at the top and bottom of the page. The report has to be written in font Times New Roman, 12 points with 1.5 lines spaced. Typescript should appear on one side only. Footnotes, quotations, references and photographic captions may be single spaced. Where appropriate, these should contain lists giving the locations of figures and illustrations. The font size of Chapter title: 20 points with bold, Heading: 14 with bold / sub-headings: 12 with bold. If applicable footnotes be given on the same page where reference is quoted and the footnote size to be used 10 points. Title page/ front page, certificate and declaration type style and formats are as per the University / Department standards. The report should comprise of a minimum of 70 pages and has to be submitted in three copies.

Guidelines for Evaluation:

- Each of the students has to undertake a project individually under the supervision of a faculty.
- Final Report Dissertation should minimum 10 working days before the scheduled date of presentation.
- The student has to submit the Project Report and appear at the Viva-Voce Examination in the subsequent years (within the time period as per University Rules).
- The late submission doesn't consider for the evaluation.
- Without prior approval from supervisor of final Dissertation Report will not be considered for the evaluation.
- Uncompleted / unorganized reports does not consider for the evaluation.
- Seminar presentation with 'Power Point' is compulsory.
- Language of Project Report and Viva-Voce Examination should be in English.
- Failure to submit the Dissertation Report or failure to appear at the Viva-voce Examination will be treated as "Absent" in the Examination.
- No marks will be allotted on the Project Report unless a candidate appears at the Viva-Voce Examination. Similarly, no marks will be allotted on Viva-Voce Examination unless a candidate submits his/her Project Report.
- Evaluation of the Project Work to be done jointly by internal expert and external expert with equal weightage, i.e., average marks of the internal and external experts will be allotted to the candidate.

Evaluation Scheme

Components	Project Report	Viva-Voce	Presentation	Total
Weightage (%)	70	20	10	100

SEMINAR

Course Code: IND2733

Credit Units: 03

Course Objective:

The objective of the seminar is to judge the understanding as well as application of the knowledge gained by the students through their research work for the dissertation. The Seminar provides the students with an opportunity to further enhance their knowledge in a sector of their choice by undertaking a significant practical unit of examining and analyzing various aspects of interior design and its application at a level commensurate with the learning outcomes of the various courses taken up them in the on-going semester.

Course description:

A seminar is primarily a record of intelligent reading in several sources on a particular subject followed by a presentation. The students will choose the topic at the beginning of the session in consultation with the faculty assigned. Seminars enable open discussion between students and the subject experts. At least one middle level or senior level person of a company from the chosen sector may be interviewed face to face is recommended. Students are encouraged to test their knowledge and to listen to other's points of view, thus enabling their critical abilities to develop. Students should prepare well prior to their research presentation.

Guidelines:

- The Seminar will be related to the contemporary issue and the topic will be given by the department.
- The presentation of the Seminar is scheduled to be held before the commencement of Semester examinations.
- The paper will carry 100 marks that will be marked on the basis of understanding and organization of content based on the literature review.
- The Bibliography shall form an important part of the paper.
- Examples of a few broad areas for Seminar (List is indicative, not exhaustive)
- Viva-voce by a jury consisting of external and internal examiner to be appointed by the Department / University.
- Failure to appear the seminar presentation & Viva-voce Examination will be treated as "Absent" in the Final Examination.

Major Themes for Seminar:

- Building Information Systems.
- Ethics and Social Responsibility in interior designing
- Emotional and physical impacts of residential lighting.
- Identification of various lighting styles.
- Popular trends in fixtures.
- Selection of kid-friendly surfaces and finishes for kids' rooms.
- Product knowledge to select the right paint

Guidelines for Evaluation:

- Seminar presentation with 'Power Point' is compulsory.
- Language of Project Report and Viva-Voce Examination should be in English.


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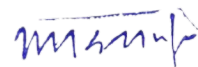
- Failure to submit the Seminar Report or failure to appear at the Viva-voce Examination will be treated as “Absent” in the Examination.
- No marks will be allotted on the Seminar Report unless a candidate appears at the Viva-Voce Examination. Similarly, no marks will be allotted on Viva-Voce Examination unless a candidate submits his/her Seminar Report
- Evaluation of the Seminar to be done jointly by internal expert and external expert with equal weightage, i.e., average marks of the internal and external experts will be allotted to the candidate.

Evaluation Scheme

Components	Organisation and Relevance of content	Literature Review	Bibliography	Presentation	Total
Weightage (%)	30	30	20	20	100



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INTERIOR DESIGN PORTFOLIO DEVELOPMENT

(Studio-Graphics)

Course Code: IND2736

Credit Units: 04

Course Objective:

The portfolio submission is a mandatory component of the graduation process for the B. Des (ID) program. This course is intensive visualization skill based course that requires a lot of time and commitment. This course aims to develop the student's ability to communicate their ideas, thoughts and feelings about the field of interior design in a visual form.

Course description:


The Design Portfolio is not simply a collection of your work. Rather, it is a personal statement of creative ability and design thinking. The portfolio is a self-presentation tool that creatively communicates the students' design outlook and level of development through a variety of media and skill sets. The portfolio should include a selection of design works and at least one example of the development of design work in the area of interior design. The portfolio submits for consideration must clearly indicate students' potential for graduate study to the reviewers. Computer access is strongly recommended for this course, especially to visualization part.

Please note, there is no typical model of a successful portfolio. Students remember that the reviewer is curious to see their best work and will make a decision based on the creativity display. It is always better to edit the work by presenting each project in a clear, concise, and legible manner before include into the portfolio. Also, do not include too many sketches and images. Students need to think of the progression of their work; show how each project builds on another or stand-alone projects that show their diverse talents. There is no minimum or maximum number of required pages, but the content counted on the basis of a number of projects available in the portfolio. Minimum 7 graphic projects and 1 Standalone project (compulsory) are required. If a student's original work is done on a larger format, scan / digital-photo it and reduces it to the requested size format. A table of contents should be included.

Originality and Integrity of Portfolio

Simply copying an image violates copyright law, is unethical, and constitutes plagiarism. Students are encouraged to create art and design from their imaginations, experiences and from direct observation of the world around them. It has make sure that all work should be the student's own.

In case students who make use of borrowed images, such as photographs in magazines, books or from the internet need to demonstrate a creativity and sophistication of approach that goes beyond mere copying. Students must show substantial and significant development that surpasses duplication.


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PORTFOLIO DEVELOPMENT - GUIDELINES

I. Portfolio Format:

Students should submit their portfolio in two ways, electronic format and hard copy (paper format). The specifications are given below for each format.

Electronic Format: Use pdf. files with a maximum resolution of 300 dpi submitted on a CD-ROM.

Hard copy format:

Size	:	A3 / 11" × 17" Size is preferred.
Layout	:	Portrait or Landscape with removable page inserts.
Portfolio display case	:	Vinyl Back Ring Binder with transparent removable file storage folder.

Note: Premium quality paper should use to print out of computer generated images. Good quality Cartridge sheets need to use for illustrations and sketching. The use of wood, metal, glass, or plastic in hard copy portfolios is NOT acceptable.

II. Portfolio Preparation

Things to consider:

1. Composition - Placement or arrangement of elements in a work
2. Drawing - Demonstration of line weights, mark-making, proportion and medium
3. Design - Overall unity achieved by combining elements of art and principles of design.
4. Value - Relative darkness or lightness of a color
5. Spatial perception - Understanding of the spatial relationships of objects, and foreground, middle and background
6. Technique - Skillfulness in the use of fundamental methods and media
7. Color perception - General sensitivity to color and sophistication in its application
8. Originality - Capacity to think independently and transform the predictable; the quality of being new and original
9. Conceptual awareness - Expression of a clear idea, effective use of materials & processes to strengthen the concept
10. Aesthetic awareness - Guiding principle in matters of artistic beauty and taste (PTO....)

III. Portfolio Organization:

1. Portfolio Title Page

This is the starting page of an interior design portfolio contains a brief profile of the student that includes: Name & Photograph; Registration Number; Program Name, Institution Name; Contact Address; Date of Submission; Declaration of ownership, etc.

2. Table of Contents

3. Bonafide Certificate cum Portfolio Evaluation (From Faculty Guide & Internal and External Examiner)

4. Portfolio Work Contents

All the works included in the portfolio should be with the prior approval from the concerned faculty only. The organization of portfolio work can be segmented into 3 Parts:

Part-1 : Project (Standalone projects - that is presented from concept to completion)

This is the first part, which is integrated to dissertation project. The students have to convert the research findings into various Interior design ideas and concepts as part of the application process. These design ideas and concepts need to visually narrate and demonstrates as student's creative work and process in the form of a portfolio. This part must include:

- **Highlight of research:** Title, Scope and significance of study, Objective of study, Findings within one page.
- **Design work Boards:** Statement of design work (Design Brief), Mood board and Story board, Architectural Floor Plan, Finish Schedule and Color Legend, Finish Floor Plan, Elevations, Sections, and Details, Miscellaneous Drawings, Furniture Floor Plan, Installation Plans, Furnishings Specifications, Furnishings Cost Estimates, Furnishings Order Form, Specification sheets, Cost sheets etc.

Part-2 : Graphics (Projects builds on another)

The second part is mainly for to highlight what the students learned from the overall graduation studies. The students have to cover the major subject modules from the past semesters and visualize. It is not necessary to rework the entire modules. They can include the best works from their past assignment collections. But it is compulsory to consider each major area what they learned. Those who are lacking the sufficient collection of work, they may need to reproduce. The collection has to be presented as follows:

- **Design Skills:**

The design specialties most desirable to show as the following order of preferences:

Office/Corporate; Residential/kitchen & Bath; Hospitality Restaurant; Health care; Commercial Spaces and Interior design specializations.


All technical design skills that can be applied in a variety of building environments as above include:

- Freehand drawing of an interior space to include an architectural element (2D)
- Freehand drawing of an interior space to include an architectural element (3D)
- Freehand drawing of a collection of items / furniture. (2D)
- Freehand drawing of a collection of items / furniture. (3D)
- Design work including pieces that student designed at class or on your own.
- Interior visualizations by computer generated- 3D S Max, Sketch up, etc.
- Photographs of 3D Objects, Models, Prototypes etc. that student designed and created.
- Architectural drafting by hand.
- Architectural drafting by computer generated- Auto CAD.
- Any other work student feels may support their application to interior design includes their specializations.

- **Art Skills**

All art skills that can be applied in a variety of medias include:

- Freehand drawings.
- Artwork demonstrating use of colour by rendering with different colour media.


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- 2D and 3D Drawings, Sketches, Posters, Graphics, Mural etc. (Manual)
- 2D and 3D Drawings, Sketches, Posters, Graphics, Mural etc. (Computer generated)
- Posters that explaining Typography and Calligraphy skills.
- Mood boards or Theme boards, Story boards that explaining Collage and Photomontage skills.
- Theme based Digital Photographs that explaining Photographic skill
- Photographs of Craft work that explaining Craft skill.

Part-3 : Written Content

The third part is to demonstrate students writing style and quality. The good hand written essay will be encouraged and gives the chance of more weightage. A 250 – 500 word essay discussing student's perspective of the Interior Design industry and why they are interested in Interior Design is essential.

IV. Portfolio Evaluation:

Strong presentation shows work in its best light and indicates students' ability to communicate in an effective manner.

The following criteria use to assess portfolio:

- Problem Solving & Creative Skills
- Drawing & Visual Skills
- Digital Literacy & Computer Skills
- Communication Skills
- Development of ideas - evidence of how you think
- An interest in contemporary interior design and the built environment.
- Experimental approach in your 3D work to handling materials in unusual combinations.
- Spatial awareness and an ability to think about interior design built environment.

Procedure for evaluation:

- Submission of priory approved portfolio hard copy.
- Make a presentation of their portfolio work (soft copy) in front of the examiners.
- Viva-voce
- The Portfolios will be reviewed by a jury consisting of external and internal examiner to be appointed by the Department / University.
- The jury will evaluate the soft copy presentation as well as a hard copy of portfolio.

Course Evaluation:

Components	Creative skill	Design Research	Presentation	Total
Weightage (%)	40	40	20	100

TRAINING & ONSITE LEARNING (Practical Industrial Training)

Course Code: IND2837

Credit Units: 16

Training Objective:

This is an industrial training session, which provides the opportunity to learn and work within a professional environment with practicing interior designers. The basic objective of training is to provide first hand practical exposure of the professional functioning of Interior Design industry and to acquaint students with the culture of corporate. The training will also provide an opportunity to the students to apply their theoretical understanding while working on the concerned project in the industry. Thus, this training is an attempt to bridge the gap between theory and practice. This will also enhance the students' intellectual ability and attributes related to data handling, decision making, report writing, oral presentation and imbibing an interdisciplinary approach. Students can be undertaken their practical training in India or abroad.

Training Contents:

(NB: Submission of Training Report will be part of the Final Training Evaluation)

SESSIONS – : TRAINING.

I

General Guidelines:

Every student of under graduate courses will be required to undergo a practical training in a interior design organization approved by the Institute for Minimum of '90 calendar days'. The candidates shall be required to undergo training in the various areas of the organization concerned. The organization may assign a specific project to the candidate, which will be completed by him / her during the period of training. The work done by the candidate during the training period shall be submitted in the form of a report as per the guidelines provided by the Department.

Attitude:

- A member of the faculty will supervise the candidates during their Training along with a supervisor from Industry.
- Students need to aware of work environment and constantly look for opportunities to learn more about interior design.
- An internship is a privilege - the firm is not receiving payment for the hours they spend to train the student.
- It is student responsibility to provide value to them (not necessarily the other way around).
- Students need to take responsibility for making training as informative as can.
- Students need to document what they observed, ask lots of questions and show initiative.
- Training and work should be creative, exciting, noteworthy and detailed.

Progress Report:

- Students have to compulsorily submit a summary report of their progress once in every two week undersigned by the industrial supervisor.

Attendance:

- Minimum of '90 calendar days' of training is compulsory for students as a 'full-time trainee'. Daily

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attendance is compulsory and to be marked daily and duly checked and signed by the industrial and faculty supervisor.

- Those who are failure to complete the training with minimum of 90 days will not be considered for final examination.

The student will be required to repeat the training when:

- (i) The report from the employer is not satisfactory.
- (ii) The attendance in the employer office is less than 70% of the number of days required for training.

SESSIONS - : TRAINING REPORT EVALUATION AND PRESENTATION. II

The candidates will prepare a comprehensive Report. The Report and the certificate from the organization should be attested by the organization where the candidate did the Internship and the same will be submitted to the faculty for evaluation.

Guidelines for Writing an Internship Report

The Industrial Training Report should contain the items as suggested below and is to be presented in the manner and order listed. Students are advised to download the Microsoft Word template of the Industrial Training Report from the Industrial Training website and use the template to prepare the report.

Contents of Training Report:

1. Front Cover (Title Page)
2. Industrial Training Certificate (From Organization)
3. Declaration
4. Acknowledgements
5. Bonafide Certificate cum Report Evaluation (From Faculty Guide & Internal and External Examiner)
6. Abstract
7. Table of Contents
 - List of Tables (optional)
 - List of Figures (optional)
8. Body of the Industrial Training Report
 - Introduction/Learning Outcome.
 - Detail of Working Experience: Description of Tasks & Application of Theory and Soft Skills
 - Conclusion and Recommendations.
9. References
 - Citation in the text (if applicable)
10. Appendices
 - Summary of Daily Records, etc.

Evaluation Method for Training Report:**Chapter Scheme for the Training Report.****Marks Distribution.**

Overall Report Format / Layout	: 05Marks
Chapter I: Introduction // Learning Outcome.	: 20marks
Chapter II: Detail of Working Experience	: 30 marks
Chapter III: Conclusion and Recommendations	: 15 marks
Total	: 70 Marks

Report Format:

The report has to be written in font Times New Roman, 12 points, 1.5 lines spacing, Print / Type on both sides of the paper, Spiral Bound. The report should comprise of a maximum of 70 pages and has to be submitted in two copies.

Evaluation and Presentation:

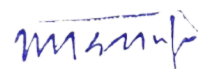
- Submission of Training Report.
- Brief oral presentation with 'Power Point' about the training.
- Evaluation by a jury consisting of external and internal examiner to be appointed by the Department / University.
- Failure to submit the Training Report or failure to appear at the Presentation / Viva-voce Examination will be treated as "Absent" in the Final Examination.

Evaluation Scheme:

Components	Attendance	Training Report.	Presentation	Viva-Voce	Total
Weightage (%)	10	70	10	10	100



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Programme Structure

Curriculum & Scheme of Examination

2022

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DRAWING-I

Course Code: FNA2101

Credit Units: 03

Course Objective:

Drawing is the basic element of learning art. Drawing exercises are to acquire accurate observation and skills to present representational art.

Course Contents:

Module I

Drawing still life or object drawing to explore basic drawing tool 'Pencil'. Suggestion of solidity by line work as well as light and shade, realization for rhythmic relationship between line, mass, volume and texture, emphasis on various visual experiences.

- a) Learning basic elements of drawing.
- b) Still life or object drawing, Free hand drawing from nature.

Module II

Pencil work representing still life with familiar objects .like fruits, foliage drapery, books and flowers etc.

Emphasis on creating characteristics and volume (light and shade).

- a) Basic knowledge of drawing with pencil.
- b) Still life with from arranged objects like fruits, drapery etc.

No. of works to be done - 06

Examination Scheme:

Components	P	CT	A	EE
Weightage (%)	10	15	5	70

(A-Attendance; P-Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination; PT- Portfolio)


Text & References:

Text:

- Anatomy & Drawing, Victor Perard, Pitman Publishing, New York, 1955

References:

- Figure Drawing, Victor Perard, Grosset and Dunlop, New York, 1956.
- Drawing Hands, Carl Sheek, Grosset and Dunlop, New York, 195
- The Art of Drawing Heads and Hands, Walter Brooks, M. Grumbacher, New York, 1966.


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GEOMETRICAL DRAWING AND PERSPECTIVE - I

Course Code: FNA2102

Credit Units: 02

Course Objective:

Introduction to orthographic projections in simple positions, drawing of plan, elevation and section of simple objects to scale, full size, reduced or enlarged.

Course Contents:

Module I

Understanding and use of geometrical instruments. Simple exercise in angles and geometrical figures i.e. triangle, quadrilaterals, parallelograms, squares, rectangles, rhombus, polygons, circles etc.

Module II

Projections of solids in simple positions. Drawing of plan, elevation and section of simple objects. Enlargement and reduction of drawings in different scales. One point, two point and three point perspective etc.

No. of works to be done – 06

Examination Scheme:

Components	P	CT	A	EE
Weightage (%)	10	15	5	70

(A-Attendance; P-Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination; PT- Portfolio)

Text & References:

Text:

- Geometrical Drawings, C. L. Martin, Macmillan Co, London, 1968.

References:

- Artists Technique, Dr. Kurt Herbert



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DESIGN – I

Course Code: FNA2103

Credit Units: 02

Course Objective:

Learning Design is to understand the basic visual language and various methods of form synthesis. It is to develop intellectual and imaginative abilities in creative thinking. It is to provide technical know-how about the principles of design, distribution of space, proportion, behaviour of force and energy contained in lines, form and colour. Organized design exercises in different media offer a wide range of opportunity to develop systematic and intuitive approaches to Creative Design work.

Course Contents:

Module I

Transformation of simple shapes into well balanced design. Understanding the subjective and objective value of applied art. Visualize complex forms into simple, primitive and basic forms from nature also.

Module II

Repetition of a well composed square block, with simple shapes or image into different scale to create rational or systematic design. Concept of positive and negative areas.

No. of works to be done - 06

Examination Scheme:

Components	P	CT	A	EE
Weightage (%)	10	15	5	70

(A-Attendance; P-Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination; PT- Portfolio)

Text & References:

Text:

- A history of Graphic Design, Philip B. Meggs, Viking, London, 1986.
- The Designer's Handbook, Stan Smith & H. F. ten Holts.

References:

- The Creative Connection, Winteb/Milton
- Innovation, Industrial Designers Society of America



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PAINTING - I

Course Code: FNA2104

Credit Units: 02

Course Objective:

The objective of this course is to acquire experience in basic knowledge to explore painting techniques. Structured exercises on painting include basic colour theory and pictorial composition, which enables students to be confident in the use and manipulation of colour. It also provides a clear idea of different painting techniques. Like water colour, Tempera and opaque colour.

Course Contents:

Module I

Understanding the colour and its possibilities. Practical approach to know primary, secondary and other colours to develop a clear perception about painting work. Painting from objects and nature; study of colours, forms, perspective, tone and texture. Experimenting with vibrant, fluorescent colours and passionate sophistication of opaque and transparent colours. Draw and paint with transparent or opaque colour on a theme (from memory & Nature)

Module II

Handling the tools, application and control of a wide range of painting media. Understanding the detail complex possibilities exploiting different types of colours. Project works on monochromatic experimentations.

Still life with monochromatic.

No. of works to be done – 06

- Colour knowledge and colour wheels
- Memory and landscape painting.
- Monochrome still life

Examination Scheme:

Components	P	CT	A	EE
Weightage (%)	10	15	5	70

(A-Attendance; P-Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination; PT- Portfolio)


Text & References:

Text:

- The complete painting course, Wendon Blake, Bonanza Books, New York, 1984

References:

- Drawing and Painting the natural environment, Barelay Sheaks, Warcester, Massachusetts, 1974
- Collage by Elizbeth
- Mosaics by Angelice Garnentt


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SCULPTURE - I

Course Code: FNA2105

Credit Units: 02

Course Objective:

Clay Modeling to develop visual awareness in three dimensions, through manipulative skills in clay and plaster etc.

Course Contents:

Module I

Simple relief composition in clay, technique of terracotta and direct modeling in plaster.

Module II

Studies to understand three dimensional forms, texture and colour of the material, principle of weight, volume, space and contour.

Module III

Finishing of the final sculpture or relief and installation.

No. of works to be done - 03

Examination Scheme:

Components	P	CT	A	EE
Weightage (%)	10	15	5	70

(A-Attendance; P-Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination; PT- Portfolio)


Text & References:

Text:

- Modelling a likeness in clay, Daisy Grubbs

References:

- The Sculptors Handbook, Stain Smity & H. F. Ten Holt
- Complete Guide to Sculpture, Barry Midgley
- Sculptor's Manual, Bainbridge Copnall


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PRINT MAKING - I

Course Code: FNA2106

Credit Units: 02

Course Objective:

This hands-on course is to introduce basic techniques in surface printing in one and more colors. It is to learn and experience simple methods of making printing lino & wood cut technique.

Course Contents:

Module I

Learning basic studio techniques in print making, surface printing relief media and use of printing equipments and tools. Understanding the concept of design construction and composition in black and white. Simple method of making relief blocks for lino print based on final design layout.

Module II

Handling the process of ink application on prepared block; experimenting with different colour-combination and paper surface. Wood cut printing in black and white.

No. of works to be done - 04

Examination Scheme:

Components	P	CT	A	EE
Weightage (%)	10	15	5	70

(A-Attendance; P-Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination; PT- Portfolio)

Text & References:

Text:

- Prints: Art and Techniques, Lambert, Susan, V & A Pub, London, 2001.

References:

- The Woodcut Artist's Handbook, George A. Walker
- The Best of Printmaking: An International Collection, Lynne Allen, Rockport Publishers sept.97
- Printmaking: A Contemporary Perspective, Paul Coldwell, Black Dog Publishing, 28th march 10



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VISUAL GRAPHICS - I

Course Code: FNA2108

Credit Units: 02

Course Objective:

The objective of the course is to focus on the usage of the digital media. The course lay emphasis on the basics of designing software's to ensure that the students are updated with the technological aspect of the industry.

Course Contents:

Module I

Photoshop: Introduction to any designing software's.
Getting familiar with the tools.

Module II

Photoshop: Making various layouts using the tools

No. of works to be done - 06

Examination Scheme:

Components	P	CT	A	EE
Weightage (%)	10	15	5	70

(A-Attendance; P-Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination; PT- Portfolio)

Text & References:

- Adobe Photoshop CS5 for Photographers: A professional image editor's guide to the creative use of Photoshop for the Macintosh and PC by Martin
- Adobe Photoshop CS5 Classroom in a Book by Adobe Creative Team
- Photoshop CS5: The Missing Manual by Lesa Snider



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PHOTOGRAPHY - I

Course Code: FNA2109

Credit Units: 02

Course Objective:

The objective of the course is to introduce the fundamental technology, theory, history, techniques and applications of photography.

Course Contents:

Module I

Basic use of camera, its various parts and their functions.

Module II

Observation according to photographic angles, selection of subject, composition exploring indoor and outdoor situations including effects of light.

No. of works to be done – 10

Examination Scheme:

Components	P	CT	A	EE
Weightage (%)	10	15	5	70

(A-Attendance; P-Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination; PT- Portfolio)

Text & References:

- Photomechanic & Printing by J.S. Mertle & Gordon
- Photo techniques by Lee Frost
- Location Photography Secrets by Andy Snow
- Ways of Seeing by John Berger
- Light and Lens: Photography in the Digital Age by Robert Hirsch



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DRAWING - II

Course Code: FNA2201

Credit Units: 02

Course Objective:

Drawing exercises are to learn accurate observation and skills to represent work of art from life or surroundings.

Course Contents:

Module I

Drawing human figures to study proportion. Centre of gravity, inclination of main mass based on anatomical structure. & Animal Study.

a) Sketches / drawing

Module II

Drawing from nature - Outdoor study

No. of works to be done – Drawing 10 + Sketching 100

Examination Scheme:

Components	P	CT	A	EE
Weightage (%)	10	15	5	70

(A-Attendance; P-Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination; PT- Portfolio)

Text & References:

Text:

- Anatomy & Drawing, Victor Perard, Pitman Publishing, New York, 1955

References:

- Figure Drawing, Victor Perard, Grosset and Dunlop, New York, 1956.
- Drawing Hands, Carl Sheek, Grosset and Dunlop, New York, 195
- The Art of Drawing Heads and Hands, Walter Brooks, M. Grumbacher, New York, 1966.



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GEOMETRICAL DRAWING AND PERSPECTIVE - II

Course Code: FNA2202

Credit Units: 02

Course Objective:

This is to provide adequate knowledge on visual illusion depending upon the distance and point of view. It makes the learners well-equipped in measurement and scaling system related to visual art.

Course Contents:

Module I

Isometric projection of simple objects like cube, prism, pyramids, cone etc.

Module II

Introduction of perspective - Parallel and angular perspective. Terminology like picture plane, station point, vanishing point. Perspective of simple geometrical objects and their combination.

No. of works to be done - 10

Examination Scheme:

Components	P	CT	A	EE
Weightage (%)	10	15	5	70

(A-Attendance; P-Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination; PT- Portfolio)

Text & References:

Text:

- Geometrical Drawings, C. L. Martin, Macmillan Co, London, 1968.

References:

- Artists Technique by Dr. Kurt Herbert



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DESIGN – II

Course Code: FNA2203

Credit Units: 02

Course Objective:

The objective of learning Design and exercises is to develop spontaneity in creative thinking executing a meaningful construction of forms based on principles of design.

Course Contents:

Module I

Creating conceptual design emphasizing the importance of lines and forms. Project on experimental design in creative forms

No. of works to be done - 06

Examination Scheme:

Components	P	CT	A	EE
Weightage (%)	10	15	5	70

(A-Attendance; P-Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination; PT- Portfolio)

Text & References:

Text:

- A history of Graphic Design, Philip B. Meggs, Viking, London, 1986.
- The Designer's Handbook, Stan Smith & H. F. ten Holts.

References:

- The Creative Connection, Winteb/Milton
- Innovation, published by Industrial Designers Society of America



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PAINTING - II

Course Code: FNA2204

Credit Units: 02

Course Objective:

Learning colour techniques of transparent and opaque representing still life and social themes.

Course Contents:

Module I

Still life with multicolour in transparent water colour technique.

Module II

Developing opaque colour treatment on figurative composition based on social themes and Landscape painting.

Study of Indian Folk painting.

No. of works to be done - 12

Examination Scheme:

Components	P	CT	A	EE
Weightage (%)	10	15	5	70

(A-Attendance; P-Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination; PT- Portfolio)

Text & References:

Text:

- Water Color Painting step by step, Arthur Z Gupill, Waston Goptill, New York, 1967.

References:

- Drawing and Painting the natural environment, Barelay Sheaks, Warcester, Massachusetts, 1974
- Painting Sea and Sky, Jean Khanbegian, Grosset and Dunlop, New York, 1967



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SCULPTURE - II

Course Code: FNA2205

Credit Units: 02

Course Objective:

Clay Modeling to develop visual awareness in three dimensions, through manipulative skills in clay and plaster etc.

Course Contents:

Module I

Simple relief composition in clay, technique of terracotta and direct modeling in plaster.

Module II

Studies for understanding the aesthetics of three dimensional forms, textures body, color of the material, principle of weight, volume, space and contour.

Module III

Finishing of the final sculpture or relief landscape and figurative composition and installation.

No. of works to be done- 06

Examination Scheme:

Components	P	CT	A	EE
Weightage (%)	10	15	5	70

(A-Attendance; P-Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination; PT- Portfolio)

Text & References:

Text:

- Modelling a likeness in clay, Daisy Grubbs

References:

- The Sculptors Handbook, Stain Smity & H. F. Ten Holt
- Complete Guide to Sculpture, Barry Midgley
- Sculptor's Manual, Bainbridge Copnall



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PRINT MAKING - II

Course Code: FNA2206

Credit Units: 02

Course Objective:

To introduce more techniques of surface printing in one and more colours, creating blocks with cardboard, plywood or linoleum. Experimental printing with other materials.

Course Contents:

Module I

Experimenting and exploring various texture of different surface using materials like wire, wire mesh, coarse cloth, cork, cardboard and ply wood on print surface. Taking monoprints.

Module II

Experimenting with different color-combination and paper surface.

No. of works to be done- 06

Examination Scheme:

Components	P	CT	A	EE
Weightage (%)	10	15	5	70

(A-Attendance; P-Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination; PT- Portfolio)

Text & References:

Text:

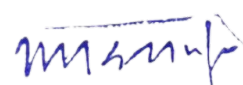
- Printmaking in the sun, waston guptill, dan Weldon, 1st Jan 2001.
- Prints: Art and Techniques, Lambert, Susan, V & A Pub, London, 2001.

References:

- The Woodcut Artist's Handbook, George A. Walker
- The Best of Printmaking: An International Collection, Lynne Allen, Rockport Publishers sept.97
- Printmaking: A Contemporary Perspective, Paul Coldwell, Black Dog Publishing, 28th march 10



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VISUAL GRAPHICS - II

Course Code: FNA2208

Credit Units: 02

Course Objective:

The objective of the course is to focus the software's which are the core of every artist. The course lay emphasis on the basics of designing software's to ensure that the students are updated with the technological aspect of the industry.

Course Contents:

Module I

Introduction to Coral Draw.
Getting familiar with the tools.

Module II

Designing using Coral Draw.

No. of works to be done - 06

Examination Scheme:

Components	P	CT	A	EE
Weightage (%)	10	15	5	70

(A-Attendance; P-Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination; PT- Portfolio)

Text & References:

- Corel DRAW X5 The Official Guide by Gary David Bouton
- Corel DRAW 8 for Dummies by Deke McClelland
- Adobe Illustrator CS5 Classroom in a Book by Adobe Creative Team



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PHOTOGRAPHY - II

Course Code: FNA2209

Credit Units: 02

Course Objective:

The objective of the course is to introduce the fundamental technology, theory, history, techniques and applications of photography.

Course Contents:

Module I

Rules of photography

Learning Camera and its basic components (Digital SLR & Beta Camera)

Module II

Learning the use of Camera Angles, Shots and lighting techniques while doing photography.

No. of works to be done – 10

Examination Scheme:

Components	P	CT	A	EE
Weightage (%)	10	15	5	70

(A-Attendance; P-Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination; PT- Portfolio)

Text & References:

- Photomechanic & Printing by J.S. Mertle & Gordon
- Photo techniques by Lee Frost
- Location Photography Secrets by Andy Snow
- Ways of Seeing by John Berger
- Light and Lens: Photography in the Digital Age by Robert Hirsch



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SUMMER PROJECT EVALUATION-I

Course Code: FNA2335

Credit Units: 03

Course Objective:

The students have to prepare a summer assignment to develop their creative skills. They also have to prepare summer assignment and give a presentation highlighting the following:

- Balance
- Perspective
- Concept
- Value
- Texture
- Composition
- Art and Artist

Examination Scheme:

Assignment	-	60
Viva voce	-	40
Total	-	100



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COMPOSITION - I

Course Code: FNA2304

Credit Units: 02

Course Objective:

The Objective of Composition exercise is the key to study theory of composition in sculptural 3 Dimensional representations of thoughts and concepts. This work provides a meaningful knowledge on creative expression.

Course Contents:

Module I

Sketches in clay of given subjects and the enlargement in round and relief with two of more human figure, birds animals, moulding and casting, direct building processes. Plaster, Cement and terracotta.

Module II

Building of armature for direct work in plaster or cement on the given topic.

Module III

Waste mould and piece mould technique and casting in wax.

No. of works to be done – 06

Examination Scheme:

Components	P	CT	A	EE
Weightage (%)	10	15	5	70

(A-Attendance; P-Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination; PT- Portfolio)

Text & References:

Text:

- The Sculptor's Handbook, Prof H. F. Ten Holt

References:

- Encyclopedia of Sculpture by John Mills
- Modeling a Likeness in Clay, Daisy Grubbs
- The Complete Guide to Sculpture. Modeling and Ceramics.
- Techniques and materials by Barry Midgley.



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CARVING - I

Course Code: FNA2305

Credit Units: 02

Course Objective:

This course is to learn about working with woods and its various texture to create relief work as well as three-dimensional composition.

Course Contents:

Module I

Introduction to various kinds of wood and carving tools. Practical approach to the introductory phase.

Module II

Simple compositions suitable for carving with appropriate emphasis on techniques.

No. of works to be done – 04

Examination Scheme:

Components	P	CT	A	EE
Weightage (%)	10	15	5	70

(A-Attendance; P-Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination; PT- Portfolio)

Text & References:

Text:

- The Sculptor's Handbook, Prof H. F. Ten Holt

References:

- Encyclopedia of Sculpture, John Mills
- Modeling a Likeness in Clay, Daisy Grubbs
- Dictionary of tools(wood work), R. A. Salaman



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MURAL - I

Course Code: FNA2306

Credit Units: 02

Course Objective:

The objective of this course is to train the learners how to work on wall surface using various mural mediums emphasizing technical aspects in details. Mural is a permanent work on building walls inside or outside. It provides professional experience and good knowledge of handling fundamentals of working on vertical wall surface using specific materials.

Course Contents:

Module I

Making suitable layout designing for mural work as per the basic technical aspects of working on wall surface, which is to be viewed from wide eye level.

Module II

Practical mural work on board using painting mediums.

No. of works to be done – 04

Examination Scheme:

Components	P	CT	A	EE
Weightage (%)	10	15	5	70

(A-Attendance; P-Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination; PT- Portfolio)

Text & References:

- The complete guide to Sculpture, Modeling and Ceramics: Techniques and materials by Barry Midgley.



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PHOTOGRAPHY - I

Course Code: FNA2307

Credit Units: 02

Course Objective:

This course is designed to provide an adequate training on photography emphasizing on handling the camera, techniques and equipments. Advanced experiments on nature and indoor subjects based on various kinds of light effects.

Course Contents:

Module I

Basic use of camera, observation according to photographic angles, selection of subject, composition exploring indoor and outdoor situations including effects of light.

Module II

Introduction to the process of developing and printing, films and their sensitivity. Basic knowledge of photo printing papers and various chemicals.

No. of works to be done – 10

Examination Scheme:

Components	P	CT	A	EE
Weightage (%)	10	15	5	70

(A-Attendance; P-Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination; PT- Portfolio)

Text & References:

- Photomechanic & Printing by J.S. Mertle & Gordon
- Photo techniques by Lee Frost
- Location Photography Secrets by Andy Snow



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CERAMICS - I

Course Code: FNA2308

Credit Units: 02

Course Objective:

This course is designed to provide basic training on ceramics.

Course Contents:

Module I

Simple slab work and wheel work

No. of works to be done – 06

Examination Scheme:

Components	P	CT	A	EE
Weightage (%)	10	15	5	70

(A-Attendance; P-Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination; PT- Portfolio)

Text & References:

- The complete guide to Sculpture, Modeling and Ceramics: Techniques and materials by Barry Midgley.



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ASSEMBLAGE - I

Course Code: FNA2309

Credit Units: 02

Course Objective:

This course is to provide basic concept on assemblage work.

Course Contents:

Module I

Introduction to various kinds of materials and their characteristics.

Module II

Practical method of assemblage.

No. of works to be done – 06

Examination Scheme:

Components	P	CT	A	EE
Weightage (%)	10	15	5	70

(A-Attendance; P-Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination; PT- Portfolio)

Text & References:

- The complete guide to Sculpture, Modeling and Ceramics: Techniques and materials by Barry Midgley.



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SCULPTURE METHODS AND MATERIALS - I

Course Code: FNA2310

Credit Units: 02

Course Objective:

The Course is planned for detailed training on methods and materials to work with through the edges. It is to provide technical knowledge of various mediums, techniques and tools used for different kinds of art work practically.

Course Contents:

Module I

Types of clay, Plaster of Paris, Cement & its properties

Module II

Nature and types of wood its growth and process of seasoning use of various tools and equipment.

Examination Scheme:

Components	P	CT	A	EE
Weightage (%)	10	15	5	70

(A-Attendance; P-Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination; PT- Portfolio)

Text & References:

- The complete guide to Sculpture, Modeling and Ceramics: Techniques and materials by Barry Midgley.
- Methods and Materials of Sculpture by David Raid.



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DRAWING AND ILLUSTRATION – I

Course Code: FNA2311

Credit Units: 02

Course Objective:

Drawing exercises are must to develop creative ability, which is essential for any artist. It is to develop accurate sense of observation and skills of graphic presentation.

Course Contents:

Module I

Life and object study to understand light and shade, half tone and colored. Sketching from nature. Quick sketches in limited time from life and nature - Outdoor as well as indoor.

No. of works to be done – 06

Examination Scheme:

Components	P	CT	A	EE
Weightage (%)	10	15	5	70

(A-Attendance; P-Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination; PT- Portfolio)

Text & References:

Text:

- The Art of Human Illustration, Nick Meglin,
- Anatomy & Drawing, Victor Perard, Pitman Publishing, New York, 1955

References:

- The Art of Drawing Heads and Hands, Walter Brooks, M. Grumbacher, New York, 1966.
- Figure Drawing, Victor Perard, Grosset and Dunlop, New York, 1956.
- Drawing Hands, Carl Sheek, Grosset and Dunlop, New York, 1959
- Children Picture Books, Magazines.
- The art of humorous illustrations, Nick Meglin
- Germany in winter time, Mario De Mirando, Tata Press, 1980



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DESIGN-III

Course Code: FNA2312

Credit Units: 03

Course Objective:

This will be student's first introduction to design. Students will do small basic level exercises to understand design.

Course Contents:

Module I

Introduction to logo Design and Overlapping of different forms identify proportions with texture black & white and Colour.

No. of works to be done – 06

Examination Scheme:

Components	P	CT	A	EE
Weightage (%)	10	15	5	70

(A-Attendance; P-Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination; PT- Portfolio)

Text & References:

Text:

- Graphic Arts Manual, Irwing E. Field, Arne Press, New York, 1980.

References:

- Design Graphics, C. L. Martin, Macmillan Co. London.
- Corporate Graphics, Mike Quon
- A History of Graphic Design, Philip B Meggs,



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LETTERING AND TYPOGRAPHY – I

Course Code: FNA2313

Credit Units: 02

Course Objective:

Study and history of letter forms of both Roman and Vernacular as design form: spacing, study of basic type faces, study of fundamentals of layout and their practical application, preparation of simple typographical layout for News Papers.

Course Contents:

Module I

Study of basic type faces and exercise based on it

No. of works to be done – 06

Examination Scheme:

Components	P	CT	A	EE
Weightage (%)	10	15	5	70

(A-Attendance; P-Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination; PT- Portfolio)

Text & References:

Text:

- Letter Assembly in Printing-D. Wooldridge

References:

- INFA Press and Advertising Year Book



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PHOTOGRAPHY - III

Course Code: FNA2314

Credit Units: 02

Course Objective:

This course is designed to provide an adequate training on photography emphasizing on handling the camera, techniques and equipments. Advanced experiments on nature and indoor subjects based on various kinds of light effects.

Course Contents:

Module I

Basic use of camera, observation according to photographic angles, selection of subject, composition exploring indoor and outdoor situations including effects of light.

Module II

Introduction to the process of developing and printing, films and their sensitivity. Basic knowledge of photo printing papers and various chemicals.

No. of works to be done – 10

Examination Scheme:

Components	P	CT	A	EE
Weightage (%)	10	15	5	70

(A-Attendance; P-Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination; PT- Portfolio)

Text & References:

- Photomechanic & Printing by J.S. Mertle & Gordon
- Photo techniques by Lee Frost
- Location Photography Secrets by Andy Snow



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PRINTING TECHNIQUES – I

Course Code: FNA2315

Credit Units: 02

Course Objective:

This course is designed for learning basic techniques in print making, surface printing relief media and use of printing equipment and tools. This course provides training on technical method of making relief blocks with linoleum, cardboard, plywood and also serigraphy techniques.

Course Contents:

Module I

Creative experimentation with different colour combinations and paper surface. Printing exercises using relief blocks made from various materials based on different layouts, basically working on serigraphy.

No. of works to be done – 10

Examination Scheme:

Components	P	CT	A	EE
Weightage (%)	10	15	5	70

(A-Attendance; P-Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination; PT- Portfolio)

Text & References:

- The art of the print by Fritz Eicherberg
- The bite of print by Frank and Dorothy Gettein
- The art of Print by Earl G. Mueller
- The art of Etching by E.S. Lumdsen
- Manual of woodcut printmaking by J. Hillier
- Screen Process Printing by Schwalbach



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COMPUTER GRAPHICS – I

Course Code: FNA2316

Credit Units: 02

Course Objective:

Introduction to Design software related to designs.

Course Contents:

Module I

Application of Coral Draw software.

No. of works to be done – 10

Examination Scheme:

Components	P	CT	A	EE
Weightage (%)	10	15	5	70

(A-Attendance; P-Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination; PT- Portfolio)

Text & References:

- Computer Graphics, Edward Angel



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DRAWING - III

Course Code: FNA2318

Credit Units: 02

Course Objective:

The objective of Drawing Exercise is to learn to approach art in most direct way. It is an introduction to various aspects and techniques of drawing exploring variety of drawing tools and mediums such as pencil, charcoal, crayons, ink and color. This exercise provides accuracy in observation and great opportunity to study and experiment expressive force and spontaneity of line work. Drawing is the most significant basic skill of visual representation of real world.

Course Contents:

Module I: Still Life

Drawing exercises from selected arranged objects and drapery to learn and study using various drawing tools based on eye level, relative proportion, perspective, structure, form, volume, texture, source of light and its effect, balance and also tonal values.

Module II: Portraiture

Portraiture drawing study of human heads, construction of the skull, anatomy, proportion, planes, masses and specific feature; light and shade from different angles and finishing.

Life Drawing-Full Figure: Drawing study from full human figure based on human anatomy, proportion, planes and masses, building blocks, posture and rhythm, unity of body parts, inter-related force of lines, foreshortening and finishing.

Module III: Landscape/ Nature Study (outdoor)

Observation, finding the right view to study, addition and elimination, simplification, eye level and perspective, balance and rhythmic presentation with a unique aesthetic value.

No. of works to be done – 12

Examination Scheme:

Components	P	CT	A	EE
Weightage (%)	10	15	5	70

(A-Attendance; P-Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination; PT- Portfolio)


Text & References:

Text:

- An Introduction to Drawing by James Horton in association with the Royal Academy of Arts.

References:

- Grassroot of Art by Herbert Read
- How to draw and paint by Hazel Harrison, from Art School
- Human Figure by Walter Foster
- Anatomy by Walter Foster
- Heads by Walter Foster
- Figure Drawing by Patricia Monahan with Albany Wiseman
- Human Anatomy by James Horton
- Big book of Drawing and painting by Francisco Asensio Cerver.


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PAINTING - III

Course Code: FNA2319

Credit Units: 03

Course Objective:

This is an intensive training to equip the students with a great skill for original and creative visual expression using different painting mediums and tools. Mastery of technical aspects provides essential foundation for the learners, though it is only means, not the end. Painting is the visual expression of thoughts, dreams and experiences. It is an introductory exposure to different schools, traditions, techniques and media of painting practiced through the ages.

Course Contents:

Module I: Still Life

Painting Study (Monochrome) from selected well arranged objects along with drapery; emphasizing on composition, eye level, structure, relative proportion and perspective, source of light and its effect, tonal and textural values, colour balance and colour perspective.

Module II: Painting from life: portraiture and full figure

Head study and full figure study (monochrome) same as drawing from life models (male & female)

Module III: Landscape

Outdoor study using different painting mediums (water colours/pastel/acrylic etc).

Module IV: Mix Media

Experimentation handling variety of painting mediums including collage and other innovative techniques working on still life, life or nature study to explore beyond traditional and academic method.

No. of works to be done – 12

Examination Scheme:

Components	P	CT	A	EE
Weightage (%)	10	15	5	70

(A-Attendance; P-Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination; PT- Portfolio)


Text & References:

Text:

- Notes on the techniques of Painting by Hilaire Hiler
- Painting Course by Ronald Pearsall

References:

- Big book of drawing and painting by Francisco Asensio Cerver.
- A Concise History of Modern Painting, 1974 Thames & Hudson, London
- The portrait by Norbert Schneider.


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COMPOSITION - I

Course Code: FNA2320

Credit Units: 02

Course Objective:

Composition exercise is the most important to learn and study theory of composition, individual approach to the possibilities. Experimenting innovative arrangement of the thing around to create unique visual presentation improves artistic sense and concept of beauty.

Course Contents:

Module I

Composition Exercises working on still life, life and nature study –outdoor and indoor; The 2-D and 3-D objects and the structural possibilities, use of colour and textural values, form and content compositions, use of suitable objects. Exercises based on traditional formats

Module II

Creative composition exercise from traditional paintings and imagination emphasizing on individual creative sense, transformation of simple shapes into well-balanced unique visual presentation.

No. of works to be done – 06

Examination Scheme:

Components	P	CT	A	EE
Weightage (%)	10	15	5	70

(A-Attendance; P-Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination; PT- Portfolio)

Text & References:

Text:

- Artist's Handbook by Ray Smith

References:

- Art Class ,Copy Right 1999 by Harper Collins Publishers
- Artist's Encyclopedia by John Quick



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PHOTOGRAPHY - III

Course Code: FNA2321

Credit Units: 02

Course Objective:

This course is designed to provide an adequate training on photography emphasizing on handling the camera, techniques and equipments. Advanced experiments on nature and indoor subjects based on various kinds of light effects.

Course Contents:

Module I

Basic use of camera, observation according to photographic angles, selection of subject, composition exploring indoor and outdoor situations including effects of light.

Module II

Introduction to the process of developing and printing, films and their sensitivity. Basic knowledge of photo printing papers and various chemicals.

No. of works to be done – 12

Examination Scheme:

Components	P	CT	A	EE
Weightage (%)	10	15	5	70

(A-Attendance; P-Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination; PT- Portfolio)

Text & References:

- Photomechanic & Printing by J.S. Mertle & Gordon
- Photo techniques by Lee Frost
- Location Photography Secrets by Andy Snow



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PRINT MAKING - III

Course Code: FNA2322

Credit Units: 02

Course Objective:

This course is designed for learning basic techniques in print making, surface printing relief media and use of printing equipments and tools. This course provides training on technical method of making relief blocks with linoleum, cardboard, plywood and also making blocks using various metal sheets.

Course Contents:

Module I

Creative experimentation with different colour combinations and paper surface. Printing exercises using relief blocks made from various materials based on different layouts, basically working on silkscreen.

No. of works to be done – 10

Examination Scheme:

Components	P	CT	A	EE
Weightage (%)	10	15	5	70

(A-Attendance; P-Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination; PT- Portfolio)

Text & References:

- The art of the print by Fritz Eicherberg
- The bite of print by Frank and Dorothy Gettein
- The art of Print by Earl G. Mueller
- The art of Etching by E.S. Lumdsen
- Manual of woodcut printmaking by J. Hillier
- Screen Process Printing by Schwalbach



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COMPUTER GRAPHICS – I

Course Code: FNA2323

Credit Units: 02

Course Objective:

Introduction to Design software related to designs.

Course Contents:

Module I

Application of Coral Draw software.

No. of works to be done – 10

Examination Scheme:

Components	P	CT	A	EE
Weightage (%)	10	15	5	70

(A-Attendance; P-Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination; PT- Portfolio)

Text & References:

- Computer Graphics, Edward Angel



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PAINTING METHODS AND MATERIALS - I

Course Code: FNA2324

Credit Units: 02

Course Objective:

The Course is planned for detailed training on methods and materials to work with through the edges. It is to provide technical knowledge of various mediums, techniques and tools used for different kinds of art work practically.

Course Contents:

Module I

Importance of method & materials.

Permanence and deterioration of paint.

Module II

Nature and characteristic of drawing and painting media such as Pencil, crayon, charcoal, pen and ink, water color, gouache, pastel and oil paint.

Examination Scheme:

Components	CT	P	A	EE
Weightage (%)	15	10	5	70

(A-Attendance; P-Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination; PT- Portfolio)

Text & References:

- Method and Materials by Lynton Lamb.
 - A manual of Painting Materials & Techniques by Mark David Goattsegen

References:

- Fundamental of Indian Art by S. N. Dasgupta
- Dance of Shiva by A. K. Coomaraswamy
- Transformation of Nature in Art by A. K. Coomaraswamy
- Color by Edith Anderson Feisner.



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COMPOSITION - II

Course Code: FNA2404

Credit Units: 03

Course Objective:

The Objective of Composition exercise is the key to study theory of composition in sculptural 3 Dimensional representations of thoughts and concepts. This work provides a meaningful knowledge on creative expression.

Course Contents:

Module I

Sketches in clay of given subjects and the enlargement in round and relief with two of more human figure, birds animals, moulding and casting, direct building processes. Plaster, Cement and terracotta.

Module II

Building of armature for direct work in plaster or cement on the given topic.

Module III

Waste mould and piece mould technique and casting in wax.

No. of works to be done – 6

Examination Scheme:

Components	P	CT	A	EE
Weightage (%)	10	15	5	70

(A-Attendance; P-Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination; PT- Portfolio)

Text & References:

Text:

- The Sculptor's Handbook, Prof H. F. Ten Holt

References:

- Encyclopedia of Sculpture by John Mills
- Modeling a Likeness in Clay, Daisy Grubbs
- The Complete Guide to Sculpture. Modeling and Ceramics. Techniques and materials by Barry Midgley.



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CARVING - II

Course Code: FNA2405

Credit Units: 01

Course Objective:

The course is designed to improve the skills in working with these two mediums based on textural values and technical differences chiseling out artist's own expressions.

Course Contents:

Module I

To make the small maquettes on creative theme, and the concept of mix-media.

Module II

Uses of various carving tools on the given medium. Emphasis on techniques. Enlargement of the maquettes to create the final work.

Module III

Finishing & installing the final work.

No. of works to be done – 6

Examination Scheme:

Components	P	CT	A	EE
Weightage (%)	10	15	5	70

(A-Attendance; P-Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination; PT- Portfolio)

Text & References:

Text:

- Dictionary of tools by R. A Salaman.
- The Sculptor's Handbook, Prof H. F. Ten Holt

References:

- Contemporary Stone Sculpture, Dona Z. Meliach
- Methods and Materials of Sculpture by David Raid.
- The Complete Guide to Sculpture. Modeling and Ceramics. Techniques and materials by Barry Midgley.



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MURAL - II

Course Code: FNA2406

Credit Units: 02

Course Objective:

This course is to train the learners about working on wall surface using various mediums emphasizing technical aspects in details. Mural is a permanent work wall inside or outside. It provides professional experience and good knowledge of handling fundamentals of working on vertical wall surface.

Course Contents:

Module I

Making suitable layout designing for mural work as per the basic technical aspects of working on wall surface, which is to be viewed from wide eye level.

Module II

Practical mural work on board using painting mediums.

No. of works to be done – 06

Examination Scheme:

Components	P	CT	A	EE
Weightage (%)	10	15	5	70

(A-Attendance; P-Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination; PT- Portfolio)

Text & References:

- The complete guide to Sculpture, Modeling and Ceramics: Techniques and materials by Barry Midgley.



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PHOTOGRAPHY - II

Course Code: FNA2407

Credit Units: 02

Course Objective:

This course is to provide a training on photography emphasizing on creative techniques using basic equipments. Experiments on nature and indoor subjects using specific Light arrangements.

Course Contents:

Module I

Indoor project on photography experimenting with light effects.

Module II

Outdoor project exploring various possibilities.

No. of works to be done – 12

Examination Scheme:

Components	P	CT	A	EE
Weightage (%)	10	15	5	70

(A-Attendance; P-Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination; PT- Portfolio)

Text & References:

- Photomechanic & Printing by J.S. Mertle & Gordon
- Photo techniques by Lee Frost
- Location Photography Secrets by Andy Snow



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CERAMICS - II

Course Code: FNA2408

Credit Units: 02

Course Objective:

This course is designed to provide basic training on ceramics emphasizing on basic techniques.

Course Contents:

Module I

Slab work, wheel work, coil work and tile making in different textures and designs.

Module II

Ceramic clay body making.

No. of works to be done – 10

Examination Scheme:

Components	P	CT	A	EE
Weightage (%)	10	15	5	70

(A-Attendance; P-Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination; PT- Portfolio)

Text & References:

- The complete guide to Sculpture, Modeling and Ceramics: Techniques and materials by Barry Midgley.



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ASSEMBLAGE - II

Course Code: FNA2409

Credit Units: 02

Course Objective:

This course is designed to provide basic training on assemblage.

Course Contents:

Module I

Practical assemblage training on working surface according to the layout.

No. of works to be done – 06

Examination Scheme:

Components	P	CT	A	EE
Weightage (%)	10	15	5	70

(A-Attendance; P-Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination; PT- Portfolio)

Text & References:

- The complete guide to Sculpture, Modeling and Ceramics: Techniques and materials by Barry Midgley.



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SCULPTURE METHODS AND MATERIALS - II

Course Code: FNA2410

Credit Units: 02

Course Objective:

The Course is planned for detailed training on methods and materials to work with through the edges. It is to provide technical knowledge of various mediums, techniques and tools used for different kinds of art work practically.

Course Contents:

Module I

Types of clay, Plaster of Paris, Cement & its properties

Module II

Nature and types of wood its growth and process of seasoning use of various tools and equipments.

Examination Scheme:

Components	CT	P	A	EE
Weightage (%)	15	10	5	70

(A-Attendance; P-Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination; PT- Portfolio)

Text & References:

Text:

- Dictionary of tools by R. A Salaman.
- The Sculptor's Handbook, Prof H. F. Ten Holt

References:

- Contemporary Stone Sculpture, Dona Z. Meliach
- Methods and Materials of Sculpture by David Raid.
- The Complete Guide to Sculpture. Modeling and Ceramics. Techniques and materials by Barry Midgley.



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DRAWING AND ILLUSTRATION – II

Course Code: FNA2411

Credit Units: 02

Course Objective:

Drawing exercises are must to develop creative ability, which is essential for any artist. It is to develop accurate sense of observation and skills of graphic presentation.

Course Contents:

Module I

Detailed portrait study and human figure, practicing planes, volume, and perspective in figure and foreshortening.

No. of works to be done – 15

Examination Scheme:

Components	P	CT	A	EE
Weightage (%)	10	15	5	70

(A-Attendance; P-Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination; PT- Portfolio)

Text & References:

Text:

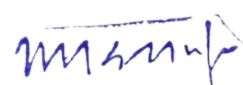
- Anatomy & Drawing, Victor Perard, Pitman Publishing, New York, 1955

References:

- The Art of Drawing Heads and Hands, Walter Brooks, M. Grumbacher, New York, 1966.
- Figure Drawing, Victor Perard, Grosset and Dunlop, New York, 1956.
- Drawing Hands, Carl Sheek, Grosset and Dunlop, New York, 1959
- Children Picture Books, Magazines.
- The art of humorous illustrations, Nick Meglin
- Germany in winter time, Mario De Mirando, Tata Press, 1980



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DESIGN – IV

Course Code: FNA2412

Credit Units: 03

Course Objective:

This course provides a clear concept of various aspects of designing. It is specially planned for a graphic artist to enable students to develop a commercial skill in design work.

Course Contents:

Module II

Introduction to product poster.

Module I

Show cards and other exercises of creative concept.

No. of works to be done – 10

Examination Scheme:

Components	P	CT	A	EE
Weightage (%)	10	15	5	70

(A-Attendance; P-Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination; PT- Portfolio)

Text & References:

Text:

- Graphic Arts Manual, Irwing E. Field, Arne Press, New York, 1980

References:

- The Art of Human Illustration, Nick Meglin,
- Corporate Graphics, Mike Quon
- A History of Graphic Design, Philip B Meggs,
- Graphic Arts Manual, Irwing E. Field, Arne Press, New York, 1980
- Design Graphics, C. L. Martin, Macmillan Co. London.



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LETTERING AND TYPOGRAPHY – II

Course Code: FNA2413

Credit Units: 02

Course Objective:

Study of letter forms as design form: spacing, study of basic type faces, study of fundamentals of layout and their practical application, preparation of simple typographical layout for News Papers.

Course Contents:

Module I

Preparation of typographical layout, logo design, Book jacket and Book Cover.

No. of works to be done – 09

Examination Scheme:

Components	P	CT	A	EE
Weightage (%)	10	15	5	70

(A-Attendance; P-Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination; PT- Portfolio)

Text & References:

Text:

- Letter Assembly in Printing-D. Wooldridge

References:

- INFA Press and Advertising Year Book



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COMPUTER GRAPHICS - II

Course Code: FNA2414

Credit Units: 02

Course Objective:

Introduction to Design Softwares

Course Contents:

Module I

Working with Coral Draw software for various design purpose.

Module II

Introduction to Adobe Photoshop CS4 or later version for various design purpose.

No. of works to be done – 10

Examination Scheme:

Components	P	CT	A	EE
Weightage (%)	10	15	5	70

(A-Attendance; P-Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination; PT- Portfolio)

Text & References:

- Computer Graphics, Edward Angel



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PRINTING TECHNIQUES - II

Course Code: FNA2415

Credit Units: 02

Course Objective:

This course is designed for learning techniques in print making, surface relief printing using printing equipment and tools. This course provides technical training on method of making experimental serigraphy on various surfaces.

Course Contents:

Module I

Exploring various texture of different surface by using various printing surfaces with serigraphy.

No. of works to be done – 10

Examination Scheme:

Components	P	CT	A	EE
Weightage (%)	10	15	5	70

(A-Attendance; P-Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination; PT- Portfolio)

Text & References:

- Serigraphy: Silk Screen Techniques for the Artist, Kenneth W. Auvil
- Silk Painting : The Artist's Guide to Gutta and Wax Resist Techniques



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DRAWING - IV

Course Code: FNA2417

Credit Units: 02

Course Objective:

The objective of Drawing Exercise is to learn to approach art in most direct way. It is an introduction to various aspects and techniques of drawing exploring variety of drawing tools and mediums such as pencil, charcoal, crayons, ink and colour. This exercise provides accuracy in observation and great opportunity to study and experiment expressive force and spontaneity of line work. Drawing is the most significant basic skill of visual representation of real world.

Course Contents:

Module I: Still Life

Drawing with pen and ink. Still life with pen and ink.

Module II: Landscape/ Nature Study (outdoor)

Nature with pen and ink

Module III: Life drawing with charcoal /pencil.

No. of works to be done – 20

Examination Scheme:

Components	P	CT	A	EE
Weightage (%)	10	15	5	70

(A-Attendance; P-Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination; PT- Portfolio)

Text & References:

Text:

- An Introduction to Drawing by James Horton in association with the Royal Academy of Arts.

References:

- Grassroot of Art by Herbert Read
- How to draw and paint by Hazel Harrison ,from Art School
- Human Figure by Walter Foster
- Anatomy by Walter Foster
- Heads by Walter Foster
- Figure Drawing by Patricia Monahan with Albany Wiseman
- Human Anatomy by James Horton
- Big book of Drawing and painting by Francisco Asensio Cerver.



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PAINTING - IV

Course Code: FNA2418

Credit Units: 03

Course Objective:

This is an intensive and advanced training to equip the students with a great skill for original and creative visual expression using different painting mediums and tools. Mastery of technical aspects provides essential foundation for the learners, though it is only means, not the end. Painting is the visual expression of thoughts, dreams and experiences. It is an introductory exposure to different schools, traditions, techniques and media of painting practiced through the ages.

Course Contents:

Module I: Still Life

Painting Study (Monochrome) from selected well arranged objects along with drapery; emphasizing on composition, eye level, structure, relative proportion and perspective, source of light and its effect, tonal and textural values, colour balance and colour perspective.

- Still life : multi-colour with water colour

Module II: Painting from life

Portraiture and full figure: Head study and full figure study (monochrome) same as drawing from life models (male & female)

- Portrait : multi-colour technique

Module III: Landscape

Copy work from traditional paintings.

Copy work (traditional painting)

Module IV: Mix Media

Copy work (Indian & western) from traditional paintings and opaque colour technique

No. of works to be done – 16

Examination Scheme:

Components	P	CT	A	EE
Weightage (%)	10	15	5	70

(A-Attendance; P-Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination; PT- Portfolio)

Text & References:

Text:

- Notes on the techniques of Painting by Hilaire Hiler
- Painting Courseby Ronald Pearsall

References:

- Big book of drawing and painting by Francisco Asensio Cerver
- by Mark David Goattsegen
- Art Class, Copy Right 1999 by Harper Collins Publishers.
- Images of the human body by Pepin Van Roojen.
- A Concise History of Modern Painting, 1974 Thames & Hudson, London
- The portrait by Norbert Schneider.

COMPOSITION – II

Course Code: FNA2419

Credit Units: 02

Course Objective:

Composition exercise is the most important to learn and study theory of composition, individual approach to the possibilities. Experimenting innovative arrangement of the thing around to create unique visual presentation improves artistic sense and concept of beauty.

Course Contents:

Module I

Composition, arrangement of objects, figures and architectures.

Module II

Creative composition exercise from imagination emphasizing on individual creative sense, transformation of simple shapes into well-balanced unique visual presentation with experimentation.

No. of works to be done – 10

Examination Scheme:

Components	P	CT	A	EE
Weightage (%)	10	15	5	70

(A-Attendance; P-Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination; PT- Portfolio)

Text & References:

Text:

- Artist's Handbook by Ray Smith
- Artist's Encyclopedia by John Quick

References:

- Big book of drawing and painting by Francisco Asensio Cerver
- Art Class, Copy Right 1999 by Harper Collins Publishers.
- A Concise History of Modern Painting, 1974 Thames & Hudson, London
- Painting Course by Ronald Pearsall
- The portrait by Norbert Schneider.
- Color by Edith Anderson Feisner.



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MURAL - I

Course Code: FNA2420

Credit Units: 02

Course Objective:

The objective of this course is to train the learners how to work on wall surface using various mural mediums emphasizing technical aspects in details. Mural is a permanent work on building walls inside or outside. It provides professional experience and good knowledge of handling fundamentals of working on vertical wall surface using specific materials.

Course Contents:

Module I

Making suitable layout designing for mural work as per the basic technical aspects of working on wall surface, which is to be viewed from wide eye level.

Module II

Practical mural work on board using painting mediums.

No. of works to be done – 06


Examination Scheme:

Components	P	CT	A	EE
Weightage (%)	10	15	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Text & References:

The complete guide to Sculpture, Modeling and Ceramics: Techniques and materials by Barry Midgley.


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PRINT MAKING - II

Course Code: FNA2421

Credit Units: 02

Course Objective:

This course is designed for learning techniques in print making, surface relief printing using printing equipment and tools. This course provides technical training on method of making experimental relief blocks on various surfaces.

Course Contents:

Module I

Exploring various texture of different surface by using materials including metal sheets like zinc plate and aluminum sheet.

Module II

Advanced experimentation with monochrome & multi-color lithography etching – intaglio/photo process, advanced print making, use of multicolor relief print and mixed media.

No. of works to be done – 10


Examination Scheme:

Components	P	CT	A	EE
Weightage (%)	10	15	5	70

(A-Attendance; P-Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination; PT- Portfolio)

Text & References:

- The art of the print by Fritz Eicherberg
- The bite of print by Frank and Dorothy Gettein
- The art of Print by Earl G. Mueller
- The art of Etching by E.S.Lumdsen
- Manual of woodcut printmaking by J. Hillier
- Screen Process Printing by Schwalbach


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PAINTING METHODS AND MATERIALS - II

Course Code: FNA2422

Credit Units: 02

Course Objective:

The Course is planned for detailed training on methods and materials to work with through the edges. It is to provide technical knowledge of various mediums, techniques and tools used for different kinds of artwork practically.

Course Contents:

Module I

Nature and characteristics of Drawing and Painting Media such as Pencils, Crayons, Charcoal, Pen and Ink, Water Colour, Gouache, Pastels and Oils.

Module II

Introduction to murals and Print making media.

Module III

Folk Art of India

Examination Scheme:

Components	CT	P	A	EE
Weightage (%)	15	10	5	70

(A-Attendance; P-Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination; PT- Portfolio)

Text & References:

Text:

- A manual of Painting Materials & Techniques
- Method and Materials by Lynton Lamb.

References:

- Artist's Handbook by Ray Smith
- Artist's Encyclopedia by John Quick
- A manual of Painting Materials & Techniques
- Color by Edith Anderson Feisner.

PRACTICAL TRAINING EVALUATION - I

Course Code: FNA2535

Credit Units: 03

Course Objective:

It provides exposure to research methodology and an opportunity to work closely with a faculty guide. It usually requires the use of advanced concepts, a variety of experimental techniques, and state-of-the-art instrumentation.

Research is genuine exploration of the unknown that leads to new knowledge which often warrants publication. But whether or not the results of a research project are publishable, the project should be communicated in the form of a research report written by the student.

Sufficient time should be allowed for satisfactory completion of reports, taking into account that initial drafts should be critiqued by the faculty guide and corrected by the student at each stage.

BFA (Applied Art)

- Practical work in concerned subject
- Visualization
- Concept of designing

BFA (Painting)

- Concept
- Different technique of painting

BFA (Animation)

- Apply the principle of animation, animation using software
- Short animation clip

Examination Scheme:

Project Report: 60
Viva Voce: 40

Total: 100



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STUDY FROM LIFE - III

Course Code: FNA2503

Credit Units: 03

Course Objective:

The objective of sculptural study from life is to learn human forms in details. It provides the skill to sculpt human figure in realistic way based on anatomy, planes, body masses, balance, posture and rhythm.

Course Contents:

Module I:

Life Drawing:- Bust & Portrait:- Study of Human Portrait and bust using different drawing tools to study blocks, posture and rhythm, unity of body parts, inter-related force of lines, foreshortening and finishing.

Module II

Head Study Male & Female, Building of Armature study in clay and direct plaster.

Module III

Understanding of structure and proportion and detail modeling of full figure. Waste mould technique & casting in PoP.

No. of works to be done – 12

Examination Scheme:

Components	P	CT	A	EE
Weightage (%)	10	15	5	70

(A-Attendance; P-Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination; PT- Portfolio)

Text & References:

Text:

- Modeling a Likeness in Clay, Daisy Grubbs

References:

- Human Figure, Walter Foster
- Anatomy, Walter Foster
- Figure Drawing, Patricia Monahan with Albany Wiseman
- Human Anatomy, James Horton
- The Sculptor's Handbook, Prof H. F. Ten Holt



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COMPOSITION - III

Course Code: FNA2504

Credit Units: 02

Course Objective:

The Objective of Composition exercise is the key to study theory of composition in sculptural 3 Dimensional representations of thoughts and concepts. This work provides a meaningful knowledge on creative expression.

Course Contents:

Module I

Sketches in clay of given subjects and the enlargement in round and relief with two of more human figure, birds animals, moulding and casting, direct building processes. Plaster, Cement and terracotta.

Module II

Building of armature for direct work in plaster or cement on the given topic.

Module III

Waste mould and piece mould technique and casting in wax.

No. of works to be done – 08

Examination Scheme:

Components	P	CT	A	EE
Weightage (%)	10	15	5	70

(A-Attendance; P-Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination; PT- Portfolio)


Text & References:

Text:

- The Sculptor's Handbook, Prof H. F. Ten Holt

References:

- Encyclopedia of Sculpture by John Mills
- Modeling a Likeness in Clay, Daisy Grubbs
- The Complete Guide to Sculpture. Modeling and Ceramics. Techniques and materials by Barry Midgley.


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METAL CASTING - I

Course Code: FNA2505

Credit Units: 02

Course Objective:

This course provides the knowledge on working with metals.

Course Contents:

Module I

Methods of casting – lost wax and sand process.

No. of works to be done – 03

Examination Scheme:

Components	P	CT	A	EE
Weightage (%)	10	15	5	70

(A-Attendance; P-Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination; PT- Portfolio)

Text & References:

Text:

- The Sculptor's Handbook, Prof H. F. Ten Holt

References:

- Encyclopedia of Sculpture by John Mills
- Modeling a Likeness in Clay, Daisy Grubbs
- The Complete Guide to Sculpture. Modeling and Ceramics. Techniques and materials by Barry Midgley.



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MURAL - III

Course Code: FNA2506

Credit Units: 02

Course Objective:

This course is to innovative training to work on wall surface using various mediums emphasizing technical aspects. It provides professional exposure and good knowledge of handling mural materials to work on wall surface.

Course Contents:

Module I

Designing for mural work as per the advanced technique of working on wall surface with tempera, acrylic, encaustic, fiber glass etc.

No. of works to be done – 04

Examination Scheme:

Components	P	CT	A	EE
Weightage (%)	10	15	5	70

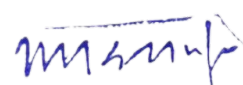
(A-Attendance; P-Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination; PT- Portfolio)

Text & References:

- Painting Murals: Image, Ideas & Techniques by Patrica Seligman
- Paintings Murals Fast & Easy: 21 (Design for walls, canvas you can paint with a sponge) by Terrence Tse, Theodore
- Paintings Murals Step by Step by Charles Grund.



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PHOTOGRAPHY - III

Course Code: FNA2507

Credit Units: 02

Course Objective:

The objective of this course is to provide an experimental exposure on photography highlighting on creative aspects. Experiments on nature, depending upon time and mood. It also provides experimental experience on indoor subjects.

Course Contents:

Module I

Basic use of camera, observation according to photographic angles, selection of subject, composition exploring indoor and outdoor situations including effects of light.

No. of works to be done – 12

Examination Scheme:

Components	P	CT	A	EE
Weightage (%)	10	15	5	70

(A-Attendance; P-Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination; PT- Portfolio)

Text & References:

- Photomechanic & Printing by J.S. Mertle & Gordon
- Photo techniques by Lee Frost
- Location Photography Secrets by Andy Snow



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CERAMICS - III

Course Code: FNA2508

Credit Units: 02

Course Objective:

This course is to provide training on creative aspects on ceramics.

Course Contents:

Module I

Slab work, wheel work, coil work and tile making in different textures and designs.

Module II

Ceramic claybody making

No. of works to be done – 06

Examination Scheme:

Components	P	CT	A	EE
Weightage (%)	10	15	5	70

(A-Attendance; P-Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination; PT- Portfolio)

Text & References:

- The complete guide to Sculpture, Modeling and Ceramics: Techniques and Materials by Barry Midgley.



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ASSEMBLAGE - III

Course Code: FNA2509

Credit Units: 02

Course Objective:

This course is designed to provide experimental training on assemblage.

Course Contents:

Module I

Methods of various assemblage techniques

No. of works to be done – 06

Examination Scheme:

Components	P	CT	A	EE
Weightage (%)	10	15	5	70

(A-Attendance; P-Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination; PT- Portfolio)

Text & References:

- The complete guide to Sculpture, Modeling and Ceramics: Techniques and materials by Barry Midgley.



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SCULPTURE METHODS AND MATERIALS - III

Course Code: FNA2510

Credit Units: 02

Course Objective:

The Course is planned for detailed training on methods and materials to work with through the edges. It is to provide technical knowledge of various mediums, techniques and tools used for different kinds of art work practically.

Course Contents:

Module I

Analysis of fundamentals of sculpture in various media.

Module II

Enlarging and reducing devices. Taking points for copying sculpture.

Examination Scheme:

Components	P	CT	A	EE
Weightage (%)	10	15	5	70

(A-Attendance; P-Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination; PT- Portfolio)

Text & References:

Text:

- The Sculptor's Handbook, Prof H. F. Ten Holt

References:

- Encyclopedia of Sculpture by John Mills
- Modeling a Likeness in Clay, Daisy Grubbs
- The Complete Guide to Sculpture. Modeling and Ceramics. Techniques and materials by Barry Midgley.



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DRAWING AND ILLUSTRATION – III

Course Code: FNA2511

Credit Units: 02

Course Objective:

Drawing exercises are must to develop creative ability which is essential for any artist. It is to develop accurate sense of observation and skills of graphic presentation. Exercises on illustration for various needs of the clients.

Course Contents:

Module I

Study of human figure draped and undraped to study volume, proportion, mass, weight, and anatomy with the aid of light and shade.

Module II

Developing compositions through studies working in colour mediums.

No. of works to be done – 10

Examination Scheme:

Components	P	CT	A	EE
Weightage (%)	10	15	5	70

(A-Attendance; P-Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination; PT- Portfolio)

Text & References:

Text:

- Anatomy & Drawing, Victor Perard, Pitman Publishing, New York, 1955

References:

- The Art of Drawing Heads and Hands, Walter Brooks, M. Grumbacher, New York, 1966.
- Figure Drawing, Victor Perard, Grosset and Dunlop, New York, 1956.
- Drawing Hands, Carl Sheek, Grosset and Dunlop, New York, 1959
- Children Picture Books, Magazines.
- The art of humorous illustrations, Nick Meglin
- Germany in winter time, Mario De Mirando, Tata Press, 1980



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DESIGN – V

Course Code: FNA2512

Credit Units: 03

Course Objective:

This course provides a clear concept of various aspects of designing. It is specially planned for a graphic artist to enable students to develop a commercial skill in design work. To understand the needs of visual communications.

Course Contents:

Module I

Comparatively study of different types of Indoor layouts like Designing for press, Brouchers and magazine advertisements etc.

No. of works to be done – 08

Examination Scheme:

Components	P	CT	A	EE
Weightage (%)	10	15	5	70

(A-Attendance; P-Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination; PT- Portfolio)

Text & References:

Text:

- Graphic Arts Manual, Irwing E. Field, Arne Press, New York, 1980

References:

- The Art of Human Illustration, Nick Meglin,
- Corporate Graphics, Mike Quon
- A History of Graphic Design, Philip B Meggs,
- Graphic Arts Manual, Irwing E. Field, Arne Press, New York, 1980
- Design Graphics, C. L. Martin, Macmillan Co. London.



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PACKAGING – I

Course Code: FNA2513

Credit Units: 02

Course Objective:

This will be student's first introduction to various packaging design according to the environment, occasions and need. Students will do small basic level layouts exercises to understand design of packaging.

Course Contents:

Module I

Study the basic layouts of Label Design, Box design and shopping Bags and their practical application.

No. of works to be done – 08

Examination Scheme:

Components	P	CT	A	EE
Weightage (%)	10	15	5	70

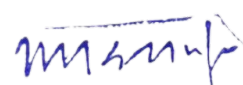
(A-Attendance; P-Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination; PT- Portfolio)

Text & References:

- Packaging Art for Export, Nduka Nwosu
- Packaging: The art of the right proposition: An artistic from : Groser (HTML), Nicola Gordon-Seymour



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COMPUTER GRAPHICS – III

Course Code: FNA2514

Credit Units: 02

Course Objective:

To understand Computer Software related to Design.

Course Contents:

Module I

Tools interface and applications of Adobe Photoshop CS4 (or above) and Use of Adobe Photoshop CS4 (or above) software to create different types of layouts.

No. of works to be done – 08

Examination Scheme:

Components	P	CT	A	EE
Weightage (%)	10	15	5	70

(A-Attendance; P-Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination; PT- Portfolio)

Text & References:

- Color Harmony for the Web, Cailin Boyle



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PRINTING TECHNIQUES-III

Course Code: FNA2515

Credit Units: 02

Course Objective:

This course is designed for learning basic techniques in print making, surface printing relief media and use of printing equipment and tools. This course provides training on technical method of making relief blocks.

Course Contents:

Module I

Originals for reproduction (monochrome, line originals)

Photographic materials and equipments.

Line negative making.

Line block-making

No. of works to be done – 08

Examination Scheme:

Components	P	CT	A	EE
Weightage (%)	10	15	5	70

(A-Attendance; P-Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination; PT- Portfolio)

Text & References:

- Color Harmony for the Web, Cailin Boyle



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TEXTILE DESIGN-I

Course Code: FNA2516

Credit Units: 02

Course Objective:

To enable creation of various types of textile designs and patterns

Course Contents:

Module I

Fundamental of Textile Design: Motif, Repeat & Design Concept, Setting of Repeat & Change or Repeat into Design.

Module II

Design for Weaving:

- a. Weaving Texture
- b. Stripe & Check Effect
- c. Floral Design

No. of works to be done – 08

Examination Scheme:

Components	P	CT	A	EE
Weightage (%)	10	15	5	70

(A-Attendance; P-Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination; PT- Portfolio)

Text & References:



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DRAWING - V

Course Code: FNA2518

Credit Units: 02

Course Objective:

The objective of Drawing Exercise is to practice the basic technique in direct way emphasizing on various aspects and techniques of drawing in advanced concept, exploring and experimenting variety of drawing tools and mediums in traditional way as well as innovative way. This exercise provides accuracy in observation and great opportunity to face the challenge and experiment possibilities in line work.

Course Contents:

Module I: Still Life

Study of selected assorted objects in advanced drawing techniques using various drawing tools based on eye level, relative proportion, perspective, structure, form, volume, texture, source of light and its effect, balance and also tonal values in analytical process.

Module II: Landscape/ Nature Study (outdoor)

Advanced training in landscape drawing depending upon artist's observation, concept of addition and elimination, simplification. Study from nature as a controlled design, difference of handling near and distant objects.

Module III: Life Drawing- Portraiture

Advanced drawing study of human heads based on proportion, masses and specific feature and character using various media with emphasize on manner of finished execution.

Life Drawing-Full Figure: Advanced drawing study from full human figure based on structure of human form and anatomy using life models

Module IV: Sketching

Quick sketches in limited time from life and nature exploring innovative possibilities emphasizing on advanced techniques - Outdoor and indoor.

No. of works to be done – 20

Examination Scheme:

Components	P	CT	A	EE
Weightage (%)	10	15	5	70

(A-Attendance; P-Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination; PT- Portfolio)

Text & References:

Text:

- An Introduction to Drawing by James Horton in association with the Royal Academy of Arts.

References:

- How to draw and paint by Hazel Harrison ,from Art School
- Human Figure by Walter Foster
- Anatomy by Walter Foster
- Heads by Walter Foster
- Figure Drawing by Patricia Monahan with Albany Wiseman
- Human Anatomy by James Horton
- Big book of Drawing and painting by Francisco Asensio Cerver.

PAINTING - V

Course Code: FNA2519

Credit Units: 03

Course Objective:

Painting is a visual experience with various medium and techniques .learning the fundamental methods of painting will lead to an individual style of painting .developing skill and experimenting different media of painting working in water colour , acrylic and oil colour technique.

Course Contents:

Module I: Still Life

Advanced Painting Study in water colour from selected assorted objects along with drapery; emphasizing on composition, eye level, structure, relative proportion and perspective, source of light and its effect, tonal and textural values with appropriate colour balance and colour perspective.

Module II: Painting from life

Portraiture: Advanced study of human head using colours. The knowledge of advanced techniques of colour application

Module III: Landscape

Figurative composition with opaque colour treatment.

Module IV: Mix Media

Experimentation with various painting mediums exploring innovative techniques to represent thoughts in creative form. Use of various tools like roller, spatula etc.

No. of works to be done – 16

Examination Scheme:

Components	P	CT	A	EE
Weightage (%)	10	15	5	70

(A-Attendance; P-Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination; PT- Portfolio)

Text & References:

- Big book of drawing and painting by Francisco Asensio Cerver
- Notes on the techniques of Painting by Hilaire Hiler
- Method and Materials by Lynton Lamb.
- Artist's Handbook by Ray Smith
- Artist's Encyclopedia by John Quick
- A manual of Painting Materials & Techniques by Mark David Goattsegen
- Art Class, Copy Right 1999 by Harper Collins Publishers.
- Images of the human body by Pepin Van Roojen.
- A Concise History of Modern Painting, 1974 Thames & Hudson, London
- Painting Courseby Ronald Pearsall
- The portrait by Norbert Schneider.
- Color by Edith Anderson Feisner.



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COMPOSITION – III

Course Code: FNA2520

Credit Units: 02

Course Objective:

Composition exercise is the most important to learn and study theory of composition, individual approach to the possibilities. Experimenting innovative arrangement of the thing around to create unique visual presentation improves artistic sense and concept of beauty.

Course Contents:

Module I

Composition, arrangement of objects, figures and architectures.

Module II

Creative composition exercise from imagination emphasizing on individual creative sense, transformation of simple shapes into well-balanced unique visual presentation with experimentation.

No. of works to be done – 10

Examination Scheme:

Components	P	CT	A	EE
Weightage (%)	10	15	5	70

(A-Attendance; P-Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination; PT- Portfolio)

Text & References:

Text:

- Artist's Handbook by Ray Smith
- Artist's Encyclopedia by John Quick

References:

- Big book of drawing and painting by Francisco Asensio Cerver
- Art Class, Copy Right 1999 by Harper Collins Publishers.
- A Concise History of Modern Painting, 1974 Thames & Hudson, London
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PHOTOGRAPHY- III

Course Code: FNA2521

Credit Units: 02

Course Objective:

The objective of this course is to provide an experimental exposure on photography highlighting on creative aspects. Experiments on nature, depending upon time and mood. It also provides experimental experience on indoor subjects.

Course Contents:

Module I

Basic use of camera, observation according to photographic angles, selection of subject, composition exploring indoor and outdoor situations including effects of light.

No. of works to be done – 12

Examination Scheme:

Components	P	CT	A	EE
Weightage (%)	10	15	5	70

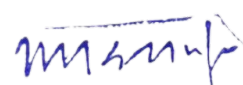
(A-Attendance; P-Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination; PT- Portfolio)

Text & References:

- Photomechanic & Printing by J.S. Mertle & Gordon
- Photo techniques by Lee Frost
- Location Photography Secrets by Andy Snow



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PRINT MAKING- III

Course Code: FNA2522

Credit Units: 02

Course Objective:

This course is designed for learning techniques in print making, surface relief printing using printing equipment and tools. This course provides technical training on method of making experimental relief blocks on various surfaces.

Course Contents:

Module I

Exploring various texture of different surface by using materials including metal sheets like zinc plate and aluminum sheet.

Module II

Advanced experimentation with monochrome & multi-color lithography etching – intaglio/photo process, advanced print making, use of multicolor relief print and mixed media and further experimentation.

No. of works to be done – 10

Examination Scheme:

Components	P	CT	A	EE
Weightage (%)	10	15	5	70

(A-Attendance; P-Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination; PT- Portfolio)

Text & References:

- The art of the print by Fritz Eicherberg
- The bite of print by Frank and Dorothy Gettein
- The art of Print by Earl G. Mueller
- The art of Etching by E.S.Lumdsen
- Manual of woodcut printmaking by J. Hillier
- Screen Process Printing by Schwalbach



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TRADITIONAL PAINTING-I

Course Code: FNA2523

Credit Units: 02

Course Objective:

To introduce Indian traditional art and painting techniques and styles

Course Contents:

Module I

Rajasthani Miniature

Mughal Miniature

Pahari Miniature

Nathdwara and Tanjore Paintings

No. of works to be done – 12

Examination Scheme:

Components	P	CT	A	EE
Weightage (%)	10	15	5	70

(A-Attendance; P-Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination; PT- Portfolio)

Text & References:



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PAINTING METHODS AND MATERIALS - III

Course Code: FNA2524

Credit Units: 02

Course Objective:

The Course is planned to provide technical knowledge of various mediums, techniques and tools used for different kinds of artwork practically.

Course Contents:

Module I

Preparation of canvas

Stretching and framing of canvas & Traditional and Folk Paintings making Process etc.

Module II

Lithography, silkscreen and etching methods and experimental approach.

Examination Scheme:

Components	CT	P	A	EE
Weightage (%)	15	10	5	70

(A-Attendance; P-Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination; PT- Portfolio)

Text & References:

Text:

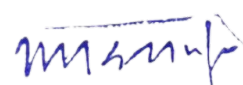
- The painter's handbook by Stan Smith & Prof. H. F. Tenhalt
- Materials and methods of painting by Lynton Lamb

References:

- Artists Techniques by Dr. Kohei Aida
- A manual of painting Materials and techniques by Mark Daid Gaottsegen
- Notes on the techniques of painting by Hilaire Hiler



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PROJECT-I

Course Code: FNA2532

Credit Units: 03

Course Objective:

The objective of this course is to help the students with an opportunity to further their intellectual and personal development in the chosen field by undertaking a significant practical unit of activity. The project can be defined as a scholarly inquiry into a problem or issue, involving a systematic approach to gathering and analysis of information/data, leading to production of a structured Report.

Chapter Scheme and distribution of marks:

Chapter 1: Introduction – 10 marks

Chapter 2: Conceptual Framework/National/International Scenario – 25 marks

Chapter 3: Presentation, Analysis & Finding – 25 marks

Chapter 4: Conclusion & Recommendations – 10 marks

Chapter 5: Bibliography – 05 marks

Selection of the Topic for the project by taking following points into consideration:

- Suitability of the topic
- Relevance of the Topic
- Time available at the disposal

Examination Scheme:

Components	Project Report	PowerPoint Presentation & Viva
Weightage (%)	75	25

(A-Attendance; P-Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination; PT- Portfolio)

Note:-

Marking is completely based on submitted project Report



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DISSERTATION-I

Course Code: FNA2637

Credit Units: 06

Course Objective:

This course is to continue the research work to put the collected materials together for developing the body of the dissertation on the particular subject.

Putting up the necessary photographs, reproductions with the text materials.

Course Contents:

Module I

Preparing the final paper along with necessary photographs, reproductions with detail information.

Module II

Submission and review of printed dissertation paper.

Examination Scheme:

Components	PR	PS	V
Weightage (%)	70	15	15

(V- Viva; PR- Project Report; PS; Presentation)



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COMPOSITION - IV

Course Code: FNA2604

Credit Units: 02

Course Objective:

The Objective of Composition exercise is the key to study theory of composition in sculptural 3 Dimensional representations of thoughts and concepts. This work provides a meaningful knowledge on creative expression.

Course Contents:

Module I

Sketches in clay of given subjects and the enlargement in round and relief with two of more human figure, birds animals, moulding and casting, direct building processes. Plaster, Cement and terracotta.

Module II

Building of armature for direct work in plaster or cement on the given topic.

Module III

Waste mould and piece mould technique and casting in wax.

No. of works to be done – 06

Examination Scheme:

Components	P	CT	A	EE
Weightage (%)	10	15	5	70

(A-Attendance; P-Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination; PT- Portfolio)


Text & References:

Text:

- The Sculptor's Handbook, Prof H. F. Ten Holt

References:

- Encyclopedia of Sculpture by John Mills
- Modeling a Likeness in Clay, Daisy Grubbs
- The Complete Guide to Sculpture. Modeling and Ceramics. Techniques and materials by Barry Midgley.


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METAL CASTING - II

Course Code: FNA2605

Credit Units: 02

Course Objective:

The course is designed to improve the skills in working with these two mediums based on textural values and technical differences chiseling out artist's own expressions.

Course Contents:

Module I

Making maquettes in wax or clay alongwith addition, alteration & modification depending upon the layout. Enlargement of the maquette in round or relief

Module II

Student will learn the process of sand casting.

Module III

Finishing, grinding, buffing, and polishing.

No. of works to be done – 03

Examination Scheme:

Components	P	CT	A	EE
Weightage (%)	10	15	5	70

(A-Attendance; P-Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination; PT- Portfolio)

Text & References:

- Contemporary Stone Sculpture, Dona Z. Meliach
- Dictionary of tools by R. A Salaman.
- Methods and Materials of Sculpture by David Raid.
- The Sculptor's Handbook, Prof H. F. Ten Holt
- The Complete Guide to Sculpture. Modeling and Ceramics. Techniques and materials by Barry Midgley.



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MURAL - IV

Course Code: FNA2606

Credit Units: 02

Course Objective:

This course is to provide advanced training to work on wall surface using various mediums emphasizing all possible techniques. It provides professional exposure and professional knowledge of handling mural materials.

Course Contents:

Module I

Practical mural work on slab using mosaic tiles

No. of works to be done – 06

Examination Scheme:

Components	P	CT	A	EE
Weightage (%)	10	15	5	70

(A-Attendance; P-Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination; PT- Portfolio)

Text & References:

- The complete guide to Sculpture, Modeling and Ceramics: Techniques and materials by Barry Midgley.



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PHOTOGRAPHY - IV

Course Code: FNA2607

Credit Units: 02

Course Objective:

The objective of this course is to provide advanced exposure on photography highlighting on all possible creative aspects on natural subjects and also indoor subjects.

Course Contents:

Module I

Introduction to the process of developing and printing, films and their sensitivity. Basic knowledge of photo printing papers and various chemicals.

No. of works to be done – 12

Examination Scheme:

Components	P	CT	A	EE
Weightage (%)	10	15	5	70

(A-Attendance; P-Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination; PT- Portfolio)

Text & References:

- Photomechanic & Printing by J.S. Mertle & Gordon
- Photo techniques by Lee Frost
- Location Photography Secrets by Andy Snow



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CERAMICS - IV

Course Code: FNA2608

Credit Units: 02

Course Objective:

This course is to provide training on creative techniques on ceramics.

Course Contents:

Module I

Creating innovative texture and design on claywork.

No. of works to be done – 08

Examination Scheme:

Components	P	CT	A	EE
Weightage (%)	10	15	5	70

(A-Attendance; P-Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination; PT- Portfolio)

Text & References:

- The complete guide to Sculpture, Modeling and Ceramics: Techniques and materials by Barry Midgley.



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ASSEMBLAGE - IV

Course Code: FNA2609

Credit Units: 02

Course Objective:

This course is designed to provide creative experimental training on assemblage.

Course Contents:

Module I

Methods of technical assemblage aesthetically

No. of works to be done – 06

Examination Scheme:

Components	P	CT	A	EE
Weightage (%)	10	15	5	70

(A-Attendance; P-Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination; PT- Portfolio)

Text & References:

- The complete guide to Sculpture, Modeling and Ceramics: Techniques and materials by Barry Midgley.



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SCULPTURE METHODS AND MATERIALS - IV

Course Code: FNA2610

Credit Units: 02

Course Objective:

The Course is planned for detailed training on methods and materials to work with through the edges. It is to provide technical knowledge of various mediums, techniques and tools used for different kinds of art work practically.

Course Contents:

Module I

Types of clay, Plaster of Paris, Cement & its properties

Module II

Nature and types of wood its growth and process of seasoning use of various tools and equipments.

Examination Scheme:

Components	CT	P	A	EE
Weightage (%)	15	10	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Text & References:

- Fundamental of Indian Art by S. N. Dasgupta
- Dance of Shiva by A. K. Coomaraswamy
- Transformation of Nature in Art by A. K. Coomaraswamy



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DRAWING AND ILLUSTRATION – IV

Course Code: FNA2611

Credit Units: 02

Course Objective:

Drawing exercises are to learn accurate observation and skills of graphic presentation, and various exercises on illustrations.

Course Contents:

Module I

Illustrate children story book.

No. of works to be done – 04

Examination Scheme:

Components	P	CT	A	EE
Weightage (%)	10	15	5	70

(A-Attendance; P-Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination; PT- Portfolio)

Text & References:

Text:

- Anatomy & Drawing, Victor Perard, Pitman Publishing, New York, 1955

References:

- The Art of Drawing Heads and Hands, Walter Brooks, M. Grumbacher, New York, 1966.
- Figure Drawing, Victor Perard, Grosset and Dunlop, New York, 1956.
- Drawing Hands, Carl Sheek, Grosset and Dunlop, New York, 1959
- Children Picture Books, Magazines.
- The art of humorous illustrations, Nick Meglin
- Germany in winter time, Mario De Mirando, Tata Press, 1980



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DESIGN – VI

Course Code: FNA2612

Credit Units: 03

Course Objective:

This course provides a clear concept of various aspects of designing. It is specially planned for a graphic artist to enable students to develop a commercial skill in design work.

Course Contents:

Module I

Comparatively study of different types of outdoor layouts like Hording, bus shelter, Poster etc

No. of works to be done – 08

Examination Scheme:

Components	P	CT	A	EE
Weightage (%)	10	15	5	70

(A-Attendance; P-Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination; PT- Portfolio)

Text & References:

Text:

- Graphic Arts Manual, Irwing E. Field, Arne Press, New York, 1980

References:

- The Art of Human Illustration, Nick Meglin,
- Corporate Graphics, Mike Quon
- A History of Graphic Design, Philip B Meggs,
- Graphic Arts Manual, Irwing E. Field, Arne Press, New York, 1980
- Design Graphics, C. L. Martin, Macmillan Co. London.



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PACKAGING - II

Course Code: FNA2613

Credit Units: 02

Course Objective:

Making of various packaging according to products environment and needs

Course Contents:

Module I

Advanced exercises on packaging according to various shapes and styles.

No. of works to be done – 08

Examination Scheme:

Components	P	CT	A	EE
Weightage (%)	10	15	5	70

(A-Attendance; P-Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination; PT- Portfolio)

Text & References:

- Packaging Art for Export by Nduka Nwosu
- Packaging: The art of the right proposition: An artistic from: Groser (HTML) – Nicola Gordon-Seymour



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PRINTING TECHNIQUES-IV

Course Code: FNA2614

Credit Units: 02

Course Objective:

This course is designed for learning basic techniques in print making, surface printing relief media and use of printing equipment and tools. This course provides training on technical method of making relief blocks.

Course Contents:

Module I

Originals for reproduction (Monochrome, half tone originals)

Half tone negative –making.

Half tone block making.

No. of works to be done – 08

Examination Scheme:

Components	P	CT	A	EE
Weightage (%)	10	15	5	70

(A-Attendance; P-Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination; PT- Portfolio)

Text & References:

- Color Harmony for the Web, Cailin Boyle



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COMPUTER GRAPHICS – IV

Course Code: FNA2615

Credit Units: 01

Course Objective:

To work on design related software's for various purpose.

Course Contents:

Module I

Tools interface and Applications of Flash software.

No. of works to be done – 06

Examination Scheme:

Components	P	CT	A	EE
Weightage (%)	10	15	5	70

(A-Attendance; P-Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination; PT- Portfolio)

Text & References:

- Color Harmony for the Web, Cailin Boyle



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TEXTILE DESIGN-II

Course Code: FNA2616

Credit Units: 02

Course Objective:

To enable creation of various types of textile designs and patterns.

Course Contents:

Module I

Fundamental of Textile Design: Motif, Repeat & Design Concept, Setting of Repeat & Change or Repeat into Design.

Module II

Design for Block Printing :

- Design for Block Printing
- Design for Screen Printing

No. of works to be done – 08

Examination Scheme:

Components	P	CT	A	EE
Weightage (%)	10	15	5	70

(A-Attendance; P-Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination; PT- Portfolio)

Text & References:



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DRAWING - VI

Course Code: FNA2618

Credit Units: 02

Course Objective:

This course will be found on learning pen & ink drawing technique depicting various objects and nature. It is to develop skill in handling black and white distribution, tonal values and texture which will lead to expertise in visualization.

Course Contents:

Module I: Still Life in pen & ink

Study of selected assorted objects in advanced drawing techniques using various drawing tools based on eye level, relative proportion, perspective, structure, form, volume, texture, source of light and its effect, balance and also tonal values in analytical process.

Module II: Landscape/ Nature Study (outdoor) in pen & ink

Advanced training in landscape drawing depending upon artist's observation, concept of addition and elimination, simplification. Study from nature as a controlled design, difference of handling near and distant objects.

Module III: Life Drawing- Portraiture in pen & ink

Advanced drawing study of human heads based on proportion, masses and specific feature and character using various media with emphasis on manner of finished execution.

Life Drawing-Full Figure: Advanced drawing study from full human figure based on structure of human form and anatomy using life models.

No. of works to be done – 20

Examination Scheme:

Components	P	CT	A	EE
Weightage (%)	10	15	5	70

(A-Attendance; P-Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination; PT- Portfolio)


Text & References:

Text:

- An Introduction to Drawing by James Horton in association with the Royal Academy of Arts.

References:

- Grassroot of Art by Herbert Read
- How to draw and paint by Hazel Harrison, from Art School
- Human Figure by Walter Foster
- Anatomy by Walter Foster
- Heads by Walter Foster
- Figure Drawing by Patricia Monahan with Albany Wiseman
- Human Anatomy by James Horton
- Big book of Drawing and painting by Francisco Asensio Cerver.


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PAINTING - VI

Course Code: FNA2619

Credit Units: 03

Course Objective:

This is an intensive and advanced training in painting using variety of painting mediums and tools. Mastery of technical aspects of painting provides advanced knowledge for the learners. It is an exposure to different schools, traditions, techniques and media of painting practiced through the ages in details.

Course Contents:

Module I: Still Life

Creative composition in acrylic or oil colour on canvas.

Module II: Painting from life

Portraiture and full figure: Advanced study of human head and full figure using colours. The knowledge of advanced techniques of colour application in monochrome and full colour.

Module III: Landscape

Exploring outdoor painting to capture the various moods of nature.

Module IV: Mix Media

Experimentation with various painting mediums exploring innovative techniques to represent thoughts and dreams in creative form.

No. of works to be done – 12

Examination Scheme:

Components	P	CT	A	EE
Weightage (%)	10	15	5	70

(A-Attendance; P-Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination; PT- Portfolio)

Text & References:

Text:

- Notes on the techniques of Painting by Hilaire Hiler
- Painting Course by Ronald Pearsall

References:

- Big book of drawing and painting by Francisco Asensio Cerver by Mark David Goattsegen
- Art Class, Copy Right 1999 by Harper Collins Publishers.
- Images of the human body by Pepin Van Roojen.
- A Concise History of Modern Painting, 1974 Thames & Hudson, London
- The portrait by Norbert Schneider.



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COMPOSITION - IV

Course Code: FNA2620

Credit Units: 02

Course Objective:

The objective of composition exercise is to study theory of composition, individual approach to the possibilities. Exploration of creative composition of the real world and imaginary world in unique visual presentation, to improve concept of creative sense.

Course Contents:

Module I

Composition Exercises working on still life, life and nature study – outdoor and indoor. The 2-D and 3-D objects, pictorial space, forms sub division and grouping. Use of colour and textural values

Module II

Creative composition exercise based on individual layouts using various painting mediums giving more stress on oil on canvas also on acrylic.

No. of works to be done – 06

Examination Scheme:

Components	P	CT	A	EE
Weightage (%)	10	15	5	70

(A-Attendance; P-Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination; PT- Portfolio)

Text & References:

- Big book of drawing and painting by Francisco Asensio Cerver
- Artist's Handbook by Ray Smith
- Artist's Encyclopedia by John Quick
- Art Class, Copy Right 1999 by Harper Collins Publishers.
- Images of the human body by Pepin Van Roojen.
- A Concise History of Modern Painting, 1974 Thames & Hudson, London
- Painting Course by Ronald Pearsall
- The portrait by Norbert Schneider.
- Color by Edith Anderson Feisner.



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MURAL - II

Course Code: FNA2621

Credit Units: 02

Course Objective:

This course is to innovative training to work on wall surface using various mediums emphasizing technical aspects. It provides professional exposure and good knowledge of handling mural materials to work on wall surface.

Course Contents:

Module I

Designing for mural work as per the advanced techniques of working on wall surface with tiles, Arrangement of tiles and fixing on board for final execution.

No. of works to be done – 04

Examination Scheme:

Components	P	CT	A	EE
Weightage (%)	10	15	5	70

(A-Attendance; P-Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination; PT- Portfolio)

Text & References:

- Painting Murals: Image, Ideas & Techniques by Patrica Seligman
- Paintings Murals Fast & Easy: 21 (Design for walls, canvas you can paint with a sponge) by Terrence Tse, Theodore
- Paintings Murals Step by Step by Charles Grund.



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PRINT MAKING-II

Course Code: FNA2622

Credit Units: 01

Course Objective:

This course is designed for learning techniques in print making, surface relief printing using printing equipment and tools. This course provides technical training on method of making experimental relief blocks on various surfaces.

Course Contents:

Module I

Exploring various texture of different surface by using materials including metal sheets like zinc plate and aluminum sheet.

Module II

Advanced experimentation with monochrome & multi-color lithography etching – intaglio/photo process, advanced print making, use of multicolor relief print and mixed media and further experimentation.

No. of works to be done – 10

Examination Scheme:

Components	P	CT	A	EE
Weightage (%)	10	15	5	70

(A-Attendance; P-Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination; PT- Portfolio)

Text & References:

- The art of the print by Fritz Eicherberg
- The bite of print by Frank and Dorothy Gettein
- The art of Print by Earl G. Mueller
- The art of Etching by E.S.Lumdsen
- Manual of woodcut printmaking by J. Hillier
- Screen Process Printing by Schwalbach



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PAINTING METHODS AND MATERIALS - IV

Course Code: FNA2623

Credit Units: 02

Course Objective:

The Course is planned to provide technical knowledge of various mediums, techniques and tools used for different kinds of art work practically.

Course Contents:

Module I

Classification and variation of colours.

Chemical factors and cause of changing colours.

Module II

Techniques of fresco painting

Tempera Techniques

Module III

Cataloging, Concept of art galleries and auction houses.

Examination Scheme:

Components	CT	P	A	EE
Weightage (%)	15	10	5	70

(A-Attendance; P-Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination; PT- Portfolio)

Text & References:

Text:

- The painter's handbook by Stan Smith & Prof. H. F. Tenhalt
- Materials and methods of painting by Lynton Lamb

References:

- Artists Techniques by Dr. Kohei Aida
- A manual of painting Materials and techniques by Mark Daid Gaottsegen
- Notes on the techniques of painting by Hilaire Hiler



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COMPUTER ANIMATION – II

Course Code: FNA2624

Credit Units: 03

Course Objective:

Objective of this course is to undergo Maya deformers, rigging, animation, dynamics, lighting, rendering so the student can have complete knowledge of the software.

Course Contents:

Module I

Deformers, Rigging, Animation

Module II

Dynamics, Lighting & Rendering

No. of works to be done – 12

Examination Scheme:

Components	P	CT	A	EE
Weightage (%)	10	15	5	70

(A-Attendance; P-Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination; PT- Portfolio)

Text & References:

- Mastering Maya 2009 by Eric Kelly
- Character Animation Fundamentals (Digital) by Chris Kirshbaum.
- Character Rigging (Digital) Carlo Sansonetti
- Mental Ray. Global Illumination (Rendering Techniques) by Matt Hartle



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PRACTICAL TRAINING EVALUATION-II

Course Code: FNA2735

Credit Units: 02

Course Objective:

The Practical Training can best be described as an attempt to institutionalize efforts to bridge the gap between the professional world and the academic institutions. Entire effort in internship is in terms of extending the program of education and evaluation beyond the classroom of a university or institution. The educational process in the internship course seeks out and focuses attention on many latent attributes, which do not surface in the normal class room situations. The students have to prepare a project and give a presentation highlighting the following:

BFA (Applied Art)

- Organizational structure
- Design Development
- Software's used for designing
- Type of printing machines used
- Industry feedback

BFA (Painting)

- About Senior Artist and his/her history, work style etc.
- Student's independent work style.

BFA (Animation)

- Organizational structure
- Demo reel
- Software's used for 2D / 3D animation
- Personal review of the students management skill
- Animation studio feedback

Assessment Scheme:

Continuous Evaluation: (based on Internship File and the observations of the faculty guide/ supervisor)	15%
Feedback from Company/ Organization:	25%
Final Evaluation: (Based on Internship Report, Viva/ Presentation)	60%



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COMPOSITION - V

Course Code: FNA2703

Credit Units: 02

Course Objective:

The Objective of Composition exercise is the key to study theory of composition in sculptural 3 Dimensional representations of thoughts and concepts. This work provides a meaningful knowledge on creative expression.

Course Contents:

Module I

Detailed and advance sketches in clay of given subjects and the enlargement in round and relief exploring various possible techniques of moulding and casting, direct building processes.

Module II

Building of armature for direct work in plaster or cement on the given topic.

Module III

Waste mould and piece mould technique and casting in wax.

No. of works to be done – 06

Examination Scheme:

Components	P	CT	A	EE
Weightage (%)	10	15	5	70

(A-Attendance; P-Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination; PT- Portfolio)

Text & References:

Text:

- The Sculptor's Handbook, Prof H. F. Ten Holt

References:

- Encyclopedia of Sculpture by John Mills
- Modeling a Likeness in Clay, Daisy Grubbs
- The Complete Guide to Sculpture. Modeling and Ceramics. Techniques and materials by Barry Midgley.



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METAL CASTING - III

Course Code: FNA2704

Credit Units: 02

Course Objective:

The course is designed to improve the skills in working with these two mediums based on textural values and technical differences chiseling out artist's own expressions.

Course Contents:

Module I

Making maquettes in wax or clay alongwith addition, alteration & modification depending upon the layout. Enlargement of the maquette in round or relief.

Module II

Student will learn the process of sand casting

Module III

Finishing, grinding, buffing, polishing

No. of works to be done – 04

Examination Scheme:

Components	P	CT	A	EE
Weightage (%)	10	15	5	70

(A-Attendance; P-Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination; PT- Portfolio)

Text & References:

- Contemporary Stone Sculpture, Dona Z. Meliach
- Dictionary of tools by R. A Salaman.
- Methods and Materials of Sculpture by David Raid.
- The Sculptor's Handbook, Prof H. F. Ten Holt
- The Complete Guide to Sculpture. Modeling and Ceramics. Techniques and materials by Barry Midgley.

MURAL - V

Course Code: FNA2705

Credit Units: 02

Course Objective:

This course is to provide an advanced training on Mural.

Course Contents:

Module I

Experimentation on mural work in professional way with direct and indirect methods, designs, materials and techniques including Mosaic tiles, Fresco, Encaustic and assemblage along with glaze, distemper, plastering and installing on wall.

No. of works to be done – 06

Examination Scheme:

Components	P	CT	A	EE
Weightage (%)	10	15	5	70

(A-Attendance; P-Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination; PT- Portfolio)

Text & References:

- The complete guide to Sculpture, Modeling and Ceramics: Techniques and materials by Barry Midgley.



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PHOTOGRAPHY - V

Course Code: FNA2706

Credit Units: 02

Course Objective:

This course is to provide an advanced training on photography.

Course Contents:

Module I

Advanced training on photography capturing various moods from nature & indoor subjects with special light effects emphasizing on different types of lenses to explore experimental photographic techniques.

No. of works to be done – 20

Examination Scheme:

Components	P	CT	A	EE
Weightage (%)	10	15	5	70

(A-Attendance; P-Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination; PT- Portfolio)

Text & References:

- Photomechanic & Printing by J.S. Mertle & Gordon
- Photo techniques by Lee Frost
- Location Photography Secrets by Andy Snow



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CERAMICS - V

Course Code: FNA2707

Credit Units: 02

Course Objective:

This course is to provide training on creative techniques on ceramics.

Course Contents:

Module I

Working on 3D creative form, introduction to glazing.

No. of works to be done – 06

Examination Scheme:

Components	P	CT	A	EE
Weightage (%)	10	15	5	70

(A-Attendance; P-Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination; PT- Portfolio)

Text & References:

- The complete guide to Sculpture, Modeling and Ceramics: Techniques and materials by Barry Midgley.



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ASSEMBLAGE - V

Course Code: FNA2708

Credit Units: 02

Course Objective:

This course is designed to provide creative experimental training on assemblage.

Course Contents:

Module I

Advanced creative assemblage.

No. of works to be done – 06

Examination Scheme:

Components	P	CT	A	EE
Weightage (%)	10	15	5	70

(A-Attendance; P-Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination; PT- Portfolio)

Text & References:

- The complete guide to Sculpture, Modeling and Ceramics: Techniques and materials by Barry Midgley.



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SCULPTURE METHODS AND MATERIALS - V

Course Code: FNA2709

Credit Units: 02

Course Objective:

The Course is planned for detailed training on methods and materials to work with through the edges. It is to provide technical knowledge of various mediums, techniques and tools used for different kinds of art work practically.

Course Contents:

Module I

System of indigenous casting foundry practice, metals and alloys.

Module II

Coppers and its alloys, metals and aluminium etc. melting points of different metals. Properties of bronze preparation of modeling was and reins, finishing and technical treatments.

Examination Scheme:

Components	CT	P	A	EE
Weightage (%)	15	10	5	70

(A-Attendance; P-Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination; PT- Portfolio)

Text & References:

- Fundamental of Indian Art by S. N. Dasgupta
- Dance of Shiva by A. K. Coomaraswamy
- Transformation of Nature in Art by A. K. Coomaraswamy



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DESIGN - VII

Course Code: FNA2710

Credit Units: 05

Course Objective: Students will learn the various exercises of Design according to the promotion of products and services.

Course Contents:

Module I

Promotional campaign for any product (indoor as well as outdoor advertisement)

Create a distinct brand identity campaign design for product, services and social awareness while building networking and entrepreneurial skills. With the help of print media, broadcast and social media promotion. Working on a Social Design research-based project leads you to evolve into ethical and purposeful design professionals committed to designing for a better future.

Examination Scheme:

Components	P	CT	A	EE
Weightage (%)	10	15	5	70

(A-Attendance; P-Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination; PT- Portfolio)

Text & References:

Text:

- Graphic Arts Manual, Irwing E. Field, Arne Press, New York, 1980

References:

- The Art of Human Illustration, Nick Meglin,
- Corporate Graphics, Mike Quon
- A History of Graphic Design, Philip B Meggs,
- Graphic Arts Manual, Irwing E. Field, Arne Press, New York, 1980
- Design Graphics, C. L. Martin, Macmillan Co. London.



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PACKAGING - III

Course Code: FNA2711

Credit Units: 03

Course Objective:

Various Packaging Designs.

Course Contents:

Module I

3D forms in thermo coal & card board etc.

No. of works to be done – 08

Examination Scheme:

Components	P	CT	A	EE
Weightage (%)	10	15	5	70

(A-Attendance; P-Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination; PT- Portfolio)

Text & References:

- Packaging Art for Export by Nduka Nwosu
- Packaging: The art of the right proposition: An artistic from: Groser (HTML) – Nicola Gordon-Seymour



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DRAWING AND ILLUSTRATION-V

Course Code: FNA2712

Credit Units: 02

Course Objective:

Drawing exercises are to learn accurate observation and skills of graphic presentation, and various exercises on illustrations.

Course Contents:

Module I

Illustrate Graphic Novels and Book/Magazine Covers.

No. of works to be done – 04

Examination Scheme:

Components	P	CT	A	EE
Weightage (%)	10	15	5	70

(A-Attendance; P-Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination; PT- Portfolio)

Text & References:

Text:

- Anatomy & Drawing, Victor Perard, Pitman Publishing, New York, 1955

References:

- The Art of Drawing Heads and Hands, Walter Brooks, M. Grumbacher, New York, 1966.
- Figure Drawing, Victor Perard, Grosset and Dunlop, New York, 1956.
- Drawing Hands, Carl Sheek, Grosset and Dunlop, New York, 1959
- Children Picture Books, Magazines.
- The art of humorous illustrations, Nick Meglin
- Germany in winter time, Mario De Mirando, Tata Press, 1980



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COMPUTER GRAPHICS – V

Course Code: FNA2713

Credit Units: 02

Course Objective:

To work on design related software's for various purpose.

Course Contents:

Module I

Advance study of Flash software and Applications.

No. of works to be done – 04

Examination Scheme:

Components	P	CT	A	EE
Weightage (%)	10	15	5	70

(A-Attendance; P-Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination; PT- Portfolio)

Text & References:

- Color Harmony for the Web, Cailin Boyle



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PHOTOGRAPHY-V

Course Code: FNA2714

Credit Units: 02

Course Objective:

The objective of this course is to provide an experimental exposure on photography highlighting on creative aspects. Experiments in darkroom on light control, developing and fixing the pictures. It also provides experimental experience on indoor and outdoor subjects.

Course Contents:

Module I

Experiments on indoor and outdoor subjects. Post Production research in dark room.

No. of works to be done – 12

Examination Scheme:

Components	P	CT	A	EE
Weightage (%)	10	15	5	70

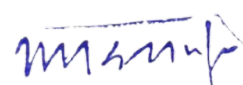
(A-Attendance; P-Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination; PT- Portfolio)

Text & References:

- Photomechanic & Printing by J.S. Mertle & Gordon
- Photo techniques by Lee Frost
- Location Photography Secrets by Andy Snow
- Photomechanic & Printing by J.S. Mertle & Gordon
- Photo techniques by Lee Frost
- Location Photography Secrets by Andy Snow



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DRAWING - VII

Course Code: FNA2716

Credit Units: 03

Course Objective:

Advanced drawing exercise is an exposure to various creative aspects and contemporary techniques of drawing exploring all available drawing tools and mediums such as pencil, charcoal, crayons, ink, colour and brush. This exercise provides accuracy in observation and wide opportunity to study and experiment variety of significant possibilities of line work.

Course Contents:

Module I: Portrait study

Portrait study with charcoal from model, life study.

Module II: life study

Life study from a model in different media of drawing.

Module III: Full Figure

Advanced drawing study of human head and full body (male & female) exploring complex detailing and finishing from different viewpoints and angles using suitable drapery background and surrounding.

Module IV: creative and individual composition using pen and ink

No. of works to be done – 08

Examination Scheme:

Components	P	CT	A	EE
Weightage (%)	10	15	5	70

(A-Attendance; P-Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination; PT- Portfolio)

Text & References:

Text:

- An Introduction to Drawing by James Horton in association with the Royal Academy of Arts.

References:

- Grassroot of Art by Herbert Read
- How to draw and paint by Hazel Harrison ,from Art School
- Human Figure by Walter Foster
- Anatomy by Walter Foster
- Heads by Walter Foster
- Figure Drawing by Patricia Monahan with Albany Wiseman
- Human Anatomy by James Horton
- Big book of Drawing and painting by Francisco Asensio Cerver.



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PAINTING & COMPOSITION - I

Course Code: FNA2717

Credit Units: 05

Course Objective:

Painting is an activity which requires a long time involvement to achieve excellence. This stage to explore one's own ideas and style. Studying various schools of art, traditional to modern and contemporary. This stage is to focus in one particular style of his or her own after learning various techniques of paintings. The students would produce/create a number of works of art, paintings and drawings in a fashion of specializing in the subject. It is to specialize in thinking and imagination which create good art.

Advanced exercise on composition work provides thorough knowledge on theory of composition, individual approach to the possibilities and experimental innovative aspects to create unique visual presentation enriched with artistic and aesthetic value. Working with figurative and non-figurative arrangement of objects.

Course Contents:

Module I

Sketching/making layouts based on life experience, culture and people

Human Figure Study Based on Models from Various Perspective.

Medium: Pastel (dry/oil)/water colour etc.

Module: II

Painting on individual composition based on the layouts.

Painting Using Digital Media Application and Mixed Media.

Module III

Composition Exercises working on objects from real life and nature. Creative transformation of real world according to the possibilities (2-D & 3-D), use of colour and textural values, forms and individual expression.

Medium: Acrylic/oil/tempera on canvas/paper/board.

Module IV

Creative composition exercise from imagination emphasizing on individual vision and concept, complete pictorial interpretation, theme, expression of moods, symbolism, dramatization, and distortion for emotional effect. Project on independent creative work.

Examination Scheme:

Components	P	CT	A	EE
Weightage (%)	10	15	5	70

(A-Attendance; P-Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination; PT- Portfolio)

Text & References:

- Big book of drawing and painting by Francisco AsensioCerver
- Notes on the techniques of Painting by HilaireHiler
- Method and Materials by LyntonLamb.
- Artist's Handbook by RaySmith
- Artist's Encyclopedia by JohnQuick
- A manual of Painting Materials & Techniques by Mark DavidGoattsegen
- Art Class, Copy Right 1999 by Harper CollinsPublishers.
- Images of the human body by Pepin VanRoojen.
- A Concise History of Modern Painting, 1974 Thames &Hudson,London
- Painting CoursebyRonaldPearsall
- The portrait by NorbertSchneider.
- Color by Edith AndersonFeisner.

MURAL - III

Course Code: FNA2718

Credit Units: 02

Course Objective:

This course is for innovative training to work on wall surface using various mediums emphasizing technical aspects. It provides professional exposure and good knowledge of handling mural materials to work on wall surface.

Course Contents:

Module I

Designing for mural work as per the advanced techniques of working on wall surface with tiles .arrangement of tiles and fixing on board.

Module II

Relief mural in P.O.P & mix media.

No. of works to be done – 04

Examination Scheme:

Components	P	CT	A	EE
Weightage (%)	10	15	5	70

(A-Attendance; P-Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination; PT- Portfolio)

Text & References:

- Painting Murals: Image, Ideas & Techniques by Patrica Seligman
- Paintings Murals Fast & Easy: 21 (Design for walls, canvas you can paint with a sponge) by Terrence Tse, Theodore
- Paintings Murals Step by Step by Charles Grund.



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PRINT MAKING - III

Course Code: FNA2719

Credit Units: 02

Course Objective:

This course is designed for learning techniques in print making, surface relief printing using printing equipment and tools. This course provides technical training on method of making experimental relief blocks on various surfaces.

Course Contents:

Module I

Exploring various texture of different surface by using materials including metal sheets like zinc plate and aluminum sheet.

Module II

Advanced experimentation with monochrome & multi-color lithography, etching – intaglio/photo process, aquatint, mezzotint, advanced print making, use of multicolor relief print and mixed media and further experimentation.

No. of works to be done – 10

Examination Scheme:

Components	P	CT	A	EE
Weightage (%)	10	15	5	70

(A-Attendance; P-Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination; PT- Portfolio)

Text & References:

- The art of the print by Fritz Eicherberg
- The bite of print by Frank and Dorothy Gettein
- The art of Print by Earl G. Mueller
- The art of Etching by E.S.Lumdsen
- Manual of woodcut printmaking by J. Hillier
- Screen Process Printing by Schwalbach



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PAINTING METHODS AND MATERIALS - V

Course Code: FNA2720

Credit Units: 02

Course Objective:

This course is designed to provide a thorough knowledge of methods and technical aspects of drawing and painting work. It helps the students to handle the materials and tools in scientific way.

Course Contents:

Module I

Technique of Jaipur Murals.

Ceramics, glass and terra-cotta tiles.

Module II

Various modern techniques in Painting and Printmaking.

Restoration and Preservation.

Module III

Exhibition Display and Lighting.

Examination Scheme:

Components	CT	P	A	EE
Weightage (%)	15	10	5	70

(A-Attendance; P-Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination; PT- Portfolio)

Text & References:

Text:

- The painter's handbook by Stan Smith & Prof. H. F. Tenhalt
- Materials and methods of painting by Lynton Lamb

References:

- Artists Techniques by Dr. Kohei Aida
- A manual of painting Materials and techniques By Mark Daid Gaottsegen



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PROJECT - II

Course Code: FNA2732

Credit Units: 03

FOR ANIMATION SPECIALIZATION

Course Objective:

The objective of this course is to help the student in their preparation of their Show Reel and let them understand the pipeline procedure of the industry by working in groups.

Methodology

Students are advised to work in small groups and make a short animation clip.

Examination Scheme:

Components	P	CT	A	EE
Weightage (%)	10	15	5	70

(A-Attendance; P-Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination; PT- Portfolio)

Note: - Marking is based on submitted project work (Show reel)



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PORTFOLIO DEVELOPMENT AND PRESENTATION WITH EXHIBITIONS

Course Code: FNA2837

Credit Units: 5

Course Objective:

Portfolio Development & Presentation is for the students who are in the final stage of specialization in a particular subject. The students are to prepare a portfolio which contains all type of works relating to the subjects studied by them.

Course Contents:

Submission & Presentation

Module I

As decided by faculty.

Examination Scheme:

Components	C	P	A	EE (Presentation, Report & Viva)
Weightage (%)	15	10	5	70

FOR ANIMATION SPECIALIZATION

Course Objective:

The objective of this course is to help the student in their preparation of their Demo Reel and let them understand the pipeline procedure of the industry by working in groups.

Course Contents:

Methodology

Students are advised to work on individual short animation clip.

Examination Scheme:

Components	P	C	A	FP
Weightage (%)	10	15	5	70

Note: - Marking is based on submitted project work (Demo reel)



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COMPOSITION - VI

Course Code: FNA2803

Credit Units: 02

Course Objective:

The Objective of Composition exercise is the key to study theory of composition in sculptural 3 Dimensional representations of thoughts and concepts. This work provides a meaningful knowledge on creative expression.

Course Contents:

Module I

Sketches in clay of given subjects and the enlargement in round and relief with two of more human figure, birds animals, moulding and casting, direct building processes. Plaster, Cement and terracotta.

Module II

Building of armature for direct work in plaster or cement on the given topic.

Module III

Waste mould and piece mould technique and casting in wax.

No. of works to be done – 04

Examination Scheme:

Components	P	CT	A	EE
Weightage (%)	10	15	5	70

(A-Attendance; P-Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination; PT- Portfolio)


Text & References:

Text:

- The Sculptor's Handbook, Prof H. F. Ten Holt

References:

- Encyclopedia of Sculpture by John Mills
- Modeling a Likeness in Clay, Daisy Grubbs
- The Complete Guide to Sculpture. Modeling and Ceramics. Techniques and materials by Barry Midgley.


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METAL CASTING - IV

Course Code: FNA2804

Credit Units: 02

Course Objective:

The course is designed to improve the skills in working with these two mediums based on textural values and technical differences chiseling out artist's own expressions.

Course Contents:

Module I

Taking a waste or piece moulds in PoP. Casting in this mould with wax and fixing runners and risers and preparation of mould for firing.

Module II

Firing of the mould in a kiln. And pouring of molten metal.

Module III

Breaking open the mold and cutting of runners and risers. Grinding buffing and polishing and patina.

No. of works to be done – 04

Examination Scheme:

Components	P	CT	A	EE
Weightage (%)	10	15	5	70

(A-Attendance; P-Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination; PT- Portfolio)

Text & References:

- Contemporary Stone Sculpture, Dona Z. Meliach
- Dictionary of tools by R. A Salaman.
- Methods and Materials of Sculpture by David Raid.
- The Sculptor's Handbook, Prof H. F. Ten Holt
- The Complete Guide to Sculpture. Modeling and Ceramics. Techniques and materials by Barry Midgley.



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MURAL-IV

Course Code: FNA2805

Credit Units: 02

Course Objective:

This course is to provide an advanced training on Mural.

Course Contents:

Module I

Experimentation on mural work in professional way with direct and indirect methods, designs, materials and techniques including Mosaic tiles, Fresco, Encaustic and assemblage along with glaze, distemper, plastering and installing on wall.

No. of works to be done – 06

Examination Scheme:

Components	P	CT	A	EE
Weightage (%)	10	15	5	70

(A-Attendance; P-Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination; PT- Portfolio)

Text & References:

- The complete guide to Sculpture, Modeling and Ceramics: Techniques and materials by Barry Midgley.



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PHOTOGRAPHY-IV

Course Code: FNA2806

Credit Units: 02

Course Objective:

This course is to provide an advanced training on photography.

Course Contents:

Module I

Advanced training on photography capturing various moods from nature & indoor subjects with special light effects emphasizing on different types of lenses to explore experimental photographic techniques in dark room and out door.

No. of works to be done – 20

Examination Scheme:

Components	P	CT	A	EE
Weightage (%)	10	15	5	70

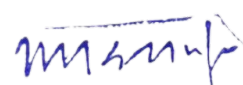
(A-Attendance; P-Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination; PT- Portfolio)

Text & References:

- Photomechanic & Printing by J.S. Mertle & Gordon
- Photo techniques by Lee Frost
- Location Photography Secrets by Andy Snow



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CERAMICS-IV

Course Code: FNA2807

Credit Units: 02

Course Objective:

This course is to provide training on creative techniques on ceramics.

Course Contents:

Module I

Working on 3D creative form, introduction to glazing.

No. of works to be done – 06

Examination Scheme:

Components	P	CT	A	EE
Weightage (%)	10	15	5	70

(A-Attendance; P-Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination; PT- Portfolio)

Text & References:

- The complete guide to Sculpture, Modeling and Ceramics: Techniques and materials by Barry Midgley.



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ASSEMBLAGE-IV

Course Code: FNA2808

Credit Units: 02

Course Objective:

This course is designed to provide creative experimental training on assemblage.

Course Contents:

Module I

Advanced creative assemblage.

No. of works to be done – 06

Examination Scheme:

Components	P	CT	A	EE
Weightage (%)	10	15	5	70

(A-Attendance; P-Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination; PT- Portfolio)

Text & References:

- The complete guide to Sculpture, Modeling and Ceramics: Techniques and materials by Barry Midgley.



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SCULPTURE METHODS AND MATERIALS-IV

Course Code: FNA2809

Credit Units: 02

Course Objective:

The Course is planned for detailed training on methods and materials to work with through the edges. It is to provide technical knowledge of various mediums, techniques and tools used for different kinds of art work practically.

Course Contents:

Module I

System of indigenous casting foundry practice, metals and alloys.

Module II

Coppers and its alloys, metals and aluminum etc. melting points of different metals. Properties of bronze preparation of modeling was and reins, finishing and technical treatments.

Examination Scheme:

Components	P	CT	A	EE
Weightage (%)	10	15	5	70

(A-Attendance; P-Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination; PT- Portfolio)

Text & References:

- Fundamental of Indian Art by S. N. Dasgupta
- Dance of Shiva by A. K. Coomaraswamy
- Transformation of Nature in Art by A. K. Coomaraswamy



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DESIGN-VIII

Course Code: FNA2810

Credit Units: 05

Course Objective: Students will learn the various exercises of Design according to the promotion of products and services.

Course Contents:

Module I

Promotional campaign for any product (indoor as well as outdoor advertisement)

Portfolio Development according to the industry requirement. Professional portfolio page on behance and academic, designer profile on linked in. Complete self-branding of print media and Digital research portfolio.

No. of works to be done – 04

Examination Scheme:

Components	P	CT	A	EE
Weightage (%)	10	15	5	70

(A-Attendance; P-Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination; PT- Portfolio)

Text & References:

Text:

- Graphic Arts Manual, Irwing E. Field, Arne Press, New York, 1980

References:

- The Art of Human Illustration, Nick Meglin,
- Corporate Graphics, Mike Quon
- A History of Graphic Design, Philip B Meggs,
- Graphic Arts Manual, Irwing E. Field, Arne Press, New York, 1980
- Design Graphics, C. L. Martin, Macmillan Co. London.



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PACKAGING-IV

Course Code: FNA2811

Credit Units: 03

Course Objective:

Various Packaging Designs

Course Contents:

Module I

3D forms in thermo coal & card board etc.

No. of works to be done – 08

Examination Scheme:

Components	P	CT	A	EE
Weightage (%)	10	15	5	70

(A-Attendance; P-Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination; PT- Portfolio)

Text & References:

- Packaging Art for Export by Nduka Nwosu
- Packaging: The art of the right proposition: An artistic from: Groser (HTML) – Nicola Gordon-Seymour



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DRAWING AND ILLUSTRATION-VI

Course Code: FNA2812

Credit Units: 02

Course Objective:

Drawing exercises are to learn accurate observation and skills of graphic presentation, and various exercises on illustrations.

Course Contents:

Module I

Illustrate Graphic Novels and Book/Magazine Covers.

No. of works to be done – 04

Examination Scheme:

Components	P	CT	A	EE
Weightage (%)	10	15	5	70

(A-Attendance; P-Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination; PT- Portfolio)

Text & References:

Text:

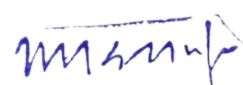
- Anatomy & Drawing, Victor Perard, Pitman Publishing, New York, 1955

References:

- The Art of Drawing Heads and Hands, Walter Brooks, M. Grumbacher, New York, 1966.
- Figure Drawing, Victor Perard, Grosset and Dunlop, New York, 1956.
- Drawing Hands, Carl Sheek, Grosset and Dunlop, New York, 1959
- Children Picture Books, Magazines.
- The art of humorous illustrations, Nick Meglin
- Germany in winter time, Mario De Mirando, Tata Press, 1980



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COMPUTER GRAPHICS-VI

Course Code: FNA2813

Credit Units: 02

Course Objective:

To work on design related software's for various purpose.

Course Contents:

Module I

Advance study of Flash software and Applications.

No. of works to be done – 04

Examination Scheme:

Components	P	CT	A	EE
Weightage (%)	10	15	5	70

(A-Attendance; P-Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination; PT- Portfolio)

Text & References:

- Color Harmony for the Web, Cailin Boyle



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PHOTOGRAPHY-VI

Course Code: FNA2814

Credit Units: 02

Course Objective:

The objective of this course is to provide an experimental exposure on photography highlighting on creative aspects. Experiments in darkroom on light control, developing and fixing the pictures. It also provides experimental experience on indoor and outdoor subjects.

Course Contents:

Module I

Experiments on indoor and outdoor subjects. Post Production research in dark room.

No. of works to be done – 12

Examination Scheme:

Components	P	CT	A	EE
Weightage (%)	10	15	5	70

(A-Attendance; P-Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination; PT- Portfolio)

Text & References:

- Photomechanic & Printing by J.S. Mertle & Gordon
- Photo techniques by Lee Frost
- Location Photography Secrets by Andy Snow
- Photomechanic & Printing by J.S. Mertle & Gordon
- Photo techniques by Lee Frost
- Location Photography Secrets by Andy Snow



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DRAWING-VIII

Course Code: FNA2816

Credit Units: 03

Course Objective:

Advanced drawing exercise is an exposure to various creative aspects and contemporary techniques of drawing exploring all available drawing tools and mediums such as pencil, charcoal, crayons, ink, colour and brush. This exercise provides accuracy in observation and wide opportunity to study and experiment variety of significant possibilities of line work.

Course Contents:

Module I: Portrait study

Portrait study with charcoal from model, life study.

Module II: life study

Life study from a model in different media of drawing.

Module III: Full Figure

Advanced drawing study of human head and full body (male & female) exploring complex detailing and finishing from different viewpoints and angles using suitable drapery background and surrounding.

Module IV: creative and individual composition using pen and ink

No. of works to be done – 08

Examination Scheme:

Components	P	CT	A	EE
Weightage (%)	10	15	5	70

(A-Attendance; P-Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination; PT- Portfolio)

Text & References:

Text:

- An Introduction to Drawing by James Horton in association with the Royal Academy of Arts.

References:

- Grassroot of Art by Herbert Read
- How to draw and paint by Hazel Harrison ,from Art School
- Human Figure by Walter Foster
- Anatomy by Walter Foster
- Heads by Walter Foster
- Figure Drawing by Patricia Monahan with Albany Wiseman
- Human Anatomy by James Horton
- Big book of Drawing and painting by Francisco Asensio Cerver.



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PAINTING & COMPOSITION-II

Course Code: FNA2817

Credit Units: 05

Course Objective:

Painting is an activity which requires a long time involvement to achieve excellence. This stage to explore one's own ideas and style. Studying various schools of art, traditional to modern and contemporary. This stage is to focus in one particular style of his or her own after learning various techniques of paintings. The students would produce/create a number of works of art, paintings and drawings in a fashion of specializing in the subject. It is to specialize in thinking and imagination which create good art.

Advanced exercise on composition work provides thorough knowledge on theory of composition, individual approach to the possibilities and experimental innovative aspects to create unique visual presentation enriched with artistic and aesthetic value. Working with figurative and non-figurative arrangement of objects.

Course Contents:

Module I

Creative Sketching Based on Surround Observation and Life Experiences.

Human Figure Study Based on Models from Various Perspective.

Medium: Pastel (Dry/Oil)/Water Colour and Mixed Media.

Module: II

Creative Painting on Individual Compositions Based on Own Concept.

Creative Painting Using Digital Media Application and Mixed Media.

Medium: Any Mediums

Module III

Composition Exercises working on objects from real life and nature. Creative transformation of real world according to the possibilities (2-D & 3-D), use of colour and textural values, form and individual expression

Medium: Acrylic/oil/tempera on canvas/paper/board.

Module IV

Creative composition exercise from imagination emphasizing on individual vision and concept, complete pictorial interpretation, theme, expression of moods, symbolism, dramatization, and distortion for emotional effect. Project on independent creative work.

Examination Scheme:

Components	P	CT	A	EE
Weightage (%)	10	15	5	70

(A-Attendance; P-Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination; PT- Portfolio)

Text & References:

- Big book of drawing and painting by Francisco AsensioCerver
- Notes on the techniques of Painting by HilaireHiler
- Method and Materials by LyntonLamb.
- Artist's Handbook by RaySmith
- Artist's Encyclopedia by JohnQuick
- A manual of Painting Materials & Techniques by Mark DavidGoattsegen
- Art Class, Copy Right 1999 by Harper CollinsPublishers.
- Images of the human body by Pepin VanRoojen.
- A Concise History of Modern Painting, 1974 Thames &Hudson,London
- Painting CoursebyRonaldPearsall
- The portrait by NorbertSchneider.

MURAL-IV

Course Code: FNA2818

Credit Units: 02

Course Objective:

This course is for innovative training to work on wall surface using various mediums emphasizing technical aspects. It provides professional exposure and good knowledge of handling mural materials to work on wall surface.

Course Contents:

Module I

Designing for mural work as per the advanced techniques of working on wall surface with tiles .arrangement of tiles and fixing on board.

Module II

Relief mural in P.O.P & mix media.

No. of works to be done – 04

Examination Scheme:

Components	P	CT	A	EE
Weightage (%)	10	15	5	70

(A-Attendance; P-Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination; PT- Portfolio)

Text & References:

- Painting Murals: Image, Ideas & Techniques by Patrica Seligman
- Paintings Murals Fast & Easy: 21 (Design for walls, canvas you can paint with a sponge) by Terrence Tse, Theodore
- Paintings Murals Step by Step by Charles Grund.



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PRINT MAKING-IV

Course Code: FNA2819

Credit Units: 02

Course Objective:

This course is designed for learning techniques in print making, surface relief printing using printing equipment and tools. This course provides technical training on method of making experimental relief blocks on various surfaces.

Course Contents:

Module I

Exploring various texture of different surface by using materials including metal sheets like zinc plate and aluminum sheet.

Module II

Advanced experimentation with monochrome & multi-color lithography, etching – intaglio/photo process, aquatint, mezzotint, advanced print making, use of multicolor relief print and mixed media and further experimentation.

No. of works to be done – 10

Examination Scheme:

Components	P	CT	A	EE
Weightage (%)	10	15	5	70

(A-Attendance; P-Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination; PT- Portfolio)

Text & References:

- The art of the print by Fritz Eicherberg
- The bite of print by Frank and Dorothy Gettein
- The art of Print by Earl G. Mueller
- The art of Etching by E.S.Lumdsen
- Manual of woodcut printmaking by J. Hillier
- Screen Process Printing by Schwalbach



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PAINTING METHODS AND MATERIALS-VI

Course Code: FNA2820

Credit Units: 02

Course Objective:

This course is designed to provide a thorough knowledge of methods and technical aspects of drawing and painting work. It helps the students to handle the materials and tools in scientific way.

Course Contents:

Module I

Technique of Jaipur Murals.

Ceramics, glass and terra-cotta tiles.

Module II

Various modern techniques in Painting and Printmaking.

Restoration and Preservation.

Module III

Exhibition Display and Lighting.

Examination Scheme:

Components	P	CT	A	EE
Weightage (%)	10	15	5	70

(A-Attendance; P-Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination; PT- Portfolio)

Text & References:

Text:

- The painter's handbook by Stan Smith & Prof. H. F. Tenhalt
- Materials and methods of painting by Lynton Lamb

References:

- Artists Techniques by Dr. Kohei Aida
- A manual of painting Materials and techniques By Mark Daid Gaottsegen



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FASHION DESIGN

(Skill Track)

Programme Structure

Course Code	Course Title	Lectures (L) Hours per week	Tutorial (T) Hours per week	Practical (P) Hours per week	Total Credits
VFD2152	Design Eco-System	1	-	4	3
VFD2252	Fashion Design Research	1	-	4	3
VFD2352	Design Preparatory Process	1	-	4	3
VFD2452	Prototype Garment Development	1	-	4	3
VFD2552	Design Development	1	1	2	3
VFD2652	Health & Safety Equilibrium	1	-	4	3
	TOTAL				18



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FASHION DESIGN

Syllabus - Semester First

DESIGN ECO-SYSTEM

Course Code: VFD2152

Credit Units: 03

Course Objectives:

The aim of the course is to provide Performance Criteria, Knowledge & Understanding and skills & abilities required to organize/maintain work areas and activities to ensure tools and machines are maintained as per norms to a Fashion Designer.

Course Contents:

Module-I: Maintain the work area

(1) Handle materials, drawing and pattern drafting tools, equipment and the system for computer designing with care (2.) Use correct handling procedures. (3.) Use materials to minimize waste (4.) Use of measuring devices effectively

Module-II: Maintain the work Tools

(1) Maintain tools and equipment (2) Carryout running maintenance within agreed schedules (3) Carryout maintenance and/or cleaning within one's responsibility (4) Report unsafe equipment and other dangerous occurrences (5) working a comfortable position with the correct posture.

Module-III: Maintain the work equipment.

(1) Use cleaning equipment and methods appropriate for the work to be carried out (2) Dispose of waste safely in the designated location (3) Carryout cleaning according to schedules and limits of responsibility

Module-IV: Maintain the Self and work Computers

(1.) Request for up gradation of system or software's when required for effective working (2.) Always a backup file to be maintained when working on various design software's (3.) All soft copies of design work to be maintained in files as well for future reference (4.) Personal hygiene and duty of care. (5.) Safe working practices and organizational procedures. (6.) Limits of your own responsibility, (7.) Ways of resolving with problems within the work area. (8.) The production process and the specific work activities that relate to the whole process (9.) The importance of effective communication with colleagues (10) the lines of communication, authority and reporting procedures

Module-V: Case Study (Compulsory)

Industrial visit and case presentation

Examination Scheme:

Components	A	CS	CT	EE
Weight age (%)	05	10	15	70

(A-Attendance; CS-Case Study; CT-Class Test; EE-End Semester Examination)

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Text:

- Giolleo and Berks, fashion Production Terms
- Grig Hazer, Fantastic Fit For Everybody

References:

- Tracy Diane and Tom Cassidy, Colour Forecasting
- J Chuter, Introduction to Clothing Production Management.
- Apparel Online, Apparel Views, Clothesline, Moda, Vogue, Simplicity etc
- Rosemar Varley, Retail Product Management: Buying And Merchandising, Routledge, 2006
- Jay Diamond, Ellen Diamond, Contemporary Visual Merchandising, Prentice Hall PTR, 2010



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Syllabus - Semester Second

FASHION DESIGN-RESEARCH

Course Code: VFD2252

Credit Units: 03

Course Objectives: The aim of the course is the development of design concepts for commercial production. The Initial process includes conducting market research and trend analysis for the particular season and identifying a theme for the collection; then creating a mood board and color board based on the theme, develop an entire range according to the business plan and as per the theme board.

Course Contents:

Module-I: Designing Fashion Design Research

(1) Review previous 10 years trends and their impact in terms of accuracy. (2) Research on fashion trends and identify the emerging theme (3.) Product range and previous designs developed by the business are reviewed to assess relevance to current design.

Module-II: Conduct fashion design research

(1) Business processes and client goals are identified. (2.) Research is conducted on target market, materials, designs, processes and marketing materials according to the needs of the design. (3.) Quality standards for designs are identified.

Module-III: Design Brief

(1) Design themes and style requirements of design are determined (2) Budget, cost points and timing constraints are identified. (3) Requirements for use of fabrics, materials, suppliers and production processes are determined. (4) Client Requirements are confirmed with the client

Module-IV: Organize fashion design research.

(1) Analyze the market trends and targets for the season (2) Rule-based decision-making processes (3) Complete accurate well written work with attention to detail

Module-V: Case Presentation (Compulsory)

Case presentation with complete mood boards and design presentation for the following season.

Examination Scheme:

Components	A	CS	CT	EE
Weight age (%)	05	10	15	70

(A-Attendance; CS-Case Study; CT-Class Test; EE-End Semester Examination)

References:

- Gini Stephens Frings (1999): Fashion: From concept to consumer, Prentice-Hill Inc.
- Gavin Ambrose & Paul Harris, Design Thinking, AVA Publishing, Switzerland.
- Harry B. Watton, "New Product Planning", Prentice Hall Inc., 1992.
- Jacob Solinger, "Apparel Manufacturing Handbook", Reinhold Publications, 1998.
- Introduction to research in education, Ary Hort Reinhart, 1982
- Research methodology by C. R Kothari, Published by Wiley Eastern Ltd, New Delhi, 2000
- Design Research: Methods and Perspectives, edited by Brenda Laurel
- Lateral Thinking: Creativity Step by Step, Edward De Bono, 1970.
- How Customers Think: Essential Insights into the Mind of the Market – Gerald Zaltman
- Five Minds for the Future – Howard Gardner
- Harry Nystrom, "Creativity and Innovation", John Wiley & Sons, 1979.

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Syllabus - Semester Third

DESIGN PREPARATORY PROCESS

Course Code: VFD2352

Credit Units: 03

Course Objectives:

The aim of the course is to designs a clothing range and gets it finalized to make the prototype garments.

Course Contents:

Module-I: Determine key criteria for design brief

(1) Determined Design themes and style. (2) Recognizing and adapting to cultural differences in the workplace, including modes of behavior and interactions (3.) Identify improvements.

Module-II: Technical Aspects

(1.) To do the design by hand sketches or by Computer Aided Design (CAD). (2.) Garment construction techniques and processes. (3.) Detailed knowledge of a range of fabrics and trims

Module-III: Financial Aspects

(1) An understanding on the cost process involved in making an apparel (2) Costing of created designs / product ensembles with knowledge of sale ability of a product designed (3) Knowledge of Intellectual Property Rights with respect to designs.

Module-IV: Pre proto Analyses

(1) Provide opinions on work in a detailed and constructive way (2) communicate with others in the company and to clients in writing (3) Clarification on the design to be developed with the team members

Module-V: Case Presentation (Compulsory)

Case presentation for any two constructed garment with their technical details i.e. Teck-pack and Coasting

Examination Scheme:

Components	A	CS	CT	EE
Weight age (%)	05	10	15	70

(A-Attendance; CS-Case Study; CT-Class Test; EE-End Semester Examination)

Text:

- Winifred Aldrich, CAD in Clothing and Textiles
- Corel Draw 11 for Windows: Visual Quick Start Guide
- From Sue Chastain, your guide to Graphics software
- David Huss, Gary W. Priester, Corel Draw Studio Techniques.
- Corel Draw 10 for Windows: Visual Quick Start Guide.
- Linnea Dayton, Cristen Gillespie, The Photoshop Cs/Cs2 Wow!


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Syllabus - Semester Fourth

PROTOTYPE GARMENT DEVELOPMENT

Course Code: VFD2452

Credit Units: 03

Course Objectives:

The aim of the course is about how technical package is made after garment range confirmation and process of how prototype garment is made for entire collection

Course Contents:

Module-I: Confirming Design Brief

(1) Create techpack which clearly conveys all guidelines for development of the sample (2) Appropriate personnel are consulted with to confirm feasibility and appropriateness of techpack (3.) Sketches, drawings and samples are used to illustrate design requirements, as appropriate. (4) Given techpacks on the range to be finalised

Module-II: Specify Design Processes

(1.) Required involvement of sampling merchandiser, patternmaker, and tailor are identified, finalized and briefed about the collection (2.) Monitoring procedures and checking points are determined. (3.) Design development personnel selected are briefed and time constraints met (4.)

Module-III: Proto- Type Construction

(1) Construct the prototype and given to concerned dept for better understanding on the product, if required

Module-IV: Implement Design Processes

(1.) Development of sample is monitored to ensure budget and time constraints are met (2) Problems or inconsistencies in sample are identified and addressed. (3) Communicate with others in the company and to clients in writing (4) Evaluate the prototype sample.

Module-V: Case Presentation (Compulsory)

Case presentation for actually constructed garment with their technical details and Coasting

Examination Scheme:

Components	A	CS	CT	EE
Weight age (%)	05	10	15	70

(A-Attendance; CS-Case Study; CT-Class Test; EE-End Semester Examination)

Text:

- By Gillian Holman, Pattern cutting made easy
- Dorothy Wood, The Practical Encyclopaedia of Sewing

Reference:

- Leila Aitken, Step by step dress making course
- Amaden-Crawford, A Guide to Fashion Sewing


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Syllabus - Semester Fifth

DESIGN DEVELOPMENT

Course Code: VFD2552

Credit Units: 03

Course Objectives:

The aim of the course is about how to review the prototype garment developed for the collection

Course Contents:

Module-I: Evaluate Design Process

(1) Analyze the prototype sample along with the design team (2) coordinate along with design team to check sample against the techpack given to the sampling merchandiser, the look and feel and fit of the sample (3.) Identify the prototype for the feasibility of the garment in terms of sourcing of the fabric and the trims available for the span of production.

Module-II: Evaluate Development Process

(1.) Identify various products testing to proceed with prototype (2.) Incorporate modification of the sample until approved for final production. (3.) Get approval on the prototype/final techpack, agreement finalized with the client

Module-III: Complete Documentation

(1) Document Design brief, development processes and outcomes (2) Complete Documentation processes, including filing and storing, Construct the prototype and given to concerned dept for better understanding on the product, if required

Module-IV: Organization Process

(1) Organization's policies, procedures and priorities for your area of work and your role and responsibilities in carrying out your work. (2) Limits of your responsibilities when coordinating with other department. (3) Your specific work requirements and who these must be agreed with

Module-V: Industrial Case (Compulsory)

Developing Standard Operating Procedure for an Fashion Design Team

Examination Scheme:

Components	A	CS	CT	EE
Weight age (%)	05	10	15	70

(A-Attendance; CS-Case Study; CT-Class Test; EE-End Semester Examination)

Text

- Tracy Diane and Tom Cassidy, Colour Forecasting

References:

- Mike Easey, Fashion Marketing
- Maria Constantino, Fashion Marketing and PR
- V. D Dudeja, Professional Management of Fashion Industry
- Julia Kuo, 20 Ways to Draw a Dress and 44 Other Fabulous Fashions and Accessories


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Syllabus - Semester Sixth

HEALTH AND SAFETY EQUILIBRIUM

Course Code: VFD2652

Credit Units: 03

Course Objectives:

The aim of the course is to provide Performance Criteria, Knowledge, Understanding, Skills and Abilities required to comply with health, safety and security requirements at the workplace and Covers procedures to prevent, control and minimize risk to self and others.

Course Contents:

Module-I: Comply with Health Requirements at Work

1) Comply with health and safety related instructions applicable to the work place (2) Use and maintain personal protective equipment as per protocol (3) Carry out own activities in line with approved guidelines and procedures. (4) Maintain a healthy lifestyle and guard against dependency on intoxicants (5) Follow environment management system related procedures

Module-II: Comply with Safety Requirements at work

Identify and correct (if possible) malfunctions in machinery and equipment (2.)Report any service malfunctions that cannot be rectified. (3.) Store materials and equipment in line with manufacturer's and organizational requirements (4) safely handle and move waste and debris (5) Minimize health and safety risks to self and others due to own actions (6) Seek clarifications, from supervisors or other authorized personnel in case of perceived risks (7) Monitor the workplace and work processes for potential risks and threats

Module-III: Comply with Security Requirements at work

(1) Carry out periodic walk through to keep work area free from hazards and obstruction (2) Report hazards and potential risks/ threats to supervisors or other authorized personnel (3) Participate in mock drills/ evacuation procedures organized at the workplace (4) Undertake first aid, fire fighting and emergency response training (5) Take action based on instructions in the event of fire, emergencies or accidents. (6) Follow organization procedures for shutdown and evacuation when required

Module-IV: Organization Process

(1) To know and understand: (A) Occupational health and safety risks and methods. (B) Proper disposal system for waste and by-products (c) Signage related to health and safety and their meaning (2) limits of your responsibilities when coordinating with other department. (3) Identification, handling and storage of hazardous substances (4) effects of alcohol, tobacco and drugs

Module-V: Industrial Case (Compulsory)

Ill-effects of alcohol and tobacco (on Employ) – physiology & performance

Examination Scheme:

Components	A	CS	CT	EE
Weight age (%)	05	10	15	70

(A-Attendance; CS-Case Study; CT-Class Test; EE-End Semester Examination)

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Text:


- Susan B. Kaiser, The social psychology of clothing and personal adornment, Macmillan, 1985
- Anthony Gonzalez (2007): Cosmetology, Global Media Publications

References:

- Avis. M. Dry, The Psychology of Jung, Methuen & Co., London, 1961.
- Horn, Marilyu J, The Second Skin, Houghton Mifflin Co., USA, 1968.
- Claudia Piras & Bernhard Roetzel, Ladies: A guide to fashion and style, Dumonte Monte, 2002.
- Vincent Brome, Jung, Granada Publishing, London, 1978.
- Flugel, J.C. The psycho-analytical study of the family, The Hograth Press & INPA, London, 1950.
- Rona Berg, Beauty: The new basics, Workman Publishing Company Inc., 2000.
- Solomon, Consumer Behavior: In Fashion, Pearson Education India.
- Small Business Safety Management Series OSHA 2209-02R 2005



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FASHION MANAGEMENT

Programme Structure

Course Code	Course Title	Lecture (L) Hours Per Week	Tutorial (T) Hours Per Week	Practical (P) Hours Per Week	Total Credits
FDT2151	Fashion Art Illustration and Model Drawing	3	-	-	3
FDT2251	Fashion Theory	3	-	-	3
FDT2351	Computer Aided Manufacturing	3	-	-	3
FDT2451	Fashion Management	3	-	-	3
FDT2551	Fashion Forecasting	3	-	-	3
FDT2651	Fashion Retailing & Visual Merchandising	3	-	-	3
	TOTAL				18



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FASHION MANAGEMENT

Syllabus - Semester First

FASHION ART ILLUSTRATION AND MODEL DRAWING

Course Code: FDT2151

Credit Units: 03

Course Objective:

The study of this course develops the student's ability to visualize the ideas and putting them in concepts for fashion garments. It gives an understanding to different illustration techniques and explores other media for creating concepts through practical assignments. Whereas Model Drawing is introduced with the concept of drawing normal figures in movement and different postures.

Course Content:

Module I	:	Sketching of Block and Flesh Figures
Module II	:	Photo Analysis
Module III	:	Rendering of Prints into flat illustration
Module IV	:	Detailed drawing of Basic Styles
Module V	:	Draping of Garments
Module VI	:	Introduction to Garment Drawing
Module VII	:	Use of different colour medium

Submission of practical work records - (Compulsory)

Examination Scheme:

Components	A	H	R	EE
Weightage (%)	05	10	15	70

(A - Attendance; H -Home Assignment; R- Practical work records; EE-End Semester Examination)


Text & References:

Text:

- By Kathryn McKelvey, Fashion Source book.

References:

- Fashion Design and Illustrations
- By Patrick John Ireland, Introduction to Fashion Design
- By BinaAbling, Model Drawing
- By BinaAbling, Fashion Sketch Book


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Syllabus - Semester Second

FASHION THEORY

Course Code: FDT2251

Credit Units: 03

Course Objective:

To provide a broad foundation to acquire the knowledge of fashion theory and its growth which develop the students' potential for professional activities that demand considerable independence or for fashion research work.

Course Contents:

Module-I: Fashion Development

Origin of the Fashion, Effect of Industrial Revolution on Fashion; Mass production of clothing; Introduction of Retailing; Changes caused by communications, leisure, and Industry; Effect of world War-i; Effect of depression on Fashion; Effect of world War –ii; Reactionary Postwar Fashion; Fashion at 1960s; Anti fashion at 1970s; Fashion 1980s; Fashion 1990s.

Module-II: Fashion Evaluation & Adoption.

Introduction - Fashion Cycles, Length of Fashion Cycles; **Adoption**- Traditional Fashion adaption (Trickle – Down Theory), Reverse Adaption (Trickle-up or Bottom-up Theories), Mass Dissemination (Trickle-across Theory); James Laver and Laws on the Timeline of Style

Module-III: Study of International Fashion Centers.

France, Italy, England, Germany, Canada, United States.

Module-IV: Applied Learning Assignments.

Visit fashion malls and analyze current fashion styles and find social, economical, technological influence on it. Also refer the fashion magazines and newspapers for trend review. Make a report with views and reasons.

Examination Scheme:

Components	A	L	CT	EE
Weightage (%)	05	10	15	70

(A-Attendance; L- Learning Assignments; CT-Class Test; EE-End Semester Examination)

Text & References:

Text:

- By Gini Stephens Frings (1999): Fashion: From concept to consumer, Prentice-Hill Inc.

References:

- By Phyllis Tortora, The Fairchild's Dictionary of Fashion
- By S. A Hussain, Variety- Fashion for Freedom
- By Sandra J. Keiser & Myrna B. Garner, Beyond Design, Fairchild publication.
- By G. J Sumathi, Elements of Fashion & Apparel Design.
- By Solomon, Consumer Behavior: In Fashion, Pearson Education India.

List of Magazines

Apparel online, Fiber 2 Fashion, Cosmopolitan. Marie Claire, Elle, Vogue, Harper's Bazaar, In Style, Glamour, Lucky, Allure, W Magazine.


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Syllabus - Semester Third

COMPUTER-AIDED MANUFACTURING (CAM)

Course Code: FDT2351

Credit Units: 03

Course Objective:

This module makes the student know-how the Computer Applications in the Fashion & Apparel Industry.

Course content:

Module I	:	Adobe Photoshop - Functions of Tools & Working on layers
Module II	:	Photo-editing & its usage
Module III	:	Demo on 'TUKA cad' Module
Module IV	:	Mode conversation through editing
Module V	:	Demo on 'Opti Tex'
Module VI	:	Rendering & filter effects along tutorials

Examination Scheme:

Components	A	H	CT	EE
Weightage (%)	05	10	15	70

(A-Attendance; H -Home Assignment; CT-Class Test; EE-End Semester Examination)

Text & References:

Text:

- By Corel DRAW 11 for Windows: Visual Quick start Guide
- By Sue Chastain, your guide to Graphics software
- By David Huss, Gary W. Priester ,Corel DRAW Studio Techniques, McGraw-Hill Osborne Media, 1998
- By CorelDraw 10 for Windows: Visual Quick Start Guide.
- By Linnea Dayton, Cristen Gillespie, The Photoshop Cs/Cs2 Wow!

References:

- Illustrated Encyclopedia of Costume and Fashion,
- By Jill B. Treadwell, Edited: Donald Treadwell, Public Relations Writing: Principles in Practice, SAGE, 2004


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Syllabus - Semester Fourth

FASHION MANAGEMENT

Course Code: FDT2451

Credit Units: 03

Course Objective:

The objective of this course is to impart knowledge about fashion global market, fashion brand management, different pricing strategies, and necessary for successful employment in apparel businesses.

Course Contents:

Module-I: Fashion for global market

Social, Cultural, Economic, Demographic factors relating to branded and licensed products, Analyzing potential or global market, identify target consumers and competition, market research and testing, customization

Module-II: Fashion Marketing Concepts

The concept of marketing, Utility, Marketing functions and related activities, The concepts of market segmentation and niche marketing, The marketing mix, The channels of distribution used in the fashion industry, Marketing and merchandising

Module-III: Economics in the Fashion Industry

The concept of economic goods/services, The concept of economic resources, The concept of supply and demand, Cost and retail, Gross profit and net profit.

Module-IV: Fashion Promotional Mix

Types of media used in fashion retail advertising, The importance of special promotional events

Module-V: Consumer Demand for Fashion Marketing

Consumer Groups - Demographic Trends & Psychographic Trends, Consumer spending – Personal Income, Disposable Income, Discretionary Income, Purchasing Power, Factors influencing consumer behaviour.

Module-VI: Pricing strategies & Decisions

Concept and importance of pricing, Factors affecting pricing decisions, Methods of pricing

Module-VII: Fashion Brand Management

Types and relevance of branding, Fashion & brand positioning, launching strategies, distribution, marketing campaigns for brand introduction

Examination Scheme:

Components	A	H	CT	EE
Weightage (%)	05	10	15	70

(A-Attendance; H -Home Assignment; CT-Class Test; EE-End Semester Examination)

Text & References:

Text:

- By V. D Dudeja, Professional Management of Fashion Industry

References:

- By Mike Easey, Fashion marketing
- By Philips Kotler, Marketing management
- By Maria Constantino, Fashion Marketing and PR
- By Nicholas Alexander, international Retailing
- By V. D Dudeja, Professional Management of Fashion Industry
- By Lynda Gamans, Retailing Principles

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Syllabus - Semester Fifth

FASHION FORECASTING

Course Code: FDT2551

Credit Units: 03

Course Objective:

The students are made to start their work with the collection of data regarding fashion forecasting, trend analysis and presentations. They are then made to forecast the fashion trend and dictate fashion in their very own way.

Course Contents:

Module-I: Concept of fashion forecasting (Theory)

Awareness of fashion fairs and fashion centers, Knowledge of creative writing, Reading of fashion forecast magazine, Sources of information, Role of Exhibitions and Fashion shows

Module-II: Fashion Forecasting Process (Theory)

Market Research- Consumer research, Shopping, Sales records; Evaluating the collections- Similar Ideas indicate fashion trends, Trends for target market; Fashion services – Collection reports, Trend books, consulting, Color services, Television/Video services, News letter services, Web sites, Directories and reference books, Fashion Magazines and news papers, Catalogs. Design Sources- Historic inspirations, Folk influences, Vintage clothing shops, Museums, Libraries and bookstores, Arts, Fabrics/Textiles, Travel, Form follows function, The street scene, The turn of the century, innovations and technologies.

Module-III: Applied Learning Assignments. (Practical)

- | | | |
|------------------------------------|---|---|
| Market Research | - | On site visits to fashion retailers and cloth markets and study the market trends and collect various cloth samples, catalogs etc. |
| Forecasting Exploration | - | Students will explore a variety of sources like Magazines, News papers, Internet sites and in-site, their market research reports etc. to become familiar with apparel, textile, color, style, and general culture and consumer forecasting resources. Each student will identify and report trends found to class. |
| Preparation of story boards | - | Students will prepare story boards for specific target. |
| Presentation of designs | - | Students will prepare fashion forecast for different seasons. |
| Final Presentation | - | Each student have to submit their Research file in a standard format guided by the faculty for the final evaluation. |

Course Evaluation:

Components	A	C	A & F	P	Viva	Total
Weightage (%)	10	20	20	25	25	100

(A - Attendance, C - Concept Development, A & F - Analysis & Findings, P – Presentation)

References:

- By Gini Stephens Frings (1999): Fashion: From concept to consumer, Prentice-Hill Inc.
- By Tracy Diane and Tom Cassidy, Colour Forecasting
- By Kathryn Mc Kelvey, Fashion Design Process, Innovation and Practice

List of Magazines

Apparel online, Fiber 2 Fashion, Cosmopolitan. Marie Claire, Elle, Vogue, Harper's Bazaar, In Style, Glamour, Lucky, Allure, W Magazine.

Syllabus - Semester Sixth

FASHION RETAILING AND VISUAL MERCHANDISING

Course Code: FDT2651

Credit Units: 03

Course Objectives:

The aim of the course is to provide an integrated curriculum frame work within which students are able to acquire a range of knowledge and transferable skills relevant to employment in retail industry.

Course Contents:

Module-I: Introduction to Fashion Retailing & Strategies

Fashion Retailing-Definition, Concept, Importance, Functions – Indian Retails vs. Global Scenario, **Retail Location**- Factors affecting location decision, Site Selection. **Retail Directions** -Value directed retailing; Service oriented retailing, Unique Merchandising, Shopping as entertainment, Street retailing, Global expansion of retailing; **Types of Retail operations** – (1) Specialty stores- Single brand or Private label retailers, Secondary spin-offs, (2) Department stores, (3) Mass Merchants – Discounters, Off-Price retailers, Outlet stores, Warehouse clubs, (4) Promotional stores, (5) Non store retailing - Mail order merchants, Party plan retailing, Electronic retailing, Television shopping, Online shopping.

Module-II: Fashion Retail Functions & Organizations

Retailing Functions – Merchandising, Store operations, Marketing, Sales Promotion, Finance, Real estate or Store planning, Human resources **Organizations** – (1) Shopping Centers – Traditional Malls, Diversified Malls, Value centers, Outlet Malls, Transportation centers, Recreational Malls, Town center malls; (2) The small stores, (3) The large stores, (4) Store with in a store – In store designer boutiques, Leased departments; (5) Multiple -unit stores – Chain stores, Department store groups, corporate ownerships. **Retail Buying** – Buyer's role, Duties & responsibilities of a retail buyer

Module-III: Introduction to Visual Merchandising

Visual Merchandising - Definition, Concept, Importance; **Store Planning** – Store Image, Target customers, Seasonal Visual merchandising, **Store Design** – (1) Windows – Special event windows, Fashion message windows, Direct-sell windows; (2) Interiors - Apparel fixtures, Folding and stacking, Accessories display **Managing Visual Merchandising Elements** - Mannequins, Standards Manuals, Presentation packages, Tele communications, Designer / Brand in-store shops

Module-IV: General Principles of IPR

Introduction to Intellectual Property 1.1 Concept of Intellectual Property 1.2 Kinds of Intellectual Property 1.3 Economic importance of Intellectual Property 2. **Philosophical Justification of Intellectual Property Western Theories on Private and IP** 2.1 Locke's Labour Theory of Property 2.2 Hegel's Personality Theory of Property 2.3 Marxian Theory on Private Property and IP. 3. **Indian Theory on Private Property** 3.1 Constitutional Aspects of Property 3.2 Constitutional Protection of Property and IP 4. **International Scenario** Introduction to the leading international instruments concerning intellectual property rights: the Berne Convention, Universal Copyright Convention, the Paris Convention, TRIPS, the World Intellectual Property Rights Organization (WIPO) and the UNESCO 5. **Economic Development and IPR Protection**


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6.Enforcement of Industrial Property in General 6.1 Civil Court Procedures 6.2 Criminal Actions:
7.Counterfeiting Intellectual Property Rights and Human Rights 7.1 Right to Health as Basic Human Rights and IPR 7.2 Right to Food as Basic Human Rights and IPR
Need for Protection of Industrial Designs 8.1 Introduction 8.2 Justification for Protecting Design 9. **Subject Matter of Protection and Requirements** 9.1 Copyright on Registered Design 9.2 Industrial and International Exhibition 10. **The Designs Act, 2000** 10.1 Procedure for obtaining Design Protection 10.2 Revocation, Infringement and Remedies

Module-V: Capstone Project (Compulsory)

Model of Online retailing in Indian Fashion Retail Industry- Establishment and Procedural Working

Examination Scheme:

Components	A	CS	CT	EE
Weight age (%)	05	10	15	70

(A-Attendance; CS-Case Study; CT-Class Test; EE-End Semester Examination)

Reference:

- Gini Stephens Frings (1999): Fashion: From concept to consumer, Prentice-Hill Inc.
- Dickerson Kitty G., Inside The Fashion Business, Pearson Education India, 2004
- Swati Bhalla & Anuraag S., Visual Merchandising, Tata McGraw-Hill Education, 2010
- Diamond, Fashion Retailing: A Multi-Channel Approach , Pearson Education India, 2007
- Rosemar Varley, Retail Product Management: Buying And Merchandising, Routledge, 2006
- Jay Diamond, Ellen Diamond, Contemporary Visual Merchandising, Prentice Hall PTR, 2010



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Programme Structure

Curriculum & Scheme of Examination

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VISUALIZATION - I

Course Code: FNA4101

Credit Units: 08

Course Objective:

Additionally for MFA students, to develop further an ability to pursue independent research and articulate ideas in writing through a sound understanding of a range of historical, theoretical and philosophical approaches to art and an understanding of the relevance of these to their work

Course Contents:

Module I

Introduction to Visualization

Module II

Execution of ONE advertising campaigns on consumer's Institutional (Services), related with any of the appropriate medias including Print, Television, Transit etc. and in various techniques available

Module III

Photography module:

- a) Product Shoot
- b) Models shoot
- c) Creative photography

These shoots are to be utilized in the campaign making process by the students.

Module IV

Advanced learning of Corel draw and Photoshop software


Examination Scheme:

Components	A	PT / HA / CT	End Term Exam	
			Project (Display & Viva)	Exam (Practical)
Weightage (%)	5	25	30	40

(A-Attendance; PT- Portfolio; HA-Home Assignment; CT-Class Test)

Text & References:

- The Art of Human Illustration, Nick Meglin.
- Corporate Graphics, Mike Quon
- A History of Graphic Design, Philip B Meggs.
- Graphic Arts Manual, Irwing E. Field, Arne Press, New York, 1980
- Design Graphics, C. L. Martin, Macmillan Co. London


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GRAPHIC DESIGNING - I

Course Code: FNA4102

Credit Units: 08

Course Objective:

Graphic designing is a creative field of work which involves imagination in communicating with users. It deals with working with object, shape, text, images etc. It is used to create corporate identity. Brochures, advertisements, print media, product, packaging and icon etc. The objective of this course is to make the students professionals and fully equipped with the software. So that the software's become just a more tool for them to execute the finished artworks.

Software's introduced:

Adobe Illustrator: Adobe Photoshop, Corel Draw

Course Contents:

Module I

To edit photographs, create artistic imagery

Module II

To create illustrations, logos

Module III

Product window display for interactive media

Examination Scheme:

Components	A	PT / HA / CT	End Term Exam	
			Project (Display & Viva)	Exam (Practical)
Weightage (%)	5	25	30	40

(A-Attendance; PT- Portfolio; HA-Home Assignment; CT-Class Test)


Text & References:

Text:

- Graphic design & reproduction techniques, Peter Croy
- Artists and illustration's encyclopedia, John Quick

References:

- The Art of Human Illustration, Nick Meglin.
- Corporate Graphics, Mike Quon
- A History of Graphic Design, Philip B. Meggs,
- Graphic Arts Manual, Irwing E. Field, Arne Press, New York, 1980
- Design Graphics, C. L. Martin, Macmillan Co. London


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TV GRAPHICS - I

Course Code: FNA4103

Credit Units: 08

Course Objective:

The design for programmes, station identifies signs, symbols, commercial advertisement, trade-marks and short films etc.

Course Contents:

Module I

Stations identify signs, symbols, commercial advertisement, trade-marks and short films etc.

Examination Scheme:

Components	A	PT / HA / CT	End Term Exam	
			Project (Display & Viva)	Exam (Practical)
Weightage (%)	5	25	30	40

(A-Attendance; PT- Portfolio; HA-Home Assignment; CT-Class Test)


Text & References:

Text:

- Graphic design & reproduction techniques, Peter Croy
- Artists and illustration's encyclopedia, John Quick

References:

- The Art of Human Illustration, Nick Meglin.
- Corporate Graphics, Mike Quon
- A History of Graphic Design, Philip B. Meggs
- Graphic Arts Manual, Irwing E. Field, Arne Press, New York, 1980
- Design Graphics, C. L. Martin, Macmillan Co. London


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ILLUSTRATION - I

Course Code: FNA4104

Credit Units: 08

Course Objective:

Advance studies in illustration for graphic expression.

Course Contents:

Module I

Forming of individual style in illustration and cartooning.

Examination Scheme:

Components	A	PT / HA / CT	End Term Exam	
			Project (Display & Viva)	Exam (Practical)
Weightage (%)	5	25	30	40

(A-Attendance; PT- Portfolio; HA-Home Assignment; CT-Class Test)


Text & References:

Text:

- Graphic design & reproduction techniques, Peter Croy
- Artists and illustration's encyclopedia, John Quick

References:

- The Art of Human Illustration, Nick Meglin.
- Corporate Graphics, Mike Quon
- A History of Graphic Design, Philip B. Meggs.
- Graphic Arts Manual, Irwing E. Field, Arne Press, New York, 1980
- Design Graphics, C. L. Martin, Macmillan Co. London


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DRAWING - I

Course Code: FNA4106

Credit Units: 08

Course Objective:

The course is to develop professional drawing skill through anatomical study of human figure. This drawing activity is to learn creating big sized drawing on bigger space to capture life size drawing. The drawing exercise to be done from a model in front is called life study. Secondly this course is also to execute creative drawing based on life experience or to depict socio cultural aspect or conceptualization of new ideas.

Course Contents:

Module I: Life Study

Life study from life model

Module II: Creative Drawing

Creative drawing (figurative/non-figurative)

Examination Scheme:

Components	A	PT / HA / CT	End Term Exam	
			Project (Display & Viva)	Exam (Practical)
Weightage (%)	5	25	30	40

(A-Attendance; PT- Portfolio; HA-Home Assignment; CT-Class Test)


Text & References:

Text:

- Big book of Drawing and painting, Francisco Asensio Cerver

References:

- An Introduction to Drawing, James Horton in association with the Royal Academy of Arts.
- Grassroot of Art, Herbert Read
- How to draw and paint, Hazel Harrison, from Art School
- Human Figure, Walter Foster
- Anatomy, Walter Foster
- Heads, Walter Foster
- Figure Drawing, Patricia Monahan with Albany Wiseman
- Human Anatomy, James Horton


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CREATIVE PAINTING - I

Course Code: FNA4107

Credit Units: 08

Course Objective:

Life study in acrylic or oil colour on canvas from life model to exercise figurative painting technique, colour and tonal variation to create three dimensional human figure. An approach to achieve professional level realistic painting skill.

After life study the students are to give the task of innovative and experimental work. This is to execute acrylic or oil colour painting on canvas based on given themes or on themes will be chosen by the students themselves to achieve individual or original style of rendering painting. It is to explore various mediums of painting with new ideas and perception.

Course Contents:

Module I: Life Study

Life Study from life model.

Module II: Creative Painting

Painting based on social or individual experience based themes.

Examination Scheme:

Components	A	PT / HA / CT	End Term Exam	
			Project (Display & Viva)	Exam (Practical)
Weightage (%)	5	25	30	40

(A-Attendance; PT- Portfolio; HA-Home Assignment; CT-Class Test)


Text & References:

Text:

- Notes on the techniques of Painting, Hilaire Hiler
- A Concise History of Modern Painting, 1974 Thames & Hudson, London

References:

- Big book of drawing and painting, Francisco Asensio Cerver
- Method and Materials, Lynton Lamb.
- Artist's Handbook, Ray Smith
- Artist's Encyclopedia, John Quick
- A manual of Painting Materials & Techniques, Mark David Goattsegen
- Art Class, Copy Right 1999, Harper Collins Publishers.
- Images of the human body, Pepin Van Roojen.
- Painting Course, Ronald Pearsall
- The portrait, Norbert Schneider.
- Color, Edith Anderson Feisner.
- History of Painting, Janson.
- History of Western Painting, Eric Ne


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MURAL (PAINTING) - I

Course Code: FNA4108

Credit Units: 08

Course Objective:

The objective of this course is to provide working knowledge on wall surface. It gives a detail exposure about all kinds of mural techniques.

Course Contents:

Module I

Preparing suitable layout for mural followed by modification required according to the materials to be used

Module II

Preparing the base and surface

Module III

Final work followed by the installation


Examination Scheme:

Components	A	PT / HA / CT	End Term Exam	
			Project (Display & Viva)	Exam (Practical)
Weightage (%)	5	25	30	40

(A-Attendance; PT- Portfolio; HA-Home Assignment; CT-Class Test)

Text & References:

- Ajanta Murals, Indian Archeology Dept.
- Techniques of Indian paintings and Murals, Indian Archeology Dept.
- Decorative Murals, Donna Dewberry


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PORTRAITURE - I

Course Code: FNA4109

Credit Units: 08

Course Objective:

The objective of this course is to provide advanced training on portrait painting exploring all mediums.

Course Contents:

Module I

Portrait study in oil on canvas

Examination Scheme:

Components	A	PT / HA / CT	End Term Exam	
			Project (Display & Viva)	Exam (Practical)
Weightage (%)	5	25	30	40

(A-Attendance; PT- Portfolio; HA-Home Assignment; CT-Class Test)


Text & References:

Text:

- Big book of Drawing and painting, Francisco Asensio Cerver

References:

- An Introduction to Drawing, James Horton in association with the Royal Academy of Arts.
- Grassroot of Art, Herbert Read
- How to draw and paint, Hazel Harrison ,from Art School
- Human Figure, Walter Foster
- Anatomy, Walter Foster
- Heads, Walter Foster
- Figure Drawing, Patricia Monahan with Albany Wiseman
- Human Anatomy, James Horton


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CREATIVE DRAWING - I

Course Code: FNA4111

Credit Units: 08

Course Objective:

The course is to develop professional drawing skill through anatomical study of human figure. This drawing activity is to learn creating big sized drawing on bigger space to capture life size drawing. The drawing exercise to be done from a model in front is called life study. Secondly this course is also to execute creative drawing based on life experience or to depict socio cultural aspect or conceptualization of new ideas.

Course Contents:

Module I: Life Study

Life study from life model

Module II: Creative Drawing

Creative drawing (figurative/non-figurative)

Examination Scheme:

Components	A	PT / HA / CT	End Term Exam	
			Project (Display & Viva)	Exam (Practical)
Weightage (%)	5	25	30	40

(A-Attendance; PT- Portfolio; HA-Home Assignment; CT-Class Test)


Text & References:

Text:

- Big book of Drawing and painting, Francisco Asensio Cerver

References:

- An Introduction to Drawing, James Horton in association with the Royal Academy of Arts.
- Grassroot of Art, Herbert Read
- How to draw and paint, Hazel Harrison, from Art School
- Human Figure, Walter Foster
- Anatomy, Walter Foster
- Heads, Walter Foster
- Figure Drawing, Patricia Monahan with Albany Wiseman
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PORTRAITURE SCULPTURE-I

Course Code: FNA4113

Credit Units: 08

Course Objective:

This is to provide about working on realistic sculpture.

Course Contents:

Module I

Realistic sculpture study supported by preparatory studies and techniques

Examination Scheme:

Components	A	PT / HA / CT	End Term Exam	
			Project (Display & Viva)	Exam (Practical)
Weightage (%)	5	25	30	40

(A-Attendance; PT- Portfolio; HA-Home Assignment; CT-Class Test)

Text & References:

Text:

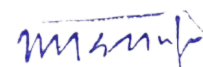
- Art Now, Herbert Read
- Sculpture Today, Kinston parker

References:

- History of Sculpture, George Henry Chase and Chander Rathform.
- Four steps towards



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MURAL (SCULPTURE) - I

Course Code: FNA4114

Credit Units: 08

Course Objective:

The objective of this course is to provide working knowledge on wall surface. It gives a detail exposure about all kinds of mural techniques.

Course Contents:

Module I

Preparing suitable layout for mural followed by modification required according to the materials to be used

Module II

Preparing the base and surface

Module III

Final work followed by the installation.


Examination Scheme:

Components	A	PT / HA / CT	End Term Exam	
			Project (Display & Viva)	Exam (Practical)
Weightage (%)	5	25	30	40

(A-Attendance; PT- Portfolio; HA-Home Assignment; CT-Class Test)

Text & References:

- Ajanta Murals, Indian Archeology Dept.
- Techniques of Indian paintings and Murals, Indian Archeology Dept.
- Decorative Murals, Donna Dewberry


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CREATIVE SCULPTURE - I

Course Code: FNA4115

Credit Units: 08

Course Objective:

This is to provide professional experience about working on sculpture using various materials.

Course Contents:

Module I

Abstract Composition supported by preparatory studies and techniques.

Examination Scheme:

Components	A	PT / HA / CT	End Term Exam	
			Project (Display & Viva)	Exam (Practical)
Weightage (%)	5	25	30	40

(A-Attendance; PT- Portfolio; HA-Home Assignment; CT-Class Test)

Text & References:

Text:

- Art Now, Herbert Read
- Sculpture Today, Kinston parker

References:

- History of Sculpture, George Henry Chase and Chander Rathform.
- Four steps towards


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REPORT AND VIVA (Specialization Specific)

Course Code: FNA4237

Credit Units: 01

Course Objective:

This course has an aim to be as one of the most important aspects in the process of artistic growth and for enrichment of knowledge. This will lead for awareness of contemporary art scene. The students will be given the task to prepare report on various art exhibitions and museum visits near their neighborhood.

This is to provide professional exposure for the researchers.

Course Contents:

Module I

Visiting ad-agencies, museums and exhibitions

Module II

Preparing reports on visits with visual proof.

Examination Scheme:

Components	PR	PS	V
Weightage (%)	70	15	15

(V-Viva; PR-Project Report; PS-Presentation)


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VISUALIZATION - II

Course Code: FNA4201

Credit Units: 08

Course Objective:

MFA Program grounded in hands-on making, entrepreneurial strategies, and social and environmental engagement. The realization of work for a specific community or client, and entrepreneurship that connects making a living with making a difference.

Course Contents:

Module I: Social Campaign

Take any burning issue of today's world. It can be regarding exploitation, poverty, human rights, Industrialization, women related issues or any other. Conduct a comprehensive research into its prevalence,

In the society- its origin, its extent, myths related to it, what measures are being taken to eradicate it, what more can be done etc.

Module II

Photography module for the application of social campaign effectively.

Module III

Design the social campaign for either magazine or newspaper according to the subject requirement.

Module IV

Introduction to Illustrator and Flash software.


Examination Scheme:

Components	A	PT / HA / CT	End Term Exam	
			Project (Display & Viva)	Exam (Practical)
Weightage (%)	5	25	30	40

(A-Attendance; PT- Portfolio; HA-Home Assignment; CT-Class Test)

Text & References:

- The Art of Human Illustration, Nick Meglin,
- Corporate Graphics, Mike Quon
- A History of Graphic Design, Philip B Meggs,
- Graphic Arts Manual, Irwing E. Field, Arne Press, New York, 1980
- Design Graphics, C. L. Martin, Macmillan Co. London


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GRAPHIC DESIGNING - II

Course Code: FNA4202

Credit Units: 08

Course Objective:

The focus of this course is on refining design work and preparation for the professional world. Projects focus on advanced issues of representation

Software's introduced:

Adobe Flash

Course Contents:

Module I

Use Adobe Photoshop and Adobe Illustrator to create Promotional campaign for print/broadcast media

Module II

Graphic design for web with software flash etc

Examination Scheme:

Components	A	PT / HA / CT	End Term Exam	
			Project (Display & Viva)	Exam (Practical)
Weightage (%)	5	25	30	40

(A-Attendance; PT- Portfolio; HA-Home Assignment; CT-Class Test)


Text & References:

Text:

- Graphic design & reproduction techniques, Peter Croy
- Artists and illustration's encyclopedia, John Quick

References:

- The Art of Human Illustration, Nick Meglin,
- Corporate Graphics, Mike Quon
- A History of Graphic Design, Philip B Meggs,
- Graphic Arts Manual, Irwing E. Field, Arne Press, New York, 1980
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TV GRAPHICS - II

Course Code: FNA4203

Credit Units: 08

Course Objective:

The design for programmes, station identifies signs, symbols, commercial advertisement, trade marks and short films etc.

Course Contents:

Module I

Station identify signs, symbols, commercial advertisement, trade marks and short films etc.

Examination Scheme:

Components	A	PT / HA / CT	End Term Exam	
			Project (Display & Viva)	Exam (Practical)
Weightage (%)	5	25	30	40

(A-Attendance; PT- Portfolio; HA-Home Assignment; CT-Class Test)


Text & References:

Text:

- Graphic design & reproduction techniques, Peter Croy
- Artists and illustration's encyclopedia, John Quick

References:

- The Art of Human Illustration, Nick Meglin,
- Corporate Graphics, Mike Quon
- A History of Graphic Design, Philip B Meggs,
- Graphic Arts Manual, Irwing E. Field, Arne Press, New York, 1980
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ILLUSTRATION - II

Course Code: FNA4204

Credit Units: 08

Course Objective:

Advance studies in illustration for graphic expression.

Course Contents:

Module I

Emphasis on forming of individual style in illustration and cartooning

Examination Scheme:

Components	A	PT / HA / CT	End Term Exam	
			Project (Display & Viva)	Exam (Practical)
Weightage (%)	5	25	30	40

(A-Attendance; PT- Portfolio; HA-Home Assignment; CT-Class Test)

Text & References:

Text:

- Graphic design & reproduction techniques, Peter Croy
- Artists and illustration's encyclopedia, John Quick

References:

- The Art of Human Illustration, Nick Meglin,
- Corporate Graphics, Mike Quon
- A History of Graphic Design, Philip B Meggs,
- Graphic Arts Manual, Irwing E. Field, Arne Press, New York, 1980
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DRAWING - II

Course Code: FNA4206

Credit Units: 08

Course Objective:

Drawing portraiture in this stage will help to enhance professional skill in drawing.

This exercise to make drawing with various mediums from life model is essential. It is to obtain self confidence of making life size portrait and head study.

After the portrait/head study students to be ensured required freedom to create creative drawing based on social themes or abstract compositions of their choice which lead to develop one's own individual creative style and perception in drawing.

The drawing style is necessarily to be related with the style of painting has been developed by the individuals.

Course Contents:

Module I: Portrait Study

Portrait from life model.

Module II: Creative Drawing

Creative drawing to be based on the element like observation, distortion, simplification, symbolic, experimentation, photo-realistic or conceptual.

Examination Scheme:

Components	A	PT / HA / CT	End Term Exam	
			Project (Display & Viva)	Exam (Practical)
Weightage (%)	5	25	30	40

(A-Attendance; PT- Portfolio; HA-Home Assignment; CT-Class Test)

Text & References:

- An Introduction to Drawing, James Horton in association with the Royal Academy of Arts.
- Grassroot of Art, Herbert Read
- How to draw and paint, Hazel Harrison, from Art School
- Human Figure, Walter Foster
- Anatomy, Walter Foster
- Heads, Walter Foster
- Figure Drawing, Patricia Monahan with Albany Wiseman
- Human Anatomy, James Horton
- Big book of Drawing and painting, Francisco Asensio Cerver.


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CREATIVE PAINTING - II

Course Code: FNA4207

Credit Units: 08

Course Objective:

This course is for exploring most individualistic style of painting, experimenting with various mediums and ideas. The students will work in figurative/non-figurative compositions. They can work with any medium which provides them a kind of comfort or skill in oil /acrylic colour on canvas/ water colour / tempara on paper / mix-media and so on.

This course also experiments with new media, conceptual art like installation art/video art. Installation/video art introduces to a widely practiced medium in the contemporary art scene. This new medium which is unconventional in nature has modern approach which goes beyond studio practice. It is to develop skill of the craft and has potential to express intense feelings and sensibilities. It deals with new material for displaying social message in particular.

Course Contents:

Module I: Creative Painting

Creative painting (figurative/non-figurative) based on social or individual themes.

Module II: Installation/video art

Creating conceptual art in installation/video art medium

Examination Scheme:

Components	A	PT / HA / CT	End Term Exam	
			Project (Display & Viva)	Exam (Practical)
Weightage (%)	5	25	30	40


(A-Attendance; PT- Portfolio; HA-Home Assignment; CT-Class Test)

Text & References:

- Big book of drawing and painting, Francisco Asensio Cerver
- Notes on the techniques of Painting, Hilaire Hiler
- Method and Materials, Lynton Lamb.
- Artist's Handbook, Ray Smith
- Artist's Encyclopedia, John Quick
- A manual of Painting Materials & Techniques, Mark David Goattsegen
- Art Class, Copy Right 1999, Harper Collins Publishers.
- Images of the human body, Pepin Van Roojen.
- A Concise History of Modern Painting, 1974 Thames & Hudson, London
- Painting Course by Ronald Pearsall
- The portrait, Norbert Schneider.
- Color, Edith Anderson Feisner.



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MURAL (PAINTING) - II

Course Code: FNA4208

Credit Units: 08

Course Objective:

The objective of this course is to provide advanced techniques of working knowledge on wall surface. It gives a professional exposure about all kinds of mural work.

Course Contents:

Module I

Preparing suitable layout for mural followed by modification required according to the materials to be used

Module II

Preparing the base and surface

Module III

Final work followed by the installation.

Examination Scheme:

Components	A	PT / HA / CT	End Term Exam	
			Project (Display & Viva)	Exam (Practical)
Weightage (%)	5	25	30	40

(A-Attendance; PT- Portfolio; HA-Home Assignment; CT-Class Test)

Text & References:

- Ajanta Murals, Indian Archeology Dept.
- Techniques of Indian paintings and Murals, Indian Archeology Dept.
- Decorative Murals, Donna Dewberry


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PORTRAITURE - II

Course Code: FNA4209

Credit Units: 08

Course Objective:

The objective of this course is to provide advanced training on portrait painting exploring all mediums.

Course Contents:

Module I

Portrait study in oil on canvas

Examination Scheme:

Components	A	PT / HA / CT	End Term Exam	
			Project (Display & Viva)	Exam (Practical)
Weightage (%)	5	25	30	40

(A-Attendance; PT- Portfolio; HA-Home Assignment; CT-Class Test)

Text & References:

Text:

- Big book of Drawing and painting, Francisco Asensio Cerver

References:

- An Introduction to Drawing, James Horton in association with the Royal Academy of Arts.
- Grassroot of Art, Herbert Read
- How to draw and paint, Hazel Harrison ,from Art School
- Human Figure, Walter Foster
- Anatomy, Walter Foster
- Heads, Walter Foster
- Figure Drawing, Patricia Monahan with Albany Wiseman
- Human Anatomy, James Horton


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CREATIVE DRAWING - II

Course Code: FNA4211

Credit Units: 08

Course Objective:

Drawing portraiture in this stage will help to enhance professional skill in drawing.

This exercise to make drawing with various mediums from life model is essential. It is to obtain self confidence of making life size portrait and head study.

After the portrait/head study students to be ensured required freedom to create creative drawing based on social themes or abstract compositions of their choice which lead to develop one's own individual creative style and perception in drawing.

The drawing style is necessarily to be related with the style of painting has been developed by the individuals.

Course Contents:

Module I: Portrait Study

Portrait from life model

Module II: Creative Drawing

Creative drawing to be based on the element like observation, distortion, simplification, symbolic, experimentation, photo-realistic or conceptual

Examination Scheme:

Components	A	PT / HA / CT	End Term Exam	
			Project (Display & Viva)	Exam (Practical)
Weightage (%)	5	25	30	40

(A-Attendance; PT- Portfolio; HA-Home Assignment; CT-Class Test)

Text & References:

- An Introduction to Drawing, James Horton in association with the Royal Academy of Arts.
- Grassroot of Art, Herbert Read
- How to draw and paint, Hazel Harrison, from Art School
- Human Figure, Walter Foster
- Anatomy, Walter Foster
- Heads, Walter Foster
- Figure Drawing, Patricia Monahan with Albany Wiseman
- Human Anatomy, James Horton
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PORTRAITURE SCULPTURE-II

Course Code: FNA4212

Credit Units: 08

Course Objective:

This is to provide about working on realistic sculpture.

Course Contents:

Module I

Realistic study work supported by preparatory studies and techniques.

Examination Scheme:

Components	A	PT / HA / CT	End Term Exam	
			Project (Display & Viva)	Exam (Practical)
Weightage (%)	5	25	30	40

(A-Attendance; PT- Portfolio; HA-Home Assignment; CT-Class Test)

Text & References:

Text:

- Art Now, Herbert Read
- Sculpture Today, Kinston parker

References:

- History of Sculpture, George Henry Chase and Chander Rathforn.


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MURAL (SCULPTURE) - II

Course Code: FNA4213

Credit Units: 08

Course Objective:

The objective of this course is to provide advanced techniques of working knowledge on wall surface. It gives a professional exposure about all kinds of mural work.

Course Contents:

Module I

Preparing suitable layout for mural followed by modification required according to the materials to be used

Module II

Preparing the base and surface

Module III

Final work followed by the installation.

Examination Scheme:

Components	A	PT / HA / CT	End Term Exam	
			Project (Display & Viva)	Exam (Practical)
Weightage (%)	5	25	30	40

(A-Attendance; PT- Portfolio; HA-Home Assignment; CT-Class Test)

Text & References:

- Ajanta Murals, Indian Archeology Dept.
- Techniques of Indian paintings and Murals, Indian Archeology Dept.
- Decorative Murals, Donna Dewberry


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CREATIVE SCULPTURE - II

Course Code: FNA4214

Credit Units: 08

Course Objective:

This is to provide professional experience about working on sculpture using various materials.

Course Contents:

Module I

Abstract Composition supported by preparatory studies and techniques.

Examination Scheme:

Components	A	PT / HA / CT	End Term Exam	
			Project (Display & Viva)	Exam (Practical)
Weightage (%)	5	25	30	40

(A-Attendance; PT- Portfolio; HA-Home Assignment; CT-Class Test)

Text & References:

Text:

- Art Now, Herbert Read
- Sculpture Today, Kinston parker

References:

- History of Sculpture, George Henry Chase and Chander Rathform.


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DISSERTATION AND VIVA - I

Course Code: FNA4337

Credit Units: 02

Course Objective:

PAINTING-

This course is about research work on a particular school of art, artist so on. It is for enrichment of professional knowledge through detail study and research about the field and artist as well. It focuses to put authentic information with analytical approach.

This paper is to be submitted in a form of a report, printed with necessary and authentic reproductions, photographs, or images as illustrations.

Portfolio development is also a part of this course. This project compiles the selected art works have been executed during MFA programme (first and second year both). The portfolio development project has the purpose of preparing students for future prospects in the professional field.

APPLIED ARTS & SCULPTURE-

This is to provide professional exposure for the researchers.

Course Contents:

Module I

- Research work on the given topic from various sources like art institutes, galleries, libraries so on.
- Collecting materials like notes, photographs and reproductions.


Module II

Portfolio development project (compiling of selected art works).

Examination Scheme:

Components	PR	PS	V
Weightage (%)	70	15	15

(V-Viva; PR-Project Report; PS-Presentation)


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VISUALIZATION - III

Course Code: FNA4301

Credit Units: 08

Course Objective:

There will be students advanced understanding of design in relation to advertising. Students will do intensive exercises to understand design, market trends, target audience, consumer behavior. Each and every media will be explored. Learn new ways of thinking, processing and communicating ideas, emotions, and experiences through your discipline.

Course Contents:

Module I

Execution of ONE advertising Campaigns on consumer's product or Institutional (Services)
Related with any of the appropriate Medias including Print, Television, Transit etc. and in various techniques available.

Module II

Perform the simple exercises on the software's, they will explore flash and illustrator software's in their campaign making process.


Examination Scheme:

Components	A	PT / HA / CT	End Term Exam	
			Project (Display & Viva)	Exam (Practical)
Weightage (%)	5	25	30	40

(A-Attendance; PT- Portfolio; HA-Home Assignment; CT-Class Test)

Text & References:

- The Art of Human Illustration, Nick Meglin,
- Corporate Graphics, Mike Quon
- A History of Graphic Design, Philip B Meggs,
- Graphic Arts Manual, Irving E. Field, Arne Press, New York, 1980
- Design Graphics, C. L. Martin, Macmillan Co. London


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GRAPHIC DESIGNING - III

Course Code: FNA4302

Credit Units: 08

Course Objective:

The focus of this course is to equip students with knowledge of designing campaign for media.

Software's introduced:

Adobe Flash

Course Contents:

Module I

Product and social advertisement for electronic media in the help of i.e adobe flash/Web design software.

Examination Scheme:

Components	A	PT / HA / CT	End Term Exam	
			Project (Display & Viva)	Exam (Practical)
Weightage (%)	5	25	30	40

(A-Attendance; PT- Portfolio; HA-Home Assignment; CT-Class Test)

Text & References:

Text:

- Graphic design & reproduction techniques, Peter Croy
- Artists and illustration's encyclopedia, John Quick

References:

- The Art of Human Illustration, Nick Meglin,
- Corporate Graphics, Mike Quon
- A History of Graphic Design, Philip B Meggs,
- Graphic Arts Manual, Irwing E. Field, Arne Press, New York, 1980
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TV GRAPHICS - III

Course Code: FNA4303

Credit Units: 08

Course Objective:

The design for programmes, station identify signs, symbols, commercial advertisements, trade marks and short films etc.

Course Contents:

Module I

The design for programmes, station identify signs, symbols, commercial advertisement, trade marks and short films etc.

Examination Scheme:

Components	A	PT / HA / CT	End Term Exam	
			Project (Display & Viva)	Exam (Practical)
Weightage (%)	5	25	30	40

(A-Attendance; PT- Portfolio; HA-Home Assignment; CT-Class Test)

Text & References:

Text:

- Graphic design & reproduction techniques, Peter Croy
- Artists and illustration's encyclopedia, John Quick

References:

- The Art of Human Illustration, Nick Meglin,
- Corporate Graphics, Mike Quon
- A History of Graphic Design, Philip B Meggs,
- Graphic Arts Manual, Irwing E. Field, Arne Press, New York, 1980
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ILLUSTRATION - III

Course Code: FNA4304

Credit Units: 08

Course Objective:

Illustration for books meant for different age groups. Comprehensive illustration for book animation.

Course Contents:

Module I

Advance studies in illustration for graphic expression. Emphasis on forming of individual style in illustration, cartooning.

Examination Scheme:

Components	A	PT / HA / CT	End Term Exam	
			Project (Display & Viva)	Exam (Practical)
Weightage (%)	5	25	30	40

(A-Attendance; PT- Portfolio; HA-Home Assignment; CT-Class Test)


Text & References:

Text:

- Graphic design & reproduction techniques, Peter Croy
- Artists and illustration's encyclopedia, John Quick

References:

- The Art of Human Illustration, Nick Meglin,
- Corporate Graphics, Mike Quon
- A History of Graphic Design, Philip B Meggs,
- Graphic Arts Manual, Irwing E. Field, Arne Press, New York, 1980
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DRAWING - III

Course Code: FNA4306

Credit Units: 08

Course Objective:

Drawing is not only one of the most significant aspects for painting students but also is a complete medium in itself. Working in one particular style and media is advisable in this stage.

Drawing is a medium which deals with black and white composition in various drawing mediums like pen and ink, charcoal etc. In this stage a student needs to work on own individual style.

Rendering creative drawing after experimenting with various techniques and possibilities of using different mediums for exploring individual perception in the medium

Course Contents:

Module I: Creative Sketching

Making layouts

Module II: Creative Drawing

Creative drawing (figurative/ non-figurative)


Examination Scheme:

Components	A	PT / HA / CT	End Term Exam	
			Project (Display & Viva)	Exam (Practical)
Weightage (%)	5	25	30	40

(A-Attendance; PT- Portfolio; HA-Home Assignment; CT-Class Test)

Text & References:

- An Introduction to Drawing, James Horton in association with the Royal Academy of Arts.
- Grassroot of Art, Herbert Read
- How to draw and paint, Hazel Harrison, from Art School
- Human Figure, Walter Foster
- Anatomy, Walter Foster
- Heads, Walter Foster
- Figure Drawing, Patricia Monahan with Albany Wiseman
- Human Anatomy, James Horton
- Big book of Drawing and painting, Francisco Asensio Cerver.


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CREATIVE PAINTING - III

Course Code: FNA4307

Credit Units: 08

Course Objective:

The course is to maintain a sense of painting as a language that simultaneously upholds tradition and seeks innovation. Painting from observation, formal structure, narrative content. Painting as a means of individual expression are qualities that are valued. Students work both figuratively and abstractly. The course is structured to emphasize individual studio work that is assessed through one on one and group critiques.

This course is to develop an intense ethos towards studio practice that makes for a stimulating work environment.

Course Contents:

Module I

Painting in oil / acrylic colour on canvas (figurative /non-figurative)

Examination Scheme:

Components	A	PT / HA / CT	End Term Exam	
			Project (Display & Viva)	Exam (Practical)
Weightage (%)	5	25	30	40

(A-Attendance; PT- Portfolio; HA-Home Assignment; CT-Class Test)

Text & References:

- Big book of drawing and painting, Francisco Asensio Cerver
- Notes on the techniques of Painting, Hilaire Hiler
- Method and Materials, Lynton Lamb.
- Artist's Handbook, Ray Smith
- Artist's Encyclopedia, John Quick
- A manual of Painting Materials & Techniques, Mark David Goattsegen
- Art Class, Copy Right 1999, Harper Collins Publishers.
- Images of the human body, Pepin Van Roojen.
- A Concise History of Modern Painting, 1974 Thames & Hudson, London
- Painting Course, Ronald Pearsall
- The portrait. Norbert Schneider.
- Color, Edith Anderson Feisner.


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MURAL (PAINTING) - III

Course Code: FNA4308

Credit Units: 08

Course Objective:

The objective of this course is to provide advanced techniques of working knowledge on wall surface. It gives a professional exposure about all kinds of mural work including mixed materials.

Course Contents:

Module I

Preparing suitable layout for mural followed by modification required according to the materials to be used

Module II

Preparing the base and surface

Module III

Final work followed by the installation.

Examination Scheme:

Components	A	PT / HA / CT	End Term Exam	
			Project (Display & Viva)	Exam (Practical)
Weightage (%)	5	25	30	40

(A-Attendance; PT- Portfolio; HA-Home Assignment; CT-Class Test)

Text & References:

- Ajanta Murals, Indian Archeology Dept.
- Techniques of Indian paintings and Murals, Indian Archeology Dept.
- Decorative Murals, Donna Dewberry


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PORTRAITURE - III

Course Code: FNA4309

Credit Units: 08

Course Objective:

The objective of this course is to provide advanced training on portrait painting exploring all mediums.

Course Contents:

Module I

Portrait study in oil on canvas

Examination Scheme:

Components	A	PT / HA / CT	End Term Exam	
			Project (Display & Viva)	Exam (Practical)
Weightage (%)	5	25	30	40

(A-Attendance; PT- Portfolio; HA-Home Assignment; CT-Class Test)


Text & References:

Text:

- Big book of Drawing and painting, Francisco Asensio Cerver

References:

- An Introduction to Drawing, James Horton in association with the Royal Academy of Arts.
- Grassroot of Art, Herbert Read
- How to draw and paint, Hazel Harrison ,from Art School
- Human Figure, Walter Foster
- Anatomy, Walter Foster
- Heads, Walter Foster
- Figure Drawing, Patricia Monahan with Albany Wiseman
- Human Anatomy, James Horton


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ART CRITICISM (PAINTING) - I

Course Code: FNA4310

Credit Units: 03

Course Objective:

The objective of this course is to provide Critical Study of Art.

Course Contents:

Module I

Importance and necessary criticism. Evaluation of art works.

Module II

Understanding of Modern and post modern art trends in eastern and western of view.

Examination Scheme:

Components	A	PT / HA / CT	End Term Exam	
			Project (Display & Viva)	Exam (Practical)
Weightage (%)	5	25	30	40

(A-Attendance; PT- Portfolio; HA-Home Assignment; CT-Class Test)


Text & References:

Text:

- Civilization of Mankind, Van Loon
- History of Art, Janson
- Art through the ages, Helen Gardener
- Concise History of Art-Vols. 1 & 2, Germain. Bazin.

References:

- Fundamental of Indian Art, S. N. Dasgupta
- Art of Mankind, Van Loon
- History of Indian and Indonesian Art, A. K. Coomaraswamy
- The Art and Architecture of Indian, Benjamin Rowland.
- The Story of Indian Art, S. K. Bhattacharya.
- 5000 Years of Indian Art, Shivaramaurti
- A History of Fine Arts in India and West, Edith Tomory
- Introduction of Chinese Art, Lawrence Binyon
- History of Indian and Indonesian Art, Benjamin Rowland.
- Concise History of Art Vols. 1&2, Germain Bazin
- Italian Painters of the Renaissance, Bernard Berenson
- Art Now, Herbert Read
- Grassroot of Art, Herbert Read.
- History of Modern Art, H. H. Arnason.


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CREATIVE SCULPTURE - III

Course Code: FNA4311

Credit Units: 08

Course Objective:

This is to provide professional experience about working on sculpture using various materials.

Course Contents:

Module I

Abstract Composition supported by preparatory studies and techniques.

Examination Scheme:

Components	A	PT / HA / CT	End Term Exam	
			Project (Display & Viva)	Exam (Practical)
Weightage (%)	5	25	30	40

(A-Attendance; PT- Portfolio; HA-Home Assignment; CT-Class Test)

Text & References:

Text:

- Art Now, Herbertb Read
- Sculpture Today, Kinston parker

References:

- History of Sculpture, George Henry Chase and Chander Rathform.
- Four steps towards


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PORTRAITURE SCULPTURE-III

Course Code: FNA4312

Credit Units: 08

Course Objective:

This is to provide about working on realistic sculpture.

Course Contents:

Module I

Realistic study work supported by preparatory studies and techniques.

Examination Scheme:

Components	A	PT / HA / CT	End Term Exam	
			Project (Display & Viva)	Exam (Practical)
Weightage (%)	5	25	30	40

(A-Attendance; PT- Portfolio; HA-Home Assignment; CT-Class Test)

Text & References:

Text:

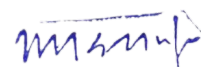
- Art Now, Y Herbert Read
- Sculpture Today, Kinston parker

References:

- History of Sculpture. George Henry Chase and Chander Rathform.
- Four steps towards



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MURAL (SCULPTURE) - III

Course Code: FNA4313

Credit Units: 08

Course Objective:

The objective of this course is to provide advanced techniques of working knowledge on wall surface. It gives a professional exposure about all kinds of mural work including mixed materials.

Course Contents:

Module I

Preparing suitable layout for mural followed by modification required according to the materials to be used.

Module II

Preparing the base and surface.

Module III

Final work followed by the installation.

Examination Scheme:

Components	A	PT / HA / CT	End Term Exam	
			Project (Display & Viva)	Exam (Practical)
Weightage (%)	5	25	30	40

(A-Attendance; PT- Portfolio; HA-Home Assignment; CT-Class Test)

Text & References:

- Ajanta Murals, Indian Archeology Dept.
- Techniques of Indian paintings and Murals, Indian Archeology Dept.
- Decorative Murals, Donna Dewberry


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ART CRITICISM (SCULPTURE) - I

Course Code: FNA4315

Credit Units: 03

Course Objective:

The objective of this course is to provide Critical Study of Art.

Course Contents:

Module I

Importance and necessary criticism. Evaluation of art works.

Module II

Understanding of Modern and post modern art trends in eastern and western of view.

Examination Scheme:

Components	CT	P	A	EE
Weightage (%)	15	10	5	70

(A-Attendance; P-Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination; PT- Portfolio)


Text & References:

Text:

- Civilization of Mankind, Van Loon
- History of Art, Janson
- Art through the ages, Helen Gardener
- Concise History of Art-Vols. 1 & 2, Germain. Bazin.

References:

- Fundamental of Indian Art, S. N. Dasgupta
- Art of Mankind, Van Loon
- History of Indian and Indonesian Art, A. K. Coomaraswamy
- The Art and Architecture of Indian, Benjamin Rowland.
- The Story of Indian Art, S. K. Bhattacharya.
- 5000 Years of Indian Art, Shivaramaurti
- A History of Fine Arts in India and West, Edith Tomory
- Introduction of Chinese Art, Lawrence Binyon
- History of Indian and Indonesian Art, Benjamin Rowland.
- Concise History of Art Vols. 1&2, Germain Bazin
- Italian Painters of the Renaissance, Bernard Berenson
- Art Now, Herbert Read
- Grassroot of Art, Herbert Read.
- History of Modern Art, H. H. Arnason.


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DISSERTATION AND VIVA - II

Course Code: FNA4437

Credit Units: 06

Course Objective:

This course is to continue the research work to put the collected materials together for developing the body of the dissertation on the particular subject.

Putting up the necessary photographs, reproductions with the text materials.

Course Contents:

Module I

Preparing the final paper along with necessary photographs, reproductions with detail information.


Module II

- a. Submission of printed dissertation paper.
- b. Reviewing dissertation paper.

Examination Scheme:

Components	PR	PS	V
Weightage (%)	70	15	15

(V-Viva; PR-ProjectReport; PS-Presentation)


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VISUALIZATION - IV

Course Code: FNA4401

Credit Units: 08

Course Objective:

Encouraging a cross-disciplinary studio environment in which the workshop is a lab to collaboratively explore design and making processes, the Program welcomes students from a wide range of creative backgrounds to make original work with an applied purpose. Applied art transform ideas into symbols to convey specific messages for and in the public.

Course Contents:

Module I: Preparation of a project and presentation

This subject focuses on defining, researching and producing a project work with a formal structure for research and exploration in deciding upon any one topic chosen by the students. These projects are formally presented by all MFA students reflecting on their time and experience within the Program.


Examination Scheme:

Components	A	PT / HA / CT	End Term Exam	
			Project (Display & Viva)	Exam (Practical)
Weightage (%)	5	25	30	40

(A-Attendance; PT- Portfolio; HA-Home Assignment; CT-Class Test)

Text & References:

- The Art of Human Illustration, Nick Meglin,
- Corporate Graphics, Mike Quon
- A History of Graphic Design, Philip B Meggs,
- Graphic Arts Manual, Irwing E. Field, Arne Press, New York, 1980
- Design Graphics, C. L. Martin, Macmillan Co. London


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GRAPHIC DESIGNING - IV

Course Code: FNA4402

Credit Units: 08

Course Objective:

Understanding of graphic designing for campaign for media & develop skill for portfolio presentation.

Course Contents:

Module I

Conceptual campaign for any brand/social issue

Module II

Portfolio Development and presentation

Examination Scheme:

Components	A	PT / HA / CT	End Term Exam	
			Project (Display & Viva)	Exam (Practical)
Weightage (%)	5	25	30	40

(A-Attendance; PT- Portfolio; HA-Home Assignment; CT-Class Test)


Text & References:

Text:

- Graphic design & reproduction techniques, Peter Croy
- Artists and illustration's encyclopedia, John Quick

References:

- The Art of Human Illustration, Nick Meglin,
- Corporate Graphics, Mike Quon
- A History of Graphic Design, Philip B Meggs,
- Graphic Arts Manual, Irwing E. Field, Arne Press, New York, 1980
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TV GRAPHICS - IV

Course Code: FNA4403

Credit Units: 08

Course Objective:

The design for programmes, station identify signs, symbols, commercial advertisements, trade marks and short films etc.

Course Contents:

Module I

The design for programmes, station identify signs, symbols, commercial advertisement, trade marks and short films etc.

Examination Scheme:

Components	A	PT / HA / CT	End Term Exam	
			Project (Display & Viva)	Exam (Practical)
Weightage (%)	5	25	30	40

(A-Attendance; PT- Portfolio; HA-Home Assignment; CT-Class Test)

Text & References:

Text:

- Graphic design & reproduction techniques, Peter Croy
- Artists and illustration's encyclopedia, John Quick

References:

- The Art of Human Illustration, Nick Meglin,
- Corporate Graphics, Mike Quon
- A History of Graphic Design, Philip B Meggs,
- Graphic Arts Manual, Irwing E. Field, Arne Press, New York, 1980
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ILLUSTRATION - IV

Course Code: FNA4404

Credit Units: 08

Course Objective:

Illustration for books meant for different age groups. Comprehensive illustration for book animation.

Course Contents:

Module I

Advance studies in illustration for graphic expression. Emphasis on forming of individual style in illustration, cartooning.

Examination Scheme:

Components	A	PT / HA / CT	End Term Exam	
			Project (Display & Viva)	Exam (Practical)
Weightage (%)	5	25	30	40

(A-Attendance; PT- Portfolio; HA-Home Assignment; CT-Class Test)


Text & References:

Text:

- Graphic design & reproduction techniques, Peter Croy
- Artists and illustration's encyclopedia, John Quick

References:

- The Art of Human Illustration, Nick Meglin,
- Corporate Graphics, Mike Quon
- A History of Graphic Design, Philip B Meggs,
- Graphic Arts Manual, Irwing E. Field, Arne Press, New York, 1980
- Design Graphics, C. L. Martin, Macmillan Co. London


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ADVERTISING AND BUSINESS ORGANIZATION - II

Course Code: FNA4405

Credit Units: 03

Course Objective:

The objective of this course includes instruction in International advertising, visual communication, advertising design and production methods, campaign methods and techniques, Advertising messages, related principles of creative process, and applicable technical and equipment skills

Course Contents:

Module I: The Effective Advertising Messages

The Art and Science of Creative Advertising

Creative thinking

The creative process: How to get an Idea

Creative Strategy: Message Objective, Head and Heart Strategies, Messages that drive perception, Message that touches emotions, Message that persuade.

Module II: Visual Communication

Visual Impact

Layout and Design

Print Production: Print Media Requirement, Art Production

Effective Web Design

Module III: International Advertising

Importance of international Markets

Role of International Advertising

Advantages and disadvantages of global Marketing and Advertising

Decision Areas in International Advertising

Module IV: Evaluating the Social, Ethical and Economic Aspect of Advertising

Social and Ethical Criticism of Advertising

Economic Effects of Advertising

Module V: Brand Management

Brands and their Significance: Attributes, Benefits, Values, Target User, Personality, Culture,

Categories of Brands

Brand equity: Managing Brand Equity

Brand Loyalty: Brand Associations

International Branding Considerations

Examination Scheme:

Components	CT	P	A	EE
Weightage (%)	15	10	5	70

(A-Attendance; P-Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination; PT- Portfolio)

Text & References:

- Innovation in Marketing, T, Levit.
- Environment of Marketing Behaviour, Halloway and Hawrock.
- Advertising Hand Book, D. V. Gandhi
- Modern Advertising, Hepner
- Economic of Advertising, B. Chiplin
- International Handbook of Advertising
- Advertising Procedure, Kleppner's.
- Advertising Management, Donald R. Cooper, PamelaS. Schindler

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DRAWING - IV

Course Code: FNA4406

Credit Units: 08

Course Objective:

This course of drawing is in the final stage of learning in an art institute. Students are provided required space and freedom to express themselves. The drawings to be executed in this stage to focus on confined and individual perception. The drawings may be creating in a series, therefore, all the drawings to have a kind of continuation. This stage is after experimenting various techniques and possibilities of using different mediums for exploring individual and innovative ideas. Working in one particular style and media is advisable in this stage.

Course Contents:

Module I: Creative Sketching

Making layouts

Module II: Creative Drawing

Drawing figurative / non-figurative compositions.

Examination Scheme:

Components	A	PT / HA / CT	End Term Exam	
			Project (Display & Viva)	Exam (Practical)
Weightage (%)	5	25	30	40

(A-Attendance; PT- Portfolio; HA-Home Assignment; CT-Class Test)

Text & References:

- An Introduction to Drawing, James Horton in association with the Royal Academy of Arts.
- Grassroot of Art, Y. Herbert Read
- How to draw and paint, Hazel Harrison, from Art School
- Human Figure, Walter Foster
- Anatomy, Walter Foster
- Heads, Walter Foster
- Figure Drawing, Patricia Monahan with Albany Wiseman
- Human Anatomy, James Horton
- Big book of Drawing and painting, Francisco Asensio Cerver.


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CREATIVE PAINTING - IV

Course Code: FNA4407

Credit Units: 08

Course Objective:

The course emphasizes the development of a sustained artistic practice through exploration, experimentation, and intensive studio work and study. Opportunities to investigate areas beyond one's concentration are made available.

The course is also to refine the technical aspect like developing individual style of colour application and introduce new treatment of theme and concept as reflection of life experience and social awareness.

This is to render conceptual art to explore new media of creative art like installation art or video art.

Course Contents:

Module I

Painting in oil / acrylic colour on canvas (figurative /non-figurative).

Module II: Installation/video art

Creating conceptual art in installation/video art medium.


Examination Scheme:

Components	A	PT / HA / CT	End Term Exam	
			Project (Display & Viva)	Exam (Practical)
Weightage (%)	5	25	30	40

(A-Attendance; PT- Portfolio; HA-Home Assignment; CT-Class Test)

Text & References:

- Big book of drawing and painting, Francisco Asensio Cerver
- Notes on the techniques of Painting, Hilaire Hiler
- Method and Materials, Lynton Lamb.
- Artist's Handbook, Ray Smith
- Artist's Encyclopedia, John Quick
- A manual of Painting Materials & Techniques, Mark David Goattsegen
- Art Class, Copy Right 1999, Harper Collins Publishers.
- Images of the human body, Pepin Van Roojen.
- A Concise History of Modern Painting, 1974 Thames & Hudson, London
- Painting Course, Ronald Pearsall
- The portrait, Norbert Schneider.
- Color, Edith Anderson Feisner.


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MURAL (PAINTING) - IV

Course Code: FNA4408

Credit Units: 08

Course Objective:

The objective of this course is to provide advanced techniques of working knowledge on wall surface. It gives a professional exposure about all kinds of mural work including mixed materials.

Course Contents:

Module I

Preparing suitable layout for mural followed by modification required according to the materials to be used.

Module II

Preparing the base and surface.

Module III

Final work followed by the installation.

Examination Scheme:

Components	A	PT / HA / CT	End Term Exam	
			Project (Display & Viva)	Exam (Practical)
Weightage (%)	5	25	30	40

(A-Attendance; PT- Portfolio; HA-Home Assignment; CT-Class Test)

Text & References:

- Ajanta Murals published by Indian Archeology Dept.
- Techniques of Indian paintings and Murals published by Indian Archeology Dept.
- Decorative Murals by Donna Dewberry


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PORTRAITURE - IV

Course Code: FNA4409

Credit Units: 08

Course Objective:

The objective of this course is to provide advanced training on portrait painting exploring all mediums.

Course Contents:

Module I

Portrait study in oil on canvas.

Examination Scheme:

Components	A	PT / HA / CT	End Term Exam	
			Project (Display & Viva)	Exam (Practical)
Weightage (%)	5	25	30	40

(A-Attendance; PT- Portfolio; HA-Home Assignment; CT-Class Test)


Text & References:

Text:

- Big book of Drawing and painting, Francisco Asensio Cerver

References:

- An Introduction to Drawing, James Horton in association with the Royal Academy of Arts.
- Grassroot of Art, Herbert Read
- How to draw and paint, Hazel Harrison ,from Art School
- Human Figure, Walter Foster
- Anatomy, Walter Foster
- Heads, Walter Foster
- Figure Drawing, Patricia Monahan with Albany Wiseman
- Human Anatomy, James Horton


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ART CRITICISM (PAINTING) - II

Course Code: FNA4410

Credit Units: 03

Course Objective:

The objective of this course is to provide Critical Study of Art.

Course Contents:

Module I

History of criticism, Development of Art History as Human Discipline, Visual Analysis and Psycho-analytic point of View on Art.

Module II

Critical References on Painting and Sculpture (Indian and Western)

Examination Scheme:

Components	CT	P	A	EE
Weightage (%)	15	10	5	70

(A-Attendance; P-Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination; PT- Portfolio)


Text & References:

Text:

- Civilization of Mankind, Van Loon
- History of Art, Janson
- Art through the ages, Helen Gardener
- Concise History of Art-Vols. 1 & 2, Germain. Bazin.

References:

- Fundamental of Indian Art, S. N. Dasgupta
- Art of Mankind, Van Loon
- History of Indian and Indonesian Art, A. K. Coomaraswamy
- The Art and Architecture of Indian, Benjamin Rowland.
- The Story of Indian Art, S. K. Bhattacharya.
- 5000 Years of Indian Art, Shivaramaurti
- A History of Fine Arts in India and West, Edith Tomory
- Introduction of Chinese Art, Lawrence Binyon
- History of Indian and Indonesian Art, Benjamin Rowland.
- Concise History of Art Vols. 1&2, Germain Bazin
- Italian Painters of the Renaissance, Bernard Berenson
- Art Now, Herbert Read
- Grassroot of Art, Herbert Read.
- History of Modern Art, H. H. Arnason.


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SPECIALIZATION - SCULPTURE

CREATIVE DRAWING - IV

Course Code: FNA4411

Credit Units: 08

Course Objective:

This course of drawing is in the final stage of learning in an art institute. Students are provided required space and freedom to express themselves. The drawings to be executed in this stage to focus on confined and individual perception. The drawings may be creating in a series, therefore, all the drawings to have a kind of continuation. This stage is after experimenting various techniques and possibilities of using different mediums for exploring individual and innovative ideas. Working in one particular style and media is advisable in this stage.

Course Contents:

Module I: Creative Sketching

Making layouts

Module II: Creative Drawing

Drawing figurative / non-figurative compositions.


Examination Scheme:

Components	A	PT / HA / CT	End Term Exam	
			Project (Display & Viva)	Exam (Practical)
Weightage (%)	5	25	30	40

(A-Attendance; PT- Portfolio; HA-Home Assignment; CT-Class Test)

Text & References:

- An Introduction to Drawing, James Horton in association with the Royal Academy of Arts.
- Grassroot of Art, Y. Herbert Read
- How to draw and paint, Hazel Harrison, from Art School
- Human Figure, Walter Foster
- Anatomy, Walter Foster
- Heads, Walter Foster
- Figure Drawing, Patricia Monahan with Albany Wiseman
- Human Anatomy, James Horton
- Big book of Drawing and painting, Francisco Asensio Cerver.


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PORTRAITURE SCULPTURE-IV

Course Code: FNA4412

Credit Units: 08

Course Objective:

This is to provide about working on realistic sculpture.

Course Contents:

Module I

Realistic study work supported by preparatory studies and techniques.

Examination Scheme:

Components	A	PT / HA / CT	End Term Exam	
			Project (Display & Viva)	Exam (Practical)
Weightage (%)	5	25	30	40

(A-Attendance; PT- Portfolio; HA-Home Assignment; CT-Class Test)

Text & References:

Text:

- Art Now, Herbert Read
- Sculpture Today, Kinston parker

References:

- History of Sculpture, George Henry Chase and Chander Rathform.
- Four steps towards


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MURAL (SCULPTURE) - IV

Course Code: FNA4413

Credit Units: 08

Course Objective:

The objective of this course is to provide advanced techniques of working knowledge on wall surface. It gives a professional exposure about all kinds of mural work including mixed materials.

Course Contents:

Module I

Preparing suitable layout for mural followed by modification required according to the materials to be used.

Module II

Preparing the base and surface.

Module III

Final work followed by the installation.

Examination Scheme:

Components	A	PT / HA / CT	End Term Exam	
			Project (Display & Viva)	Exam (Practical)
Weightage (%)	5	25	30	40

(A-Attendance; PT- Portfolio; HA-Home Assignment; CT-Class Test)

Text & References:

- Ajanta Murals published, Indian Archeology Dept.
- Techniques of Indian paintings and Murals, Indian Archeology Dept.
- Decorative Murals, Donna Dewberry

CREATIVE SCULPTURE - IV

Course Code: FNA4414

Credit Units: 08

Course Objective:

This is to provide professional experience about working on sculpture using various materials.

Course Contents:

Module I

Abstract Composition supported by preparatory studies and techniques.

Examination Scheme:

Components	A	PT / HA / CT	End Term Exam	
			Project (Display & Viva)	Exam (Practical)
Weightage (%)	5	25	30	40

(A-Attendance; PT- Portfolio; HA-Home Assignment; CT-Class Test)

Text & References:

Text:

- Art Now, Herbert Read
- Sculpture Today, Kinston Parker

References:

- History of Sculpture, George Henry Chase and Chander Rathorn.
- Four steps towards

ART CRITICISM (SCULPTURE) - II

Course Code: FNA4415

Credit Units: 03

Course Objective:

The objective of this course is to provide Critical Study of Art.

Course Contents:

Module I

History of criticism, Development of Art History as Human Discipline, Visual Analysis and Psycho-analytic point of View on Art.

Module II

Critical References on Painting and Sculpture (Indian and Western)

Examination Scheme:

Components	CT	P	A	EE
Weightage (%)	15	10	5	70

(A-Attendance; P-Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination; PT- Portfolio)

Text & References:

Text:

- Civilization of Mankind, Van Loon
- History of Art, Janson
- Art through the ages, Helen Gardener
- Concise History of Art-Vols. 1 & 2, Germain Bazin.

References:

- Fundamental of Indian Art, S. N. Dasgupta
- Art of Mankind, Van Loon
- History of Indian and Indonesian Art, A. K. Coomaraswamy
- The Art and Architecture of Indian, Benjamin Rowland.
- The Story of Indian Art, S. K. Bhattacharya.
- 5000 Years of Indian Art, Shivaramaurti
- A History of Fine Arts in India and West, Edith Tomory
- Introduction of Chinese Art, Lawrence Binyon
- History of Indian and Indonesian Art, Benjamin Rowland.
- Concise History of Art Vols. 1&2, Germain Bazin
- Italian Painters of the Renaissance, Bernard Berenson
- Art Now, Herbert Read
- Grassroot of Art, Herbert Read.
- History of Modern Art, H. H. Arnason.


PAINTING ARTS

Programme Structure-2021

Course Code	Course Title	Lectures (L) Hours per week	Tutorial (T) Hours per week	Practical (P) Hours per week	Total Credits
FNA2151	Basics of Drawing and Asian Landscape	1	-	4	3
FNA2251	Basics of Drawing and Monochrome Folk Composition	1	-	4	3
FNA2351	Advanced Drawing and Illustration of Indian Temple Sculpture	1	-	4	3
FNA2451	Advanced Drawing with Ink & Brush Illustration	1	-	4	3
FNA2551	Advanced Drawing & Illustration with Mural Art	1	-	4	3
FNA2651	Advanced Drawing & Illustration with Visual Design	1	-	4	3
	TOTAL				18



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PAINTING ARTS

Syllabus - Semester First

BASICS OF DRAWING AND ASIAN LANDSCAPE

Course Code: FNA2151

Credit Units: 03

Course Objective:

Drawing is the basic element of learning art. Drawing exercises are to acquire accurate sense of observation and skills to present representational art. Also the objective of this course is to acquire experience in basic knowledge to explore painting techniques too. Structured exercises on painting include basic colour theory and pictorial composition, which enables students to be confident in the use and manipulation of colour. It also provides a clear idea of different painting practices. Like water colours and opaque colours.

Course Contents:

Module I: Basics of Drawing

Object drawing to explore basic drawing tool 'Pencil'. Suggestion of solidity by line work as well as light and shade, realization for rhythmic relationship between lines, mass, volume and texture, emphasis on various visual experiences. Quick Sketching to increase hand eye coordination and improving vision and observation skills.

- a) Learning basic elements of drawing.
- b) Object drawing.

Module II: Asian Landscape

Landscape drawing and rendering using pencil, charcoal pencil or colour pencils. Understanding the basic fundamentals of Asian style landscapes.

Works to be done:

- 1. Sketches – 5
- 2. Landscape-5

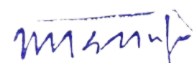
Examination Scheme:

Components	PT	CT	A	EE (Practical)
Weightage (%)	10	15	5	70

(A-Attendance; P-Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination; PT- Portfolio)



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Syllabus - Semester Second

BASICS OF DRAWING AND MONOCHROME FOLK COMPOSITION

Course Code: FNA2251

Credit Units: 03

Course Objective:

Drawing is the basic element of learning art. Drawing exercises are to acquire accurate sense of observation and skills to present representational art. Also the objective of this course is to acquire experience in basic knowledge to explore Indian folk painting style & techniques too. Structured exercises on painting include basic colour theory, theme and pictorial composition, which enables students to be confident in the use and manipulation of colour of the folk traditions also provides a clear idea of different folk painting practices.

Course Contents:

Module I: Basics of Drawing

Object drawing to explore basic drawing tool 'Pencil'. Suggestion of solidity by line work as well as light and shade, realization for rhythmic relationship between lines, mass, volume and texture, emphasis on various visual experiences. Quick Sketching to increase hand eye coordination and improving vision and observation skills.

- a) Learning basic elements of drawing.
- b) Object drawing.

Module II: Monochrome Folk Composition

Indian folk style paintings in monochrome colours using any 2 mediums.

Works to be done:

1. Sketches – 5
2. Folk Paintings-5

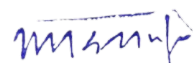
Examination Scheme:

Components	PT	CT	A	EE (Practical)
Weightage (%)	10	15	5	70

(A-Attendance; P-Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination; PT- Portfolio)



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Syllabus - Semester Third

ADVANCED DRAWING AND ILLUSTRATION OF INDIAN TEMPLE SCULPTURE

Course Code: FNA2351

Credit Units: 03

Course Objective:

Drawing is the basic element of learning art. Drawing exercises are to acquire accurate sense of observation and skills to present representational art. Also the objective of this course is to acquire experience in basic knowledge to explore temple art & techniques too. It also provides a clear idea of different illustration/painting techniques. Also understanding the structural formation of objects as well as architectural structures is to be taught.

Course Contents:

Module I:

Quick Sketching to increase hand eye coordination and improving vision and observation skills.

- a). Indian sculpture drawing like Buddhashirsha, dancing girl of Mohenjo-Daro
- b) Ancient architectural composition like Kailas temple, Konark temple

Module II: Illustration of Indian Temple Sculpture

Illustrations and drawings related to the Indian Temple Sculpture of whole India. Understanding the various parts and formation along with architectural structure.


Works to be done:

- 1. Sculpture drawing – 05
- 2. Indian Architectures composition -- 05

Examination Scheme:

Components	P	CT	A	EE
Weightage (%)	10	15	5	70

(A-Attendance; P-Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination; PT- Portfolio)


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Syllabus - Semester Fourth

ADVANCED DRAWING WITH INK & BRUSH ILLUSTRATION

Course Code: FNA2451

Credit Units: 03

Course Objective:

Illustration and composition is the basic element of learning art. Drawing exercises are to acquire accurate sense of observation and skills to present representational art. Also the objective of this course is to acquire experience in basic knowledge to explore illustrative techniques too. It also provides a clear idea of different Illustration style & techniques with ink and brush. Like transparent colours and opaque colours.

Course Contents:

Module I: Illustration and Composition

Quick Sketching to increase hand eye coordination and improving vision and observation skills.

- Theme based figure composition in ink
- Poster making composition for social cause.

Module II: Ink and color Composition

Illustrations and composition using ink and color. Both single & multi-colour techniques.

Works to be done:

- Illustration and Composition -- 05
- Ink and color Composition --05

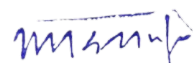
Examination Scheme:

Components	P	CT	A	EE
Weightage (%)	10	15	5	70

(A-Attendance; P-Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination; PT- Portfolio)



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Syllabus - Semester Fifth

ADVANCED DRAWING & ILLUSTRATION WITH MURAL ART

Course Code: FNA2551

Credit Units: 03

Course Objective:

Drawing is the basic element of learning art. Drawing study of human figure based on proportion, masses, specific feature and character using various media with emphasize on manner of finished execution. Structured exercises on mural painting include basic Indian style application and composition, which enables students to be confident in the use and manipulation of Indian mural themes, style & techniques. Mural Art techniques are taught to liberate the students in context of mediums of expression.

Course Contents:

Module I: Life Study

Life study and figurative composition using different mediums of drawing.

- Quick Sketching of Human Figure
- Figure drawing Composition

Module II: Mural

Illustrations and drawing as murals on wall or board in single/multi-colour.

Works to be done:

- Sketches – 05
- Mural - 1

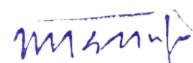
Examination Scheme:

Components	PT	CT	A	EE (Practical)
Weightage (%)	10	15	5	70

(A-Attendance; P-Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination; PT- Portfolio)



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Syllabus - Semester Sixth

ADVANCED DRAWING & ILLUSTRATION WITH VISUAL DESIGN

Course Code: FNA2651

Credit Units: 03

Course Objective:

Drawing is the basic element of learning art. Drawing exercises are to acquire accurate sense of observation and skills to present representational art. Practice figurative drawing through observation. Also the objective of this course is to acquire experience in basic knowledge to explore illustration as well as visual design styles & techniques too. It also provides a clear idea of different design techniques and mediums. Other techniques like visual design are taught to help them develop a visual sense of design in general.

Course Contents:

Module I: Life Study

- a) Figure Sketching
- b) Life study and figurative composition using different mediums of drawing.

Module II: Illustration with Visual Design

- a) Illustrations and drawings using the basic elements of Visual Design along with developing a better sense of color & form coordination to represent the subject.
- b) Creative composition exercise based on individual layouts using various painting mediums.


Works to be done:

1. Drawings – 05
2. Illustrations – 1
3. Painting - 1

Examination Scheme:

Components	PT	CT	A	EE (Practical)
Weightage (%)	10	15	5	70

(A-Attendance; P-Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination; PT- Portfolio)


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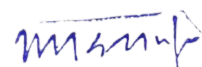
ANIMATION

Programme Structure-2021

Course Code	Course Title	Lectures (L) Hours per week	Tutorial (T) Hours per week	Practical (P) Hours per week	Total Credits
ANI2152	Introduction to Multimedia and its Application	2	-	2	3
ANI2252	Creating 2D Animation	2	-	2	3
ANI2352	3D Modeling & Texturing	1	-	4	3
ANI2452	Maya Modeling & Texturing	1	-	4	3
ANI2552	Scripting & Storyboarding	1	1	2	3
ANI2652	VFX	2	-	2	3
	TOTAL				18



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ANIMATION

Syllabus - Semester First

ANI2152	INTRODUCTION TO MULTIMEDIA & ITS APPLICATION	L	T	P	C
Version	2021	2	-	2	3
Pre-requisites/ Exposure	Basic computer skills				
Co-requisites	None				

Catalog Description

Students will learn the basic concepts and skills required to develop effective graphics for the Web and various business publications. Students will learn the basic tools used in Adobe Photoshop/Illustrator to create and edit images. Students will learn how to optimize images and save images in proper file formats. Students will learn color selection and conversion as it relates to both Web and business publications. Techniques of digital image capture and photo retouching will also be explored.

Course Objectives

The objective of this course is-

- To teach the idea about screen resolution, picture assembling and color combination.
- To train the basic element which are used in creating a design/logo/creative work
- To teach the tools of image editing, drawing and special effects.
- To guide the logic behind imagination or visualization of creative ideas and graphics using Adobe Photoshop & Illustrator.

Course Outcomes

On completion of this course, the students will be able to

- CO1. Create poster, leaflets, logo or design the given reference object or self-visualize poster for Visual Communication.
- CO2. Create advertisement for digital and print media.
- CO3. Develop their graphic designs and desk-top publishing.
- CO4. Manipulate professional photographs and images.

Course Content

Modules	Blooms level*	Number of hours
MODULE 1: Graphics using line, Graphics by combining basic shapes. Make a perfect crop-ping of some images using Photoshop. Prepare a cut-out of images using Photoshop; use background for images. Colour adjustment of images. Convert a B & W image into colour.	L1, L2	12
MODULE 2: Vector Graphics (Designing, Color Theory, Vector Designing & Editing, Text Formatting): Interface: working with menus, toolbars, Dockers. Document Setup: Setting Page Size & Orientation, Document Navigation Rulers & Guide-lines:	L3	18

<p>Status Bar.</p> <p>Text: Formatting, Text Layout, Skewing and rotating, Creating drop shadow, Text to Path, Extruding text. Objects: Grouping & locking objects, Combining & breaking apart, Transforming & Shaping, Cutting objects apart, Trim, weld & Intersection of objects.</p> <p>Lines & Curves: Using freehand & Bezier tool, Line properties, Arrowheads Eraser & artist media tools Nodes & Paths.</p> <p>Color& Fills: Solid Color, Color Palettes, Eyedropper & Paint bucket, Fountain, Fills, Patterns, Texture Fills, Interactive Mesh Fill. Special effects: Envelopes, Blends, Perspective, Shadow Objects, Power clip Command, Transparency, Distortion, Contour, Lens Docker. Complex Shapes: Polygon & Stars</p> <p>Spirals Printing Menu.</p>		
<p>MODULE 3:</p> <p>Raster Graphics (Designing, Color Theory, Raster Designing & Editing, text Formatting: Adobe Photoshop, Colour modes, Colour, Using the tools, Selecting and using a tool from the toolbox, Using the tool options bar and other palettes, Customizing the workspace, Using Photoshop Help, Viewing and editing files in Adobe Bridge, Embedding information for easy identification, Automating routine tasks, Resolution and image size, Straightening and cropping an image, Making automatic adjustments, Manually adjusting the tonal range, Replacing colors in an image, etc.</p>	L4, L6	18

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Text books:

- Annesa Hartman (2009), *Exploring Adobe Illustrator CS4*, United States, Cengage Learning, Inc
- Andrew Faulkner and Conrad Chavez (2018), *Adobe Photoshop CC Classroom*, San Francisco: Adobe Press.

References books:

- Jim Krause (2004), *Design basic Index*, United States : HOW Books

Modes of Evaluation: Class Test/ Assignment/ End Term Examination/ Case Presentation Examination Scheme:

Components	P	C	CT	A	EE	
					Practical	Theory
Weightage (%)	5	10	10	5	20	50

P- Project, C- Case Discussion/Presentation/Analysis, CT- Class Test, A- Attendance, EE- End Semester Examination

CO, PO and PSO Mapping

	PO1	PO2	PO3	PO4	PSO1	PSO2	PSO3	PSO4
CO1	1	--	1	1	1	1	--	--
CO2	--	1	--	1	1	--	--	1
CO3	--	--	1	1	--	1	--	1
CO4	1	1	1	--	--	1	1	1

1: Strongly Related, 2: Moderately Related and 3: Weakly Related

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Syllabus - Semester Second

ANI2252	CREATING 2D ANIMATION	L	T	P	C
Version 1	2021	2	-	2	3
Pre- requisites/Exposure					
Co-requisites					

Catalog Description

This course introduces students to the art and concept of two dimensional or 2D computer animation. 'D' stands for dimension and refers to animation which is conducted on a two- dimensional plane, unlike the real world where everything is seen and experienced on a three dimensional plane. This course primarily focusses on the theoretical aspects of two dimensional animation and is reinforced through many hours of hands-on lab training designed to right from the start, train the students to be industry ready. The intention of this course is to provide a gradual introduction to animation concepts which are further refined in semester III, when the students will delve into 3D animation

Course Objectives:

The objective of this course is to:

- Enable the students to comprehend principles of animation using a field based approach
- To familiarize students with all aspects of software, both at the beginner as well as advanced level
- To instill in the students such a level of confidence that they can tackle projects at a near professional level by having a holistic knowledge of all software related to 2D animation.

Course Description

This course covers all aspects of two-dimensional animation, normally known as '2D' animation in industry jargon. Beginning from first principles of animation like scaling, exaggeration, squash and stretch etc., they move on to first becoming familiar with different graphical interfaces as well as learning an eclectic mix of software that equip them with tools needed to create the kind of creative content that they wish to create.

The course is graded in terms of intensity as well as complexity and considerable emphasis is placed on design and typographic basics that form building blocks of good animation.

Course Outcomes:

On completion of this course, the students will be

CO1. Completely proficient with all aspects of at least two 2D animation software, notably Adobe Animate CC (now Animate) and Adobe After Effects

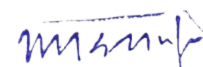
CO2. Be able to visualise, script, storyboard and create smart and relevant 2D animations

CO3. Be able to produce quality motion graphics for the Television Industry using a variety of 2D animation tools and third party plug-ins.

CO4. Be able to work in a team delegating different aspects of production to team members and also exchange notes and monitor each others work, so that professional quality work can be outputted and exported.



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Course Content

Modules	Blooms level*	Number of hours
MODULE 1: Fundamentals of Animation What is animation? How is 2D animation different from other forms of animation. How are Animate CC and After Effects different from drawing and 3D packages? The various components that will be covered in Module I are: <ul style="list-style-type: none"> • The Animate CC Interface • Animate CC tools and menu commands • Animate CC and Photoshop – an integrated workflow • Frame-by-frame animation in Animate CC • Onion skinning – why it is needed • Exploring the Timeline • Animating through action script • Motion tweening in Animate CC 	L1, L2	8
MODULE 2: After Effects: The Industry package This Unit moves out from the Animate CC interface, tools and dialogues into the domain of After effects. Since this package is used heavily by the Television Industry, many examples from this medium will be used to illustrate hard-to-grasp concepts. Various components of After Effects that will be taught in this module are: <ul style="list-style-type: none"> • The After Effects interface: Moving about and navigation in AfterEffects • AE tools and panels; how to customise and optimise them • Keyboard shortcuts - how to use and customize • Creating your first composition • The Timeline - navigation, panels and scope of the timeline • Project windows and assets; moving assets from project to timeline • Use of keyframes to create simple animations • Illustration of first principles of animation - ease in, out and ease • Frame rates, speeding up and slowing down of animation - using the Graph editor • Rendering and compression concepts; Different kinds of movie formats • Outputting your first movie; Settings and how they can be tweaked 	L2, L3	5
MODULE 3: After Effects and Animate – Intermediate This unit is a continuation of the earlier unit. Here we go into greater depth of the various tools, filters effects and presets that can be used. Round tripping between After Effects and Animate as well as importing assets from various different format types (Photoshop as well as Illustrator Files) are discussed and explained. Since After Effects is known as a 2.5 type animation, this concept is explained; how After Effects although it is a straight 2D package, can simulate 3D and the illusion of 'fake depth' by using cameras, lights and third party effects such as Element 3D. Students are expected at the end of	L2, L3	8

this unit to design their own logos and animate them in this software package		
MODULE 4: Post-Production In this Module, all the salient features of both Animate and After Effects are recapped and similarities and differences discussed. In this module very little theory is imparted. Students are expected to prepare a comprehensive Animate CC and After Effects project each, which is closely monitored and supervised by the faculty in charge. The goal is to get the students as industry ready as possible and to ensure that at least one professional looking project in both software packages is designed and executed.	L3, L4	6

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Text Books

- Williams, Richard. *The Animation Survival Kit*. Expanded Ed. 2009.
- Whitaker, Harold. *Timing for Animation*. Focal Press, 2002

Reference Books

- Schenk, Sonja. Long, Ben. *The Digital Filmmaking Handbook*. Fourth Edition.
- Gyncild, Brie. *Adobe After Effects CC: Classroom in a Book : the Official Training Workbook from Adobe Systems*. 2014 Ed.

Modes of Evaluation: Practical/ Home Assignment/ Class Test/ Written Examination
Examination Scheme:

Components	P	CT	A	EE
Weightage (%)	10	15	5	70

P: Project, CT: Class Test, EE: End Semester Examination; A: Attendance

CO, PO and PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	2	1	3	..	..	..	1	1	1	3
CO2	1	2	3	3	..	..	..	1	1	1	3
CO3	1	2	1	3	..	..	..	1	3	1	3
CO4	1	1	3	1	2	3	1	1
CO5

1: Strongly Related, 2: Moderately Related and 3: Weakly Related



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Syllabus - Semester Third

ANI2352	3D MODELING & TEXTURING	L	T	P	C
Version	JULY 2021	1	-	4	3
Pre-requisites/Exposure	Basic understanding of computer and software interface				
Co-requisites					

Catalog Description

This course is the introduction to the 3d computer graphics world. In this course students will get to know about the possibilities of the 3d art and design. Student will start from the very basics of creating sphere, box, circle, line... etc

Course Objectives

The objective of this course is to

- To give a basic understanding of 3D visualization and to understanding how to start with Blender interface.
- To give hands on experience of Blender and create a foundation for the advance 3d visualization.
- To provide a detailed understanding of 3d character modeling.

Course Outcomes

On completion of this course, the students will be able to

CO1. Understand how 3d software interface work.

CO2. Learn various ways of modeling the objects.

CO3. Understand how character mesh flow help while animating and designing a character.

Course Content

Modules	Blooms level*	Number of hours
Module 1 Introduction to Blender 3d, Interface of Blender 3d, Basics of Blender 3dModeling, Exporting, Using the menus. Floating and docking, Using dragand drop feature, Introduction to different workspaces. Geometry, sub objects, Extruding, welding, bridging etc. Recognizing the workspaces.	L1, L3	24
Module 2 Introduction to modifiers and modifier gizmos. Familiarity with commonmodifier like bend, editpoly, Xform wave, lathe symmetry etc.	L1, L3	12
Module 3 This module focuses on the development of 3D interiors and environment. Use of different modelling techniques like sculpting and polygon modellingare explained with many real world references. Also how to use backgroundimages as references objects for creating the 3D model are explained and demonstrated in this module	L1, L3	12


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**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Text Books

- *John M. Blain (2019). The Complete Guide to Blender Graphics: Computer Modeling & Animation, Fifth Edition, Cloudtail India*

Reference Books

- Kelly L. Murdock (2014). *Autodesk 3ds Max Bible*, India: Wiley
- Dariush Derakhshani (2007). *Introducing 3Ds Max 9: 3D for Beginners*, India: Wiley

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	HA	CT	A	EE
Weightage (%)	10	15	5	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

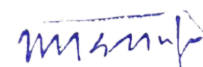
CO, PO and PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 1	PSO 2	PSO 3	PSO 4
CO1	2	-	1	3	--	--	--	1	1	--	2
CO2	2	-	1	3	--	--	--	1	1	--	2
CO3	2	-	1	3	--	--	--	1	1	--	2

1: Strongly Related, 2: Moderately Related and 3: Weakly Related



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Syllabus - Semester Fourth

ANI2452	MAYA MODELING & TEXTURING	L	T	P	C
Version	JULY 2021	1	-	4	3
Pre-requisites/ Exposure	Basic skills of computer				
Co-requisites					

Catalog Description

Course introduces students to the foundations of character/object modeling & texturing which is the process of adding mesh and controls to a character that allows a creative model to animate it in a proper manner. The course prepared to candidate for an advanced work in 3-D modeling & Texturing. In this section, student will get an introductory look at the processes in Maya. Student will use a Project-based approach as we cover the fundamentals of Maya looks at commonly used tools, and talk about some time-saving tips and techniques gleaned from production experience.

Course Objectives

The objective of this course is-

- To train the proper knowledge of surfaces which used for modeling in TV serials, films and other commercials.
- To train the basic mesh flow system in modeling.
- To teach the tools of modeling, merit and demerit of modeling and designing.
- To guide the visualize the story and their character, assets and other part of design and then impart it in modeling through various tools of Maya software.

Course Outcomes

On completion of this course, the students will be able to

CO1. Model or design the given reference object or character for TV episodes and films.

CO2. Create and design the required models and color for advertisement project or any other commercials.

CO3. Develop their own show reel in 3D including modeling, coloring and texturing appropriate shading network.

CO4. Develop and represent the 3D models and environment on their own visualize story.

CO5. Manage and make any big project management in terms of man power requirement along with budgeting of big animation film project.

Course Content

Modules	Blooms level*	Number of hours
MODULE 1: Introduction to the interface of Maya. Hotkeys. Using the spacebar. Manipulating a view. Creating objects. Simple primitives. Lights, cameras, selecting objects, types of selection, single selection, adding and subtracting selection, edit menu selection options. Marquee selection, Lasso selection, selection mask	L1, L2	24
MODULE 2: Using hyper shade, relationship editor, hyper graph and outliner. The channel box. Duplicating objects, pivot points, introduction to snapping-2D snapping and 3D snapping. Using	L3, L6	15

layers. Introduction to textures and materials.		
MODULE 3: Modeling a 3D character, understanding edge flow of face and body in order to achieve a smoother bends while animating, unwrapping and texturing the character and understanding use of Photoshop while creating realistic textures.	L3, L6	12

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Text Books:

- Kelly L. Murdock (2015), *Autodesk Maya 2015*, Buchanan: SDC publishing LLC.

References:

- Lee Lanier (2012), *Maya Professional Tip and Techniques*, United States: John Wiley and Sons Publications.

Modes of Evaluation: Class Test/ Assignment/ End Term Examination/ Case Presentation

Examination Scheme:

Components	P	C	CT	A	EE	
					Practical	Theory
Weightage (%)	5	10	10	5	20	50

P- Project, C- Case Discussion/Presentation/Analysis, CT- Class Test, A- Attendance, EE- End Semester Examination

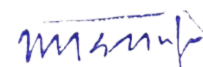
CO, PO and PSO Mapping

	PO1	PO2	PO3	PO4	PSO1	PSO2	PSO3	PSO4
CO1	1	1	--	1	1	1	1	1
CO2	1	1	--	1	1	1	1	1
CO3	1	1	--	1	1	--	--	1
CO4	1	1	--	1	--	--	--	1

1: Strongly Related, 2: Moderately Related and 3: Weakly Related



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Syllabus - Semester Fifth

ANI2552	SCRIPTING AND STORYBOARDING	L	T	P	C
Version 1	2021	1	1	2	3
Pre- requisites/Exposure					
Co-requisites					

Catalog Description

In this course, students learn the rudiments of scripting and storyboarding as well explore the differences between the different formats. They are introduced to the meaning of conceptualizing a treatment and style for a film, the differences between scripting for Ads and short films as compared to scripting for feature films as well as the different types of scripts like treatment, script, shoot and edit scripts, screenplays and finally meticulously prepared scripts which are better known as storyboards

Course Objectives:

The objective of this course is to:

- Help students improve their writing style, especially with reference to film, video and Internet
- Enable students to write creative and cohesive scripts in a variety of programme formats such as News bulletins, Ads, PSAs, promos, fiction and documentaries
- To build a sound foundational structure of film grammar so that they can translate filmic elements into narrative structures and visualise scenic elements with ease

Course Description

This course equips the learner with skills in three distinct areas. To polish their writing styles, structures and grammar so that the student can write not only well but also in a lexically and grammatically correct manner. The second objective is to build a sound theoretical foundational of filmic elements by deconstruction of popular scenes from films and expound on the principles behind the success of these scenes, so that the learner can translate prose elements into visual narratives. The third objective is to enable the learner to conceptualise, visualise and translate these abstract ideas into a concrete text in the form of storyboards and scripts – both shooting as well as edit scripts. The entire course takes the advantage of a huge repository of good audio visual material so that every theoretical construct can be supplemented and illustrated with examples drawn from filmic and broadcast domains.

Course Outcomes:

On completion of this course, the students will be

CO1. Able to write quickly effectively and well in a variety of styles

CO2. Be able to translate abstract ideas into shootable scenes

CO3. Be able to understand client briefs and producer requirements

CO4. Proficient at every aspect of writing for fiction and non-fiction

Modules	Blooms level*	Number of hours
MODULE 1: Pre-Production Research This unit focuses essentially of all aspects of pre-production. Methods of research, scouring for sources of material, collating and compiling material. Research indoors as well as outdoors. Preparing and completing a “rekky”, techniques of preliminary interview of people. Understanding the	L1, L2	6

requirements of the documentary or film are also covered in this module		
MODULE 2: Concept & Treatment In this module, students learn all about conceptualizing an idea, abstract concept, trying new and novel methods of treatment; Soliloquy; integrating one comprehensive document out of several different text material, and writing client specific briefs form the core of this module	L2, L3	4
MODULE 3: Fundamentals of Film Grammar This very important module unravels the mysteries of film shooting and filmic editing. The fundamentals of shot composition, camera angles, camera aesthetics, constructing and deconstructing a film. Dialogue creation; creative use of sound and optimizing the use of the sound studio, as well as techniques developed by the great masters of documentary and cinematic narrative, all form the backbone of this vitally essential module	L2, L3	8
MODULE 4: Writing the Script This module explains and teaches the actual writing process. How all the different ingredients of pre production research, visualization, film grammar and principles come together to form a compelling narrative. Students learn about writing prose, writing scene and shot descriptions, development of a character, plot points, diegetic and non-diegetic sound, meaning of climax, anti-climax and other structural elements that make up a well interwoven script	L2, L3, L5	8
MODULE 5: Screenplays and Storyboarding This is almost a completely practical unit, where students are taken through the entire process of writing a script and have to prepare on an individual basis scripts and storyboards in a variety of formats. Thus they have to prepare a script for a news bulletin; a storyboard for an Ad; A storyboard for a PSA; a script for non-fiction short film and one for a short documentary. Some of the exercises will be test exercises while others will be assessed and graded	L3, L4, L6	4

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Text Books

- King, Stephen. *On Writing: A Memoir of the Craft*. Simon and Schuster, 2012
- Douglas, Pamela. *Writing the TV Drama Series: How to Succeed as a Professional Writer in TV*. 2018

Reference Books:

- Truby, John. *The Anatomy of Story: 22 Steps to Becoming a Master Storyteller*. Faber and Faber, Inc. 2008
- Strunk Jr., William. White, E. *Elements of Style*. Fourth edition. 1999

Modes of Evaluation: Practical/ Home Assignment/ Class Test/ Written Examination
Examination Scheme:

Components	P	CT	A	EE
Weightage (%)	10	15	5	70

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P: Project, CT: Class Test, EE: End Semester Examination; A: Attendance

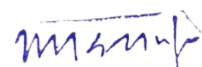
CO, PO and PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1											
CO2											
CO3											
CO4											

1: Strongly Related, 2: Moderately Related and 3: Weakly Related



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Syllabus - Semester Sixth

ANI2652	VFX	L	T	P	C
Version	2021	2	-	2	3
Pre- requisites/ Exposure					
Co-requisites					

Catalog Description

This VFX course will take you through the fundamental concepts of VFX Compositing in Nuke, and how to learn nuke the interface. The course is focused primarily on the 2D & 3D aspects of compositing to get you started. It involves replacing a background, color correcting and blending the foreground and background, motion tracking the background to the foreground, and seamlessly bringing it all together. And learn how to Render CGI in passes, footage, and all of the elements necessary to composite a CG shot.

Course Objectives

The objective of this course is to

- To impart working knowledge of Advance VFX & Compositing
- To impart knowledge into Compositing of 3D Passes and 3D motion tracking
- To Impart Knowledge of Rotoscoping & Color grading techniques

Course Outcomes (COs):

On completion of this course, the students will be able to

CO1. Create an Multi-pass CG compositing

CO2. Create 2D compositing using Rotoscoping.

CO3. Identify and describe VFX & Compositing.

Course Contents

Modules	Blooms level*	Number of hours
MODULE 1 – 2D Compositing & Rotoscoping <ul style="list-style-type: none"> • Additive color theory • Image formats / resolutions / colors • 2d Tracking • Rotopaint and Rotoscoping • Keyframe animation • Introduction to Chroma Keying / Greenscreen removal • Camera traits (Lens distortion, grain, sensor noise) • Cleanplating and removal 	L1, L2, L3	20
MODULE 2 – CGI Compositing <ul style="list-style-type: none"> • Matching color tones, darks, highlights of an image • Compositing elements / FX into a shot • Integrating a CGI (Computer Generated Image) render into areal scene • How to use the normals AOV to fine tune CG. • Use ID passes to correct different geometries 	L1, L3	20
MODULE 3 – Color Grading		

<ul style="list-style-type: none"> • Color correction / color grading techniques • Advanced Color Grading Techniques • Day to Night Tips and Techniques • Fundamentals of Light and Physics • Image Frequency Separation and Uses • Advanced Color Remap Techniques 	L1, L3	8
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**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Text Books

- Digital Compositing with Nuke (2012) : United Kingdom: Focal Press

Reference Books

- Nuke 101: Professional Compositing and Visual Effects (Digital Video & Audio Editing Courses) : Pearson

Modes of Evaluation: Class Test/ Assignment/ End Term Examination/ Case Presentation

Examination Scheme:

Components	H	C	CT	A	EE
Weightage (%)	10	-	15	5	70

CT: Class Test, H: Home Assignment, EE: End Semester Examination; A: Attendance; C:Case Presentation

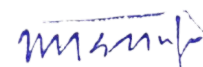
CO, PO and PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	1	1	--	2	--	--	2	2	1	2	3
CO2	1	1	--	2	--	--	3	--	1	2	--
CO3	1	1	--	2	--	--	3	--	1	2	--

1: Strongly Related, 2: Moderately Related and 3: Weakly Related



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Bachelor of Science - Animation & Visual Graphics

FLEXILEARN

-Freedom to design your degree



Programme Structure

Curriculum & Scheme of Examination

2022

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A handwritten signature in blue ink, appearing to read 'Manesar'.

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ANI2152	INTRODUCTION TO MULTIMEDIA & ITS APPLICATION	L	T	P	C
Version	2021	2	-	2	3
Pre-requisites/Exposure	Basic computer skills				
Co-requisites	None				

Catalog Description

Students will learn the basic concepts and skills required to develop effective graphics for the Web and various business publications. Students will learn the basic tools used in Adobe Photoshop/ Illustrator to create and edit images. Students will learn how to optimize images and save images in proper file formats. Students will learn color selection and conversion as it relates to both Web and business publications. Techniques of digital image capture and photo retouching will also be explored.

Course Objectives

The objective of this course is-

- To teach the idea about screen resolution, picture assembling and color combination.
- To train the basic element which are used in creating a design/logo/creative work.
- To teach the tools of image editing, drawing and special effects.
- To guide the logic behind imagination or visualization of creative ideas and graphics using Adobe Photoshop & Illustrator.

Course Outcomes

On completion of this course, the students will be able to


CO1. Create poster, leaflets, logo or design the given reference object or self-visualize poster for Visual Communication.

CO2. Create advertisement for digital and print media.

CO3. Develop their graphic designs and desk-top publishing. CO4. Manipulate professional photographs and images.

Course Contents:

Modules	Blooms level*	Number of hours
MODULE 1: Graphics using line, Graphics by combining basic shapes. Make a perfect crop-ping of some images using Photoshop. Prepare a cut-out of images using Photoshop; use back ground for images. Colour adjustment of images. Convert a B & W image into colour.	L1, L2	12


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MODULE 2: Vector Graphics (Designing, Color Theory, Vector Designing & Editing, Text Formatting): Interface: working with menus, toolbars, Dockers. Document Setup: Setting Page Size& Orientation, Document Navigation Rulers & Guide-lines: Status Bar. Text: Formatting, Text Layout, Skewing and rotating, Creating drop shadow, Text to Path, Extruding text. Objects: Grouping & locking objects, Combining & breaking apart, Transforming & Shaping, Cutting objects apart, Trim, weld & Intersection of objects. Lines & Curves: Using freehand & Bezier tool, Line properties, Arrowheads Eraser & artist media tools Nodes & Paths. Color& Fills: Solid Color, Color Palettes, Eyedropper & Paint bucket, Fountain, Fills, Patterns, Texture Fills, Interactive Mesh Fill. Special effects: Envelopes, Blends, Perspective, Shadow Objects, Power clip Command, Transparency, Distortion, Contour, Lens Docker. Complex Shapes: Polygon & Stars Spirals Printing Menu.	L3	18
MODULE 3: Raster Graphics (Designing, Color Theory, Raster Designing & Editing, text Formatting: Adobe Photoshop, Colour modes, Colour, Using the tools, Selecting and using a tool from the toolbox, Using the tool options bar and other palettes, Customizing the workspace, Using Photoshop Help, Viewing and editing files in Adobe Bridge, Embedding information for easy identification, Automating routine tasks, Resolution and image size, Straightening and cropping an image, Making automatic adjustments, Manually adjusting the tonal range, Replacing colors in an image, etc.	L4, L6	18

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Text books:

Annesa Hartman (2009), *Exploring Adobe Illustrator CS4*, United States, Cengage Learning, Inc
Andrew Faulkner and Conrad Chavez (2018), *Adobe Photoshop CC Classroom*, San Francisco:Adobe Press.

References books:

Jim Krause (2004), *Design basic Index*, United States: HOW Books

Modes of Evaluation: Class Test/Assignment/End Term Examination/Case Presentation

Examination Scheme:

Components	P	C	CT	A	EE	
					Practical	Theory
Weightage (%)	5	10	10	5	20	50

P- Project, C- Case Discussion/Presentation/Analysis, CT- Class Test, A- Attendance, EE- End Semester Examination


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CO, PO and PSO Mapping

	PO1	PO2	PO3	PO4	PSO1	PSO2	PSO3	PSO4
CO1	1	--	1	1	1	1	--	--
CO2	--	1	--	1	1	--	--	1
CO3	--	--	1	1	--	1	--	1
CO4	1	1	1	--	--	1	1	1

1: Strongly Related, 2: Moderately Related and 3: Weakly Related


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ANI2106	DESIGN SOFTWARE	L	T	P	C
Version 1	2021	2	-	2	3
Pre- requisites/ Exposure					
Co-requisites					

Catalog Description

This unit is designed to initiate the student into the rudiments of design and application of design in all walks of life that we see all around us. The student will learn and imbibe important typographic principles, use of fonts and fontography, use of color, color harmonies and tonal balance. The vitally important role that symmetry, balance, images – both vector as well as bitmaps, play in creating a harmonious and aesthetically appealing composition will all be explained with real world examples of practical design being implemented in advertising and mass communication.

Course Objectives:

The objective of this course is to:

- Enable the students to comprehend principles of design using a blended learning approach
- To familiarize students with all aspects of software, both at the beginner as well as at an intermediate level
- To integrate seamlessly both theoretical as well as practical aspects of design such that the learner is able to instantly identify design principles incorporated in the physical realm, be it print, net, web, film or television.

Course Description

This course covers all aspects of designs from the traditional orthodox straightforward design principles to contemporary design principles and application. Not only are the traditional fields such as print and broadcast design covered but also newer areas like UI/UX and game design also are briefly covered in this course. By and large however, it is meant to teach print design and layout basics through a well interwoven thought out course that embeds practical constructional projects at every stage of theoretical information imparted. Students are taught to think critically and question traditional concepts as well as come up with their own models and ideas.

Course Outcomes:

On completion of this course, the students will be

CO1. Completely proficient with all aspects of at least three print design software, notably Adobe Photoshop, Illustrator and In Design. They will also be conversant with Corel Draw, at a basic level.

CO2. Be able to visualise and conceptualise layouts for print, web and Multimedia.

CO3. Be proficient at delivery of design projects, both at a conceptual level and at the execution stage.

CO4. Be able to work in a team delegating different aspects of production to team members and also exchange notes and monitor each others work, so that professional quality work can be outputted and exported.

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Course Contents:

Modules	Blooms level*	Number of hours
MODULE 1: Manual and Computer Aided Design Differences between traditional design, primarily for print as compared to designing for the web, the internet, and for television and film will be compared and contrasted, and how these inherent differences can be optimized for a specific media will be explained and expounded upon. The importance of computer as a design tool as well as the different software currently prevailing in the industry are also highlighted and a broad overview imparted of each software with its distinguishing features	L1, L2	4
MODULE 2: What is Design? Design Elements, Design Principles. How elements and principles helps in design. Where and how these elements and principles are applicable. How do different design elements combine and collaborate together to create an overall 'look' and feel for the published output – be it a web page, a brochure or a billboard hoarding.	L2, L3	6
MODULE 3: Typography History of fonts, Sizes of fonts, Classification of fonts, True Type and Open type. Breakdown of a word into typographical elements and ligatures, designing a custom font from scratch, all form part of this particular module. Each concept that is explained is generously illustrated with practical examples drawn from mixed media	L2, L3	6
MODULE 4: Hardware and Software From more theoretical concepts like Typography and design principles we move to the more practical aspects of implementing design on the ground through use of immersive technologies. Important aspects of hardware, notably the computer and accessories like printers, scanners and other input/output devices are explained. The student is also taken through the gamut of design software that exist that take full advantage of the computer's multitasking and multi-threading capabilities. In this module, only an overview of Digital Publishing software is given. In the next two modules, the most popular design software are explained at length	L2, L3,	6
MODULE 5: Fundamentals of Design Software The Editing of images, selection and cropping, integration of text with graphics, as well as the importance of resolution, image size, pixel depth, and the different sizes for print, web, broadcast and internet mediums such as Youtube are all covered in this module. Also the different image file formats such as jpg, png, tiff etc along with transparency and scaling are also explained. From technical definitions we move on to the software itself, covering all basic aspects of industry standard software like Photoshop, Illustrator, Corel Draw and Adobe InDesign	L3, L4	8



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MODULE 6: Design Software – Intermediate level This module covers the above software in more detail and depth with overlying emphasis being given to integration of practical projects that employ all the theoretical knowledge imparted. Once a set of topics is taught, application of the same is demonstrated through several practical exercises that are not only structured but also graded in terms of complexity and applicability.	L3,L4	6
TOTAL TEACHING HOURS		36

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Text Books

- Sarkar, N. M. Art & Print Production. 2013 Ed.
- Krug, Steve. *Don't Make Me Think: A Common Sense Approach to Web Usability*. New Riders Publishing, California. 2nd Edition
- Bauer, Peter. Adobe Photoshop CC For Dummies. Wileys. 2nd Edition
- Wood, Brian. *Adobe Illustrator CC Classroom in a Book* (2019 Release), Adobe Press. First Edition. December 2018.

Reference Books:

- Anton, Kelly Kordes. Cruise, John. *Adobe InDesign CC Classroom in a Book* (2017 release). December 2016.
- Norman, Don. *The Design of Everyday Things: Revised and Expanded Edition*. November 2013.

Modes of Evaluation: Practical/Home Assignment/Class Test/Written Examination

Examination Scheme:

Components	P	CT	A	EE
Weightage (%)	10	15	5	70

P: Project, CT: Class Test, EE: End Semester Examination; A: Attendance


CO, PO and PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	1	2	1	3	..	..	..	1	1	1	3
CO2	1	2	3	3	..	..	..	1	1	1	3
CO3	1	2	1	3	..	..	..	1	3	1	3
CO4	1	1	3	1	2	3	1	1
CO5

1: Strongly Related, 2: Moderately Related and 3: Weakly Related



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ANI2108	BASICS OF ART HISTORY AND SKETCHING & DRAWING	L	T	P	C
Version	JULY 2021	1	1	2	3
Pre- requisites/Exposure					
Co-requisites					

Course Overview:

Art is a form of communication, it is an interactions between the elements and principles of art help artists to organize sensorially pleasing works of art while also giving viewers a framework within which to analyze and discuss aesthetic ideas. Art is a highly diverse range of human activities engaged in creating visual, auditory, or performed artifacts— artworks—that express the author’s imaginative or technical skill, and are intended to be appreciated for their beauty or emotional power. This course will cover the fundamentals of drawing with a focus on shapes. It will address line, tone, volume, space, scale, proportion and artistic expression. An emphasis on “process” will direct the momentum of this course. The course is graded in terms of intensity as well as complexity and considerable emphasis the concept of Illustration techniques and visualization power. It will provide the learning of the principles of art include movement, unity, harmony, variety, balance, contrast, proportion *and* pattern. *The elements include* texture, form, space, shape, color, value and line. The various interactions between the elements and principles of art help artists to organize sensorially pleasing works of art while also giving viewers a framework within which to analyze and discuss aesthetic ideas.

Course Coverage:

MODULE 1:

Introduction to pose to pose sketching (action analysis). Rapid sketching from live models, Introduction to Acting, Modeling, Sketching from Acting, Sketching from live models, Introduction to Rapid Sketching Techniques, Sketching from Memory, live action. Basics of Acting - Style breaking, Movements.

MODULE 2:

Shading in different angles of pencil strokes, formatting in different textures with pencil, shading, simple objects in drawing, simple shapes of geometrical shapes, roadsides, rivers, perspective in lines in landscapes, different head shapes, characters, human anatomy.

Learning Outcomes:

On completion of this course, the students will be able to

CO1: Able to know the concept of art with Shapes, Lines and Forms
CO2: Able to learn about Lights, Shades, Tone and Colors.

CO3: Basic concept on Rhythm, Consistency and Balance.

CO4: Knowledge on basic drawing of Organic, Leaving and Non Leaving objects.

CO5: Apply the aesthetic value and observation techniques on further complete Composition.

At the end of the course students will be able to:

To impart knowledge of Pose to Pose drawing, Rapid Sketching Techniques.

To impart knowledge of basic concepts of Sketching from Memory, live action.


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To develop the concept on basics of Acting - Style breaking, Movements
 To increase to thought on Shading in different angles of pencil strokes, simple shapes of geometrical shapes
 To enrich knowledge and skills on Human Anatomy.

Resources: Text Books

Text

- Thomas C. Wang (1977). *Pencil Sketching*, UK: John Wiley & Sons.
- Catharine Slade (1997). *The Encyclopedia of Illustration Techniques*, New York: Martin Salisbury
- Catharine Slade (2011). *The Manual of Illustration Techniques*, UK: A & CBlack Publishers Ltd.

Reference

- Darrel Rees (2008). *How to be an Illustrator*, USA: Dell Publishing Company.

Detailed Session Plan:

Total No of Sessions –20

Module-1:

Session	Topics	Pedagogical Technique/s Used	Additional Readings/ Assignments/Websites/Linksto online resources	Assessmentcriteria (based on specific Pedagogical Technique)
1	Introduction to Pose to Pose drawing	Lecture	Hand-Outs and PPTs	Peer Discussion
2	Action analysis	Lecture	Hand-Outs and PPTs	Peer Discussion
3	About the Rapid sketching from live models	Lecture	Hand-Outs and PPTs	Peer Discussion
4-6	Basic Introductionto Acting, Modeling, Sketching	Lecture	Hand-Outs and PPTs	Peer Discussion
7-8	Concept of sketching fromlive models	Lecture	Hand-Outs and PPTs	Peer Discussion

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9	Introduction to Rapid Sketching Techniques	Lecture	Hand-Outs and PPTs	Peer Discussion
10	Basics of Acting - Style breaking, Movements	Lecture	Hand-Outs and PPTs	Peer Discussion
11	Sketching from Memory, live action			

Module-2:

Session	Topics	Pedagogical Technique/s Used	Additional Readings/ Assignments/Websites/Links to online resources	Assessment criteria (based on specific Pedagogical Technique)
12	How to prepare a Composition	Lecture	Hand-Outs and PPTs	Peer Discussion
13	Shading in different angles of pencil strokes	Lecture	Hand-Outs and PPTs	Peer Discussion
14	About the formatting in different textures with pencil	Lecture	Hand-Outs and PPTs	Peer Discussion
15	Concept of Lighting and Shading technique	Lecture	Hand-Outs and PPTs	Peer Discussion
16	Simple shapes of geometrical shapes	Lecture	Hand-Outs and PPTs	Peer Discussion
17	Composition on roadsides, rivers	Lecture	Hand-Outs and PPTs	Peer Discussion



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18	Perspective in lines in landscapes	Lecture	Hand-Outs and PPTs	Peer Discussion
19	Idea on different headshapes, characters	Lecture	Hand-Outs and PPTs	Peer Discussion
20	Concept of human anatomy	Lecture	Hand-Outs and PPTs	Peer Discussion

Assessment Scheme:

Components	Project (P)	Case Discussion/ Presentation/ Analysis (C)	Class Test (CT)	Attendance (A)	External Evaluation (EE)
Weightage (%)	5	10	10	5	70


CO, PO and PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	1	2	1	2	..	..	..	1	2	1	3
CO2	1	3	3	3	..	..	..	1	1	1	2
CO3	1	1	1	3	..	..	..	1	3	2	3
CO4	1	1	2	1	..	..	..	2	1	1	1
CO5	..	..	..	..	..	..	..	..	..	..	..

1: Strongly Related, 2: Moderately Related and 3: Weakly Related

Components to Choose From – MOOCS, Day with Expert, **Case Study**, Teach Back, Quiz, Mini Survey, Simulation/Games, Brain Storming/Argumentation, Flipped Classroom. However, this list is not exhaustive. Faculty may use any other suitable pedagogical technique to ensure optimal learning.

Detailed Session Plan: Module I:


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Learning Outcome/s: Students will be able:

- To describe the Meaning of Pose to Pose Sketching
- To explain the process of Rapid sketching from live models
- To define about the Acting, Modeling, Sketching, Sketching from live models etc.
- To understand the Sketching from Memory, live action, Style breaking, Movements.

Question(s) for discussion in class:

- What is Pose to Pose Sketching technique, describe it.
- Describe the process of Live action.
- Explain the purpose of simple objects in drawing, usages of simple shapes of geometrical shapes
- Sketching from Memory, what does it mean?
- Describe the Style breaking, Movements.

Module II:

Learning Outcome/s: Students will be able:

- To describe the Meaning and Definition of Basic Sketching technique
- To explain the usages of Shapes, Colors and Form for an Illustration
- To define about the Basic Landscape Composition of roadsides, rivers.
- To understand the head shapes, characters, human anatomy.

Question(s) for discussion in class:

- What are perspective scenes in composition technique?
- Describe the process of Story adaptation.
- Explain the purpose of simple objects in drawing, usages of simple shapes of geometrical shapes.
- Describe the 7.5 Head Human Anatomy study.



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ANI2101	TYPOGRAPHY	L	T	P	C
Version	2014	2	1	0	3
Pre- requisites/Exposure					
Co-requisites					

Catalog Description

Is typography an art? That's like asking if photography is an art. Some photographers and typographers use techniques that raise their work to the level of art. But at their core, both photography and typography have a utilitarian function. The aesthetic component is separate. Being an effective typographer is more about good skills than good taste. And students will develop the skills.

Course Objectives

A reader rarely notices great typography, but its absence is keenly missed. Poor technique will kill even your best concept. This module will introduce you to fundamentals of Typography, concepts and give you an opportunity to polish and improve your designs

Course Outcomes:

On completion of this course, the students will be able to-

CO1: Know the Rules of Typography and proof checking process
CO2: Able to learn construction of different Fonts.

CO3: Basic concept on terminologies of Typography and utilisation.

CO4: Knowledge on Implementation of Group of fonts for different layouts.

CO5: Apply the aesthetic value and observation techniques on further type design project.

Course Contents:

Modules	Bloom s level*	Number of hours
MODULE 1: Brief Historical overview, What is a Font?, Types classifications Type Categories: Serif; Sans Serif; Display; Script; Pi Type Terminology Type Families: Basic & Extended; Font Names; Ligatures; Text vs Display ;Text vs Display; Bold Parts of Letters & the Optical Baseline Noticing the Differences Between Similar Typefaces Positive & Negative Space of	L1, L2	10



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Type Figure-Ground with Type Stretching or Squeezing Type? ExpertSets :Lining & Oldstyle Figures, Swashes & Glyph Substitution		
MODULE 2: The Creative Brief :Project Name, Objectives, Target Audience, User Needs, Personality, Tone & Mood, Current Target Audience Mind Set, Key Target Audience Insights, Design Approach & Strategies •Choosing an Effective Typeface •The Personality/Mood of a Typeface •Emotive Words •Researching Type Online •Legibility vs Readability	L1, L3	14
MODULE 3: Designing with Type, Ligatures, White Space, Layout Hierarchy •Grids • Creating Contrasts with Type Typeface, Weight, Size, Typeface Width; Caps.Soft/Hard;Straight/Oblique;Horizontal/Vertical;Few/Many;Order/C haos;Color or Shade; Positive/Negative •Type Color	L1	11

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis,L6-Evaluation

Text Books

Text

- Figure Drawing Design and Invention: Micheal Humpton
- Animal Anatomy of Artist: Eliot Goldfinger
- A Reader in Animation Studies: Edited by Jayne Pilling

Reference


- Animation Insider: Workflow Edition
- The Animated Man *Life of Walt Disney*

Modes of Evaluation: Class Test/Assignment/End Term Examination/Case Presentation

Examination Scheme:

Components	P	CT	A	EE
Weightage (%)	10	15	5	70

CT: Class Test, H: Home Assignment, EE: End Semester Examination; A: Attendance; C: Case Presentation


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CO, PO and PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	1	2	1	3	1	1	1	3
CO2	1	2	3	3	..	..	..	1	1	1	3
CO3	1	2	1	3	..	..	..	1	3	1	3
CO4	1	1	3	1	2	3	1	1
CO5

1: Strongly Related, 2: Moderately Related and 3: Weakly Related



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ANI2133	WORKSHOP/ CERTIFICATION (DISCIPLINE SPECIFIC)	L	T	P	C
Version	2014	0	0	0	1
Pre- requisites/Exposure					
Co-requisites					

Catalog Description

A workshop is primarily an activity based academic event that is organized to provide the students a one to one and hands on experience on any aspect of their learning. The communication in a workshop has to be necessarily two way. The trainer has to make sure that the aspect covered are practically practiced by the participants. The student will choose the option of workshop from amongst their concentration electives. The evaluation will be done by Board of examiners comprising of the faculties.

Course Objectives

The objective of this course is to

- Equip the students with the hands on experience with experts in a particular discipline.
- Provide a platform to learn and perform in activity based academic events.

Course Outcomes (COs):

On completion of this course, the students will be able to

CO1: Memorize and Outline the processes and functions involved in various themes/activities conducted in a particular discipline of animation industry.

CO2: Understand the concepts and apply the same in a particular discipline.

Course Contents:

Modules	Blooms level*	Number of hours
MODULE 1: Major Themes For Workshop The workshop may be conducted on any of the following major themes: Acting for animation	L1, L4, L3, L6	No Contact Hours


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<p>Lighting Photography Digital Painting Matt Painting Clay Animation Composting Painting / Oil / Water These themes are merely indicative and the trainer may choose any recent and relevant topic of study.</p> <p>GUIDELINES FOR WORKSHOP The procedure for earning credits from workshop consists of the following steps: Relevant study material and references will be provided by the trainer in advance. The participants are expected to explore the topic in advance and take active part in the discussions held Attending and Participating in all activities of the workshop Group Activities have to be undertaken by students as guided by the trainer. Evaluation of workshop activities would be done through test and quiz at the end of the workshop. Submitting a write up and showing the final output which focuses on the learning outcome from the workshop.</p> <p>METHODOLOGY The methodology followed at the workshop could be based on any one or more of the following methods: Case Study Simulation Group Activity</p>		
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**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Text Books

As required to perform the activities.

Reference Books

As required to perform the activities.

Modes of Evaluation: Examination Scheme:

Components	Attendance	Active Participation	Multiple Choice Questions/ Quiz	Solving the Case/Assignment/ Write Up	Total
Weightage(%)	5	30	30	35	100

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CO, PO and PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	1	1	2	--	--	--	--	2	3	1	2
CO2	1	1	2	--	--	--	--	2	3	1	2

1: Strongly Related, 2: Moderately Related and 3: Weakly Related



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ANI2252	CREATING 2D ANIMATION	L	T	P	C
Version 1	2021	2	0	2	3
Pre- requisites/Exposure					
Co-requisites					

Catalog Description

This course introduces students to the art and concept of two dimensional or 2D computer animation. 'D' stands for dimension and refers to animation which is conducted on a two-dimensional plane, unlike the real world where everything is seen and experienced on a three dimensional plane. This course primarily focusses on the theoretical aspects of two dimensional animation and is reinforced through many hours of hands-on lab training designed to right from the start, train the students to be industry ready. The intention of this course is to provide a gradual introduction to animation concepts which are further refined in semester III, when the students will delve into 3D animation

Course Objectives:

The objective of this course is to:

- Enable the students to comprehend principles of animation using a field based approach
- To familiarize students with all aspects of software, both at the beginner as well as advanced level
- To instill in the students such a level of confidence that they can tackle projects at a near professional level by having a holistic knowledge of all software related to 2D animation.

Course Description

This course covers all aspects of two-dimensional animation, normally known as '2D' animation in industry jargon. Beginning from first principles of animation like scaling, exaggeration, squash and stretch etc., they move on to first becoming familiar with different graphical interfaces as well as learning an eclectic mix of software that equip them with tools needed to create the kind of creative content that they wish to create.

The course is graded in terms of intensity as well as complexity and considerable emphasis is placed on design and typographic basics that form building blocks of good animation.

Course Outcomes:

On completion of this course, the students will be

CO1. Completely proficient with all aspects of at least two 2D animation software, notably Adobe Animate CC (now Animate) and Adobe After Effects

CO2. Be able to visualise, script, storyboard and create smart and relevant 2D animations

CO3. Be able to produce quality motion graphics for the Television Industry using a variety of 2D animation tools and third party plug-ins.

CO4. Be able to work in a team delegating different aspects of production to team members and also exchange notes and monitor each others work, so that professional quality work can be outputted and exported.

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Modules	Blooms level*	Number of hours
MODULE 1: Fundamentals of Animation What is animation? How is 2D animation different from other forms of animation. How are Animate CC and After Effects different from drawing and 3D packages? The various components that will be covered in Module I are: The Animate CC Interface Animate CC tools and menu commands Animate CC and Photoshop – an integrated workflow Frame-by-frame animation in Animate CC Onion skinning – why it is needed Exploring the Timeline Animating through action script Motion tweening in Animate CC	L1, L2	8
MODULE 2: After Effects: The Industry package This Unit moves out from the Animate CC interface, tools and dialogues into the domain of After effects. Since this package is used heavily by the Television Industry, many examples from this medium will be used to illustrate hard-to-grasp concepts. Various components of After Effects that will be taught in this module are: The After Effects interface: Moving about and navigation in AfterEffects AE tools and panels; how to customise and optimise them Keyboard shortcuts - how to use and customize	L2, L3	5
Creating your first composition The Timeline - navigation, panels and scope of the timeline Project windows and assets; moving assets from project to timeline Use of keyframes to create simple animations Illustration of first principles of animation - ease in, out and ease Frame rates, speeding up and slowing down of animation - using the Graph editor Rendering and compression concepts; Different kinds of movie formats Outputting your first movie; Settings and how they can be tweaked		



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MODULE 3: After Effects and Animate – Intermediate This unit is a continuation of the earlier unit. Here we go into greater depth of the various tools, filters effects and presets that can be used. Round tripping between After Effects and Animate as well as importing assets from various different format types (Photoshop as well as Illustrator Files) are discussed and explained. Since After Effects is known as a 2.5 type animation, this concept is explained; how After Effects although it is a straight 2D package, can simulate 3D and the illusion of 'fake depth' by using cameras, lights and third party effects such as Element 3D. Students are expected at the end of this unit to design their own logos and animate them in this software package	L2, L3	8
MODULE 4: Post-Production In this Module, all the salient features of both Animate and After Effects are recapped and similarities and differences discussed. In this module very little theory is imparted. Students are expected to prepare a comprehensive AnimateCC and After Effects project each, which is closely monitored and supervised by the faculty in charge. The goal is to get the students as industry ready as possible and to ensure that at least one professional looking project in both software packages is designed and executed.	L3, L4	6

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Text Books

- Williams, Richard. *The Animation Survival Kit*. Expanded Ed. 2009.
- Whitaker, Harold. *Timing for Animation*. Focal Press, 2002

Reference Books

- Schenk, Sonja. Long, Ben. *The Digital Filmmaking Handbook*. Fourth Edition.
- Gyncild, Brie. *Adobe After Effects CC: Classroom in a Book : the Official Training Workbook from Adobe Systems*. 2014 Ed.

Modes of Evaluation: Practical/Home Assignment/Class Test/Written Examination

Examination Scheme:

Components	P	CT	A	EE
Weightage (%)	10	15	5	70

P: Project, CT: Class Test, EE: End Semester Examination; A: Attendance

CO, PO and PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	1	2	1	3	..	..	..	1	1	1	3
CO2	1	2	3	3	..	..	..	1	1	1	3
CO3	1	2	1	3	..	..	..	1	3	1	3
CO4	1	1	3	1	2	3	1	1
CO5

1: Strongly Related, 2: Moderately Related and 3: Weakly Related

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ANI2202	WEB DESIGN AND DEVELOPMENT	L	T	P	C
Version	JULY 2021	1	1	2	3
Pre- requisites/Exposure					
Co-requisites					

Catalog Description

This will help us understand the importance of the web as a medium of communication and understand the principles of creating an effective web page, including an in-depth consideration of information architecture. Too also become familiar with graphic design principles that relate to web design and learn how to implement these theories into practice.

Course Objectives

The module is structured for the students to learn the basic layout making process of Webpage. They will able to understand the developing a thought process to making a layout, Principle of Web page design elements. Understanding the proper Fonts for the contemporary web pages, knowledge about the design edition software like Adobe Dreamweaver. Understanding of HTML and Design Table both for an Applet.

Course Outcomes (COs):

On completion of this course, the students will be able to

CO1: Knowing about the Web designing process for a professional template

CO2: An idea about the aesthetic sense of Wordpress and Blok development technique. CO3: To develop the process of content writing as well as the proper Font style setup. CO4: Description on the HTML table and how it works.

CO5: Application of URL for any embedding purpose or hyperlink.

Course Contents:

Modules	Blooms level*	Number of hours
MODULE 1: Introduction to Web Design and Development Workflow that Works Whether or not you are new to Web site design and development, if you comprehend the overall picture; understand the workflow process and best practices for design; learn the software and technology; and can maintain a site that competes and communicates effectively on the Web, then you can	L2, L3	8
launch your new or renewed career with confidence for great success. But all that does sound intimidating! So, in this introductory course to the Web Design and Development Certificate program, we'll go step-by-step through what it will take for you to become that top notch professional who stands apart in your field.		

MODULE 2: WordPress Creating a Dynamic Website Students will learn how to set-up a WordPress website and develop the site to include a menu system with navigation bars, widgets for posts and comments, theme, calendar, and interactive forms. The class will be lecture style with some hands –on. If the student as established a WordPress site the student may use their site for the lessons. Some practice on a WordPress site is offered.	L2, L3	8
MODULE 3: HTML and CSS (Basics) Hypertext Markup Language (HTML) and Cascading Style Sheets (CSS) are inseparable languages that together describe the structure and display of pages on the World Wide Web! This class introduces you to the syntax and explores techniques using both languages to create and format headings, body text, hyperlinks, images, tables, forms and more. You'll also learn to control the format and layout of elements on web pages using CSS stylesheets. Toward the end of the class you'll do several multi-column page layouts with an embedded video element. You can't design professional websites without knowing these critical technologies.	L2, L3	8
MODULE 4: Creating Website Students will learn to create website using WordPress or Using HTML coding for simple website. Understanding the layout of a website. Managing the content based on the goal of website.	L3, L4	12

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Text Books

Text

- Web Designer A Beginners: Wendy Willard
- Mastering HTML, CSS & Javascript Web Publishing: Loura Lemay
- Web Designing and Development: Tanweer Alam
- Web Designing: Hridesh Bhardwaj

Reference

Web ReDesign 2.0: Workflow that Works (2nd Edition) by Kelly Goto and Emily Cotler
 WordPress For Dummies, 4th Edition by Lisa Sabin-Wilson and Matt Mullenweg
 Head First HTML and CSS by Elisabeth Robson and Eric Freeman
 Adobe Dreamweaver CS6 Classroom in a Book by Adobe Creative Team
 References White Space is Not Your Enemy: by Rebecca Hagen and Kim Golombisky
 Introducing HTML5 (2nd Edition) by Bruce Lawson and Remy Sharp.

Modes of Evaluation: Class Test/Assignment/End Term Examination/Case Presentation

Examination Scheme:

Components	P	CT	A	EE
Weightage (%)	10	15	5	70


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P: Project, CT: Class Test, EE: End Semester Examination; A: Attendance

CO, PO and PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	1	2	1	3	..	..	..	1	1	1	3
CO2	1	2	3	3	..	..	..	1	1	1	3
CO3	1	2	1	3	..	..	..	1	3	1	3
CO4	1	1	3	1	2	3	1	1
CO5

1: Strongly Related, 2: Moderately Related and 3: Weakly Related



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ANI2209	UI & UX DESIGN	L	T	P	C
Version	2021	2	-	2	3
Pre-requisites/Exposure	Basic computer skills				
Co-requisites	None				

Catalog Description

The UI/UX Design brings a design-centric approach to user interface and user experience design, and offers practical, skill-based instruction centered around a visual communications perspective, rather than on one focused on marketing or programming alone. Students will learn to summarize and demonstrate all stages of the UI/UX development process, from user research to defining a project's strategy, scope, and information architecture, to developing sitemaps and wireframes. You'll learn current best practices and conventions in UX design and apply them to create effective and compelling screen-based experiences for websites or apps.

User interface and user experience design is a high-demand field, but the skills and knowledge you will learn in this Specialization are applicable to a wide variety of careers, from marketing to web design to human-computer interaction.

Course Objectives

The objective of this course is-

- To teach about the UX design & Frameworks
- To train the basic elements of User-centric design
- Learn the visual elements of User Interface Design
- To teach the tools of prototyping and user-testing.

Course Outcomes

On completion of this course, the students will be able to CO1. Create User persona, User flows and UX strategy CO2. Create app & website Wireframes CO3. Develop workable prototypes using Adobe XD CO4. Conduct user-testing.

Course Contents:

Modules	Blooms level*	Number of hours



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MODULE 1: UX Design Fundamentals This hands-on module examines how content is organized and structured to create an experience for a user, and what role the designer plays in creating and shaping user experience. You will be led through a condensed process that acts as a roadmap for developing robust UI/UX design: from ideation and sitemapping, to the creation of paper and digital prototypes. Building on the design skills learned in Visual Elements of User Interface Design, you will apply this methodology to produce a digital prototype for a multi-screen app of your own invention.	L1, L2	10
MODULE 2: Visual Elements of User Interface Design This design-centric module examines the broad question of what an interface is and what role a designer plays in creating a user interface. Learning how to design and articulate meaning using color, type, and imagery is essential to making interfaces function clearly and seamlessly. Through a series of lectures and visual exercises, you will focus on the many individual elements and components that make up the skillset of an interface designer. By the end of this course, you will be able to describe the key formal elements of clear, consistent, and intuitive UI design, and apply your learned skills to the design of a static screen-based interface.	L3	18
MODULE 3: Wireframes to Prototypes This module is focused on the application of the early UX research to actual user interfaces: the creation of wireframes, high-fidelity mockups, and clickable prototypes. Along the way we will also discuss: <ul style="list-style-type: none"> - Responsive web design and mobile web challenges - Mobile-first approach - Web typography 	L4, L6	20

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Text books:

UX Design: A Field Guide To Process And Methodology For Timeless User Experience(2021), Steven Miller.

Adobe XD Classroom in a Book (2020 release) , Brian Wood : Adobe Press.


References books:

Sprint: How To Solve Big Problems and Test New Ideas in Just Five Days : transworldBooks

Modes of Evaluation: Class Test/Assignment/End Term Examination/Case Presentation Examination Scheme:



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Components	P	C	CT	A	EE	
					Practical	Theory
Weightage (%)	5	10	10	5	20	50

P- Project, C- Case Discussion/Presentation/Analysis, CT- Class Test, A- Attendance, EE- End Semester Examination

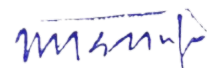
CO, PO and PSO Mapping

	PO1	PO2	PO3	PO4	PSO1	PSO2	PSO3	PSO4
CO1	1	--	1	1	1	1	--	--
CO2	--	1	--	1	1	--	--	1
CO3	--	--	1	1	--	1	--	1
CO4	1	1	1	--	--	1	1	1

1: Strongly Related, 2: Moderately Related and 3: Weakly Related



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ANI2210	PRODUCTION PIPELINE	L	T	P	C
Version	2021	2	-	2	3
Pre-requisites/Exposure					
Co-requisites					

Course Overview:

The Storytelling through video or animated show reel is an art is a form of communication, it is an interaction between the elements and principles of art help artists to organize sensorially pleasing works of art while also giving viewers a framework within which to analyze and discuss aesthetic ideas. Art is a highly diverse range of human activities engaged in creating visual, auditory, or performed artifacts artworks that express the author's imaginative understanding or technical skill, and are intended to be appreciated for their beauty or emotional power. Stories are a transfer of education, and a developer of culture. They're a way of introducing emotion into a situation.

This course explores the output production of video and show reel used to create a short or feature film in animation studios. Beginning from the story writing, scripting, story boarding and video production etc, they move on to first becoming familiar with different genre of story and storytelling process as well as learning about different phases of Audio Visual production. The course is graded in terms of intensity as well as complexity and considerable emphasis the concept of story building and visualization power.

Course Contents:

MODULE 1:

Directing and Analyzing a film, Animation film techniques, Film language in action, Adaptation of film language into animation. Student project-Character Designs, Overview, Working with a script/screenplay, Camera angles.

MODULE 2:

Working with storyboard, Field size, Design and rendering the scenes layout and composition, Pans, Trucks and Multiple Pans, Scene planning, Realistic touches; character interaction with the scene and the backgrounds

MODULE 3:

Analyse of film layouts, Design and layouts, clean of up of BGs and BG painting, Sound concepts and effects for the film, The sound track, Sound equipment and theory, Dialogue and Voice-over, Exposure-sheet doping, reading the Sound track. Editing- Image and voice, sound FX and Music.Using of continuity editing to shorten real time to screen time. Here is an edit list that makes the action move faster but yet maintains the illusion of continuity the number in parenthesis is shot length in seconds.

Learning Outcomes:

On completion of this course, the students will be able to


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CO1: Know the Film analyses technique of different aspect of Film genre CO2: Able to learn about Storytelling and Storytelling process.
 CO3: Basic concept on Audio Visual Production.
 CO4: Knowledge on basic of Super Imposition, Tittering, Color Correction etc.
 CO5: Apply the aesthetic value and observation techniques on further film production.

At the end of the course students will be able to:

To impart knowledge of basic concept of Story Writing and Scripting.
 To impart knowledge of basic concepts of Story boarding, Film studies and Production phases.
 To enrich knowledge and skills as a film maker and film language reading technique, they will also able to apply the technique of Super Imposition VFX Chroma Kye, production process and overall aesthetic value for a Fiction and Nonfiction Film.

Resources: Text Books

Text

- Bastian Clevé (1994), *Film Production Management*, Burlington: Focal Press.
- Blain Brown (2016). *Cinematography: Theory and Practice*, New York: Focal Press.
- Steven Ascher (2012). *The filmmaker's handbook*, UK: PLUME.

Reference

- Syd Field (2005). *Screenplay – The Foundations of Screenwriting*, New York: Dell Publishing Company.
- J. Michael Straczynski (1996). *The Complete Book of Scriptwriting*, USA: Writers Digest Books.
- Gary H. Anderson (1998). *Video Editing and Post Production, Fourth Edition*, New York: Focal Press.

Detailed Session Plan:

Total No of Sessions –24

Module-1:

Session	Topics	Pedagogical Technique/s Used	Additional Readings/ Assignments/Websites/ Linksto online resources	Assessmentcriteria (based on specific Pedagogical Technique)
1	Introduction to Film Production	Lecture	Hand-Outs and PPTs	Peer Discussion
2	History of Film Production	Lecture	Hand-Outs and PPTs	Peer Discussion
3	About the filmanalyses	Lecture	Hand-Outs and PPTs	Peer Discussion

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4	About the basic Story Plot, Cast and Characters	Lecture	Hand-Outs and PPTs	Peer Discussion
5-8	Film adaptation techniques, Sequence and Scene	Lecture	Hand-Outs and PPTs	Peer Discussion
9	Types of Screenplay	Lecture	Hand-Outs and PPTs	Peer Discussion
10	Types of Camera Angles	Lecture	Hand-Outs and PPTs	Peer Discussion

Module-2:

Session	Topics	Pedagogical Technique/s Used	Additional Readings/ Assignments/Websites/Links to online resources	Assessment criteria (based on specific Pedagogical Technique)
11	How to prepare a Field and composition	Lecture	Hand-Outs and PPTs	Peer Discussion
12	Basic logic of a Storyboard	Lecture	Hand-Outs and PPTs	Peer Discussion
13	About the theory of Scene Planning	Lecture	Hand-Outs and PPTs	Peer Discussion
14	Casting of Characters	Lecture	Hand-Outs and PPTs	Peer Discussion
15	Design and rendering	Lecture	Hand-Outs and PPTs	Peer Discussion
16	Trucks and Multiple Pans	Lecture	Hand-Outs and PPTs	Peer Discussion


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17	Body Language	Lecture	Hand-Outs and PPTs	Peer Discussion
18	Character Interaction	Lecture	Hand-Outs and PPTs	Peer Discussion
19	Realistic touches	Lecture	Hand-Outs and PPTs	Peer Discussion
20	BG of a Plot	Lecture	Hand-Outs and PPTs	Peer Discussion

Module-3:

Session	Topics	Pedagogical Technique/s Used	Additional Readings/ Assignments/Websites/Links to online resources	Assessment criteria (based on specific Pedagogical Technique)
21-22	Analyse a film layouts, Design and layouts	Lecture	Hand-Outs and PPTs	Peer Discussion and Presentation
23	Sound Effects, Dialogue and Voice-over	Lecture	Hand-Outs and PPTs	Peer Discussion and Case Presentation
24	Exposure- sheet doping	Lecture	Hand-Outs and PPTs	Peer Discussion and Presentation

Assessment Scheme:

Components	Project(P)	Case Discussion/ Presentation/Analysis(C)	Class Test (CT)	Attendance(A)	External Evaluation (EE)
Weightage (%)	5	10	10	5	70


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Components to Choose From – MOOCS, Day with Expert, **Case Study**, Teach Back, Quiz, Mini Survey, Simulation/Games, Brain Storming/Argumentation, Flipped Classroom. However, this list is not exhaustive. Faculty may use any other suitable pedagogical technique to ensure optimal learning.

CO, PO and PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	1	2	1	2	..	..	..	1	2	1	3
CO2	1	2	3	2	..	..	..	2	1	1	1
CO3	2	1	1	3	..	..	..	1	1	2	3
CO4	1	2	2	1	..	..	..	2	1	2	1
CO5	..	..	..	..	..	..	..	..	..	..	..

1: Strongly Related, 2: Moderately Related and 3: Weakly Related

Detailed Session Plan:

Module I:

Learning Outcome/s: *Students will be able:*

- To describe the Meaning and Definition of Film Analyses
- To explain the imposition of sound like voice, BG music and vocal music in the film
- To define about the Scripting, Screenplay and Storyboard etc.
- To build a Character for a film and process of casting for character in a film.

Question(s) for discussion in class:

- What is value of Sound for a Film?
- Describe the process of Story adaptation.
- Explain the purpose of Scripting, Screenplay and Storyboard
- Describe the process of Casting Character for a film.

Module II:

Learning Outcome/s: *Students will be able:*

- To describe About the Frame and its composition with different camera angles andshots.
- To enrich technical operation of a film camera for the Pan Trucks and Multiple Pans,Dolly, Wide and Tally etc.
- To plan for a film and Location characters and costumes and budget.
- To Compose a Stablising shot with the proper background sets
- To describe the reading a film thought
- To describe The creative pert of a composition like Sets, Props, Background etc..
- To explain Sound imposition technique for a film.
- To be able to use BG score music, Folly Sound, Dialogues dubbing etc.



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Question(s) for discussion in class:

- Write a critical note on Analysis technique of a Film.
- Describe issue of Scene Composition
- Write a note on Camera Shots.
- Explain each concept of Back Ground Sound and Sound effects.
- Explain the Voice overing.

Module III:

Learning Outcome/s: Students will be able:

- To describe the concept of Researching Type Online.
- To explain the essential using voiceover Instrumental and Live sound in a film
- To Present a Dope sheet for a film project
- To explain the concept of Sound and Foley.
- To describe the Sound Designing and editing process
- To explain about the Video Editing process

Question(s) for discussion in class:

- What is basic deference between a Live Sound and Non Live Sound?
- What is difference between Dope Sheet and Comic Strip?
- Explain the Foley Sound.
- Explain the usages of Sets and Props for a shoot.
- What is three phase of Film Production? Explain.



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ANI2201	DIGITAL PHOTOGRAPHY	L	T	P	C
Version	2021	1	1	2	3
Pre- requisites/ Exposure					
Co-requisites					

Catalog Description

This course will help students take great photographs. Composition; People & nature; Lighting & color; Learn how to display pictures. Understand the mechanics of imaging; unleash your creative potential.

Course Objectives

The objective of this course is to

This course is designed from a photographic viewpoint.

- Learn how to take great photographs. Composition. People & nature. Lighting & color.
- Learn how to display your pictures. Understand the mechanics of imaging.
- To become a proficient at the technical aspect of photographing with a digital camera.
- To learn to shoot with digital cameras maximizing the quality of the output.
- To develop the habit of looking closely at the visible world around you in order to represent it in terms of aesthetics, beauty and truth.

Course Outcomes (COs):

On completion of this course, the students will be able to

CO1. Student recognizes and understands the basic technical, aesthetic and expressive concepts of photography.

CO2. Student demonstrates a competency with a digital photographic work flow by the production of photographs in response to class assignments.

CO3. Lighting, High-Key Lighting, Rule of Visual Weight, Visual Composition Tools, Color Management, RAW Workflow,

CO4. Student demonstrates an appreciation and understanding of photography as a means of visual and artistic expression by the production of photographs.

CO5. Student develops the ability to speak about photographs, through class critiques and by giving an oral presentation on a photographer of his or her choice.

Course Contents:

Modules	Blooms level*	Number of hours
MODULE 1: Inside the digital camera: Image sensor and types, In-Built memory and memory cards. The Principles of Photography: The General Principles of Photography.	L1, L3	6

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MODULE 2: Types of cameras: Miniature Cameras, medium format cameras, large format camera and digital cameras. Comparative study of digital and analogue (SLR) camera. Advantages and applications of digital photography. Lenses: Normal, wide, tele, zoom, PC and TS lens. Working of a lens and angle of view of a lens.	L1, L3	9
MODULE 3: Films & Camera Accessories Camera Controls: Shutter speed aperture exposure control, auto winder or motorized camera, depth of field, selective focus. Exposure Meter: Incident meter and reflected meter. Metering System: Center weighted Spot and Matrix metering. Filters: UV Filter, Polarizing filter, Special effect filters and tripod. Composition: Creative Composition, rule of thirds and Golden section. Managing Your Digital Assets: Managing digital cameras, Cleanliness, Precautions, Managing Images printouts, Burning CDs. Camera mounts accessories. Camera care Difference between multicamera and single camera setup.	L1,L3	9

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Text Books

Scott Kelby.(2016), *Photoshop Book for Digital Photographers*, San Francisco:Adobe press
Corbett Bill.(2017), *A simple guide to 35mm photography*, San Francisco :Misc

Reference Books

David Taylor.(2015), *Digital Photography Complete Course*, Penguin Random House
David McKay.(2016), *Photography Demystified: Your Guide to Gaining Creative Control and Taking Amazing Photographs*- Penguin Random House

Modes of Evaluation: Class Test/Assignment/End Term Examination/Case Presentation

Examination Scheme:

Components	H	C	CT	A	EE
Weightage (%)	5	10	10	5	70

CT: Class Test, H: Home Assignment, EE: End Semester Examination; A: Attendance; C: Case Presentation

CO, PO and PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	1	1	--	--	--	--	1	1	2	--	--
CO2	1	1	--	--	--	--	1	1	2	--	--
CO3	1	1	--	--	--	--	1	1	2	--	--

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CO4	1	1	--	--	--	--	1	1	2	--	--
CO5	1	--	1	1	1	2	1	1	2	2	--

1: Strongly Related, 2: Moderately Related and 3: Weakly Related



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ANI2212	ONLINE CERTIFICATION (MINIMUM 30 HOURS)	L	T	P	C
Version	2021	0	0	0	3
Pre- requisites/Exposure					
Co-requisites					

Catalog Description

The future belongs to those who create. Whether it's to inform, persuade, entertain, or inspire, success in the digital age means communicating in visually rich and interactive ways. With a firm grasp on the world's most powerful creative tools certification of Adobe Creative Cloud & Autodesk 3DS Max and Maya

Course Objectives

The objective of this course is to

- Equip the students with the industry-recognized certification that demonstrates mastery in software's
- Provide a platform to learn and prove their digital media skills to prospective employers.

Course Outcomes (COs):

On completion of this course, the students will be able to

CO1: Proof of competency in specific digital media tools. CO2: Increased confidence in one's digital media abilities.

Course Contents:

Modules	Blooms level*	Number of hours
MODULE 1: Certifications that can be taken – Adobe Certified Professional Autodesk Certified User Unity Certified User certification	L1, L4, L3, L6	No Contact Hours
Course with certificate from coursera.org or edex.adobe.com		

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Text Books

As required to perform the activities.

Reference Books

As required to perform the activities.


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Modes of Evaluation:

Examination Scheme:

Components	Attendance	Active Participation	Multiple Choice Questions/ Quiz	Solving the Case/Assignment/ Write Up	Total
Weightage(%)	NA	NA	NA	NA	NA

CO, PO and PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	1	1	2	--	--	--	--	2	3	1	2
CO2	1	1	2	--	--	--	--	2	3	1	2

1: Strongly Related, 2: Moderately Related and 3: Weakly Related



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ANI2233	WORKSHOP/ CERTIFICATION (DISCIPLINE SPECIFIC)	L	T	P	C
Version	2021	0	0	0	1
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

A workshop is primarily an activity based academic event that is organized to provide the students a one to one and hands on experience on any aspect of their learning. The communication in a workshop has to be necessarily two way. The trainer has to make sure that the aspect covered are practically practiced by the participants. The student will choose the option of workshop from amongst their concentration electives. The evaluation will be done by Board of examiners comprising of the faculties.

Course Objectives

The objective of this course is to

- Equip the students with the hands on experience with experts in a particular discipline.
- Provide a platform to learn and perform in activity based academic events.

Course Outcomes (COs):

On completion of this course, the students will be able to

CO1: Memorize and Outline the processes and functions involved in various themes/activities conducted in a particular discipline of animation industry.

CO2: Understand the concepts and apply the same in a particular discipline.

Course Contents:

Modules	Blooms level*	Number of hours
MODULE 1: Major Themes For Workshop The workshop may be conducted on any of the following major themes: Acting for animation	L1, L4, L3, L6	No Contact Hours


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<p>Lighting Photography Digital Painting Matt Painting Clay Animation Composting Painting / Oil / Water These themes are merely indicative and the trainer may choose any recent and relevant topic of study.</p> <p>GUIDELINES FOR WORKSHOP The procedure for earning credits from workshop consists of the following steps: Relevant study material and references will be provided by the trainer in advance. The participants are expected to explore the topic in advance and take active part in the discussions held Attending and Participating in all activities of the workshop Group Activities have to be undertaken by students as guided by the trainer. Evaluation of workshop activities would be done through test and quiz at the end of the workshop. Submitting a write up and showing the final output which focuses on the learning outcome from the workshop.</p> <p>METHODOLOGY The methodology followed at the workshop could be based on any one or more of the following methods: Case Study Simulation Group Activity</p>		
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**Bloom's Level:*


L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Text Books

As required to perform the activities.

Reference Books

As required to perform the activities.


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Modes of Evaluation:Examination Scheme:

Components	Attendance	Active Participation	Multiple Choice Questions/ Quiz	Solving the Case/Assignment/ Write Up	Total
Weightage(%)	5	30	30	35	100

CO, PO and PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	1	1	2	--	--	--	--	2	3	1	2
CO2	1	1	2	--	--	--	--	2	3	1	2

1: Strongly Related, 2: Moderately Related and 3: Weakly Related



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ANI2335	SUMMER PROJECT EVALUATION-I	L	T	P	C
Version	2021	0	0	0	3
Pre-requisites/Exposure	2D Animation				
Co-requisites	None				

Catalog Description

In this subject, student will create animated clips and videos. After selecting this option a Faculty Guide will be allocated to the student by HOI and concern student will have to work with allocated faculty guide for proper guidance to complete this project. Student can choose topic as per his/her area of interest & as per the suggestion given by Faculty guide.

Course Objectives

The objective of this course is-

- To guide the techniques of creating animated clips, graphic design.
- To supervise quality of project this based on concept.
- To teach the tools and equipment which are used in making graphic designing, animation commercials.
- To assist for getting the required output of project as per client satisfaction.

Course Outcomes

On completion of this course, the students will be able to-CO1. Identify the 12 principles of animation

CO2. Create accurate and ethically appealing computer generated animation CO3. Describe characteristics of well-designed and executed animation CO4. Demonstrate progress in basic drawing and animation skills

Course Contents:

Modules	Blooms level*	Number of hours
2D Graphic designing Animation clip	L6	36



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Project Report: In this report student will have give details of his/her Topic with proper Introduction, Industry overview along with proper details of his/her area. For example if he/she is working on 2D animation or clip art so they must give details on these. Following points should be covered in it: The project itself on the computer, Report comprising of: Title page, Concept note/ Ideation, Storyboard, Objectives, Methodology, Learning Outcome, Conclusion		
Presentation & Viva: Students will have to make a Presentation (based on their Project Report) and it will be followed by a Viva Voice in front of a Panel of two or three faculty members.		

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Text Books:

Richard Williams (2012), The Animator's Survival Kit, United States: Farrar, Straus and Giroux.

References:

Kit Laybourne (1979), The Animation Book, United States: Three Rivers Press.

Modes of Evaluation: Class Test/Assignment/End Term Examination/Case Presentation

Examination Scheme:

Components	Report	Viva
Weightage (%)	70	30

T- Timely Submission, CC- Content Clarity, Comp- Comprehensiveness, O- Originality, PP- Project Presentation

CO, PO and PSO Mapping

	PO1	PO2	PO3	PO4	PSO1	PSO2	PSO3	PSO4
CO1	1	1	--	1	--	--	1	1
CO2	--	--	--	--	--	--	1	1
CO3	--	--	--	1	--	--	1	1
CO4	1	1	1	1	--	--	1	1

1: Strongly Related, 2: Moderately Related and 3: Weakly Related



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ANI2307	DESIGN THINKING	L	T	P	C
Version	2021	1	1	2	3
Pre- requisites/Exposure					
Co-requisites					

Catalog Description –

The objective is to teach students an overview of design thinking and work with a model containing four key questions and several tools to help you understand design thinking as a problemsolving approach. We also look at several stories from different organizations that used design thinking to uncover compelling solutions.

Course Objectives

The objective of this course is to

- To impart working knowledge of what design thinking is and when to use it.
- To impart knowledge use design thinking to generate innovative ideas.
- To Impart Knowledge of to prepare to see and take action when opportunity arises

Course Outcomes (COs):

On completion of this course, the students will be able to

CO1. Create the process of using design thinking to generate and test ideas CO2. How to use design thinking to generate innovative ideas,


CO3. Identify and describe various design thinking process and methods.

Course Contents:

Modules	Blooms level*	Number of hours
MODULE 1 - What Is Design Thinking? Students will begin by unpacking what we mean by design thinking and why it is more effective than traditional methods when the goal is innovation. We'll also examine what kinds of challenges are best-suited for design thinking and learn about the Visualization tool, which helps bring ideas to life. By the end of this module, you'll have a better understanding of what we mean by design thinking, when to use it, and how to use the Visualization tool.	L1, L2,L3	20



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MODULE 2 - Design Thinking's Phases Learn about the five phases of design thinking - Empathise Define Ideate Prototype Test	L1, L3	20
MODULE 3 - Experimentation By the end of this module, you'll understand how to apply the "what wows?" and "what works?" questions, and how to use the Learning Launch tool	L1, L3	8

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Text Books

- The Design Thinking Toolbox (2020): A Guide to Mastering the Most Popular and Valuable Innovation Methods , United States: Wiley Press

Reference Books

- Sprint: How To Solve Big Problems and Test New Ideas in Just Five Days : Transworld Books

Modes of Evaluation: Class Test/Assignment/End Term Examination/Case Presentation

Examination Scheme:

Components	H	C	CT	A	EE
Weightage (%)	10	-	15	5	70

CT: Class Test, H: Home Assignment, EE: End Semester Examination; A: Attendance; C: Case Presentation

CO, PO and PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	1	1	--	2	--	--	2	2	1	2	3
CO2	1	1	--	2	--	--	3	--	1	2	--
CO3	1	1	--	2	--	--	3	--	1	2	--

1: Strongly Related, 2: Moderately Related and 3: Weakly Related

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ANI2308	ONLINE CERTIFICATION (MINIMUM 30 HOURS)	L	T	P	C
Version	2021	0	0	0	3
Pre- requisites/Exposure					
Co-requisites					

Catalog Description

The future belongs to those who create. Whether it's to inform, persuade, entertain, or inspire, success in the digital age means communicating in visually rich and interactive ways. With a firm grasp on the world's most powerful creative tools certification of Adobe Creative Cloud & Autodesk 3DS Max and Maya

Course Objectives

The objective of this course is to

- Equip the students with the industry-recognized certification that demonstrates mastery in software's
- Provide a platform to learn and prove their digital media skills to prospective employers.

Course Outcomes (COs):

On completion of this course, the students will be able to

CO1: Proof of competency in specific digital media tools. CO2: Increased confidence in one's digital media abilities.

Course Contents:

Modules	Blooms level*	Number of hours
MODULE 1: Certifications that can be taken – Adobe Certified Professional Autodesk Certified User Unity Certified User certification	L1, L4,L3, L6	No Contact Hours



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Course with certificate from coursera.org or edex.adobe.com		
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**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Text Books

As required to perform the activities.

Reference Books

As required to perform the activities.

Modes of Evaluation:

Examination Scheme:

Components	Attendance	Active Participation	Multiple Choice Questions/ Quiz	Solving the Case/Assignment/ Write Up	Total
Weightage(%)	NA	NA	NA	NA	NA

CO, PO and PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	1	1	2	--	--	--	--	2	3	1	2
CO2	1	1	2	--	--	--	--	2	3	1	2

1: Strongly Related, 2: Moderately Related and 3: Weakly Related



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ANI2333	WORKSHOP/ CERTIFICATION (DISCIPLINE SPECIFIC)	L	T	P	C
Version	2014	0	0	0	1
Pre- requisites/Exposure					
Co-requisites					

Catalog Description

A workshop is primarily an activity based academic event that is organized to provide the students a one to one and hands on experience on any aspect of their learning. The communication in a workshop has to be necessarily two way. The trainer has to make sure that the aspect covered are practically practiced by the participants. The student will choose the option of workshop from amongst their concentration electives. The evaluation will be done by Board of examiners comprising of the faculties.

Course Objectives

The objective of this course is to

- Equip the students with the hands on experience with experts in a particular discipline.
- Provide a platform to learn and perform in activity based academic events.

Course Outcomes (COs):


On completion of this course, the students will be able to

CO1: Memorize and Outline the processes and functions involved in various themes/activities conducted in a particular discipline of animation industry.

CO2: Understand the concepts and apply the same in a particular discipline.

Course Contents:

Modules	Blooms level*	Number of hours
MODULE 1: Major Themes For Workshop The workshop may be conducted on any of the following major themes: Acting for animation	L1, L4, L3, L6	No Contact Hours


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<p>Lighting Photography Digital Painting Matt Painting Clay Animation Composting Painting / Oil / Water These themes are merely indicative and the trainer may choose any recent and relevant topic of study.</p> <p>GUIDELINES FOR WORKSHOP The procedure for earning credits from workshop consists of the following steps: Relevant study material and references will be provided by the trainer in advance. The participants are expected to explore the topic in advance and take active part in the discussions held Attending and Participating in all activities of the workshop Group Activities have to be undertaken by students as guided by the trainer. Evaluation of workshop activities would be done through test and quiz at the end of the workshop. Submitting a write up and showing the final output which focuses on the learning outcome from the workshop.</p> <p>METHODOLOGY The methodology followed at the workshop could be based on any one or more of the following methods: Case Study Simulation Group Activity</p>		
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**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Text Books

As required to perform the activities.

Reference Books

As required to perform the activities.

Modes of Evaluation: Examination Scheme:

Components	Attendance	Active Participation	Multiple Choice Questions/ Quiz	Solving the Case/Assignment/ Write Up	Total
Weightage(%)	5	30	30	35	100


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CO, PO and PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	1	1	2	--	--	--	--	2	3	1	2
CO2	1	1	2	--	--	--	--	2	3	1	2

1: Strongly Related, 2: Moderately Related and 3: Weakly Related



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ANI2452	MAYA MODELING & TEXTURING	L	T	P	C
Version	JULY 2021	1	0	4	3
Pre-requisites/Exposure	Basic skills of computer				
Co-requisites					

Catalog Description

Course introduces students to the foundations of character/object modeling & texturing which is the process of adding mesh and controls to a character that allows a creative model to animate it in a proper manner. The course prepared to candidate for an advanced work in 3-D modeling & Texturing. In this section, student will get an introductory look at the processes in Maya. Student will use a Project-based approach as we cover the fundamentals of Maya looks at commonly used tools, and talk about some time-saving tips and techniques gleaned from production experience.

Course Objectives

The objective of this course is-

- To train the proper knowledge of surfaces which used for modeling in TV serials, films and other commercials.
- To train the basic mesh flow system in modeling.
- To teach the tools of modeling, merit and demerit of modeling and designing.
- To guide the visualize the story and their character, assets and other part of design and then impart it in modeling through various tools of Maya software.

Course Outcomes

On completion of this course, the students will be able to

CO1. Model or design the given reference object or character for TV episodes and films.

CO2. Create and design the required models and color for advertisement project or any other commercials.


CO3. Develop their own show reel in 3D including modeling, coloring and texturing appropriate shading network.

CO4. Develop and represent the 3D models and environment on their own visualize story.

CO5. Manage and make any big project management in terms of man power requirement along with budgeting of big animation film project.



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Course Contents:

Modules	Blooms level*	Number of hours
MODULE 1: Introduction to the interface of Maya. Hotkeys. Using the spacebar. Manipulating a view. Creating objects. Simple primitives. Lights, cameras, selecting objects, types of selection, single selection, adding and subtracting selection, edit menu selection options. Marquee selection, Lasso selection, selection mask.	L1, L2	24
MODULE 2: Using hyper shade, relationship editor, hyper graph and outliner. The channel box. Duplicating objects, pivot points, introduction to snapping- 2D snapping and 3D snapping. Using layers. Introduction to textures and materials.	L3,L6	12
MODULE 3: Modeling a 3D character, understanding edge flow of face and body in order to achieve a smoother bends while animating, unwrapping and texturing the character and understanding use of Photoshop while creating realistic textures.	L3, L6	12

*Bloom's Level:

L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Text Books:

Kelly L. Murdock (2015), *Autodesk Maya 2015*, Buchanan: SDC publishing LLC.

References:

Lee Lanier (2012), *Maya Professional Tip and Techniques*, United States: John Wiley and Sons Publications.

Modes of Evaluation: Class Test/Assignment/End Term Examination/Case Presentation Examination Scheme:

Components	P	C	CT	A	EE	
					Practical	Theory
Weightage (%)	5	10	10	5	20	50

P- Project, C- Case Discussion/Presentation/Analysis, CT- Class Test, A- Attendance, EE- End Semester Examination



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CO, PO and PSO Mapping

	PO1	PO2	PO3	PO4	PSO1	PSO2	PSO3	PSO4
CO1	1	1	--	1	1	1	1	1
CO2	1	1	--	1	1	1	1	1
CO3	1	1	--	1	1	--	--	1
CO4	1	1	--	1	--	--	--	1

1: Strongly Related, 2: Moderately Related and 3: Weakly Related



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ANI2405	DIGITAL COMPOSTING	L	T	P	C
Version	2021	2	0	2	3
Pre- requisites/Exposure					
Co-requisites					

Catalog Description

The objective is to teach students about different concepts involved in digital compositing, which will help them to apply these entire concepts practically.

Course Objectives

The objective of this course is to

- To impart working knowledge of basics Image & video Compositing & color correction
- To impart knowledge into Image tracking and stabilization for seamless compositing.
- To Impart Knowledge of basics of digital compositing formats, Aspect Ratio, color bits and video formats.

Course Outcomes (COs):

On completion of this course, the students will be able to


CO1. Create digital compositing of Images & video for finished Post Production.

CO2. Create match move composites for seamless chrome key effects and 3d camera tracking.

CO3. Identify and describe various video Formats, Aspect Ratio, color depth bits, & film formats.

Course Contents:

Modules	Blooms level*	Number of hours
MODULE 1 Basic Image Manipulation and Compositing: Terminology, Color Manipulations, Spatial filters, geometric transformations, Expression Language, Filtering Algorithms, motion blur, Multi source Operators, Matte Image, The Integrated Matte Channel, Masks, Compositing With Pre multiplied Images, Morphing, Matte creation and manipulation: Rotoscoping, Procedural matte extraction, matte manipulations, Time and	L1, L2, L3	10


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Temporal Manipulations: Apparent Motion, Temporal Resolution, Temporal Artifacts, Changing the Length or Timing of a Sequence, Key Framing.		
MODULE 2 Image Tracking and Stabilization: Tracking an Element into a Plate, Choosing the Feature to Track, Limiting the Search Area, Human Intervention, Using Tracking Curves Manually, Tracking Multiple Points, Stabilizing a Plate, Camera tracking, Interface Interactions: Workflow, the evolution of Interactivity, Methods of representing the compositing process, Timelines, Curve Editors, Working With Proxy Images, Image Viewing and Analysis Tools.	L1, L3	20
MODULE 3 Film Formats: Aspect Ratio: Non square Pixels, Deciding on aResolution for an Aspect Ratio, Format Conversion Pipeline, Format Conversion Example, Film Formats: 35mm Formats ,16mm Formats,Specialized Film Formats, Video Formats: Fields, Color Resolution, Gamma, Common video formats, Other Formats, Working with non square pixels, converting and combining formats	L1, L3	18

**Bloom's Level:*

L1-Knowledge;

L2-Comprehension;

L3-Application;

L4-Analysis;

L5-

Synthesis,

L6-Evaluation

Text Books

- Steve Wright (2010). *Digital Compositing for Film and Video*, United Kingdom: Routledge

Reference Books

- Ron Ganbar (2014). *Nuke 101: Professional Compositing and Visual Effects*, United States: Peachpit Press

Modes of Evaluation: Class Test/Assignment/End Term Examination/Case Presentation


Examination Scheme:

Components	H	C	CT	A	EE
Weightage (%)	10	-	15	5	70

CT: Class Test, H: Home Assignment, EE: End Semester Examination; A: Attendance; C:Case Presentation



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CO, PO and PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	1	1	--	2	--	--	2	2	1	2	3
CO2	1	1	--	2	--	--	3	--	1	2	--
CO3	1	1	--	2	--	--	3	--	1	2	--

1: Strongly Related, 2: Moderately Related and 3: Weakly Related



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ANI2406	INTRODUCTION TO GAME DEVELOPMENT	L	T	P	C
Version	2021	1	0	4	3
Pre- requisites/Exposure					
Co-requisites					

Catalog Description

Students will learn to build the skills necessary to design and development games. The Introduction to Game Development focuses on both the theory and practice of game making. From a technical standpoint, student create game projects in the latest Unity 2020 game engine, include a 2D Shooter, 2D Platformer, First-Person Shooter, and 3D Platformer.

Students will learn to import 3d models with texture & Materials from 3D software's i.e. Maya and learn the basics of c# for interactive games.

Course Objectives

The objective of this course is to

- To impart working knowledge of Importing 3D assets into the game engine.
- To impart knowledge into unity 3D scripting using C# .
- To Impart Knowledge of publishing from Unity 3D for multiple device

Course Outcomes (COs):

On completion of this course, the students will be able to

CO1. Create & assemble 2D & 3D assets into unity 3d game engine.CO2. Create C# scripts for the 2D & 3D interactions.

CO3. Identify and describe various 3D Formats and publishing for different platforms

Course Contents:

Modules	Blooms level*	Number of hours
MODULE 1 - Introduction to Unity Getting to Know the Unity Editor The Project Dialog The Unity Interface Dimensions and Coordinate Systems	L1, L2,L3	12
The Basics of Models Built-In 3D Objects Importing Models Textures, Shaders, and Materials Lights and Cameras		



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MODULE 2 – Unity Scripting Scripts Creating Scripts Attaching a Script Anatomy of a Basic Script The Using Section The Class Declaration Section The Class Contents Variables Creating Variables Variable Scope The if / else Statement The if / else if Statement Methods Anatomy of a Method Writing Methods Using Methods Input Input Basics Input Scripting	L1, L3	20
MODULE 3 – Animation, Audio, collisions and publish - Rigidbody Collision Colliders Prefab Basics Prefab Terminology Prefab Structure The Animation Animation Types Creating an Animator The Animator View The Idle Animation Parameters	L1, L3	16
States and Blend Trees Managing Scenes Establishing Scene Order Switching Scenes Per-Platform Settings Building Your Game Build Settings Game Settings		

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Text Books

1. Unity 2018 Game Development In 24 Hours, Sams Teach Yourself Third Edition, United Kingdom: Pearson


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Reference Books

1. Mastering Unity Scripting: Learn advanced C# tips and techniques to make professional-grade games with Unity (2015) : Packt Press

Modes of Evaluation: Class Test/Assignment/End Term Examination/Case Presentation**Examination Scheme:**

Components	H	C	CT	A	EE
Weightage (%)	10	-	15	5	70

CT: Class Test, H: Home Assignment, EE: End Semester Examination; A: Attendance; C:Case Presentation


CO, PO and PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	1	1	--	2	--	--	2	2	1	2	3
CO2	1	1	--	2	--	--	3	--	1	2	--
CO3	1	1	--	2	--	--	3	--	1	2	--

1: Strongly Related, 2: Moderately Related and 3: Weakly Related



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ANI2407	MOTION GRAPHICS	L	T	P	C
Version 1	2014	1	1	2	3
Pre- requisites/Exposure					
Co-requisites					

Catalog Description

In media today, there is perhaps not a single course which is untouched by motion graphics. Keeping this widely used tool in mind, this course covers the latest in concepts and techniques in the creation and production of motion design animation using software designed specifically for this purpose such as Animate CC and Adobe After Effects. The course will cover different kinds of motion designs, concept and storyboard and computer generation of motion design sequences. The course will be profusely illustrated from scenes and sequences employing heavy use of motion graphics, both from the Hollywood as well as Bollywood Motion Picture Industry.

Course Objectives:

The objective of this course is to:

- Enable the students to comprehend principles of motion design using a judicious mix of theory and practical work
- To familiarize students with every aspect of motion design software, both at the beginner as well as advanced level
- To instill in the students such a level of confidence that they can tackle projects at a professional level by having a basic knowledge of all software related to Motion Design software, and intensive knowledge of some selected software such as After Effects.

Course Description

This course covers the plethora of motion design software, moving from very basic design software to very specific software, such as Nuke or Mocha for example, that have been created for very specific tasks. This entire course, since it is designed for an industry that requires very high quality work in the shortest possible time, is heavily weighted in favour of practical exercises that are given to the students at regular intervals and that progress from basic to intermediate and finally to advanced. Scenes and sequences from movies are deconstructed to filter out the essential ingredients of motion graphics like compositing, rotoscoping, match moving etc. so that a conceptual framework for practical execution of projects is established.

The course is graded in terms of intensity as well as complexity and equal emphasis is placed on conceptualization and visualization as well as execution, so that students can emerge with a portfolio that is only technically brilliant but also creative.

Course Outcomes:

On completion of this course, the students will be

CO1. Completely proficient with all aspects of at least three to four software, notably Adobe After Effects, Nuke, Fusion and Mocha, used heavily in the industry

CO2. Be able to visualise, script and storyboard visual effects for both the Broadcast as well as the film industry

CO3. Be able to execute both short and long sequences with precision and quality which is


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comparable to work being done in the industry

CO4. Be able to work in a team and in a networked environment, using IT tools effectively to reach a wide audience in an online environment

Course Contents:

Modules	Blooms level*	Number of hours
MODULE 1: Fundamentals of Graphics, Animation and Motion Graphics What is Motion Graphics? How is it different from other forms of animation. 2D and 3D animation software. Why is it assuming so much importance in present day movies? What packages are currently being used in the industry and advantages and disadvantages of each. Deconstruction of scenes from movies (Hollywood, Bollywood and International), explanation of how certain effects were created and demonstrating in the computer lab a scaled down version of certain selected effects.	L1, L2	4
MODULE 2: After Effects: General Motion Graphics tool This Unit moves out from creative and conceptual dialogues into the domain of After effects. Since this package is used heavily by the Television Industry, many examples from this medium will be used to illustrate hard-to-grasp concepts. Various components of After Effects that will be taught in this module are:	L2, L3	6
The After Effects interface: Moving about and navigation in AfterEffects AE tools and panels; how to customise and optimise them Keyboard shortcuts - how to use and customize Creating your first composition The Timeline - navigation, panels and scope of the timeline Project windows and assets; moving assets from project to timeline Use of keyframes to create simple animations Illustration of first principles of animation - ease in, out and easyease Frame rates, speeding up and slowing down of animation - using theGraph editor Rendering and compression concepts; Different kinds of movieformats Outputting your first movie; Settings and how they can be tweaked		
MODULE 3: Compositing and Match moving in After Effects		



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<p>This unit is a continuation of the earlier unit. Here we go into greater depth of the various tools, filters effects and presets that can be used. Round tripping between After Effects and Editing software such as Premiere and/or Final Cut Pro, this unit talks about green screen, chroma keying, masks and mattes for compositing stills and videos. Common problems encountered such as fast moving footage or color fringing are discussed and creative solutions offered. Also compositing is demonstrated in two or three software such as After Effects, Nuke and/or Fusion, and the reason why a particular software is chosen for a particular task is explained. In this unit, also match moving, locking still image or animation on a target, using 2D and 3D cameras, as well as planar tracking software like Mocca are covered in detail. Again to make the students industry, common problems encountered when using these highly specialized software are discussed, examined and students are encouraged to come up with creative solutions to fix these problems. A case study approach rather than classroom rote learning will be adopted both in this as well as the next unit.</p>	L2, L3, L4	8
<p>MODULE 4: Rotoscoping, Particle Animation. Liquid and Pyrotechnics In this Module, very specific effects used in films like particle effects, rotoscoping, liquid effects, dynamic simulations using soft and rigid bodies, as well as pyrotechnics – fire and smoke effects as well as explosion effects are dealt with at length. This unit is almost completely practical and theory is only used to augment and strengthen student's knowledge, rather than it being a substitute for imparting practical skills. Figuring out how to deal with hardware and exporting issues when rendering heavy and complex scenes is also discussed and explained.</p>	L3, L4	8
<p>MODULE 5: Assembling effects This module, although slightly different in the sense that it is more focused on editing, brings all the skills learnt in the previous modules onto the editing platform. Students learn how to combine and compile sequences, the different editing codecs, how to export both high quality videos as well as compressed videos and how to add music and sound effects to their sequences to maximize impact of the visual effects that they have created using a single or combination of different software.</p>	L3, L4, L5	6
TOTAL CONTACT HOURS		32

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Text Books

- Ron, Brinkmann. *The Art and Science of Digital Compositing: Techniques for Visual Effects, Animation and Motion Graphics: The Morgan Kaufmann Series in Computer Graphics*. 2008
- Byrne, Bill. *The Visual Effects Arsenal: VFX Solutions for the Independent Filmmaker*. Focal Press 1st Edition. 2009

Reference Books

- Dodds, David. *Hands-On Motion Graphics with Adobe After Effects CC: Develop your skills as a visual effects and motion graphics artist*. Pakt Publishing. 2019.
- Lanier, Lee. *Digital Compositing with Nuke*. Focal Press. 2012

Modes of Evaluation: Practical/Home Assignment/Class Test/Written Examination**Examination Scheme:**

Components	P	CT	A	EE
Weightage (%)	10	15	5	70

P: Project, CT: Class Test, EE: End Semester Examination; A: Attendance

CO, PO and PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	1	2	1	3	..	..	..	1	1	1	3
CO2	1	2	3	3	..	..	..	1	1	1	3
CO3	1	2	1	3	..	..	..	1	3	1	3
CO4	1	1	3	1	2	3	1	1
CO5

1: Strongly Related, 2: Moderately Related and 3: Weakly Related



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ANI2408	ONLINE CERTIFICATION (MINIMUM 30 HOURS)	L	T	P	C
Version	2021	0	0	0	3
Pre- requisites/Exposure					
Co-requisites					

Catalog Description

The future belongs to those who create. Whether it's to inform, persuade, entertain, or inspire, success in the digital age means communicating in visually rich and interactive ways. With a firm grasp on the world's most powerful creative tools certification of Adobe Creative Cloud & Autodesk 3DS Max and Maya

Course Objectives

The objective of this course is to

- Equip the students with the industry-recognized certification that demonstrates mastery in software's
- Provide a platform to learn and prove their digital media skills to prospective employers.

Course Outcomes (COs):

On completion of this course, the students will be able to

CO1: Proof of competency in specific digital media tools. CO2: Increased confidence in one's digital media abilities.

Course Contents:

Modules	Blooms level*	Number of hours
MODULE 1: Certifications that can be taken – Adobe Certified Professional Autodesk Certified User Unity Certified User certification Course with certificate from coursera.org or edex.adobe.com	L1, L4,L3, L6	No Contact Hours

**Bloom's Level:*


L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis,L6-Evaluation

Text Books

As required to perform the activities.

Reference Books

As required to perform the activities.


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Modes of Evaluation:**Examination Scheme:**

Components	Attendance	Active Participation	Multiple Choice Questions/ Quiz	Solving the Case/Assignment/ Write Up	Total
Weightage(%)	NA	NA	NA	NA	NA

CO, PO and PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	1	1	2	--	--	--	--	2	3	1	2
CO2	1	1	2	--	--	--	--	2	3	1	2

1: Strongly Related, 2: Moderately Related and 3: Weakly Related



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ANI2433	WORKSHOP/ CERTIFICATION (DISCIPLINE SPECIFIC)	L	T	P	C
Version	2014	0	0	0	1
Pre- requisites/Exposure					
Co-requisites					

Catalog Description

A workshop is primarily an activity based academic event that is organized to provide the students a one to one and hands on experience on any aspect of their learning. The communication in a workshop has to be necessarily two way. The trainer has to make sure that the aspect covered are practically practiced by the participants. The student will choose the option of workshop from amongst their concentration electives. The evaluation will be done by Board of examiners comprising of the faculties.

Course Objectives

The objective of this course is to

- Equip the students with the hands on experience with experts in a particular discipline.
- Provide a platform to learn and perform in activity based academic events.

Course Outcomes (COs):


On completion of this course, the students will be able to

CO1: Memorize and Outline the processes and functions involved in various themes/activities conducted in a particular discipline of animation industry.

CO2: Understand the concepts and apply the same in a particular discipline.

Course Contents:

Modules	Blooms level*	Number of hours
MODULE 1: Major Themes For Workshop The workshop may be conducted on any of the following major themes: Acting for animation	L1, L4, L3, L6	No Contact Hours


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<p>Lighting Photography Digital Painting Matt Painting Clay Animation Composting Painting / Oil / Water These themes are merely indicative and the trainer may choose any recent and relevant topic of study.</p> <p>GUIDELINES FOR WORKSHOP The procedure for earning credits from workshop consists of the following steps: Relevant study material and references will be provided by the trainer in advance. The participants are expected to explore the topic in advance and take active part in the discussions held Attending and Participating in all activities of the workshop Group Activities have to be undertaken by students as guided by the trainer. Evaluation of workshop activities would be done through test and quiz at the end of the workshop. Submitting a write up and showing the final output which focuses on the learning outcome from the workshop.</p> <p>METHODOLOGY The methodology followed at the workshop could be based on any one or more of the following methods: Case Study Simulation Group Activity</p>		
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**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Text Books

As required to perform the activities.

Reference Books

As required to perform the activities.

Modes of Evaluation: Examination Scheme:

Components	Attendance	Active Participation	Multiple Choice Questions/ Quiz	Solving the Case/Assignment/ Write Up	Total
Weightage(%)	5	30	30	35	100

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CO, PO and PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	1	1	2	--	--	--	--	2	3	1	2
CO2	1	1	2	--	--	--	--	2	3	1	2

1: Strongly Related, 2: Moderately Related and 3: Weakly Related



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ANI2505	MAYA RIGGING AND ANIMATION	L	T	P	C
Version	JULY 2021	1	0	4	3
Pre- requisites/Exposure					
Co-requisites					

Catalog Description

Student will also learn how Maya's interface can be customized to work faster. By the end of the section, student will be comfortable enough to utilize Maya's rigging features to rig their own assets.

Course Objectives

The objective of this course is to

- To impart working knowledge of Rigging in Autodesk Maya and automate the basic rigging system.
- To impart knowledge of Animation in Autodesk Maya for Humanoid and non-organic objects.
- Working with Autodesk Maya in Dope Sheet & Graph Editor.

Course Outcomes (COs):

On completion of this course, the students will be able to

CO1. Create detailed Rigging system of Humanoid and non-organic objects for Cinematic animations


CO2. Create Animation using Keyframes and Rigging system for smooth and effective lopping animations i.e. Walk cycle, Run Cycle and more. And effectively use graph editor& Dope sheets for ease-in & ease-out animations.

Course Contents:

Modules	Blooms level*	Number of hours
MODULE 1 Student will also learn how Maya's interface can be customized to work faster. By the end of the section, student will be comfortable enough to utilize Maya's rigging features to rig their own assets!	L1, L3	24



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MODULE 2 The intuitive and fun animation tools of Maya. How to set up animation preferences and create key frames, to learning how animation can be modified from Maya's Timeline and Graph Editor. Learn how to animate objects along a path, how to work non-linearly and non-destructively with the help of the Trax Editor and animation layers. how to animate with constraints and even cover helpful tips on how to improve your productivity.	L1, L3	24
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**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis; L6-Evaluation

Text Books

1. The Art of Maya: An Introduction to 3D Computer Graphics by Autodesk Maya Press

Reference Books

1. Maya Professional Tip and Techniques; Lee Lanier; John Wiley and Sons

Modes of Evaluation: Class Test/Assignment/End Term Examination/Case Presentation

Examination Scheme:

Components	H	C	CT	A	EE
Weightage (%)	10	-	15	5	70

CT: Class Test, H: Home Assignment, EE: End Semester Examination; A: Attendance; C: Case Presentation


CO, PO and PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	2	1	--	2	--	--	2	2	1	1	3
CO2	2	1	--	2	--	--	3	2	1	1	--
CO3	2	1	--	2	--	--	3	2	1	1	--

1: Strongly Related, 2: Moderately Related and 3: Weakly Related



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ANI2535	SUMMER PROJECT EVALUATION-II	L	T	P	C
Version	2014	0	0	0	6
Pre-requisites/Exposure	2D Animation				
Co-requisites	None				

Catalog Description

In this subject, student will create animated clips and videos. After selecting this option a Faculty Guide will be allocated to the student by HOI and concern student will have to work with allocated faculty guide for proper guidance to complete this project. Student can choose topic as per his/her area of interest & as per the suggestion given by Faculty guide.

Course Objectives

The objective of this course is-

- To guide the techniques of creating animated clips, graphic design.
- To supervise quality of project this based on concept.
- To teach the tools and equipment which are used in making graphic designing, animation commercials.
- To assist for getting the required output of project as per client satisfaction.

Course Outcomes

On completion of this course, the students will be able to-CO1. Identify the 12 principles of animation

CO2. Create accurate and ethically appealing computer generated animation CO3. Describe characteristics of well-designed and executed animation CO4. Demonstrate progress in basic drawing and animation skills

Course Contents:

Modules	Blooms level*	Number of hours
2D Graphic designing Animation clip	L6	36
Project Report: In this report student will have give details of his/her Topic with proper Introduction, Industry overview along with proper details of his/her area. For example if he/she is working on 2D animation or clip art so they must give details on these. Following points should be covered in it: The project itself on the computer, Report comprising of: Title page, Concept note/ Ideation, Storyboard, Objectives, Methodology, Learning Outcome, Conclusion		

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Presentation & Viva: Students will have to make a Presentation (based on their Project Report) and it will be followed by a Viva Voice in front of a Panel of two or three faculty members.		
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**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Text Books:

Richard Williams (2012), The Animator's Survival Kit, United States: Farrar, Straus and Giroux.

References:

Kit Laybourne (1979), The Animation Book, United States: Three Rivers Press.

Modes of Evaluation: Class Test/Assignment/End Term Examination/Case Presentation

Examination Scheme:

Components	Report	Viva
Weightage (%)	70	30

T- Timely Submission, CC- Content Clarity, Comp- Comprehensiveness, O- Originality, PP- Project Presentation

CO, PO and PSO Mapping

	PO1	PO2	PO3	PO4	PSO1	PSO2	PSO3	PSO4
CO1	1	1	--	1	--	--	1	1
CO2	--	--	--	--	--	--	1	1
CO3	--	--	--	1	--	--	1	1
CO4	1	1	1	1	--	--	1	1

1: Strongly Related, 2: Moderately Related and 3: Weakly Related



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ANI2552	SCRIPTING AND STORY BOARDING	L	T	P	C
Version 1	2021	1	1	2	3
Pre- requisites/Exposure					
Co-requisites					

Catalog Description

In this course, students learn the rudiments of scripting and storyboarding as well explore the differences between the different formats. They are introduced to the meaning of conceptualizing a treatment and style for a film, the differences between scripting for Ads and short films as compared to scripting for feature films as well as the different types of scripts like treatment, script, shoot and edit scripts, screenplays and finally meticulously prepared scripts which are better known as storyboards

Course Objectives:

The objective of this course is to:

- Help students improve their writing style, especially with reference to film, video and Internet
- Enable students to write creative and cohesive scripts in a variety of programme formats such as News bulletins, Ads, PSAs, promos, fiction and documentaries
- To build a sound foundational structure of film grammar so that they can translate filmic elements into narrative structures and visualise scenic elements with ease

Course Description

This course equips the learner with skills in three distinct areas. To polish their writing styles, structures and grammar so that the student can write not only well but also in a lexically and grammatically correct manner. The second objective is to build a sound theoretical foundational of filmic elements by deconstruction of popular scenes from films and expound on the principles behind the success of these scenes, so that the learner can translate prose elements into visual narratives. The third objective is to enable the learner to conceptualise, visualise and translate these abstract ideas into a concrete text in the form of storyboards and scripts – both shooting as well as edit scripts. The entire course takes the advantage of a huge repository of good audio visual material so that every theoretical construct can be supplemented and illustrated with examples drawn from filmic and broadcast domains.

Course Outcomes:

On completion of this course, the students will be

CO1. Able to write quickly effectively and well in a variety of styles

CO2. Be able to translate abstract ideas into shootable scenes

CO3. Be able to understand client briefs and producer requirements

CO4. Proficient at every aspect of writing for fiction and non-fiction

Course Contents:



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Modules	Blooms level*	Number of hours
MODULE 1: Pre-Production Research This unit focuses essentially of all aspects of pre-production. Methods of research, scouring for sources of material, collating and compiling material. Research indoors as well as outdoors. Preparing and completing a “rekky”, techniques of preliminary interview of people. Understanding the requirements of the documentary or film are also covered in this module	L1, L2	6
MODULE 2: Concept & Treatment In this module, students learn all about conceptualizing an idea, abstract concept, trying new and novel methods of treatment; Soliloquy; integrating one comprehensive document out of several different text material, and writing client specific briefs form the core of this module	L2, L3	4
MODULE 3: Fundamentals of Film Grammar This very important module unravels the mysteries of film shooting and filmic editing. The fundamentals of shot composition, camera angles, camera aesthetics, constructing and deconstructing a film. Dialogue creation; creative use of sound and optimizing the use of the sound studio, as well as techniques developed by the great masters of documentary and cinematic narrative, all form the backbone of this vitally essential module	L2, L3	8
MODULE 4: Writing the Script This module explains and teaches the actual writing process. How all the different ingredients of pre production research, visualization, film grammar and principles come together to form a compelling narrative. Students learn about writing prose, writing scene and shot descriptions, development of a character, plot points, digetic and non-digetic sound, meaning of clima, anti-climax and other structural elements that make up a well interwoven script	L2, L3, L5	8
MODULE 5: Screenplays and Storyboarding This is almost a completely practical unit, where students are taken through the entire process of writing a script and have to prepare on an individual basis scripts and storyboards in a variety of formats. Thus they have to prepare a script for a news bulletin; a storyboard for an Ad; A storyboard for a PSA; a script for non-fiction short film and one for a short documentary. Some of the exercises will be test exercises while others will be assessed and graded	L3, L4, L6	4
TOTAL TEACHING HOURS		30

*Bloom's Level:

L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Text Books

- King, Stephen. *On Writing: A Memoir of the Craft*. Simon and Schuster, 2012
- Douglas, Pamela. *Writing the TV Drama Series: How to Succeed as a Professional Writer in TV*. 2018

Reference Books:

- Truby, John. *The Anatomy of Story: 22 Steps to Becoming a Master Storyteller*. Faber and

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Faber, Inc. 2008

- Strunk Jr., William. White, E. *Elements of Style*. Fourth edition. 1999

Modes of Evaluation: Practical/Home Assignment/Class Test/Written Examination

Examination Scheme:

Components	P	CT	A	EE
Weightage (%)	10	15	5	70

P: Project, CT: Class Test, EE: End Semester Examination; A: Attendance

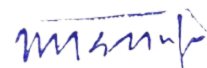
CO, PO and PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1											
CO2											
CO3											
CO4											

1: Strongly Related, 2: Moderately Related and 3: Weakly Related



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ANI2508	ONLINE CERTIFICATION (MINIMUM 30 HOURS)	L	T	P	C
Version	2021	0	0	0	3
Pre- requisites/Exposure					
Co-requisites					

Catalog Description

The future belongs to those who create. Whether it's to inform, persuade, entertain, or inspire, success in the digital age means communicating in visually rich and interactive ways. With a firm grasp on the world's most powerful creative tools certification of Adobe Creative Cloud & Autodesk 3DS Max and Maya

Course Objectives

The objective of this course is to

1. Equip the students with the industry-recognized certification that demonstrates mastery in software's
2. Provide a platform to learn and prove their digital media skills to prospective employers.

Course Outcomes (COs):

On completion of this course, the students will be able to

CO1: Proof of competency in specific digital media tools. CO2: Increased confidence in one's digital media abilities.

Course Contents:

Modules	Blooms level*	Number of hours
MODULE 1: Certifications that can be taken – Adobe Certified Professional Autodesk Certified User Unity Certified User certification Course with certificate from coursera.org or edex.adobe.com	L1, L4, L3, L6	No Contact Hours

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Text Books

As required to perform the activities.

Reference Books

As required to perform the activities.



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Modes of Evaluation:**Examination Scheme:**

Components	Attendance	Active Participation	Multiple Choice Questions/ Quiz	Solving the Case/Assignment/ Write Up	Total
Weightage(%)	NA	NA	NA	NA	NA

CO, PO and PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	1	1	2	--	--	--	--	2	3	1	2
CO2	1	1	2	--	--	--	--	2	3	1	2

1: Strongly Related, 2: Moderately Related and 3: Weakly Related



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ANI2533	WORKSHOP/ CERTIFICATION (DISCIPLINE SPECIFIC)	L	T	P	C
Version	2014	0	0	0	1
Pre- requisites/Exposure					
Co-requisites					

Catalog Description

A workshop is primarily an activity based academic event that is organized to provide the students a one to one and hands on experience on any aspect of their learning. The communication in a workshop has to be necessarily two way. The trainer has to make sure that the aspect covered are practically practiced by the participants. The student will choose the option of workshop from amongst their concentration electives. The evaluation will be done by Board of examiners comprising of the faculties.

Course Objectives

The objective of this course is to

1. Equip the students with the hands on experience with experts in a particular discipline.
2. Provide a platform to learn and perform in activity based academic events.

Course Outcomes (COs):

On completion of this course, the students will be able to

CO1: Memorize and Outline the processes and functions involved in various themes/activities conducted in a particular discipline of animation industry.

CO2: Understand the concepts and apply the same in a particular discipline.

Course Contents:

Modules	Blooms level*	Number of hours
MODULE 1: Major Themes For Workshop The workshop may be conducted on any of the following major themes: Acting for animation	L1, L4, L3, L6	No Contact Hours



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<p>Lighting Photography Digital Painting Matt Painting Clay Animation Composting Painting / Oil / Water These themes are merely indicative and the trainer may choose any recent and relevant topic of study.</p> <p>GUIDELINES FOR WORKSHOP The procedure for earning credits from workshop consists of the following steps: Relevant study material and references will be provided by the trainer in advance. The participants are expected to explore the topic in advance and take active part in the discussions held Attending and Participating in all activities of the workshop Group Activities have to be undertaken by students as guided by the trainer. Evaluation of workshop activities would be done through test and quiz at the end of the workshop. Submitting a write up and showing the final output which focuses on the learning outcome from the workshop.</p> <p>METHODOLOGY The methodology followed at the workshop could be based on any one or more of the following methods: Case Study Simulation Group Activity</p>		
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**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Text Books

As required to perform the activities.

Reference Books

As required to perform the activities.

Modes of Evaluation: Examination Scheme:

Components	Attendance	Active Participation	Multiple Choice Questions/ Quiz	Solving the Case/Assignment/ Write Up	Total
Weightage(%)	5	30	30	35	100


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CO, PO and PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	1	1	2	--	--	--	--	2	3	1	2
CO2	1	1	2	--	--	--	--	2	3	1	2

1: Strongly Related, 2: Moderately Related and 3: Weakly Related



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ANI2652	VFX	L	T	P	C
Version	2021	2	0	2	3
Pre- requisites/Exposure					
Co-requisites					

Catalog Description

This VFX course will take you through the fundamental concepts of VFX Compositing in Nuke, and how to learn nuke the interface. The course is focused primarily on the 2D & 3D aspects of compositing to get you started. It involves replacing a background, color correcting and blending the foreground and background, motion tracking the background to the foreground, and seamlessly bringing it all together. And learn how to Render CGI in passes, footage, and all of the elements necessary to composite a CG shot.

Course Objectives

The objective of this course is to

- To impart working knowledge of Advance VFX & Compositing
- To impart knowledge into Compositing of 3D Passes and 3D motion tracking
- To Impart Knowledge of Rotoscoping & Color grading techniques

Course Outcomes (COs):

On completion of this course, the students will be able to CO1. Create an Multi-pass CG compositing


CO2. Create 2D compositing using Rotoscoping. CO3. Identify and describe VFX & Compositing.

Course Contents:

Modules	Blooms level*	Number of hours
MODULE 1 – 2D Compositing & Rotoscoping		
Additive color theory Image formats / resolutions / colors	L1, L2,L3	20
2d Tracking Rotopaint and Rotoscoping Keyframe animation Introduction to Chroma Keying / Greenscreen removal Camera traits (Lens distortion, grain, sensor noise) Cleanplating and removal		



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MODULE 2 – CGI Compositing Matching color tones, darks, highlights of an image Compositing elements / FX into a shot Integrating a CGI (Computer Generated Image) render into areal scene How to use the normals AOV to fine tune CG. Use ID passes to correct different geometries	L1, L3	20
MODULE 3 – Color Grading Color correction / color grading techniques Advanced Color Grading Techniques Day to Night Tips and Techniques Fundamentals of Light and Physics Image Frequency Separation and Uses Advanced Color Remap Techniques	L1, L3	8

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Text Books

1. Digital Compositing with Nuke (2012) : United Kingdom: Focal Press

Reference Books

1. Nuke 101: Professional Compositing and Visual Effects (Digital Video & Audio Editing Courses) : Pearson

Modes of Evaluation: Class Test/Assignment/End Term Examination/Case Presentation

Examination Scheme:

Components	H	C	CT	A	EE
Weightage (%)	10	-	15	5	70

CT: Class Test, H: Home Assignment, EE: End Semester Examination; A: Attendance; C:Case Presentation

CO, PO and PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	1	1	--	2	--	--	2	2	1	2	3
CO2	1	1	--	2	--	--	3	--	1	2	--
CO3	1	1	--	2	--	--	3	--	1	2	--

1: Strongly Related, 2: Moderately Related and 3: Weakly Related


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ANI2635	INTERNSHIP	L	T	P	C
Version	2021	0	0	0	9
Pre- requisites/Exposure	ALL COURSES STUDIED IN THE PREVIOUS SEMESTERS				
Co-requisites					

Catalog Description Course Objectives

There are certain phases of every Intern's professional development that cannot be effectively taught in the academic environment. These facets can only be learned through direct, on-the-job experience working with successful professionals and experts in the field. The internship program can best be described as an attempt to institutionalise efforts to bridge the gap between the professional world and the academic institutions. Entire effort in internship is in terms of extending the program of education and evaluation beyond the classroom of a university or institution. The educational process in the internship course seeks out and focuses attention on many latent attributes, which do not surface in the normal class room situations. These attributes are intellectual ability, professional judgment and decision making ability, inter-disciplinary approach, skills for data handling, ability in written and oral presentation, sense of responsibility etc.

The objective of this course is to

- Provide hands on learning experience to work on an industry-oriented/research project.
- Provide a platform to the students to develop their research skills and its application in Production field to execute a final project.

Course Outcomes (COs):

On completion of this course, the students will be able to CO1: Describe and apply skills on real research problems.CO2: Assess and develop a solution to research problems.
CO3: Select the appropriate field for himself/herself in the media industry.

Course Contents:

Modules	Blooms level*	Number of hours
Major Themes for Project	L1, L3,	No
The project may be based on any of the following Production House or	L5, L6	Contact



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<p>AD Agencies: Print Media and Package Industry Film and TV Production Advertising Agency Event and Social Gathering Multimedia Production House Social Media Production</p> <p>Guidelines for Project It must be based on either Industry or Research. The student will work under the guidance of a Faculty Guide that will be assigned by HOI. Student can choose topic as per his/her area of interest under the guidance of the Faculty guide. The student may also choose to undertake a live project in any of the major media streams.</p> <p>Project Report/Portfolio: 75 Marks Before the end of the semester, the student will be expected to submit a project report. The project report shall have the following components. Title page Index Introduction Industry Overview Objectives Methodology Findings Conclusion Annexure (questionnaires, if any) Bibliography In case the student undertakes a live project, he/she will have to submit the portfolio instead of the project report. The portfolio will carry 75 marks.</p> <p>Presentation & Viva: 25 Marks Student will make a presentation (based on Project Report) and it will be followed by a Viva Voce in front of a Panel of one internal expert and one external expert.</p>		Hours
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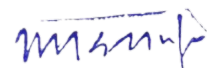
<p>The Steps of a Project Report</p> <p>STEP I: Selection of the topic for the project by taking following points into consideration: Suitability of the topic, Relevance of the topic, Time available at the disposal, Feasibility of data collection within the given time limit, Challenges involved in the data collection (time & cost involved in the data collection, possibility of getting responses, etc.)</p> <p>STEP II: Finalisation of the Topic and preparation of Project Proposal in consultation with the Supervisor.</p> <p>STEP III: Collection of information and data relating to the topic and analysis of the same.</p> <p>STEP IV : Writing the report dividing it into suitable chapters</p> <p>STEP V: The following documents are to be attached with the Final Project Report. Approval letter from the supervisor (Annexure-IA) Student's declaration (Annexure-IB) Certificate from the Competent Authority of the Organisation / Institution, if the student undertakes the Project Work in any Organisation / Institution.</p> <p>Guidelines for evaluation: Each of the students has to undertake a Project/Live Project individually under the supervision of a teacher and to submit the same following the guidelines stated below. Language of Project Report and Viva-Voce Examination may be English. The Project Report must be typed and hard bound. Failure to submit the Project Report/Portfolio or failure to appear at the Viva-voce Examination will be treated as "Absent" in the Examination. He /she has to submit the Project Report/Portfolio and appear at the Viva-Voce Examination in the subsequent years (within the time period as per University Rules). No marks will be allotted on the Project Report/Portfolio unless a candidate appears at the Viva-Voce Examination. Similarly, no marks will be allotted on Viva-Voce Examination unless a candidate submits his/her Project Report/Portfolio. Evaluation of the Project Work to be done jointly by one internal expert and one external expert with equal weightage, i.e., average marks of the internal and external experts will be allotted to the candidate.</p>		
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**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation



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Text Books

Depending upon the chosen specialization by the students.

Reference Books

Depending upon the chosen specialization by the students.

Modes of Evaluation:**Chapter Scheme and distribution of marks (for Project Report):**

Chapter 1: Introduction with statement of objectives, limitations of the study & hypothesis –10 marks

Chapter 2: Literature Review/Conceptual Framework/ National/International Scenario – 20 marks

Chapter 3: Research Design – 10 marks

Chapter 4: Findings& Results -- 20 marks

Chapter 5: Conclusion & Recommendations -- 10 marks

Chapter 6: Bibliography -- 05 marks

Examination Scheme:

Components	Project Report	Power Point Presentation & Viva
Weightage (%)	75 Marks	25 Marks

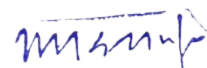
CO, PO and PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	1	2	3	2	3	--	2	3	2	1	2
CO2	1	2	3	2	3	--	2	--	2	1	2
CO3	1	2	3	2	3	--	2	3	2	1	2

1: Strongly Related, 2: Moderately Related and 3: Weakly Related



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ANI2637	PROFESSIONAL PROJECT	L	T	P	C
Version	JULY 2021	1	0	14	8
Pre-requisites/Exposure	Graphics, animation and Vfx				
Co-requisites	None				

Catalog Description

In this subject, student will get a specialisation in Maya lighting & rendering. Student will use a project-based approach where they shall put various lights as story required. Here a bunch of lights can be used at a time for creating specific situation and lighting to fulfil the project requirement. Student will also render this file for getting an output either in the form of image sequences or in video form. The rendering type depended upon required quality of project, it may be either software rendering or VRAY or mental ray rendering. Virtual 3D lighting system of Maya, look at commonly used attributes and properties of various light, and talk about sometime-saving tips and techniques gleaned from production experience

Course Objectives

The objective of this course is-

- To guide the techniques of creating realistic 3D lighting for given project.
- To supervise the light quantity and position, direction, amount, and other attributes of light required in project. .
- To teach the realistic rendering process of scene for getting video output or image sequence output.
- To assist for getting the required output of project as per client satisfaction.

Course Outcomes

On completion of this course, the students will be able to-

CO1. Create light mood and intensity as per requirement for making any project.

CO2. Put light for exterior, interior or any kind of scene using rig light, fill light, main light and back light, even VRAY and mental ray light.

CO3. Get realistic output in the form of video or still images using VARY, mental ray, software, and hardware rendering.

CO4. Develop the proper realistic texture effect, shader effect, given them glow effect, high quality render in HD format.



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Course Contents:

Modules	Blooms level*	Number of hours
Modeling, Texturing, Lighting & Rendering Animation VFX Gaming UX / UI Graphics Motion Graphics Video Editing	L5, L6	120
Project Report: In this report student will have give details of his/her Topic with proper Introduction, Industry overview along with proper details of his/her area. For example if he/she is working on 2D animation or clip art so they must give details on these. Following points should be covered in it: The project itself on the computer Report comprising of: Title page, Concept note/ Ideation, Storyboard, Objectives, Methodology, Learning Outcome, Conclusion		
Presentation & Viva Students will have to make a Presentation (based on their Project Report) and it will be followed by a Viva Voice in front of a Panel of two or three faculty members.		

*Bloom's Level:

L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Text Books:

Kelly L. Murdock (2015), *Autodesk Maya 2015*, Buchanan: SDC publishing LLC.

References:


Lee Lanier (2012), *Maya Professional Tip and Techniques*, United States: John Wiley and Sons Publications.

Modes of Evaluation: Class Test/Assignment/End Term Examination/Case Presentation

Examination Scheme:

Components	T	CC	Comp	O	PP
Weightage (%)	5	25	20	5	45

T- Timely Submission, CC- Content Clarity, Comp- Comprehensiveness, O- Originality, PP- Project Presentation


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CO, PO and PSO Mapping

	PO1	PO2	PO3	PO4	PSO1	PSO2	PSO3	PSO4
CO1	--	1	--	1	--	--	1	1
CO2	--	2	1	--	--	--	1	1
CO3	--	2	--	1	--	--	1	1
CO4	--	1	1	1	--	--	1	1

1: Strongly Related, 2: Moderately Related and 3: Weakly Related



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Bachelor of Arts Journalism & Mass Communication

FLEXILEARN
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Programme Structure

Curriculum & Scheme of Examination

2022

AMITY UNIVERSITY HARYANA

GURUGRAM

A handwritten signature in blue ink, appearing to read 'Anil'.

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A handwritten signature in blue ink, appearing to read 'Manesar'.

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JRN2151	PRINT MEDIA – REPORTING & EDITING	L	T	P	C
Version	2021	2	-	2	3
Pre- requisites/Exposure					
Co-requisites					

Catalog Description

This course aims at introducing the students to the world of journalism – news and news handling in context of print media. It deals with basic news elements, news writing and also the news room set up. Editing is also an integral part of the course.

Course Objectives

The objective of this course is to

- Introduce the history and evolution of journalism in the Indian context.
- Explain and apply the concepts related to news and news writing.
- Explain the nuances of editing including caption writing and headline writing.
- Describe and apply designing principles for newspaper designing.

Course Outcomes (COs):

On completion of this course, the students will be able to CO1: Explain the role of newspapers during freedom struggle. CO2: Describe the newsroom set up and its functioning.

CO3: Explain various aspects of news and apply the news writing principles. CO4: Apply principles of editing, headline writing and caption writing.

CO5: Apply principles of newspaper designing.

Course Contents:

Modules	Blooms level*	Number of hours
MODULE 1: History of Journalism Journalism in pre independence era in India, Role of English and Vernacular Press during Freedom Struggle, Growth of Journalism post independence.	L1	4
MODULE II: Growth and Development of Press Emergence of newspapers, magazines and publication houses, Growth of Indian news agencies	L1	3
MODULE III: The Newsroom Set up Various departments in Editorial Set-up, Hierarchy in the Newsroom, Qualities and Responsibilities of a Reporter, Sources and Beats	L1, L2	8

MODULE IV: News Reporting What is news, News value and Sources of News, Basic Elements of News, Writing a News Report, Types of Leads and Body Text, Interviewing Skills required for Reporting, Types of Reporting	L1, L3	12
MODULE V: Editing News Role and Functions of Desk, Role of Copy Editor, Electronic Copy Editing, Rewriting, Writing headlines and Captions, Understanding the Importance of Style Guides, Newspaper Design & Layout	L1, L3	9

*Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Text Books

- Parthasarathy, Rangaswami (2000). *Basic Journalism*, Delhi: McMillan India Ltd.
- Kamath, MV (2009). *The Journalist's Handbook*, Noida: Vikas Publishing House Pvt Ltd
- Dary, David (1973). *How to Write News for Broadcast and Print Media*, New York: Tabb Books.
- Sarkar, N.N. (2008). *Art and Production*, New Delhi: Sagar Publication.
- Shrivastava, KM (2015). *News Reporting and Editing*, Delhi: Sterling Publishers

Reference Books

- Mencher, Melvin (2010). *News Reporting and Writing*, New York: McGraw-Hill Education
- Krishnaswamy, KV (2016). *Writing and Editing News*, New Delhi: Orient Blackswan Private Limited
- Pabcock, Bruce (1993). *Graphics for Desktop Publisher*, US: Mis Press
- Julian Harriss, Kelly Leiter & Stanley Johnson (eds.) (1992). *The Complete Reporter: Fundamentals of News Gathering, Writing, and Editing*, Boston: Allyn/Bacon
- Harcup, Tony (2014). *Oxford Dictionary of Journalism*, Oxford: Oxford University Press

Modes of Evaluation: Class Test/Assignment/End Term Examination/Case Presentation

Examination Scheme:

Components	H	C	CT	A	EE
Weightage (%)	5	10	10	5	70

CT: Class Test, H: Home Assignment, EE: End Semester Examination; A: Attendance; C: Case Presentation



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CO, PO and PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	--	--	2	3	1	--	2	2	--	--	--
CO2	--	--	--	--	2	--	--	2	--	2	3
CO3	2	1	--	1	1	--	1	--	--	--	--
CO4	2	1	3	2	1	2	--	2	1	1	1
CO5	2	1	--	2	2	3	2	2	1	1	2

1: Strongly Related, 2: Moderately Related and 3: Weakly Related


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JRN2108	COMPUTER GRAPHICS & ANIMATION	L	T	P	C
Version	2021	2	-	2	3
Pre-requisites/Exposure	Basic Knowledge of Computer Interface				
Co-requisites					

Catalog Description

This unit will give students a broad knowledge of the basics of computer usage in publication houses. How to work with computers, what are the design software? Students will study the design and layout of pages, taking into consideration the choice of typeface and positioning and choice of color, images and text. Their work will include practical projects as well as investigations into current design and editing practices in a variety of print forms.

Course Objectives

The objective of this course is to

- Give the better understanding of computer applications.
- Learn desktop publishing concepts.
- Learn how to create a magazine, catalog and documents with better formats.

Course Outcomes

On completion of this course, the students will be able to

- CO1.** Describe the interface of basic computer application.
- CO2.** Create books, magazine designs and other documents with good layout.
- CO3.** Describe the digital production flow of a magazine.

Course Contents:

Modules	Blooms level*	Number of hours
Module I: Basics of Computer Hardware/Software, Input devices/ Output devices. Windows, MSOffice: - Ms Word, Ms Power Point, Networking: - Lan, Wan concept.	L1,	12
Module II: Desk Top Publishing What is DTP (Desk Top Publishing)? How it is linked with computers. Newspaper, Magazine, Book publishing is part of DTP. Software: page design packages (e.g. Adobe PageMaker, Adobe Indesign. "InDesign is a newer version of PageMaker") to be used for design and layout purposes, text: generation and preparation for use, display, digital typesetting, editing, creation of headlines using appropriate font, creation of pages, importation and movement of copy and images, selection and cropping of photographs and graphics, use of text wrap, anchored graphics and rules, various palettes, master pages, Animation templates etc.	L1,L3	24
Module III: Graphics Creation	L3,	12

Creating graphics in tools like Adobe Photoshop. Understanding the raster graphics. Editing images using tools like colour correction, highlights, white balance, levels and contrast. Exporting graphics in different formats like JPG, PNG, PDF, etc. Creating graphics for magazine, promotion, information, documentation, etc.		
---	--	--

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Text Books

- M.C. Sharma (2003). *Desktop Publishing on PC*, Delhi: BPB Publications.
- Adobe Creative Team (2019). *Adobe InDesign CC Classroom in a book*, Adobe Press

Reference Books:

- Daryl & Moen (2000). *Newspaper Layout & Design, US*: Iowa State Press
- P K Sinha (2004). *Fundamental of Computer*, Delhi: BPB Publication

Modes of Evaluation: Class Test/Assignment/End Term Examination/Case Presentation Examination Scheme:


Components	P	C	CT	A	EE
Weightage (%)	5	10	10	5	70

P- Project, C- Case Discussion/Presentation/Analysis, CT- Class Test, A- Attendance, EE- End Semester Exam

CO, PO and PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	--	1	--	--	--	--	--	-	1	--	--
CO2	-	1	--	--	--	--	--	-	1	--	--
CO3	-	1	--	--	--	--	--	-	1	--	--

1: Strongly Related, 2: Moderately Related and 3: Weakly Related


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JRN2251	BASIC PHOTOGRAPHY	L	T	P	C
Version	2021	2	-	2	3
Pre- requisites/Exposure					
Co-requisites					

Catalog Description

This unit introduces to the basic techniques of photography and it's applications in Mass Media with specialization in specific area. This course gives an opportunity to the student to get accustomed to this universal language of expression and communication and exhibit their skills to explore, understand the significance and utility of photographs as an effective medium of communication.

Course Objectives

The objective of this course is to

- Learn to shoot with digital cameras maximizing the quality of the output.
- Appreciate more about the "Photographer's Art" through the study of historic and contemporary trends.
- Develop the habit of looking closely at the visible world around you in order to represent it in terms of aesthetics, beauty and truth.

Course Outcomes (COs):

On completion of this course, the students will be able to

CO1. Operate Cameras in Manual Mode, Zone System, Multiple Exposures

CO2. Demonstrate knowledge of Depth of Field Preview, Lens Compression, Avoiding Lens Distortion, Panoramas,

CO3. Demonstrate knowledge of Lighting ; High-Key Lighting, Rule of Visual Weight, Visual Composition Tools, Colour Management, RAW Workflow,

CO4. Operate Advanced Camera Settings, Dust Specks, Noise, Lens Corrections, Chromatic Aberration, Sharpening, Printing.

Course Contents:

Modules	Blooms level*	Number of hours
MODULE I: Introduction to photography Brief History of photography, Uses of Photography, Principles of Photography Light and its quality, Types of Light, Camera Terminology	L1, L3	10

MODULE 2: Camera Elements of a Camera – view finder, lens, iris, shutter, film chamber, light metre Exposure Modes, Light Metering, Effects of various ISO settings, Lens options, using Shutter Speeds Camera Designs – A. pinhole camera, B. view camera, C. compact camera, D. T L R E. S L R, F. Instant/Polaroid camera, G. digital camera, Exposure control in camera	L1, L3	6
MODULE 3: Still Films & Camera Accessories Film formats & their use Lenses - prime & zoom lens . angle of view . Aperture & f-no. . Depth of field, how depth of field works . Depth of focus Lens care Camera accessories	L1,L3	10
MODULE 4: Photography & Darkroom Practical Outdoor Photography Assignments Portfolio and Presentation, Preparing Resume Photography Techniques: Light, Content, and Sharing	L1, L3	10

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation


Text Books

- Langford Michael. (2013), *Basic Photography*; Burlington: Focal Press
- Corbett Bill. (2002), *A simple guide to 35mm photography*, Sydney:4C Publishing Pty Ltd.

Reference Books

- Stephen G. Anchell (2004). *The Darkroom Cookbook*; Burlington: Focal Press
- Naomi Rosenblum (2008). *A World History of Photography*, New York, Abbeville Press.

Modes of Evaluation: Class Test/Assignment/End Term Examination/Case Presentation


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Examination Scheme:


Components	H	C	CT	A	EE
Weightage (%)	5	10	10	5	70

CT: Class Test, H: Home Assignment, EE: End Semester Examination; A: Attendance; C: Case Presentation

CO, PO and PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	1	1	--	--	--	--	1	1	2	--	--
CO2	1	1	--	--	--	--	1	1	2	--	--
CO3	1	1	--	--	--	--	1	1	2	--	--
CO4	1	1	--	--	--	--	1	1	2	--	--
CO5	1	--	1	1	1	2	1	1	2	2	--

1: Strongly Related, 2: Moderately Related and 3: Weakly Related


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JRN2202	PRINT MEDIA -- SPECIALIZED REPORTING & FEATURE WRITING	L	T	P	C
Version	2021	2	-	2	3
Pre-requisites/Exposure	Print Media – Reporting & Editing				
Co-requisites					

Catalog Description

After introducing the basics of newspaper reporting and editing in the first semester, this course discusses the nuances of specialization in news. The course introduces the concept of beat reporting and also deals with the subtle differences between reporting on politics, business, sports, crime etc. The course also describes the investigative reporting in detail with discussion on relevant case studies. The course also explains the finer points of specialized journalistic writing.

Course Objectives

The objective of this course is to

- Introduce beat reporting and discuss the finer points of specialized writing.
- Explain how reporting is different for various beats like crime, health, education, politics etc.
- Provide knowledge regarding investigative reporting and its tools.
- Provide understanding for different types of journalistic writing.

Course Outcomes (COs):

On completion of this course, the students will be able to

CO1: Describe differences and similarities between different journalistic beats. CO2: Describe and apply various concepts of beat reporting.

CO3: Explain investigative reporting in depth; especially sting operations.

CO4: Apply conceptual knowledge to write different types of features and reviews. CO5: Argue if sting journalism is a healthy practice in a democracy.

Course Contents:

Modules	Blooms level*	Number of hours
MODULE 1: City Reporting Covering a news beat, coverage of various beats: crime, education, health, civic affairs and local government	L1, L2	12
MODULE II: National Reporting Political reporting(political structure in India, covering political parties/events/rallies/elections), Parliament reporting (Parliament structure, reporting on legislature), covering the government (PIB, ministries), legal reporting (Structure in jurisdiction of courts, reporting court hearings, precautions)	L2, L3	8

MODULE III: Business & Sports Reporting Basic business knowledge and business bodies, corporate reporting, covering economic policy (Ministry of Commerce, Finance, Industry, Company Affairs, and other infrastructure ministries), stock market coverage, how to develop good sports writing skills, covering local, national internal level events		
MODULE IV: Investigative Reporting Definition and elements, tools of investigative reporting, importance of sources, sting operations and latest trends, relevant case studies: Indian and international	L1, L5	9
MODULE IV: Feature Writing How to write a feature, different types of features, book reviews and film reviews	L3	7

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Text Books

- Sharma, Seema (2005) *Journalism:Reporting*, New Delhi: Anmol Publications Pvt. Ltd.
- Fox, Walter (2001)*Writing the News: A Guide for Print Journalists*, New Jersey: Wiley- Blackwell
- Mencher, Melvin (1989)*Basic News Writing*, U.S.A. : William C. Brown Publication
- Rajan, Nalini (2007) *21st Century Journalism in India*, New Delhi : Sage India
- Rick Wilber & Randy Miller (2002) *Modern Media Wring*, Belmont : Wadsworth Publishing Company

Reference Books

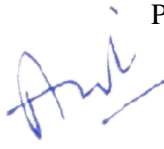
- Hough,George A. (1995) *News Writing*, Boston : Houghton Miller
- Fink,Conrad C. (2001) *Sports Writing: The Lively Game*, New Jersey : Wiley-Blackwell
- Keeble,Richard (2001)*The Newspaper Handbook*, Abingdon : Routledge
- Kamath,MV (2012) *Journalism Reporting*, Noida : Vikas Publication
- Rosenauer,Kenneth L (2004)*Storycrafting: A Process Approach to Writing News*, New Jersey: WileyBlackwell

Modes of Evaluation: Class Test/Assignment/End Term Examination/Case Presentation

Examination Scheme:

Components	H	C	CT	A	EE
Weightage (%)	5	5	15	5	70

CT: Class Test, H: Home Assignment, EE: End Semester Examination; A: Attendance; C: Case Presentation


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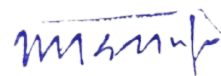
CO, PO and PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	2	2	2	1	1	2	--	1	--	1	--
CO2	2	2	2	1	1	2	--	1	--	1	2
CO3	2	1	1	1	1	3	2	1	--	2	3
CO4	--	1	--	3	2	2	--	1	--	1	2
CO5	3	2	1	1	1	--	3	1	--	2	--

1: Strongly Related, 2: Moderately Related and 3: Weakly Related



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JRN2207	ELECTRONIC COMMUNICATION: RADIO & TV	L	T	P	C
Version	2021	2	-	2	3
Pre- requisites/Exposure					
Co-requisites					

Catalog Description

The basic concepts and fundamental elements of Radio and TV production will be introduced to the students in this unit. The working mechanism of Video camera, principles of composition, need and role of lighting will be discussed and practically demonstrated. The purpose of the whole exercise is to familiarize the students with the broadcast equipment and inculcate in them the creative techniques to use them. This unit will also focus on enhancing the writing skills of the student. Writing being an integral part of journalism, the students will get an opportunity to write for various mediums and genres.

Course Objectives

The objective of this course is to

- Equip students with concepts of creative fields involved in electronic media
- Provide an overview of TV and Radio journalism.
- Familiarize the students with the broadcast equipment and inculcate in them the creative techniques to use them

Course Outcomes (COs):

On completion of this course, the students will be able to

CO1. Detail establishment of Electronic media as a medium of communication.

CO2. Demonstrate usage of audio equipments.

CO3. Demonstrate use of video camera and Lighting equipments.

CO4. Plan production steps for a TV & Radio programme.

CO5. Practicing Script Writing for Radio and Television Program Production.

Course Contents:

Modules	Blooms level*	Number of hours
Module I: Introduction Electronic Media as a Medium of Mass Communication Characteristics of Electronic Communication Growth and Development of Electronic Media in India Public v/o Private Broadcasting Status of Radio and Television in India	L1, L3	5

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Module II: Basics of Sound Basics of sound: frequency, amplitude, wavelength Radio frequencies: AM and FM transmission General audio and sound microphone techniques Types of microphones Construction of microphones Positioning of microphones Mixers Considerations in Indoor and Outdoor recording Common audio problems Importance of speech (or human voice) in broadcast media Voice modulation Sound effects and its functions Importance of music & background score in visual imagination Various Kinds of Audio Studios	L1, L3	7
Module III: Basics of Camera and Lighting Working of the camera Types of camera Camera Mounts Camera accessories Camera movements, shots & angles Camera Care Principles of composition <i>and visual grammar</i> Difference between multi-camera and single camera set up Videotape Formats – S-VHS, VHS, U-matic, Betacam & Betacam-SP, MINI-DV, DVCAM, DVC PRO, HD Difference between natural and artificial lighting Use of natural light and reflectors Factors that influence lighting needs Bouncing light Studio lighting instruments: Types of lights Basic lighting set up: Three point lighting Technical: - Color Temperature, Light intensity, <i>Filters</i> Lighting tips Taking Care of Lights and Yourself	L1,L3	9
MODULE 4: Production Pre-Production: Planning for the production Idea generation Research: location, budget, people, access, permission, insurance, resources, Set designing: floor plan etc. Formats of Radio Programs: News bulletins, live talk shows, Interviews, Radio features, Radio Documentaries, Jingles, Radio Plays, Commentaries and magazines, Music Countdown, Music Reviews, Phone-ins, Commercials Formats of Television Programs Production: Process and Execution Post-Production Terminology	L1, L5	9

MODULE 5: Writing for Radio & TV Basics of Writing for Electronic Media Differences between writing for radio, TV Writing for different formats of Broadcast Media Conventions of Writing Writing for Radio - Writing for the Human Ear and Imagination Writing Script for different genres of Television: Writing and Thinking Visually	L1, L5	6
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*Bloom's Level:

L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Text Books

- Donald, Ralph & Spann, T (2000), *Fundamentals of Television Production*; Iowa: Iowa state university press.
- Herbert Zettl.(2014), *Television Production Handbook*; California, Wadsworth Publishing.

Reference Books

- Dr. Bradley E. Schultz. (2004) *Broadcast News Producing*, New Delhi, sage publications.
- David Keith Cohler. (1993), *Broadcast Journalism: A Guide for the Presentation of Radio and Television News*, UP

Modes of Evaluation: Class Test/Assignment/End Term Examination/Case Presentation

Examination Scheme:

Components	H	C	CT	A	EE
Weightage (%)	5	10	10	5	70

CT: Class Test, H: Home Assignment, EE: End Semester Examination; A: Attendance; C: Case Presentation

CO, PO and PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	1	1	2	--	--	--	1	2	1	2	--
CO2	1	1	--	--	--	--	1	2	1	--	--
CO3	1	1	--	--	--	--	1	2	1	--	--
CO4	1	1	--	--	--	--	1	2	1	--	--
CO5	1	--	1	1	1	2	1	2	1	2	--

1: Strongly Related, 2: Moderately Related and 3: Weakly Related


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JRN2230	READINGS IN MEDIA	L	T	P	C
Version	2021	2	-	2	3
Pre- requisites/Exposure					
Co-requisites					

Catalog Description

The objective of this concentration elective on readings in media is to inculcate analytical bent of mind in students. This will also encourage reading habit along with value addition to the existing understanding of the subject. The exercise will help media students not only develop understanding of different important issues but also give an insight into content handling. Critical analysis of different genres of write ups would help broaden the intellectual horizon of the student.

Course Objectives

The objective of this course is to

- Develop reading habits and inculcate analytical bent of mind in students.
- Provide power of critical analysis of different genres of write ups

Course Outcomes (COs):

On completion of this course, the students will be able to

CO1: Describe and analyse information and relevance of the issue in detail. CO2: Criticize and write thematically correct content with unique writing style.

Course Contents:

Modules	Blooms level*	Number of hours
MODULE 1: Methodology The student shall be given high quality news articles, editorials and relevant national/international stories from newspapers and newsmagazines. He/she shall be required to critically review the same in terms of content, media handling and content presentation etc. The student may also be asked to critique any non-fiction book. The given assignments are required to be submitted in the form of reports. He/she will be assessed on the basis of the assignment reports and viva voce. In order to earn the credits, the student will be required to submit reports on the following: Book Review (1) Editorial (1) News articles published on the edit page of a national/international daily (2) Cover story of a national/international newsmagazine (1) The report submissions will be followed by viva voce by a panel of 2 faculty members. The guide will be allocated to the students for discussion and approval of books and submission of required reports.	L1, L2, L3, L4	No Contact Hours

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L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Text Books

According to the chosen area.

Reference Books

According to the chosen area.

Modes of Evaluation: Class Test/Assignment/End Term Examination/Case Presentation

Examination Scheme:

The student will be required to submit Five assignments in all as per the details mentioned above. Each assignment will carry equal marks (20 marks each) The marks break up for each assignment will be as follows:

Components	Written Reports	Viva Voce
Weightage (%)	15	5

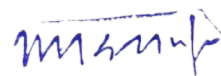
CO, PO and PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	1	1	1	--	--	--	--	1	--	2	--
CO2	1	1	1	--	--	--	--	1	--	2	--

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JRN2232	PROJECT (WITH PRESENTATION & EVALUATION)	L	T	P	C
Version	2021	2	-	2	3
Pre- requisites/Exposure	ALL COURSES STUDIED IN THE PREVIOUS SEMESTERS				
Co-requisites					

Catalog Description

This concentration elective will help the student develop a critical and analytical eye when it comes to understanding issues/trends related to media. It will provide a platform to the student to interrogate and review various media concepts. The live project will help in giving hands-on training to the communication students.

Course Objectives

The objective of this course is to

- Provide hands on learning experience to work on an industry-oriented/research project.
- Provide a platform to the students to develop their research skills and its application.

Course Outcomes (COs):

On completion of this course, the students will be able to CO1: Describe and apply skills on real research problems. CO2: Assess and develop a solution to research problems.

CO3: Select the appropriate field for himself/herself in the media industry.

Course Contents:

Modules	Blooms level*	Number of hours
Major Themes for Project The project may be based on any of the following major media streams: Print Media Electronic Media Advertising Event Management Corporate Communication & Public Relations Brand Management New Media Photography Guidelines for Project It must be based on either Industry or Research. The student will work under the guidance of a Faculty Guide that will be assigned by HOI. Student can choose topic as per his/her area of interest under the guidance of the Faculty guide. The student may also choose to undertake a live project in any of the major media streams. Project Report/Portfolio: 75 Marks Before the end of the semester, the student will be expected to submit a project report. The project report shall have the following components. Title page Index Introduction	L1, L3, L5, L6	No Contact Hours

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Industry Overview Objectives Methodology Findings Conclusion Annexures (questionnaires, if any)		
<p>Bibliography In case the student undertakes a live project, he/she will have to submit the portfolio instead of the project report. The portfolio will carry 75 marks.</p> <p>Presentation & Viva: 25 Marks Student will make a presentation (based on Project Report) and it will be followed by a Viva Voce in front of a Panel of one internal expert and one external expert.</p> <p>The Steps of a Project Report STEP I: Selection of the topic for the project by taking following points into consideration: Suitability of the topic, Relevance of the topic, Time available at the disposal, Feasibility of data collection within the given time limit, Challenges involved in the data collection (time & cost involved in the data collection, possibility of getting responses, etc.) STEP II: Finalisation of the Topic and preparation of Project Proposal in consultation with the Supervisor. STEP III: Collection of information and data relating to the topic and analysis of the same. STEP IV : Writing the report dividing it into suitable chapters STEP V: The following documents are to be attached with the Final Project Report. Approval letter from the supervisor (Annexure-IA) Student's declaration (Annexure-IB) Certificate from the Competent Authority of the Organisation / Institution, if the student undertakes the Project Work in any Organisation / Institution.</p> <p>Guidelines for evaluation: Each of the students has to undertake a Project/Live Project individually under the supervision of a teacher and to submit the same following the guidelines stated below.</p>		
<p>Language of Project Report and Viva-Voce Examination may be English. The Project Report must be typed and hard bound.</p> <p>Failure to submit the Project Report/Portfolio or failure to appear at the Viva-voce Examination will be treated as "Absent" in the Examination. He /she has to submit the Project Report/Portfolio and appear at the Viva-Voce Examination in the subsequent years (within the time period as per University Rules).</p> <p>No marks will be allotted on the Project Report/Portfolio unless a candidate appears at the Viva-Voce Examination. Similarly, no marks will be allotted on Viva-Voce Examination unless a candidate submits his/her Project Report/Portfolio.</p> <p>Evaluation of the Project Work to be done jointly by one internal expert and one external expert with equal weightage, i.e., average marks of the internal and external experts will be allotted to the candidate.</p>		

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Text Books

Depending upon the chosen specialization by the students.

Reference Books

Depending upon the chosen specialization by the students.

Modes of Evaluation:

Chapter Scheme and distribution of marks (for Project Report):

Chapter 1: Introduction with statement of objectives, limitations of the study & hypothesis – 10

Chapter 2: Literature Review/Conceptual Framework/ National/International Scenario – 20 M

Chapter 3: Research Design – 10 marks

Chapter 4: Findings& Results -- 20 marks

Chapter 5: Conclusion & Recommendations -- 10 marks

Chapter 6: Bibliography -- 05 marks


Examination Scheme:

Components	Project Report	Power Point Presentation & Viva
Weightage (%)	75 Marks	25 Marks

CO, PO and PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	1	2	3	2	3	--	2	3	2	1	2
CO2	1	2	3	2	3	--	2	--	2	1	2
CO3	1	2	3	2	3	--	2	3	2	1	2

1: Strongly Related, 2: Moderately Related and 3: Weakly Related


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JRN2236	MEDIA PRODUCTION PORTFOLIO	L	T	P	C
Version	2021	2	-	2	3
Pre- requisites/Exposure					
Co-requisites					

Catalog Description

This subject is an attempt to inculcate professional writing skills and knowledge in flowering buds of the media department. The subject will give hands on experience on different aspects of media writing to the students. The students may choose the option of this subject from their concentration electives.

Course Objectives

The objective of this course is to

- Equip the students with the hand on experience on different aspects of media writing.
- Provide an overview of different zones of technical writing skills in media industry.

Course Outcomes (COs):

On completion of this course, the students will be able to CO1: Describe and review media writings.

CO2: Write and Summarize methodologically in media industry.

Course Contents:

Modules	Blooms level*	Number of hours
MODULE 1: Major Areas of Writings The Media Production Portfolio has the following topics for writing: No. of items Press Release 1 Feature 2 Editorial/Article 1 News Story 2 News Analysis 1 Ad Copy (TV/radio/print) 1 Letter to Editor 2 Movie Review 1 Guidelines for Media Production Portfolio: The following procedure should be followed for the credits: Thorough reading of relevant study material and references. Students will choose the current topics for every area of writing. Students will discuss the topics with the guide and will take the approval. Students will use the formal writing pattern i.e. 12 font size, 1.5 line spacing and Times New Roman. Students will have to make proper formal document that includes Title Page Table of Contents	L1, L2, L3, L6	No Contact Hours

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Acknowledgement Write ups		
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**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Text Books

- Ganesh T. K. (2008). *Essentials of Mass Media Writing*. Authors Press.
- Schement, Jorge Reina (2002). *Encyclopedia of communication and information*. USA, Macmillan Reference.
- Filak Vincent F. (2018). *Dynamics of Media Writing: Adapt and Connect*, 2nd edition. CQ Press.

Reference Books

- Fink, Conrad C. (2001) *Sports Writing: The Lively Game*, New Jersey : Wiley- Blackwell
- Keeble, Richard (2001) *The Newspaper Handbook*, Abingdon : Routledge
- Kamath, MV (2012) *Journalism Reporting*, Noida : Vikas Publication
- Rosenauer, Kenneth L (2004) *Storycrafting: A Process Approach to Writing News*, New Jersey: WileyBlackwell


Examination Scheme:

Components	Complete Work	Creativity	Relevance	Clarity	Comprehensiveness	Originality	Presentation
Weightage (%)	10	15	15	15	15	15	15

CO, PO and PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	1	1	--	2	2	--	--	2	1	2	--
CO2	1	1	--	2	2	--	--	2	1	2	--

1: Strongly Related, 2: Moderately Related and 3: Weakly Related


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JRN2351	TV JOURNALISM	L	T	P	C
Version	2021	2	-	2	3
Pre-requisites/Exposure	Electronic Communication				
Co-requisites					

Catalog Description

Students will comprehend Television Journalism better. The basic attributes and skill set needed to pursue a television journalistic path will be learnt and tested. The subject will focus on a lot of hands on training in the studio and outdoor

Course Objectives:

- To learn, illustrate and apply journalistic skill sets for television.
- Differentiate, interpret and apply the nuances of outdoor and indoor shoot in a television news story.
- Assess the functioning of a TV station.

Course Outcomes


On completion of this course, the students will be able to

CO1: Comprehend and apply the essentials of live reporting. CO2: Create a television news story in a team.

CO3: Relate to the hierarchy and functioning of a television news organization CO4: Critically assess and analyze feature and hard news programme.

Course Contents:

Modules	Blooms level	Number of hours
Module I: Basics of TV journalism Qualities of TV journalist, developing sources of news gathering, Process of a news report from the idea till its final implementation, Precautions during reporting, live reporting and presenting the final story Different styles of functioning for different beats. Basic Interview Skills: different types of interviews, approach, arrangements, research. Stages of production: pre, shoot and post.	L1, L2, L3	12


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Module II: Functioning of a TV organization Modern TV newsroom: Input/output and Assignment Desks. Hierarchy of a TV set up, Television Personnel – director, floor manager, audio technician, controller, cameraman, Role of a producer, Technical Process of news from initial stages to telecast. Working process involved during live bulletin and recorded programme, Role/ contribution of each department and personnel, Hierarchy of a news organization Professional terminologies. TV news production desk and its functions. PTC: Opening, bridge and closing	L1, L2	12
Module III: TV Tools, Reporters and Production Different types of PTC, OBs, Facing the Camera, Team members and their role. Single and multi-camera shooting. Shooting for fiction and non-fiction. Process and elements of EFP (Electronic Field Production) and ENG (Electronic News Gathering). OB (Outdoor Broadcast) Van, Satellite Phone. News Production & News Transmission.	L3, L6	12

***Bloom's Level:**

L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Text Books

- Schultz, B., (2005). *Broadcast News Production*, (London), SAGE Publications
- Zettl, H., (2009). *Television Production Handbook*, Wadsworth Publishing
- Boyd,A.;Stewart,P. & Alexander,R., (2000). *Broadcast Journalism*,(London)Focal Press.

ReferenceBooks

- Belavadi,V. (2013). *Video Production*, New Delhi, OUP.
- Cohler, D. K.(1985). *Broadcast journalism: A guide for the presentation of radio and television news*, Prentice Hall
- Gormly, E. K.(2010). *Writing and Producing Television News*,(London) Wiley-Blackwell

Examination Scheme:

Components	H	P	CT	A	EE
Weight age (%)	5	10	10	5	70

H-Home Assignment, P- Project, CT- Class Test, A- Attendance, EE- End Semester Examination

Course Mapping CO, PO, PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1		1							1		
CO2	1	1							1	2	
CO3			1						1	2	
CO4						1			1		2

1: Strongly Related, 2: Moderately Related and 3: Weakly Related

JRN2308	MASS COMMUNICATION RESEARCH - I	L	T	P	C
Version	2021	2	-	2	3
Pre- requisites/Exposure					
Co-requisites					

Catalog Description

This Course would give students an understanding of Basic Research and its importance. It would give them a basic knowledge about the concepts of research.

Course Objectives

The objective of this course is to

- Familiarize students with ethical issues in educational research, including those issues that arise in using quantitative and qualitative research.
- Explain primary characteristics of quantitative research and qualitative research.
- Train students in developing a research problem.

Course Outcomes (COs):

On completion of this course, the students will be able to

CO1. Explain understanding of basic research concepts

CO2. Examine research problems and apply methods of research design CO3. Select right sampling for a research problem

CO4. Demonstrate knowledge of measure and scaling techniques

CO5. Apply statistical tools for data analysis for quantitative and qualitative studies.

Course Contents:

Modules	Blooms level*	Number of hours
MODULE 1: An Introduction to Research Research: Meaning and definition, objectives of research Types of Research – Basic & Applied Research Qualitative & Quantitative Research Significance of Research, Criteria for a good Research Problems encountered by researchers in India.	L1, L3	10
MODULE 2: Research Problem & Research Design Defining the Research Problem Selection of a problem Techniques involved in defining a problem Research Design: Meaning, definition & need of a research design. Research designs used for different types of Research	L1, L3	6
MODULE 3: Sampling Sampling: Definition & need, concept of population, sample & its characteristics, sample size & sample unit. Census & Sample Survey, steps in a sample design Criteria for selecting a sampling procedure. Types of Sampling Designs : Probability Sample & Non Probability Sampling & its further types.	L1,L3	10

MODULE 4: Measurement & Scaling Techniques Measurement in Research, Measurement Scales Nominal, Ordinal, Interval & Ratio Scale Sources of Error in Measurement, Scaling: Meaning of scaling Important scaling techniques: Rating Scales, Arbitrary Scales, Differential Scales (Turnstone-type-scales), Summated (Likert Scale) Cumulative scales & Factor Scales.	L1, L3	10
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**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Text Books

- Kothari. C.R. (1990), *Research Methodology*, New Delhi: New age Publishers.
- Deepak Chawla and Neena Sondhi.(2016),*Research Methodology: Concepts and Cases: Concepts & Cases*, New Delhi:Vikas Publishing House.

Reference Books

- Kothari. C.R. (1990), *Research Methodology: Methods and Techniques*,New Delhi: New age Publishers.
- Ram Ahuja.(2001),*Research Methods*, New Delhi:Rawat Publications

Modes of Evaluation: Class Test/Assignment/End Term Examination/Case Presentation

Examination Scheme:

Components	H	C	CT	A	EE
Weightage (%)	5	10	10	5	70

CT: Class Test, H: Home Assignment, EE: End Semester Examination; A: Attendance; C: Case Presentation

CO, PO and PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	1	1	--	--	--	--	1	1	2	--	--
CO2	1	1	--	--	--	--	1	1	2	--	--
CO3		2	--	--	--	--	1	1	2	--	--
CO4	1	1	--	--	--	--	1	1	2	--	--
CO5	1	--	1	1	1	2	1	1	2	2	--

1: Strongly Related, 2: Moderately Related and 3: Weakly Related

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JRN2303	DIGITAL PHOTOGRAPHY	L	T	P	C
Version	2021	2	-	2	3
Pre- requisites/Exposure					
Co-requisites					

Catalog Description

After being exposed to the basics of photography in the first semester, the students will be eager to try their hands in the comparatively new area of digital photography and imaging. They will be able to start maintaining their portfolios and will be required to make digital presentations and undertake practical assignments.

Course Objectives

The objective of this course is to

- Equip students with the concepts of creative photography
- Train students in digital imaging and camera handling

Course Outcomes (COs):

On completion of this course, the students will be able to

CO1. Explain the basic technical, aesthetic and expressive concepts of photography.

CO2. Demonstrate competency with a digital photographic work flow by the production of photographs in response to class assignments.

CO3. Describe knowledge digital imaging

CO4. Demonstrates editing techniques for digital image manipulation. CO5. Apply photographic knowledge to create portfolios.

Course Contents:

Modules	Blooms level*	Number of hours
MODULE 1: Artificial Lighting & its control Nature of Light, Flash and their types. Electronic flash & its synchronization, Effect of one, two & three point lighting system, Symmetrical Balanced Image.	L1, L3	6
MODULE 2: Subject & Composition Variation for various genres Portrait, Product, Wildlife, Nature & landscapes, Night photography, Commercial Photography, Social documentary and Photojournalism, Fashion Photography. How photos are used today.	L1, L3	8
MODULE 3: Understanding Digital Photography Digital Image Construction (Size & Resolution of Digital Images), Representation of digital image: Resolution – Pixel Depth, Uses, Advantages and Limitations of Digital over Conventional Photography Image Sensors (CCD and CMOS), Formats of a Digital Image Types of Digital Cameras	L1,L3	8

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MODULE4: Digital Image Manipulation Advantage and Disadvantage of Digital Photographs Exposure: Correct exposure and its determination, exposure meters Types and function, exposure tables. Printing and Sharing Digital Images	L1,L3	8
MODULE 5: Advanced Photography Practicals Practicing Outdoor Photography Photography Assignments and Projects Developing Personal Digital Portfolio Digital Image Manipulation using various computer software	L1,L3	6

*Bloom's Level:

L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Text Books

- Scott Kelby.(2016), *Photoshop Book for Digital Photographers*, San Francisco: Adobe press.
- Corbett Bill. (2017), *A simple guide to 35mm photography*, San Francisco: Misc.

Reference Books

- David Taylor.(2015), *Digital Photography Complete Course*, Penguin Random House.
- David McKay.(2016),*Photography Demystified: Your Guide to Gaining Creative Control and Taking Amazing Photographs*- Penguin Random House.

Modes of Evaluation: Class Test/Assignment/End Term Examination/Case Presentation

Examination Scheme:

Components	H	C	CT	A	EE
Weightage (%)	5	10	10	5	70

CT: Class Test, H: Home Assignment, EE: End Semester Examination; A: Attendance; C: Case Presentation

CO, PO and PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	1	1	--	--	--	--	1	2	2	1	--
CO2	1	1	--	--	--	--	1	2	2	1	--
CO3	1	1	--	--	--	--	1	2	2	1	--
CO4	1	1	--	--	--	--	1	2	2	1	--
CO5	1	--	1	1	1	2	1	2	2	1	--

1: Strongly Related, 2: Moderately Related and 3: Weakly Related

JRN2304	PUBLIC RELATIONS	L	T	P	C
Version	2021	2	1	-	3
Pre- requisites/Exposure					
Co-requisites					

Catalog Description

The objective of the course is to provide a broad introduction to the principles of public relations practice in India. The course details different facets of public relations in theory and practice in both public and private sectors. It begins with the PR basics and shifts its focus on larger PR dimensions. It teaches techniques of written presentation for a range of specific purposes focusing chiefly on the importance of the overall campaign brief of writing objectives, internal and external communication, issuing statements and press releases, dealing with crisis etc.

Course Objectives

The objective of this course is to

- Introduce public relations basics to the students.
- Describe how PR industry works in India.
- Explain the nuances of PR writing.
- Explain how public relations can be effectively used for social development.

Course Outcomes (COs):

On completion of this course, the students will be able to CO1: Explain the basics of public relations.

CO2: Plan a publicity campaign, press conference etc. CO3: Create PR writing for different stakeholders.

CO4: Explain how PR can be effectively used for social development.

CO5: Review relevant PR laws and talk about the ethical concerns in the profession of public relations.

Course Contents:

Modules	Blooms level*	Number of hours
MODULE 1: Basics of Public Relations Definitions and concepts, Role and Objectives of PR, Public Relations in India, Changing trends in PR, Internal & External PR, Globalisation & PR, and Event& Crisis Management.	L1, L2	8
MODULE II: Public Relations & Media Affairs Planning Publicity Campaign, Media Relations & Media Planning, Making Press Kit, Organising Press Conference, Advertising & Publicity Campaigns.	L2, L3	12

MODULE III: PR Writing Writing for Press, Press Release, Writing Company Profile, Contents for the Newsletter.	L3	8
MODULE IV: PR for Social Development Public Relations, NGOs & Socio-economic Development, Public Relations in Journalism and Advertising, Public Relations Laws and Ethics.	L1, L2	8

*Bloom's Level:

L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Text Books

- Centre, Allen H. & Jackson, P (2013). *Public Relation Practices*, US: Pearson
- Jethwaney, Jaishri & Sarkar, NN (2015). *Public Relations*, New Delhi: Sterling Publishers
- Seitel, Fraser P (2016). *The Practice of Public Relations*, US: Pearson
- Moore, H. Frazier (1985). *Public Relations: Principles, Cases and Problems*, US: Irwin Professional Publishing

Reference Books

- Bernays, Edward L. (2014). *Public Relations*, US: Snowball Publishing
- Sachdeva, Iqbal S. (2009). *Public Relations: Principles and Practices*, New Delhi: Oxford University Press
- Mehta, D S (1980). *Handbook of Public Relations in India*, Delhi: Allied Publishers Pvt Ltd
- Vilanilam, J V (2011). *Public Relations in India*, New Delhi: Sage Publishing

Modes of Evaluation: Class Test/Assignment/End Term Examination/Case Presentation

Examination Scheme:

Components	P	A	CT	EE
Weightage (%)	10	5	15	70

CT: Class Test, H: Home Assignment, EE: End Semester Examination; A: Attendance; C: Case Presentation

CO, PO and PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	1	--	--	2	2	2	3	1	1	2	--
CO2	--	1	1	1	2	1	2	1	1	1	1
CO3	--	1	1	2	2	3	2	--	1	1	2
CO4	2	2	1	1	2	2	3	--	1	1	1
CO5	--	--	2	2	1	2	3	--	1	3	--

1: Strongly Related, 2: Moderately Related and 3: Weakly Related

JRN2330	READINGS IN MEDIA	L	T	P	C
Version	2021	2	-	2	3
Pre- requisites/Exposure					
Co-requisites					

Catalog Description

The objective of this concentration elective on readings in media is to inculcate analytical bent of mind in students. This will also encourage reading habit along with value addition to the existing understanding of the subject. The exercise will help media students not only develop understanding of different important issues but also give an insight into content handling. Critical analysis of different genres of write ups would help broaden the intellectual horizon of the student.

Course Objectives

The objective of this course is to

- Develop reading habits and inculcate analytical bent of mind in students.
- Provide power of critical analysis of different genres of write ups

Course Outcomes (COs):

On completion of this course, the students will be able to

CO1: Describe and analyse information and relevance of the issue in detail. CO2: Criticize and write thematically correct content with unique writing style.

Course Contents:

Modules	Blooms level*	Number of hours
MODULE 1: Methodology The student shall be given high quality news articles, editorials and relevant national/international stories from newspapers and newsmagazines. He/she shall be required to critically review the same in terms of content, media handling and content presentation etc. The student may also be asked to critique any non-fiction book. The given assignments are required to be submitted in the form of reports. He/she will be assessed on the basis of the assignment reports and viva voce. In order to earn the credits, the student will be required to submit reports on the following: Book Review (1) Editorial (1) News articles published on the edit page of a national/international daily (2) Cover story of a national/international newsmagazine (1) The report submissions will be followed by viva voce by a panel of 2 faculty members. The guide will be allocated to the students for discussion and approval of books and submission of required reports.	L1, L2, L3, L4	No Contact Hours

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Text Books

According to the chosen area.

Reference Books

According to the chosen area.

Modes of Evaluation: Class Test/Assignment/End Term Examination/Case Presentation

Examination Scheme:

The student will be required to submit Five assignments in all as per the details mentioned above. Each assignment will carry equal marks (20 marks each) The marks break up for each assignment will be as follows:

Components	Written Reports	Viva Voce
Weightage (%)	15	5

CO, PO and PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	1	1	1	--	--	--	--	1	--	2	--
CO2	1	1	1	--	--	--	--	1	--	2	--

1: Strongly Related, 2: Moderately Related and 3: Weakly Related



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JRN2332	PROJECT (WITH PRESENTATION & EVALUATION)	L	T	P	C
Version	2021	1	-	4	3
Pre- requisites/Exposure	ALL COURSES STUDIED IN THE PREVIOUS SEMESTERS				
Co-requisites					

Catalog Description

This concentration elective will help the student develop a critical and analytical eye when it comes to understanding issues/trends related to media. It will provide a platform to the student to interrogate and review various media concepts. The live project will help in giving hands-on training to the communication students.

Course Objectives

The objective of this course is to

- Provide hands on learning experience to work on an industry-oriented/research project.
- Provide a platform to the students to develop their research skills and its application.

Course Outcomes (COs):

On completion of this course, the students will be able to CO1: Describe and apply skills on real research problems. CO2: Assess and develop a solution to research problems.

CO3: Select the appropriate field for himself/herself in the media industry.

Course Contents:

Modules	Blooms level*	Number of hours
Major Themes for Project The project may be based on any of the following major media streams: Print Media Electronic Media Advertising Event Management Corporate Communication & Public Relations Brand Management New Media, Photography Guidelines for Project It must be based on either Industry or Research. The student will work under the guidance of a Faculty Guide that will be assigned by HOI. Student can choose topic as per his/her area of interest under the guidance of the Faculty guide. The student may also choose to undertake a live project in any of the major media streams. Project Report/Portfolio: 75 Marks Before the end of the semester, the student will be expected to submit a project report. The project report shall have the following components. Title page Index Introduction Industry Overview Objectives Methodology Findings Conclusion	L1, L3, L5, L6	No Contact Hours

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Annexures (questionnaires, if any)		
<p>Bibliography In case the student undertakes a live project, he/she will have to submit the portfolio instead of the project report. The portfolio will carry 75 marks.</p> <p>Presentation & Viva: 25 Marks Student will make a presentation (based on Project Report) and it will be followed by a Viva Voce in front of a Panel of one internal expert and one external expert.</p> <p>The Steps of a Project Report STEP I: Selection of the topic for the project by taking following points into consideration: Suitability of the topic, Relevance of the topic, Time available at the disposal, Feasibility of data collection within the given time limit, Challenges involved in the data collection (time & cost involved in the data collection, possibility of getting responses, etc.) STEP II: Finalisation of the Topic and preparation of Project Proposal in consultation with the Supervisor. STEP III: Collection of information and data relating to the topic and analysis of the same. STEP IV : Writing the report dividing it into suitable chapters STEP V: The following documents are to be attached with the Final Project Report. Approval letter from the supervisor (Annexure-IA) Student's declaration (Annexure-IB) Certificate from the Competent Authority of the Organisation / Institution, if the student undertakes the Project Work in any Organisation / Institution.</p> <p>Guidelines for evaluation: Each of the students has to undertake a Project/Live Project individually under the supervision of a teacher and to submit the same following the guidelines stated below.</p>		
<p>Language of Project Report and Viva-Voce Examination may be English. The Project Report must be typed and hard bound.</p> <p>Failure to submit the Project Report/Portfolio or failure to appear at the Viva-voce Examination will be treated as "Absent" in the Examination. He /she has to submit the Project Report/Portfolio and appear at the Viva-Voce Examination in the subsequent years (within the time period as per University Rules).</p> <p>No marks will be allotted on the Project Report/Portfolio unless a candidate appears at the Viva-Voce Examination. Similarly, no marks will be allotted on Viva-Voce Examination unless a candidate submits his/her Project Report/Portfolio.</p> <p>Evaluation of the Project Work to be done jointly by one internal expert and one external expert with equal weightage, i.e., average marks of the internal and external experts will be allotted to the candidate.</p>		

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Text Books

Depending upon the chosen specialization by the students.

Reference Books

Depending upon the chosen specialization by the students.

Modes of Evaluation:

Chapter Scheme and distribution of marks (for Project Report):

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Chapter 1: Introduction with statement of objectives, limitations of the study & hypothesis – 10 marks

Chapter 2: Literature Review/Conceptual Framework/ National/International Scenario – 20 marks

Chapter 3: Research Design – 10 marks

Chapter 4: Findings& Results -- 20 marks

Chapter 5: Conclusion & Recommendations -- 10 marks

Chapter 6: Bibliography -- 05 marks

Examination Scheme:

Components	Project Report	Power Point Presentation & Viva
Weightage (%)	75 Marks	25 Marks

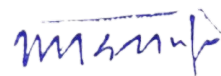
CO, PO and PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	1	2	3	2	3	--	2	3	2	1	2
CO2	1	2	3	2	3	--	2	--	2	1	2
CO3	1	2	3	2	3	--	2	3	2	1	2

1: Strongly Related, 2: Moderately Related and 3: Weakly Related



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Registrar
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JRN2336	MEDIA PRODUCTION PORTFOLIO	L	T	P	C
Version	2021	1	-	4	3
Pre- requisites/Exposure					
Co-requisites					

Catalog Description

This subject is an attempt to inculcate professional writing skills and knowledge in flowering buds of the media department. The subject will give hands on experience on different aspects of media writing to the students. The students may choose the option of this subject from their concentration electives.

Course Objectives

The objective of this course is to

- Equip the students with the hand on experience on different aspects of media writing.
- Provide an overview of different zones of technical writing skills in media industry.

Course Outcomes (COs):

On completion of this course, the students will be able to CO1: Describe and review media writings.

CO2: Write and Summarize methodologically in media industry.

Course Contents:

Modules	Blooms level*	Number of hours
MODULE 1: Major Areas of Writings The Media Production Portfolio has the following topics for writing: No. of items Press Release 1 Feature 2 Editorial/Article 1 News Story 2 News Analysis 1 Ad Copy (TV/radio/print) 1 Letter to Editor 2 Movie Review 1 Guidelines for Media Production Portfolio: The following procedure should be followed for the credits: Thorough reading of relevant study material and references. Students will choose the current topics for every area of writing. Students will discuss the topics with the guide and will take the approval. Students will use the formal writing pattern i.e. 12 font size, 1.5 line spacing and Times New Roman. Students will have to make proper formal document that includes Title Page Table of Contents	L1, L2, L3, L6	No Contact Hours

Acknowledgement, Write ups		
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*Bloom's Level:

L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Text Books

- Ganesh T. K. (2008). *Essentials of Mass Media Writing*. Authors Press.
- Schement, Jorge Reina (2002). *Encyclopedia of communication and information*. USA, Macmillan Reference.
- Filak Vincent F. (2018). *Dynamics of Media Writing: Adapt and Connect*, 2nd edition. CQ Press.

Reference Books

- Fink, Conrad C. (2001) *Sports Writing: The Lively Game*, New Jersey : Wiley- Blackwell
- Keeble, Richard (2001) *The Newspaper Handbook*, Abingdon : Routledge
- Kamath, MV (2012) *Journalism Reporting*, Noida : Vikas Publication
- Rosenauer, Kenneth L (2004) *Storycrafting: A Process Approach to Writing News*, New Jersey: WileyBlackwell


Examination Scheme:

Components	Complete Work	Creativity	Relevance	Clarity	Comprehensiveness	Originality	Presentation
Weightage (%)	10	15	15	15	15	15	15

CO PO and PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	1	1	--	2	2	--	--	2	1	2	--
CO2	1	1	--	2	2	--	--	2	1	2	--

1: Strongly Related, 2: Moderately Related and 3: Weakly Related


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JRN2451	TV PRODUCTION AND PRESENTATION	L	T	P	C
Version	2021	2	-	2	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description:

A comprehensive course to introduce students into the multilayered field of TV Production and presentation. Designed to give exposure to the students to both the theoretical as well as practical side of TV production, both in the field and in the Studio.

Course Objectives:

The module is structured for the students to move further into TV journalism. It shall explore strategies to handle key areas within broadcast journalism. The skill for anchoring and presentation will be honed after explaining the nuances and essentials of the task. This module will also familiarize them with all that is needed for outdoor production and the role of important departments on location. From this unit onwards, they will be exposed to essentials of specialized coverage in the field of current affairs, sports, business etc.

Course Description:

This course is broken up into three modules which cover all most all aspects of TV production and news presentation, into one tightly packed comprehensive programme. Students learn from faculty as well as from experts in the field, the rigours of TV Production and slick news presentation, through a balanced mix of theoretical constructs and practical field and studio exercises, graded in terms of intensity and complexity.

Course Outcomes:

On completion of this course, the students will be able to : **CO1.** Explain role of an anchor and presentation techniques **CO2.** Demonstrate knowledge of TV editing
CO3. Apply understanding of various reporting beats in TV

Course Contents:

Modules	Blooms level*	Number of hours
MODULE 1: Anchoring and presentation Qualities of an anchor; Role of styling (makeup techniques) Anchoring according to program formats; News anchoring, Entertainment, current affairs, magazines how setc. Anchoring techniques: live shows & recorded programmes Discussing different news anchors of the industry; Using the teleprompter; Piece to camera	L1, L2	14

MODULE 2: Editing(Post-production) Basic FCP (Final Cut Pro) Tools of Editing Basic Transitions, Sequencing shots; Concept of montage and Continuity; Role of the editor; Ingest and digitize footage; Overlay and underlay of sound; Ethics involved in editing; Importance of File footage and archival footage	L2, L3	12
MODULE 3: Specializedcoverage Current Affairs; Documentaries and Features; Business and stock market reporting; Sports coverage; Legal reporting and Judiciary; election based coverage; Political & parliamentary coverage	L2, L3	10

*Bloom's Level:

L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Text Books

- Spann, Thomas (2004). *Fundamental of Television Production*
- Belavadi, Vasuki(2013). *Video Production Oxford Press*

Reference Books

- Harman, Doug (2013). *The Digital Filmmaking Handbook*.
- Jago, Maxim(2018). *Adobe Premiere Pro CC Classroom in a Book*.

Modes of Evaluation: Practical/Home Assignment/Class Test/Written Examination

Examination Scheme:


Components	P	CT	A	EE
Weightage (%)	10	15	5	70

P: Project, CT: Class Test, EE: End Semester Examination; A: Attendance

CO, PO and PSO Mapping:

	PO1	PO2	PO3	PO4	PSO1	PSO2	PSO3	PSO4
CO1	1	1	2	3	3	1	2	2
CO2	1	1	2	1	3	1	2	2
CO3	3	2	1	1	3	1	2	2
CO4	1	2	2	1	3	1	2	2

1: Strongly Related, 2: Moderately Related and 3: Weakly Related


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JRN2401	FILM THEORY AND PRACTICE – I	L	T	P	C
Version	2021	2	-	2	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

Various components of film making will be covered resulting in learning and practical outcome. A theoretical analysis of some films by stalwarts of world cinema will be screened. Students will also learn the camera movements in theory and practical. The students will learn about film narrative and scriptwriting.

Course Objectives

The objective of this course is to

- To impart knowledge on the basics of filmmaking and cinema techniques for students.
- To build the capability of students to analyze a film and what it conveys cinematically.
- To impart knowledge to identify film theories and film appreciation.
- To build the capability of students to make short films, keeping in mind the finer nuances of film making.
- To broaden knowledge to world and regional cinema periodically throughout the course.

Course Outcomes

On completion of this course, the students will be able to;

CO1: Produce short films, starting with ideation, scriptwriting, shooting and editing. CO2: Apply the elements of Mise-en-scene in their film making.

CO3: Write Film reviews.

CO4: Critically analyse selected classics.

Course Contents:

Modules	Blooms Level*	Number of hours
Module I – Language of Cinema: World space and screen space Continuity: Space and Time Cinema movements, angles and shots Different screen elements & Mise-en-scene Continuous action, compression and expansion of time and concepts of editing Dimensions of Sound: on-screen & off-screen, diegetic & non-diegetic, sync and non-sync, Sound effects and silence, dialogues, ambient sound, background score & musical tracks.	L1, L2, L3	10

Module II- Stages of film production Development stage Pre-production. Production. Post-production Distribution, promotion & Release.	L2, L3	8
Module III- Scriptwriting Narrative composition: 3 plot structure Characterization & Dramatic structure Scriptwriting formats, step outline & shot break script Screenplay, Storyboarding & shooting script Script selection Writing proposal	L2,L3, L4	8
Module IV: - Film Theories Early experiments and image lantern How to view/read the movie Narrative and Non narrative Film Genre Early Indian cinema and Golden era Evolution of documentary films Case study of famous movies: Roshomon, Citizen cane, PatherPanchali, Sholey, Charulata, Gone with the wind etc.	L4,L5,L6	10

***Bloom's Level:**

L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Text Books:

- Bordwell, D & Thompson, K (1979). *Film Art an Introduction*, (New York) Mc Graw Hill.
- Miller, W. (1997). *Screenwriting for film and television*, (UK) Pearson.
- Monaco, J. (1977). *How to read a film*, (New York) Oxford University Press.

Reference Books:

<https://www.youtube.com/watch?v=IRo2IqYbEaE>

<https://www.youtube.com/watch?v=kavxsXhzD48> <https://www.youtube.com/watch?v=wFiP-E1zTRc>

https://www.youtube.com/watch?v=FiUIPK4V_40

Modes of Evaluation: Class Test/Assignment/End Term Examination/Case Presentation

Examination Scheme:

Components	P	C	CT	A	EE
Weightage (%)	5	10	10	5	70

P- Project, C- Case Discussion/Presentation/Analysis, CT- Class Test, A- Attendance, EE- End Semester Exam

CO, PO and PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1		1							1		
CO2		1							1		
CO3						1				1	
CO4						1				1	

1: Strongly Related, 2: Moderately Related and 3: Weakly Related

JRN2432	PROJECT (WITH PRESENTATION & EVALUATION)	L	T	P	C
Version	2021	2	-	2	3
Pre- requisites/Exposure	ALL COURSES STUDIED IN THE PREVIOUS SEMESTERS				
Co-requisites					

Catalog Description

This concentration elective will help the student develop a critical and analytical eye when it comes to understanding issues/trends related to media. It will provide a platform to the student to interrogate and review various media concepts. The live project will help in giving hands-on training to the communication students.

Course Objectives

The objective of this course is to

- Provide hands on learning experience to work on an industry-oriented/research project.
- Provide a platform to the students to develop their research skills and its application.

Course Outcomes (COs):

On completion of this course, the students will be able to CO1: Describe and apply skills on real research problems. CO2: Assess and develop a solution to research problems.

CO3: Select the appropriate field for himself/herself in the media industry.

Course Contents:

Modules	Blooms level*	Number of hours
Major Themes for Project The project may be based on any of the following major media streams: . Print Media . Electronic Media . Advertising . Event Management . Corporate Communication & Public Relations . Brand Management . New Media . Photography Guidelines for Project It must be based on either Industry or Research. The student will work under the guidance of a Faculty Guide that will be assigned by HOI. Student can choose topic as per his/her area of interest under the guidance of the Faculty guide. The student may also choose to undertake a live project in any of the major media streams. Project Report/Portfolio: 75 Marks Before the end of the semester, the student will be expected to submit a project report. The project report shall have the following components. Title page Index Introduction	L1, L3, L5, L6	No Contact Hours

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Industry Overview Objectives Methodology Findings Conclusion Annexures (questionnaires, if any)		
<p>Bibliography In case the student undertakes a live project, he/she will have to submit the portfolio instead of the project report. The portfolio will carry 75 marks.</p> <p>Presentation & Viva: 25 Marks Student will make a presentation (based on Project Report) and it will be followed by a Viva Voce in front of a Panel of one internal expert and one external expert.</p> <p>The Steps of a Project Report STEP I: Selection of the topic for the project by taking following points into consideration: Suitability of the topic, Relevance of the topic, Time available at the disposal, Feasibility of data collection within the given time limit, Challenges involved in the data collection (time & cost involved in the data collection, possibility of getting responses, etc.) STEP II: Finalisation of the Topic and preparation of Project Proposal in consultation with the Supervisor. STEP III: Collection of information and data relating to the topic and analysis of the same. STEP IV : Writing the report dividing it into suitable chapters STEP V: The following documents are to be attached with the Final Project Report. Approval letter from the supervisor (Annexure-IA) Student's declaration (Annexure-IB) Certificate from the Competent Authority of the Organisation / Institution, if the student undertakes the Project Work in any Organisation / Institution. Guidelines for evaluation: Each of the students has to undertake a Project/Live Project individually under the supervision of a teacher and to submit the same following the guidelines stated below.</p>		
<p>Language of Project Report and Viva-Voce Examination may be English. The Project Report must be typed and hard bound.</p> <p>Failure to submit the Project Report/Portfolio or failure to appear at the Viva-voce Examination will be treated as "Absent" in the Examination. He /she has to submit the Project Report/Portfolio and appear at the Viva-Voce Examination in the subsequent years (within the time period as per University Rules).</p> <p>No marks will be allotted on the Project Report/Portfolio unless a candidate appears at the Viva-Voce Examination. Similarly, no marks will be allotted on Viva-Voce Examination unless a candidate submits his/her Project Report/Portfolio.</p> <p>Evaluation of the Project Work to be done jointly by one internal expert and one external expert with equal weightage, i.e., average marks of the internal and external experts will be allotted to the candidate.</p>		

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Text Books

Depending upon the chosen specialization by the students.

Reference Books

Depending upon the chosen specialization by the students.

Modes of Evaluation:

Chapter Scheme and distribution of marks (for Project Report):

Chapter 1: Introduction with statement of objectives, limitations of the study & hypothesis – 10 marks

Chapter 2: Literature Review/Conceptual Framework/ National/International Scenario – 20 marks

Chapter 3: Research Design – 10 marks

Chapter 4: Findings & Results -- 20 marks

Chapter 5: Conclusion & Recommendations -- 10 marks

Chapter 6: Bibliography -- 05 marks

Examination Scheme:

Components	Project Report	Power Point Presentation & Viva
Weightage (%)	75 Marks	25 Marks

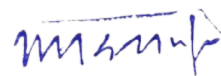
CO, PO and PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	1	2	3	2	3	--	2	3	2	1	2
CO2	1	2	3	2	3	--	2	--	2	1	2
CO3	1	2	3	2	3	--	2	3	2	1	2

1: Strongly Related, 2: Moderately Related and 3: Weakly Related



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JRN2409	DIGITAL MARKETING	L	T	P	C
Version	2021	2	-	2	3
Pre-Requisites/ Exposure					
Co-Requisites					

Catalog Description

This course aims at introducing students to the recent practices in the field of Digital Marketing. It equips them with a practical exposure to latest software, necessary skills and analytical mindset for making a successful career in Digital Marketing.

Course Objectives

The objective of this course is to

- Introduce the concept of Digital Marketing
- Explain and apply the important concepts related to SEO, SEM and SMM.
- Describe the process of Creating and promoting online content.
- Understand and apply the knowledge about analytics.

Course Outcomes

On completion of this course students will be able to

CO1: Understand and create online business plan

CO2: Explain concepts related to SEO and SEM

CO3: Describe and create social media marketing plans

CO4: Describe how content marketing works and create content for online platforms

CO5: Analyze and apply data related to digital marketing trends

Course Contents:

Modules	Bloom's Level*	Number of hours
Module 1: Introduction to Digital Marketing Deciding Online Goals, Creating Online presence-Marketing, Analyzing and Adapting; Understanding working of a website, Fundamentals of creating websites, Do's and Don'ts of a website, Online business-strategic planning, Understanding e-commerce, Online payments and orders, Re-targeting	L1, L3	8
Module 2: Online Search Basic of Search engine, Working of a search engine, Organic Vs Paid Search, Introduction to SEO-Plan and Process, Selecting keywords, Web pages and SEO, Introduction to SEM, SEM Auction, Essentials of good keywords, Ways to improvise on keywords, expanding local reach, Introduction to international marketing and export	L1, L2	10

Module 3: Social Media Basics of Social Media, selecting appropriate social media sites, developing social media plans, Social Media advertising, Ways to analyze success on Social Media, Do's and Don'ts of Social Media Marketing, Understanding mobile web and mobile apps, Introduction for advertising on mobile, Search campaigns for mobile, Display campaigns for mobile, Social media campaigns for mobile, Video for mobile	L1,L3	12
Module 4: Content Marketing Introduction to content marketing, Understanding online customers, Choosing the right format for content, Writing for online audiences, Promoting the content, Measuring success in content marketing, Creating marketing emails, Designing email campaigns, Measuring success in email marketing, Influencer Marketing, Understanding ad networks, How retargeting works	L1,L3	8
Module 5: Analytics Understanding web analytics, Meeting goals with web analytics, Succeeding with analytics, Web analytics and organic search, Tools to measure SEM, disintegration of data for insights, Using online video for online strategy, Promotion of videos, Measuring video performance, Using data to understand audiences, Understanding the Data Cycle and application of data for success, Presenting data effectively	L1,L4	10

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation*

Modes of Evaluation: Class Test/Assignment/End Term Examination/Case Presentation

Examination Scheme

Components	H	C	CT	A	EE
Weightage (%)	5	10	10	5	70

CT: Class Test, H: Home Assignment, EE: End Semester Examination; A: Attendance; C: Case Presentation

Text Book

- Kingsnorth, S. (2019). *Digital marketing strategy* (2nd ed.). United Kingdom: Kogan Page.
- Kotler, P., Kartajaya, H., & Setiawan, I. (2016). *Marketing 4.0* (1st ed.). Wiley.
- Kotler, P., Kartajaya, H., & Setiawan, I. (2021). *Marketing 5.0* (1st ed.). Newark: John Wiley & Sons, Incorporated.
- Gupta, S. (2020). *Digital marketing* (2nd ed.). 2020: McGraw Hill.

Reference Books

- Bhatia, P. (2019). *Social Media & Mobile Marketing* (1st ed.). Wiley.

- Martin, G. (2018). *The essential social media marketing handbook* (1st ed.). India: Rupa Publications India.
- Sammis, K., Lincoln, C., Pomponi, S., Ng, J., Gassmann Rodriguez, E., & Zhou, J. (2016). *Influencer marketing for dummies* (1st ed.). India: Wiley.

CO, PO and PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1		1	3				3		1	2	
CO2		1	3				3		1	2	
CO3		1	3				3		1	2	
CO4		1	3				3		1	2	
CO5		1	3				3		1	2	

1: Strongly Related, 2: Moderately Related and 3: Weakly Related



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JRN2404	WEB DESIGNING	L	T	P	C
Version	2021	2	-	2	3
Pre- requisites/Exposure					
Co-requisites					

Catalog Description

The power of the Internet has penetrated every nook and cranny of our lives. Journalism has also been revolutionized with the inclusion of the World Wide Web for news gathering and news dissemination. Aspiring journalists today need to be familiar with cyber journalism and basics of web designing. The course curriculum has been designed keeping this end in view.

Course Objectives

The objective of this course is to

- Equip the students with concepts of Internet & Web.
- Provide an overview of Design Patterns & Web Graphics
- Provide deep understanding of HTML & CSS.

Course Outcomes (COs):

On completion of this course, the students will be able to CO1: Define and classify W3, Internet & Ethics of web

CO2: Describe and apply various aspects of Web Designing with Design Patterns CO3: Describe the working process of basics HTML & CSS

Course Contents:

Modules	Blooms level*	Number of hours
MODULE 1: Introduction to Internet Internet- Introduction, History, Benefits, limitations and Ethics, Future of the Web, W3C, Internet tool kits - server, IP address, URL, ISP, networking, browsers, Search Engine, Domain, Domain name etc. Classification of Websites. Home page, hyperlinks	L1, L2	6
MODULE 2: Web Designing Web Design Guidelines, Customer-Centered Design Process; Knowing your Customers Planning your Website, Design Patterns, Basic HTML, CSS & Dreamweaver	L1, L3	8
MODULE 3: Web Graphics Introduction & Image optimization, size, resolution and number of Colours, Creating. Homepage, File formats, Image mapping, Image manipulation (Effects)	L1, L3	10

*Bloom's Level:

L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Text Books

- Harley Hahn(1994). *Harley Hahn teaches the Internet*, United States:McGraw-Hill Osborne Media.
- Towers, J. Tarin (). *Macromedia Dreamweaver Mx advanced*, United States:Peachpit Press.

Reference Books

- Hartman, Patricia(2001). *Flash 5 Visual Jumpstart*, United States: Sybex.
- N. N. Sarkar(2013), *Art and production; Art and production*, United States: Oxford University Press.

Modes of Evaluation: Class Test/Assignment/End Term Examination/Project**Examination Scheme:**


Components	H	P	CT	A	EE
Weightage (%)	5	10	10	5	70

CT: Class Test, H: Home Assignment, EE: End Semester Examination; A: Attendance; P: Project

CO, PO and PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	1	2	--	--	--	--	2	2	2	1	3
CO2	1	1	--	--	--	--	3	--	2	1	--
CO3	1	1	--	--	--	--	3	--	2	1	--

1: Strongly Related, 2: Moderately Related and 3: Weakly Related


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JRN2551	NEW MEDIA	L	T	P	C
Version	2021	2	-	2	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

The power of the Internet has penetrated into the every parts of life today so, Journalism is not any exception. It has also been revolutionized with the inclusion of the World Wide Web for newsgathering and news dissemination. Aspiring journalists today need to be familiar with cyber journalism and the basics of web designing. Also, it is important to understand the hugest impact of online media and news dissemination though it, how media is not only making but also changing opinion in present times. It has become a major source of news. Gone are the days, when people used to wait for newspaper for getting information on certain news or even go to watch television for current updates. In the era of smart phones, everything is in our hand and just a click away. Almost every big and small media houses are online through streaming channels, apps, or even on YouTube. Even many independent news portals are in existence today and doing pretty well with full fledged websites of their own. So, in the midst of this scenario for a budding journalist should have basics knowledge for this medium, 'more you know better it is' is the tagline today. After studying this course students will be aware of not only writing and skills part of it but also, the ethical and legal aspect of the same through the course. Besides, the concept of convergence and its technological uses have been described in course curriculum.

Course Objectives

The objective of this course is to

- Impart basic knowledge of the term New Media and convergence and its application in different areas of online media.
- Spread the knowledge regarding the dissemination of news through digital platforms including News portal, online news channels, YouTube and social media.
- Apply knowledge and skills as a communicator via World Wide Web and also, analyze its huge impact among the receivers.
- Impart knowledge regarding writing for digital media, ethics of online media, and its virtue and iniquity as a news medium.

Course Outcomes

On completion of this course, the students will be able to

CO1. Analyze and apply knowledge about the coverage of various genres including disaster, science and technology, environment, poverty and gender.

CO2. Describe convergence in media and its effects on various classes and communities; also, develop knowledge about language and writing skills for various formats of new media and business and technical skills in media convergence.

CO3. Write about cyber journalism and explore how it is different from other news mediums and online media and correlate advertising tools and its impact on globalization, cyber laws, concept

of e-governance and World Wide Web.

Course Contents:

Modules	Blooms level*	Number of hours
MODULE 1: : Specialized coverage – II Disaster & crises coverage, Science and Technology, Environment, Poverty, and Gender	L1, L2, L4	12
MODULE 2: Convergence What is convergence?, Emergence of convergence and its effects on broadcast media, Language, structure and technology of new media, Creative, Business, Technical Skills in Convergence Media Programming	L1, L3, L4, L6	12
MODULE 3: Cyber Media Cyber Journalism: History of Internet, Comparison of cyber media with Print, TV & Radio, Writing for Web Media, Online as a publishing medium Online as an advertising tool, Why Print & Electronic Media networks are going on the Net, Impact of Web Journalism on reading habits of people and media industry, Analysis of important Indian news-based websites, Impact of globalization on Web Journalism, Cyber Laws and debates, Concept of E-Governance & E-Learning, Finding information on the World Wide Web Writing for blogs	L1, L3, L4, L6	12

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Text Books:

- The language of New Media; Lev Manovich, MIT Press, 2011.
- Understanding New Media; E. Siaper, Sage, 2011.
- Online Journalism: Reporting, Writing, and Editing for New Media; Richard Craig.

Reference Books:

- Cyber law: The Law of the Internet and Information Technology; Brian Craig, Pearson Education, 2012.
- E-governance: concepts and case studies; CSR Prabhu, Prentice Hall of india, 2004.

Other Readings:

- https://www.academia.edu/1710229/The_Three-Dimensional_Concept_of_New_Media_Notes_on_New_Media_Studies
- <https://www.docsity.com/en/characteristics-and-types-of-new-media/2231386/>
- <http://download.nos.org/srsec335new/ch21.pdf>
- <https://www.tutor2u.net/sociology/reference/what-are-the-new-mediaTthe>


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Examination Scheme:

Components	P	C	CT	A	EE
Weightage (%)	5	10	10	5	70

P- Project, C- Case Discussion/Presentation/Analysis, CT- Class Test, A- Attendance, EE- End Semester Examination

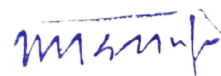
CO, PO and PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	2	1	1	1	1	1	1	2	1	1	2
CO2	2	1	2	1	-	1	2	2	1	2	-
CO3	2	2	-	2	2	1	1	2	1	2	2

1: Strongly Related, 2: Moderately Related and 3: Weakly Related



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JRN2501	FILM THEORY AND PRACTICE – II	L	T	P	C
Version	2021	2	-	2	3
Pre-requisites/Exposure	Film Theory and Practice -I				
Co-requisites					

Catalogue Description

This will focus on the production and marketing techniques of films. This course will also allow students to analyze the elements of filmmaking, which included editing, sound and documentary filmmaking. Students will participate in collaborative learning class projects. Students will examine the way films synthesize all elements to make a work of art. Cultural implications inherent in film productions and in the “reading” of cinema as a text-of famous film directors, both national and international- will be analyzed by students

Course Objectives

The objective of this course is to

- Impart in-depth knowledge and application of the technical elements of film making.
- Students to comprehend the methods film marketing in contemporary times.
- Broaden knowledge of cultural implication associated with film production.
- Analyses and “read” documentary films

Course Outcomes

On completion of this course, the students will be able to;

CO1: Identify elements of editing; acquire and apply these techniques.

CO2: Demonstrate knowledge in the area of documentary films and reflect on its relation to films as a social institution

CO3: Analyze marketing strategies in the current structure of the film industry and technological development

Course Contents:

Module	Blooms Level	Number of hours
Module 1:Editing Technique Digital and Analog. Differences and similarities. The move towards all digital systems and studios. Linear and Non Linear editing. Online and offline editing. Technical Director Vs Creative Director, Basic Transitions, Match’ Cut, Jump Cut, cut-in & cut aways.Example with National and International Cinema. Movements in Cinema. Intellectual Editing & Montage Theory. Techniques of editing: Action sequence, comedy sequence, Romantic sequence, conversation. Use of graphics and Animation Basics of FCP	L1,L3	12

Module 2: Documentary Film Producing a documentary Types of documentary films Scripting documentary film Post-production techniques of documentaries Narration and voice-over style Importance of Research in documentary film	L1,L4,L3	12
Module 3: Funding, Marketing ,Promotions & Union Memberships Pitching the producer & distributors Packaging of final product Marketing and promotion strategies Exhibition & film festival Funding agencies and financial issues Associations and Guilds Changing audience perceptions and tastes Strategies to garner profit: Multi theatre or single theatre release Structure of the film industry	L1,L3	11

***Bloom's Level:**

L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Text Books:

- Bordwell, D. & Thompson, K (2010). *Film History: An Introduction*, (New York) Mc Graw Hill
- Eisenstein, S. (1969). *Film Form: Essays in Film Theory*, Harcourt
- Ondatjee, M. (2002). *The Conversations: Walter Murch and the Art of Editing Film*, (New York) Penguin Random House LLC.

Reference Books:

- Arnheim, R. (1957). *Film as Art*, (USA) University of California Press
- Dancyger, K. (2011). *The Technique of Film and Video Editing: History, Theory and Practice*, (Burlington) Focal Press

Examination Scheme:

Components	P	C	CT	A	EE
Weightage (%)	5	10%	10%	5%	70

P- Project, C-Case Discussion/Presentation/Analysis, CT-Class Test, A-Attendance, EE-End Semester Examination.

CO, PO and PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1							1		1		--
CO2						1			1		--
CO3				1					1	2	--
CO4	1							1	1		--
CO5							1		1		

1: Strongly Related, 2: Moderately Related and 3: Weakly Related

JRN2507	MASS COMMUNICATION RESEARCH-II	L	T	P	C
Version	2021	2	-	2	3
Pre-requisites/Exposure	Mass Communication Research- I				
Co-requisites					

Catalog Description

This course equips students with the necessary knowledge and skills to complete a large-scale dissertation project required for a Master's award in research. This course improves students' abilities in several key areas, enabling them to develop an advanced understanding of various research philosophies, methods, data analyses and presentation styles.

Course Objectives

The objective of this course is-

- To familiarize participants with basic of research and the research process.
- To enable the participants in conducting research work and formulating research synopsis and report.
- To familiarize participants with Statistical packages such as SPSS/EXCEL.
- To impart knowledge for enabling students to develop data analytics skills and meaningful interpretation to the data sets so as to solve the business/Research problem.

Course Outcomes

On completion of this course, the students will be able to-

CO1. Explain various kinds of concepts of research methods

CO2. Apply marketing research tools and produce a research report. CO3. Describe concepts of advertising research.

CO4. Produce a research project

Course Contents:

Modules	Blooms level*	Number of hours
MODULE 1: Communication Research Theories Brief introduction to main communication models Three traditions in communication research: Users and gratification, lifestyle, and reception analysis	L1, L2	6

MODULE 2: Marketing Research Concepts & definitions Stages & process Strengths & limitations Relationship with marketing management Applications of market research Case Studies Field trip to market research companies & submit a research report	L3	8
MODULE 3: Advertising Research Concept & definitions Importance of advertising research Strengths & limitations	L2	5
MODULE 4: Main Project Students have a choice to choose from qualitative or quantitative project mixed approach to doing research.	L3	5

*Bloom's Level:

L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Text Books

- Kothari, C. R (1990) *Research Methodology: Methods and Techniques*, New Delhi: Wishwa Prakashan.

References Books

- K N Krishnaswamy, A.I. Sivakumar and M Mathirajan (2006). *Management Research Methodology: Integration of Methods and Techniques*. Pearson Education: New Delhi
- Bell, Judith (2005) (4th edn.) *Doing your Research Project: A Guide for First-Time Researchers in Education and Social Science*, Buckingham: Open University Press.
- David J. Luck and Ronald S. Rubin (1987) *Marketing Research*, Prentice-Hall: Englewood Cliffs, NJ.
- Roger D. Wimmer and Joseph R. Dominick (2005) (8 edn.) *Mass Media Research*, London: Wadsworth Publishing.

Modes of Evaluation: Class Test/Assignment/End Term Examination/Case Presentation Examination Scheme:

Components	Q	P	CT	A	EE
Weightage (%)	5	10	10	5	70

Q-Quiz, P- Project, CT- Class Test, A- Attendance, EE- End Semester Examination

CO, PO and PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	1	--	--	--	2	--	1	--	2	1	2
CO2	3	1	--	--	--	--	--	--	2	1	2
CO3	--	2	--	2	--	2	--	--	2	1	2
CO4	1	1	--	--	--	--	3	--	2	1	2

1: Strongly Related, 2: Moderately Related and 3: Weakly Related

JRN2535	SUMMER INTERNSHIP EVALUATION	L	T	P	C
Version	2021	-	-	-	3
Pre- requisites/Exposure	All courses taught in the previous semesters				
Co-requisites					

Catalog Description

The basic objective of a Summer Internship is to refine the practical exposure of the corporate functioning. This summer training will provide an opportunity to the students to apply their theoretical understanding while working on the concerned project in the industry. Thus this summer internship programme is an attempt to bridge the gap between theory and practice. This will also enhance the students' intellectual ability and attributes related to data handling, decision making, report writing, oral presentation and imbibing an interdisciplinary approach.

Course Objectives

The objective of this course is to

- Provide hands on learning experience to the students.
- Provide a platform to the students to hone their skill sets.
- Provide students a learning experience where they get to work in the media industry and learn the 'tricks of the trade.'
- Provide an out-of-classroom training environment to the students.

Course Outcomes (COs):

On completion of this course, the students will be able to

CO1: Memorize and Outline the processes and functions involved in a particular discipline of media industry.

CO2: Use and Relate activities learnt by the students in academics and industry.

Course Contents:

Modules	Blooms level*	Number of hours
General Guidelines: Every student of BA (J&MC) shall be required to undergo a practical training in a media organization approved by the Institute for eight weeks, normally in the Summer Vacation, after the end of the semester examinations. The candidates shall be required to undergo training in the various areas of the media organization concerned. The work done by the candidate during the training period shall be submitted in form of a training report. The last date for the receipt of training report in the department shall be one month after the date of completion of training, i.e. at the beginning of the next semester. The report has to be type written in font Times New Roman, 12 points, line spacing on both sides of the paper, Spiral Bound. The report should comprise a maximum of 80 to 100 pages and has to be submitted in two copies.	L1, L4, L3, L6	No Contact Hours

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<p>Components of the Report The outcome of Summer Internship is the Project Report. A project report should have the following components:</p> <p>Cover Page: This should contain the title of the report with the name of the name of the media organization where the student interned, to whom it is submitted, for which degree, the name of the author, name of the supervisor, year of submission of the project work, name of the University.</p> <p>Acknowledgement: Various organizations and individuals who might have provided assistance /co-operation during his/her internship.</p> <p>Table of Content: Page-wise listing of the main contents in the report, i.e., different Chapters and its main Sections along with</p>		
<p>their page numbers.</p> <p>Body of the Report: The body of the report should have these four logical divisions</p> <p>Introduction: This will cover the overview of the media organization in which the student has interned, rationale/ need / justification for interning with the organization, expectations from the internship and Chapter Planning.</p> <p>Conceptual Framework / National and International Scenario: (relating to the media domain in which the organization functions).</p> <p>Work Profile/ Assignments Handled by the Student :(using the tools and techniques mentioned in the methodology).</p> <p>Conclusion and Recommendations and Skill Sets Learnt during Internship: In this section, the concluding observations based on the main findings and suggestions are to be provided.</p> <p>Bibliography or References: This section will include the list of books and articles which have been used in the project work, and in writing a project report.</p> <p>Annexures: Questionnaires (if any), relevant reports, etc.</p> <p>Chapter Scheme Chapter I: Introduction 20 marks Chapter II: Conceptual Framework/National/International Scenario 5 marks Chapter III: Work profile/ assignments handled by the student 35 marks Chapter IV: Conclusion and Recommendations and skill sets learnt during internship 15 marks</p>		


**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Text Books NA

Reference Books NA

Modes of Evaluation: Class Test/Assignment/End Term Examination/Case Presentation


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Examination Scheme:

Components	Report	Power Point Presentation & Viva
Weightage (%)	75	25

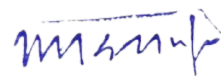
CO, PO and PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	1	1	1	2	2	3	1	1	1	1	--
CO2	--	2	2	2	1	2	1	1	1	1	--

1: Strongly Related, 2: Moderately Related and 3: Weakly Related



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JRN2503	EVENT MANAGEMENT	L	T	P	C
Version	2021	2	-	2	3
Pre- requisites/Exposure					
Co-requisites					

Catalog Description

This course gives a further insight to the students, on the latest yet very important element of marketing communications- Event Management. With the traditional forms of communication becoming saturated, event management has emerged as an effective alternate for brand awareness. The students will essentially be taken through fundamentals of event management, concept and design, logistics, marketing and promotion, stagecraft.

Course Objectives

The objective of this course is to

- Equip the students with concepts of creative fields and activities in event management.
- Provide an overview of events as an alternate for brand awareness.

Course Outcomes (COs):

On completion of this course, the students will be able to

CO1: Define and explain various pre, during and post event activities in event management. CO2:

Describe and illustrate various themes for different events.

CO3: Describe and apply various processes for organizing an event.

CO4: Describe and assess basic two way evaluation process for any event.

Course Contents:

Modules	Blooms level*	Number of hours
MODULE 1: Activities in Event Management 5 C's of Event Designing, Scheduling, Pre, During and Post Event Activities, Logistic, Suppliers, Technical Requirements- Lighting, Audio/Video.	L1, L2	10
MODULE 2: Event Theme Venue, Target Audience, Layout, Theme, Backdrop, Banner, Décor.	L2, L3	10
MODULE 3: Entertainment Catering, Various Media for Event Promotion, Understanding the Relevance of each Media to Event Promotion, Comparison and Strengths and Weaknesses of Each, Sponsorships, Event Marketing and Event Promotion	L2, L3	10

MODULE 4: Event Evaluation Basic Evaluation Process, Establishing tangible objectives and sensitivity in evaluation, Evaluation from Event Organizer's Point of View, Evaluation from Client's Point of View	L2, L6	6
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*Bloom's Level:

L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Text Books

- Wagen Lynn Van Der (2010). *Event Management*, Australia, Pearson Higher Education.
- Wakhlu, Savita Bhan (2000). *Managing Presentations: Communicating with Impact*, 1st ed., Sage Publications Pvt. Ltd.
- Palmer Scott (2000). *Essential Guide to Stage Management, Lighting and Sound*, Hodder & Stoughton.
- Walters Graham (1997). *Stage Lighting: Step-by-Step (Stage and Costume)*, A & C Black Publications.

Reference Books

- Parker, W. Oren & Wolf, R. Craig (2008). *Scene Design and Stage Lighting*, 9th ed., Wadsworth Publishing.
- Gaur, Sanjaya Singh & Saggere, Sanjay. V (2003). *Event Marketing & Management*, Delhi, Vikas Publishing Pvt. Ltd.
- Hoyle, Leonard H (2002). *Event Marketing: How to Successfully Promote Events, Festivals, Conventions and Expositions*, New York, John Wiley & Sons Ltd.
- Angus, Robert B and Gundersen, Norman, A (2002). *Planning, Performing and Controlling Projects: Principles and Applications*, 3rd ed., Pearson Prentice Hall.

Modes of Evaluation: Class Test/Assignment/End Term Examination/Case Presentation

Examination Scheme:

Components	P	C	CT	A	EE
Weightage (%)	10	10	10	5	70

CT: Class Test, P: Project, EE: End Semester Examination; A: Attendance; C: Case Presentation

CO, PO and PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	1	--	2	--	--	--	--	--	1	2	--
CO2	1	2	2	--	--	--	--	--	1	2	--
CO3	1	2	2	--	--	--	--	--	1	2	--
CO4	1	--	2	--	--	--	--	--	1	--	--

1: Strongly Related, 2: Moderately Related and 3: Weakly Related

JRN2504	MULTIMEDIA JOURNALISM	L	T	P	C
Version 1	2021	2	-	2	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

Understanding the narrative and production characteristics of all formats involved is a basic requirement for today's information professional. This course therefore will expose students to the skills needed for creating information content in various formats, using multimedia and ICT tools such as computers, Internet, digital audio recorders, video recorders, cameras and mobile phones to tell stories and their effects on journalism's role in society. Not only will this course inform the learner how to use these enabling technologies to maximum advantage but some information of the technologies behind these Web based, ICT and communication tools will also be imparted. Students apart from learning production basics like scripting, shooting and editing, will also learn software related to this workflow. Basics of software such as Adobe Photoshop, Illustrator, Dreamweaver, Premiere Pro and Audition for basic image, sound and video editing will form the foundational aspects of this course. At the same time, the basic tenets of journalism, principles of good communication and ethics of the media will, at no stage be sidelined or subsumed because of the tools that are used to package good stories.

Course Objectives:

The objective of this course is to:

- Enable the students to write well, effectively and visually
- enable students to translate theoretical concepts and ideas into a form that can be visualised, shot and edited into a complete story or package
- Enable students to master the basics of multimedia tools that are used to deliver a finished audio or video product
- Teach students to work in a team environment, understand client briefs or channel requirements and churn out compelling stories

Course Description

This course integrates both the theoretical tenets of journalism and practical ICT and media tools into one comprehensive multimedia package that can be repurposed into a variety of media platforms

Course Outcomes:

On completion of this course, the students will be

CO1. Completely proficient with all the principles as well as the different types of reporting and writing and industry requirements

CO2. Be able to visualise, script and write for different media platforms like Web, Internet, print, as well as audio-visual (broadcast) media

CO3. Be completely proficient with tools and techniques related to audio-visual production

CO4. Be able to work in a team and in a networked environment, using ICT tools effectively to reach a wide audience in an online and offline environment

Course Contents:

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Modules	Blooms level*	Number of hours
MODULE 1: Fundamentals of Journalism and it's evolving nature What we understand by Journalism. Brief history of journalism. Understand its growth over time from a n expression of nationalistic and patriotic sentiment to a systematic and informed model of written and audio-visual communication. Principles of good writing and reporting. Some of the risks that are prevalent in certain specialised reporting like crime beats or war journalism. Examples of brilliant journalism that have been wake up calls internationally. Different tools and styles that are needed for different media such as Web, Print and Broadcast Journalism	L1, L2	4
MODULE 2: Basics of Image, Sound and Video editing This Unit focuses on teaching students the basics of web, multimedia and audio-visual production. Editing of images in packages such as Photoshop, Lightroom and Affinity Photo are taught so students can integrate well edited images in different media platforms, be it for print, web pages or videos for broadcast or YouTube. Differences between bitmaps and vectors; advantages and disadvantages of each; Basics of industry standard package like Illustrator are also imparted. Fundamental tools related to vector image editing are also taught. Techniques of properly recording audio; editing the audio and then syncing it to video form a core element of this section. Students learn the basics of audio editing software like Adobe Audition or Audacity. Once students are comfortable with still image editing, audio editing, and basics of video production like frame rates, image resolutions, codecs etc., then they are introduced to essential elements of audio video editing using a package like Adobe Premiere or Final Cut Pro (for those who are Mac users)	L2, L3	6
MODULE 3: Writing for print and broadcast. Scripts, Storyboarding and content writing This unit focuses more on the writing aspects. Now that students have a fairly good idea of production and multimedia techniques and are able to write to the visual, elements of style and those ingredients that are peculiar to the broadcast medium such as run down scripts; camera blocking and shot compositions and storyboarding are explained with numerous examples. Videos of News packages, documentaries and fiction stories, so that students are able to write in a variety of styles and formats. Also aspects of video journalism such as crime reporting and editing, sports beats, current affairs reporting and other unique journalistic requirements also form an essential part of this module	L2, L3, L4	8
MODULE 4: Packaging and Post-production In this Module, all the skills of image editing, audio and video editing as well as writing in different formats for different media all converge together to create a single unified product which is the audio video report or the news story or documentary. Students employ all practical skills garnered to produce one or more stories for television, for webcasts, podcasts as well as for print. Whatever format may be required by the	L3, L4	8

respective media, be it a brochure for print, a slideshow, a radio production or a news package, all these production elements are brought together, refined and tweaked to produce a professional looking and sounding project		
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*Bloom's Level:

L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis,

L6-Evaluation

Text Books

Bull, Andy. *Multimedia Journalism: A Practical Guide*. Routledge. 2nd Edition. 2016

Hernandez, Richard Koci. Rue, Jeremy. *The Principles of Multimedia Journalism: Packaging Digital News*. 1st Edition. 2015

Reference Books

Saddik, El. Abdulmotaleb. *Interactive Multimedia Learning: Shared Reusable Visualization-based Modules*. Springer. 2001

Costello, Vic. *Multimedia Foundations Core Concepts for Digital Design*. Taylor and Francis 2nd Edition. 2016

Modes of Evaluation: Practical/Home Assignment/Class Test/Written Examination

Examination Scheme:

Components	P	CT	A	EE
Weightage (%)	10	15	5	70

P: Project, CT: Class Test, EE: End Semester Examination; A: Attendance

CO, PO and PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	2	1	2	1	3	3	2	1	1	1	3
CO2	2	1	3	2	3	2	1	1	1	1	3
CO3	3	1	2	3	3	2	1	1	1	1	2
CO4	1	1	1	2	2	3	1	1	1	1	3
CO5	--	--	--	--	--	--	--	--	--	--	--

1: Strongly Related, 2: Moderately Related and 3: Weakly Related



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JRN2502	NATIONAL AND INTERNATIONAL ISSUES AND AFFAIRS	L	T	P	C
Version	2021	2	-	2	3
Pre-requisites/Exposure	General understanding of news and current affairs				
Co-requisites					

Catalog Description

The course helps students understand different social, economic and political issues and policies and their implications and impact on society. The study concentrates on and analyses the latest happenings in the national and international arena as well as world organizations. The students master and discuss and debate contemporary national and global social and political issues facing the world and the Indian polity.

Course Objectives

The objective of this course is:

- To equip students with a broadly-based knowledge of the operation of the national and world affairs;
- To develop a comparative analysis of new ideas and different policies and international relations;
- To understand and analyze as well as debate why countries go to war; equip students with the concepts and functioning of national and world organizations, their growth and progress as well as international understandings;
- To develop in students a critical awareness of various media available for reporting; and
- To understand and debate guiding parameters of national and international politics.

Course Outcomes (COs):

On completion of this course, the students will be able to

CO1: Critically identify the basic structure of the internationally relevant organizations.

CO2: Write, design and communicate clearly through different media to convey socially and politically significant national and international organizations.

CO3: Explain and write about Indian foreign policy and forecast social and political fall outs.

Course Contents:

Modules	Blooms level*	Number of hours
MODULE 1: INTERNATIONAL ORGANIZATIONS Introduction, United Nations Organization, International Red Cross, Interpol	L1, L2	12
MODULE 2: INTERNATIONAL GROUPINGS G – 8, Non-aligned Movement, Commonwealth Central Bureau of Investigation (CBI), Election Commission (EC), Central Vigilance Commission (CVC), National Human Rights Commission	L1, L2, L3	12

MODULE 3: INDIAN FOREIGN POLICY India and issue of permanent seat in UN Security Council, India's relation with different countries including US, UK, Nepal, Sri Lanka, Pakistan, Middle East, Maldives, etc.	L1, L2, L3	12
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L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

. Resources:

a) Main Resource:

- Year Book, Publications Division, Government of India
- World Encyclopedia Americana
- Manorama Year Book

b) Additional Resources:

- The Times of India
- The Hindustan Times
- The Hindu
- General newspapers reading and discussion.

c) Other resources:

<https://www.jagranjosh.com>

https://blog.feedspot.com/international_relations_blogs <https://www.worldaffairsjournal.com>

<https://www.un.org/sections/issues-depth/global-issues-overview>

Modes of Evaluation: Class Test/Assignment/End Term Examination/Case Presentation

Examination Scheme:


Components	P	C	CT	A	EE
Weightage (%)	5	10	10	5	70

CT: Class Test, P: Project, EE: End Semester Examination; A: Attendance; C: Case Presentation

CO, PO and PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	1	--	1	2	1	1	2	2	2	1	--
CO2	1	1	2	2	2	--	--	2	2	1	2
CO3	1	1	2	2	2	--	--	2	2	1	--

1: Strongly Related, 2: Moderately Related and 3: Weakly Related


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JRN2637	PROFESSIONAL PROJECT OR DISSERTATION	L	T	P	C
Version	2021	4	-	10	9
Pre- requisites/Exposure	ALL COURSES STUDIED IN THE PREVIOUS SEMESTERS				
Co-requisites					

Catalog Description

By the final semester, students have learnt about all the aspects of mass communication. This course aims at providing an opportunity to put this knowledge to use in a professional manner. The course introduces the students to the professional world of media and research. After learning the intricacies of mass media and its various mediums, it is trusted that the students will now be competent to decide a particular area of interest. The objective of the course is to help the students focus on a specific stream of mass media which they would want to specialize in.

Course Objectives

The objective of this course is to

- Provide hands on learning experience to the students.
- Provide a platform to the students to hone their skill sets.
- Provide students a learning experience where they get to work on an industry-oriented research project.
- Enable the students to understand the research process and be aware of research obligations and pitfalls.
- Provide an out-of-classroom training environment to the students.

Course Outcomes (COs):

On completion of this course, the students will be able to CO1: Describe and apply skills on real research problems.

CO2: Assess and develop a solution to research problems.

CO3: Select the appropriate field for himself/herself in the media industry.

Course Contents:

Modules	Blooms level*	Number of hours
Project Outlines The students can opt for any of the following specialized area: Print Advertising Public Relations Photography Electronic Communication PRINT Students can jointly bring out a journal with each one attending to a specific	L1, L3, L5, L6	12

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<p>function of its production like reporting, editing, sub-editing, design and layout, photography and graphics.</p> <p>ADVERTISING</p> <p>The students will use their understanding of all advertising concepts learnt in the previous semesters to do a practical exercise. Students will act as brand managers of a new brand being launched. They will be required to study the following elements for the product category assigned to them: Market Research to determine the situation analysis Segmenting the market and selecting a segment for their new brand Identifying target audience Positioning their brand. This will involve a detailed study of the positioning of the competitive brands Developing the media strategy, including the communication mix Developing the creative strategy Creative strategy to follow a complete campaign creative presentation. This will include development of TV Commercials, print ads, radio ads and POP material.</p>		
<p>PUBLIC RELATIONS & EVENTS</p> <p>PR specialization can be undertaken in these different areas Crisis case studies PR in Non- Governmental organizations Cross- cultural PR Internal PR department in corporate situation</p> <p>EVENTS</p> <p>Event specialization can be undertaken as a consolidation of various elements of event management. The student will conceptualize and develop an original project which will incorporate the following aspects. Designing of an event Event logistics and Stage management Marketing and promotions of the event (Topics other than listed can also be chosen in consultation with the concerned faculty)</p> <p>PHOTOGRAPHY</p> <p>Student can choose any two subjects for Specialization: Photojournalism Travel Photography Portrait Photography Product & Table-top Photography Glamour Photography Wild life Photography</p> <p>Students have to get themselves registered with the faculty concerned and take up project work in a systematic manner, planning, exposing in colour as well as in B & W processing, contact sheet, enlargements and presentation in a portfolio. These projects have a direct bearing on the career prospects of students as well as the image of the Photography Department of ASCO, therefore, the decision of faculty in every stage of assignment would be considered final and binding</p>		
<p>ELECTRONIC COMMUNICATION</p> <p>(The Student can choose between creating and analyzing a topic in radio or television as part of this specialization)</p> <p>RADIO</p> <p>Students can do specialization in the different areas of Radio production Viz. Various Formats, News, Talk shows, Spots and commentaries, Radio documentary, Radio features, Various music formats- classical, countdown shows, contemporary hit radio, music on demand, oldies, artist spotlights, request and dedication shows etc. Commercials/Jingles/ PSAs</p> <p>TELEVISION</p>		

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<p>The students can choose a specific area of TV production in which they want to specialize, viz. TV Journalism, Reporting, Anchoring, Editing, Camera, Documentary Film making, Feature Films, Short Film, Ad Film making, Entertainment Based programming etc.</p> <p>The above specialization will be conducted by guides and mentors responsible for a group of students and will include industry training, research and dissertation.</p>		
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**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Text Books

Depending upon the chosen specialization by the students.

Reference Books

Depending upon the chosen specialization by the students.

Modes of Evaluation: Class Test/Assignment/End Term Examination/Case Presentation

Examination Scheme:

Components	Timely Submission of Report	Content Comprehensiveness	Content Clarity	Content Originality	Presentation & Viva
Weightage (%)	5	20	25	5	45

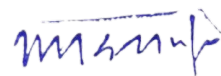
CO, PO and PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	1	2	3	2	3	--	2	3	2	1	2
CO2	1	2	3	2	3	--	2	--	2	1	2
CO3	1	2	3	2	3	--	2	3	2	1	2

1: Strongly Related, 2: Moderately Related and 3: Weakly Related



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JRN2635	INTERNSHIP	L	T	P	C
Version	2021	-	-	-	8
Pre- requisites/Exposure	All courses taught in the previous semesters				
Co-requisites					

Catalog Description

The basic objective of a Summer Internship is to refine the practical exposure of the corporate functioning. This summer training will provide an opportunity to the students to apply their theoretical understanding while working on the concerned project in the industry. Thus this summer internship programme is an attempt to bridge the gap between theory and practice. This will also enhance the students' intellectual ability and attributes related to data handling, decision making, report writing, oral presentation and imbibing an interdisciplinary approach.

Course Objectives

The objective of this course is to

- Provide hands on learning experience to the students.
- Provide a platform to the students to hone their skill sets.
- Provide students a learning experience where they get to work in the media industry and learn the 'tricks of the trade.'
- Provide an out-of-classroom training environment to the students.

Course Outcomes (COs):

On completion of this course, the students will be able to

CO1: Memorize and Outline the processes and functions involved in a particular discipline of media industry.

CO2: Use and Relate activities learnt by the students in academics and industry.

Course Contents:

Modules	Blooms level*	Number of hours
<p>General Guidelines:</p> <p>Every student of BJMC shall be required to undergo a practical training in a media organization approved by the Institute for eight weeks, normally in the Summer Vacation, after the end of the semester examinations. The candidates shall be required to undergo training in the various areas of the media organization concerned. The work done by the candidate during the training period shall be submitted in form of a training report.</p> <p>The last date for the receipt of training report in the department shall be one month after the date of completion of training, i.e. at the beginning of the next semester.</p> <p>The report has to be type written in font Times New Roman, 12 points, 1.5 line spacing on both sides of the paper, Spiral Bound. The report should comprise a maximum of 80 to 100 pages and has to be submitted in two copies.</p>	L1, L4, L3, L6	No contact hrs

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<p>Components of the Report The outcome of Summer Internship is the Project Report. A project report should have the following components:</p> <p>1) Cover Page: This should contain the title of the report with the name of the name of the media organization where the student interned, to whom it is submitted, for which degree, the name of the author, name of the supervisor, year of submission of the project work, name of the University. 2) Acknowledgement: Various organizations and individuals who might have provided assistance /co-operation during his/her internship.</p> <p>3) Table of Content: Page-wise listing of the main contents in the report, i.e., different Chapters and its main Sections along with their page numbers.</p>		
<p>Body of the Report: The body of the report should have these four logical divisions</p> <p>i) Introduction: This will cover the overview of the media organization in which the student has interned, rationale/ need / justification for interning with the organization, expectations from the internship and Chapter Planning.</p> <p>Conceptual Framework / National and International Scenario: (relating to the media domain in which the organization functions).</p> <p>k) Work Profile/ Assignments Handled by the Student :(using the tools and techniques mentioned in the methodology).</p> <p>l) Conclusion and Recommendations and Skill Sets Learnt during Internship: In this section, the concluding observations based on the main findings and suggestions are to be provided.</p> <p>5) Bibliography or References: This section will include the list of books and articles which have been used in the project work, and in writing a project report.</p> <p>6) Annexures: Questionnaires (if any), relevant reports, etc.</p> <p>Chapter Scheme Chapter I: Introduction 20 marks Chapter II: Conceptual Framework/National/International Scenario 5 marks Chapter III: Work profile/ assignments handled by the student 35 marks Chapter IV: Conclusion and Recommendations and skill sets learnt during internship 15 marks</p>		

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Text Books NA

Reference Books NA

Modes of Evaluation: Class Test/Assignment/End Term Examination/Case Presentation

Examination Scheme:

Components	Report	Power Point Presentation & Viva
Weightage (%)	75	25

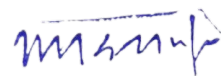
CO, PO and PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	1	1	1	2	2	3	1	1	1	1	--
CO2	--	2	2	2	1	2	1	1	1	1	--

1: Strongly Related, 2: Moderately Related and 3: Weakly Related



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JOURNALISM

Programme Structure

Course Code	Course Title	Lectures (L) Hours per week	Tutorial (T) Hours per week	Practical (P) Hours per week	Total Credits
JRN2151	Print Media- Reporting and Editing	2	-	2	3
JRN2251	Basic Photography	2	-	2	3
JRN2351	TV Journalism	2	-	2	3
JRN2451	TV Production and Presentation	2	-	2	3
JRN2551	New Media	2	1	-	3
JRN2651	Media Analysis	3	-	-	3
	TOTAL				18


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JOURNALISM

Syllabus - Semester First

PRINT MEDIA – REPORTING AND EDITING

Course Code: JRN2151

Credit Units : 03

Course Objective:

This unit is aimed at introducing the students to the world of journalism- news and its handling in context of print media. It deals with basic news elements, news structure as also the newsroom set up. The student is to be taught about agency and magazine journalism. Editing is an integral part of this unit.

Course Contents:

Module I: History of Journalism

Journalism in pre-independence era in India
Role of English and vernacular press during freedom struggle
Growth of journalism post independence

Module II: Growth and development of press

Emergence of newspapers, magazines and publication houses
Emergence and growth of Indian news agencies

Module III: The newsroom Set-up

Various departments in Editorial set-up
Hierarchy in the Newsroom
Qualities and responsibilities of a reporter
Sources and beats

Module III: News Reporting

What is News, News Value and Sources of News
Basic elements of News
Writing a News Report
Types of leads & Body text
Interviewing skills required for reporting
Types of Reporting

Module IV: Editing News

Role and functions of desk
Role of copy editor
Electronic Copyediting
Rewriting
Writing Headlines and captions
Understanding the importance of style guides
Newspaper design & Layout


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Examination Scheme:

Components	P	C	CT	A	EE
Weightage (%)	5	5	15	5	70

Components Codes


Project	P
Case Discussion/Presentation/Analysis	C
Class Test	CT
Attendance	A
End Semester Examination	EE

Text & References:

- History of India Journalism; Natarajan, J.
- History of Indian press: Growth of Newspaper in India; Ahuja, B.N.
- Journalism Reporting; Sharma, Seema
- Communication for Development In the Third world; Melkote, Srinivas R.
- Editing; Ahuja, B.N. & Chhabra, S.S
- News Reporting & Writing, A.L. Lawrenz;
- Handbook of Journalism & Mass Communication
- Vir Bala Aggarwal, V.S. Gupta



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Syllabus - Semester Second

BASIC PHOTOGRAPHY

Course Code: JRN2251

Credit Units: 03

Course Objective:

This unit introduces to the basic techniques of photography and its applications in Mass Media with specialization in specific area. This course gives an opportunity to the student to get accustomed to this universal language of expression and communication and exhibit their skills to explore, understand the significance and utility of photographs as an effective medium of communication.

Course Contents:

Module I: Introduction to photography

Brief History of photography

Uses of Photography

Principles of light

How photography works

- a. image capturing
- b. film processing
- c. print processing

Module II: Camera

Elements of a Camera (Introduction) – view finder, lens, iris, shutter, film chamber, light metre

Camera Designs –

- a. pinhole camera,
- b. view camera,
- c. compact camera,
- d. T L R
- e. S L R,
- f. Instant/Polaroid camera,
- g. digital camera

Exposure control in camera

Module III: Films & Camera Accessories

Film formats & their use

Lenses - prime & zoom lens

- a. angle of view
- b. Aperture & f-no.
- c. Depth of field, how depth of field works
- d. Depth of focus
- e. Lens care

Camera accessories

Module IV: Photography & Darkroom Practicals

✓ Outdoor Photography Assignments

✓ Introduction to Darkroom Equipments and their uses

✓ Developing & Printing B&W Films

✓ Developing, Printing and Enlarging B&W Prints

✓ Portfolio and Presentation


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Examination Scheme:

Components	P	C	CT	A	EE
Weightage (%)	5	5	15	5	70

Components Codes

Project	P
Case Discussion/Presentation/Analysis	C
Class Test	CT
Attendance	A
End Semester Examination	EE

Text & References:

- Basic Photography; Langford, Michael (Focal Press)
- Photography, Handbook, Wright, Terence
- Photography, History; Spira, s f
- A simple guide to 35mm photography; Corbett, Bill
- The Darkroom Cookbook; Anchell, Stephen G.



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Syllabus - Semester Third

TV JOURNALISM

Course Code: JRN2351

Credit Units: 03

Course Objective:

Students will move further into broadcast journalism in India. The unit will cover the process of how news develops and is moulded into essentials of any medium (Radio or TV) over a chain of processes. The basic attributes and skill set needed to pursue a journalistic path will also be debated and discussed. The unit will encourage students to identify the similarities and differences between key processes in both the mediums. The organizational set up will also be communicated for a better understanding of the functioning of a broadcast media organization.

Course Contents:

Module I: Basics of TV journalism

Qualities of a journalist
Developing sources of news gathering
Process of a report from the idea till its final implementation
Essentials during reporting
Live reporting and presenting the final story
Different styles of functioning for different beats
Basic Interview Skills: different types of interviews, approach, arrangements, research
Stages of production: pre, shoot and post.

Module II: Functioning of a TV organization

Hierarchy of a TV set up
Television Personnel – director, floor manager, audio technician, controller, cameraman
Role of a producer
Technical Process of news from initial stages to telecast.
Working process involved during live bulletin and recorded programme
Role/ contribution of each department and personnel
Hierarchy of a news organization
Professional terminologies

Module III: Outdoor production

Basic shooting according to shooting script
Team members and their role
Precautions and safety features while shooting
Single and multi-camera shoot
Shooting for fiction
Shooting for non-fiction
Building a sequence in the camera and without external editing
Process and elements of EFP (Electronic Field Production) and ENG (Electronic News Gathering)
OB (Outdoor Broadcast) Van
Satellite Phone

Examination Scheme:

Components	H	C	CT	A	EE
Weight age (%)	5	5	15	5	70

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Components Codes

Home Assignment	H
Case Discussion/Presentation/Analysis	C
Class Test	CT
Attendance	A
End Semester Examination	EE

Texts & References:

- Television Production Handbook; Zettl, Herbert
- Video production, Belavadi Vasuki
- Writing and Production Television News; Gormly, Eric K.
- Broadcast News Production; Schultz, Brad
- Digital Broadcasting Journalism; Sharma, Jitendra K.
- Broadcast journalism; Boyd, Andrew
- Broadcast journalism; Cohler, David Keith
- Television & Social change in Rural India; Johnson, Kirk
- Producing Public Television, Producing Public Culture; Dornfeld, Barry



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Syllabus - Semester Fourth

TV PRODUCTION AND PRESENTATION

Course Code: JRN2451

Credit Units: 03

Course Objective:

The module is structured for the students to move further into TV journalism. It shall explore strategies to *handle* key areas within broadcast journalism.

The skill for anchoring and presentation will be honed after explaining the nuances and essentials of the task. This module will also familiarize them with all that is needed for outdoor production and the role of important departments on location. From this unit onwards, they will be exposed to essentials of specialized coverage in the field of current affairs, sports, business etc.

Course Contents:

Module I: Anchoring and presentation

Qualities of an anchor

Role of styling (makeup techniques)

Anchoring according to program formats

News anchoring, Entertainment, current affairs, magazine shows etc

Anchoring techniques: live shows & recorded programmes

Discussing different news anchors of the industry

Using the teleprompter

Piece to camera

Module II: Editing (Post-production)

Basic FCP (Final Cut Pro) Tools of Editing

Basic Transitions (cut, dissolve, fade, wipe)

Sequencing shots

Concept of montage

Continuity vs. non continuity

Linear vs. non linear editing

Role of the editor

Ingest and digitize

Overlay and underlay of sound

Ethics involved in editing

Importance of File footage and archival footage

From finished product to broadcasting

Module III: Specialized coverage I

Current Affairs

Documentaries and Features

Business and stock market reporting

Sports coverage

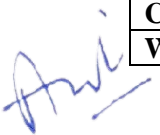
Legal reporting and Judiciary

Psephology and election based coverage

Political & parliamentary coverage

Examination Scheme:

Components	P	H	CT	A	EE
Weight age (%)	5	5	15	5	70


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Components Codes

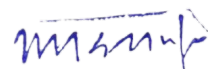
Project	P
Home Assignment	H
Class Test	CT
Attendance	A
End Semester Examination	EE

Texts & References:

- Television Production Handbook; Zettl, Herbert
- Video production, Belavadi Vasuki
- Writing and Production Television News; Gormly, Eric K.
- Broadcast News Production; Schultz, Brad
- Digital Broadcasting Journalism; Sharma, Jitendra K.
- Broadcast journalism; Boyd, Andrew
- Broadcast journalism; Cohler, David Keith
- Television & Social change in Rural India; Johnson, Kirk
- Producing Public Television, Producing Public Culture; Dornfeld,



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Syllabus - Semester Fifth

NEW MEDIA

Course Code: JRN2551

Credit Units: 03

Course Objective:

Apart from discussing specialized coverage, *the concept of convergence* will be explored in this semester. The power of the Internet has penetrated every nook and cranny of life. Journalism has also been revolutionized with the inclusion of the World Wide Web for newsgathering and news dissemination. Aspiring journalists today need to be familiar with cyber journalism and the basics of web designing. The course curriculum has been designed, keeping this end in view

Course Contents:

Module I: Specialized coverage – II

Disaster & crises coverage
Science and technology
Environment, Poverty, and Gender

Module II: Convergence

What is convergence?
Emergence of convergence and its effects on broadcast media
Language, structure and technology of new media
Creative, Business, Technical Skills in Convergence Media Programming

Module III: Cyber Media

Cyber Journalism: History of Internet
Comparison of cyber media with Print, TV, Radio.
Writing for Web Media
Online as a publishing medium
Online as an advertising tool
Why Print & Electronic Media networks are going on the Net?
Impact of Web Journalism on reading habits of people and media industry.
Analysis of important Indian news-based websites
Impact of globalization on Web Journalism
Cyber Laws and debates
Concept of e-governance & e-learning
Finding information on the World Wide Web
Writing for blogs

Examination Scheme:

Components	P	C	CT	EE
Weightage (%)	5	5	15	70

Components Codes

Project
Case Discussion/Presentation/Analysis
Class Test
End Semester Examination

P
C
CT
EE

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Text & References:

- Journalism Online, Mike Ward
- The Internet Complete Reference; Harley Hahn
- The Web Writer's Guide, Koppel
- The Ethics of Cyber space; Hamelink, Cees J.
- E-government; Bhatnagar, Subhash
- Cyber Media Journalism Emerging Technologies; Chakravarthy, Jagadish



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Syllabus - Semester Sixth

MEDIA ANALYSIS

Course Code: JRN2651

Credit Units: 03

Course Objective: The objective of this course is to provide a clear understanding of trends, movements and principles of journalism, problems and issues in newsgathering.

Course Contents:

Module-I: Problems and Issues in Newsgathering Objectivity Introduction to defamation Activism in journalism Embedded reporters Credibility of sources Pressures on media – internal, governmental, advertising, PR

Module-II: Commercialization of media, Media trials, Changing Equations in media business – mergers & acquisitions, cross media holdings, new trends Media ethics

Module-III: Alternate media Citizen Journalism Blogs as alternate media Community media

Module-IV: Broadcast Regulations Overview of Broadcast law Evolution of Broadcast Bill Cable TV Regulation Act

Examination Scheme:

Components	P	C	CT	A	EE
Weightage (%)	5	10	10	5	70

P- Project, C- Case Discussion/Presentation/Analysis, CT- Class Test, A- Attendance, EE- End Semester Examination


Texts & References:

Text

- Mass communication In India; Keval J. Kumar
- Communication for Development In the third world; Melkote, Srinivas R.

References

- India's communication Revolution; Singhal, A. & Rogers, E. M.
- Media in a Globalised Society; Stig Hiavard
- Media Management in India; Prassana K Biswasroy
- Government Media, Autonomy and After; G S


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Master of Arts Journalism & Mass Communication

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Programme Structure

Curriculum & Scheme of Examination

2022

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GURUGRAM

A handwritten signature in blue ink, appearing to read 'Anil'.

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JRN4103	MEDIA ARTS-I: RADIO & TV	L	T	P	C
Version	2021	2	0	2	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

Today broadcasting media is one of the most ruling media in day to day life. TV and Radio plays a very vital role in dissemination of the information and to communicate with the masses not only to cover the national issues but also to go for parachute coverage. This course outline helps students to develop the basic concepts and fundamentals for the broadcasting media not only textual but also hands on practice for the Television as well as Radio.

Course Objectives

The objective of this course is to

- Impart knowledge of basic working of Radio and TV as a medium of mass communication, also to apply knowledge of basic anatomy and working of the Radio and TV in India as well as in global domain.
- Apply knowledge and skills required to know about the different broadcasting instruments in Television and Radio broadcasting Industry.
- Engage in life-long learning and hands on technical expertise in handling the Basics of Camera, Light, Sounds and other equipment's .

Course Outcomes

On completion of this course, the students will be able to

CO1. Describe the different characteristics of Sounds – in film productions for both fiction and Non-fictions.

CO2. Identify and describe various concepts and instruments used for the capturing of Sound in broadcasting media.

CO3. Equipping the students with skills to be able to work on the lighting part- to understand the aesthetical approaches of lighting and different kinds and functions of lighting in the varied environment.

CO4. Analyze the different dimensions and applications of editing for making the raw footage to the finished one.

CO5. Demonstrate hands-on experience on anatomy of Video Camera, different kinds of video productions equipments and to learn the rules of the compositions.

CO6. Analyze the different approaches and aesthetical approaches in Film making and TV Productions.

Course Contents:

Modules	Blooms level*	Number of hours
MODULE 1: Audio and Sound: The Characteristics The basic attributes: Loudness, Frequency, Intensity, Pitch, Amplitude, and Timbre, Sound Aesthetics- Spatial Hearing, Sound Isolation, Sound perspective (mono and stereo), Importance of speech in broadcast media, Sound and its functions, Functions of sound in relation to picture, Acoustics and psychoacoustics.	L1, L2	6
MODULE 2: Sound and Technical Approaches Types of microphones, Directionality and pick-up patterns, Cardioid, Omni directional, super-cardioid and hyper-cardioid, Quadraphonic	L1, L4	6

and surround sound, Construction of mikes- dynamic mics and condenser mics, Positioning of mics- floor stand, hidden mics, camera mics, wireless mics.		
MODULE 3: Lighting: The Fundamentals Nature, quality, lighting for TV, Colour temperature, Lighting instruments, Three point lighting, Creative additions to lighting for different genres.	L1, L2,	6
MODULE 4: Editing techniques Editing; principles and techniques, Continuity and non-continuity editing, Linear and non-linear editing	L1, L2, L3,	6
MODULE 5: Anatomy of Video Camera The basic structure of a Video Camera, Working mechanism and basic parts of camera, Types of camera, Camera Mounts.	L1, L3	6
MODULE 6: Broadcast: Rules and Approaches Camera movements & angles, shots, Composition principles, TV as a Medium of close ups, Role of sound / voice over in TV programs, TV as a medium of glamour, immediacy, democratizing, Infotainment.	L1, L2, L5	6

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Text Books:

- Boyd, A. (1997). Broadcast Journalism: Techniques of Radio and TV news. Boston: Focal Press.
- Belavadi, V. (2013). Video production. New Delhi: Oxford University Press.
- Hakemulder, J. R., Jonge, F. A., & Singh, P. P. (2005). Broadcast Journalism. New Delhi, India: Anmol Publications.
- Millerson, G., & Millerson, G. (1999). Television Production. Oxford: Focal Press. 13 edition.

Reference Books:

- Trewin, J. (2003). Presenting on TV and Radio: An Insider's Guide. Amsterdam: Elsevier.
- Utz, P. (2006). Today's Video. Jefferson, NC: McFarland.
- Zettl, H. (2005). Television Production Handbook, Cengage Learning.

Other Books:

- Chantler, P., & Stewart, P. (2003). Basic Radio Journalism. Amsterdam: Focal Press.
- Chatterji, P. C. (1987). Broadcasting in India. New Delhi: Sage Publications.
- Luthra, H. R. (1986). Indian Broadcasting. New Delhi: Publications Division, Ministry of Information and Broadcasting, Govt. of India.
- McLeish, R. (1999). Radio Production: A manual for broadcasters. Oxford: Focal Press.
- Shrivastava, K. M. (1990). Radio & TV Journalism. Sterling.
- Sharma, R. (2012). Breakout nations: In pursuit of the next economic miracles. New York: W.W. Norton &.
- Pavarala, V., & Malik, K. K. (2007). Other voices: The Struggle for Community Radio in India. Thousand Oaks, CA: Sage Publications.

Examination Scheme:

Components	P	CT	A	EE
Weightage (%)	10	15	5	70

P- Project, C- Case Discussion/Presentation/Analysis, CT- Class Test, A- Attendance, EE- End Semester Examination

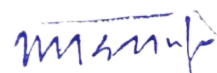
CO, PO and PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	2	2	2	-	1	-	-	1	2	3	3
CO2	2	1	1	2	1	-	-	1	2	3	3
CO3	2	2	2	-	1	-	-	1	2	3	2
CO4	2	2	2	2	1	-	-	1	2	3	2
CO5	2	2	2	-	1	-	-	1	2	3	2
CO6	2	1	2	1	1	-	-	1	2	3	3

1: Strongly Related, 2: Moderately Related and 3: Weakly Related



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JRN4104	ADVERTISING: CONCEPTS AND PRINCIPLES	L	T	P	C
Version	2021	2	1	0	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

The course will focus on basics concepts of advertising, its role & functions. The purpose of this course is to offer cutting-edge thinking on Advertising and explain how advertising works in the real world. The elaborative content will provide strong knowledge base to the students about Advertising and will enhance their critical and creative skills.

Course Objectives

The objective of this course is to:

- Equip the students with advertising environment by understanding, identifying and analyzing important concepts.

Course Outcomes (COs):

On completion of this course, the students will be able to

CO1: Comprehend role and functions of advertising.

CO2: Identify various types of advertising and structure with in advertising agency.

CO3: Analyze role of various department of agency and making of a campaign.

CO4: Comprehend the role of Segmentation, Targeting and position in campaign planning

Course Contents:

Modules	Blooms level*	Number of hours
MODULE 1: Introduction Definition and key concepts of advertising, Advertising Types, Role and Functions	L1, L2	10
MODULE 2: Advertising as a tool of marketing The Marketing Planning ,Relationship of Marketing with Advertising ,Situation Analysis to the Marketing Mix, Market Share, Target Segment, Positioning, Developing Advertising from Marketing Objectives	L1, L3	7
MODULE 3: Understanding advertising agencies Advertising Agencies, Types of Advertising Agencies, Advertising agency structure, Functions of various departments, Workflow in An Agency, Pitching , Account Planning, Media Planning, Copy Writing	L1,L2,L4	7
MODULE 4: Segmenting, Targeting and Positioning (STP) strategy Market Segmentation, Markets, market segments and niches, Meeting editorial needs, Basis for segmenting consumer markets, Targeting strategies, Undifferentiated targeting, Differentiating targeting, Niche targeting, Various positioning strategies, Benefit approach, Price –Quality approach, User approach, Product category approach, Competitor approach	L1,L2,L3	11

*Bloom's Level:

L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis,

L6-Evaluation

Text Books

- Jethwaney, J. & Jain, S (2006). *Advertising* (6th Ed). Oxford University Press.
- Chunawalla, Sethia, S. (2015). *Foundation of Advertising* (8th ed., Vol. 1). Himalaya Publications.

Reference Books

- Mohan, M. (2008). *Advertising Management* (2008 ed., Vol. 8th, p. 429). McGraw Hill Education (India) Private Limited.
- Thomas, C., & Guinn, O. (1999). *Advertising* (1st ed., p. 694). South-Western College Pub.
- Wells, Moriarty, Burnett. (2006). *Advertising Principles & Practice* (7 Ed) Pearson Prentice Hal.

Modes of Evaluation: Class Test/Assignment/End Term Examination/Case Presentation

Examination Scheme:


Components	H	C	CT	A	EE
Weightage (%)	5	10	10	5	70

CT: Class Test, H: Home Assignment, EE: End Semester Examination; A: Attendance; C: Case Presentation

CO, PO and PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	1	1	--	--	--	--	--	1	2	--	--
CO2	1	1	--	--	--	--	--	1	2	--	--
CO3	1	1	--	--	--	--	--	1	2	--	--
CO4	1	1	--	--	--	--	--	1	2	--	--

1: Strongly Related, 2: Moderately Related and 3: Weakly Related


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JRN4106	DESIGN SOFTWARE	L	T	P	C
	2021	2	0	2	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

This unit is designed to initiate the student into the rudiments of design and application of design in all walks of life that we see all around us. The student will learn and imbibe important typographic principles, use of fonts and fontography, use of color, color harmonies and tonal balance. The vitally important role that symmetry, balance, images – both vector as well as bitmaps, play in creating a harmonious and aesthetically appealing composition will all be explained with real world examples of practical design being implemented in advertising and mass communication.

Course Objectives:

The objective of this course is to:

- Enable the students to comprehend principles of design using a blended learning approach
- To familiarize students with all aspects of software, both at the beginner as well as at an intermediate level
- To integrate seamlessly both theoretical as well as practical aspects of design such that the learner is able to instantly identify design principles incorporated in the physical realm, be it print, net, web, film or television.

Course Description

This course covers all aspects of designs from the traditional orthodox straightforward design principles to contemporary design principles and application. Not only are the traditional fields such as print and broadcast design covered but also newer areas like UI/UX and game design also are briefly covered in this course. By and large however, it is meant to teach print design and layout basics through a well interwoven thought out course that embeds practical constructional projects at every stage of theoretical information imparted. Students are taught to think critically and question traditional concepts as well as come up with their own models and ideas.

Course Outcomes:

On completion of this course, the students will be

CO1. Completely proficient with all aspects of at least three print design software, notably Adobe Photoshop, Illustrator and In Design. They will also be conversant with Corel Draw, at a basic level.

CO2. Be able to visualise and conceptualise layouts for Print, Web and Multimedia.

CO3. Be proficient at delivery of design projects, both at a conceptual level and at the execution stage.

CO4. Be able to work in a team delegating different aspects of production to team members and also exchange notes and monitor each others work, so that professional quality work can be outputted and exported.

Course Contents:

Modules	Blooms level*	Number of hours
MODULE 1: Manual and Computer Aided Design Differences between traditional design, primarily for print as compared to designing for the web, the internet, and for television and film will be compared and contrasted, and how these inherent	L1, L2	4

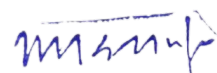
<p>differences can be optimized for a specific media will be explained and expounded upon. The importance of computer as a design tool as well as the different software currently prevailing in the industry are also highlighted and a broad overview imparted of each software with its distinguishing features</p>		
<p>MODULE 2: What is Design? Design Elements, Design Principles. How elements and principles helps in design. Where and how these elements and principles are applicable. How do different design elements combine and collaborate together to create an overall ‘look’ and feel for the published output – be it a web page, a brochure or a billboard hoarding.</p>	L2, L3	6
<p>MODULE 3: Typography History of fonts, Sizes of fonts, Classification of fonts, True Type and Open type. Breakdown of a word into typographical elements and ligatures, designing a custom font from scratch, all form part of this particular module. Each concept that is explained is generously illustrated with practical examples drawn from mixed media</p>	L2, L3	6
<p>MODULE 4: Hardware and Software From more theoretical concepts like Typography and design principles we move to the more practical aspects of implementing design on the ground through use of immersive technologies. Important aspects of hardware, notably the computer and accessories like printers, scanners and other input/output devices are explained. The student is also taken through the gamut of design software that exist that take full advantage of the computer’s multitasking and multi-threading capabilities. In this module, only an overview of Digital Publishing software is given. In the next two modules, the most popular design software are explained at length</p>	L2, L3,	6
<p>MODULE 5: Fundamentals of Design Software The Editing of images, selection and cropping, integration of text with graphics, as well as the importance of resolution, image size, pixel depth, and the different sizes for print, web, broadcast and internet mediums such as Youtube are all covered in this module. Also different image file formats such as jpg, png, tiff etc along with transparency and scaling are also explained. From technical definitions we move on to the software itself, covering all basic aspects of industry standard software like Photoshop, Illustrator, Corel Draw and Adobe InDesign</p>	L3, L4	8
<p>MODULE 6: Design Software – Intermediate level This module covers the above software in more detail and depth with overlying emphasis being given to integration of practical projects that employ all the theoretical knowledge imparted. Once a set of topics is taught, application of the same is demonstrated through several practical exercises that are not only structured but also graded in terms of complexity and applicability.</p>	L3,L4	6

**Bloom’s Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation



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Text Books

- Sarkar, N. M. Art & Print Production. 2013 Ed.
- Krug, Steve. *Don't Make Me Think: A Common Sense Approach to Web Usability*. New Riders Publishing, California. 2nd Edition
- Bauer, Peter. Adobe Photoshop CC For Dummies. Wileys. 2nd Edition
- Wood, Brian. *Adobe Illustrator CC Classroom in a Book* (2019 Release), Adobe Press. First Edition. December 2018.

Reference Books:

- Anton, Kelly Kordes. Cruise, John. *Adobe InDesign CC Classroom in a Book* (2017 release). December 2016.
- Norman, Don. *The Design of Everyday Things: Revised and Expanded Edition*. November 2013.

Modes of Evaluation: Practical/Home Assignment/Class Test/Written Examination

Examination Scheme:

Components	P	CT	A	EE
Weightage (%)	10	15	5	70

P: Project, CT: Class Test, EE: End Semester Examination; A: Attendance

CO, PO and PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	3	2	2	3	..	..	..	1	3	3	2
CO2	1	2	2	3	..	..	..	1	3	3	1
CO3	1	2	1	3	..	..	..	1	3	1	3
CO4	1	1	3	1	..	..	..	2	3	1	1

1: Strongly Related, 2: Moderately Related and 3: Weakly Related

JRN4202	PRINT DESIGN AND VISUALISATION	L	T	P	C
Version	2021	2	0	2	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description:

This course prepares the students for a career in the print industry. It comprises of modules that move from theoretical concepts like page sizes, resolutions etc to using software to craft print publications for newspapers and the advertising industry.

Course Objectives:

The primary objectives of this course are to:

- Introduce students to design concepts like layout, use of positive-negative space etc.
- Familiarize them with the juxtaposition of fonts, images and text to create compelling print material for publication
- Teach them how to effectively use software to create advertisements, banners and magazine layouts for printing and publication

Course Description

This course moves seamlessly from the definition and description of layout and design theoretical concepts to the actual realization of these concepts in print. Various concepts and jargon used by the print industry are explained and demonstrated, culminating in the use of software to translate design concepts into visually appealing printed material. Fundamentals of advertising and media campaigns are also an integral part of this course

Course Outcomes:

On completion of this course, the students will be able to:

CO1. Describe various style sheets for print media.

CO2. Comprehend how images, text and fonts interact to create pleasing layouts.

CO3. Use different design software to edit and accomplish print related tasks

CO4. Use design skills and knowledge of software to create one or more professionally designed projects.

Course Contents:

Modules	Blooms level*	Number of hours
MODULE 1: Module I: House Styles What is style sheet? How to create style sheets? Style guide: examples from newspapers, magazines; own guide produced for new publication. Styles: choice of typeface and masthead, choice and use of images and color, positioning of articles and images on the page, use of headlines in an appropriate font, point size, number of lines etc., text manipulation, juxtaposition of text/images/advertising, Typography.	L1, L2	8
MODULE 2: Comparison in newspapers and magazines What is the difference between Newspaper & Magazine layouts? What needs to be taken care when creating layouts for Fashion feature or Business articles or News pages. Which software is to be used - for making layouts, creating vector graphics and raster	L2, L3	6

images? Proper utilization of design elements and principles in layouts.		
MODULE 3: Advertising concepts Corporate Identity: Usage of Types & Fonts, Color schemes, Punch line, Orientation. Corporate Stationary: Logo, Letterhead design, Business Cards, Envelopes, Catalogues, Brochures, Digital Posters, Calendar Design. Communicating through multiple media: Digital and print	L2, L3	6
MODULE 4: Relevant software to design advertisements Advertising campaigns: Developing advertising campaigns from concept to creation, from creative to presentation. Photoshop, PageMaker, Corel Draw, Illustrator and their relevant usage in creating different forms of design for advertisements and campaigns.	L2, L3	8

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Text Books

- Sarkar, N.N(2001). *Art and Print Production*. 6th Ed.
- Lupton, Ellen(2015). *Graphic Design: The New Basics*. 2nd Ed.

Reference Books

- Moggridge, Bill(2010). *Designing Media*. The MIT Press.
- Shaoqiang, Wang(2018). *Page Design: Printed Matter and Editorial Design*.

Modes of Evaluation: Practical/Home Assignment/Class Test/Written Examination Examination Scheme:

Components	P	CT	A	EE
Weightage (%)	10	15	5	70

P: Project, CT: Class Test, EE: End Semester Examination; A: Attendance

CO, PO and PSO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	1	1	2	3	-	-	-	2	1	2	3
CO2	3	2	3	3	-	-	-	2	1	2	3
CO3	1	2	1	3	-	-	-	2	1	2	2
CO4	1	3	2	3	-	-	-	2	1	2	2

1: Strongly Related, 2: Moderately Related and 3: Weakly Related

JRN4203	SPECIALIZED REPORTING AND FEATURE WRITING	L	T	P	C
Version	2021	2	-	2	3
Pre-requisites/Exposure	Print Journalism – Reporting & Editing				
Co-requisites					

Catalog Description

After introducing the basics of newspaper reporting and editing in the first semester, this course describes the issues of specialization in news. The course introduces the concepts of beat reporting and also deals with the subtle differences between reporting on politics, business, sports, crime etc. The course also describes the nuances of investigative reporting with discussion on relevant case studies.

Course Objectives

The objective of this course is to

- Introduce beat reporting and discuss the finer points of specialized writing.
- Explain how reporting is different for various beats like crime, health, education, politics etc.
- Provide knowledge regarding investigative reporting and its tools.
- Provide understanding for different types of journalistic writing.

Course Outcomes (COs):

On completion of this course, the students will be able to

CO1: Describe differences and similarities between different journalistic beats.

CO2: Describe and apply various concepts of beat reporting.

CO3: Explain investigative reporting in depth; especially sting operations.

CO4: Apply conceptual knowledge to write different types of features and reviews.

CO5: Argue if sting journalism is a healthy practice in a democracy.

Course Contents:

Modules	Blooms level*	Number of hours
MODULE 1: Beat Reporting Covering a news beat, coverage of various beats: crime, education, health, civic affairs and local government, political reporting (political structure in India, covering political parties/events/rallies/elections), parliament reporting (parliament structure, reporting on legislature), covering the government (PIB, ministries), legal reporting (Structure in jurisdiction of courts, reporting court hearings, precautions)	L1, L2	12
MODULE II: Business and Sports reporting Basic business knowledge and business bodies, corporate reporting, covering economic policy (Ministry of Commerce, Finance, Industry, Company Affairs, and other infrastructure ministries), stock market coverage, how to develop good sports writing skills, covering local, national internal level events, entertainment and lifestyle reporting	L2, L3	8
MODULE III: Investigative Reporting Definition and elements, tools of investigative reporting, importance of sources, sting operations and latest trends, relevant case studies: Indian and international	L1, L5	9

MODULE IV: Feature Writing How to write a feature, different types of features, book reviews and film reviews	L3	7
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*Bloom's Level:

L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Text Books

- Sharma, Seema (2005) *Journalism: Reporting*, New Delhi: Anmol Publications Pvt. Ltd.
- Fox, Walter (2001) *Writing the News: A Guide for Print Journalists*, New Jersey: Wiley-Blackwell
- Mencher, Melvin (1989) *Basic News Writing*, U.S.A. : William C. Brown Publication
- Rajan, Nalini (2007) *21st Century Journalism in India*, New Delhi : Sage India
- Rick Wilber & Randy Miller (2002) *Modern Media Writing*, Belmont : Wadsworth Publishing Company

Reference Books

- Hough, George A. (1995) *News Writing*, Boston : Houghton Miller
- Fink, Conrad C. (2001) *Sports Writing: The Lively Game*, New Jersey : Wiley-Blackwell
- Keeble, Richard (2001) *The Newspaper Handbook*, Abingdon : Routledge
- Kamath, MV (2012) *Journalism Reporting*, Noida : Vikas Publication
- Rosenauer, Kenneth L (2004) *Storycrafting: A Process Approach to Writing News*, New Jersey: Wiley Blackwell

Modes of Evaluation: Class Test/Assignment/End Term Examination/Case Presentation

Examination Scheme:


Components	P	A	CT	EE
Weightage (%)	10	5	15	70

CT: Class Test, H: Home Assignment, EE: End Semester Examination; a: Attendance; C: Case Presentation

CO, PO and PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	3	--	3	2	3	--	2	1	2	2	--
CO2	2	1	2	1	2	--	2	1	2	2	2
CO3	3	2	--	2	2	3	--	1	2	2	2
CO4	--	1	2	2	2	2	2	1	2	2	2
CO5	--	--	1	1	1	2	--	1	3	2	--

1: Strongly Related, 2: Moderately Related and 3: Weakly Related


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JRN4204	MEDIA ARTS-II: RADIO AND TV	L	T	P	C
Version	2021	2	0	2	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

Various components of television production will be taught through praxis. Students will know about how a television organization operates and the finer nuances of reporting. Students will do on camera interviews and learn how to work in a PCR and studio.

Course Objectives

The objective of this course is to

1. Give students the opportunity to study the contemporary conventions and practices in Television and Radio Journalism.
2. Identify and examine key principles involved and required in news broadcasting.
3. Train the student in basics of news and feature reporting, writing and programming

Course Outcomes

On completion of this course, the students will be able to

CO1. Write scripts in different formats different genres; Radio and Television.

CO2. Describe roles & functions of various TV Newsroom

CO3. Demonstrate qualities of TV Journalist

Course Contents:

Module	Blooms Level	Number of Hours
Module I: Writing For Media Writing styles for Broadcast Medium TV - Writing for visuals, Conversational Writing Terminology Script, screen play, story board, script formats Writing for different formats Radio- Writing for ear Style, Radio scripts for different formats, Jargon and terminology	L1, L3	12
Module II : Introduction to TV Journalism Basic contours and characteristics of TV news journalism. TV news room- hierarchy, role of each element in hierarchy The news process from field reporting to packaging and going on Air Various technical departments Functioning of each department Designations of technical staff Equipments or hardwares for a news channel Utility of each Importance of technical functioning in a news channel Coordinating with the newsroom Professional terminologies Functioning while working on a live bulletin and recorded programme	L1,L3	12

TV news bulletin; rundown, stacking, blocking		
Module III: Television Reporting: the human angle Qualities and attributes of a broadcast reporter. Essentials during reporting Live reporting and working on a story Different functioning for different beats Interviewing skills The news Anchor- qualities, role and responsibilities.	L2, L3	11

Text Books:

- Page, D. & Crawley, W. (2001). *Satellites over South Asia*, (New Delhi) Sage Publications Ltd.
- Sexena, G. (1996) *Television in India: Changes and Challenges*, (New Delhi) Vikas Publishing
- Monroe, E. & Verhulst, S. (2001). *Broadcasting reforms in India: Media Law from a Global Perspective*, (New Delhi), Oxford University Press

References:

<https://www.youtube.com/watch?v=Xs0K4ApWl4g>
<https://www.youtube.com/watch?v=6lKehR9HENE>
<https://www.youtube.com/watch?v=6PXORQE5-CY>
<https://www.youtube.com/watch?v=p8636YkEhU4>
<https://www.youtube.com/watch?v=Yaj2PXRswxI>
https://www.youtube.com/watch?v=vtU_N57MZf8
<https://www.youtube.com/watch?v=W8PBRBIW50I>

Other Readings:

- Handout: Television:

Web Resources: (IF ANY)

- <http://www.bbc.co.uk/radio4/factual/indiasroute66.shtml>
- <http://www.radiomirchi.com/>
- <http://www.aljazeera.com/>

Modes of Evaluation: Class Test/Assignment/End Term Examination/Case Presentation

Examination Scheme:

Components	P	C	CT	A	EE
Weightage (%)	5	10	10	5	70

P- Project, C- Case Discussion/Presentation/Analysis, CT- Class Test, A- Attendance, EE- End Semester Exam

CO, PO and PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	1	-	-	-	-	-	-	1	2	-	-
CO2	-	1	-	-	-	-	-	1	-	2	-
CO3	-	-	-	1	-	-	1	1	2	-	-
CO4	-	-	-	1	-	-	1	1	-	-	-

1: Strongly Related, 2: Moderately Related and 3: Weakly Related

JRN4207	ADVANCED PHOTOGRAPHY	L	T	P	C
Version	2021	2	0	2	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

This course describes how to develop a unique photographic vision using a combination of aesthetics and technology. Using both practical's and theoretical teaching methods and blending traditional processes with current digital technologies, the photographic curriculum provides aspiring photographers with the breadth of experience and knowledge required to succeed in today's market place

Course Objectives

After Being exposed to the basics of photography in the first semester, the students will be eager to try their hands in the comparatively new area of digital photography and imaging. They will be able to start maintaining their portfolios and will be required to make digital presentations and undertake practical assignments.

Course Outcomes (COs):

On completion of this course, the students will be able to

CO1: Demonstrate Lighting essentials for creating incredible images, their importance and purpose of the main light in Photography.

CO2: Analyse aesthetics for various genres of photography.

CO3: Describe concepts of digital photography and imaging.

CO4: Apply techniques of Photo manipulation.

CO5: Produce portfolio in the genre of their choice.

Course Contents:

Modules	Blooms level*	Number of hours
Module I: Advanced lighting and Composition Lighting and its control (source, Contents & Direction of light) Electronic Flash & Its synchronization One, Two- & Three-Point Lighting Working on the subject (Changing proximity, varying angle, tightly framing subjects)	L1,L2	8
Module II: Aesthetics Variations for various beats Portrait Wildlife, Nature and Landscapes Night Photography Journalism (Photography for newspapers and magazines)	L1,L2,L4	6
Module III: Understanding Digital Photography	L1,L2	6

Digital Imaging Construction (Size, Resolution of Digital Images) Uses, Advantages and Limitations of Digital over conventional Photography image sensors (CCD and CMOS) Formats of a Digital Image Types of Digital Cameras		
Module IV: Digital Image and Manipulation Problems with Digital Photographs Commonly used image editors Editing images with Adobe Photoshop and Photoshop Elements Printing and sharing Digital Images	L1,L2,L3	6
Module V: Advanced Photography Practical's Practicing outdoor Photography Photography Assignment and Projects Developing personal Digital Portfolio Digital Image Manipulation using various computer software	L1,L3	6

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Text Books

- Langford Michael. (2013), *Basic Photography*; Burlington: Focal Press
- Corbett Bill. (2002), *A simple guide to 35mm photography*, Sydney:4C Publishing Pty Ltd

Reference Books

- Stephen G. Anchell, *The Darkroom Cookbook*; Burlington: Focal Press
- Naomi Rosenblum. (2008), *A World History of Photography*, New York, Abbeville Press.

Modes of Evaluation: Class Test/Assignment/End Term Examination/Case Presentation

Examination Scheme:

Components	P	A	CT	EE
Weightage (%)	10	5	15	70

CT: Class Test, EE: End Semester Examination; A: Attendance; P: Practicals

CO, PO and PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	--	2	--	--	--	--	--	1	2	2	2
CO2	--	2	--	--	--	--	--	1	2	2	2
CO3	--	2	--	--	--	--	--	1	2	2	2
CO4	--	2	--	--	--	--	--	1	--	2	2
CO5	--	--	--	--	--	--	1	1	2	2	2

1: Strongly Related, 2: Moderately Related and 3: Weakly Related

JRN4209	MEDIA PLANNING AND BRAND MANAGEMENT	L	T	P	C
Version	2021	2	1	0	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

This course comes under a management domain which describes various concepts of media planning and brand management. It includes marketing and negotiation skills and concepts of selection of media mix and substantial marketing and branding research etc. The aim of the course is to explore various creative fields involved in the placement of advertisements and branding strategies and brand positioning decisions involved in managing a brand in the market.

Course Objectives

The objective of this course is to

- Equip the students with concepts of creative fields involved in media planning and buying for advertisements.
- Provide an overview of the process of selecting and buying of media mix for the placement of advertisements.
- Equip the students with the creative branding strategies involved in launching, building and sustaining brands.
- Provide an overview of brand positioning and marketing of brands.

Course Outcomes (COs):

On completion of this course, the students will be able to

CO1: Describe media planning and select the media mix.

CO2: Describe and distinguish various media forms.

CO3: Select and apply research data to develop media strategy process.

CO4: Identify and explain media buying and complexities in media buying.

CO5: Define and describe various basic concepts related to brands.

CO6: Describe and classify various branding strategies.

Course Contents:

Modules	Blooms level*	Number of hours
PART-I MODULE 1: Media Planning Planning is the strategic formulation of activities design to carry out the goals or objectives of the advertising program. The Planner decisions are directed by a series of questions: Whom is the campaign directed to Where will the campaign directed to When will the campaign run What degree of target coverage and repetition of exposure are necessary Integrating science with creatively in advertising Role of media in the Marketing Framework Media Planning Framework	L1, L2	10

Developing Media Strategy- the media mix, Factors influencing media strategy decision Media availability & economics		
MODULE 2: Overview Media types characteristic of major media forms Electronic Media- The global goose Outdoor Advertising- They do not circulate market circulate around them Transit Advertising Internet- new born medium for the millennium	L1, L2	3
MODULE 3: Matching Media & Market Geographical Selectivity, Reach & Frequency Maximizing Advertising Exposure Media Briefing Media Scheduling What patterns of exposure works best Timing the effective exposure and finding time opportunities to communicate and Media Budget	L1, L3	4
MODULE 4: Selecting and Buying Acceptable Media Media Buying Functions New Media Increasing Complexity in Media Buying	L1, L2	3
PART-II MODULE 5: Brand Management Evolution of Brands Brand & Products Brand Perspectives Brand Differentiation Brand Positioning Brand Image Brand Equity Brand Extension	L1, L2	12
MODULE 6: Branding Strategies Closing Branding Strategies Product Branding, Line Branding, Range Branding, Umbrella Branding, Source/Double Branding Endorsement Branding	L1, L2	4

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Text Books

- Croteam, David; Hoynes, William D (2005). The Business of Media. Corporate Media and the Public Interest. SAGE Publications, Inc.
- Albarran, Alan B (2002). Media Economic (Understanding markets, Industries and Concepts). Wiley-Blackwell.
- Kelley Larry D, Jugenheimer Donald W, (2009). Advertising Media Planning: A Brand Management Approach. Phi Learning.
- Jack Z. Sissors, Roger B. Baron, (2010). Advertising Media Planning, Tata Mcgraw Hill Education Private Limited.
- Harsh V Verma (2008). *Brand Management: Text and Cases*, Excel Books.

- Keller, Kevin Lane, Parameswaran and Jacob (1998). *Strategic Brand Management*, Pearson Education.
- S. A. Chunawalla (2004). *Compendium of Brand Management*, Mumbai: Himalaya Publishing House.

Reference Books

- Menon, Arpita; (2010). *Media Planning and Buying*. Tata Mcgraw- Hill Education Private Limited.
- Katz, Helen; (Jun 2010). *The Media Handbook: A Complete Guide to Advertising Media Selection, Planning, Research, and Buying*. Routledge.
- Sissors, Jack Z., Goodrich, William B. (1996). *Media Planning Workbook*, McGraw-Hill Humanities/Social Sciences/Langua.
- Philip Kotler. *Marketing Management*, Pearson Education.
- Magazines- Business World, Time & Brand Reporter.
- Brand Equity- a Wednesday Supplement with Economic Times.

Modes of Evaluation: Class Test/Assignment/End Term Examination/Case Presentation

Examination Scheme:

Components	P	A	CT	EE
Weightage (%)	10	5	15	70

CT: Class Test, EE: End Semester Examination; A: Attendance; P: Project

CO, PO and PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	1	1	--	--	--	--	--	2	2	1	--
CO2	1	3	--	--	--	--	--	--	2	1	--
CO3	2	1	--	--	--	--	--	--	2	1	--
CO4	2	1	--	--	--	--	--	--	2	1	--
CO5	1	3	--	--	--	--	--	2	3	1	--
CO6	1	1	2	--	--	--	--	2	3	1	--

1: Strongly Related, 2: Moderately Related and 3: Weakly Related

JRN4301	MEDIA ARTS- III: FILM	L	T	P	C
Version	2021	2	0	2	3
Pre-requisites/Exposure	Media Arts 2: Radio and TV				
Co-requisites					

Catalogue Description: The finer nuances of cinema will be the core of this subject. Praxis is the method of all various production processes taught. Students will learn how to analyze and critiques various classics so as to understand human communication.

Course Objectives

The objective of this course is to

- Give students the opportunity to be able to interpret the language of filmmaking and its techniques.
- Train students in analyzing documentary films against mainstream commercial film genres.

Course Outcomes:

On completion of this course, the students will be able to

CO1: Analyze cinema as an art form and human communication.

CO2: Interpret Classics and use it as reference to make films in the digital age.

CO3: Identify and critique factors that influence making successful cinema.

CO4: Examine different genres, apply the production methods in making a short film.

Course Contents:

Module	Blooms Level	Number of Hours
Module I: Introduction Language of cinema Shots, camera angles, movements Mise-en-scène Dimensions of Sound: sync and non-sync, sound effects, and silence, dialogues, ambient sound. Narrative Composition: 3 plot structure, Characterization & Dramatic Structure Ideation and Visualization, Screen Play, Storyboarding	L1, L2	10
Module II: Production Overview Three stages of Film Production: Pre-production, Production, Post Production Lighting Art Direction Departments and their role Role and importance of the director Division of roles between creative and technical personnel	L2,L3	10
Module III: Aesthetics of film	L2,L4	8

Sound as a metaphor Importance of silence Misc en scene and interpretations Continuity vs discontinuity Film space and screen space Changing dimensions of pace and rhythm		
Module IV: Learning Outcome/s : Film Genres Narrative and non narrative Fiction: romance, comedy, family drama, suspense thriller Documentary Film and its sub-genres The bollywood masala	L2,L4	8

***Bloom's Level:**

L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Resources:

a) Main text:

- Monaco, J. (1977). *How to read a film*, (New York) Oxford University Press
- Nicholas, B. (1976). *Movies and Methods Volume 1*, (Berkeley) University of California Press
- Nicholas, B. (1985). *Movies and Methods Volume 2*, (Berkeley) University of California Press

b) Additional Texts:

- Rabiger, M., (1987). *Directing the Documentary*, (Burlington) Focal Press
- Bordwell, D.; Thomson, K., (1990). *Film Art: An Introduction* (New York) McGraw Hill
- Denzin, K. N. (1995). *The Cinematic Society*, SAGE Publication.
- Kabir, N.M., (2006). *Guru Dutt: A Life in Cinema*, (New Delhi) OUP

c) Other readings:

- Handout: Sound: Its Nature in Cinema, Arun Khopkar, (FTII)
- Handout: "Genre Cinema", Rick Altman
- Handout: Film History: An outline, Suresh Chabaria (FTII)

Assessment Scheme (more columns may be added for assessment):

Components	Presentation/Short film	Attendance	Quiz/CT	External Evaluation
Weightage (%)	10	5	15	70

CO, PO and PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	-	1	-	-	-	-	-	2	1	-	-
CO2	1	-	-	-	-	-	-	-	1	-	-
CO3	1	-	-	-	-	-	-	2	1	-	-
CO4	-	2	-	-	-	-	1	-	1	-	-

1: Strongly Related, 2: Moderately Related and 3: Weakly Related

JRN4304	MEDIA LAWS & ETHICS	L	T	P	C
Version	2021	2	-	-	2
Pre-requisites/Exposure	Print Journalism – Reporting & Editing Specialized Reporting & Feature Writing				
Co-requisites					

Catalog Description

Today's media is increasingly market driven, and the students in this course will learn about regulations and practices in media houses. The course talks in details about legal implications of news and other issues and laws which rule the everyday lives of newsmen. The course discusses in details various ethical issues.

Course Objectives

The objective of this course is to

- Describe in detail various regulations like Contempt of Court, Right to Information, IPR to the future journalists.
- Explain the importance and relevance of media ethics
- Provide knowledge about the relevant constitutional framework such as freedom of speech and expression

Course Outcomes (COs):

On completion of this course, the students will be able to

CO1: Explain the differences and importance of media laws and ethics.

CO2: Explain in detail relevant laws for reporting.

CO3: Describe codes of conduct for reporting, as given by different regulatory bodies.

CO4: Distinguish between different types of sources.

CO5: Recognize if the news report is legally safe.

Course Contents:

Modules	Blooms level*	Number of hours
MODULE 1: Reporting Defining ethics, truth, fairness & objectivity, sources of information, Case Studies: Aarushi and the Indian Media	L1, L2	5
MODULE II: Constitutional Framework Constitutional Provisions on Freedom of Speech and Expression, Constitutional Restrictions on Freedom of Speech and Expression, Law on Morality, Obscenity and Censorship	L1, L2	6
MODULE III: Media Laws Contempt of Court, Defamation, Right to Privacy, Intellectual Property Rights, Right to Information (Official Secrets Act, 1923, Evidence Act, 1872), Cinematograph Act	L2, L3	11
MODULE IV: Media Ethics Editorial Content & Integrity, Editorial & Advertorial, Meeting Advertisers' Needs, Press Council Guidelines, Broadcast Regulation, Sting Journalism, Case Studies: Uma Khurana Sting Operation, Other Relevant Case Studies	L1, L3	14

*Bloom's Level:

L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis,

L6-Evaluation

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Text Books

- Hakemulder, R. Jan (2010). *Media Ethics & Laws*, Gaziabad: Anmol Publications Pvt Ltd
- Neelamalar, M. (2009). *Media Law and Ethics*, New Delhi: Prentice Hall India Learning Private limited
- Divan, Madhavi G., (2018), *Facets of Media Law*, Delhi: Eastern Book Company
- Thakurta, Paranjay Guha (2015). *Media Ethics: Truth, Fairness and Objectivity*, Delhi: Generic

Reference Books

- Cristians, Clifford G (2016), *Media Ethics: Cases and Moral*, New York: Taylor and Francis
- Ravindran, R K (1999), *Media & Society*, Delhi: Commonwealth Publishers
- Nanda, Vartika (2018), *Media Laws & Ethics: An Introduction to Legal and Ethical Issues in Journalism*, New Delhi: Kanishka Publishers Distributors

Modes of Evaluation: Class Test/Assignment/End Term Examination/Case Presentation

Examination Scheme:

Components	P	A	CT	EE
Weightage (%)	10	5	15	70

CT: Class Test, H: Home Assignment, EE: End Semester Examination; A: Attendance; C: Case Presentation

CO, PO and PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	--	2	2	1	1	--	3	2	3	1	--
CO2	1	2	--	1	3	--	3	2	2	1	3
CO3	2	2	--	1	1	3	--	3	2	1	--
CO4	3	--	3	--	2	--	--	3	2	1	--
CO5	1	2	--	--	3	--	2	2	2	1	2

1: Strongly Related, 2: Moderately Related and 3: Weakly Related

JRN4306	DIGITAL MEDIA PRODUCTION	L	T	P	C
Version	2021	1	0	4	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description:

This course introduces the students to the vast field of digital media production. Not only does it provide an overview of all aspects of production, but it also introduces them to the new formats of digital and mobile media, the apps associated with them and how to produce the best possible videos in the shortest possible time.

Course Objectives:

The primary objectives of this course are to:

1. Introduce students to concepts of pre, production and post-production
2. Cover all aspects of scripting as well as hardware and software related to production
3. Synthesize traditional production methods with new digital formats and optimal use of this new format for seamless audio visual production

Course Outcomes:

On completion of this course, the students will be able to:

- CO1.** Describe all aspects of media production
CO2. Explain various format of animation; stop motion, go-motion, 2D, 3D etc.
CO3. Apply macromedia flash 5 for creating animations
CO4. Use sound editing techniques for producing animations

Course Contents:

Modules	Blooms level*	Number of hours
MODULE 1: Module I: Concept of Graphics and Animation Understanding graphics. Types of Graphics. Understanding animation. Difference between graphics and animation. Conventional aspects of graphics and animation, new forms of animation/recent trends.	L1, L2	8
MODULE 2: Formats Stop Motion and Go animation, different forms of animation, 2D, 3D, Cell, Clay (Making sets), etc. Concept definition and Uses.	L1, L2	6
MODULE 3: Applications of Macromedia Flash Keyframe Onion Skinning Importing BMP and JPG images Multi-layering Importing sound	L2, L3	4
MODULE 4: Fundamentals of Sound editing Types of Sound formats- WAVE, MP3 Mixing of Stereo, Mono and Multi-track sound Mixing the composed sound with the animation	L2, L3	8

*Bloom's Level:

L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Text Books

- Simmons, Ian. Computer dictionary
- Kindem, Gorham. Musburger, Robert B. *Introduction to Media Production: The Path to Digital Media Production*. 4th Edition
- Rich, Jason R. *Ultimate Guide to YouTube for Business*, Kindle Edition.

Reference Books:

- *Making Media: Production, Practices, and Professions*. Amsterdam University Press
- Kindem, Gorham Anders. Musburger, Robert B. *Introduction to Media Production: From Analog to Digital*. Focal Press, 2001

Modes of Evaluation: Practical/Home Assignment/Class Test/Written Examination

Examination Scheme:

Components	P	CT	A	EE
Weightage (%)	10	15	5	70

P: Project, CT: Class Test, EE: End Semester Examination; A: Attendance

CO, PO and PSO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	1	1	1	3	-	-	-	2	1	2	2
CO2	2	1	1	3	-	-	-	2	1	2	2
CO3	1	1	2	3	-	-	-	3	1	2	2
CO4	3	2	1	1	-	-	-	3	1	2	2

1: Strongly Related, 2: Moderately Related and 3: Weakly Related

JRN4307	MASS MEDIA & INDUSTRY	L	T	P	C
Version	2021	2	0	0	2
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

A knowledge of mass media as a corporate enterprise is essential for a complete understanding of mass communication. Today's media is increasingly market driven, and the students will learn about the various branches in the mass media industry and various aspects of the industry such as ownership patterns, legal issues and laws, and organizational structure.

Course Objectives

- To impart knowledge and understanding of the mass media industries.
- To build an awareness of mass media industries and their functioning, so that meaningful media content can be made.

Course Outcomes

On completion of this of this course students will be able to :

CO1: Analyze the complex relationship between mass media organisations the diverse set of individual, social, and professional practices.

CO2: Describe mass media as a system of interrelated forces, including historical foundations, technological advances, economic dynamics, and regulatory constraints.

CO3: Examine concerns related with media & globalization.

Course Contents:

Modules	Blooms Level*	Number of hours
Module I: Media as an industry Journalists becoming managers Ownership patterns in Print Media Ownership patterns in Broadcast Media Organizational structure Fieldtrip to media industries	L1,L2	10
Module II: Contemporary Practices Overview of Indian Media Market Growth of the Indian Print Business: Problems and Prospects Growth of the Television Industry: Problems and Prospects Radio Industry: Growth, Problems and Opportunities Indian Film Industry: Growth and success story, problems and prospects Overview of the Indian Music Industry	L2,L1	12
Module III: Media and Globalization Foreign equity in Indian media The concept of global media Global Media Giants Critical analysis of media globalization	L1,L2	12

*Bloom's Level:

L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Resources:

- Herrick, D.H.,(2012). *Media management in the age of Giants*, University of New Mexico Press
- Khandekar, V.K., (2003). *The Indian Media Business*,(New Delhi), SAGE Publication
- Aggarwal, V.(2001). *Handbook of Journalism and Mass Communication*,(New Delhi)Concept Publishing

Modes of Evaluation: Class Test/Assignment/End Term Examination/Case Presentation**Examination Scheme:**


Components	P	A	CT	EE
Weightage (%)	10	5	15	70

P- Project, C- Case Discussion/Presentation/Analysis, CT- Class Test, A- Attendance, EE- End Semester Exam

CO, PO and PSO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	1	-	-	-	-	-	-	2	-	1	-
CO2	-	-	-	-	1	-	-	-	2	1	-
CO3	-	-	-	-	1	-	-	-	-	1	-
CO4	-	-	-	-	-	-	1	-	-	1	-

1: Strongly Related, 2: Moderately Related and 3: Weakly Related


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JRN4308	COMMUNICATION RESEARCH	L	T	P	C
Version	2021	2	0	2	3
Pre-Requisites/ Exposure					
Co-Requisites					

Catalog Description

This course is designed to introduce students to social research methods in the Communication discipline so that they can read, conduct and analyze empirical research. They will be able to understand and apply different principles and techniques of research methods. They will have a better understanding of research process and its importance in various fields. Students will be able to develop hypothesis related to communication studies and statistically analyze data. The course emphasizes on both quantitative and qualitative research methods.

Course Objectives

The objective of this course is to

- Understand the importance and research and application of different types of research methods.
- Describe various techniques of data collection and data analysis.
- Understand and apply the research report writing methods.
- Describe Media Research Ethics.

Course Outcomes

On completion of this course students will be able to

CO1: Understand and critically analyze research studies.

CO2: Understand and create research design and apply different research methods.

CO3: Explain different methods of data collection and analyze dataset.

CO4: Develop research problem and Hypothesis and apply statistical operations to analyze.

CO5: Write a research report in a systematic format and understand research ethics.

Course Contents:

Modules	Bloom's Level*	Number of hours
Module 1: Introduction to Communication Research Concept and definition of Research; Process of Research; Approaches to research Problem, qualitative and quantitative approach to research, quantitative approach-scientific/ hypothetic-Deductive methods, Experimental Design, Exploring a population; qualitative approach, Ethnography, Phenomenology; Mixed Methodology; Areas of Communication Research; Research Design and its types; Formulation of Research problem; Scope of Communication Research	L1,L2	12
Module 2: Research Methods Types of Research Methods: Census, Case study, Content analysis, Focused Group studies, Survey, Observation, interviews, research tools, schedule, questionnaire; field work; Sampling- Probabilistic sampling and non-probabilistic sampling; Sources and methods of data collection: coding, classification, tabulation, Minimizing errors in recording source data	L1, L2	12

Module 3: Data Analysis Statistical Terms used in Communication Research; Measures of Central Tendency; Importance of averages of statistical analysis; Levels of significance, Content Analysis; Different types of scales used in communication research; Problems in scaling; Readership survey, Television audience measurement and television rating, public opinion poll, pre-election and exit poll	L1,L3	12
Module 4: Research Ethics and Report Writing Code of Ethics; Ethical Principles to be followed by researchers; plagiarism, self-plagiarism, tools to avoid plagiarism and references management; Sequence in report writing; formats of research reports; format of dissertation; Important Media and Communication Research journals	L1,L2	12

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation*

Modes of Evaluation: Class Test/Assignment/End Term Examination/Case Presentation Examination Scheme

Components	H	C	CT	A	EE
Weightage (%)	5	10	10	5	70

CT: Class Test, H: Home Assignment, EE: End Semester Examination; A: Attendance; C: Case Presentation

Text Book

- C R Kothari : Research Methodology: Methods & Techniques Wishwa Prakashan, New Delhi, 1996
- Judith Bell : Doing Your Research Project, Viva Books Private Limited, 1999
- Wimmer Roger D, Dominick Joseph R : Mass Media Research, Thompson, New York, 2004
- Philip Mayer : Precision Journalism : A reporters' introduction to social science methods, Rowman and Littlefield, Lanham, MD, 2005

Reference Books

- Sharon Lorio : Qualitative Research in Journalism : Taking it to the streets, Lawrence Erlbaum, Mahwah: NJ, 2004
- Uma Joshi : Media Research- Cross Sectional Analysis, Authors Press, 2002
- G K Parthasarthy : Electronic Media and Communication Research Methods, Authors Press, New Delhi, 2006

CO, PO and PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	1	2					3	2			3
CO2	1	2			3		2	2		3	3
CO3	1	1						3	1		
CO4	2	3						3	2	3	
CO5	3	2			1			2	2	3	

1: Strongly Related, 2: Moderately Related and 3: Weakly Related

JRN4335	SUMMER INTERNSHIP EVALUATION	L	T	P	C
Version	2021	-	-	-	6
Pre-requisites/Exposure	All courses studied in the previous semesters				
Co-requisites					

Catalog Description

After the second semester, all students of MAJMC are required to undertake an internship which is evaluated in the third semester. While internship introduces the students to the professional world of media, this course aims at providing an opportunity the students to showcase their learnings during internship in a professional manner.

Course Objectives

The objective of this course is to

- Provide an opportunity to the students to discuss their learnings.
- Evaluate the learning experience of the students during internship.
- Enable the students to share the skills acquired during the course of internship.
- Enable the students to understand nuances of formal report writing.

Provide hands on learning experience to the students.

Course Outcomes (COs):

On completion of this course, the students will be able to

CO1: Recognize the expectations of the media industry.

CO2: Assess his/her suitability in his/her desired areas of specialization.

CO3: Have firsthand experience regarding how the media industry functions.

CO4: Explain and understand the latest technology being used in the media industry.

Course Contents:

Modules	Blooms level*	Number of hours
<p>All students of MA J&MC shall be required to undergo a practical training in a media organization for 4-6 weeks after the second semester. The students are required to undergo training in the various areas of the media organization concerned. The work done by the student during the training period shall be submitted in the form of a report in the third semester.</p> <p>The last date of the receipt of the internship report in the department shall be at least 15 working days before the commencement of the end term exams.</p> <p>Guidelines for Internship</p> <p>Duration of Internship: 4-6 Weeks</p> <p>There are certain phases of every intern's professional development that cannot be effectively taught in the academic environment. These facets can only be learned through direct, on-the-job experience working with successful professionals and experts in the field. The internship program can best be described as an attempt to institutionalize efforts to bridge the gap between the professional</p>	L3, L4, L5, L6	No Contact hours

world and the academic institutions. Entire effort in internship is in terms of extending the program of education and evaluation beyond the classroom of a university or an institution. The educational process in the internship course seeks out and focuses attention on many latent attributes, which do not surface in the normal classroom situations. These attributes are intellectual ability, professional judgment and decision making ability, inter-disciplinary approach, skills for data handling, ability in written and oral presentation, sense of responsibility etc.

The primary objectives of internship are:

- To provide an out-of-the classroom training environment for the students and provide opportunities for them to apply the knowledge and skills that they have learnt in real life working environment.
- To enable the students to be exposed to more real life work situations and prepare them for their career.

The students will submit their **Internship Reports** at least 15 working days before the commencement of the end term exams (as per the date decided upon by the HoI in consultation with the Programme Co ordinator). The Internship Report aims to encourage students to keep a personal record of their learning and achievement throughout the training. It can be used as the basis for lifelong learning and for job applications. Items can be drawn from activities completed in the course modules and from the workplace to demonstrate learning and personal development.

The Internship report will assess the student's analytical skills and ability to present supportive evidence, whilst demonstrating understanding of their organization, its needs and their own personal contribution to the organization.

The Internship report submission will be followed by a PowerPoint Presentation on their internship experience as per the date decided by the HoI in consultation with the Programme Co ordinator.

The **layout guidelines** for the Internship File:

- A4 size Paper
- Font: Arial (10 points) or Times New Roman (11 points)
- Line spacing: 1.5
- Top and Bottom margins: 1 inch/2.5 cm; left and right margins: 1.25 inches/ 3 cm

The Internship report should include

1. Title Page
2. Table of Contents
3. Internship Experience Certificate
4. Acknowledgements
5. Main Body
6. Appendices

<p>The Main Body will have different sections/chapters and will include the following items which will be evaluated for the final assessment:-</p> <p>An analysis of the company/stream in which the student has interned Student's expectations from internship Student's work profile/assignments handled during the course of internship A research report that the student has prepared on a project assigned to him/her by the organization (if applicable) Skill set (technical skills & soft skills) learnt during the internship Overall internship experience</p> <p>Guidelines for Evaluation</p> <ul style="list-style-type: none"> • All students are required to undertake internship report writing under the supervision of a teacher and to submit the same following the guidelines stated below. • Language of the report and presentation & viva-voce examination should be English. The internship report must be typed and hard bound. • Failure to submit the report or failure to make the presentation followed by viva-voce examination will be treated as absence in the examination. The student shall submit the report and make a PowerPoint Presentation followed by appear viva voce examination in the subsequent years (within the time period as per University Rules). • No marks will be allotted for the report unless the student appears for the presentation and the viva-voce examination. Similarly, no marks will be allotted for presentation & viva voce examination unless the student submits his/her report. • Evaluation will be done jointly by one internal expert and one external expert with equal weightage, i.e. average marks of the internal and external experts will be allotted to the student. 		
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**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation


Text Books

NA

Reference Books

NA

Modes of Evaluation: Class Test/Assignment/End Term Examination/Case Presentation Examination Scheme (For Dissertation):


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Examination Scheme:

Components	Report	Presentation	Viva Voce	Industry Feedback
Weightage (%)	50	25	20	5

CO, PO and PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	--	3	1	2	2	3	1	2	2	1	2
CO2	--	--	2	2	1	2	1	2	2	1	2
CO3	2	3	2	2	1	2	1	2	2	1	2
CO4	--	1	1	2	--	--	2	--	2	1	3
CO5	2	1	--	--	1	--	1	--	3	1	2

1: Strongly Related, 2: Moderately Related and 3: Weakly Related


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 Registrar
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JRN4402	MEDIA ARTS – IV: CYBER MEDIA	L	T	P	C
Version	2021	2	0	2	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

No aspect of today's world has been able to escape the influence of the World Wide Web. Journalism has also been revolutionized with the inclusion of the Internet for newsgathering and news dissemination. The students are made familiar with online organization, process and strategies as well as Internet tool kits, servers and other aspects of the virtual world. The scope of this subject is too vast to merit a detailed or in depth analysis, so a broad overview of the various issues and aspects related to the subject are discussed. Furthermore, since it is a core subject, we go deep into the subject and provide an empirical knowledge to students about the increasing use of digital and online media in all kinds of media industries today.

Course Objectives

The objective of this course is to

- Impart knowledge of basic concepts of Cyber Media. Difference between media as traditionally understood and the Digital platform.
- Apply knowledge of basic principles related to online media. Some myths that exist about Blogging and Online Reading Platforms to be demystified as well as the difference highlighted.
- Impart knowledge and details about how online media Industry functions and to understand various ways of generating revenue via use of cyber media.

Course Outcomes

On completion of this course, the students will be able to

CO1. Identify and describe various online organization, process and strategies as well as various components of Internet as revenue generation tool kits, servers and other aspects of the virtual world and analyze the difference between traditional and New Media platforms.

CO2. Develop the various formats of writing for cyber media e.g. writing online, blog writing, writing for advertisements and online publishing mediums vis a vis traditional styles of writing also equipping the student with the knowledge of media laws in principles and applications as well.

CO3. Demonstrate hands-on experience as content marketers using journalistic and digital techniques for designing a website with the help of various design patterns, HTML and Dreamweaver.

Course Contents:

Modules	Blooms level*	Number of hours
Module I: (Introduction to Internet) Internet-history and development, WWW, W3C, revenue generation Internet tool kits - server, IP address, URL, ISP, networking, browsers, Search Engine, Domain, Domain name, home page, hyperlinks, etc	L1, L2, L3	10
Module II: (Cyber Journalism) Comparison of Cyber Media with Print, TV, Radio mediums, Online as a publishing medium (main features), Basic rules of online writing, content writing, blog writing, advertising on net, Print &	L1, L2, L4, L5	13

Electronic Media networks are going on the Net, Impact of Web Journalism and reading habits, Web Journalism as a career, Cyber Laws.		
Module III: (Web Designing) Web Design Guidelines, Planning your Website, Design Patterns, Basic HTML, Dream weaver	L1, L3,L5, L6	13

*Bloom's Level:

L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Text Books:

- Briggs Mark (2002). *Journalism 2.0: How to Survive and Thrive*.
- Wardrip Noah Fruin & Montfort Nick (2003). *The New Media Reader*.
- Kumar. Suresh (2005). *Internet Patrakarita*, Delhi, Takshila Publication.
- Ward. Mike (2008). *Journalism Online*.

Reference Books:

- Hahn, Harley (2008). *The Internet Complete Reference*.
- Jaiswal A. & Wiley Dreamtech (2002). *Fundamentals of computer Information technology today*.
- Ronal Dewolk (2000). *Introduction to Online Journalism*, Allyn & Bacon.
- Towers, J. Tarin (2001). *Macromedia Dreamweaver Max advanced*.
- Michael M. Mirabito (2015), *New Communication Technologies: Application*, Barbara.

Examination Scheme:

Components	P	CT	A	EE
Weightage (%)	10	15	5	70

P- Project, C- Case Discussion/Presentation/Analysis, CT- Class Test, A- Attendance, EE- End Semester Examination

CO, PO and PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	1	2	2	1	2	-	-	2	1	2	2
CO2	1	2	1	2	2	-	-	2	1	2	2
CO3	1	2	2	2	1	-	-	2	1	2	2

1: Strongly Related, 2: Moderately Related and 3: Weakly Related

JRN4435	INTERNSHIP	L	T	P	C
Version	2021	-	-	-	6
Pre-requisites/Exposure	All courses studied in the previous semesters				
Co-requisites					

Catalog Description

By the final semester, students have learnt about all the aspects of mass communication. This course aims at providing an opportunity to put this knowledge to use in a professional manner. The course introduces the students to the professional world of media.

Course Objectives

The objective of this course is to

- Provide hands on learning experience to the students.
- Provide a platform to the students to hone their skill sets.
- Provide students a learning experience where they get to work in the media industry and learn the 'tricks of the trade.'
- Provide an out-of-classroom training environment to the students.

Course Outcomes (COs):

On completion of this course, the students will be able to

CO1: Recognize the expectations of the media industry.

CO2: Assess his/her suitability in his/her desired areas of specialization.

CO3: Have firsthand experience regarding how the media industry functions.

CO4: Explain and understand the latest technology being used in the media industry.

Course Contents:

Modules	Blooms level*	Number of hours
<p>All students of MA J&MC shall be required to undergo a practical training in a media organization for 4-6 weeks.</p> <p>The candidate shall be required to undergo training in the various areas of the media organization concerned. The work done by the student during the training period shall be submitted in the form of a report.</p> <p>The last date of the receipt of the internship report in the department shall be at least 15 working days before the commencement of the end term exams.</p> <p>Guidelines for Internship</p> <p>Duration of Internship: 4-6 Weeks</p> <p>There are certain phases of every intern's professional development that cannot be effectively taught in the academic environment. These facets can only be learned through direct, on-the-job experience working with successful professionals and experts in the field. The internship program can best be described as an attempt to institutionalize efforts to bridge the gap between the professional world and the academic institutions. Entire effort in internship is in terms of extending the program of education and evaluation beyond the classroom of a university or an institution. The educational process in the internship course seeks out and focuses attention on many latent</p>	L3, L4, L5, L6	No Contact hours

attributes, which do not surface in the normal classroom situations. These attributes are intellectual ability, professional judgment and decision making ability, inter-disciplinary approach, skills for data handling, ability in written and oral presentation, sense of responsibility etc.

The primary objectives of internship are:

To provide an out-of-the classroom training environment for the students and provide opportunities for them to apply the knowledge and skills that they have learnt in real life working environment.

To enable the students to be exposed to more real life work situations and prepare them for their career.

The students will be at least 15 working days before the commencement of the end term exams (as per the date decided upon by the HoI in consultation with the Programme Co ordinator), the students will submit their **Internship Reports**. The Internship File aims to encourage students to keep a personal record of their learning and achievement throughout the training. It can be used as the basis for lifelong learning and for job applications. Items can be drawn from activities completed in the course modules and from the workplace to demonstrate learning and personal development.

The Internship report will assess the student's analytical skills and ability to present supportive evidence, whilst demonstrating understanding of their organization, its needs and their own personal contribution to the organization.

The Internship report submission will be followed by a PowerPoint Presentation on their internship experience as per the date decided by the HoI in consultation with the Programme Co ordinator.

The **layout guidelines** for the Internship File:

A4 size Paper

Font: Arial (10 points) or Times New Roman (11 points)

Line spacing: 1.5

Top and Bottom margins: 1 inch/2.5 cm; left and right margins: 1.25 inches/ 3 cm

The Internship report should include

Title Page

Table of Contents

Internship Experience Certificate

Acknowledgements

Main Body

Appendices

The **Main Body** will have **different sections/chapters** and will include the following items which will be evaluated for the final assessment:-

An analysis of the company/stream in which the student has interned

Student's expectations from internship

Student's work profile/assignments handled during the course of internship

<p>A research report that the student has prepared on a project assigned to him/her by the organization (if applicable)</p> <p>Skill set (technical skills & soft skills) learnt during the internship</p> <p>Overall internship experience</p> <p>Guidelines for Evaluation</p> <ul style="list-style-type: none"> All students are required to undertake internship report writing under the supervision of a teacher and to submit the same following the guidelines stated below. Language of the report and presentation & viva-voce examination should be English. The internship report must be typed and hard bound. Failure to submit the report or failure to make the presentation followed by viva-voce examination will be treated as absence in the examination. The student shall submit the report and make a PowerPoint Presentation followed by appear viva voce examination in the subsequent years (within the time period as per University Rules). No marks will be allotted for the report unless the student appears for the presentation and the viva-voce examination. Similarly, no marks will be allotted for presentation & viva voce examination unless the student submits his/her report. Evaluation will be done jointly by one internal expert and one external expert with equal weightage, i.e. average marks of the internal and external experts will be allotted to the student. 		
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**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Text Books

NA

Reference Books

NA

Modes of Evaluation: Class Test/Assignment/End Term Examination/Case Presentation

Examination Scheme (For Dissertation):

Examination Scheme:

Components	Report	Presentation	Viva Voce	Industry Feedback
Weightage (%)	50	25	20	5

CO, PO and PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	--	3	1	2	2	3	1	2	2	1	2
CO2	--	--	2	2	1	2	1	2	2	1	2
CO3	2	3	2	2	1	2	1	2	2	1	2
CO4	--	1	1	2	--	--	2	--	2	1	3
CO5	2	1	--	--	1	--	1	--	3	1	2

1: Strongly Related, 2: Moderately Related and 3: Weakly Related

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JRN4437	DISSERTATION/ PROFESSIONAL PROJECT	L	T	P	C
Version	2021	-	-	-	7
Pre-requisites/Exposure	All courses studied in the previous semesters				
Co-requisites					

Catalog Description

By the final semester, students have learnt about all the aspects of mass communication. This course aims at providing an opportunity to put this knowledge to use in a professional manner. The course introduces the students to the professional world of media and research. The course provides an option to the students to either work on a dissertation or undertake a professional project under the supervision of a senior faculty member.

Course Objectives

The objective of this course is to

- Provide hands on learning experience to the students.
- Provide a platform to the students to hone their skill sets.
- Provide students a learning experience where they get to work on either an industry-oriented professional project or a research project and learn the ‘tricks of the trade.’
- Provide an out-of-classroom training environment to the students.

Course Outcomes (COs):

On completion of this course, the students will be able to

CO1: Recognize the expectations of the media industry.

CO2: Assess his/her suitability in his/her desired areas of specialization.

CO3: Have firsthand experience regarding how the media industry functions.

CO4: Explain and understand the latest technology being used in the media industry.

CO5: Describe and apply various steps to be followed for undertaking a professional project.

Course Contents:

Modules	Blooms level*	Number of hours
<p>Every student of MA J&MC shall be required to undertake either a hands on project or a scholarly research under the guidance of an assigned supervisor.</p> <p>Dissertation: The student shall be required to undertake a research based scholarly project under the guidance of a supervisor, who shall be assigned by the institution.</p> <p>The last date of the receipt of the report in the department shall be at least ten working days before the commencement of the end term exams.</p> <p>Guidelines for Dissertation</p> <p>The primary purpose of dissertation is to introduce the final semester students to the processes of scholarly research and writing under the guidance of an assigned supervisor. Through this research experience involved in the process of dissertation, students gain exposure to research methodology and its various tools & techniques. It usually requires the use of advanced concepts with a sound understanding of theoretical underpinnings.</p>	L3, L4, L5, L6	No Contact hours

<p>The primary objectives of dissertation are:</p> <ul style="list-style-type: none">• To enable the students to apply their theoretical and methodological understanding and skills into devising researchable ideas• To design and execute a meaningful research report (dissertation) that demonstrates spatial thinking and uses the knowledge and skills learned during the programme• To enable the students to understand the research process and be aware of research obligations and pitfalls. <p>The layout guidelines for the dissertation are:</p> <ul style="list-style-type: none">• A4 size Paper• Font: Arial (10 points) or Times New Roman (11 points)• Line spacing: Preferably 1.5• Top and Bottom margins: 1 inch/2.5 cm; left and right margins: 1.25 inches/ 3 cm <p>The dissertation should include</p> <p>Cover Page</p> <p>Table of Contents</p> <p>Certificate of originality by the Supervisor</p> <p>Acknowledgements</p> <p>Main Body</p> <p>References</p> <p>Appendices</p> <p>The Main Body will have different sections/chapters and will include the following items which will be evaluated for the final assessment:-</p> <p>Introduction</p> <p style="padding-left: 40px;">Scope of the study</p> <p style="padding-left: 40px;">Conceptual Background</p> <p style="padding-left: 40px;">Research Objectives & Questions</p> <p style="padding-left: 40px;">Hypothesis (wherever applicable)</p> <p style="padding-left: 40px;">Limitations of the study</p> <p>Review of Literature</p> <p>Research Design & Methods</p> <p>Results & Discussion</p> <p>Conclusion</p> <p>References</p> <p>The dissertation should be submitted to the supervisor at least ten working days before the commencement of the end-term exams (as per the date decided upon by the supervisor). The dissertation submission will be followed by a PowerPoint Presentation on their research as per the date decided by the HoI in consultation with the research supervisor.</p> <p>Examination Scheme:</p> <table><tr><td>Dissertation Submission by Student</td><td>50</td></tr><tr><td>Presentation & Viva</td><td>45</td></tr><tr><td>Research Paper Publication</td><td>05</td></tr><tr><td>Total</td><td>100</td></tr></table>	Dissertation Submission by Student	50	Presentation & Viva	45	Research Paper Publication	05	Total	100		
Dissertation Submission by Student	50									
Presentation & Viva	45									
Research Paper Publication	05									
Total	100									

<p>Professional Project: The students opting for professional project can choose amongst the broad categories of television, radio, print, advertising, public relation, development communication, digital media and photography. They will devote time and attention to the chosen specific area and attempt to comprehensively understand it through making projects, presentations, reports, and assignments on the topic. The duration of the project will be 8 weeks and the students will be expected to submit their project to the school through the assigned faculty guide.</p> <p>SPECIALIZATION (ANY ONE)</p> <p><i>RADIO</i></p> <p>Course Objective: Students can do specialization in the different areas of Radio production Viz. Various Formats, News, Talk shows, Spots and commentaries, Radio documentary, Radio features, various music formats- classical, countdown shows, contemporary hit radio, music on demand, oldies, artist spotlights, request and dedication shows etc. Commercials/Jingles/ PSAs</p> <p><i>TELEVISION</i></p> <p>Course Objective: The students can choose a specific area of TV production in which they want to specialize, viz. TV Journalism, Reporting, Anchoring, Editing, Camera, Documentary Film making, Feature Films, Short Film, Ad Film making, Entertainment Based programming etc.</p> <p><i>PRINT</i></p> <p>Course Objective: Students can jointly bring out a journal with each one attending to a specific function of its production like reporting, editing, sub-editing, design and layout, photography and graphics.</p> <p><i>ADVERTISING</i></p> <p>Course Objective: The students will use their understanding of all advertising concepts learnt in the previous semesters to do a practical exercise. Students will act as brand managers of a new brand being launched. They will be required to study the following elements for the product category assigned to them: Market Research to determine the situation analysis Segmenting the market and selecting a segment for their new brand Identifying target audience Positioning their brand. This will involve a detailed study of the positioning of the competitive brands Developing the media strategy, including the communication mix Developing the creative strategy</p>		
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<p>Creative strategy to follow a complete campaign creative presentation. This will include development of TV Commercials, print ads, radio ads and POP material.</p> <p>PUBLIC RELATIONS</p> <p>Course Objective: PR specialization can be undertaken in these different areas Crisis case studies PR in Non- Governmental organizations Cross- cultural PR Internal PR department in corporate situation</p> <p>PHOTOGRAPHY</p> <p>Course Objective: Student can choose any two subjects for Specialization: Photojournalism Travel Photography Portrait Photography Product & Table-top Photography Glamour Photography Wildlife Photography</p> <p>DEVELOPMENT COMMUNICATION</p> <p>The focus of the professional project will be an approach to communication for social change that has people controlling the means and content of the communication process. Any topic that is chosen will be to highlight the utilization of power of communication as a catalyst for social development.</p> <p>1) Students to plan a Communication Design and Implementation strategy for projects that bring about change in society. You could work on any one of the UN sustainable Development Goals towards 2030.</p> <p>Or</p> <p>2) Volunteering your time with a NGO (governmental or private); Intern with CSR department and prepare a report based on a theoretical perspective studied in class or look at the participatory approach that has been adopted for the programmes being implemented.</p> <p>Or</p> <p>3) Make a documentary on an NGO, Community Radio Station, Skill Development center, ASHA workers.</p> <p>DIGITAL MEDIA</p> <p>Students can work on different aspects of digital media such as Cyber Security & E-governance Fake News Creating blogs & vlogs on different online platforms Multimedia Convergence Journalism Analysis of news aggregators Mobile Journalism</p>		
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Examination Scheme:			
a) Duration of summer Project	8 weeks		
b) Total marks for summer project	100 marks		
Break-up of marks			
I) Timely Submission	5 marks		
II) Content			
i) Clarity	25 Marks		
ii) Comprehensiveness	20 marks		
iii) Originality	5 marks		
c) Project Presentation & Viva	45 marks		

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Text Books

NA

Reference Books

NA

Examination Scheme (For Dissertation):

Components	Report	Presentation & Viva	Research Paper Publication
Weightage (%)	50	45	05

Examination Scheme (For Professional Project):

Components	Timely Submission of Report	Content Comprehensiveness	Content Clarity	Content Originality	Presentation & Viva
Weightage (%)	5	20	25	5	45

CO, PO and PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	--	3	1	2	2	3	1	2	2	1	2
CO2	--	--	2	2	1	2	1	2	2	1	2
CO3	2	3	2	2	1	2	1	2	2	1	2
CO4	--	1	1	2	--	--	2	--	2	1	3
CO5	2	1	--	--	1	--	1	--	3	1	2

1: Strongly Related, 2: Moderately Related and 3: Weakly Related

Post Graduate Diploma in Journalism & Mass Communication

FLEXILEARN
-Freedom to design your degree



Programme Structure

Curriculum & Scheme of Examination

2022

AMITY UNIVERSITY HARYANA

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A handwritten signature in blue ink, appearing to read 'Anil'.

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Deputy Dean Academics
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A handwritten signature in blue ink, appearing to read 'manesar'.

Registrar
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JRN3102	PRINT JOURNALISM – REPORTING & EDITING	L	T	P	C
Version	2021	1	1	2	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

This course describes various aspects of print journalism. The course begins with the history of Indian Press. It introduces basics of journalism and news reporting and editing. The aim of this course is to explore various dimensions of print journalism in concept and practice.

Course Objectives

The objective of this course is to

- Provide an overview of the fundamentals of Print Journalism.
- Introduce the students to the most important aspects of print journalism – reporting & editing.
- Describe the growth of Press in India.
- Outline the mechanics of newspaper designing

Course Outcomes (COs):

On completion of this course, the students will be able to

CO1: Outline the history of print journalism in India.

CO2: Describe and apply various concepts of print journalism such as news, news values, style guides, reporting, editing, newspaper designing etc.

CO3: Describe the process of news reporting and editing.

CO4: Apply newspaper layout and design techniques

Course Contents:

Modules	Blooms level*	Number of hours
MODULE 1: History of Press in India Press in pre-independent India, Growth of Press post-independence, Role of English and vernacular press during freedom struggle, Emergence of newspapers, magazines and publication houses, Growth of Indian news agencies	L1, L2	10
MODULE II: Reporting What is journalism, What is News, News Values & Sources of News, Basic Elements of News, Qualities and responsibilities of a reporter, Interviewing skills required for reporting, Types of reporting, Structure of news report, Lead and types of leads, Body text, Newsroom set up, News Agencies	L1, L2, L3, L4	6
MODULE III: Editing Copy Editing, Role and functions of copyeditor, Newsroom, Desk management, Tools of editing, Editing marks and symbols, Editing on line, Rewriting, Headlines and captions, Style guides and importance	L1, L2, L3	6
MODULE IV: Mechanics of Newspaper Layout and Design	L3, L4	8

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Photo editing: Choosing a picture, Creative cropping, Giving captions, Relationship between newspaper content and design, Tools and techniques of layout designing, front page make up, types and typefaces, use of white space in layout designing, importance of dummy		
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*Bloom's Level:

L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Text Books

- Parthasarathy, Rangaswami (2000). *Basic Journalism*, Delhi: McMillan India Ltd.
- Kamath, MV (2009). *The Journalist's Handbook*, Noida: Vikas Publishing House Pvt Ltd
- Dary, David (1973). *How to Write News for Broadcast and Print Media*, New York: Tabb Books.
- Sarkar, N.N. (2008). *Art and Production*, New Delhi: Sagar Publication.

Reference Books

- Melvin Menchor, *Basic News Variety*, Universal Book
- Alder Elizabeth (1991) *Print that Works*, Boulder: Bull Publication, Colorado
- Pabbock, Bruce T., *Graphics for Desktop Publisher*, US: National Text Book
- Julian Harris, Kelly Leiter & Stanley Johnson (eds.) (1992) *The Complete Reporter: Fundamentals of News Gathering, Writing, and Editing*, Boston: Allyn/Bacon

Modes of Evaluation: Class Test/Assignment/End Term Examination/Case Presentation

Examination Scheme:

Components	H	A	CT	EE
Weightage (%)	10	5	15	70

CT: Class Test, H: Home Assignment, EE: End Semester Examination; A: Attendance; C: Case Presentation

CO, PO and PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	2	--	1	1	2	3	--	1	--	3	--
CO2	1	1	2	2	1	2	1	1	2	2	--
CO3	--	2	2	--	2	--	3	1	--	2	--
CO4	2	1	2	1	1	--	2	1	2	2	3
CO5	1	1	2	2	1	2	--	1	2	2	2

1: Strongly Related, 2: Moderately Related and 3: Weakly Related



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JRN3103	MEDIA ARTS- I: RADIO & TV	L	T	P	C
Version	2021	2	0	2	3
Pre-requisites/Exposure	Media Arts I: Radio & TV				
Co-requisites					

Catalog Description

Today broadcasting media is one of the most ruling media in day to day life. TV and Radio plays a very vital role in dissemination of the information and to communicate with the masses not only to cover the national issues but also to go for parachute coverage. This course outline helps students to develop the basic concepts and fundamentals for the broadcasting media not only textual but also hands on practice for the Television as well as Radio.

Course Objectives

The objective of this course is to

- To impart knowledge of basic working of Radio and TV as a medium of mass communication, also to apply knowledge of basic anatomy and working of the Radio and TV in India as well as in global domain .
- To apply knowledge and skills required to know about the different broadcasting instruments in Television and Radio broadcasting Industry.
- To engage in life-long learning and hands on technical expertise in handling the Basics of Camera, Light, Sounds and other equipment's .

Course Outcomes

On completion of this course, the students will be able to

CO1. Describe the different characteristics of Sounds – in film productions for both fiction and Non-fictions.

CO2. Identify and describe various concepts and instruments used for the capturing of Sound in broadcasting media.

CO3. Equipping the students with skills to be able to work on the lighting part- to understand the aesthetical approaches of lighting and different kinds and functions of lighting in the varied environment.

CO4. Students would be able to analyze the different dimensions and applications of editing for making the raw footage to the finished one.

CO5. Demonstrate hands-on experience on anatomy of Video Camera, different kinds of video production equipment and to learn the rules of the compositions.

CO6. Analyze the different approaches and aesthetical approaches in Film making and TV Productions.

Course Contents:

Modules	Blooms level*	Number of hours
MODULE 1: Audio and Sound: The Characteristics The basic attributes: Loudness, Frequency, Intensity, Pitch, Amplitude, and Timbre, Sound Aesthetics- Spatial Hearing, Sound Isolation, Sound perspective (mono and stereo), Importance of speech in broadcast media,	L1, L2	6

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Sound and its functions, Functions of sound in relation to picture, Acoustics and psychoacoustics.		
MODULE 2: Sound and Technical Approaches Types of microphones, Directionality and pick-up patterns, Cardioid, Omnidirectional, supercardioid and hypercardioid, Quadraphonic and surround sound, Construction of mikes- dynamic mics and condenser mics, Positioning of mics- floor stand, hidden mics, camera mics, wireless mics.	L1, L4	6
MODULE 3: Lighting: The Fundamentals Nature, quality, lighting for TV, Colour temperature, Lighting instruments, Three point lighting, Creative additions to lighting for different genres.	L1, L2	6
MODULE 4: Editing techniques Editing; principles and techniques, Continuity and non-continuity editing, Linear and non-linear editing	L1, L2, L3	6
MODULE 5: Anatomy of Video Camera The basic structure of a Video Camera, Working mechanism and basic parts of camera, Types of camera, Camera Mounts.	L1, L3	6
MODULE 6: Broadcast: Rules and Approaches Camera movements & angles, shots, Composition principles, TV as a Medium of close ups, Role of sound / voice over in TV programs, TV as a medium of glamour, immediacy, democratizing, Infotainment.	L1, L2, L5	6

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Resources: (APA Style)

a) Main Text:

- Boyd, A. (1997). Broadcast Journalism: Techniques of Radio and TV news. Boston: Focal Press.
- Belavadi, V. (2013). Video production. New Delhi: Oxford University Press.
- Hakemulder, J. R., Jonge, F. A., & Singh, P. P. (2005). Broadcast Journalism. New Delhi. India: Anmol Publications.
- Millerson, G., & Millerson, G. (1999). Television Production. Oxford: Focal Press. 13th Ed.

b) Additional Texts:

- Trewin, J. (2003). Presenting on TV and Radio: An Insider's Guide. Amsterdam: Elsevier.
- Utz, P. (2006). Today's Video. Jefferson, NC: McFarland.
- Zettl, H. (2005). Television Production Handbook, Cengage Learning.

c) Other readings:

- Chantler, P., & Stewart, P. (2003). Basic Radio Journalism. Amsterdam: Focal Press.
- Chatterji, P. C. (1987). Broadcasting in India. New Delhi: Sage Publications.
- Luthra, H. R. (1986). Indian Broadcasting. New Delhi: Publications Division, Ministry of Information and Broadcasting, Govt. of India.
- McLeish, R. (1999). Radio Production: A manual for broadcasters. Oxford: Focal Press.
- Shrivastava, K. M. (1990). Radio & TV Journalism. Sterling.


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- Sharma, R. (2012). Breakout nations: In pursuit of the next economic miracles. New York: W.W. Norton &.
- Pavarala, V., & Malik, K. K. (2007). Other voices: The Struggle for Community Radio in India. Thousand Oaks, CA: Sage Publications.

Examination Scheme:

Components	P	CT	A	EE
Weightage (%)	10	15	5	70

P- Project, C- Case Discussion/Presentation/Analysis, CT- Class Test, A- Attendance, EE- End Semester Examination

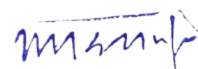
CO, PO and PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	2	2	2	-	1	-	-	1	2	2	3
CO2	2	1	1	2	1	-	-	1	2	2	3
CO3	2	2	2	-	1	-	-	1	2	2	2
CO4	2	2	2	2	1	-	-	1	2	2	2
CO5	2	2	2	-	1	-	-	1	2	2	2
CO6	2	1	2	1	1	-	-	1	2	2	3

1: Strongly Related, 2: Moderately Related and 3: Weakly Related



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JRN3104	ADVERTISING: CONCEPTS AND PRINCIPLES	L	T	P	C
Version	2021	2	1	0	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

The course will focus on basics concepts of advertising, its role & functions. The purpose of this course is to offer cutting-edge thinking on Advertising and explain how advertising works in the real world. The elaborative content will provide strong knowledge base to the students about Advertising and will enhance their critical and creative skills.

Course Objectives

The objective of this course is to:

- Equip the students with advertising environment by understanding, identifying and analyzing important concepts.

Course Outcomes (COs):

On completion of this course, the students will be able to

CO1: Comprehend role and functions of advertising.

CO2: Identify various types of advertising and structure with in advertising agency.

CO3: Analyze role of various department of agency and making of a campaign.

CO4: Comprehend the role of Segmentation, Targeting and position in campaign planning

Course Contents:

Modules	Blooms level*	Number of hours
MODULE 1: Introduction Definition and key concepts of advertising, Advertising Types, Role and Functions	L1, L2	10
MODULE 2: Advertising as a Tool of Marketing The Marketing Planning ,Relationship of Marketing with Advertising ,Situation Analysis to the Marketing Mix, Market Share, Target Segment, Positioning, Developing Advertising from Marketing Objectives	L1, L3	7
MODULE 3: Understanding advertising agencies Advertising Agencies, Types of Advertising Agencies, Advertising agency structure, Functions of various departments, Workflow in An Agency, Pitching , Account Planning, Media Planning, Copy Writing	L1,L2,L4	7
MODULE 4: Segmenting, Targeting and Positioning (STP) strategy Market Segmentation, Markets, market segments and niches, Meeting editorial needs, Basis for segmenting consumer markets, Targeting strategies, Undifferentiated targeting, Differentiating targeting, Niche targeting, Various positioning strategies, Benefit approach, Price – Quality approach, User approach, Product category approach, Competitor approach	L1,L2,L3	11

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**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Text Books

- Jethwaney, J. & Jain, S (2006). *Advertising* (6th Ed). Oxford University Press.
- Chunawalla, Sethia, S. (2015). *Foundation of Advertising* (8th ed., Vol. 1). Himalaya Publications.

Reference Books

- Mohan, M. (2008). *Advertising Management* (2008 ed., Vol. 8th, p. 429). McGraw Hill Education (India) Private Limited.
- Thomas, C., & Guinn, O. (1999). *Advertising* (1st ed., p. 694). South-Western College Pub.
- Wells, Moriarty, Burnett. (2006). *Advertising Principles & Practice* (7 Ed) Pearson Prentice Hall.

Modes of Evaluation: Class Test/Assignment/End Term Examination/Case Presentation

Examination Scheme:

Components	H	C	CT	A	EE
Weightage (%)	5	10	10	5	70

CT: Class Test, H: Home Assignment, EE: End Semester Examination; A: Attendance; C: Case Presentation

CO, PO and PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	1	1	--	--	--	--	--	1	2	--	--
CO2	1	1	--	--	--	--	--	1	2	--	--
CO3	1	1	--	--	--	--	--	1	2	--	--
CO4	1	1	--	--	--	--	--	1	2	--	--

1: Strongly Related, 2: Moderately Related and 3: Weakly Related

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JRN3105	INTRODUCTION TO PHOTOGRAPHY	L	T	P	C
Version	2021	2	0	2	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

Photographs are an effective communication medium and students will explore this immensely artistic as well as highly technical media in this unit. The importance of photographs, techniques and utility of photography and its applications in mass media will be made clear to them. The unit will expose them to the intricacies of developing, printing and enlarging photographs.

Course Objectives

The objective of this course is to

- Learn to shoot with digital cameras maximizing the quality of the output.
- Appreciate more about the "Photographer's Art" through the study of historic and contemporary trends.
- Develop the habit of looking closely at the visible world around you in order to represent it in terms of aesthetics, beauty and truth.

Course Outcomes (COs):

On completion of this course, the students will be able to

CO1. Operate Cameras in Manual Mode, Zone System, Multiple Exposures

CO2. Demonstrate knowledge of Depth of Field Preview, Lens Compression, Avoiding Lens Distortion, Panoramas,

CO3. Demonstrate knowledge of Lighting ; High-Key Lighting, Rule of Visual Weight, Visual Composition Tools, Colour Management, RAW Workflow,

CO4. Operate Advanced Camera Settings, Dust Specks, Noise, Lens Corrections, Chromatic Aberration, Sharpening, Printing.

Course Contents:

Modules	Blooms level*	Number of hours
MODULE 1: Introduction and applications Historical background, stages of development Requirement and utility of photographs Principles of light Working of Photography	L1, L3	10
MODULE 2: Camera & Accessories Various still photography cameras & its types (Including pinhole, view camera, compact camera, T.L.R., S.L.R., digital camera, D-SLRs) Lenses, its type ,Exposure Control in SLRs Aperture ,Shutter ,Films, its types and sizes	L1, L3	6
MODULE 3: Aesthetics of Photography Depth-of-field Composition & its Rules Outdoor & indoor lighting	L1,L3	10
MODULE 4: Photography Practicals Handling of camera, studio lights Practicing outdoor, indoor in B. & W. and Colour Developing, Printing and Enlarging (B. & W.)	L1, L3	10

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Assignments / Portfolio /Presentations		
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*Bloom's Level:

L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Text Books

- Langford Michael. (2013), *Basic Photography*; Burlington: Focal Press
- Corbett Bill. (2002), *A simple guide to 35mm photography*, Sydney:4C Publishing Pty Ltd

Reference Books

- Stephen G. Anchell(2002). *The Darkroom Cookbook*; Burlington: Focal Press
- Naomi Rosenblum. (2008), *A World History of Photography*, New York, Abbeville Press.

Modes of Evaluation: Class Test/Assignment/End Term Examination/Case Presentation

Examination Scheme:

Components	H	C	CT	A	EE
Weightage (%)	5	10	10	5	70

CT: Class Test, H: Home Assignment, EE: End Semester Examination; A: Attendance; C: Case Presentation

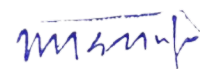
CO, PO and PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	1	1	--	--	--	--	1	1	2	--	--
CO2	1	1	--	--	--	--	1	1	2	--	--
CO3	1	1	--	--	--	--	1	1	2	--	--
CO4	1	1	--	--	--	--	1	1	2	--	--
CO5	1	--	1	1	1	2	1	1	2	2	--

1: Strongly Related, 2: Moderately Related and 3: Weakly Related



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JRN3106	DESIGN SOFTWARE	L	T	P	C
Version 1	2021	2	-	2	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

This unit is designed to initiate the student into the rudiments of design and application of design in all walks of life that we see all around us. The student will learn and imbibe important typographic principles, use of fonts and fontography, use of color, color harmonies and tonal balance. The vitally important role that symmetry, balance, images – both vector as well as bitmaps, play in creating a harmonious and aesthetically appealing composition will all be explained with real world examples of practical design being implemented in advertising and mass communication.

Course Objectives:

The objective of this course is to:

- Enable the students to comprehend principles of design using a blended learning approach
- To familiarize students with all aspects of software, both at the beginner as well as at an intermediate level
- To integrate seamlessly both theoretical as well as practical aspects of design such that the learner is able to instantly identify design principles incorporated in the physical realm, be it print, net, web, film or television.

Course Description

This course covers all aspects of designs from the traditional orthodox straightforward design principles to contemporary design principles and application. Not only are the traditional fields such as print and broadcast design covered but also newer areas like UI/UX and game design also are briefly covered in this course. By and large however, it is meant to teach print design and layout basics through a well interwoven thought out course that embeds practical constructional projects at every stage of theoretical information imparted. Students are taught to think critically and question traditional concepts as well as come up with their own models and ideas.

Course Outcomes:

On completion of this course, the students will be

CO1. Completely proficient with all aspects of at least three print design software, notably Adobe Photoshop, Illustrator and In Design. They will also be conversant with Corel Draw, at a basic level.

CO2. Be able to visualise and conceptualise layouts for Print, Web and Multimedia.

CO3. Be proficient at delivery of design projects, both at a conceptual level and at the execution stage.

CO4. Be able to work in a team delegating different aspects of production to team members and also exchange notes and monitor each others work, so that professional quality work can be outputted and exported.

Course Contents:

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Modules	Blooms level*	Number of hours
MODULE 1: Manual and Computer Aided Design Differences between traditional design, primarily for print as compared to designing for the web, the internet, and for television and film will be compared and contrasted, and how these inherent differences can be optimized for a specific media will be explained and expounded upon. The importance of computer as a design tool as well as the different software currently prevailing in the industry are also highlighted and a broad overview imparted of each software with its distinguishing features	L1, L2	4
MODULE 2: What is Design? Design Elements, Design Principles. How elements and principles helps in design. Where and how these elements and principles are applicable. How do different design elements combine and collaborate together to create an overall 'look' and feel for the published output – be it a web page, a brochure or a billboard hoarding.	L2, L3	6
MODULE 3: Typography History of fonts, Sizes of fonts, Classification of fonts, True Type and Open type. Breakdown of a word into typographical elements and ligatures, designing a custom font from scratch, all form part of this particular module. Each concept that is explained is generously illustrated with practical examples drawn from mixed media	L2, L3	6
MODULE 4: Hardware and Software From more theoretical concepts like Typography and design principles we move to the more practical aspects of implementing design on the ground through use of immersive technologies. Important aspects of hardware, notably the computer and accessories like printers, scanners and other input/output devices are explained. The student is also taken through the gamut of design software that exist that take full advantage of the computer's multitasking and multi-threading capabilities. In this module, only an overview of Digital Publishing software is given. In the next two modules, the most popular design software are explained at length	L2, L3,	6
MODULE 5: Fundamentals of Design Software The Editing of images, selection and cropping, integration of text with graphics, as well as the importance of resolution, image size, pixel depth, and the different sizes for print, web, broadcast and internet mediums such as Youtube are all covered in this module. Also different image file formats such as jpg, png, tiff etc along with transparency and scaling are also explained. From technical definitions we move on to the software itself, covering all basic aspects of industry standard software like Photoshop, Illustrator, Corel Draw and Adobe InDesign	L3, L4	8
MODULE 6: Design Software – Intermediate level This module covers the above software in more detail and depth with overlying emphasis being given to integration of practical projects that employ all the theoretical knowledge imparted. Once a set of topics is taught, application of the same is demonstrated through several practical exercises that are not only structured but also graded in terms of complexity and applicability.	L3,L4	6

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Text Books

- Sarkar, N. M. Art & Print Production. 2013 Ed.
- Krug, Steve. *Don't Make Me Think: A Common Sense Approach to Web Usability*. New Riders Publishing, California. 2nd Edition
- Bauer, Peter. *Adobe Photoshop CC For Dummies*. Wileys. 2nd Edition
- Wood, Brian. *Adobe Illustrator CC Classroom in a Book* (2019 Release), Adobe Press. First Edition. December 2018.

Reference Books:

- Anton, Kelly Kordes. Cruise, John. *Adobe InDesign CC Classroom in a Book* (2017 release). December 2016.
- Norman, Don. *The Design of Everyday Things: Revised and Expanded Edition*. November 2013.

Modes of Evaluation: Practical/Home Assignment/Class Test/Written Examination Examination Scheme:

Components	P	CT	A	EE
Weightage (%)	10	15	5	70

P: Project, CT: Class Test, EE: End Semester Examination; A: Attendance

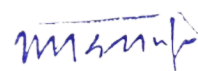
CO, PO and PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	3	2	2	3	..	..	..	1	3	3	2
CO2	1	2	2	3	..	..	..	1	3	3	1
CO3	1	2	1	3	..	..	..	1	3	1	3
CO4	1	1	3	1	2	3	1	1

1: Strongly Related, 2: Moderately Related and 3: Weakly Related



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JRN3201	ADVERTISING PLANNING AND STRATEGY	L	T	P	C
Version	2021	2	1	0	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

This course describes all the nitty-gritty of advertising. It includes steps in developing an advertising plan, consumer behavior, preferences and compulsions. The aim of this course is to explore various creative advertising strategies and ethics involved in advertising.

Course Objectives

The objective of this course is to

- Equip the students with concepts of creative fields and strategies involved in making advertisements.
- Provide an overview of consumer behavior and ethics in advertising.

Course Outcomes (COs):

On completion of this course, the students will be able to

CO1: Identify and develop various steps in advertising plan.

CO2: Describe the decision making process as consumer behaviour and apply to create advertising plan.

CO3: Apply and describe ASCI code of advertising practice and ethics in advertising.

CO4: Classify and apply advertising strategies to create advertisements.

Course Contents:

Modules	Blooms level*	Number of hours
MODULE 1: The Advertising Plan Steps involved in developing an advertising plan Situation analysis, Identify target audience, Determine communication objective, The Creative Plan: Copywriting, The Media Plan: selecting the communication channel, Determining the advertising budget, Deciding on the communication mix, Evaluation	L2, L5	10
MODULE 2: Advertising and Consumer Behaviour The Decision Process: Low-Involvement Decision Process, High-Involvement Decision Process, Stages in the Decision Process	L1, L3	8
MODULE 3: Advertising and Ethics ASCI Code of Advertising Practice, Truth in Advertising, Advertising to Children, Advertising Controversial Products	L1, L3	8
MODULE 4: How Advertising Works Rational to Emotional Approaches, Advertising Strategies: Generic, Pre-emptive, USP, Positioning, Brand Image Approach, Resonance, Affective, Concepts of an Advertising Brief, Study of various elements of a brief and how advertising evolves out of a brief.	L1, L3	10

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**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Text Books

- Jaishri N. Jethwaney (1999). *Advertising*, New Delhi, Phoenix Publishing House Pvt. Ltd.
- Chunawalla, S.A. & Sethia, K.C (2002). *Foundation of Advertising Theory & Practice*, 7th ed., Himalaya Publishing House.
- David Ogilvy (1985). *Ogilvy on Advertising*, 1st ed., New York, Vintage Books: A Division of Random House.
- Rathor, B. S. (2003). *Advertising Management*, 11th ed., New Delhi, Himalaya Publishing House.

Reference Books

- Batra Rajeev, John G Myers & Aaker David A. (1995). *Advertising Management*, 4th ed., New Delhi, Prentice Hall of India.
- Frank Jefkins (2003). *Advertising*, Macmillan India Limited.
- J. Thomas Russell (2008). *Advertising Procedure*, 17th ed., Pearson Prentice Hall
- Lewis Herschell Gordon (1994). *The Complete Advertising and Marketing Handbook*, Chennai, East West Books (Madras) Pvt. Ltd.

Modes of Evaluation: Class Test/Assignment/End Term Examination/Case Presentation
Examination Scheme:

Components	P	A	CT	EE
Weightage (%)	10	5	15	70

CT: Class Test, P: Project, EE: End Semester Examination; A: Attendance.

CO, PO and PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	1	1	1	--	--	--	--	2	1	2	--
CO2	1	--	--	--	--	--	--	2	1	--	--
CO3	1	2	--	--	3	--	--	2	1	2	--
CO4	1	1	1	2	3	--	--	2	1	2	--

1: Strongly Related, 2: Moderately Related and 3: Weakly Related



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JRN3202	PRINT DESIGN AND VISUALISATION	L	T	P	C
Version	2021	2	-	2	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description:

This course prepares the students for a career in the print industry. It comprises of modules that move from theoretical concepts like page sizes, resolutions etc to using software to craft print publications for newspapers and the advertising industry.

Course Objectives:

The primary objectives of this course are to:

- Introduce students to design concepts like layout, use of positive-negative space etc.
- Familiarize them with the juxtaposition of fonts, images and text to create compelling print material for publication
- Teach them how to effectively use software to create advertisements, banners and magazine layouts for printing and publication

Course Description

This course moves seamlessly from the definition and description of layout and design theoretical concepts to the actual realization of these concepts in print. Various concepts and jargon used by the print industry are explained and demonstrated, culminating in the use of software to translate design concepts into visually appealing printed material. Fundamentals of advertising and media campaigns are also an integral part of this course

Course Outcomes:

On completion of this course, the students will be able to:

CO1. Describe various style sheets for print media.

CO2. Comprehend how images, text and fonts interact to create pleasing layouts.

CO3. Use different design software to edit and accomplish print related tasks

CO4. Use design skills and knowledge of software to create one or more professionally designed projects.

Course Contents:

Modules	Blooms level*	Number of hours
MODULE 1: Module I: House Styles What is style sheet? How to create style sheets? Style guide: examples from newspapers, magazines; own guide produced for new publication. Styles: choice of typeface and masthead, choice and use of images and color, positioning of articles and images on the page, use of headlines in an appropriate font, point size, number of lines etc., text manipulation, juxtaposition of text/images/advertising, Typography.	L1, L2	8
MODULE 2: Comparison in newspapers and magazines What is the difference between Newspaper & Magazine layouts? What needs to be taken care when creating layouts for Fashion feature or	L2, L3	6

Business articles or News pages. Which software is to be used - for making layouts, creating vector graphics and raster images? Proper utilization of design elements and principles in layouts.		
MODULE 3: Advertising concepts Corporate Identity: Usage of Types & Fonts, Color schemes, Punch line, Orientation. Corporate Stationary: Logo, Letterhead design, Business Cards, Envelopes, Catalogues, Brochures, Digital Posters, Calendar Design. Communicating through multiple media: Digital and print	L2, L3	6
MODULE 4: Relevant software to design advertisements Advertising campaigns: Developing advertising campaigns from concept to creation, from creative to presentation. Photoshop, PageMaker, Corel Draw, Illustrator and their relevant usage in creating different forms of design for advertisements and campaigns.	L2, L3	8

*Bloom's Level:

L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Text Books

- Sarkar, N.N(2001). *Art and Print Production*. 6th Ed.
- Lupton, Ellen(2015). *Graphic Design: The New Basics*. 2nd Ed.

Reference Books

- Moggridge, Bill(2010). *Designing Media*. The MIT Press.
- Shaoqiang, Wang(2018). *Page Design: Printed Matter and Editorial Design*.

Modes of Evaluation: Practical/Home Assignment/Class Test/Written Examination Examination Scheme:

Components	P	CT	A	EE
Weightage (%)	10	15	5	70

P: Project, CT: Class Test, EE: End Semester Examination; A: Attendance

CO, PO and PSO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	1	1	2	3	-	-	-	2	1	2	3
CO2	3	2	3	3	-	-	-	2	1	2	3
CO3	1	2	1	3	-	-	-	2	1	2	2
CO4	1	3	2	3	-	-	-	2	1	2	2

1: Strongly Related, 2: Moderately Related and 3: Weakly Related

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JRN3203	SPECIALIZED REPORTING AND FEATURE WRITING	L	T	P	C
Version	2021	2	0	2	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

After introducing the basics of newspaper reporting and editing in the first semester, this course describes the issues of specialization in news. The course introduces the concepts of beat reporting and also deals with the subtle differences between reporting on politics, business, sports, crime etc. The course also describes the nuances of investigative reporting with discussion on relevant case studies.

Course Objectives

The objective of this course is to

- Introduce beat reporting and discuss the finer points of specialized writing.
- Explain how reporting is different for various beats like crime, health, education, politics etc.
- Provide knowledge regarding investigative reporting and its tools.
- Provide understanding for different types of journalistic writing.

Course Outcomes (COs):

On completion of this course, the students will be able to

CO1: Describe differences and similarities between different journalistic beats.

CO2: Describe and apply various concepts of beat reporting.

CO3: Explain investigative reporting in depth; especially sting operations.

CO4: Apply conceptual knowledge to write different types of features and reviews.

CO5: Argue if sting journalism is a healthy practice in a democracy.

Course Contents:

Modules	Blooms level*	Number of hours
MODULE 1: Beat Reporting Covering a news beat, coverage of various beats: crime, education, health, civic affairs and local government, political reporting(political structure in India, covering political parties/events/rallies/elections), parliament reporting (parliament structure, reporting on legislature), covering the government (PIB, ministries), legal reporting (Structure in jurisdiction of courts, reporting court hearings, precautions)	L1, L2	12
MODULE II: Business and Sports reporting Basic business knowledge and business bodies, corporate reporting, covering economic policy (Ministry of Commerce, Finance, Industry, Company Affairs, and other infrastructure ministries), stock market coverage, how to develop good sports writing skills, covering local, national internal level events, entertainment and lifestyle reporting	L2, L3	8

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MODULE III: Investigative Reporting Definition and elements, tools of investigative reporting, importance of sources, sting operations and latest trends, relevant case studies: Indian and international	L1, L5	9
MODULE IV: Feature Writing How to write a feature, different types of features, book reviews and film reviews	L3	7

*Bloom's Level:

L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Text Books

- Sharma, Seema (2005) *Journalism: Reporting*, New Delhi: Anmol Publications Pvt. Ltd.
- Fox, Walter (2001) *Writing the News: A Guide for Print Journalists*, New Jersey: Wiley-Blackwell
- Mencher, Melvin (1989) *Basic News Writing*, U.S.A. : William C. Brown Publication
- Rajan, Nalini (2007) *21st Century Journalism in India*, New Delhi : Sage India
- Rick Wilber & Randy Miller (2002) *Modern Media Writing*, Belmont : Wadsworth Publishing Company

Reference Books

- Hough, George A. (1995) *News Writing*, Boston : Houghton Miller
- Fink, Conrad C. (2001) *Sports Writing: The Lively Game*, New Jersey : Wiley- Blackwell
- Keeble, Richard (2001) *The Newspaper Handbook*, Abingdon : Rutledge
- Kamath, MV (2012) *Journalism Reporting*, Noida : Vikas Publication
- Rosenauer, Kenneth L (2004) *Storycrafting: A Process Approach to Writing News*, New Jersey: Wiley Blackwell

Modes of Evaluation: Class Test/Assignment/End Term Examination/Case Presentation

Examination Scheme:

Components	P	A	CT	EE
Weightage (%)	10	5	15	70

CT: Class Test, H: Home Assignment, EE: End Semester Examination; A: Attendance; C: Case Presentation

CO, PO and PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	3	--	3	2	3	--	2	1	2	2	--
CO2	2	1	2	1	2	--	2	1	2	2	2
CO3	3	2	--	2	2	3	--	1	2	2	2
CO4	--	1	2	2	2	2	2	1	2	2	2
CO5	--	--	1	1	1	2	--	1	3	2	--

1: Strongly Related, 2: Moderately Related and 3: Weakly Related



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JRN3204	MEDIA ARTS - II: RADIO & TV	L	T	P	C
Version	2021	2	0	2	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

Various components of television production will be taught through praxis. Students will know about how a television organization operates and the finer nuances of reporting. Students will do on camera interviews and learn how to work in a PCR and studio.

Course Objectives

The objective of this course is to

- Give students the opportunity to study the contemporary conventions and practices in Television and Radio Journalism.
- Identify and examine key principles involved and required in news broadcasting.
- Train the student in basics of news and feature reporting, writing and programming

Course Outcomes

On completion of this course, the students will be able to

CO1. Write scripts in different formats different genres; Radio and Television.

CO2. Describe roles & functions of various TV Newsroom

CO3. Demonstrate qualities of TV Journalist

Course Contents:

Module	Blooms Level	Number of Hours
Module I: Writing For Media Writing styles for Broadcast Medium TV - Writing for visuals, Conversational Writing Terminology Script, screen play, story board, script formats Writing for different formats Radio- Writing for ear Style, Radio scripts for different formats, Jargon and terminology	L1, L3	12
Module II: Introduction to TV Journalism Basic contours and characteristics of TV news journalism. TV news room- hierarchy, role of each element in hierarchy The news process from field reporting to packaging and going on Air Various technical departments Functioning of each department Designations of technical staff Equipments or hardwares for a news channel Utility of each Importance of technical functioning in a news channel	L1,L3	12

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Coordinating with the newsroom Professional terminologies Functioning while working on a live bulletin and recorded programme TV news bulletin; rundown, stacking, blocking		
Module III: Television Reporting: the human angle Qualities and attributes of a broadcast reporter. Essentials during reporting Live reporting and working on a story Different functioning for different beats Interviewing skills The news Anchor- qualities, role and responsibilities.	L2, L3	11

Text Books:

- Page, D. & Crawley, W. (2001). *Satellites over South Asia*, (New Delhi) Sage Publications Ltd.
- Sexena, G. (1996) *Television in India: Changes and Challenges*, (New Delhi) Vikas Publishing
- Monroe, E. & Verhulst, S. (2001). *Broadcasting reforms in India: Media Law from a Global Perspective*, (New Delhi), Oxford University Press

References:

<https://www.youtube.com/watch?v=Xs0K4ApWl4g>
<https://www.youtube.com/watch?v=6lKehR9HENE>
<https://www.youtube.com/watch?v=6PXORQE5-CY>
<https://www.youtube.com/watch?v=p8636YkEhU4>
<https://www.youtube.com/watch?v=Yaj2PXRswxI>
https://www.youtube.com/watch?v=vtU_N57MZf8
<https://www.youtube.com/watch?v=W8PBRBIW50I>

Other readings:

- Handout: Television:

Web Resources: (IF ANY)

- <http://www.bbc.co.uk/radio4/factual/indiasroute66.shtml>
- <http://www.radiomirchi.com/>
- <http://www.aljazeera.com/>

Modes of Evaluation: Class Test/Assignment/End Term Examination/Case Presentation

Examination Scheme:

Components	P	C	CT	A	EE
Weightage (%)	5	10	10	5	70

P- Project, C- Case Discussion/Presentation/Analysis, CT- Class Test, A- Attendance, EE- End Semester Exam


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CO, PO and PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	1	-	-	-	-	-	-	1	2	-	-
CO2	-	1	-	-	-	-	-	1	-	2	-
CO3	-	-	-	1	-	-	1	1	2	-	-
CO4	-	-	-	1	-	-	1	1	-	-	-

1: Strongly Related, 2: Moderately Related and 3: Weakly Related



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JRN3206	PUBLIC RELATIONS AND CORPORATE COMMUNICATION	L	T	P	C
Version	2021	2	1	0	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

This course is designed to help students understand the concepts of public relations (PR) and corporate communication practices. The students will understand the PR relations scenario and significance in India both in public and private organizations. They will get to analyze about different techniques of effective PR practices, producing and disseminating press material and releases. They will also explore how PR techniques are applicable in corporate communication for successful products and media management.

Course Objectives

The objectives of this course are to:

- Define and analyse PR and its concept
- Apply PR applications in different fields (political, social and public).
- Explain PR campaigns its planning, organizing and evaluation.
- Explain corporate communication and its relationship with PR strategies.

Course Outcomes (COs):

On completion of this course, the students will be able to

CO1: Define and classify various concepts of Public Relation and distinguish its need for effective employee & community relations.

CO2: Describe and apply various aspects of planning a PR campaigns, targeting audience and managing media utilizing research as an effective tool.

CO3: Apply PR tools such as Press releases, Backgrounders, catalogues, Brochures, Journals, annual reports, writing company profile newsletter and organizing Press conferences. Assessing its relation with Socio –Economic development, Journalism, Advertising, associated organizations such as PRSI and laws and ethics.

CO4: Identify Corporate Communication: its philosophy, culture, corporate identity, citizenship and Philanthropy, Image management, direct marketing, network marketing, issue management and Celebrity endorsement.

CO5: Apply tools of designing for corporate communication

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Modules	Blooms level*	Number of hours
MODULE 1: Public Relations Basics of Public Relations: Evolution and History of PR Definitions and Concepts: PR definition and PR w.r.t allied disciplines Political and financial PR, PR as management function. Role and Objectives of PR (need of PR for effective employee & community relations) Publics in public relations: Internal and External PR, targeting the correct public. Public Relations in India and other developing countries. Globalisation & PR: Changing trends in PR	L1, L2	8
MODULE 2: Public Relations and Media Affairs Planning Process in PR: Research –Brief Intro of qualitative and Quantitative research methods and Media Planning, Implementation and Evaluation of Campaign and techniques, program budget & assessing results Event and Crisis management Media Relations (Understanding the Media, Media events and facility visit, principles of good media relations)	L1, L3	7
MODULE 3: PR tools Press releases, Backgrounders, catalogues, Brochures, Journals, annual reports, writing company profile, Newsletter (types & contents) Making press kit, organizing press conference (Role & importance, press reception and conference organization) Public Relations & Socio –Economic development Public Relations in Journalism and Advertising Public Relations Laws and Ethics PRSI, origin, Objectives and Achievements	L1,L2, L3,L6	7
MODULE 4: Corporate Communication PR vs Corporate Communication Introduction, its need, importance and functions Elements of corporate communication: corporate philosophy, culture, corporate identity, citizenship and philanthropy Important concepts in corporate communication: Image management, direct marketing, network marketing, Issue management, Celebrity endorsement	L1,L2	7
MODULE 5: Tools of Corporate Communication Desktop Publishing (DTP) Corporate Communication through websites, designing of website Annual Reports: Budget, timing and general concepts of the annual report, essentials of designing a report Types of leaflets, formal and informal invitations, Designing of leaflets, invitations Blogs, Pod casting, chat rooms, social networking sites and current TV: Impact of citizen journalism and “Transparency” on Corporate communications practice	L1, L3,L5,L6	7

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation*

Text Books

- Gregory Anne (1999). Planning and Managing a Public Relations campaign: A step by step guides. The institute of Public Relations: London. Kogan.
- Cutli M Scott and Centre H Centre (1990). Effective Public Relations. (1990). Prentice Hall.

Reference Books

- Sahai Baldev (2002). Public Relations a Scientific Approach. Scope Publication: New Delhi.
- Mehta S D (2006) Handbook of Public Relation in India. Allied Publisher: New Delhi.
- Kaul J N (1998). Public Relations in India. Nyay Prakashan: Calcutta.

Modes of Evaluation: Class Test/Assignment/End Term Examination/Case Presentation

Examination Scheme:

Components	P	CT	A	EE
Weightage (%)	10	15	5	70

P: Practical, CT: Class Test, H: Home Assignment, EE: End Semester Examination; A: Attendance

CO, PO and PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	1	2	3	2	1	-	-	1	2	2	-
CO2	1	1	1	1	1	-	-	1	2	2	-
CO3	1	2	2	2	1	-	-	1	2	2	-
CO4	1	2	1	1	1	-	-	1	2	2	-
CO5	1	2	2	2	1	-	-	1	2	2	-

1: Strongly Related, 2: Moderately Related and 3: Weakly Related



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JRN3207	ADVANCED PHOTOGRAPHY	L	T	P	C
Version	2021	2	0	2	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

This course describes how to develop a unique photographic vision using a combination of aesthetics and technology. Using both practical's and theoretical teaching methods and blending traditional processes with current digital technologies, the photographic curriculum provides aspiring photographers with the breadth of experience and knowledge required to succeed in today's market place

Course Objectives

After Being exposed to the basics of photography in the first semester, the students will be eager to try their hands in the comparatively new area of digital photography and imaging. They will be able to start maintaining their portfolios and will be required to make digital presentations and undertake practical assignments.

Course Outcomes (COs):

On completion of this course, the students will be able to

CO1: Demonstrate Lighting essentials for creating incredible images, their importance and purpose of the main light in Photography.

CO2: Analyse aesthetics for various genres of photography.

CO3: Describe concepts of digital photography and imaging.

CO4: Apply techniques of Photo manipulation.

CO5: Produce portfolio in the genre of their choice.

Course Contents:

Modules	Blooms level*	Number of hours
Module I: Advanced lighting and Composition Lighting and its control (source, Contents & Direction of light) Electronic Flash & Its synchronization One, Two- & Three-Point Lighting Working on the subject (Changing proximity, varying angle, tightly framing subjects)	L1,L2	8
Module II: Aesthetics Variations for various beats Portrait Wildlife, Nature and Landscapes Night Photography	L1,L2,L4	6

Journalism (Photography for newspapers and magazines)		
Module III: Understanding Digital Photography Digital Imaging Construction (Size, Resolution of Digital Images) Uses, Advantages and Limitations of Digital over conventional Photography image sensors (CCD and CMOS) Formats of a Digital Image Types of Digital Cameras	L1,L2	6
Module IV: Digital Image and Manipulation Problems with Digital Photographs Commonly used image editors Editing images with Adobe Photoshop and Photoshop Elements Printing and sharing Digital Images	L1,L2,L3	6
Module V: Advanced Photography Practical's Practicing outdoor Photography Photography Assignment and Projects Developing personal Digital Portfolio Digital Image Manipulation using various computer software	L1,L3	6

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Text Books

- Langford Michael. (2013), *Basic Photography*; Burlington: Focal Press
- Corbett Bill. (2002), *A simple guide to 35mm photography*, Sydney:4C Publishing Pty Ltd

Reference Books

- Stephen G. Anchell, *The Darkroom Cookbook*; Burlington: Focal Press
- Naomi Rosenblum. (2008), *A World History of Photography*, New York, Abbeville Press.

Modes of Evaluation: Class Test/Assignment/End Term Examination/Case Presentation Examination Scheme:

Components	P	A	CT	EE
Weightage (%)	10	A	15	70

CT: Class Test, EE: End Semester Examination; A: Attendance; P: Practicals

CO, PO and PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	--	2	--	--	--	--	--	1	2	2	2
CO2	--	2	--	--	--	--	--	1	2	2	2
CO3	--	2	--	--	--	--	--	1	2	2	2
CO4	--	2	--	--	--	--	--	1	--	2	2
CO5	--	--	--	--	--	--	1	1	2	2	2

1: Strongly Related, 2: Moderately Related and 3: Weakly Related

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JRN3209	MEDIA PLANNING AND BRAND MANAGEMENT	L	T	P	C
Version	2021	2	1	0	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

This course comes under a management domain which describes various concepts of media planning and brand management. It includes marketing and negotiation skills and concepts of selection of media mix and substantial marketing and branding research etc. The aim of the course is to explore various creative fields involved in the placement of advertisements and branding strategies and brand positioning decisions involved in managing a brand in the market.

Course Objectives

The objective of this course is to

- Equip the students with concepts of creative fields involved in media planning and buying for advertisements.
- Provide an overview of the process of selecting and buying of media mix for the placement of advertisements.
- Equip the students with the creative branding strategies involved in launching, building and sustaining brands.
- Provide an overview of brand positioning and marketing of brands.

Course Outcomes (COs):

On completion of this course, the students will be able to

CO1: Describe media planning and select the media mix.

CO2: Describe and distinguish various media forms.

CO3: Select and apply research data to develop media strategy process.

CO4: Identify and explain media buying and complexities in media buying.

CO5: Define and describe various basic concepts related to brands.

CO6: Describe and classify various branding strategies.

Course Contents:

Modules	Blooms level*	Number of hours
PART-I MODULE 1: Media Planning Planning is the strategic formulation of activities design to carry out the goals or objectives of the advertising program. The Planner decisions are directed by a series of questions: Whom is the campaign directed to Where will the campaign directed to When will the campaign run	L1, L2	10

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What degree of target coverage and repetition of exposure are necessary Integrating science with creativity in advertising Role of media in the Marketing Framework Media Planning Framework Developing Media Strategy- the media mix, Factors influencing media strategy decision Media availability & economics		
MODULE 2: Overview Media types characteristic of major media forms Electronic Media- The global goose Outdoor Advertising- They do not circulate market circulate around them Transit Advertising Internet- new born medium for the millennium	L1, L2	3
MODULE 3: Matching Media & Market Geographical Selectivity, Reach & Frequency Maximizing Advertising Exposure Media Briefing Media Scheduling What patterns of exposure works best Timing the effective exposure and finding time opportunities to communicate and Media Budget	L1, L3	4
MODULE 4: Selecting and Buying Acceptable Media Media Buying Functions New Media Increasing Complexity in Media Buying	L1, L2	3
PART-II MODULE 5: Brand Management Evolution of Brands Brand & Products Brand Perspectives Brand Differentiation Brand Positioning Brand Image Brand Equity Brand Extension	L1, L2	12
MODULE 6: Branding Strategies Closing Branding Strategies Product Branding, Line Branding, Range Branding, Umbrella Branding, Source/Double Branding Endorsement Branding	L1, L2	4

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation



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Text Books

- Croteam, David; Hoynes, William D (2005). The Business of Media. Corporate Media and the Public Interest. SAGE Publications, Inc.
- Albarran, Alan B (2002). Media Economic (Understanding markets, Industries and Concepts). Wiley-Blackwell.
- Kelley Larry D, Jugenheimer Donald W, (2009). Advertising Media Planning: A Brand Management Approach. Phi Learning.
- Jack Z. Sissors, Roger B. Baron, (2010). Advertising Media Planning, Tata Mcgraw Hill Education Private Limited.
- Harsh V Verma (2008). *Brand Management: Text and Cases*, Excel Books.
- Keller, Kevin Lane, Parameswaran and Jacob (1998). *Strategic Brand Management*, Pearson Education.
- S. A. Chunawalla (2004). *Compendium of Brand Management*, Mumbai: Himalaya Publishing House.

Reference Books

- Menon, Arpita; (2010). *Media Planning and Buying*. Tata Mcgraw- Hill Education Private Limited.
- Katz, Helen; (Jun 2010). *The Media Handbook: A Complete Guide to Advertising Media Selection, Planning, Research, and Buying*. Routledge.
- Sissors, Jack Z., Goodrich, William B. (1996). *Media Planning Workbook*, McGraw-Hill Humanities/Social Sciences/Langua.
- Philip Kotler. Marketing Management, Pearson Education.
- Magazines- Business World, Time & Brand Reporter.
- Brand Equity- a Wednesday Supplement with Economic Times.

Modes of Evaluation: Class Test/Assignment/End Term Examination/Case Presentation

Examination Scheme:

Components	P	A	CT	EE
Weightage (%)	10	5	15	70

CT: Class Test, EE: End Semester Examination; A: Attendance; P: Project

CO, PO and PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	1	1	--	--	--	--	--	2	2	1	--
CO2	1	3	--	--	--	--	--	--	2	1	--
CO3	2	1	--	--	--	--	--	--	2	1	--
CO4	2	1	--	--	--	--	--	--	2	1	--
CO5	1	3	--	--	--	--	--	2	3	1	--
CO6	1	1	2	--	--	--	--	2	3	1	--

1: Strongly Related, 2: Moderately Related and 3: Weakly Related

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JRN3232	PROJECT	L	T	P	C
Version	2021	-	-	-	2
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

The objective of the course is to develop a critical and analytical eye when it comes to understanding issues/trends related to media. It aims at providing a platform to the students to interrogate and review various media concepts. The course helps in giving hands-on training to the students.

Course Objectives

The objective of this course is to

1. Provide hands on learning experience to the students.
2. Provide a platform to the students to hone their skill sets.
3. Provide students a learning experience in an out-of-classroom training environment.
4. Enable the students to understand the research process and be aware of research obligations and pitfalls.

Course Outcomes (COs):

On completion of this course, the students will be able to

CO1: Recognize the expectations of the media industry.

CO2: Assess his/her suitability in his/her desired areas of specialization.

CO3: Describe how the media industry functions.

CO4: Describe and apply various steps to be followed for undertaking scholarly projects.

Course Contents:

Modules	Blooms level*	Number of hours
Every student of PGD J&MC shall be required to undertake an industry/research based project in the second semester. The student will work under the guidance of a faculty guide who shall be assigned by the HoI. The student may choose to undertake a project in any of the major media streams such as print, electronic media, advertising, photography etc. In case the student undertakes a live project, he/she shall submit a portfolio instead of the project report. The work done by the student shall be submitted in the form of a report. SPECIALIZATION (ANY ONE) RADIO Course Objective: Students can do specialization in the different areas of Radio production Viz. Various Formats, News, Talk shows,	L2, L3, L4, L5, L6	No Contact Hours

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<p>Spots and commentaries, Radio documentary, Radio features, various music formats- classical, countdown shows, contemporary hit radio, music on demand, oldies, artist spotlights, request and dedication shows etc. Commercials/Jingles/ PSAs</p> <p>TELEVISION</p> <p>Course Objective: The students can choose a specific area of TV production in which they want to specialize, viz. TV Journalism, Reporting, Anchoring, Editing, Camera, Documentary Film making, Feature Films, Short Film, Ad Film making, Entertainment Based programming etc.</p> <p>PRINT</p> <p>Course Objective: Students can jointly bring out a journal with each one attending to a specific function of its production like reporting, editing, sub-editing, design and layout, photography and graphics.</p> <p>ADVERTISING</p> <p>Course Objective: The students will use their understanding of all advertising concepts learnt in the previous semesters to do a practical exercise. Students will act as brand managers of a new brand being launched. They will be required to study the following elements for the product category assigned to them: Market Research to determine the situation analysis Segmenting the market and selecting a segment for their new brand Identifying target audience Positioning their brand. This will involve a detailed study of the positioning of the competitive brands Developing the media strategy, including the communication mix Developing the creative strategy Creative strategy to follow a complete campaign creative presentation. This will include development of TV Commercials, print ads, radio ads and POP material.</p> <p>PUBLIC RELATIONS</p> <p>Course Objective: PR specialization can be undertaken in these different areas Crisis case studies PR in Non- Governmental organizations Cross- cultural PR Internal PR department in corporate situation</p>		
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PHOTOGRAPHY	
Course Objective: Student can choose any two subjects for Specialization: Photojournalism Travel Photography Portrait Photography Product & Table-top Photography Glamour Photography Wildlife Photography	
Students have to get themselves registered with the faculty concerned and take up project work in a systematic manner, planning, exposing in colour as well as in B & W, processing, contact sheet, enlargements and presentation in a portfolio.	
These projects have a direct bearing on the career prospects of students as well as the image of the Photography Department of ASCO, therefore, the decision of faculty in every stage of assignment would be considered final and binding.	
Examination Scheme:	
Duration of summer Project -	8 weeks
Total marks for summer project -	100 marks
Break-up of marks	
Timely Submission	5 marks
Content	
i) Clarity	25 marks
ii) Comprehensiveness	20 marks
iii) Originality	5 marks
c) Project Presentation	45 marks

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Text Books

NA

Reference Books

NA

Modes of Evaluation: Class Test/Assignment/End Term Examination/Case Presentation

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Examination Scheme:

Components	Project Report/Portfolio	Presentation & Viva
Weightage (%)	75	25

CT: Class Test, H: Home Assignment, EE: End Semester Examination; A: Attendance; C: Case Presentation

CO, PO and PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	2	--	2	2	2	--	2	3	2	1	3
CO2	--	3	2	2	2	2	3	--	2	1	2
CO3	--	2	2	2	2	2	3	3	2	1	2
CO4	2	2	3	--	2	--	2	--	3	1	2

1: Strongly Related, 2: Moderately Related and 3: Weakly Related



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Bachelor of Arts French (Honors)

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Curriculum & Scheme of Examination

2022

AMITY UNIVERSITY HARYANA

GURUGRAM

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Compétences Langagières à l'écrit - I – Written expression - I

Course Code: FRE2101

Course Credits: 04

Course Objective:

To furnish the linguistic tools

- to present oneself and others, to ask and give personal information
- to give directions, to describe one's surrounding
- to talk about likes and dislikes, hobbies
- to tell time and date, to talk about daily routine
- to describe weather
- to take about events in past, to talk about one's experiences

Course Contents:

Unité 1 : Parlez-vous français ?

Actes de Communication :

Saluer, se présenter, communiquer en classe, épeler, différencier le tutoiement du vouvoiement, consulter le dictionnaire, appliquer des stratégies de lecture.

Unité 2 : Elle s'appelle Laura

Actes de Communication :

Se présenter ou présenter quelqu'un, demander et donner des renseignements personnels, exprimer des objectifs, compter, se renseigner sur la nationalité.

Unité 3 : Mon quartier est un monde

Actes de Communication :

Localiser, décrire et qualifier une ville ou un quartier, exprimer la quantité.

Unité 4 : Tes amis sont mes amis

Actes de Communication :

Parler de ses goûts, de ses intérêts et de ses loisirs, parler de la première impression produite [par quelqu'un et de son caractère, parler de son entourage.

Unité 5 : Jour après jour

Actes de Communication :

Parler de nos habitudes, exprimer l'heure, informer sur l'heure, le moment, la fréquence ; parler de séquences d'actions.

Unité 6 : On fait les boutiques

Actes de Communication :

S'informer sur un produit, acheter et vendre un produit, donner son avis sur la façon de s'habiller, parler du temps qu'il fait.

Unité 7 : Et comme dessert ?

Actes de Communication :

Donner et demander des informations sur des plats et des aliments, commander et prendre la commande dans un restaurant, exprimer la quantité, situer une action dans le futur.

Unité 8 : Je sais bricoler

Actes de Communication :

Parler de faits passés, parler de nos expériences et de ce que nous savons faire.

Grammaire :

1. Le genre des noms
2. Les articles indéfinis, définis, partitifs
3. Les verbes – être, avoir, aller, faire, vivre, sortir, prendre, en –er au présent, les verbes pronominaux

4. Les adjectifs possessifs, qualificatifs, interrogatifs, démonstratifs
5. L'interrogation, Les quantificatifs
6. Les prépositions de lieu, La négation
7. Les adjectifs de nationalité et de couleur – le nombre et le genre
8. Les pronoms COD
9. Le futur proche : aller + infinitif
10. Le passé composé et les marqueurs temporels du passé

Examination Scheme:

Components	CT	Home Assign	Att.	EE
Weightage (%)	20	5	5	70

Text & References:

Text:

Le livre à suivre:

M. Denyer, A. Garmendia, C. Royer, Marie-Laure Lions-Olivieri, Version Originale 1 (A1)
Livre de l'élève. Paris: Maison des Langues, 2009.

M. Denyer, A. Garmendia, C. Royer, Marie-Laure Lions-Olivieri, Version Originale 1 (A1)
Cahier d'exercices. Paris: Maison des Langues, 2009.

Références :

- Girardeau, Bruno et Nelly Mous. Réussir le DELF A1. Paris: Didier, 2010.

Compétences Langagières à l'Oral I - Oral expression I

Course Code: FRE2102

Course Credits: 04

Course Objective: To provide the students with the know-how

- To understand the French phonetic system
- To develop strategies of listening comprehension
- To pass from written to oral, from oral to written easily
- To be sensitized to nuances of speech, dialectical variations, and “registre de langage”
- To overcome the fear of speaking a foreign language and take position as a foreigner speaking French

Course Content:

Listening exercises and speaking tasks (imagining dialogues, role plays, telephone conversations) of:

- M. Denyer, A. Garmendia, C. Royer, Marie-Laure Lions-Olivieri, Version Originale 1 (A1) Livre de l'élève. Paris: Maison des Langues, 2009.
- Corbeau, Sophie., et al. hôtellerie-restauration.com. Paris: CLE International, 2006. Print.

Examination Scheme:


Components	CT	Att.	H	EE
Weightage (%)	20	5	5	70

Texts& References:

- M. Denyer, A. Garmendia, C. Royer, Marie-Laure Lions-Olivieri, Version Originale 1 (A1) Livre de l'élève. Paris: Maison des Langues, 2009. Print.
- Corbeau, Sophie., et al. hôtellerie-restauration.com. Paris: CLE International, 2006. Print.



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Practical Phonetics – I

Course Code: FRE2104

Credit Units: 02

Course Objective:

- To introduce the students to the sounds found in French language.
- To make them able to combine those sounds and pronounce them.
- To introduce and perfect them to the use of liaison in French language.

Module 1

- Les sons isolés du système phonique: Les voyelles, les Consonnes, les semi-consonnes.
- Les sons dans la chaîne parlée: facteurs d'accents linguistiques et phonétiques
- Les lettres non prononcées, les sons spécifiques du français
- La chaîne des mots et la continuité

Module 2

- Le rythme
 - Plusieurs mots ou un seul mot
 - Les groupes rythmiques
 - La dernière syllabe du groupe et plus longue
 - Les syllabes des groupes sont régulières
 - Les syllabes sont toutes régulières
 - Plusieurs groupes rythmiques
 - Synthèse rythmique
- La musique et l'intonation
 - La montée de la voix dans la question
 - La descente de la voix à la fin des phrases
 - La montée de la voix quand la phrase n'est pas finie
 - Synthèse rythmique et mélodique

Examination Scheme:

Components	CT	Att.	H	EE
Weightage (%)	20	5	5	70

Text and References:

Les livres à consulter:

Charliac, Lucile et al., *Phonétique Progressive du Français* – niveau débutant, Clé Internationale, Paris, 2003.

Compétences Langagières à l'écrit - II – Written expression - II

Course Code: FRE2201

Course Credits: 05

Course Objective:

To furnish the linguistic tools

- to express one's point of view, difficulties, emotions, motivation, preferences etc.
- to describe lodgings, objects
- to talk about or narrate events in past and future,
- to talk about health, express pain and symptoms
- to ask and to give advices, to give instructions
- to compare objects and people, to describe daily activities

Course Contents:

Unité 1 : J'adore le français !

Actes de Communication :

Parler de sa relation avec les langues, exprimer son point de vue (1), exprimer des difficultés et des émotions, parler de faits passés, exprimer une motivation

Unité 2 : Faites comme chez vous !

Actes de Communication :

Décrire un logement et des objets, localiser, faire des comparaisons, exprimer des préférences, nommez ses activités quotidiennes

Unité 3 : Bien dans sa peau

Actes de Communication :

Parler de sa santé, décrire des douleurs et des symptômes, demander et donner des conseils, donner des instructions, exprimer son point de vue (2)

Unité 4 : En ce temps-là...

Actes de Communication :

Situer dans le passé, décrire des situations du passé et du présent

Unité 5 : L'histoire, les histoires

Actes de Communication :

Poser des questions sur un parcours de vie, décrire et rapporter des faits et des situations du passé, raconter des anecdotes, situer des événements dans le passé, demander des informations

Unité 6 : Qui vivra verra

Actes de Communication :

Faire des prévisions, parler de l'avenir, parler de condition et de conséquences, exprimer différents degrés de certitude, parler du temps.

Grammaire :

1. le passé composé et l'imparfait
2. les prépositions de lieu
3. Les pronoms COD, y, relatifs (**qui, que, ou**), le pronom personnel **on**
4. la comparaison de l'adjectif et de l'adverbe (plus, moins, aussi, autant que...)
5. L'impératif, la forme et la place des pronoms réfléchis à l'impératif
6. Le futur proche et les marqueurs temporels du futur
7. Les adjectifs et les pronoms indéfinis
8. Les adjectifs qualificatifs et leur place
9. La subordonnée temporelle avec **quand**

10. Devoir (au conditionnel), Etre en train de + infinitif

Examination Scheme:

Components	CT	Home Assign	Att.	EE
Weightage (%)	20	5	5	70

Text & References:

Text:

Le livre à suivre:

M. Denyer, A. Garmendia, C. Royer, Marie-Laure Lions-Olivieri, Version Originale 2 (A2) Livre de l'élève. Paris: Maison des Langues, 2009.

M. Denyer, A. Garmendia, C. Royer, Marie-Laure Lions-Olivieri, Version Originale 2 (A2) Cahier d'exercices. Paris: Maison des Langues, 2009.

Références :

· Girardeau, Bruno et Nelly Mous. Réussir le DELF A2. Paris: Didier, 2010.

Compétences Langagières à l'Oral II - Oral expression II

Course Code: FRE2202

Course Credits: 05

Course Objective: To provide the students with the know-how

- To understand the French phonetic system
- To develop strategies of listening comprehension
- To pass from written to oral, from oral to written easily
- To be sensitized to nuances of speech, dialectical variations, and “registre de langage”
- To overcome the fear of speaking a foreign language and take position as a foreigner speaking French

Course Content:

Listening exercises and speaking tasks (imagining dialogues, role plays, telephone conversations) of:

- M. Denyer, A. Garmendia, C. Royer, Marie-Laure Lions-Olivieri, Version Originale 2 (A2) Livre de l'élève, Paris: Maison des Langues, 2009.
- Corbeau, Sophie., et al. tourisme.com. Paris: CLE International, 2004. Print

Examination Scheme:

Components	CT	Att.	H	EE
Weightage (%)	20	5	5	70

Text & References:

- M. Denyer, A. Garmendia, C. Royer, Marie-Laure Lions-Olivieri, Version Originale 2 (A2) Livre de l'élève, Paris: Maison des Langues, 2009. Print.
- Corbeau, Sophie., et al. tourisme.com. Paris: CLE International, 2004. Print

Practical Phonetics – II

Course Code: FRE2204

Credit Units: 02

Course Objective:

- To introduce the students to principle difficulties of French pronunciation and aide them to overcome them.
- To introduce them to the various aspects of accents and proper pronunciation.
- To make the students capable in using different styles of pronunciation.

Module 1

- La tension
- La sonorité
- La labialité
- L'acuité
- Les autres difficulté

Module 2

- Les syllable du mot
 - L'égalité syllabique
 - La syllabe accentuée dans le mot
 - La désaccentuation
- La continuité
 - L'enchaînement vocalique
 - l'enchaînement consonantique
 - La liaison
- La phrase et l'intonation
- Les styles

Examination Scheme:

Components	CT	Att.	H	EE
Weightage (%)	20	5	5	70

Text and References:

Les livres à consulter:

Charliac, Lucile et al., *Phonétique Progressive du Français* – niveau débutant, Clé Internationale, Paris, 2003.

Charliac, Lucile et Annie-Claude Motron, *Phonétique Progressive du Français* – niveau intermédiaire, Clé Internationale, Paris, 1998.

Compétences Langagières à l'écrit - III – Written expression - III

Course Code: FRE2301

Course Credits: 04

Course Objective:

To furnish the linguistic tools

- to ask for a service, authorization.
- to ask questions in a given situation
- to talk about or narrate events in past
- to talk about one's relation with a language
- to describe someone, a journey, sentiments
- to accept or to refuse a proposal
- to give one's opinion, to carry out a debate or an interaction

Course Contents:

Unité 7 : Je vous en prie !

Actes de Communication :

Demander un service, demander l'autorisation, refuser et accepter, se justifier

Unité 8 : Apprendre en jouant !

Actes de Communication :

Poser des questions en fonction de la situation de communication, situer des actions dans le temps, décrire et raconter dans le passé, situer géographiquement, exprimer différents degrés de certitude

Unité 1 : Dis-moi ce que tu as fait, je te dirai qui tu es

Actes de Communication :

Raconter des expériences passées, Exprimer la cause, parler de sa relation avec les langues, faire une description détaillée, parler de ses motivations, justifier un choix

Unité 2 : Les voyages forment la jeunesse

Actes de Communication :

Préciser les détails d'un voyage, faire des propositions, donner son opinion, faire des hypothèses, situer dans l'espace

Unité 3 : La voix est le miroir de l'âme

Actes de Communication :

Décrire le caractère d'un personnage, décrire ses sentiments, parler de ses espoirs et de ses projets, évoquer ses regrets, donner et suivre des indications scéniques

Unité 4 : On n'arrête pas le progrès ?

Actes de Communication :

Exprimer des opinions, défendre des idées, réaliser un débat d'idées, débattre et décider de la seconde vie d'un objet, gérer des interactions

Grammaire :

1. L'opposition – passe composée et imparfait, plus-que-parfait
2. L'accord du participe passé avec avoir
3. Les pronoms COD
4. Le système de l'hypothétique, le conditionnel
5. Les prépositions et articles pour localiser (régions)
6. Les articulateurs temporels et logiques
7. Le subjonctif et les verbes d'opinion

Examination Scheme:

Components	CT	Home Assign	Att.	EE
Weightage (%)	20	5	5	70

Text & References:**Text:****Le livre à suivre:**

M. Denyer, A. Garmendia, C. Royer, Marie–Laure Lions–Olivieri, Version Originale 2 (A2) Livre de l'élève. Paris: Maison des Langues, 2009.

M. Denyer, A. Garmendia, C. Royer, Marie–Laure Lions–Olivieri, Version Originale 3 (B 1) Livre de l'élève. Paris: Maison des Langues, 2009.

M. Denyer, A. Garmendia, C. Royer, Marie–Laure Lions–Olivieri, Version Originale 2 (A2) Cahier d'exercices. Paris: Maison des Langues, 2009.

M. Denyer, A. Garmendia, C. Royer, Marie–Laure Lions–Olivieri, Version Originale 3 (B1) Cahier d'exercices. Paris: Maison des Langues, 2009.

Références :

· Girardeau, Bruno et Nelly Mous. Réussir le DELF A2. Paris: Didier, 2010.

Girardeau, Bruno et Nelly Mous. Réussir le DELF B1. Paris: Didier, 2010.

Compétences Langagières à l'Oral III - Oral expression III

Course Code: FRE2302

Course Credits: 04

Course Objective: To provide the students with the know-how

- To understand the French phonetic system
- To develop strategies of listening comprehension
- To pass from written to oral, from oral to written easily
- To be sensitized to nuances of speech, dialectical variations, and “registre de langage”
- To master the current social communication skills in oral
- To enrich the formulations, the linguistic tools and vary the sentence structure

Course Content:

Listening exercises and speaking tasks (imagining dialogues, role plays, telephone conversations, participating in debates, and discussions) of:

- M. Denyer, A. Garmendia, C. Royer, Marie-Laure Lions-Olivieri, Version Originale 2 (A2) Livre de l'élève. Paris: Maison des Langues, 2009.
- M. Denyer, A. Garmendia, C. Royer, Marie-Laure Lions-Olivieri, Version Originale 3 (B1) Livre de l'élève. Paris: Maison des Langues, 2009.

Examination Scheme:

Components	CT	Att.	H	EE
Weightage (%)	20	5	5	70

Text & References:

- M. Denyer, A. Garmendia, C. Royer, Marie-Laure Lions-Olivieri, Version Originale 2 (A2) Livre de l'élève. Paris: Maison des Langues, 2009. Print.
- 2. M. Denyer, A. Garmendia, C. Royer, Marie-Laure Lions-Olivieri, Version Originale 3 (B1) Livre de l'élève. Paris: Maison des Langues, 2009. Print.

Understanding French Texts – I

Course Code: FRE2304

Credit Units: 06

Course Objective:

- To enhance students' linguistic skills through the study of written discourse.
- To understand the structure and content of texts written in French, such as magazine and newspaper articles, reports, press releases and literary texts.
- To express ideas and opinions in French in relation to the individual, family and daily life, society, environment and current affairs.

Course Contents:

Module 1

La Famille : L'individu, la famille et la vie journalière

Structure and function of the family; relationships; patterns of daily life and living conditions; young people and their values; health and fitness, healthy living choices, aspects of cultural life, for example, music and dance: importance and influence on individuals and society.

Module 2

La société et les affaires sociales

Gender roles in society; employment and unemployment: causes and consequences; role of the media; Religion in multicultural societies; education: education system and the role of education in the development of society; crime and violence, for example, crime against individuals and existing laws for the related issues.

Module 3

L'environnement

Destruction of the environment and its challenges: pollution; deforestation; climate change. Conservation of the environment and its benefits: recycling; reforestation; nature reserves including protection of endangered species.

Module 4

L'actualité

Current issues: social and political unrest: causes and consequences; political alliances: objective and composition of the alliances, government policies.

Examination Scheme:

Components	CT	Att.	H	EE
Weightage (%)	20	5	5	70

Text and References:

Les livres à consulter:

Lhote, G. et al.

Parlez-moi: Le français au quotidien,
Paris: Nathan, 1998.

Lien, B. and Raud, M.

Thèmes et Textes. Topics and text studies

	for advanced French, London: John Murray, 1998.
Maun, I. and Rodrigues, I.	Bien lire, bien écrire, Sandy, Beds. : Advance Materials, 2001.
Maruani, M	Travail et emploi des femmes, Paris: Editions La Découverte (Coll Repère) 2006.
McLachlan, A.	Zénith, Oxford: Heinemann Educational, 2000.
Monnerie-Goarin, A. et al	Champion (nouvelle édition), Paris: CLE International, 2001.
Murillo, J. et al.	Forum, Paris, Hachette FLE, 2000 – 2003.
Neather, T. et al.	Prévisions/Réalisations, Cheltenham: Nelson Thornes, 1998.
Noël, M. F. and Davies, V.	Communiquez, London: Hodder and Stoughton, 1999.
Open University	Francothèque: A Resource for French Studies, London: Hodder and Stoughton, 1997.
Paris, D and Foltete-Paris B	Environnement.com, Paris: Clé International 2009.

Les sites web à consulter:

www.advmaterials.demon.co.uk
www.champs-elysees.com
www.cilt.org.uk
www.cndp.fr
www.esb.co.uk
www.fdlm.org
www.fle.fr
www.french.about.com
www.frenchteachers.org
www.grantandcutler.com
www.quia.com/pages/babelspeak/html
www.rf.fr
www.sitesforteachers.com
http://www.tv5.org/TV5Site/enseigner-apprendre-francais/accueil_enseigner.php
www.voila.fr
www.yahoo.fr

Compétences Langagières à l'écrit - IV – Written expression - IV

Course Code: FRE2401

Course Credits: 05

Course Objective:

To develop the writing skills

- to express sentiments, obligation, possibility
- to present a person, to narrate a story
- to give or to justify one's opinion,

Course Contents:

Unité 5 : Les paroles volent, les écrits restent

Actes de Communication :

Exprimer ses sentiments, exprimer l'obligation, la possibilité, l'interdiction, exprimer la manière

Unité 6 : A chacun son cinéma

Actes de Communication :

Présenter les personnages d'un film, raconter l' synopsis d'un film, exprimer son avis, justifier son opinion

Unité 7 : Y a-t-il une vie après l'école ?

Actes de Communication :

Synthétiser des informations et les transmettre, présenter et publier un compte rendu d'enquête, rapporter un événement, une information, une interview

Unité 8 : Pas de nouvelles, bonnes nouvelles !

Actes de Communication :

Rapporter les paroles d'autrui, rendre compte d'événements, présenter des faits et des événements

Unité 9 : Tout finit par des slams

Actes de Communication :

Exprimer ses sentiments, exprimer ses idées, expliquer la définition d'un mot, comprendre la formation des mots, jouer avec les mots

Grammaire :

1. Constructions et mode des verbes de sentiments, des verbes impersonnels
2. Le gérondif, le participe présent
3. Les pronoms COD, COI, la double pronominalisation
4. Le pronom relatif- ce que, ce qui, ce dont
5. La place de l'adjectif
6. Le discours rapporte, la concordance des temps dans le discours rapporte au passé
7. L'interrogation directe et indirecte
8. Le pronom en
9. Les registres de langues, les figures de style

Examination Scheme:

Components	CT	Home Assign	Att.	EE
Weightage (%)	20	5	5	70

Text & References:

Text:

Le livre à suivre:

M. Denyer, A. Garmendia, C. Royer, Marie–Laure Lions–Olivieri, Version Originale 3 (B 1)
Livre de l'élève. Paris: Maison des Langues, 2009.

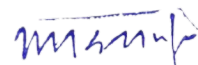
M. Denyer, A. Garmendia, C. Royer, Marie–Laure Lions–Olivieri, Version Originale 3 (B1)
Cahier d'exercices. Paris: Maison des Langues, 2009.

Références :

· Girardeau, Bruno et Nelly Mous. Réussir le DELF B1. Paris: Didier, 2010.



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Compétences Langagières à l'Oral IV - Oral expression IV

Course Code: FRE2402

Course Credits: 04

Course Objective: To provide the students with the know-how

- To understand the French phonetic system
- To develop strategies of listening comprehension
- To pass from written to oral, from oral to written easily
- To be sensitized to nuances of speech, dialectical variations, and “registre de langage”
- To master the current social communication skills in oral
- To enrich the formulations, the linguistic tools and vary the sentence structure

Course Content:

Listening exercises and speaking tasks (imagining dialogues, role plays, telephone conversations, participating in debates, and discussions) of:

- M. Denyer, A. Garmendia, C. Royer, Marie–Laure Lions–Olivieri, Version Originale 3 (B1)
Livre de l'élève. Paris: Maison des Langues, 2009.

Examination Scheme:

Components	CT	Att.	H	EE
Weightage (%)	20	5	5	70

Text & References:

- M. Denyer, A. Garmendia, C. Royer, Marie–Laure Lions–Olivieri, Version Originale 3 (B1)
Livre de l'élève. Paris: Maison des Langues, 2009. Print.

Understanding French Texts – II

Course Code: FRE2406

Credit Units: 04

Course Objective:

- To familiarise the students with the texts written in French in relation to the science, technology, industries and economic issues.
- To understand the structure and content of texts written in French, such as magazine and newspaper articles, reports, press conferences, speeches and literary texts.
- To enhance students' linguistic skills through the study of written discourse.

Course Contents:

Module 1

La Science et la technologie

Symptoms and transmission of diseases like cancer and AIDS, treatment and preventative measures; the impact of Science and Technology on medical practices, disease prevention and cure; the impact of Information and Communication Technology on social life.

Module 2

L'industrie et l'économie

Various kinds of industries as agriculture and tourism: eco-tourism, genetically modified foods; renewable and non-renewable sources of energy; new trends in business, for example, e-commerce: innovations and impact on traditional business. Impact of industrialization, liberalization and globalization on social and economic life.

Examination Scheme:

Components	CT	Att.	H	EE
Weightage (%)	20	5	5	70

Text and References:

Les ressources à consulter:

Lhote, G. et al.	Parlez-moi: Le français au quotidien, Paris: Nathan, 1998.
Lien, B. and Raud, M.	Thèmes et Textes. Topics and text studies for advanced French, London: John Murray, 1998.
Maun, I. and Rodrigues, I.	Bien lire, bien écrire, Sandy, Beds. : Advance Materials, 2001.
Maruani, M	Travail et emploi des femmes, Paris: Editions La Découverte (Coll Repère) 2006.
McLachlan, A.	Zénith, Oxford: Heinemann Educational, 2000.
Monnerie-Goarin, A. et al	Champion (nouvelle édition), Paris: CLE International, 2001.

Murillo, J. et al.	Forum, Paris, Hachette FLE, 2000 – 2003.
Neather, T. et al.	Prévisions/Réalisations, Cheltenham: Nelson Thornes, 1998.
Noël, M. F. and Davies, V.	Communiquez, London: Hodder and Stoughton, 1999.
Open University	Francothèque: A Resource for French Studies, London: Hodder and Stoughton, 1997.

Les sites web à consulter:

www.advmaterials.demon.co.uk

www.champs-elysees.com

www.cilt.org.uk

www.cndp.fr

www.esb.co.uk

www.fdlm.org

www.fle.fr

www.french.about.com

www.frenchteachers.org

www.grantandcutler.com

www.quia.com/pages/babelspeak/html

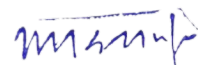
www.rf.fr

www.sitesforteachers.com

http://www.tv5.org/TV5Site/enseigner-apprendre-francais/accueil_enseigner.php

www.voila.fr

www.yahoo.fr

Introduction to French and Francophone Civilization & Culture-II

Course Code: FRE2405

Credit Units: 04

Course Objective:

- To familiarise the students with the essentials of culture and civilisation of France and francophone countries.
- To introduce them to the history, political system, historical movements and social structure of France.
- To acquaint the students with the gastronomy, monuments, sports, cinema and music of France and francophone countries.

Course Contents:

Module 1: La colonisation française

Part 1: L'Introduction de la *Colonisation* et l'illumination.

Part 2: L'Histoire du monde Francophone

- Expansion colonial de la France: Phase I
- Expansion colonial de la France: Phase II
- Mouvements contre Colonisation française
- Désintégration de l'Empire Coloniale
- Impact de la Colonisation française

Part 3: Organisation Internationale de la Francophonie (OIF).

Part 4: Les Langues dans le monde Francophone.

Module 2: La vie politique

Part 1: IVe République

Part 2: Ve République

Part 3: les institutions politiques

Part 4: Les parties politiques

Part 5: L'avenir européen

Module 3: La vie économique

Part 1: centralisation et décentralisation

Part 2: nationalisation et privatisation

Part 3: La technologie, les transports

Part 4: L'Union européenne

Module 4: La francophone contemporaine

Part 1: Auteurs Francophone et Littératures

- Grand auteurs Francophones
- Caractéristiques de la littérature Francophone

Part 2: Communauté ethnique du monde Francophone

- Qu'est-ce que l'ethnie?
- Ethnie en Afrique et les groupes majeurs en Afrique.
- Conflits ethniques et impact sur la vie sociale et politique de l'Afrique

Part 3: quelques sujets importants (to be updated from time to time)

- Boko Haram
- Conflit Mali

- Algérie
- Conflit Libye
- République de l'Afrique centrale
- Crise du Soudan du Sud
- conflit DRC
- Guerre civile de la Somalie

Part 4: Cinéma Francophone

- Cinéma africain
- Cinéma acadien
- Cinéma canadien
- Cinéma suisse

Examination Scheme:

Components	CT	Att.	H	EE
Weightage (%)	20	5	5	70

Text and References:

Les ressources à consulter:

Alexandre P, Francophonie: the French and Africa. J. Contemporary History, 1969, 4(1):117-25

Beauclair Michelle, *The Francophone World: Cultural Issues and Perspectives*, Peter Lang, Bern, 2007.

Bujra Abdalla, *African Conflicts: Their causes and their political and social environment*, Development Policy Management Forum, Addis Ababa, 2002.

Crettien Charles, *France's relations with her former colonies*, Proceedings of the Meeting of the French Colonial Historical Society, Vol. 8 (1985), pp.1-8

Deniau X, *La Francophonie*, Presses Universitaires de France, Paris, 1983.

Holm John, *An introduction to pidgins and creoles*, Cambridge University Press, Cambridge, 2004.

Kirk-Greene, Anthony & Daniel Bach. (eds.), *State and society in Francophone Africa since independence*, Palgrave macmillan, 1995, UK.

Yacono, Xavier, *Histoire de la colonisation française*, Presses Universitaires de France, Paris, 1988 (4th ed.).

Compétences Langagières à l'écrit - V – Written expression - V

Course Code: FRE2501

Course Credits: 05

Course Objective:

To develop the writing skills

- To report speech, to express one's point of view
- To analyze an editorial, to compare informations given in different texts
- To describe or narrate an experience
- To give advice and organize a debate
- To express an opposition, a hypothesis, a goal, probabilities
- To compare

Course Contents:

Unité 1 : Informer : tous journalistes ?

Actes de Communication :

Rapporter des paroles, rapporter des informations, exprimer son point de vue, analyser un éditorial, comparer le traitement de l'information dans différentes unes de journaux

Unité 2 : Gérer son image

Actes de Communication :

Exprimer une hypothèse, raconter son expérience

Unité 3 : Vivre mieux

Actes de Communication :

Donner des conseils, organiser un débat, exprimer des probabilités

Unité 4 : Faire du lien

Actes de Communication :

Comparer, exprimer son opposition, argumenter, commenter des données chiffrées

Unité 5 : Vivre ensemble

Actes de Communication :

Savoir captiver son auditoire, rire, se moquer, convaincre, relever des procédés humoristiques, exprimer le but

Grammaire :

1. Les formes de la question et les mots interrogatifs
2. Les prépositions de lieu
3. Le discours rapporté
4. L'hypothèse (les phrases avec si), l'opposition
5. Le passé simple, le futur antérieur
6. Les pronoms relatifs composés
7. Les adjectifs qualificatifs
8. La restriction, le passif
9. La négation (ni...ni..)

Examination Scheme:

Components	CT	Home Assign	Att.	EE
Weightage (%)	20	5	5	70

Text & References:

Text:

Le livre à suivre:

M. Denyer, A. Garmendia, C. Royer, Marie–Laure Lions–Olivieri, Version Originale 4 (B2) Livre de l'élève. Paris: Maison des Langues, 2009.

M. Denyer, A. Garmendia, C. Royer, Marie–Laure Lions–Olivieri, Version Originale 4 (B2) Cahier d'exercices. Paris: Maison des Langues, 2009.

Références :

· Girardeau, Bruno et Nelly Mous. Réussir le DELF B2. Paris: Didier, 2010.



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Compétences Langagières à l'Oral V- Oral expression V

Course Code: FRE2502

Course Credits: 04

Course Objective: To provide the students with the know-how

- To understand the French phonetic system
- To develop strategies of listening comprehension
- To pass from written to oral, from oral to written easily
- To be sensitized to nuances of speech, dialectical variations, and “registre de langage”
- To master the current social communication skills in oral
- To enrich the formulations, the linguistic tools and vary the sentence structure
- To present facts, projects, plans with precision
- To develop logical thinking, to speak, argue and debate in a coherent and cohesive manner employing appropriate words of liaison, and transition

Course Content:

Preparing presentations, exposés on any topic, developing the techniques of debates, discussions; mastering the art of convincing through logical arguments

M. Denyer, A. Garmendia, C. Royer, Marie–Laure Lions–Olivieri, Version Originale 4 (B2) Livre de l'élève. Paris: Maison des Langues, 2009.

Examination Scheme:

Components	CT	Att.	H	EE
Weightage (%)	20	5	5	70

Text & References:

M. Denyer, A. Garmendia, C. Royer, Marie–Laure Lions–Olivieri, Version Originale 4 (B2) Livre de l'élève. Paris: Maison des Langues, 2009. Print.

Introduction à la littérature française: Typologie des genres littéraires français – Partie-I
(Introduction to French Literature-I)

Course Code: FRE2506

Credit Units: 05

Course Objective:

To introduce the students to French literature through extracts of texts selected from different literary genres of various famous authors across the centuries.

Course Content: Material compiled by the Department from Itinéraires Littéraires, and Dix Siècles de Littérature Française

Module-1 : Poésie

Mignonne allons voir si la rose : Pierre de Ronsard

Ballade des pendus : François Villon

Module 2: Poésie-II

Le bateau ivre : Rimbaud

L'homme et la mer : Charles Baudelaire

Module- 3 : Theatre-I

Le cid : Pierre Corneille

Tartuffe : Molière

Module 4: Théâtre-II

Le mariage de Figaro : Beaumarchais

Hernani : Victor Hugo

Module-5 : Roman

Les misérables : Victor Hugo

Le père Goriot : Honore de Balzac

Madame Bovary : Gustave Flaubert

Examination Scheme

Components	CT	Att.	H	EE
Weightage	20	5	5	70

Text & References:

Castex, P.G., P. Surer et G. Becker. Histoire de la Littérature Française. Paris : Hachette, 1974. Print.

Itinéraires Littéraires. (Moyen Age XVIe, XVIIe, XVIIIe) Paris: Collection Hatier. Print.

Dix Siècles de Littérature Française. Paris :Collection Bordas, 1991. Print.

Masson, Nicole. La littérature française. Editions Eyrolles, 2007.

Ploquin, Françoise, Laurent Hermeline, and Dominique Rolland. Littérature française: les textes essentiels. Hachette, 2000.

Introduction à la Traduction – Introduction to Translation

Course Code: FRE2507

Course Credits: 05

Course Objective:

- To introduce to students basic concepts and theory of translation
- processes of translation
- methods and ‘procédé’ of translation

Course Contents:

Module 1

Translation – Definition and basic concepts (equivalence of text in translation – word to word translation and meaning based translation), Interpretation

Translation and Traductologie (Translation Studies)

Module 2

Technical translation and Literary translation

Types of Translation according to Roman Jakobson (illustrating the subject matter of translation studies)

Module 3

Text (source text, target text, texts in print/audio/video, texts through words and images), analysis of text (identifying difficulties in text-unknown words, technical terms, expression specific to the context, deciphering meaning, finding equivalent terms/expressions in Target language etc), practice translating texts, phenomenon of untranslatability and skewed translation

Module 4

Methodology of translation, methods, ‘sept procédés de traduction’ by Vinay & Darbelnet

Examination Scheme:

Components	CT	Att.	H	EE
Weightage (%)	20	5	5	70

Text & References:

- Vinay, Jean-Paul and Jean Darbelnet. *Comparative Stylistics of French and English : A methodology for translation*. Trans. Sagar, Juan C., and M.-J. Hamel. Amsterdam/ Philadelphia: Jean Benjamins Publishing Company, 1995. Print.
- Newmark, Peter. *A textbook of translation*. New York: Prentice-Hall International, 1988. Print.

ifique: Le Français du Tourisme - French for Tourism industry

Course Code: FRE2508

Course Credits: 06

Course Objective:

- To familiarize the students with the basic essentials of French for tourism industry
- To enable the students to understand how they communicate in French in simple, common professional situations of the tourism industry
- Apart from providing the students with the linguistic tools to present themselves and their company, receive clients, this course also familiarizes them with services like organizing event in a tourist site, promoting a destination, conceive the design and sale of a product, accompanying and providing support.

Course Contents: Unités 1--6

Unité 1 : Premiers contacts

Actes de Communication : se présenter et parler de son métier, présenter une entreprise touristique, savoir répondre au téléphone et prendre un message, comprendre et rédiger un CV, le qui fait quoi dans le tourisme en France

Unité 2 : Accueil

Actes de Communication : lire un plan, indiquer la direction, accueillir et servir les passagers à bord d'un avion, lire un indicateur horaire et informer sur les horaires, expliquer un billet de train, prendre une réservation, un bon comportement pour un bon accueil

Unité 3 : Animation

Actes de Communication : concevoir, rédiger et présenter un programme, concevoir et proposer des animations, connaître le calendrier des jours fériés, renseigner sur le programme des manifestations, évaluer une prestation touristique, les différentes formes de tourisme

Unité 4 : Promotion d'une destination

Actes de Communication : renseigner sur les activités proposées par une ville, rédiger une lettre commerciale : mise en forme et formules, rédiger une lettre publipostage, comprendre la demande d'un visiteur et proposer une documentation adéquate, l'organisation de la promotion touristique en France

Unité 5 : Vente d'un produit touristique

Actes de Communication : connaître les caractéristiques techniques des produits touristiques, se familiariser avec la mise en forme, le style des brochures de voyagistes, connaître les différentes étapes d'un entretien de vente, annuler une réservation et proposer des solutions de remplacement, les produits touristiques de demain

Unité 6 : Guide

Actes de Communication : utiliser des outils documentaires : guides et cartographie, préparer une visite guidée, décrire un monument : son histoire, son architecture et les anecdotes qui lui sont liées, adapter commentaires et attitudes au groupe, les guides touristiques en ligne

Examination Scheme:


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Components	CT	Att.	H	EE
Weightage (%)	20	5	5	70

Text & References:

Le livre à suivre: Corbeau, Sophie., et al. tourisme.com. Paris: CLE International, 2004. Print.

References: Marion, Juliette, Baptiste Chauveau et Léo Bézies-Gros. Carnet de Voyage. Delhi : Goyal Publishers and Distributors, 2013. Print.



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Compétences Langagières à l'écrit - VI – Written expression - VI

Course Code: FRE2601

Course Credits: 05

Course Objective:

To furnish the writing skills

- to express regret, one's opinion, the cause, sentiments
- to defend or to justify oneself
- to talk about one's relation with a language
- to compare, to talk about the qualities of other's

Course Contents:

Unité 6 : Avoir ses chances

Actes de Communication :

Exprimer des regrets, exprimer des reproches, se défendre, comparer des modèles d'enseignement, débattre des questions éducatives

Unité 7 : Pouvoir le dire

Actes de Communication :

Présenter et exprimer son opinion, exprimer la cause, se justifier, rendre compte d'actions, prendre position

Unité 8 : S'engager

Actes de Communication :

Argumenter, structurer son discours, jouer avec les sons, utiliser des procédés de l'art oratoire

Unité 9 : Créer

Actes de Communication :

S'opposer, concéder, défendre des idées

Unité 10 : Circuler

Actes de Communication :

Parler de notre relation avec la langue française, fait le récit d'une expérience, vanter les mérites et les qualités de quelqu'un, exprimer ses sentiments

Grammaire :

1. Le regret et le reproche
2. Les règles d'accord du participe passé
3. Le conditionnel passé
4. L'expression du but, la cause, l'opposition et la concession
5. Les pronoms indéfinis
6. Le subjonctif
7. La comparaison, le passe simple
8. Les marqueurs temporels
9. Les expressions impersonnelles

Examination Scheme:

Components	CT	Home Assign	Att.	EE
Weightage (%)	20	5	5	70

Text & References:

Text:

Le livre à suivre:

M. Denyer, A. Garmendia, C. Royer, Marie–Laure Lions–Olivieri, Version Originale 4 (B2)
Livre de l'élève. Paris: Maison des Langues, 2009.

M. Denyer, A. Garmendia, C. Royer, Marie–Laure Lions–Olivieri, Version Originale 4 (B2)
Cahier d'exercices. Paris: Maison des Langues, 2009.

Références :

- Girardeau, Bruno et Nelly Mous. Réussir le DELF A2. Paris: Didier, 2010.



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Compétences Langagières à l'Oral VI - Oral expression VI

Course Code: FRE2602

Course Credits: 04

Course Objective: To provide the students with the know-how

- To understand the French phonetic system
- To develop strategies of listening comprehension
- To pass from written to oral, from oral to written easily
- To be sensitized to nuances of speech, dialectical variations, and “registre de langage”
- To master the current social communication skills in oral
- To enrich the formulations, the linguistic tools and vary the sentence structure
- To present facts, projects, plans with precision
- To develop logical thinking, to speak, argue and debate in a coherent and cohesive manner employing appropriate words of liaison, and transition

Course Content:

Preparing presentations, exposés on any topic, developing the techniques of debates, discussions; mastering the art of convincing through logical arguments

Exposé : présentation, appréciation et critique du texte et débat sur l'exposé

Genres littéraires: Présenter un texte littéraire

Se présenter à une interview

M. Denyer, A. Garmendia, C. Royer, Marie-Laure Lions-Olivieri, Version Originale 4 (B2) Livre de l'élève. Paris: Maison des Langues, 2009.

Examination Scheme:

Components	CT	Att.	H	EE
Weightage (%)	20	5	5	70

Text & References:

M. Denyer, A. Garmendia, C. Royer, Marie-Laure Lions-Olivieri, Version Originale 4 (B2) Livre de l'élève. Paris: Maison des Langues, 2009. Print.

Introduction à la littérature française: Typologie des genres littéraires français – Partie- II
(Introduction to French Literature-II)

Course Code: FRE2603

Credit Units: 06

To introduce the students to French literature through extracts of texts selected from different literary genres of various famous authors across the centuries.

Course Content: Material compiled by the Department from Itinéraires Littéraires, and Dix Siècles de Littérature Française.

Module 1: Poésie-I

Liberté : Paul Eluard

Déjeuner du Matin : Jacques Prévert

Module 2: Poésie-II

Le Cimetière marin : Paul Valéry

Le Pont Mirabeau : Guillaume Apollinaire

Module 3: Théâtre-I

Rhinocéros : Eugène Ionesco

Huis clos : Jean-Paul Sartre

Module 4: Théâtre-II

Antigone : Jean Anouilh

En attendant Godot : Samuel Beckett

Module 5: Roman-I

La Peste : Albert Camus

La Jalousie : Alain Robbe-Grillet

Module 6: Roman-II

Le petit prince : Saint-Exupéry

La Place de l'étoile : Patrick Modiano

Examination Scheme

Components	CT	Att.	H	EE
Weightage	20	5	5	70

Text & References:

- Castex, P.G., P. Surer et G. Becker. Histoire de la Littérature Française. Paris : Hachette, 1974. Print.
- Itinéraires Littéraires. (Moyen Age XVIe, XVIIe, XVIIIe) Paris: Collection Hatier. Print.
- Dix Siècles de Littérature Française. Paris :Collection Bordas, 1991. Print.
- Masson, Nicole. La littérature française. Editions Eyrolles, 2007.
- Ploquin, Françoise, Laurent Hermeline, and Dominique Rolland. Littérature française: les textes essentiels. Hachette, 2000.

Français sur Objectif Spécifique: Le Français Professionnel et des Affaires – Professional and Business French

Course Code: FRE2606

Course Credits: 05

Course Objective:

- To familiarize the students with the essentials of professional French
- To enable the students
- To understand how they communicate in French in simple, common situations related to the business and corporate world
- To prepare their CVs, to face interviews

Course Contents: francais.com- intermédiaire Unités 6–9

Unité 6 : Actes de Communication : Entreprises

Actes de Communication : identifier une entreprise, lire /expliquer/ dessiner un graphique, analyser/ comparer des résultats et des tendances, analyser des techniques de vente, lancer un produit, analyser un secteur économique

Unité 7: Travail

Actes de Communication : identifier les différents services de l'entreprise, les tâches du secrétariat, examiner différentes façons d'aménager un lieu de travail, rédiger un rapport, analyser les relations du travail, comparer les conditions de travail d'un pays à l'autre, rédiger un e-mail

Unité 8: Recherche d'emploi

Actes de Communication : consulter/ analyser/ expliquer une petite annonce/ ses motivations
rédiger une petite annonce/ une lettre de motivation/ un curriculum vitae
passer un entretien d'embauche

Unité 9: Prise de parole

Actes de Communication: pratiquer l'écoute active : analyser/ comparer des types de conversations, reformuler, questionner, interrompre, répliquer avec tact, présenter des objections, faire une présentation – établir une grille d'évaluation, faire/ évaluer un exposé, prendre des notes, maîtriser les techniques d'interview, poser les bonnes questions et collecter des informations

Examination Scheme:

Components	CT	Att.	H	EE
Weightage (%)	20	5	5	70

Text & References:

Le livre à suivre: Penfornis, Jean-Luc. francais.com- intermédiaire . Paris: CLE International, 2002. Print.

PROJECT REPORT EVALUATION

Course Code: FRE2637

Credit Units: 02

The Project Report is primarily a research work and its primary objective is to gain knowledge through practical experience, a sound appreciation and understanding of the theoretical principles learnt during the semesters. It involves academic reading of several sources and writing on a particular topic relating to the core course or courses of the program. It is a scholarly inquiry into academic problems or issues. It should involve a systematic approach to gathering and analysis of information/ideas, leading to production of a structured report. The research topic should hold significant academic value commensurate with level of the Program.

GUIDELINES FOR PROJECT REPORT

Topic: The topic of the paper will be of the student's choice with consent of the Supervisor. It must be relevant to the content of the course, but it should be treated in greater depth than it is covered in class. Make sure the subject focuses on one question or topic so that the paper has a definite purpose. Composing an introduction and conclusion can be a good test of the cohesiveness of the subject. The domain can include literature, culture, civilization or any other related areas.

Synopsis of Project Report: A Synopsis of the Project Report should be submitted to the Board of Studies of the Institute. The Board, after deliberation, will suggest changes and modifications and will assign a supervisor from amongst the teaching faculty of the Institute. The synopsis should include the following – Title of Project Report Introduction Problems of Research/Presenting the Topic/Problems/Issues of Research Objectives of Research Tentative Subheadings Suggested readings Source Material and References presenting your own ideas in a Project Report is encouraged. However, the paper must be based on facts and opinions from authoritative sources and these sources must be given proper credit. A minimum of three published sources should be cited. Direct quotes must be placed inside quotation marks or in indented sections and should be used sparingly. Paraphrasing is better in most cases. There are two popular ways to cite references. One is to place superscripted numbers in the text with corresponding footnotes at the bottom of the page or endnotes at the end of the paper. More typical of scientific papers is to place the author and year in parentheses (Heaton, 1984). In either case you need a bibliography of all cited sources at the end of the paper with author(s), year, title, publication or publisher, volume, and pages. These should be in alphabetical order by name of the primary author. Preference however should be given to MLA Style Sheet. Be sure to find source materials that are specific to your topic, either books or journal articles. Textbooks are usually too general and should be avoided. The libraries have published and computerized indexes that can be used to find relevant sources. See the Supervisor or a reference librarian if you are unfamiliar with these resources.

Plagiarism is the presenting of someone else's wording or ideas as one's own and is a violation of university policy. If you use someone else's words or ideas, you must give them proper credit. You must also obtain permission from the Supervisor before using your Project Report for more than one course.

Length and Format Length is not important; 20 to 25 pages of 2 spaced texts is a good target. The title, author, course, and date should be typed onto a cover sheet. Illustrations are not required but are often useful in explaining graphical concepts and in giving the paper character. The bibliography should be the last section of the paper. The entire report has to be submitted in two spiral bound copies.

Grading Students are required to make two submissions: a first draft and a final draft prior to final submission. The first draft is not to be a "rough" draft; it should be a completed, typed paper like you would ordinarily submit. It will read by the supervisor carefully, who may offer suggestions for improvement, give it a grade, and return it to you promptly. The final draft, which is worth a larger share

of the points, is your chance to respond to the suggestions and submit an improved paper. This will make the writing of a Project Report more of a learning experience. We strongly suggest using a word processor so that the final draft can be created by editing rather than complete retyping.

Grading is based on both research content and presentation. Your paper should demonstrate that you have gained a level of expertise in the subject by studying the relevant literature. Your presentation should be clean and convincing with proper use of paragraphs, complete sentences, and correct grammar, spelling, and punctuation. Make your Project Report look and sound professional.

Evaluation of Project Report

Evaluated by

1 Institution

☐ Scope and content ☐ Understanding and presenting the topic ☐ Depth and breadth of analysis ☐ Project fulfillment ☐ Language, logical flow, coherence. ☐ Data collection ability in the field (if any) ☐ Scope of Implementation. (if applicable)

Criteria Marks: 50

2 Board of Examiners Viva-voce

Examination Marks: 50

Total 100

Project Schedule Registration First week of the last academic month Allotment of Faculty Guide takes place in accordance to the area of interest / stream chosen by the student at the time of registration.

Approval of Project Topic Week following: the week of registration

Submission of Synopsis to Faculty Guide

Prior to the completion of End-Term Examination. The synopsis could be submitted any time after the allotment of project topic but certainly must be before completion of last examination.

Duration of Project: The project stretches for the full duration of the Semester break

Submission of Report: **First Draft** – After 20 Days from the commencement of the project **Second Draft** – 20 days after submission of the first draft. The first and second reports could be submitted through e-mail or any other medium as per the consent of faculty guide.

Final Draft – Within second week of rejoining of institution.

Course Code: FRE2608

Credit Units: 04

Course Objective:

- To introduce the students to the the French literature from moyen age to sixteenth century.
- To introduce the students with different genre of literature; novel, poem, theatre etc
- To introduce and perfect them to analyse variety of texts.

Le Moyen Âge

Module 1; Chanson de geste, l'histoire

- Introduction au Moyen Âge
- Naissance de la littérature française
- La Chanson de Roland.
- Les genres littéraires au Moyen Âge

Module 2: Theatre, Roman

- Les romans d'aventure et d'amour
- Le théâtre du Moyen Âge
- Introduction à la farce
- La farce de maître Pathelin
- Le théâtre religieux
- Le Roman de Renart

La Renaissance

Module 3: Roman,

- Du Moyen Âge à la Renaissance
- les œuvres de Rabelais
- Pantagruel
- Gargantua

Module 4: Poésie, Theatre

- La Pléiade
- Les Poésies de Ronsard, Du Bellay
- Montaigne
- Cleopatre Captive, Jules César

Examination Scheme:

Components	CT	Att.	H	EE
Weightage (%)	20	5	5	70

Text and References:

<https://www.espacefrancais.com/les-courants-litteraires/>

Blumenfeld-Kosinski, Renate. *Reading myth: classical mythology and its interpretations in medieval French literature*. Stanford: Stanford University Press, 1997.

Les livres à consulter:

Xavier Darcos, *Histoire de la littérature française*, Hachette Education, ([lire en ligne](#))
Les Grands etapes de la literature francaise

Bachelor of Arts German (Honors)

FLEXILEARN

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Curriculum & Scheme of Examination

2022

AMITY UNIVERSITY HARYANA

GURUGRAM

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WRITTEN EXPRESSION-I

(Schriftliche Kompetenz- I)

Course Code: GER2101

Credit Units: 06

Course Objective:

To furnish the linguistic tools

- to introduce oneself and others, to ask and give personal information.
- to describe one's family and surroundings
- to name and count things and to talk about likes and dislikes.
- to describe one's house and give opinions
- to tell time and date and to talk about daily routine and activities.
- to talk about leisure time and hobbies
- to talk about events in the past
- to describe professions
- to talk about weather
- to ask directions and advices, to ask for help

Course Contents:

Lektion 1 : Guten Tag. Mein Name ist...

Jemanden begrüßen, sich verabschieden, Herkunftsland erfragen und nennen, Sprachen benennen.

Lektion 2 : Familie und Freunde

Familienmitglieder und Freunde vorstellen, Wohnort nennen, Angaben zu Personen machen.

Lektion 3 : Essen und Trinken

Dinge benennen, Einkaufsgespräche führen, Zahlen, Vorlieben ausdrücken,

Lektion 4 : Meine Wohnung

Nach einem Ort fragen, eine Wohnung/ Haus beschreiben, Möbel und elektronische Geräte benennen, Wohnungsanzeigen

Lektion 5 : Mein Tag

Uhrzeit nennen, Alltagsaktivitäten nennen, Tagesablauf, Öffnungszeiten verstehen.

Lektion 6 : Freizeit

Wetter, Jahreszeiten, über Freizeit und Hobbys sprechen, Wetterbericht

Lektion 7 : Lernen- ein Leben lang

Fähigkeiten ausdrücken, Absichten ausdrücken, über Aktivitäten in der Vergangenheit sprechen.

Lektion 8 : Beruf und Arbeit

Berufe benennen und erfragen, Information über Vergangenheit und Gegenwart austauschen, Anzeigen verstehen

Lektion 9 : In einer fremden Stadt

Anweisungen und Ratschläge geben, über Erlaubtes/ Verbotenes und Regeln sprechen

Grammatik :

1. Possessivartikel
2. Modalverb sollen

3. Nomen, definiter und undefiniter Artikel
4. Verbkonjugation
5. Personalpronomen
6. Prepositionen
7. Adjektive
8. Trennbare Verben
9. Akkusativ
10. Modal verben
11. Perfekt mit haben und sein
12. Wortbildung
13. Präteritum
14. Imperativ

Examination Scheme:


Components	CT	Home Assign	Att.	EE
Weightage (%)	20	5	5	70

Text and References

- Niebisch, Daniela et al. Schritte International 1. Ismaning : Heuber Verlag, 2006
- Niebisch, Daniela et al. Schritte International 2. Ismaning : Heuber Verlag, 2006



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ORAL EXPRESSION-I (Mündliche Kompetenz-I)

Course Code: GER2102

Credit Units: 06

Course Objective:

To provide the students with the know-how

- to understand the German phonetic system
- to develop strategies of listening comprehension
- to pass from written to oral, from oral to written easily
- to be sensitized to nuances of speech, dialectical variations.
- to overcome the fear of speaking a foreign language and take position as a foreigner speaking German.

Course Content:

Listening exercises and speaking tasks (imagining dialogues, role plays, telephone conversations) of:


- Niebisch, Daniela et al. Schritte International 1. Ismaning : Heuber Verlag, 2006
- Niebisch, Daniela et al. Schritte International 2. Ismaning : Heuber Verlag, 2006
- Deutsche Welle : Deutsch interaktiv

Examination Scheme

Components	CT	Home Assign	Attd.	EE
Weightage (%)	20	5	5	70

Texts & References

- Niebisch, Daniela et al. Schritte International 1. Ismaning : Heuber Verlag, 2006
- Niebisch, Daniela et al. Schritte International 2. Ismaning : Heuber Verlag, 2006


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WRITTEN EXPRESSION-II (Schriftliche Kompetenz-II)

Course Code: GER2201

Credit Units: 05

Course Objective:

- to name body parts and describe appearances
- to give advices and instructions
- to describe modes of transports
- to ask directions and understand itinerary
- to convey information in written and verbally
- to describe clothes and express
- to express preferences and choice
- to narrate events and to congratulate in written and verbally
- to accept and refuse invitations

Course Contents:

Lektion 10: Gesundheit

Körperteile benennen, über das Befinden anderer sprechen, das aussehen beschreiben, Anweisungen und Ratschläge geben und verstehen, einen Brief schreiben, einen Termin vereinbaren.

Lektion 11: In der Stadt Unterwegs

Nach dem Weg Fragen und Weg beschreiben, Ortsangaben machen, Richtungen bestimmen, Fahrplan

Lektion 12: Der Kunde ist König

Zeitangaben verstehen und machen, zeitliche Bezüge nennen um Serviceleistungen bitten, höfliche Bitten und aufforderungen ausdrücken, einen Informationstext verstehen, schriftliche Mitteilungen und Telefonansagen verstehen.

Lektion 13: Neue Kleider

Kleidungsstücke benennen und bewerten, Gefallen/Missfallen ausdrücken, Vorlieben und Bewertungen ausdrücken, im Kaufhaus um Hilfe/Rat bitten

Lektion 14: Feste

Das Datum erfragen und nennen, über Personen und Dinge sprechen, Gründe angeben, einen Termin Schriftlichabsagen und zusagen, Einladungen lesen und schreiben, Feste nennen Glückwünsche ausdrücken.

Lektion 1 : Kennenlernen

Themen :

Gründe nennen, von Reiseerlebnissen berichten, Familien Stammbaum: über die Familie berichten, Wohn- und Lebensformen

Lektion 2 : Zu Hause

Themen :

Richtungen angeben, Gespräch unter Nachbarn verstehen, Mitteilungen lesen und sprechen

Lektion 3 : Guten Appetit !

Themen :

Häufigkeitsangaben machen, über Frühstücksgewohnheiten sprechen, Dinge im Haushalt benennen, Gespräche im Restaurant führen, Vorlieben ausdrücken, Private Einladungen

Lektion 4 : Arbeitswelt

Themen :

Ratschläge geben, Bedingungen ausdrücken, Telefongespräche am Arbeitsplatz führen, Zeitungsmeldung, „Welcher Berufstyp sind Sie“

Grammatik:

- Präposition
- Konjunktiv II
- Verben mit verschiedenen Präfixen
- Demonstrativpronomen
- Personalpronomen mit Dativ
- Verben mit Dativ
- Ordinalzahlen
- Konjunktion Konjunktion *weil* , *wenn* , *dass*
- Verben in Perfekt
- Namen im Genitiv
- Präpositionen, Verben mit Präpositionen
- Verben mit wechseln Präposition
- Direktional- Adverbien
- Indefinitpronomen im Nominativ and Akkusativ
- Konjunktiv II : *sollte*

Examination Scheme:

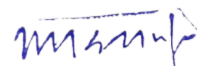
Components	CT	Home Assign	Attd.	EE
Weightage (%)	20	5	5	70

Text and References

- Niebisch, Daniela et al. Schritte International 2. Ismaning : Heuber Verlag, 2006
- Niebisch, Daniela et al. Schritte International 3. Ismaning : Heuber Verlag, 2006



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ORAL EXPRESSION-II (Mündliche Kompetenz-II)

Course Code: GER2202

Credit Units: 05

Course Objective:

To provide the students with the know-how

- to understand the German phonetic system
- to develop strategies of listening comprehension
- to pass from written to oral, from oral to written easily
- to be sensitized to nuances of speech, dialectical variations.
- to overcome the fear of speaking a foreign language and take position as a foreigner speaking German.

Course Content:

Listening exercises and speaking tasks (imagining dialogues, role plays, telephone conversations) of:

- Niebisch, Daniela et al. Schritte International 1. Ismaning : Heuber Verlag, 2006
- Niebisch, Daniela et al. Schritte International 2. Ismaning : Heuber Verlag, 2006
- Deutsche Welle : Deutsch interaktiv

Examination Scheme


Components	CT	Home Assign	Attd.	EE
Weightage (%)	20	5	5	70

Texts & References

- Niebisch, Daniela et al. Schritte International 2. Ismaning : Heuber Verlag, 2006
- Niebisch, Daniela et al. Schritte International 3. Ismaning : Heuber Verlag, 2006



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GERMAN THROUGH ACTIVITIES

(Deutsch mit Aktivitäten)

Course Code: GER2203

Credit Units: 06

Course Objective:

- To introduce plays, songs, poems and films with the purpose of helping students to read, listen, write, speak and think in German spontaneously; learn the content and be able to find new meanings through analysis, evaluation, synthesis and application
- To launch students on their personal course of learning through training in activities like acting, reciting poems, appreciating cinematography and writing film reviews
- To empower them to develop skills independently and to develop critical/ creative thinking

Course Content: Material compiled by the Department

Module I: Deutschen mit Spielen und Rätseln

Übungen, Spiele und illustrierte Vokabeln, Phonetik und Wortschatzaufgaben.

Module II: Deutsch mit Gedichte und Lieder

Grammatische und phonetische und Vokabeln Übungen mit Kindergedichte und Lieder

Module III: Deutsch mit Rollenspiele

Rollenspiele von alltäglichen Themen, einen Dialog führen

Module III : Deutsch mit Filme

Grammatik durch Filme , Die Themen verstehen und zusammenfassen,

Module IV: Deutsch mit Märchen und Fabeln

Bekannte deutsche Märchen und Fabeln lesen und verstehen


Examination Scheme:

Components	CT	Attd.	C	P
Weightage (%)	40	5	30	25

*There is no end-term examination. There is continuous assessment.

Text & References

Material compiled by the Department


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WRITTEN EXPRESSION-III (Schriftliche Kompetenz-III)

Course Code: GER2301

Credit Units: 04

Course Objective:

To furnish the linguistic tools

- To describe past experiences and events like journey
 - To talk about family, living conditions
 - To ask and tell directions
 - To talk about eating habits, order food in a restaurant
 - To talk about different professions, making phone calls at workplace
 - To give health tips and understand expert's opinion
 - To discuss and give opinions on Germany's education and school system
- Give ideas/ suggestions/ requests, talk about gifts and gift- coupons, marriage customs

Course Contents:

Lektion 5 : Sport und Fitness

Themen :

Gesundheitstipps geben, Interesse ausdrücken, Gefühle ausdrücken, telefonische Anfrage, einen Expertentipp verstehen

Lektion 6 : Ausbildung und Karriere

Themen :

über den Ausbildungsweg sprechen, die Meinung sagen, über das Schulsystem und Schulerinnerungen sprechen, Kursangebote : Aus- und Weiterbildung, ein Interview verstehen

Lektion 7 : Feste und Geschenke

Themen :

Über Geschenke sprechen, Ideen ausdrücken, Bitten und Empfehlungen ausdrücken, Geschenkgutscheine, Hochzeitsbräuche, ein Fest planen

Lektion8 : Am Wochenende

Themen :

Gegenstände ausdrücken, Wünsche ausdrücken, Vorschläge machen, Wochendaktivitäten und Veranstaltungskalender

Lektion 9 : Warenwelt

Themen :

Gegenstände beschreiben, etwas vergleichen, kurze Interviews im Radio, über private Ausgaben sprechen, einen Gegenstand präsentieren

Lektion 10 : Kommunikation

Themen :

Unpersönliche Sachverhalte verstehen, Produkte beschreiben, Anrufbeantworter : Nachrichten verstehen, Telefongespräche : sich entschuldigen

Lektion 11 : Unterwegs

Themen :

Ortsangaben machen, Wege beschreiben, Sicherheitsangaben verstehen, Verkehrsnachrichten, Wetterverhältnisse

Lektion 12 : Reisen

Themen :

Reiseziele angeben, Kleinanzeigen verstehen, eine Reise buchen, Postkarten schreiben, eine Traumreise planen

Grammatik :


- reflexive Verben
- Präteritum der Modalverben
- Konjunktion : Trotzdem
- Konjunktiv II : wäre, hätte,würde
- Adjektivdeklinaton
- Komparativ und Superlativ
Vergleichspartikel : *als, wie*
- Passiv- Präsens
- Frageartike : *was für ein... ?*
- Wortbildung Adjektive und Nomen
- Lokale, modale und temporale Präpositionen
- Indirekte Fragen mit Fragepronomen

Examination Scheme:

Components	CT	Home Assign	Attd.	EE
Weightage (%)	20	5	5	70

Text & References:

- Niebisch, Daniela et al. Schritte International 3. Ismaning : Heuber Verlag, 2006
- Niebisch, Daniela et al. Schritte International 4. Ismaning : Heuber Verlag, 2006


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ORAL EXPRESSION-III (Mündliche Kompetenz-III)

Course Code: GER2302

Credit Units: 04

Course Objective: To provide the students with the know-how

- to understand the German phonetic system
- to develop strategies of listening comprehension
- to pass from written to oral, from oral to written easily
- to be sensitized to nuances of speech, dialectical variations, and „Sprache bemerken und festhalten“
- to master the current social communication skills in oral
- to enrich the formulations, the linguistic tools and vary the sentence structure

Course Content:

Listening exercises and speaking tasks (imagining dialogues, role plays, telephone conversations, participating in debates, and discussions) of:

- Niebisch, Daniela et al. Schritte International 3. Ismaning : Heuber Verlag, 2006
- Niebisch, Daniela et al. Schritte International 4. Ismaning : Heuber Verlag, 2006
- Deutsche Welle : Deutsch interaktiv

Examination Scheme:

Components	CT	Att.	H	EE
Weightage (%)	20	5	5	70

Text & References:

- Niebisch, Daniela et al. Schritte International 3. Ismaning : Heuber Verlag, 2006
- Niebisch, Daniela et al. Schritte International 4. Ismaning : Heuber Verlag, 2006
- Deutsche Welle : Deutsch interaktiv



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WRITTEN EXPRESSION-IV (Schriftliche Kompetenz-IV)

Course Code: GER2401

Credit Units: 05

Course Objective:

To develop the writing skills

- to express wishes, sentiments, possibilities
- to discuss weekend and free time activities
- to present, describe and compare objects
- to understand radio interviews
- telephonic conversations, automatic answering machine
- to understand transport news and directions
- to talk about and plan a trip to your dream destination
- to make conversations in a bank, exchange money

Course Contents:

Lektion 13 : Geld

Themen :

Sich am Bankschalter informieren, sich über Zahlungswege informieren, über Dienstleistungen sprechen, Radiointerview, Zeitungsanmeldungen

Lektion 14 : Lebensstationen

Themen :

Über Vergangenes sprechen, Wünsche, Vorschläge und Ratschläge, Kosenamen, Statistik und Interview

Lektion 1 : Glück im Alltag

Themen :

Über Vergangenes berichten, eine Zeitungsmeldung schreiben, über Glücksmomente sprechen, Pech gehabt, über Glückbringer sprechen

Lektion 2 : Unterhaltung

Themen :

Gegensätze ausdrücken, Dinge und Personen beschreiben, Fernsehprogramm, einen Konsens finden, einen Krimi lesen

Lektion 3 : Gesund bleiben

Themen :

Entspannungsübungen machen und beschreiben, Ratschläge und Empfehlungen geben, Untersuchung beim Arzt- einen Vorgang beschreiben, Vorsorge, über eine Statistik sprechen, einen Beipackzettel verstehen

Lektion 4 : Sprachen

Themen :

Über irrales spreche, etwas nicht verstehen, nachfragen & begründen, Wichtigkeit ausdrücken, über das Sprachlernen sprechen, eine Radiosendung verstehen

Lektion 5 : Eine Arbeit finden

Themen :

Über Berufswünsche und –interessen sprechen, über Geschäftsideen sprechen, über die Arbeit sprechen, sich schriftlich bewerben, sich telefonisch vorstellen

Lektion 6 : Kundenwünsche

Themen :

über Urlaubsinteressen sprechen, über eine Statistik sprechen, gute Vorsätze fassen, Verkaufsgespräche führen, eine Reisebroschüre verstehen, Informationen über Wuppertal im Internet

Grammatik :

- Vergleichspartikel : *als, wie*
- Passiv- Präsens
- Frageartike : *was für ein... ?*
- Wortbildung Adjektive und Nomen
- Lokale, modale und temporale Präpositionen
- Indirekte Fragen mit Fragepronomen
- Konjunktion: *als, obwohl, darum, deswegen, damit*
- Präteritum
- Plusquamperfekt
- Gradpartike : *ziemlich*
- Relativpronomen und Relativsatz
- Genetiv
- Passiv- Präsens mit Modalverb
- Irreale Bedingungssätze
- Präposition : *wegen, trotz*
- Infinitiv mit *zu, um...zu, statt...zu, ohne zu*
- Zweiteilige Konjunktionen : *nicht nur... sondern auch... , zwar...aber... , entweder...oder...*
- Verben mit Präpositionen

Examination Scheme:

Components	CT	Home Assign	Attd.	EE
Weightage (%)	20	5	5	70

Text & References:

- Niebisch, Daniela et al. Schritte International 4. Ismaning : Heuber Verlag, 2006
- Niebisch, Daniela et al. Schritte International 5. Ismaning : Heuber Verlag, 2006

ORAL EXPRESSION-IV (Mündliche Kompetenz-IV)

Course Code: GER2402

Credit Units: 04

Course Objective: To provide the students with the know-how

- to understand the German phonetic system
- to develop strategies of listening comprehension
- to pass from written to oral, from oral to written easily
- to be sensitized to nuances of speech, dialectal variations, and „Sprache bemerken und festhalten“
- to master the current social communication skills in oral
- to enrich the formulations, the linguistic tools and vary the sentence structure

Course Content:

Listening exercises and speaking tasks (imagining dialogues, role plays, telephone conversations participating in debates, and discussions) of:


- Niebisch, Daniela et al. Schritte International 4. Ismaning : Heuber Verlag, 2006
- Niebisch, Daniela et al. Schritte International 5. Ismaning : Heuber Verlag, 2006
- Deutsche Welle : Deutsch Interaktiv

Examination Scheme:

Components	CT	Attd.	H	EE
Weightage (%)	20	5	5	70

Text & References:

- Niebisch, Daniela et al. Schritte International 4. Ismaning : Heuber Verlag, 2006
- Niebisch, Daniela et al. Schritte International 5. Ismaning : Heuber Verlag, 2006


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GERMAN THROUGH LITERARY TEXTS

(Deutsch mit literarischen Texten)

Course Code : GER2403

Credit Units: 05

Course Objective:

- To make the students understand the differences between various kinds of literary texts like novel, poem, short story, parable etc.
- To introduce them to German literature through a study of selected literary works
- To enable them to read and understand literary texts and find new meanings through analysis, evaluation and synthesis
- To empower them to develop critical/ creative thinking

Course Content:

Module I: Bedeutung und Merkmale der unterschiedlichen literarischen Textsorte :

Romane, Kurzgeschichten, Gedichte, Ballade, Fabeln, Märchen, Novelle usw.

Module 2: deutsche Kurzgeschichten :

- Das Brot- Wolfgang Borchert
- Ein Tisch ist ein Tisch- Peter Bichsel
- Popp und Mingel- Marie Luise Kaschnitz
- Anekdote zur Senkung Arbeitsmoral- Heinrich Boell
- Die Küchenuhr – Wolfgang Borchert

Module 3: deutsche Gedichte :

- Todesfuge- Paul Celan
- An den Mond- Goethe
- Wandrers Nachtlied- Goethe
- Der Knabe im Moor- Annette von Droste-Hülshoff
- Die Stadt- Theodor Storm

Module 4: deutsche Novelle:

- Das Erdbeben in Chili - Heinrich von Kleist
- Katz und Maus - Eine Novelle Günter Grass
- Der Tod in Venedig - Thomas Mann
- Peter Schlemihls wundersame Geschichte - A.v.Chamisso

Module 5 : deutsche Ballade, Fabeln, Märchen :

- Erlkönigs Tochter - Johann Gottfried von Herder
- Kinder- und Hausmärchen der Brüder Grimm - Brüder Grimm
- The Tortoise and the Hare



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Examination Scheme:

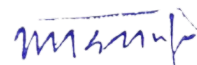
Components	CT	Attd.	H	EE
Weightage (%)	20	5	5	70

Text & References:

- Wolfgang Borchert : An diesem Dienstag neunzehn Geschichten. Rowohlt, Hamburg/Stuttgart 1947
- Johann Wolfgang von Goethe : An den Mond Goethes Schriften, Achter Band. Seite 153-154. G.J.Götschen, Leipzig 1789
- http://www.dirkvanwingerden.nl/Duits_GHL-web/Literatuur/B02.pdf
- <http://www.deutschunddeutsch.de/contentLD/GD/GT67cTischistTisch.pdf>
- Annette von Droste-Hülshoff: Der Knabe im Moor, in: Deutsche Balladen, hrsg. v. Hartmut Laufhütte, Stuttgart 2000
- <http://www.celan-projekt.de>
- <http://lyrik.antikoerperchen.de/theodor-storm-die-stadt,textbearbeitung,213.html>
- <http://www.literaturwelt.com/werke/herder/erlkoenigstochter.html>



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ENHANCING LANGUAGE PROFICIENCY

(Beherrschung der Sprachfertigkeit)

Course Code: GER2404

Credit Units: 04

Course Objective:

To enable students to enhance their language proficiency

- by analyzing texts and authentic documents of different genres
- through a study of newspaper and magazine articles and other texts

Course Contents:

Module 1

Verschiedene Texttypen und Textsorten
Analyse von Texte unterschiedlicher Genre.
Textexterne und textinterne Faktoren

Module 2

Informative Texte : Zeitungen, Zeitschriften, Sachtexte usw

Module 3

Kochrezepte, Gebrauchsanleitungen, Anzeige, Werbung, usw.

Examination Scheme:

Components	CT	Attd.	H	EE
Weightage (%)	20	5	5	70

Text & References:

Material compiled by the Department



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GERMAN CULTURE AND CIVILISATION

(Einführung in die deutsche Kultur und Zivilisation)

Course Code: GER2405

Credit Units: 04

Course Objective:

- This course is designed to give a broad cultural and social background of Germany.
- This course will highlight various other cultural aspects like German festivals, cuisine, cinema, music and theatre.
- The course will also talk about contemporary themes in Germany like political engagement of Germans, technology, environment, higher education etc.

Course Content:

Module I

Deutschland und Nachbarländer: Deutschlands Beziehung mit Nachbarländer wie Frankreich, Italien usw. , deutsch Sprachige Länder wie Schweiz, Österreich, Luxemburg usw.

Module II

Deutsche Kultur: Bräuche und Traditionen (Feste, Kochkunst, Kino, Malerei, Musik und Tanzkunst)

Module III


Zeitgenössische Themen: politische Stellung der Bundesländer, Technologie, Automobil und die Folgen für die Umwelt, die Streben nach höherer Bildung, Singles und unverheiratete Paare, deutsche Sorge, Hoffnungen und Visionen zum Thema Europa

Examination Scheme:

Components	CT	Att.	H	EE
Weightage (%)	20	5	5	70

Text and References

- Kirchmeyer Susanne, *Blick auf Deutschland: Landeskunde Deutsch als Fremdsprache*. Ernst Klett Verlag. Stuttgart 2004
- Berger, Maria Cr. u Martini, Maddalena. *Generation E Deutschsprachige Landeskunde im Europäischen Kontext*. Klett Verlag
- Ethlers, Michaela u Schladebach, Almut. *Politik in Deutschland*. Ernst Klett Sprachen Stuttgart
- Tipton, Frank B. *A history of modern Germany since 1815*. A&C Black, 2003.


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WRITTEN EXPRESSION-V (Schriftliche Kompetenz-V)

Course Code: GER2501

Credit Units: 05

Course Objective:

To furnish the linguistic tools

- To report past experiences, to write a newspaper article, to talk about a happy or sad moments
- To express differences and contrasts, to describe people and things
- To talk about television programs, to find a consensus, to read a thriller novel
- To do & describe relaxing exercises for one's health, to give suggestions and advices, examination by a doctor, to talk about statistics, to understand an instruction leaflet
- To ascertain opinions and views, to talk about language learning, to understand a radio transmission.
- To talk about professional wishes and interests, about business ideas, to apply for a job and to introduce oneself over telephone
- To talk about holiday wishes and dialogues while shopping, to understand travel brochures
- To talk & exaggerate about a dream house, unreal wishes, to live neighbors and resolve conflicts

Course Contents:

Lektion 7 : Rund ums Wohnen

Themen :

Über eine Traumwohnung sprechen und übertreiben, über irreales sprechen, eine Hausordnung verstehen, mit Nachbarn leben und Konflikte lösen

Lektion :8 Unter Freunden

Themen :

eine Spielanleitung verstehen, Du oder Sie ?eine Person näher beschreiben,über Freunde und Kollegen sprechen, eine Kontaktanzeige und ein interview verstehen, Reportage : Tipps für Singles

Lektion 9 : Technik und Alltag

Themen

Unter Schein und Wirklichkeit sprechen, Über zeitliche Bezüge sprechen, Bedienungsanleitungen verstehen und erklären, sich in einem „ Forum“ im Internet austauschen, eine Geschichte verstehen

Lektion 10 : Rund ums Produkt

Themen :

Über Pannen und Missgeschicke im Alltag sprechen, ein Produkt näher beschreiben, sich im Handel, bei Dienstleitern beschweren, Radiosendung : Frauen in der Werbung

Lektion 11 : Mit Menschen

Themen :

Über Plänen und gute Vorsätze sprechen, sich entschuldigung und jemanden überreden,über Benimm-Regeln sprechen einen Standpunkt vertreten,über andere ländern und ihre Sitten sprechen

Lektion 12 Rat und Hilfe

Themen :

ein Problem beschreiben und sich beraten lassen, ein schriftliches Interview verstehen, einen Sachtext verstehen, über Engagement sprechen, über Vorbilder und Gewissensfragen sprechen

Lektion 13 Aus Politik und Geschichte**Themen :**

Über Politische Entscheidung sprechen und sie vergleichen, Zeitungsmeldungen über politisches Engagement, Deutsche Geschichte nach 1945, über Parteien und Politiker sprechen.

Lektion 14 Zu Hause in der Welt**Themen :**

über Deutschland und das Heimatland sprechen, Radio-Umfrage : Meinungen zu Europa, Kurioses aus Europa, über Heimat sprechen, Artikel : Zukunftsvisionen

Grammatik :

- Temporale Konjunktionen mit Wiederholung von Präteritum, Plusquamperfekt, Adjektivdeklinaton
- Infinitiv mit zu Perfekt und wiederholung von Präsens und Konjunktiv II
- Graduierung der Adverbien, doppelte Verneinung
- Konjunktion *falls*
- Relativsatz mit Präposition
- Adjektiv als Nomen
- N-Deklination
- Zweiteilige Konjunktion *je...desto, sowohl...als auch, weder..noch*
- Konjunktion *als ob, nachdem, während*
- Relativsätze mit was und wo
- Werden+ Infinitiv
- Konjunktion *:seit dem, ohne dass, bis, in dem*
- Adjektivdeklinaton mit dem *Komparativ und Superlativ*
- Partizip Perfekt als Adjektiv
- Passiv Präteritum und Perfekt

Examination Scheme:

Components	CT	Home Assign	Attd.	EE
Weightage (%)	20	5	5	70

Text & References:

- Niebisch, Daniela et al. Schritte International 5. Ismaning : Heuber Verlag, 2006
- Niebisch, Daniela et al. Schritte International 6. Ismaning : Heuber Verlag, 2006

ORAL EXPRESSION-V (Mündliche Kompetenz-V)

Course Code: GER2502

Credit Units: 04

Course Objective: To provide the students with the know-how

- to understand the German phonetic system
- to develop strategies of listening comprehension
- to pass from written to oral, from oral to written easily
- to be sensitized to nuances of speech, dialectical variations, and „Sprache bemerken und festhalten“
- to master the current social communication skills in oral
- to enrich the formulations, the linguistic tools and vary the sentence structure

Course Content:

Listening exercises and speaking tasks (imagining dialogues, role plays, telephone conversations participating in debates, and discussions) of:

Niebisch, Daniela et al. Schritte International 5. Ismaning : Heuber Verlag, 2006


Niebisch, Daniela et al. Schritte International 6. Ismaning : Heuber Verlag, 2006

Examination Scheme:

Components	CT	Att.	H	EE
Weightage (%)	20	5	5	70

Text & References:

- Niebisch, Daniela et al. Schritte International 5. Ismaning : Heuber Verlag, 2006
- Niebisch, Daniela et al. Schritte International 6. Ismaning : Heuber Verlag, 2006


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INTRODUCTION TO GERMAN LITERATURE

(Einführung in die deutsche Literatur)

Course Code: GER2503

Credit Units: 05

Course Objective:

To introduce students to different literary epochs starting from enlightenment till modernism through extracts of selected texts from different genres by famous authors.

Course Content:

Module 1:

Aufklärung : Emilia Galotti (1772) - Lessing
Nathan der Weise (1779) - Lessing

Sturm und Drang : Teil des Briefromans : Leiden des jungen Werther(1774) – Goethe
Der Erlkönig - Goethe (1778)

Klassik : Maria Stuart – Schiller (1800)

Module 2 :

Romantik : Teil des romans Der blonde Eckbert (1797) – Tieck
Kinder- und Hausmärchen (1812) - Gebrüder Grimm

Junges Deutschland

und Vormärz : Der Hessische Landbote (1834) - Büchner
Woyzeck (1836) - Büchner
Das Lied der Deutschen (1841) – Fallersleben
Deutschland. Ein Wintermärchen (1844) - Heine

Realismus : Maria Magdalene (1844) - Heibel
Immensee (1850) – Storm
Kleider machen Leute – Gottfried Keller


Module 3 :

Naturalismus : Bahnwärter Thiel (1888) - Hauptmann
Vor Sonnenaufgang (1889) – Hauptmann

Moderne : Buddenbrooks (1901) - Thomas Mann

Examination Scheme:

Components	CT	Attd.	H	EE
Weightage (%)	20	5	5	70


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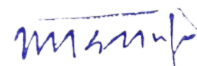

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Text & References:

- Wulf , Segebrecht: *Gedichte und Interpretationen*: Band 3. Klassik und Romantik Taschenbuch – 1986
- Thomas , Mann: *Buddenbrooks* Paperback – Apr 2015
- Friedrich Hebbel : *Maria Magdalena* (German Texts) Paperback – Import, Dec 1944, Blackwell Publishers 1944
- Gottfried Keller : *Kleider Machen Leute*. Paperback, Nabu Press
- Ludwig Tieck: *Der Blonde Eckbert / Der Runenberg* , CreateSpace Independent Publishing Platform 2015
- Friedrich Schiller : *Maria Stuart: Ein Trauerspiel*. CreateSpace Independent Publishing Platform 2013
- Gotthold Ephraim Lessing : *Emilia Galotti: Ein Trauerspiel* in fünf Aufzügen Taschenbuch 2014
- Nathan der Weise Taschenbuch – 3. Februar 2015
- Gotthold Ephraim Lessing , CreateSpace Independent Publishing Platform 2015
- Woyzeck Reclam XL - Text und Kontext Taschenbuch 2013
- Georg Büchner , Rüdiger Bernhardt C. Bange Verlag; Auflage: 3. Aufl. 2013
- Gotthold Ephraim Lessing : *Königs Erläuterungen: Textanalyse und Interpretation zu Lessing. Emilia Galotti*, Bange; Auflage: 2., Aufl. (10. August 2012)
- Theodor Storm: *Immensee* ,CreateSpace Independent Publishing Platform 2012
- Heinrich Von Kleist : *Das Erdbeben in Chili / Die Verlobung in St. Domingo*. CreateSpace Independent Publishing Platform 2015
- Thomas Mann : *Der Tod in Venedig* 2014



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SUMMER PROJECT EVALUATION

Course Code: GER2535

Credit Units: 03

Summer Project is primarily a research work and its primary objective is to gain knowledge through practical experience, a sound appreciation and understanding of the theoretical principles learnt during the semesters. It involves academic reading of several sources and writing on a particular topic relating to the core course or courses of the program. It is a scholarly inquiry into academic problems or issues. It should involve a systematic approach to gathering and analysis of information/ideas, leading to production of a structured report. The research topic should hold significant academic value commensurate with level of the Program.

GUIDELINES FOR SUMMER PROJECT REPORT

Topic

The topic of the paper will be of the student's choice with consent of the Supervisor. It must be relevant to the content of the course, but it should be treated in greater depth than it is covered in class. Make sure the subject focuses on one question or topic so that the paper has a definite purpose. Composing an introduction and conclusion can be a good test of the cohesiveness of the subject. The domain can include literature, culture, civilization or any other related areas.

Synopsis of Summer Project Report

A Synopsis of the Summer Project Report should be submitted to the Board of Studies of the Institute. The Board, after deliberation, will suggest changes and modifications and will assign a supervisor from amongst the teaching faculty of the Institute. The synopsis should include the following –

Title of Summer Project Report

Introduction

Problems of Research/Presenting the topic/Problems/Issues of Research

Objectives of Research

Tentative Subheadings

Suggested readings

Source Material and References

Presenting your own ideas in a Summer Project Report is encouraged. However, the paper must be based on facts and opinions from authoritative sources and these sources must be given proper credit. A minimum of three published sources should be cited. Direct quotes must be placed inside quotation marks or in indented sections and should be used sparingly. Paraphrasing is better in most cases.

There are two popular ways to cite references. One is to place superscripted numbers in the text with corresponding footnotes at the bottom of the page or endnotes at the end of the paper. More typical of scientific papers is to place the author and year in parentheses (Heaton, 1984). In either case you need a bibliography of all cited sources at the end of the paper with author(s), year, title, publication or publisher, volume, and pages. These should be in alphabetical order by name of the primary author. Preference however should be given to MLA Style Sheet.

Be sure to find source materials that are specific to your topic, either books or journal articles. Textbooks are usually too general and should be avoided. The libraries have published and computerized indexes

that can be used to find relevant sources. See the Supervisor or a reference librarian if you are unfamiliar with these resources.

Plagiarism is the presenting of someone else's wording or ideas as one's own and is a violation of university policy. If you use someone else's words or ideas, you must give them proper credit. You must also obtain permission from the Supervisor before using your Summer Project Report for more than one course.

Length and Format

Length is not important; 20 to 25 pages of 2 spaced texts is a good target. The title, author, course, and date should be typed onto a cover sheet. Illustrations are not required but are often useful in explaining graphical concepts and in giving the paper character. The bibliography should be the last section of the paper. The entire report has to be submitted in two spiral bound copies.

Grading

Students are required to make two submissions: a first draft and a final draft prior to final submission. The first draft is *not* to be a "rough" draft; it should be a completed, typed paper like you would ordinarily submit. It will read by the supervisor carefully, who may offer suggestions for improvement, give it a grade, and return it to you promptly. The final draft, which is worth a larger share of the points, is your chance to respond to the suggestions and submit an improved paper. This will make the writing of a Summer Project Report more of a learning experience. We strongly suggest using a word processor so that the final draft can be created by editing rather than complete retyping.

Grading is based on both research content and presentation. Your paper should demonstrate that you have gained a level of expertise in the subject by studying the relevant literature. Your presentation should be clean and convincing with proper use of paragraphs, complete sentences, and correct grammar, spelling, and punctuation. Make your Summer Project Report look and sound professional.

Sl. No.	Evaluated by	Criteria	Marks
1	Institution	<ul style="list-style-type: none">• Scope and content• Understanding and presenting the topic• Depth and breadth of analysis• Project fulfillment• Language, logical flow, coherence.• Data collection ability in the field (if any)• Scope of Implementation.(if applicable)	50
2	Board of Examiners	Viva-voce Examination	50
Total			100

Project Schedule

Registration

First week of the last academic month

Allotment of Faculty Guide takes place in accordance to the area of interest / stream chosen by the student at the time of registration.

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Approval of Project Topic

Week following the „week of registration“

Submission of Synopsis To Faculty Guide

Prior to the completion of End-Term Examination. The synopsis could be submitted any time after the allotment of project topic but certainly must be before completion of last examination.

Duration of Project

The project stretches for the full duration of the Semester break .

Submission of Report

First Draft – After 20 Days from the commencement of the project.

Second Draft – 20 days after submission of the first draft.

The first and second reports could be submitted through e-mail or any other medium as per the consent of faculty guide.

Final Draft – Within second week of rejoining of institution.



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INTRODUCTION TO LINGUISTICS

Course Code: GER2504

Credit Units: 04

Course Objective:

This paper aims to provide the students the basic knowledge of Linguistics and its various branches of study. The focus of the paper is to enable the learners to have an understanding of the science of language and to be able to analyze linguistically any given language including the foreign language that they pursue.

Course Contents:

Module I: Introduction

What is language and linguistics?

Design features of human language.

Various branches of Linguistics and their application.

Module II: Phonetics and Phonology

Anatomy and physiology of speech production

Classification of sounds through IPA symbols

Difference between Phonetics and Phonology.

Module III: Morphology

Basic concepts of morphology

Word Formation processes

Module IV: Syntax

Theories and concepts of Syntactic structure.

Analysis of sentence structure

Module V: Semantics

Basic concepts of Semantics


Meaning and types of Meaning

Examination Scheme:

Components	CT	Attd.	H	EE
Weightage (%)	20	5	5	70

Text & References:

Text: Fromkin, V., and R. Rodman. 1974 (9th Edition) *An Introduction to Language*. New York: Holt, Rinehart and Winston.


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References:

- Akmajian, A., R.A. Demers, A.K. Farmer, & R.M. Harnish 2001. *Linguistics: An Introduction to Language and Communication*. Cambridge, Massachusetts: The MIT Press
- Carnie, Andrew. 2013 (3rd Edition). *Syntax: A Generative Introduction*. West Sussex: Wiley-Blackwell Publication
- Crystal D.1997. *Encyclopedia of Language: 2nd Vol.*, Cambridge: Cambridge University Press
- Haegeman, L. 1991. (rev. Ed.). *Introduction to Government and Binding Theory*.
- Hockett. C.F. 1958. *A Course in Modern Linguistics*. New York: Macmillan. Indian Edition, New Delhi: Oxford and IBH Publishing Co.
- Katamba, F. and John Stonham 2006. *Morphology* 2nd ed. London: Palgrave.
- Ladefoged, Peter. 2001 (4th edn.). *A course in phonetics*. New York: Harcourt Brace.
- Lyons J, 1977. *Semantics*. 2 Vols. Cambridge: Cambridge University Press.
- Odden, David. 2005. *Introducing phonology*. Cambridge: Cambridge University Oxford: Blackwell.Press
- Roach, P. 2001. *Phonetics*. Oxford: Oxford University Press.



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BUSINESS GERMAN-I

(Deutsch für den Beruf-I)

Course Code: GER2505

Credit Units: 4

Course Objective:

The Program's objective is to familiarise students with the current terminology used in German business contexts and building an extensive active and passive Business German vocabulary.

Course Content: Unternehmen Deutsch (Course Book)

Module I

Herzlich Willkommen:

Gäste, Besucher begrüßen, sich vom Gastgeber verabschieden, Wünsche , Bitten im Hotel vortragen, Besuchs und Besichtigungprogramme planen, sich nach Veranstaltung erkündigen Speisen und Getränke empfehlen und bestellen.

Rund um die Firma

Über Branchen und Produkte sprechen, Wirtschaftsbereiche benennen, Schaubilder und Diagramme beschreiben, Unternehmenstrukturen erläutern, die Geschichte einer Firma darstellen, ein Unternehmen vorstellen.

Am Arbeitsplatz

Abteilung im Betrieb und ihre Aufgaben darstellen, Betrieblicher Arbeit, neue Mitarbeiter vorstellen, über Krankheiten, Schmerzen und Beschwerden sprechen, Fragen beim Arzt beantworten, Krankversicherungssysteme vergleichen.

Von Haus zu Haus mit...

Planen und organisieren, auf Aufträge erteilen und reagieren, passende Mittel in der Geschäftskommunikation wählen.

Das perfekte Mietsystem

Abläufe beschreiben: Was wird von wem gemacht? über Vereinbarung und Verpflichtung informieren, Ursachen für Störungen im geschäftlichen Ablauf ermitteln, Verschiedene Zahlungsweisen unterscheiden und benutzen.

Grammatik


- Reflexivpronomen und Verben
- Genitiv-Atribut
- Possessivartikel
- Verben mit Präposition
- Satzbau: Dativ-und Akkusativ
- Adjektivendung
- Relativsatz und pronomen
- KII-Gegenwart und Vergangenheit: würde+Infinitiv, hätte/ware+Partizip
- Passiv
- Indirekte Fragen mit Ob und dass Sätze

Examination Scheme:

Components	CT	Att.	H	EE
Weightage %	20	5	5	70

Text & References:

- Jörg Braunert, Wolfram Schlenker : Unternehmen Deutsch B1/B2. Ernst Klett Sprachen GmbH, Stuttgart 2006


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WRITTEN EXPRESSION-VI

(Schriftliche Kompetenz-VI)

Course Code: GER2601

Credit Units: 05

Course Objective:

To furnish the linguistic tools

- To give, accept and decline an invitation
- To talk about wishes and expectations
- To read biographies and make notes
- To compare pictures
- To read advertisements
- To talk about rights and duties
- To predict things and advice
- To talk about media and its role
- To talk about eating habits and food
- To summarize a text
- To express ideas about nature
- To describe tourist places
- To talk about professions and job applications
- To write a bio data and to ask questions regarding it
- To talk about relationships
- To discuss a hypothesis, to take a position and to criticize
- To talk about books and reading habits
- To talk about a theme for and against the motion, to interrupt and continue a discussion.

Course Contents:

Lektion 1 : Von Feen und Prinzen

Themen :

Über Märchen sprechen und nacherzählen, eine Biografie lesen und Notizen machen, Bilder vergleichen, einen Werbetext schreiben

Lektion 2 : Mein gutes Recht

Themen :

Über Rechte und Pflichten sprechen, Wissen und Nichtwissen ausdrücken, Vermutungen äußern, sich beschweren, Konflikte lösen, eine Beschwerdebrief schreiben, Ratschläge geben

Lektion 3 : Digital zu Hause

über Medien und Mediennutzung sprechen, eine Grafik auswerten und kommentieren, eine Nachricht auf der Mailbox hinterlassen.

Lektion 4 : Einfach lecker ?!

Über Lebensmittel und Essen sprechen, Aussagen kurz kommentieren, etwas aushandeln, bestätigen, bestellen, einen Text auswerten und zusammenfassen

Lektion 5 : Natur pur

Eigene Ideen/Gedanken zum Thema 'Natur' ausdrücken, einen Standort beschreiben, über Urlaubziele sprechen, über Ausbildungsinhalte sprechen

Lektion 6 : Viel Arbeit

Über Arbeit diskutieren, über Arbeitsuche und Bewerbung sprechen, Frage zum Lebenslauf stellen und beantworten, eine tabellarischen Lebenslauf schreiben, ein Bewerbungsschreiben verfassen

Lektion 7 : wo die Liebe hinfällt

Über Beziehungen sprechen, eine Hypothese diskutieren, Positionen im Raum darstellen, Eindrücke beschreiben und kommentieren, eine Kritik schreiben.

Lektion 8 : Lesezeichen

Über Bücher und Lesegeohnheiten sprechen, Vor- und Nachteile zu einem Thema sammeln und Stellung nehmen, eine Diskussion führen, beim Diskutieren unterbrechen/ weitersprechen, eine Geschichte zu Ende schreiben.

Grammatik :


- Infinitiv mit zu Perfekt und wiederholung von Präsens und Konjunktiv II
- Graduierung der Adverbien, doppelte Verneinung
- Partizip I mit Verb oder Nomen, Nebensatz von Hauptsatz
- Satzglieder erkennen, Umstellprobe, Satzgliedkerne erkennen, verben und Ergänzungen
- Nomen Verb Verbindungen
- Reflexivpronomen
- Adjektivpaare auf -los und -voll
- Indirekte Rede
- Konzessive und konsekutive Konnektoren und Präpositionen
- Indefinitpronomen : irgendwer, irgendwelche

Examination Scheme:

Components	CT	Home Assign	Attd.	EE
Weightage (%)	20	5	5	70

Text and References

- Studio d: Sprach-und Prüfungstraining: die Mittelstufe./von Rita Maria Niemann und Nelli Pasemann. B2, Sprach-und Prüfungstraining. Cornelsen, 2012.


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ORAL EXPRESSION-VI (Mündliche Kompetenz-VI)

Course Code: GER2602

Credit Units: 04

Course Objective:

To provide the students with the know-how

- to understand the German phonetic system
- to develop strategies of listening comprehension
- to pass from written to oral, from oral to written easily
- to be sensitized to nuances of speech, dialectical variations.
- to overcome the fear of speaking a foreign language and take position as a foreigner speaking German.

Course Content:

Listening exercises and speaking tasks (imagining dialogues, role plays, telephone conversations) of:

- Studio d: Sprach-und Prüfungstraining: die Mittelstufe./von Rita Maria Niemann und Nelli Pasemann. B2, Sprach-und Prüfungstraining. Cornelsen, 2012.

Examination Scheme

Components	CT	Home Assign	Attd.	EE
Weightage (%)	20	5	5	70

Texts & References

- Studio d: Sprach-und Prüfungstraining: die Mittelstufe./von Rita Maria Niemann und Nelli Pasemann. B2, Sprach-und Prüfungstraining. Cornelsen, 2012.



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DISSERTATION

Course Code: GER2637

Credit Units: 03

Dissertation is primarily a research work. It involves academic reading of several sources and writing on a particular topic relating to the core course or courses of the program. It is a scholarly inquiry into academic problems or issues. It should involve a systematic approach to gathering and analysis of information/ideas, leading to production of a structured report. The research topic should hold significant academic value commensurate with level of the Program.

The Dissertation will help students deal with literary problems and issues and they will learn to demonstrate critical thinking in research and writing.

GUIDELINES OF DISSERTATION

Objectives of Dissertation

The students will decide the topic at the beginning of the session in consultation with the Supervisor assigned. The progress of the work will be monitored regularly by the Supervisor. At the end of the Semester/Term the detailed dissertation will be submitted to the Supervisor assigned. The evaluation will be done by Board of Studies of the Institute.

Title of Dissertation

The title should reflect the area and problems/issues of the dissertation properly. The student should do a preliminary reading of primary as well as secondary texts on the identified area of research followed by discussion with the teaching faculty before deciding the title. The title may be decided only after the area and problems of research have been identified. The student should ensure that the title is related to one or more of the courses or areas of the study program.

Synopsis of Dissertation:

A Synopsis of the Dissertation should be submitted to the Board of Studies of the Institute. The Board, after deliberation, will suggest changes and modifications and will assign a supervisor from amongst the teaching faculty of the Institute. The synopsis should include the following –

Title of Dissertation

Introduction

Problems of Research

Objectives of Research

Tentative Chapterization

Suggested readings

Format of Dissertation:

- Cover page should provide **Title, Student's particulars, Supervisor's Name and name of Institution/School.**
- Self- declaration
- Certificate from the HOI/HOD of the school. & the supervisor
- Acknowledgements
- Table of contents.

- Chapter I should be a general introduction of the Dissertation: background of the area, problems and objectives of the dissertation. The nature and scope of the dissertation may also be given.
- Other chapters will constitute the body of the Dissertation. The number of chapters and their length will depend on, among others, a critical analysis, implications and major findings.
- References: quotes and extracts should be recorded appropriately in Parenthetical References or Footnotes.
- Appendices and Glossary, if any, should be placed after the concluding chapter.
- Bibliography should be put at the end of the Dissertation: It should include all primary and secondary materials referred in the Dissertation. The references will include Manuscript, Primary Tests, Secondary Texts, Journals, e-texts and Web-links.
- Annexures (if any)

Please note:


Format for Cover page, declaration and certificates from the HOI/HOD of the school will be provided by the department.

Typing Instructions:

- Paper A4 Size
- Font (Times New Roman)-12 Points
- Spacing between two lines 2
- Margins Left = 1.5 inch, Right = 1 inch

Submission of Dissertation:

- Students **MUST** write the dissertation in the **Language of Specialization** only.
- Each student will make at least three copies of project report in the recommended format. It should be typed on one side. The students will submit one copy to the school and one copy to the concerned guide (internal).
- Two or more students cannot work on the same topic. It will not be acceptable.
- Each student is required to make a soft copy of the dissertation (in CD) and submit along with the dissertation.
- Dissertation will be run on plagiarism software and if found copied appropriate action will be taken against the student.
- Only 30-40% quotations are allowed, 60% of work should be their original work.
- The cover page must be hard bound in navy blue color with golden embossing. The size of the report would depend on the project undertaken. However it must be 30-35 (approx.) typed pages on A4 size paper. All the students are required to use uniform font and format (except in heading and subheadings) throughout the dissertation.
- The dissertation must be submitted along with certificates (one from the Head of the Institution of the school and another from the Supervisor) authenticating the originality of the work done in the prescribed format.
- If any matter in the report is picked up from any source and the source name is not referred in the bibliography section then it will be treated as a case of plagiarism. (Cheating)
- If the student uses any table/graph or Figure, then it is to be numbered and source of information from which it is collected, is to be mentioned under each.
- Page numbers should be mentioned at the bottom center of each page.


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Assessment Scheme:

Continuous Evaluation:

40%

(Based on abstract writing, interim draft, general approach, research orientation, readings undertaken etc.)

Final Evaluation:

60%

(Based on the organization of the work, objectives/ problem profile/ issue outlining, comprehensiveness of the research, flow of the idea/ ideas, relevance of material used/presented, outcomes vs. objectives, presentation/ viva etc.)



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BUSINESS GERMAN-II

(Deutsch für den Beruf-II)

Course Code: GER2605

Credit Units: 4

Course Objective: The syllabus is in continuation of Business German-I where the students deal with complex grammar and business oriented vocabulary. It prepares the students to communicate effectively at workplace, makes them aware of the professional language and develops intercultural competence.

Course Content : Unternehmen Deutsch (Course Book)

Module I

Der Mitarbeiter im Betrieb

Über das Personalwesen sprechen, Wünsche und Ziele ausdrücken, Inhalte präsentieren, ein Mitarbeitergespräch führen, Zielvereinbarungen treffen, Arbeitszeiten und Gehälter vergleichen.

Verkaufen, verkaufen, verkaufen

Umsatzziele und Maßnahmen vorschlagen und vereinbaren, Marketingstrategien besprechen, Vorschläge machen, zustimmen, widersprechen, Verkaufsverhandlung führen, planen, organisieren, evaluieren.

Auf der Messe

Über Messen sprechen, Gründe für eine Messebestellung nennen, Messegespräche führen, Produkte vorstellen, Aufgabe im Team verteilen, pro und contra diskutieren.

Import-Export

Eine Auftragsabwicklung erläutern, Lieferwege nachverfolgen, über die Allgemeinen Geschäftsbedingungen sprechen, auf Beschwerden reagieren.

Ich möchte hier arbeiten

Um Informationen zu Stellenanzeigen bitten, Bildungssysteme vergleichen, einen Lebenslauf schreiben, Bewerbungsbriefe schreiben, Vorstellungsgespräche führen, sich über den Arbeitsmarkt in einem deutschsprachigen Land erkundigen.

Grammatik

- Dass- Sätze/ Infinitivsätze mit zu
- Konjunktiv II
- Der Gebrauch von werden und Konjugation
- Partizip Perfekt und mit sein und als Adjektive
- Passiv Perfekt und Präteritum
- Präpositionen mit Genitiv: trotz, wegen, während, statt
- Relativsätze mit Präposition
- Konjunktion mit Nebensatz: wenn, obwohl, weil, während

Examination Scheme:

Components	CT	Att.	H	EE
Weightage %	20	5	5	70

Text & References:

- Jörg Braunert, Wolfram Schlenker : Unternehmen Deutsch B1/B2. Ernst Klett Sprachen GmbH, Stuttgart 2006

Bachelor of Arts Spanish (Honors)

FLEXILEARN

-Freedom to design your degree



Programme Structure

Curriculum & Scheme of Examination

2022

AMITY UNIVERSITY HARYANA
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WRITTEN EXPRESSION-I

(Expresión Escrita-I)

Course Code: SPA2101

Credit Units: 05

Course Objective:

To furnish the linguistic tools

- to present oneself and others, to ask and give personal information
- to give directions, to describe one's surrounding
- to talk about likes and dislikes hobbies
- to tell time and date, to talk about daily routine
- to describe weather
- to take about events in past, to talk about one's experiences

Course Contents:

Unidad 1: Nosotros

Objetivos Comunicativos:

A dar y a pedir los datos personales: el nombre, la edad etcétera. , a saludar y a despedirnos.

Unidad 2: Quiero aprender español

Objetivos Comunicativos:

A expresar intenciones, a expresar intereses, a explicar motivos de lo que hacemos.

Unidad 3: ¿Dónde está Santiago?

Objetivos Comunicativos:

Describir lugares y países, expresar existencia, hablar de ubicación, hablar del clima.

Unidad 4: ¿Cuál prefieres?

Objetivos Comunicativos:

Identificar objetos, expresar necesidad, hablar de preferencias, comprar en tiendas, preguntar por productos, pedir precios etc.

Unidad 5: Tus amigos son mis amigos

Objetivos Comunicativos:

Hablar del aspecto y del carácter, expresar gustos e intereses, preguntar sobre gustos, contrastar gustos, hablar de relaciones personales.

Unidad 6: Día a día

Objetivos Comunicativos:

Hablar de hábitos, expresar frecuencia, describir rutina diaria y el uso de los verbos reflexivos.

Unidad 7: ¡A comer!

Objetivos Comunicativos:

Pedir y dar información sobre comida, las comidas del día, hábitos gastronómicos de los españoles, platos típicos del mundo latino.

Contenido Gramatical:

- Ortología o pronunciación correcta: vocales, consonantes, sílabas. El acento tónico o de intensidad. Grupos fónicos y figuras entonacionales. La puntuación.
- Las tres conjugaciones: -ar, -er, -ir y los verbos ser, tener y llamarse
- El artículo determinado e indeterminado. Algunos usos de a, con, de, por y para
- Los pronombres personales sujeto .El presente de Indicativo (verbos terminados en -ar)

er/-ir)

- Algunos usos de hay, El verbo estar. El Superlativo, Un/una/unos/unas, Mucho/ mucha/ muchos/muchas
- Qué/cuál/cuáles/cuántos/ cuántas/ Dónde/Cómo
- Los demostrativos: este/esta/estos/estas/esto
- El/la/los/las adjetivo, Qué+ sustantivo/ cuál/cuáles
- Tener que + Infinitivo, El verbo Ir El verbo gustar, Los posesivos
- El presente de Indicativo de algunos verbos irregulares. Los verbos reflexivos
- Yo también/ Yo tampoco/ Yo sí/ Yo no. Primero/ Después/ Luego

Examination Scheme

Component	CT	Home Assign	Att.	EE
Weightage (%)	20	5	5	70

Text & References:

Text

El Libro para seguir

Corpas, Jaime et al. Aula Internacional 1. Barcelona: Difusión, 2005.

Corpas, Jaime et al. Cuadernos de gramática española A1. Barcelona: Difusión, 2010.

Fuentes

Concha Moreno Garc. Nuevo Español Sin Fronteras. SGEL. 2005.



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ORAL EXPRESSION-I

(Expresión Oral)

Course Code: SPA2102

Credit Units: 05

Course Objective: To provide the students with the know-how

- to understand the Spanish phonetic system
- to develop strategies of listening comprehension
- to pass from written to oral, from oral to written easily
- to be sensitized to nuances of speech, dialectical variations.
- to overcome the fear of speaking a foreign language and take position as a foreigner speaking Spanish.

Course Content:

Listening exercises and speaking tasks (imagining dialogues, role plays, telephone conversations) of:

- Corpas, Jaime et al. *Aula Internacional I*. Barcelona: Difusión, 2005.
- Jesús Sánchez Lobato et al. *Español sin fronteras. España: SGE, 2005*

Examination Scheme:

Components	CT	Attd.	EE
Weightage (%)	25	5	70

Texts & References:

- Corpas, Jaime et al. *Aula Internacional I*. Barcelona: Difusión, 2005.
- Jesús Sánchez Lobato et al. *Español sin fronteras. España: SGE, 2005*.



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GRAMMAR AND COMMUNICATIVE SPANISH-I

(Gramática y español comunicativo)

Course Code: SPA2103

Credit Units: 5

Course Objective:

To furnish the linguistic tools

- to present oneself and others, to ask and give personal information
- to give directions, to describe one's surrounding
- to talk about likes and dislikes, hobbies
- to tell time and date, to talk about daily routine
- to describe weather
- to talk about events in past, to talk about one's experiences

Course Content:

Actos de comunicación

Unidad 1: Conociendo gente

Saludos y despedidas formales e informales, Presentarte y presentar a otros, Preguntar y contestar sobre nombre, nacionalidad y profesión.

Unidad 2: ¿Dónde está?

Situar lugares y objetos en el espacio, Preguntar y contestar sobre direcciones y teléfonos, Preguntar y contestar sobre la existencia de lugares y objetos.

Unidad 3: ¿Tienes tiempo?

Hablar de horas y de fechas, hablar de algunas costumbres y situar en el tiempo, preguntar y expresar costumbres y frecuencia

Unidad 4: ¡Que cara esta la vida!

Hablar de cantidades: precios, salarios, monedas etcétera, Preguntar e informar sobre el precio de cosas usuales, comprar el precio entre países, Expresar sorpresa, acuerdo y desacuerdo con exclamaciones.

Unidad 6: ¿Y cómo es él?

Descripciones físicas, hablar de relaciones con otras personas, preguntar por la edad, llamar la atención, confirmar una afirmación

Unidad 7: Para gustos están los colores

Expresar y pedir opinión, expresar, preguntar y contrastar gustos y preferencias

Gramática:

- El género y el número
- El artículo determinado e indeterminado
- Las tres conjugaciones –ar, -er& -ir y los verbos ser, llamarse, tener, vivir etc.
- Construcciones con hay e el verbo estar
- Los artículos
- Interrogativos: ¿Cuál?, ¿Dónde?
- Presente de hacer, ir(se) y venir
- Contracciones al, del

- Marcadores de frecuencia
- Algunos exclamaciones
- Los demostrativos
- Adjetivos posesivos
- La doble negación.

Examination Scheme:

Components	CT	Home Assign	Attd.	EE
Weightage (%)	20	5	5	70

Text & References:

Text: Nueva Español sin Fronteras I, SGEL, Madrid, 1998

Referencia

Aula Internacional I, Editorial difusión, Barcelona, 2006 (Indian Edition Available)



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WRITTEN EXPRESSION-II

(Expresión Escrita-II)

Course Code: SPA2201

Credit Units: 05

Course Objective:

To furnish the linguistic tools

- to express one's point of view, difficulties, emotions, motivation, preferences etc.
- to describe lodgings, objects
- to talk about or narrate events in past and future,
- to talk about health, express pain and symptoms
- to ask and to give advices, to give instructions
- to compare objects and people, to describe daily activities

Course Contents:

Unidad 8: El barrio ideal

Objetivos Comunicativos:

Describir pueblo, barrios y ciudades, hablar de lo que más uno gusta de un lugar, pedir y dar información para llegar a un sitio.

Unidad 9: ¿Sabes cocinar?

Objetivos Comunicativos:

Hablar de platos típicos del mundo hispánico, hablar de experiencias pasadas, hablar de habilidades y aptitudes, hablar de cualidades y defectos de las personas.

Unidad 10: Una vida de película

Objetivos Comunicativos:

Escribir y describir una biografía imaginaria, hablar de cineastas del mundo hispánico.

Unidad 1: ¿El español y tú

Objetivos Comunicativos:

Hablar de hábitos, expresar duración, preguntar y responder sobre motivaciones, hablar de dificultades, hacer recomendaciones.

Unidad 2: Hogar dulce hogar

Objetivos Comunicativos:

Expresar gustos y preferencias, describir una casa, ubicar objetos en el espacio, describir objetos: los muebles y las partes de la casa.

Unidad 3: Esta soy yo

Objetivos Comunicativos:

Identificar y describir físicamente a las personas, hablar de las relaciones y de los parecidos entre personas.

Unidad 4: ¿Cómo va todo?

Objetivos Comunicativos:

Desenvolverse en situaciones muy codificadas: invitaciones, presentaciones, saludos y despedidas, pedir cosas, acciones y favores.

Contenido Gramatical:

- Los verbos poner y traer
- La forma impersonal con se


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- Los cuantificadores
- A resaltar un aspecto
- El Pretérito Perfecto
- Saber + Infinitivo
- Adjetivos de carácter
- La forma y algunos usos del Pretérito Indefinido
- Marcadores temporales para el pasado
- Empezar a + Infinitivo
- Ir / Irse

Examination Scheme

Component	CT	Home Assign	Attd.	EE
Weightage (%)	20	5	5	70

Text & References:

Text

El Libro para seguir

Corpas, Jaime et al. *Aula Internacional 1*. Barcelona: Difusión, 2005.

Corpas, Jaime et al. *Cuadernos de gramática española A1*. Barcelona: Difusión, 2010.

Corpas, Jaime et al. *Cuadernos de gramática española A2*. Barcelona: Difusión, 2010.

Corpas, Jaime et al. *Aula Internacional 2*. Barcelona: Difusión, 2005.

Fuentes

Concha Moreno Garc. *Nuevo Español Sin Fronteras 1*. SGEL. 2005.

Concha Moreno Garc. *Nuevo Español Sin Fronteras 2*. SGEL. 2005.



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ORAL EXPRESSION-II

(Expresión Oral)

Course Code: SPA2202

Credit Units: 05

Course Objective: To provide the students with the know-how

- to understand the Spanish phonetic system
- to develop strategies of listening comprehension
- to produce sentence-level oral discourse in Spanish and begin to connect strings of coherent sentences to approximate paragraph-level oral discourse
- to apply appropriate listening strategies to aid their understanding of extended discourse in spoken Spanish
- to be sensitized to nuances of speech, dialectical variations.
- to overcome the fear of speaking a foreign language and take position as a foreigner speaking Spanish

Course Content:

Listening exercises and speaking tasks (imagining dialogues, role plays, telephone conversations) of:

- Corpas, Jaime et al. Aula Internacional 2. Barcelona: Difusión, 2005.
- Jesús Sánchez Lobato et al. Español sin fronteras. España: SGE, 2005

Examination Scheme:

Components	CT	Attd.	EE
Weightage (%)	25	5	70

Text & References

- Corpas, Jaime et al. Aula Internacional 2. Barcelona: Difusión, 2005.
- Jesús Sánchez Lobato et al. Español sin fronteras. España: SGE, 2005.



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GRAMMAR AND COMMUNICATIVE SPANISH-II

Course Code: SPA2203

Credit Units: 6

Course Objective:

To furnish the linguistic tools

- to express one's point of view, difficulties, emotions, motivation, preferences etc.
- to ask and to give advices, to give instructions
- to express likes and give opinions regarding what one has seen or read.
- to talk about events in past, to talk about one's experiences
- to talk about habits in past.

Course Content:

Actos de comunicación

Unidad 8: ¡Ay, Qué dolor, qué dolor!

Preguntar cómo se encuentra una persona, expresar dolor y malestar, expresar obligación, expresar deseos.

Unidad 9: El próximo fin de semana salimos

Expresar planes e intenciones, expresar acciones futuras, hablar por teléfono, poner mensajes en el contestador automático

Unidad 10: Unidad de repaso.

Unidad 11: ¿Que ha pasado? Hablar de pasado. Dar excusas y disculparte. Ofrecer ayuda inmediata. Expresar gustos y opciones sobre algo que has visto o leído. Expresar ignorancia.

Unidad 12: ¿Qué tal las vacaciones?


Hablar de acontecimientos pasados. Hablar de la última vez. Expresar tiempo aproximado.

Unidad 13: ...Porque Éramos Jóvenes

Expresar hábitos y costumbre en el pasado. Describir en el pasado. Expresar la circunstancia en que ocurre algo.

Gramática:

- Uso de seguir + gerundio, seguir + infinitivo, estar + gerundio
- Tener/deber + infinitivo
- Tener ganas de/Apetecer + infinitivo / nombre
- Futuros de los verbos en -ar, -er y -ir.
- Ir a+ infinitivo, pensar +infinitivo, estar pensando en +infinitivo
- Después de/ antes de + Infinitivo
- Pretérito perfecto, pronombres objeto directo, verbo Saber.
- Pretéritos irregulares, acordarse de + pretérito.
- Pretérito imperfecto, marcadores temporales de frecuencia.
- Usos del imperfecto. Soler + infinitivo.


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Examination Scheme:

Components	CT	Home Assign	Attd.	EE
Weightage (%)	20	5	5	70

Text & References

Text: Nueva Español sin Fronteras I, SGEL, Madrid, 1998

Referencia:

Aula Internacional I, Editorial difusión, Barcelona, 2006 (Indian Edition Available)



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WRITTEN EXPRESSION-III

(Expresión Escrita-III)

Course Code: SPA2301

Credit Units: 04

Course Objective:

- to furnish the linguistic tools
- to ask for a service, authorization.
- to ask questions in a given situation
- to talk about or narrate events in past
- to talk about one's relation with a language
- to describe someone, a journey, sentiments
- to accept or to refuse a proposal
- to give one's opinion, to carry out a debate or an interaction

Course Contents:

Unidad 5: Guía del ocio

Objetivos Comunicativos:

Hablar de actividades de ocio, hablar de horarios, relatar experiencias pasadas, describir lugares, hablar de intenciones y de proyectos.

Unidad 6: No como carne

Objetivos Comunicativos:

Hablar de gustos y de hábitos alimentarios, preparar el bufé para una fiesta con toda la clase.

Unidad 7: Nos gustó mucho

Objetivos Comunicativos:

Hablar de experiencias y a valorarlas, expresar el deseo de hacer algo, hacer una lista de las cosas más interesantes del lugar.

Unidad 8: Estamos muy bien

Objetivos Comunicativos:

Dar consejos, hablar de estados de ánimo, describir dolores, molestias y síntomas.

Unidad 9: Antes y ahora

Objetivos Comunicativos:

Hablar de hábitos, costumbres y circunstancias en el pasado, situar acciones en el pasado y en el presente, argumentar y debatir.

Unidad 10: Momentos Especiales

Objetivos Comunicativos:

Relatar en pasado, secuenciar acciones, el contraste entre el pretérito indefinido y el pretérito imperfecto.

Unidad 11: Busque y compre

Objetivos Comunicativos:

Dar instrucciones, describir una escena en pasado y en presente, imperativos y sus usos.

Unidad 12: Mañana

Objetivos Comunicativos:

Hablar de acciones y situaciones futuras, expresar condiciones.

Contenido Gramatical:

- El pretérito perfecto .Ir a+ infinitivo
- ya/ todavía no , las formas impersonales con se
- Algunos usos de ser y de estar y/pero/además
- Usos del pretérito perfecto y del pretérito indefinido
- parecer, caer bien/mal
- me/te/le/nos/os/les gustaría + infinitivo
- usos de los verbos ser y estar
- Algunos usos del pretérito imperfecto
- ya no / todavía, futuro imperfecto.
- El contraste entre pretérito indefinido y el pretérito imperfecto
- Las formas del pasado de estar + gerundio.
- Imperativos

Examination Scheme

Component	CT	Home Assign	Attd.	EE.
Weightage (%)	20	5	5	70

Text & References:

Text

El Libro para seguir

Corpas, Jaime et al. Aula Internacional 1. Barcelona: Difusión, 2005.

Corpas, Jaime et al. Aula Internacional 2. Barcelona: Difusión, 2005.

Corpas, Jaime et al. Cuadernos de gramática española A1. Barcelona: Difusión, 2010.

Corpas, Jaime et al. Cuadernos de gramática española A2. Barcelona: Difusión, 2010.

Fuentes

Concha Moreno Garc. Nuevo Español Sin Fronteras1.SGEL.2005.

Concha Moreno Garc. Nuevo Español Sin Fronteras 2.SGEL.2005.

ORAL EXPRESSION-III (Expresión Oral)

Course Code: SPA2302

Credit Units: 04

Course Objective: To provide the students with the know-how

- which includes all aspects of the Spanish language: grammar, vocabulary and phonetics,
- colloquial expressions etc., and benefit from continuous personalized evaluation.
- to express in Spanish in a variety of situations, through active learning.
- to develop strategies of listening comprehension
- conversation practice, listening comprehension and reproduction of the text. Use of
- audio and video materials
- to be sensitized to nuances of speech, dialectical variations.
- to master the current social communication skills in oral
- to enrich the formulations, the linguistic tools and vary the sentence structure

Course Content:

Listening exercises and speaking tasks (imagining dialogues, role plays, telephone conversations, participating in debates, and discussions) of:


- Corpas, Jaime et al. *Aula Internacional 2*. Barcelona: Difusión, 2006.
- Corpas, Jaime et al. *Aula Internacional 3*. Barcelona: Difusión, 2006.
- Jesús Sánchez Lobato et al. *Español sin fronteras*. España: SGE, 2006

Examination Scheme:

Components	CT	Attd.	EE
Weightage (%)	25	5	70

Text & References:

- Corpas, Jaime et al. *Aula Internacional 2*. Barcelona: Difusión, 2006.
- Corpas, Jaime et al. *Aula Internacional 3*. Barcelona: Difusión, 2006.
- Jesús Sánchez Lobato et al. *Español sin fronteras*. España: SGE, 2006.


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WRITTEN EXPRESSION-IV

(Expresión Escrita-IV)

Course Code: SPA2401

Credit Units: 05

Course Objective:

To develop the writing skills

- to express sentiments, obligation, possibility
- to present a person, to narrate a story
- to give or to justify one's opinion.

Course Contents:

Unidad 1: Volver a empezar

Objetivos Comunicativos:

Hablar de hábitos en el presente, relatar experiencias pasadas, el uso de los tiempos del pasado.

Unidad 2: Prohibido Prohibir

Objetivos Comunicativos:

Expresar prohibición, expresar obligatoriedad, expresar impersonalidad, hablar de hábitos.

Unidad 3: Mensajes

Objetivos Comunicativos:

Desenvolverse por teléfono, tomar y dejar recados por teléfono, algunas estrategias de comunicación.

Unidad 4: Va y le dice

Objetivos Comunicativos:

Relatar en presente, resumir un argumento, contar chiste, los usos de los pronombres de OD y de OI

Unidad 5: ¡Basta Ya!

Objetivos Comunicativos:

Expresar deseos, reclamaciones y necesidades, valorar situaciones y hechos.

Unidad 6: El turista accidental

Objetivos Comunicativos:

Recursos para contar anécdotas, recursos para mostrar interés al escuchar un relato, hablar de cosas y de consecuencias.

Unidad 7: Tenemos que hablar

Objetivos Comunicativos:

Expresar interés y sentimientos, hablar de las relaciones entre las personas, contra argumentar, suavizar una expresión de desacuerdo.


Unidad 8: De Diseño

Objetivos Comunicativos:

Describir las características y el funcionamiento de algo, opinar sobre objetos, usar las frases exclamativas.

Contenido Gramatical:

- Pretérito perfecto y Indefinido.
- Los pronombres de OD y de OI
- Presente de subjuntivo


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- Pretérito pluscuamperfecto.
- Los verbos irregulares
- Expresiones exclamativas.

Examination Scheme

Component	CT	Home Assign	Attd.	EE
Weightage (%)	20	5	5	70

Text & References:

Text

El Libro para seguir

Corpas, Jaime et al. Aula Internacional 1. Barcelona: Difusión, 2005.

Corpas, Jaime et al. Aula Internacional 2. Barcelona: Difusión, 2005.

Corpas, Jaime et al. Cuadernos de gramática española A1. Barcelona: Difusión, 2010.

Corpas, Jaime et al. Cuadernos de gramática española A2. Barcelona: Difusión, 2010.

Corpas, Jaime et al. Aula Internacional 3. Barcelona: Difusión, 2006.

Fuentes

Concha Moreno Garc. Nuevo Español Sin Fronteras 1, SGEL. 2005.

Concha Moreno Garc. Nuevo Español Sin Fronteras 2, SGEL. 2005.



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ORAL EXPRESSION-IV (Expresión Oral)

Course Code: SPA2402

Credit Units: 04

Course Objective: To provide the students with the know-how

- to understand the Spanish phonetic system
- to develop strategies of listening comprehension
- to pass from written to oral, from oral to written easily
- to be sensitized to nuances of speech, dialectical variations.
- to master the current social communication skills in oral
- to enrich the formulations, the linguistic tools and vary the sentence structure

Course Content:

Listening exercises and speaking tasks (imagining dialogues, role plays, telephone conversations, participating in debates, and discussions) of:

- Corpas, Jaime et al. *Aula Internacional 3*. Barcelona: Difusión, 2006.
- Jesús Sánchez Lobato et al. *Español sin fronteras*. España: SGE, 2006.

Examination Scheme:

Components	CT	Attd.	EE
Weightage (%)	25	5	70

Text & References:

- Corpas, Jaime et al. *Aula Internacional 3*. Barcelona: Difusión, 2006.
- Jesús Sánchez Lobato et al. *Español sin fronteras*. España: SGE, 2006.



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BUSINESS SPANISH

(Español profesional paranegocio)

Course Code: SPA2403

Credit Units: 05

Course Objective:

- To familiarize the students with the essentials of professional French
- To enable the students;
 - to take an appointment
 - to enquire and give information about different cities of Spain
 - to talk about work habits and preferences (verbs like to want/ prefer)
 - to present Spanish companies, prepare their CVs, and to face interviews

CourseContents: IntermedioUnidad6-9 pp. 56-95

Contenidoléxico: Unidad: 6: Lugares para trabajar, lugares para vivir

- i) Características de un piso
- ii) Objetos de oficina
- iii) Instalaciones y servicios de un hotel

Unidad 7: Agenda de trabajo

- i) Actividadescotidianas
- ii) Las partes del día
- iii) Los días de la semana
- iv) Proponer y concertarunacita
- v) Rechazar una propuesta , justificarse , plantear una alternativa , expresar consejo
- vi) Curriculum vitae

Unidad 8: Citas y reuniones

- i) Hábitosalimentarios
- ii) Platostípicos
- iii) Los ingredientes de un plato.

Unidad 9: Productos y proyectos

- i) Colores, materiales, tamaño de los productos.
- ii) Estaciones del año.

TareaComunicativa:

- i) Hablar de acciones habituales y del horario.
- ii) Expresar gustos y preferencias de trabajo
- iii) Proponer y rechazar una cita a compañeros del trabajo o invitar a unos clientes.
- iv) Conversación entre un camarero y dos clientes.
- v) Expresarobligación y consejo
- vi) Enfrentar la entrevista de trabajo: presentar a si mismo, estudios, practicas, experiencia profesional, preparación para entrevista, simulación de entrevista.
- vii) Describir los productos: material, color, función, precio.

ContenidoGramatical:

- i) La concordancia del adjetivo, el presente de indicativo de preferir y querer.
- ii) Contraste entre ser y estar, los cuantificadores del adjetivo.
- iii) La comparación: más /menos+adjetivo+que, más /menos+sustantivo+que.
- iv) El superlative:el/la/los/las, más /menos+adjetivo+que
- v) El presente de indicativo de empezar, querer, preferir, poder, dormir, salir etc
- vi) Con+ pronombrespersonales:conmigo,contigo

- vii) Marcadores de frecuencia y secuencia; siempre, casi siempre, a veces, nunca y primero, después, luego
- viii) La construcción es que, tener que + Infinitivo
- ix) Por la mañana/tarde/noche, a/al mediodía
- x) El verbo gustar, los pronombres de Objeto Indirecto, las fechas
- xi) A mí también /tampoco, a mí, sí/no
- xii) Expresiones para invitar y proponer algo

Examination Scheme

Component Codes	CT	Attd.	H	EE.
Weightage (%)	20	5	5	70

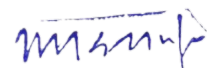
Text &References:

El Libro para seguir

- González, Marisa et al. *Socios I Libro del alumno*. Barcelona: Difusión, 2007.
- González, Marisa et al. *Socios I Workbook*. Barcelona: Difusión, 2007.



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WRITTEN EXPRESSION-V

(Expresión Escrita-V)

Course Code: SPA2501

Credit Units: 05

Course Objective:

To develop the writing skills

- To report speech, to express one's point of view
- To analyze an editorial, to compare informations given in different texts
- To describe or narrate an experience
- To give advice and organize a debate
- To express an opposition, a hypothesis, a goal, probabilities
- To compare

Course Contents:

Unidad 9: Misterios y enigmas

Objetivos Comunicativos:

Hacer hipótesis y conjeturas, relatar sucesos misteriosos.

Unidad 10: Buenas noticias

Objetivos Comunicativos:

Redactar una noticia, referirse a una noticia y comentarla, el uso de voz pasiva.

Unidad 11: Yo nunca lo haría

Objetivos Comunicativos:

Dar consejos, evocar situaciones imaginarias, opinar sobre acciones y conductas, expresar desconocimiento, expresar deseo.

Unidad 12: América

Objetivos Comunicativos:

Recursos para narrar acontecimientos de pasado, los usos del presente de subjuntivo, cómo expresar conocimientos y desconocimientos sobre un tema.

Unidad 1: Maneras de vivir

Objetivos Comunicativos:

Hablar de sentimientos, del carácter y de la personalidad, dar consejos y hacer propuestas, expresar deseos, hablar de las cualidades de personas y objetos.

Unidad 2: Así pasó

Objetivos Comunicativos:

Usos del imperfecto de indicativo, uso del imperfecto de subjuntivo, usos del gerundio, la colocación del adjetivo.

Unidad 3: ¿Y tú qué opinas?

Objetivos Comunicativos:

Dar nuestra opinión usando creo que más indicativo, no creo que más subjuntivos. Discutir vocabulario para hablar del ocio y del turismo.

Contenido Gramatical:

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- Subjuntivos
- La voz pasiva
- Uso de condicional
- Pretérito imperfecto del subjuntivo
- Usos de por y para.

Examination Scheme

Component	CT	Home Assign	Attd.	EE.
Weightage (%)	20	5	5	70

Text & References:

Text

El Libro para seguir

Corpas, Jaime et al. Aula Internacional 1. Barcelona: Difusión, 2005.

Corpas, Jaime et al. Aula Internacional 2. Barcelona: Difusión, 2005.

Corpas, Jaime et al. Cuadernos de gramática española A1. Barcelona: Difusión, 2010.

Corpas, Jaime et al. Cuadernos de gramática española A2. Barcelona: Difusión, 2010.

Corpas, Jaime et al. Aula Internacional 3. Barcelona: Difusión, 2006.

Corpas, Jaime et al. Aula Internacional 4. Barcelona: Difusión, 2006.

Fuentes

Concha Moreno Garc. Nuevo Español Sin Fronteras 1. SGEL. 2005.

Concha Moreno Garc. Nuevo Español Sin Fronteras 2. SGEL. 2005.



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ORAL EXPRESSION-V

(Expression Oral)

Course Code: SPA2502

Credit Units: 04

Course Objective: To provide the students with the know-how

- to understand the Spanish phonetic system
- to develop strategies of listening comprehension
- to pass from written to oral, from oral to written easily
- to be sensitized to nuances of speech, dialectical variations.
- to master the current social communication skills in oral
- to enrich the formulations, the linguistic tools and vary the sentence structure
- to present facts, projects, plans with precision
- to develop logical thinking, to speak, argue and debate in a coherent and cohesive manner employing appropriate words of liaison, and transition

Course Content:

Preparing presentations, talk about any topic, developing the techniques of debates, discussions; mastering the art of convincing through logical arguments

- Corpas, Jaime et al. *Aula Internacional 4*. Barcelona: Difusión, 2006.
- Jesús Sánchez Lobato et al. *Español sin fronteras. España: SGE, 2005.*

Examination Scheme:

Components	CT	Att.	EE
Weightage (%)	25	5	70

Text & References:

- Corpas, Jaime et al. *Aula Internacional 4*. Barcelona: Difusión, 2006.
- Jesús Sánchez Lobato et al. *Español sin fronteras. España: SGE, 2005.*



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INTRODUCTION TO TRANSLATION

(Introducción a la Traducción)

Course Code: SPA2503

Credit Units: 05

Course Objective:

To introduce to students

- Basic concepts and theory of translation
- Methods and procedures
- Translation of commercial correspondence, such as brochures, handouts, agreements, contracts, etc. from Spanish to English and vice versa.

Course Contents:

Module I

What is translation, the concept of source text and target text, the concept of original audience, text internal and text external factors, types of dictionaries and references, using parallel text and background text.

Module II

Introduction to methodology and theories of translation, equivalence and adequacy in translation, skopos theory, about various pioneers of translation and their theories.

Module III

Grammatical and lexical aspects of translation, stylistic variations in language, various text types.

Module IV


Theory and problems of Translation: Commercial, Economic, Journalistic and Technical Texts.

Examination Scheme

Component	CT	Attd.	H	EE
Weightage (%)	20	5	5	70

Text & References:

- Jack Child *Introduction to Spanish Translation*; University Press of America, 2012
- José H. Valdivieso, L. Teresa Valdivieso, D.C. Heath / Co, *Negocio y comunicación*, Lexington, Massachussets, 1988.
- Blanca Aguirre, Consuelo Hernández, *Curso de español comercial*, SEGEL, Madrid, 1987.
- Josefa Gómez de Enterría, *Correspondencia comercial en español*, SEGEL, Madrid, 1990.


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SUMMER PROJECT EVALUATION

Course Code: SPA2535

Credit Units: 03

Summer Project is primarily a research work and its primary objective is to gain knowledge through practical experience, a sound appreciation and understanding of the theoretical principles learnt during the semesters. It involves academic reading of several sources and writing on a particular topic relating to the core course or courses of the program. It is a scholarly inquiry into academic problems or issues. It should involve a systematic approach to gathering and analysis of information/ideas, leading to production of a structured report. The research topic should hold significant academic value commensurate with level of the Program.

GUIDELINES FOR SUMMER PROJECT REPORT

Topic

The topic of the paper will be of the student's choice with consent of the Supervisor. It must be relevant to the content of the course, but it should be treated in greater depth than it is covered in class. Make sure the subject focuses on one question or topic so that the paper has a definite purpose. Composing an introduction and conclusion can be a good test of the cohesiveness of the subject. The domain can include literature, culture, civilization or any other related areas.

Synopsis of Summer Project Report

A Synopsis of the Summer Project Report should be submitted to the Board of Studies of the Institute. The Board, after deliberation, will suggest changes and modifications and will assign a supervisor from amongst the teaching faculty of the Institute. The synopsis should include the following –

Title of Summer Project Report

Introduction

Problems of Research/Presenting the topic/Problems/Issues of Research

Objectives of Research

Tentative Subheadings

Suggested readings

Source Material and References

Presenting your own ideas in a Summer Project Report is encouraged. However, the paper must be based on facts and opinions from authoritative sources and these sources must be given proper credit. A minimum of three published sources should be cited. Direct quotes must be placed inside quotation marks or in indented sections and should be used sparingly. Paraphrasing is better in most cases.

There are two popular ways to cite references. One is to place superscripted numbers in the text with corresponding footnotes at the bottom of the page or endnotes at the end of the paper. More typical of scientific papers is to place the author and year in parentheses (Heaton, 1984). In either case you need a bibliography of all cited sources at the end of the paper with author(s), year, title, publication or publisher, volume, and pages. These should be in alphabetical order by name of the primary author. Preference however should be given to MLA Style Sheet.

Be sure to find source materials that are specific to your topic, either books or journal articles. Textbooks are usually too general and should be avoided. The libraries have published and computerized indexes that can be used to find relevant sources. See the Supervisor or a reference librarian if you are unfamiliar with these resources.

Plagiarism is the presenting of someone else's wording or ideas as one's own and is a violation of university policy. If you use someone else's words or ideas, you must give them proper credit. You must

also obtain permission from the Supervisor before using your Summer Project Report for more than one course.

Length and Format

Length is not important; 20 to 25 pages of 2 spaced texts is a good target. The title, author, course, and date should be typed onto a cover sheet. Illustrations are not required but are often useful in explaining graphical concepts and in giving the paper character. The bibliography should be the last section of the paper. The entire report has to be submitted in two spiral bound copies.

Grading

Students are required to make two submissions: a first draft and a final draft prior to final submission. The first draft is *not* to be a "rough" draft; it should be a completed, typed paper like you would ordinarily submit. It will read by the supervisor carefully, who may offer suggestions for improvement, give it a grade, and return it to you promptly. The final draft, which is worth a larger share of the points, is your chance to respond to the suggestions and submit an improved paper. This will make the writing of a Summer Project Report more of a learning experience. We strongly suggest using a word processor so that the final draft can be created by editing rather than complete retyping.

Grading is based on both research content and presentation. Your paper should demonstrate that you have gained a level of expertise in the subject by studying the relevant literature. Your presentation should be clean and convincing with proper use of paragraphs, complete sentences, and correct grammar, spelling, and punctuation. Make your Summer Project Report look and sound professional.

Sl. No.	Evaluated by	Criteria	Marks
1	Institution	<ul style="list-style-type: none">• Scope and content• Understanding and presenting the topic• Depth and breadth of analysis• Project fulfillment• Language, logical flow, coherence.• Data collection ability in the field (if any)• Scope of Implementation.(if applicable)	50
2	Board of Examiners	Viva-voce Examination	50
Total			100

Project Schedule

Registration

First week of the last academic month

Allotment of Faculty Guide takes place in accordance to the area of interest / stream chosen by the student at the time of registration.

Approval of Project Topic

Week following the „week of registration“

Submission of Synopsis To Faculty Guide

Prior to the completion of End-Term Examination. The synopsis could be submitted any time after the allotment of project topic but certainly must be before completion of last examination.

Duration of Project

The project stretches for the full duration of the Semester break .

Submission of Report

First Draft – After 20 Days from the commencement of the project.

Second Draft – 20 days after submission of the first draft.

The first and second reports could be submitted through e-mail or any other medium as per the consent of faculty guide.

Final Draft – Within second week of rejoining of institution.



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INTRODUCTION TO LINGUISTICS

Course Code: SPA2504

Credit Units: 04

Course Objective: This paper aims to provide the students the basic knowledge of Linguistics and its various branches of study. The focus of the paper is to enable the learners to have an understanding of the science of language and to be able to analyze linguistically any given language including the foreign language that they pursue.

Course Contents:

Module I: Introduction

What is language and linguistics?

Design features of human language.

Various branches of Linguistics and their application.

Module II: Phonetics and Phonology

Anatomy and physiology of speech production.

Classification of sounds through IPA symbols.

Difference between Phonetics and Phonology.

Module III: Morphology

Basic concepts of morphology

Word Formation processes

Module IV: Syntax

Theories and concepts of Syntactic structure.

Analysis of sentence structure

Module V: Semantics

Basic concepts of Semantics

Meaning and types of Meaning

Examination Scheme:

Components	CT	ATT	H	EE
Weightage %	20	5	5	70

Text & References:

Text:

Fromkin, V., and R. Rodman. 1974 (9th Edition). *An Introduction to Language*. New York: Holt, Rinehart and Winston.

References:

1. Akmajian, A., R.A. Demers, A.K. Farmer, & R.M. Harnish 2001. *Linguistics: An Introduction to Language and Communication*. Cambridge, Massachusetts: The MIT Press
2. Carnie, Andrew. 2013 (3rd Edition). *Syntax: A Generative Introduction*. West Sussex: Wiley- Blackwell Publication
3. Crystal D.1997. *Encyclopedia of Language: 2nd Vol.*, Cambridge: Cambridge University Press
4. Haegeman, L. 1991. (rev. Ed.). *Introduction to Government and Binding Theory*.
5. Hockett. C.F. 1958. *A Course in Modern Linguistics*. New York: Macmillan. Indian Edition, New Delhi: Oxford and IBH Publishing Co.
6. Katamba, F. and John Stonham 2006. *Morphology* 2nd ed. London: Palgrave.
7. Ladefoged, Peter. 2001 (4th edn.). *A course in phonetics*. New York: Harcourt Brace.
8. Lyons J, 1977. *Semantics*. 2 Vols. Cambridge: Cambridge University Press.
9. Odden, David. 2005. *Introducing phonology*. Cambridge: Cambridge University Oxford: Blackwell.Press
10. Roach, P. 2001. *Phonetics*. Oxford: Oxford University Press.

WRITTEN EXPRESSION-VI

(Expresión Escrita-VI)

Course Code: SPA2601

Credit Units: 05

Course Objective:

- To develop the writing skills
- to express regret, one's opinion, the cause, sentiments
- to defend or to justify oneself
- to talk about one's relation with a language
- to compare, to talk about the qualities of others

Course Contents:

Unidad 4: Se valorará la experiencia

Objetivos Comunicativos:

Usos del pretérito perfecto de subjuntivo, usos de se en oraciones impersonales, usos de las oraciones pasivas.

Unidad 5: La vida es puro teatro

Objetivos Comunicativos:

Describir acciones con adjetivos, gerundios y adverbios, describir los movimientos y la situación de personas y cosas, describir estados de ánimo, hablar de la postura corporal.

Unidad 6: Dijiste que lo harías

Objetivos Comunicativos:

Uso de presente/ imperfecto de subjuntivo, escribir y describir relatos breves, una carta etcétera.

Unidad 7: Lugares con encanto

Objetivos Comunicativos:

Usos de la voz pasiva, hablar de ciudades; describirlas y comentar sus cualidades, expresar sentimientos positivos, negativos o neutros sobre algo.

Unidad 8: Antes de que sea tarde

Objetivos Comunicativos:

Uso de diferentes recursos léxicos y gramaticales para cohesionar textos: uso de sinónimos, hipónimos, pronombres. Comprender y poder capaz de formar noticias y artículos periodísticos imaginarios.

Unidad 9: Vivir para trabajar


Objetivos Comunicativos:

Hablar de cualidades en el trabajo, hablar de problemas y sentimientos en el trabajo, describir una empresa, hablar de las funciones de un puesto de trabajo.

Unidad 10: Como no lo sabía

Objetivos Comunicativos:

Hablar de hechos no realizados en el pasado y de sus consecuencias, hacer reproches, hablar de habilidades etcétera.


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Contenido Gramatical:

- Pretérito perfecto de subjuntivo
- Uso de se, construcciones relativas: aquellos que, todo aquel que etcétera.
- Condicional compuesto
- El pretérito pluscuamperfecto de subjuntivo.
- Usos de poner y quedar
- Volver a más infinitivo.
- Seguir más gerundio.

Examination Scheme:

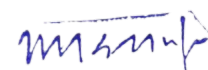
Component	CT	Home Assign	Attd.	EE.
Weightage (%)	20	5	5	70

Text & References:

- **El Libro para seguir:** Corpas, Jaime et al. Aula Internacional 1. Barcelona: Difusión, 2005.
- **El Libro para seguir:** Corpas, Jaime et al. Aula Internacional 2. Barcelona: Difusión, 2005.
- **El Libro para seguir:** Corpas, Jaime et al. Aula Internacional 3. Barcelona: Difusión, 2006.
- **El Libro para seguir:** Corpas, Jaime et al. Aula Internacional 4. Barcelona: Difusión, 2006.



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ORAL EXPRESSION-VI

(Expression Oral)

Course Code: SPA2602

Credit Units: 04

Course Objective: To provide the students with the know-how

- to understand the Spanish phonetic system
- to develop strategies of listening comprehension
- to pass from written to oral, from oral to written easily
- to be sensitized to nuances of speech, dialectical variations.
- to master the current social communication skills in oral
- to enrich the formulations, the linguistic tools and vary the sentence structure
- to present facts, projects, plans with precision
- to develop logical thinking, to speak, argue and debate in a coherent and cohesive manner employing appropriate words of liaison, and transition

Course Content:

Preparing presentations, talk about any topic, developing the techniques of debates, discussions; mastering the art of convincing through logical arguments

Presentación: presentación, aprecio y texto crítico y el debate sobre la declaración.

Géneros literarios: Presentar un texto literario.

Asistir una entrevista.

- Corpas, Jaime et al. *Aula Internacional 4*. Barcelona: Difusión, 2005.
- Jesús Sánchez Lobato et al. *Español sin fronteras*. España: SGE, 2005.


Examination Scheme:

Components	CT	Att.	EE
Weightage (%)	25	5	70

Text & References:

El Libro para seguir:

- Corpas, Jaime et al. *Aula Internacional 4*. Barcelona: Difusión, 2005.
- Jesús Sánchez Lobato et al. *Español sin fronteras*. España: SGE, 2005.


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INTRODUCTION TO SPANISH LITERATURE

(Introducción a la literatura española: Tipología de los géneros literarios españoles)

Course Code: SPA2603

Credit Units: 06

Course Objective:

To introduce the students to Spanish literature through extracts of texts selected from different literary genres of various famous authors across the centuries

Course Content:

Module I: Novelas

Miguel de Cervantes : Novelas Ejemplares
Federico García Lorca : La casa de Bernarda Alba
Doña Perfecta : Benito Pérez Galdós
La familia de Pascual Duarte : Camilo José Cela
Benito Pérez Galdós : Marianela

Module II: Teatro

Pedro Calderón : Autos Sacramentales
La Celestina : Fernando de Rojas
La vida es sueño : Lope de Vega
Don Juan Tenorio : José Zorrilla

Module III: Poesía

Luis de Góngora : Letrillas y sonetos
Francisco de Quevedo : Sueños
José Martí : Versos sencillos
Rubén Darío : Canto de Vida Esperanza
Pablo Neruda : Veinte poemas de amor

Examination Scheme:

Components	CT	Att.	H	EE
Weightage (%)	20	5	5	70

Text & References:

- *Literaturahispanoamericana* 1 y 2, Ed. de Enrique Anderson Imbert y Eugenio Florit, Holt, Rinehart and Winston, 1970.
- Alborg, Juan Luis. *Historia de la literatura española. Tomo II: Barroco*. Madrid, Gredos, 1972.
- Wilson, Edward M. y Moir, Duncan. *Historia y crítica de la literatura española 3. Siglo de Oro: Teatro (1492-1700)*. México, Ariel, 1987.

DISSERTATION

Course Code: SPA2637

Credit Units: 03

Dissertation is primarily a research work. It involves academic reading of several sources and writing on a particular topic relating to the core course or courses of the program. It is a scholarly inquiry into academic problems or issues. It should involve a systematic approach to gathering and analysis of information/ideas, leading to production of a structured report. The research topic should hold significant academic value commensurate with level of the Program.

The Dissertation will help students deal with literary problems and issues and they will learn to demonstrate critical thinking in research and writing.

GUIDELINES OF DISSERTATION

Objectives of Dissertation

The students will decide the topic at the beginning of the session in consultation with the Supervisor assigned. The progress of the work will be monitored regularly by the Supervisor. At the end of the Semester/Term the detailed dissertation will be submitted to the Supervisor assigned. The evaluation will be done by Board of Studies of the Institute.

Title of Dissertation

The title should reflect the area and problems/issues of the dissertation properly. The student should do a preliminary reading of primary as well as secondary texts on the identified area of research followed by discussion with the teaching faculty before deciding the title. The title may be decided only after the area and problems of research have been identified. The student should ensure that the title is related to one or more of the courses or areas of the study program.

Synopsis of Dissertation:

A Synopsis of the Dissertation should be submitted to the Board of Studies of the Institute. The Board, after deliberation, will suggest changes and modifications and will assign a supervisor from amongst the teaching faculty of the Institute. The synopsis should include the following –

Title of Dissertation

Introduction

Problems of Research

Objectives of Research

Tentative Chapterization

Suggested readings

Format of Dissertation:

- Cover page should provide **Title, Student's particulars, Supervisor's Name and name of Institution/School.**
- Self- declaration
- Certificate from the HOI/HOD of the school. & the supervisor
- Acknowledgements
- Table of contents.
- Chapter I should be a general introduction of the Dissertation: background of the area, problems and objectives of the dissertation. The nature and scope of the dissertation may also be given.
- Other chapters will constitute the body of the Dissertation. The number of chapters and their length will depend on, among others, a critical analysis, implications and major findings.

- References: quotes and extracts should be recorded appropriately in Parenthetical References or Footnotes.
- Appendices and Glossary, if any, should be placed after the concluding chapter.
- Bibliography should be put at the end of the Dissertation: It should include all primary and secondary materials referred in the Dissertation. The references will include Manuscript, Primary Tests, Secondary Texts, Journals, e-texts and Web-links.
- Annexures (if any)

Please note:

Format for Cover page, declaration and certificates from the HOI/HOD of the school will be provided by the department.

Typing Instructions:

- Paper A4 Size
- Font (Times New Roman)-12 Points
- Spacing between two lines 2
- Margins Left = 1.5 inch, Right = 1 inch

Submission of Dissertation:

- Students **MUST** write the dissertation in the **Language of Specialization** only.
- Each student will make at least three copies of project report in the recommended format. It should be typed on one side. The students will submit one copy to the school and one copy to the concerned guide (internal).
- Two or more students cannot work on the same topic. It will not be acceptable.
- Each student is required to make a soft copy of the dissertation (in CD) and submit along with the dissertation.
- Dissertation will be run on plagiarism software and if found copied appropriate action will be taken against the student.
- Only 30-40% quotations are allowed, 60% of work should be their original work.
- The cover page must be hard bound in navy blue color with golden embossing. The size of the report would depend on the project undertaken. However it must be 30-35 (approx.) typed pages on A4 size paper. All the students are required to use uniform font and format (except in heading and subheadings) throughout the dissertation.
- The dissertation must be submitted along with certificates (one from the Head of the Institution of the school and another from the Supervisor) authenticating the originality of the work done in the prescribed format.
- If any matter in the report is picked up from any source and the source name is not referred in the bibliography section then it will be treated as a case of plagiarism. (Cheating)
- If the student uses any table/graph or Figure, then it is to be numbered and source of information from which it is collected, is to be mentioned under each.
- Page numbers should be mentioned at the bottom center of each page.

Assessment Scheme:

Continuous Evaluation:


40%

(Based on abstract writing, interim draft, general approach, research orientation, readings undertaken etc.)

Final Evaluation:

60%

(Based on the organization of the work, objectives/ problem profile/ issue outlining, comprehensiveness of the research, flow of the idea/ ideas, relevance of material used/presented, outcomes vs. objectives, presentation/ viva etc.)


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APPLIED SPANISH GRAMMAR AND INTRODUCTION TO LINGUISTICS

(Gramática aplicada del español e Introducción a la lingüística)

Course Code: SPA2604

Credit Units: 04

Course Objective: To lay a foundation in Spanish Grammar

To provide the students

- i. with a knowledge of basic grammatical concepts
- ii. with technical tools to do grammatical analysis of sentences
- iii. with a knowledge of basic theories and concepts in linguistics.

Course Content:

Module 1

Construcciones infinitivos

Los verbos auxiliares modales

Preposiciones

Por y para

Adjetivos indefinidos, pronombres y adverbios

Module 2

Las diferencias entre el español de América Latina y el español de España

Module 3

La lengua; su definición

Lugar de lengua en los hechos de lenguaje


Lugar de la lengua en los hechos humanos. La semiología

Examination Scheme:

Components	CT	Att.	H	EE
Weightage (%)	20	5	5	70

Text & References:

- Bradley, Peter T., and Lan Mackenzie. *Spanish: An Essential Grammar*. London: Routledge, 2004.
- Saussure, Ferdinand De, Charles Bally, and Albert Sechehaye. *Curso de Linguística General*. Madrid: Akal Editor, 1980.


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Curriculum & Scheme of Examination

2022

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SOCIAL FORMATIONS AND CULTURAL PATTERNS OF THE ANCIENT WORLD

Course Code: HIS2104

Credit Units: 5

Course Objective

The course is designed to provide in-depth knowledge about the historical processes of the ancient world. Some key components of the course include evolution of humankind, the Neolithic phase, Bronze Age civilizations, and the history of Ancient Greece. The course will give an insight into the socio-cultural and political factors which impacted the historical process in the world during the ancient period.

Course Content

Unit I Evolution of humankind

- Palaeolithic Culture
- Mesolithic Culture

Unit II Neolithic Phase

- Food production-beginnings of agriculture and animal husbandry

Unit III Bronze Age Civilizations

- Case Study I: Egypt
- Case Study II: Mesopotamia

Unit IV Ancient Greece I

- Slave society in ancient Greece
- Agrarian economy, urbanisation and trade

Unit V Ancient Greece II

- Polis in ancient Greece: Athens and Sparta
- Greek Culture
- Greek Religion

Examination Scheme

Components	A	P	A/TP	CT	EE
Weightage (%)	5	10	5	10	70

(A : Attendance ; P : Presentation ; A/TP : Assignment/Term Paper ; CT : Class Test ; EE : External Examination)

Texts and References

Compulsory Readings

Burns and Ralph. World Civilisations
Cambridge History of Africa, Vol. I
V. Gordon Childe, What Happened in History
G. Clark, World Prehistory : A New Perspective
B. Fagan, People of the Earth
Amar Farooqui, Early Social Formations
M. I. Finley, The Ancient Economy
Jacquetta Hawkes, First Civilisations
G. Roux, Ancient Iraq
Bai Shaoyi, An Outline History of China
H. W. F. Saggs, The Greatness that was Babylon

B. Trigger, Ancient Egypt: A Social History
UNESCO Series: History of Mankind, Vols. I – III/ or New ed. History of Humanity
R. J. Wenke, Patterns in Prehistory

Optional Readings

G. E. M. Ste Croix, Class Struggles in the Ancient Greek World
J. D. Bernal, Science in History, Vol. I
V. Gordon Childe, Social Evolution
Glyn Daniel, First Civilisations
A. Hauser, A Social History of Art, Vol. I



HISTORY OF EARLY INDIA-I

Course Code: HIS2105

Credit Units: 5

Course Objective

The course is aimed at providing in-depth knowledge about the historical processes of early India. The course also intends to provide a historiographical background to ancient Indian history by reconstructing the history of the period. The course will focus on Stone Age cultures, advent of food production, the Harappan Civilization, and the Vedic Period.

Course Content

Unit I Reconstructing Ancient Indian History

- Early Indian notions of History
- Sources and tools of historical reconstruction
- Historical interpretations (with special reference to gender, environment, technology, and regions)

Unit II Pre-historic Hunter-Gatherers

- Palaeolithic cultures- sequence and distribution; stone industries and other technological developments
- Mesolithic cultures- regional and chronological distribution; new developments in technology and economy; rock art

Unit III The Advent of Food Production

- Understanding the regional and chronological distribution of the Neolithic and Chalcolithic cultures : subsistence, and patterns of exchange

Unit IV The Harappan Civilization

- Origins; settlement patterns and town planning; agrarian base; craft productions and trade; social and political organisation; religious beliefs and practices; art; the problem of urban decline and the late/post-Harappan traditions

Unit V Cultures in Transition

- The Aryan Invasion Debate
- The Vedic Period

Examination Scheme

Components	A	P	A/TP	CT	EE
Weightage (%)	5	10	5	10	70

(A : Attendance ; P : Presentation ; A/TP : Assignment/Term Paper ; CT : Class Test ; EE : External Examination)

Texts and References

Compulsory Readings

D. P. Agrawal, The Archaeology of India, 1985

Bridget & F. Raymond Allchin, The Rise of Civilisation in India and Pakistan, 1983

A. L. Basham, The Wonder that Was India, 1971

D. K. Chakrabarti, The Archaeology of Ancient Indian Cities, 1997, Paperback

D. K. Chakrabarti, The Oxford Companion to Indian Archaeology, New Delhi, 2006

H. C. Raychaudhuri, Political History of Ancient India, Rev. ed. with Commentary by B.N.

Mukherjee, 1996

K. A. N. Sastri, ed., History of South India, OUP, 1966
R. S. Sharma, Material Culture and Social Formations in Ancient India, 1983
Upinder Singh, A History of Ancient and Early Medieval India, 2008
Romila Thapar, Early India from the Beginnings to 1300, London, 2002

Optional Readings

Uma Chakravarti, The Social Dimensions of Early Buddhism, 1997
Rajan Gurukkal, Social Formations of Early South India, 2010
R. Champakalakshmi, Trade, Ideology and Urbanisation South India 300 BC- AD 1300, 1996



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SOCIAL FORMATIONS AND CULTURAL PATTERNS OF THE MEDIEVAL WORLD

Course Code: HIS2106

Credit Units: 5

Course Objective

The course is designed to introduce students to the social patterns and cultural formations of the Medieval world. The key components of this course are an in-depth analysis of the Roman Republic, the religion and culture of ancient Rome, crisis of the Roman Empire, economic developments in Europe, and social formations in Central Islamic lands. The course is aimed at equipping students with learning about the historical processes of the medieval world.

Course Content

Unit I The Roman Republic

- Origins of the Roman Empire
- Slave society in ancient Rome
- Agrarian economy, urbanization and trade

Unit II Religion and Culture in Ancient Rome

- Roman Religion
- Cultural Patterns

Unit III Crises of the Roman Empire

- Causes of Decline of the Roman Empire

Unit IV Economic Developments in Europe from the 7th to the 14th Centuries

- Organisation of production
- Towns and trade
- Technological developments
- Crisis of feudalism

Unit V Societies in Central Islamic Lands

- The tribal background, ummah, Caliphal state; rise of Sultanates
- Religious developments : the origins of Shariah , Mihna ,Sufism
- Urbanisation and trade

Examination Scheme

Components	A	P	A/TP	CT	EE
Weightage (%)	5	10	5	10	70

(A : Attendance ; P : Presentation ; A/TP : Assignment/Term Paper ; CT : Class Test ; EE : External Examination)

Texts and References

Compulsory Readings

Perry Anderson, *Passages from Antiquity to Feudalism*

Marc Bloch, *Feudal Society*, 2 Vols

Cambridge History of Islam, 2 Vols

Georges Duby, *The Early Growth of the European Economy*

Fontana, *Economic History of Europe*, Vol. I (relevant chapters)

P. K. Hitti, *History of the Arabs*

P. Garnsey and Saller, *The Roman Empire*

Optional Readings

S. Ameer Ali, *The Spirit of Islam*

J. Barraclough, *The Medieval Papacy*

Encyclopaedia of Islam, 1st ed., 4 vols

M. G. S. Hodgson, *The Venture of Islam*



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HISTORY OF EARLY INDIA-II

Course Code: HIS2205

Credit Units: 4

Course Objective

The course is aimed at developing an understanding among students about the socio-political processes of Ancient Indian history. The key components of the course include social stratification, changing political formations, history of the Gupta Empire, religious philosophy and their development in this phase, and the important cultural developments of the period.

Course Content

Unit I Social Stratification

- Class, *varna*, *jati*, untouchability
- Gender and the institution of marriage

Unit II Changing political formations

- The Mauryan Empire
- Post-Mauryan Polities with special reference to the Kushanas and the Satavahanas
-

Unit III The Gupta Empire and Post-Gupta Period

- Nature of Polity
- Socio-cultural developments
- Post-Gupta Period: Pallavas, Chalukyas, and Vardhanas

Unit IV Religion, Philosophy and Society

- Consolidation of the brahmanical tradition
- Development of Jainism
- Development of Buddhism
- The beginnings of Tantricism

Unit V Cultural Developments

- A brief survey of Sanskrit, Pali-Prakrit and Tamil literature
- Scientific and technical treatises
- Art and architecture – forms and patronage; Mauryan, post-Mauryan, Gupta, post-Gupta

Examination Scheme

Components	A	P	A/TP	CT	EE
Weightage (%)	5	10	5	10	70

(A : Attendance ; P : Presentation ; A/TP : Assignment/Term Paper ; CT : Class Test ; EE : External Examination)

Texts and References

Compulsory Readings

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B. D. Chattopadhyaya, The Making of Early Medieval India, 1994
D. P. Chattopadhyaya, History of Science and Technology in Ancient India, 1986
D. D. Kosambi, An Introduction to the Study of Indian History, 1975
S. K. Maity, Economic Life in Northern India in the Gupta Period, 1970
B. P. Sahu (ed), Land System and Rural Society in Early India, 1997
K. A. N. Sastri, A History of South India
R. S. Sharma, Indian Feudalism, 1980
Romila Thapar, Asoka and the Decline of the Mauryas, 1997
Susan Huntington, The Art of Ancient India: Buddhist, Hindu, Jain, New York, 1985

Optional Readings

N. N. Bhattacharya, Ancient Indian Rituals and Their Social Contents, 2nd ed., 1996
J. C. Harle, The Art and Architecture of the Indian Subcontinent, 1987
P. L. Gupta, Coins, 4th ed., 1996
Kesavan Veluthat, The Early Medieval in South India, New Delhi, 2009
H. P. Ray, Winds of Change, 1994
Romila Thapar, Early India : From the Origins to 1300, 2002



INDO-ISLAMIC POLITY AND CULTURE IN MEDIEVAL INDIA-I

Course Code: HIS2206

Credit Units: 4

Course Objective

The course is aimed at introducing students to the critical components of Medieval Indian history, beginning from the Delhi Sultanate. The key components of the course include historiography, political structures, social and economic developments, and cultural and religious processes.

Course Content

Unit I Interpreting the Delhi Sultanate

- Survey of sources: Persian tarikh tradition; vernacular histories; epigraphy

Unit II Sultanate Political Structures

- Foundation, expansion and consolidation of the Sultanate of Delhi; The Khaljis and the Tughluqs; Mongol threat and Timur's invasion; The Lodis: Conquest of Bahlul and Sikandar; Ibrahim Lodi and the battle of Panipat
- Theories of kingship; ruling elites; Sufis, ulama and the political authority; imperial monuments and coinage
- Emergence of provincial dynasties: Bahamanis, Vijayanagar, Gujarat, Malwa, Jaunpur and Bengal
- Consolidation of regional identities; regional art, architecture and literature

Unit III Society and Economy

- Iqta and the revenue-free grants
- Agricultural production; technology
- Changes in rural society; revenue systems
- Monetisation; market regulations; growth of urban centres; trade and commerce; Indian Ocean trade

Unit IV Religion, Society and Culture

- Sufi silsilas: Chishtis and Suhrawardis; doctrines and practices; social roles
- Bhakti movements and monotheistic traditions in South and North India; Women Bhaktas; Nathpanthis; Kabir, Nanak and the Sant tradition
- Sufi literature: malfuzat; premakhayans

Examination Scheme

Components	A	P	A/TP	CT	EE
Weightage (%)	5	10	5	10	70

(A : Attendance ; P : Presentation ; A/TP : Assignment/Term Paper ; CT : Class Test ; EE : External Examination)

Texts and References

Compulsory Readings

Mohammad Habib and K.A. Nizami, eds, Comprehensive History of India, Vol. V, The Delhi Sultanate
Satish Chandra, Medieval India I
Peter Jackson, The Delhi Sultanate
Catherine Asher and Cynthia Talbot, India Before Europe
Tapan Raychaudhuri and Irfan Habib, eds, Cambridge Economic History of India, Vol. I
K.A. Nizami, Religion and Politics in the Thirteenth Century

W.H. McLeod, Karine Schomer, et al, eds, The Sants
S.A.A. Rizvi, A History of Sufism in India, Vol. I
Mohibul Hasan, Historians of Medieval India

Optional Readings

Cynthia Talbot, Precolonial India in Practice
Simon Digby, War Horses and Elephants in the Delhi Sultanate
I.H. Siddiqui, Afghan Despotism
Burton Stein, New Cambridge History of India: Vijayanagara
Richard M. Eaton, ed., India's Islamic Traditions
Vijaya Ramaswamy, Walking Naked: Women, Society, Spirituality in South India
Sheldon Pollock, Languages of the Gods in the World of Men
Pushpa Prasad, Sanskrit Inscriptions of the Delhi Sultanate
Andre Wink, Al-Hind, Vols. I-III



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INDO-ISLAMIC POLITY AND CULTURE IN MEDIEVAL INDIA-II

Course Code: HIS2305

Credit Units: 4

Course Objective

The course is intended to provide an in-depth analysis about the social, political, cultural, and economic structures of the Mughal period. The key components of the course include historiography, establishment of the Mughal rule, consolidation of the Mughal rule under Akbar, the Mughal Empire under Aurangzeb, and the eventual decline of the Mughal Empire.

Course Content

Unit I Sources and Historiography

- Persian literary culture; translations; Vernacular literary traditions
- Modern Interpretations

Unit II Establishment of Mughal rule

- India on the eve of Babur's invasion
- Fire arms, military technology and warfare
- Humayun's struggle for empire
- Sher Shah and his administrative and revenue reforms

Unit III Consolidation of Mughal rule under Akbar

- Evolution of administrative institutions: zabt, mansab, jagir, madad-i-ma'ash
- Religious policies
- Relations with the Rajputs
- Expansion and integration

Unit IV Consolidation of the Empire under Jahangir and Shah Jahan

- Jahangir as a Ruler
- Nur Jahan's Junta
- Shah Jahan's reign

Unit V The Mughal Empire Under Aurangzeb

- War of Succession
- Aurangzeb's religious policies

Unit VI Decline of the Mughal Empire

- Debate
- Recent Historiographical Trends

Examination Scheme

Components	A	P	A/TP	CT	EE
Weightage (%)	5	10	5	10	70

(A :Attendance ; P :Presentation ; A/TP :Assignment/Term Paper ; CT : Class Test ; EE :External Examination)

Texts and References

Compulsory Readings

S. Nurul Hasan, Religion, State, and Society in Medieval India

Jadunath Sarkar, History of Aurangzeb
Muzaffar Alam and Sanjay Subrahmanyam, eds, The Mughal State, 1526 – 1750
J.F. Richards, The Mughal Empire
Catherine Asher and Cynthia Talbot, India Before Europe
Irfan Habib, Agrarian System of Mughal India, 1526 – 1707
S.A.A. Rizvi, Religious and Intellectual History of the Muslims in Akbar's Reign
Stephen F. Dale, Garden of the Eight Paradises: Babur and the Culture of Empire
R P Tripathi, The Rise and the Fall of the Mughal Empire

Optional Readings

Athar Ali, Mughal India: Studies in Polity, Ideas, Society, and Culture
Douglas Streusand, The Formation of the Mughal Empire
Harbans Mukhia, Historians and Historiography During the Reign of Akbar
A.J. Qaiser, The Indian Response to European Technology and Culture
Richard M. Eaton, The Rise of Islam and the Bengal Frontier
Shireen Moosvi, Economy of the Mughal Empire
K.N. Chaudhuri, Trade and Civilization in the Indian Ocean
Iqtidar Alam Khan, Gunpowder and Fire Arms: Warfare in Medieval India
Jos J.S. Gommans and Dirk H.A. Kolff, eds, Warfare and Weaponry in South Asia
Irfan Habib, An Atlas of the Mughal Empire



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RISE OF MODERN WEST-II

Course Code: HIS2306

Credit Units: 4

Course Objective

The course is designed to provide a critical insight into the historical processes of the 17th-18th centuries in Europe. The critical components of the course include the 17th century European crisis, the English Revolution, rise of modern science, mercantilism and European economies, political process in the Europe in the 18th century, and the Industrial Revolution. The course is intended to develop the learning skills of students as far as European history is concerned.

Course Content

Unit I 17th century European crisis

- Economic factors
- Social factors
- Political dimensions

Unit II The English Revolution

- Major issues
- Political and intellectual currents

Unit III Rise of Modern Science

- Developments in science

Unit IV Mercantilism and European Economics

- Rise of Mercantilism in the 17th and 18th centuries in Europe

V European politics in the 18th century

- Parliamentary monarchy
- Patterns of Absolutism in Europe

VI The Industrial Revolution

- Origins
- Case Studies- Britain, France, Germany
- Course of the Industrial Revolution and its consequences

Examination Scheme

Components	A	P	A/TP	CT	EE
Weightage (%)	5	10	5	10	70

(A : Attendance ; P : Presentation ; A/TP : Assignment/Term Paper ; CT : Class Test ; EE : External Examination)

Texts and References

Compulsory Readings

T.S. Aston and C.H.E. Philpin (eds.), The Brenner Debate

H. Butterfield, The Origins of Modern Science

Carlo M. Cipolla, Fontana Economic History of Europe, Vols. II and III

Carlo M. Cipolla, Before the Industrial Revolution, European Society and Economy, 1000–1700. 3rd ed. (1993)

D.C. Coleman (ed.), Revisions in Mercantilism

Ralph Davis, The Rise of the Atlantic Economics

Maurice Dobb, Studies in the Development of Capitalism

J.R. Hale, Renaissance Europe
 R. Hall, From Galileo to Newton
 Christopher Hill, A Century of Revolutions
 Rodney Hilton, Transition from Feudalism to Capitalism
 H.G. Koenigsberger and G.L. Mosse, Europe in the Sixteenth Century
 Stephen J. Lee, Aspects of European History, 1494 – 1789
 G. Parker, Europe in Crisis, 1598 – 1648
 G. Parker and L.M. Smith, General Crisis of the Seventeenth Century
 J.H. Parry, The Age of Reconnaissance
 Meenaxi Phukan, Rise of the Modern West: Social and Economic History of Early Modern Europe
 V. Poliselky, War and Society in Europe. 1618 – 48
 Theodore K. Rabb, The Struggle for Stability in Early Modern Europe
 V. Scammell, The First Imperial Age: European Overseas Expansion, 1400 – 1715
 Jan de Vries, Economy of Europe in an Age of Crisis 1600 – 1750

Optional Readings

M. S. Anderson, Europe in the Eighteenth Century
 Perry Anderson, The Lineages of the Absolutist State
 Stuart Andrews, Eighteenth Century Europe
 B. H. Slicher von Bath, The Agrarian History of Western Europe. AD. 500 – 1850
 The Cambridge Economic History of Europe. Vol. I – VI
 James B. Collins, The State in Early Modern France, New Approaches to European History
 G. R. Elton, Reformation Europe, 1517 – 1559
 M. P. Gilmore, The World of Humanism. 1453 – 1517
 Peter Kriedte, Peasants, Landlords and Merchant Capitalists
 J. Lynch, Spain under the Hapsburgs
 Peter Mathias, First Industrial revolution
 Harry Miskimin, The Economy of Later Renaissance Europe: 1460 – 1600
 Charles A. Nauert, Humanism and the Culture of the Renaissance (1996)
 The New Cambridge Modern History of Europe, Vols. I – VII
 L. W. Owie, Seventeenth Century Europe
 D. H. Pennington, Seventeenth Century Europe
 F. Rice, The Foundations of Early Modern Europe



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HISTORY OF BRITISH RULE IN INDIA-I

Course Code: HIS2307

CreditUnits: 4

Course Objective

This course has been created to acquaint the students with the early history of the British rule in India. The key components of the course include the expansion and consolidation of colonial power, colonial strategy and ideology, rural economy and society under British rule, trade and industry under the British, and popular resistance movements. The course will help in enhancing the awareness of students about the coming of the British to India.

Course Content

Unit I India in the mid-18th Century

- Society-economy developments
- Political developments

Unit II Expansion and Consolidation of Colonial Power

- Mercantilism, foreign trade and early forms of exactions from Bengal
- Dynamics of expansion, with special reference to Bengal, Mysore, Western India, Awadh, Punjab, and Sindh

Unit III Colonial State and Ideology

- Arms of the colonial state: army, police, law
- Ideologies of the Raj and racial attitudes
- Education: indigenous and 'modern'

Unit IV Rural Economy and Society

- Land revenue systems and forest policy
- Commercialization and indebtedness
- Rural society: change and continuity
- Famines
- Pastoral economy and shifting cultivation

Unit V Trade and Industry

- De-industrialization
- Trade and fiscal policy
- Drain of Wealth
- Growth of modern industry

Unit VI Popular Resistance

- Santhal uprising (185-7); Indigo rebellion (1860); Pabna agrarian leagues (1873); Deccan riots (1875)
- Uprising of 1857

Examination Scheme

Components	A	P	A/TP	CT	EE
Weightage (%)	5	10	5	10	70

(A : Attendance ; P : Presentation ; A/TP : Assignment/Term Paper ; CT : Class Test ; EE : External Examination)

Texts and References

Compulsory Readings

C. A. Bayly, Indian Society and the Making of the British Empire, New Cambridge History of India.

Bipan Chandra, Rise and Growth of Economic Nationalism in India.

Subash Chakravarty, The Raj Syndrome: A Study in Imperial Perceptions, 1989.

J.S. Grewal, The Sikhs of the Punjab, New Cambridge History of India

Ranajit Guha, ed., A Subaltern Studies Reader.

Dharma Kumar and Tapan Raychaudhuri, eds., The Cambridge Economic History of India, Vol. II.

P.J. Marshall, Bengal: The British Bridgehead, New Cambridge History of India.

R.C. Majumdar, ed., History and Culture of Indian People, Vols. IX and X.

British Paramountcy and Indian Renaissance

Rajat K. Ray, ed., Entrepreneurship and Industry in India, 1800-1947, Oxford India Readings.

Eric Stokes, English Utilitarians and India.

Ram Lakhan Shukla, ed., Adhunik Bharat ka Itihas

Optional Readings

David Arnold and Ramchandra Guha, eds., Nature, Culture and Imperialism.

Amiya Bagchi, Private Investment in India.

Bipan Chandra, K.N. Panikkar, Mridula Mukherjee, Sucheta Mahajan and Aditya Mukherjee, India's Struggles for Independence.

A.R. Desai, Peasant Struggles in India.

R.P. Dutt, India today.

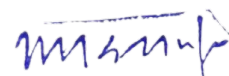
M.J. Fisher, ed., Politics of Annexation (Oxford India Readings).

Ranajit Guha, Elementary Aspects of Peasant Insurgency in Colonial India (1983).

P.C. Joshi, Rebellion 1857: A Symposium.

J. Krishnamurti, Women in Colonial India.

Dadabhai Naroji, Poverty and Un-British Rule in India.



HISTORY OF BRITISH RULE IN INDIA-II

Course Code: HIS2405

CreditUnits: 05

Course Objective

This course has been created to acquaint the students with the history of the British rule in India. The key components of the course include the cultural changes and religious reform movements during the British period, early trends in nationalism, Gandhian nationalism, communal politics, and the partition of India. The course will help in enhancing the awareness of students about the history of the freedom movement in India.

Course Content

Unit I Cultures changes and Social and Religious Reform Movements

- The advent of printing and its implications
- Reform and Revival: BrahmoSamaj, PrarthnaSamaj, Ramakrishnaand Vivekananda, Arya Samaj, Wahabi, Deoband, Aligarh and SinghSabha movements
- Debates around gender

Unit II Nationalism: Trends up to 1919

- Political ideology and organizations, formation of INC
- Moderates and extremists
- Swadeshi movement
- Revolutionaries

Unit III Gandhian nationalism after 1919: Ideas and Movements

- Mahatma Gandhi: his Perspectives and Methods
- Rowlatt Satyagraha and JallianwalaBagh
- Non-Cooperative and Civil Disobedience
- Provincial Autonomy, Quit India and INA
- Left-wing movements

Unit IV Communalism: Ideologies and practices

- RSS
- Hindu Maha Sabha
- Muslim League

Unit V Independence and Partition

- Negotiations for independence, and partition
- Popular movements
- Partition riots

ExaminationScheme

Components	A	P	A/TP	CT	EE
Weightage (%)	5	10	5	10	70

(A :Attendance ; P :Presentation ; A/TP :Assignment/Term Paper ; CT : Class Test ; EE :ExternalExamination)

Texts and References

Compulsory Readings

Judith Brown, Gandhi's rise to Power, 1915-22.

Paul Brass, The Politics of India Since Independence, OUP, 1990.
 Bipan Chandra, Nationalism and Colonialism in Modern India, 1979.
 Bipan Chandra, Rise and Growth of Economic Nationalism in India.
 Mohandas K. Gandhi, An Autobiography or The Story of My Experiments with Truth.
 RanajitGuha, ed., ASubaltem Studies Reader.
 Peter Hardy, Muslims of British India.
 Mushirul Hasan, ed., India's Patition, Oxford in India Readings.
 D.A. Low, ed., Congress and the Raj.
 John R. McLane, Indian Nationalism and the Early Congress.
 Jawaharlal Nehru, An Autobiography.
 Gyanendra Pandey, The Construction of Communalism in colonial north India.
 Sumit Sarkar, Modern India, 1885-1947.
 Anil Seal, Emergence of Indian Nationalism.
 Ram Lakhan Shukla (ed.), Adhunik Bharat kaItihas.
 Eleanor Zelliot, From Untouchable to Dalit: Essays on the Ambedkar Movement

Optional Readings

Judith Brown, Gandhi: (et al) A Prisoner of Hope.
 Bipan Chandra, Communalism in Modern India, 2nd ed., 1987.
 Bipan Chandra, K.N. Panikkar, Mridula Mukherjee, Sucheta Mahajan and Aditya Mukherjee, India's, Struggles for Independence.
 A.R. Desai, Social Background of Indian Nationalism.
 A.R. Desai, Peasant Struggles in India.
 Francine Frankel, India's Political Economy, 1947-77.
 RanajitGuha, and G.C. Spivak, eds., Select Subaltern Studies.
 Charles Heimsath, Indian Nationalism and Hindu Social Reform.
 F. Hutchins, Illusion of Permanence.
 F. Hutchins, Spontaneous Revolution.
 V.C. Joshi (ed.), Rammohan Roy and the process of Modernisation in India.
 J.Krishnamurti, Women in Colonial India.

HISTORY OF USA

Course Code: HIS2406

Credit Units: 5

Course Objective

This course has been introduced in order to acquaint students with the major trends in the history of America. By focussing on the political, constitutional, economic, and socio-cultural history of the USA, this course will help in developing a spirit of inquiry in students. The key components of the course include history of the American republic, evolution of American democracy, save society and culture, foreign policy, Civil War, imperialist policies, and resistance movements.

Course Content

Unit I Making of the Republic

- Revolution Sources of conflict: Revolutionary groups, Ideology: The War of Independence and its historical interpretations
- Processes and Features of Constitution making: Debates and historical interpretations

Unit II Evolution of American Democracy

- Federalists: Jeffersonianism: Jacksonianism, Rise of political parties-1840-1960
- Expansion of Frontier: Turner's Thesis; Marginalisation, displacement and decimation of native Americans; Case histories of: Tecumseh; Shawnee Prophet

Unit III Slave Society and Culture

- Agrarian South: Plantation economy
- Slave Society and Culture: Slave resistance

Unit IV Ante Bellum Foreign Policy

- War of 1812
- Monroe Doctrine
- Manifest Destiny

Unit V Civil War

- Abolitionism and Sectionalism
- Issues and interpretations
- Rise of Republicanism, Emancipation and Lincoln

Unit VI Industrial America

- Growth of Capitalism and Big Business
- The Great Depression

Unit VII US Imperialism

- Spanish-American War
- Expansion in the Far East and Latin America
- World War I and Fourteen Points
- America and World War II

Unit VII Resistance Movements

- Afro-American Movements: Black Movements: Booker T. Washington, W.E.B. Dubois; NAACP and Marcus Garvey
- Women's Movements: Rise of the Lowell Factory System, Abolitionists and Women's rights movement, Suffrage, Afro-American Women

Examination Scheme

Components	A	P	A/TP	CT	EE
Weightage (%)	5	10	5	10	70

(A : Attendance ; P : Presentation ; A/TP : Assignment/Term Paper ; CT : Class Test ; EE : External Examination)

Texts and References

Compulsory Readings

Bernard Bailyn, The Great Republic.
Bernard Bailyn, The Ideological Origins of the American Revolution.
Charles Beard, An Economic Interpretation of the American Constitution.
Dee Brown, Bury My Heart at Wounded Knee, An Indian History of the American West.
Peter Carroll and David Noble, Free and Unfree: A New History of the United States.
David B. Davis, The Problem of Slavery in the Age of Revolution.
U. Faulkner, American Economic History.
Robert Fogel, Railroads and American Economic Growth.
Eric Foner, America's Black Past.
John Hope Franklin, From Slavery to Freedom.
Gerald N. Grobb and Geogre A. Billias, Interpretations of American History: Patterns and Perspectives, 2 Vols.
Richard Hofstadter, The Age of Reform, From Bryan to FDR
Linda Kerber, Women's America: Refocusing the Past.
David M. Potter, The Impending Crisis.
W. Pratt, A History of the United states Foreign Policy.
James Randail, TheCivil War and Reconstruction.
J. G. Randall and David Donald, The Civil War and Recontruction.
Kenneth Stamp, The Peculiar Institution, Slavery in the Ante-bellum South.
Fcedrick Jackson Turner, The Frontier in American History.
Robert Wiebe, The Search for Order.

Optional Readings

Lee Benson, The Concept of Jackson Democracy.
Ray A. Billington, Westward Expansion.
Paul Boyer, Harvard Sitkoff, Nancy Woloch, The Enduring Vision: A History of the American People, Vols. Land 2.
Thomas Cochran, The Inner Revolution.
A. O. Craven, The Growth of Southern Nationalism, 1848 – 1861.
Lance E. Davis (ed.), American Economic Growth.
Carl N. Degler, At Odds: Women and Family in America from the Revolution to the Present.
Fogel and Engerman? Time on the Cross.
Lewis L. Gould (ed.), The Progressive Era.
John D. Hicks, The Federal Union: A History of USA Since 1865.
R.P. Kaushik, Significant Themes in American History.
David M. Kennedy, Thomas Baileyand Mel Piehl, The Brief American Pageant.
Irving Kristol, Gordon Wood and others, America's Continuing Revolution.
Richard W. Leopold, The Growth of American Foreign Policy.

Perry Miller, From Colony to Province.

Gary Nash (ed.), Retracing the Past.

Henry Pelling, American Labor.

Edward Pessen, Jacksonian Panorama.

Charles Sellers, Henry May and Neil McMillen, A Synopsis of American History; 2 Vols.

Donald Shiham, The Making of American History: The Emergence of the Nation, Vols. I & II.

Dwijendra Tripathi and S.C. Tiwari, Themes and Perspectives in American History.

James Weinstein, The Corporate Ideal in the Liberal state.



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HISTORY OF CHINA AND JAPAN

Course Code: HIS2407

Credit Units: 05

Course Objective

The main objective of this course is to acquaint students with the history of two superpowers of the East- China and Japan. The course aims to introduce students to the different facets of political, social, cultural, and economic history of the two countries. Most of the major developments in China and Japan have been included in the course to provide the students with sufficient knowledge about the historical processes in the two countries of the Far East.

Course Content

SEMESTER V

UNIT I China during the 19th century: feudalism and commercialism

- Feudal values- the principles of Confucius
- Gentry, bureaucracy and common people
- The Canton commercial system

UNIT II Imperialism in China

- The transformation of China into an 'informal' colony
- The Opium Wars and Unequal Treaties
- Finance Imperialism
- The 'Open Door' policy
- Agrarian and popular movements: Taiping and Yi Ho Tuan (Boxer Rebellion)
- Attempts at 'Self-Strengthening' (Tzu-chiang): Reforms of 1860-95; 1898; and 1901-08

UNIT III The Emergence of Nationalism in China

- The Revolution of 1911: Causes, nature and significance, social composition
- Contribution of Sun Yat-sen to the Revolution
- May Fourth Movement of 1919: nature and significance
- The Warlord Era-1916-1928

UNIT IV Nationalism and Communism in China (1921-1937)

- Formation of the CCP
- The Guomintang (Nationalist Party or KMT)
- The First United Front
- The Jiangxi Period and the rise of Mao Tse-tung
- The Second United Front

UNIT V Japan- Transition from Feudalism to Capitalism

- Crisis of Tokugawa Bakufu system
- Meiji Restoration: Its nature and significance
- Political Reorganization
- Military Reforms
- Social, cultural and educational reforms (bunmeikaika)
- Financial reforms and Economic development in the 'Meiji' era.
- Meiji Constitution

UNIT VI Japanese Imperialism, Militarism and Fascism

- Japanese imperialism in China, Korea and Manchuria
- Popular/People's Rights Movement
- Nature of political parties
- Rise of Militarism- nature and significance
- Japan and the Second World War
- American occupation of Japan

Examination Scheme

Components	A	P	A/TP	CT	EE
Weightage (%)	5	10	5	10	70

(A : Attendance ; P : Presentation ; A/TP : Assignment/Term Paper ; CT : Class Test ; EE : External Examination)

Text and References

COMPULSORY READINGS

George Allen, *A Short Economic History of Japan*

G. Beasley, *The Modern History of Japan*

Jean Chesneaux, et al, *China from Opium War to 1911 Revolution*.

Chalmers A Johnson, *Peasant Nationalism and Communist Power: The Emergence of Red China, 1937 – 1945*

E.H. Norman, *Japan's Emergence as a Modern State*

Mary C. Wright, *China in Revolution: The First Phase, 1900 – 1913*

George M. Beckmann, *Modernisation of China and Japan*

George M. Beckmann, *The Making of the Meiji Constitution*

SUGGESTED READINGS

B. Jansen (ed.), *The Cambridge History of Japan*, Vol. V and VI.

M.B. Jansen, *Japan and China: From War to Peace, 1894 – 1972*

HISTORICAL RESEARCH METHOD

Course Code: HIS2408

Credit Units: 03

Course Objective

This course is being offered in order to acquaint students with the intricacies of historical research, and its methodology. Historical research is a specialized area, and needs some knowledge of the technical aspects of research. In order to introduce students to the various research methodologies which might be of help to them in the future, this course has been introduced.

Course Content

Unit I History

- Definition
- Development of Historical Concepts
- Introducing E. H. Carr's What is History

Unit II History and its Allied Subjects

- Inter-disciplinary relation with Geography and Cartography
- Inter-disciplinary relation with Anthropology and Political Science
- Inter-disciplinary relation with Archaeology

Unit III Sources for the study of History

- Primary and Secondary
- Textual, Material, Digital, Oral

Unit IV Historical Methods

- Sources for the study of Indian History Ancient, Medieval, Modern and Contemporary

Unit V

- Significance and Purpose of History

Examination Scheme

Components	A	P	A/TP	CT	EE
Weightage (%)	5	10	5	10	70

(A : Attendance ; P : Presentation ; A/TP : Assignment/Term Paper ; CT : Class Test ; EE : External Examination)

Texts and References

Compulsory Readings

E. H. Carr, What is History, London, 1961 (Hindi translation available)

Arthur Marwick, The Nature of History, Macmillan, London, 3rd edition 1989, Translated by L. B.

Verma, Itihaas ka Swarup, Granth Shilpi, 2003

L. B. Verma, Itihaas ke bare mein, Itihaas Bodh Prakashan, 4th edition 2003

HISTORY OF USSR

Course Code: HIS2504

CreditUnits: 5

Course Objective

The course has been designed in order to acquaint students with the processes which shaped the history of USSR. The course includes key components such as the Russian Revolutions, the Civil War, the New Economic Policy, and the period of Soviet industrialization. The course is aimed at introducing students to the history of the Soviet Union and enhancing their learning abilities.

Course Content

Unit I The Russia Revolutions of February and October 1917

- Dual Power
- Provisional government
- The establishment of soviet Power
- Nationalities question

Unit II Civil War and War Communism 1918-1921

- The first eight months
- Red and White Economic Policies

Unit III The New Economic Policy

- Political Debates
- Trade unions
- Gender relations
- Foreign Policy
- The Comintern
- Formation of the USSR

Unit IV Soviet Industrialization

- Debates and Historiographical Interpretations

Examination Scheme

Components	A	P	A/TP	CT	EE
Weightage (%)	5	10	5	10	70

(A :Attendance ; P :Presentation ; A/TP :Assignment/Term Paper ; CT : Class Test ; EE :External Examination)

Texts and References

Compulsory Readings

E.H. Carr : A History of Soviet Russia, 4 Volumes (1952).

Stephen F. Cohen : Bukharin and the Bolshevik Revolution : A Political Biography, 1888 –

1938 (1973).
 Isaac Deutscher : Stalin (1949).
 Maurice Dobb : Soviet Economic Development Since 1917 (1972).
 Marc Ferro : The Russian Revolution of February 1917 (1972).
 Sheila Fitzpatrick : Cultural Revolution in Soviet Russia (1978).
 Arch Getty : The Origins of the Great Purges (1985).
 Graeme Gill : Peasants and Government in the Russian Revolution (1979).
 John Keep : The Last of the Empires : A History of the Soviet Union, 1945 – 1991 (1995).
 John Keep : The Russian Revolution : A Study in Mass Mobilisation (1976).
 A. Kollontai : Selected Writings.
 Moshe Levin : The Making of the Soviet System (1985).
 Roy & Zhores Medvedev : Khrushchev : The Years in Power (1977).
 Alec Nove : An Economic History of the USSR (1993).
 Richard Pipes : Russia of the Old Regime.
 L. Szamueli : First Models of Socialist Economic Systems.
 L. Trotsky : The History of the Russian Revolution (translated by Max Eastman) (1959).
 A.B. Ulam : Expansion and Coexistence : A History of Soviet Foreign Policy, 1917 – 67 (1968).
 K. Vaidyanathan : The Formation of the Soviet Control Asian Nationalities.

Optional Readings

Y.S. Borisova et. al.: Outline History of the Soviet Working Class.
 Dallin : Soviet Foreign Policy after Russia.
 R.W. Davies: The Industrialisation of Soviet Russia, 3 volumes.
 First Soviet Writers Congress, 1934 (Reprint, 1977)
 Michael T. Florinsky: The End of the Russia Revolution.
 Christopher Hill : Lenin and the Russian Revolution.
 George Katkov (ed.): Russia Enters the Twentieth Century (1973).
 David Lane: Politics and Society in the USSR (1972).
 Richard Stites : Women's Liberation Movement in Russia : Feminism, Nihilism and Bolshevism, 1860 – 1930 (1976).
 J. Stalin: Problems of Leninism.

HISTORY OF WEST ASIA

Course Code: HIS2505

Credit Units: 5

Course Objective

The course is aimed at introducing students to the history of West Asia. The region of West Asia plays an important role in global politics. Geopolitically, this region is very important. The key components of this course include the rise of Arab nationalism, the Palestinian problem, political formations in Turkey, and the rise of nationalism in Egypt.

Course Content

Unit I Rise of Arab Nationalism

- Causes and Result
- Mandate System in West Asia after First World War, Iraq , Syria and Lebanon

Unit II Palestinian Problem

- History and Development
- Arab and Israel conflicts upto 1967
- Formation of Kingdom of Saudi-Arab

Unit III Iran and Western Powers

- Iran and Western Powers
- Reign of Shah Raza Khan: Reforms and Achievements
- Foreign Policy of Iran in First Half of 20th Century

Unit IV Political Formations in Turkey

- Tanzimat Era
- Abdul Hamid's Policy of Reforms, Limitations
- Young Turk Movement; Programme and Achievements

Unit V Post-War Developments in Turkey

- Turkey and First World War
- Emergence of Kamal Pasha
- Reforms and Achievements

Unit VI Rise of Nationalism in Egypt

- Growth of Anglo-French Imperialism in Egypt
- Rise of Nationalism: Causes and Results
- Anglo-Egyptian Relations: Treaty of 1936 and afterwards till Second World War

Examination Scheme

Components	A	P	A/TP	CT	EE
Weightage (%)	5	10	5	10	70

(A : Attendance ; P : Presentation ; A/TP : Assignment/Term Paper ; CT : Class Test ; EE : External Examination)

Texts and References

Compulsory Readings

Bernard Lewis, The Emergence of Modern Turkey
George Kirk, Short History of the Middle East
Sydney N Fisher, The Middle East

Hasan Kayali, Arabs and Young Turk
William Yale, The Near East
Erik J Zurrcher, Turkey, A Modern History
M Rowlatt, Founders of Modern Egypt
Alberts H Houran, Syria and Lebnan
Stephen H Longrigg, Iraq (1900-1950)
William Yale, The Near East
P Sykes, History of Persia vol. II
Charles Issawi, Economic History of Middle East
George Antonius, The Arab Awakening
Hans Kohn, A History of Nationalism in the East

Optional Readings

HE Wortham, Mustafa Kamal
Henry A Foster, Mustafa Kamal
George Lenczowski, The Middle East in the World Affairs
Terald Kurland, Arab Israeli Conflict
W. Lacqueur, A History of Zionism
D. Wilbur, Iran: Past and Present



HISTORY OF THE WORLD WARS

Course Code: HIS2506

Credit Units: 5

Course Objective

This course has been designed to make the students aware of the major political developments that shaped European history in particular and world history in general in the 20th century. The two world wars were a turning point in history of humanity not only in terms of its political, economic and social consequences but also in term of the aftermath of the wars which left an indelible mark on the history of human civilization. Many lives were lost and much was learnt from these two wars that were fought. The inter-war period and the historical processes that shaped this period are also significant in terms of various political institutions that came up during this time and brought Europe on the brink of the Second World War.

Course Content

SEMESTER VI

UNIT I First World War

- Origins- Europe on the brink of War
- Causes of World War I
- Alliances- Triple Entente and Triple Alliance
- Major events of World War I
- End of the War and the Treaty of Versailles
- Consequences of the War

UNIT II Europe between the Wars

- The League of Nations
- The Great Depression and its impact on Europe
- The Spanish Civil War
- Japanese Invasion of China
- Literary and cultural developments in the inter-war period

UNIT III Nazism and Fascism

- Rise of Fascism in Italy
- Italian Invasion of Ethiopia
- Rise of Nazism in Germany
- Stalinist Russia

UNIT IV Second World War

- Origins and causes
- The Axis powers and Allied powers
- Major events of the War
- Aftermath of the War

Examination Scheme

Components	A	P	A/TP	CT	EE
Weightage (%)	5	10	5	10	70

(**A** : Attendance ; **P** : Presentation ; **A/TP** : Assignment/Term Paper ; **CT** : Class Test ; **EE** : External Examination)

Text and References

COMPULSORY READINGS

David Stevenson, 1914-1918: The History of the First World War, Penguin Books, UK, 2004

Ross F. Collins, World War One

Samuel L.A. Marshall, World War I

Jeremy Black, World War Two- A Military History

Antony Beevor, The Second World War

Anthony Wood, History of Europe, 1815 – 1960

SUGGESTED READINGS

William L. Shirer, Rise and Fall of the Third Reich

Mark A. Stoler and Stefanie M. Gustafson (ed), Major Problems in the History of World War II- Documents and Essays

HISTORY OF LATIN AMERICA

Course Code: HIS2507

Credit Units: 03

Course Objective

The course is aimed at introducing students to the history of Latin America. The history of this region has been kept out of the mainstream for very long. It is important for students to understand the developments which shaped this continent. The course intends to acquaint students with the historical background of various movements and transformations in the continent.

Course Content

Unit I Historiography

- Brief survey of pre-15th century
- Cultures and civilizations of Latin America

Unit II The Colonization and Conquest of Central and South America

- Spain and Portugal in Latin America (1490's onwards)
- War and conquest; agrarian transformation; gold and silver mining
- The question of labour and slavery
- Transatlantic commerce and the modern world system
- Institutions of state
- The advent of Christianity and evangelization
- Demographic consequences
- Resistance, collaboration, survival
- New and old hierarchies
- Gender, race, and culture: separateness or syncretism?

Unit III The Breakdown of the Colonial Order and the Movements for Independence

- Social base
- Practices and ideologies

Unit IV Class and State Formation

- Industrialization
- Immigration
- Popular culture 1830's to the 1930's: case studies of Mexico, Argentina, and Brazil

Unit V Authoritarianism Regimes

- Populism
- Revolutions
- the politics of literature, music and sports-1930's to the 1960's

Examination Scheme

Components	A	P	A/TP	CT	EE
Weightage (%)	5	10	5	10	70

(A : Attendance ; P : Presentation ; A/TP : Assignment/Term Paper ; CT : Class Test ; EE : External Examination)

Texts and References

Compulsory Readings

- Bethell, L., ed. *Cambridge History of Latin America: Colonial Latin America, volume II*. Cambridge: Cambridge University Press, 1997.
- Bethell, L., ed. *Cambridge History of Latin America: From Independence to c. 1870, volume III*. Cambridge: Cambridge University Press, 2002.
- Bothell, L., ed. *Mexico Since Independence*. Cambridge: Cambridge University Press, 1985.
- Burns, E.B. *Latin America Conflict and Creation: A Historical Reader*. New York: Pearson, 1992.
- Chasteen, J. *Born in Blood and Fire: A Concise History of Latin America*. New York: W.W. Norton and Company, 2006.
- Frank, A.G. *Capitalism and Underdevelopment in Latin America*. New York: Monthly Review Press, 1967.
- Galeano, E. *Century of the Wind: Memories of Fire Volume III*. New York: Nation Books, 2010.
- Galeano, E. *Faces and Masks: Memories of Fire Volume II*. New York: Nation Books, 2010.
- Galeano, E. *Genesis: Memories of Fire Volume I*. New York: Nation Books, 2010.
- Galeano, E. *Open Veins of Latin America: Five Centuries of the Pillage of A Continent*. New York: Monthly Review Press, 1997.
- Gott, R. *Cuba A New History*. New Haven: Yale University Press, 2005.
- Levine, R.M., and John Crocitti, eds. *The Brazil Reader: History, Culture, Politics*. Durham: Duke University Press, 2002.
- Nouzeilles, G., and Graciela Montaldo, eds. *The Argentine Reader: History, Culture, Politics*. Durham: Duke University Press, 2002.
- Skidmore, T., and Peter H. Smith. *Modern Latin America*. New York: Oxford University Press, 2010.
- Wade, P. *Race and Ethnicity in Latin America*. London: Pluto, 1997.
- Williamson, E. *The Penguin History of Latin America*. London: Penguin Books, 2010.
- Wright, T. *Latin America in the Era of the Cuban Revolution*. Connecticut: Praeger Publishers, 2001.

Optional Readings

- Bellos, A. *Futebol: The Brazilian Way of Life*. London: Bloomsbury, 2003.
- Chavez, L., ed. *Capitalism, God and Good Cigar*. Durham: Duke University Press, 2005.
- Craske, N. *Women and Politics in Latin America*. New Brunswick: Rutgers University Press, 1999.
- Hanke, L., and Jane M. Rausch, eds. *Latin American History from Independence to the Present*. Princeton: Markus Wiener, 1999.
- Karush, M.B., and O. Chamosa, eds. *The New Cultural History of Peronism*. Durham: Duke University Press, 2010.
- Levine, R.M. *Father of the Poor: Vargas and His Era*. Cambridge: Cambridge University Press 1998.
- Marichal, C. *etal. From Silver to Cocaine: Latin American Commodity Chains and the Building of World Economy, 1500-2000*. Durham: Duke University Press, 2006.
- Marquez, G.G. *Autumn of the Patriarch*. London: Penguin, 1996.
- Meyer, C.M. *et al. The Course of Mexican History*. New York: Oxford University Press,

1999.

Naipaul, V.S. *Loss of Eldorado: A History*. London: Penguin Books, 1982.

Romero, L.A. *A History of Argentina in the Twentieth Century*. Pennsylvania: Penn State University Press, 2002.

Womack, J. *Zapata and the Mexican Revolution*. New York: Alfred A. Knopf, 1972.



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GENDER AND HISTORY

Course Code: HIS2604

Credit Units: 04

Course Objective

The role played by gender dynamics in shaping historical processes has not been paid much attention especially at the under-graduate level. This course is developed keeping in mind the need for students to be sensitized to the issue of gender through the prism of historical movements. This course seeks to provide a deeper understanding to the students about the role of gender in history, and how has played a significant role over a period of time.

Course Content

UNIT I Gender, Culture and History: Theoretical Perspectives

- Theories of Gender
- Historicising Gender
- Correlation between History and Gender

UNIT II Position of Women in the Indian Historical Context

- Women in the Indus Valley Civilisation
- Women in Vedic Age
- Construction of women's role by Manusmriti
- Women in the Epic Age
- Women in ancient Indian dynastic history
- Position of women in Medieval India
- Role of women in India's independence struggle

UNIT III Role of women in World History

- Women in the French Revolution
- Women in the Industrial Revolution

UNIT IV Origins of the Feminist Movement

- Socio-cultural genesis
- Political background
- Impact of feminism on history writing

Examination Scheme

Components	A	P	A/TP	CT	EE
Weightage (%)	5	10	5	10	70

(A : Attendance ; P : Presentation ; A/TP : Assignment/Term Paper ; CT : Class Test ; EE : External Examination)

Texts and References

Scott, Joan Wallach. *Gender and the Politics of History*. New York: Columbia University Press, 1988
Zemon Davis, Natalie. "Women's History in Transition: The European Case." *Feminist Studies* 3, no. 3-4 (1976)

O'Connor, Karen, *Gender and Women's Leadership*, Sage Publications, 2010

Altekar A.S., *The Position of Women in Hindu Civilization: From Pre-Historic Times to the Present Day*, Motilal Banarasi Das, 1959 (second edition), New Delhi
Lal, Ruby, *Domesticity and Power in the Early Mughal World*, Cambridge University Press, 2005
Agrawal, M.G., *Women Freedom Fighters of India*, Isha Books, New Delhi, 2008

Web References:

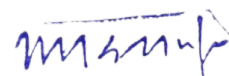
<http://www.ihp.sinica.edu.tw/~tangsong/reference/96102601.pdf>
http://www.tcr.org/tcr/essays/CB_Women-French_Rev.pdf
<http://www.history.ac.uk/ihr/Focus/Gender/websites.html>
http://www.stephen-knapp.com/women_in_vedic_culture.htm
http://invention.smithsonian.org/centerpieces/whole_cloth/u2ei/u2materials/dublin.ht
<http://odisha.gov.in/e-magazine/Orissareview/2010/August/engpdf/74-76.pdf>

Optional Readings

Thakur, Bharti, *Women in Gandhi's Mass Movement*
Bowles Gloria, Duelli-KleinRenate, KleinRenate, *Theories of Women's Studies*, Routledge & Kegan Paul, 1983
Jackson, Stevi and Jones, Jackie, *Contemporary Feminist Theories*, Edinburgh University Press, 1998



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HISTORY OF CONTEMPORARY INDIA

Course Code: HIS2605

Credit Units: 04

Course Objective

This course is designed to provide an in-depth understanding about contemporary issues in India including most of the major political, economic, social, and cultural events that have shaped India post-independence. The course will equip students to not only prepare for relevant competitive examinations but will also help them in analysing events and issues related to contemporary times. The course will help students in developing critical thinking about processes of which they are a part. By providing a link between the past and the present, this course will enrich the knowledge of the students and make them aware about various issues related to the growth and development of India.

Course Content

SEMESTER V

UNIT I Political Events in the History of Contemporary India

- Emergence of political parties at the national level
- Emergence of political parties at the state level
- History of electoral politics and its contemporary relevance
- Caste and religion as factors in electoral politics in contemporary India
- The Kashmir Issue
- Uniform Civil Code
- Violence and Politics- Sikh Riots, Babri Masjid, Bombay Riots, Gujarat Riots

UNIT II Perspectives on Development since Independence

- State and planning- The Five Year Plans, impact and assessment
- Reforms undertaken by the government since independence
- Economy and Liberalization, emergence of middle class, industrial expansion

UNIT III Development Strategy and its Impact

- New economic structures-mixed economy, privatisation, special economic zones (SEZ)
- Impact on industry, organised and unorganised labour
- Land reforms in India
- History of the Green and White Revolutions
- IT Revolution
- Environmental Issues- Historical perspective on environmental issues

UNIT IV Ideologies and Movements

- Emergence of Naxalism-historical perspective
- RSS and the emergence of Hindutva politics- secularism vs communalism debate
- Muslim right-wing organizations and politics
- Terrorism and its impact on India
- Linguistic movements and emergence of new states
- Human Rights and Women's Rights in India

- Right to Information

Examination Scheme

Components	A	P	A/TP	CT	EE
Weightage (%)	5	10	5	10	70

(A :Attendance ; P :Presentation ; A/TP :Assignment/Term Paper ; CT : Class Test ; EE :External Examination)


Text and References

COMPULSORY READINGS

NeeraChandhoke and Praveen Priyadarshi (ed.) Contemporary India: Economy, Society, Politics, Delhi: Pearson, 2009
 PratapBhanu Mehta and NeerjaJoyal (ed), Handbook of Indian Politics, Oxford University Press
 Bipin Chandra, Mridula Mukherjee and Aditya Mukherje, India since Independence, Penguin, New Delhi, 2008
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 Stephen Cohen, India: Emerging Power, Oxford University Press, Chapter 4: Domestic Dimension
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 Ganguly, Sumit and DeVotta Neil (ed) Understanding Contemporary India, Viva Books 2003

SUGGESTED READINGS

T.K Oommen, Society: Tradition and Autonomy in HirnnmayKarlekar, Independent India: The First Fifty Years, New Delhi: Oxford, 1998
 Gadgil, M. and Guha, R., 'Ecological Conflicts and the Environmental Movement in India' in Rangrajan, M. (ed.) Environmental Issues in India: A Reader, Pearson Delhi: Longman, 2006
 Omvedt, G., Reinventing Revolution, New Social Movements and the Socialist Tradition in India. New York: Sharpe, 1983
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ENVIRONMENTAL HISTORY- GLOBAL PERSPECTIVES

Course Code: HIS2606

Credit Units: 03

Course Objective

The course aims to acquaint students with environmental history. In today's world where global warming and climate change are important concerns, it is important to understand the basics of environmental history. The course will introduce students to various constituents of environment and the symbiotic relationship between man and nature. The measures taken to mitigate climate change and other environmental concerns shall also be analyzed as part of the course.

Course Content

Unit I Revisiting understanding/s of Environment

- Problematising Anthropocentrism and Anthropocene
- Challenging Stationarity?

Unit II Humans and animals: Multiplicity of interactions

- Entertainment and amusement
- A viable source of energy in 'energy-scarce' world

Unit III To and from the New World: ecological imperialism

- Native vs invasions
- Contestation over aquatic resources

Unit IV Colonialism and industrialization: ecological readings

- Access and use: new inequalities
- Elimination of diversity: endangered livelihood patterns
- Ever expanding encroachments of wild

Unit V World of insatiable appetite

- Fuel-ing consumption
- Issue of climate change
- Challenges

Examination Scheme

Components	A	P	A/TP	CT	EE
Weightage (%)	5	10	5	10	70

(A : Attendance ; P : Presentation ; A/TP : Assignment/Term Paper ; CT : Class Test ; EE : External Examination)

Texts and References

COMPULSARY READINGS

Ahmed, Nafeez. "Patriarchy is killing our Planet." *Ecologist*, 13 March, 2015

Bhattacharya, Neeladri. "Pastoralists in the Colonial World." In *Nature, Culture, Imperialism*, edited by David Arnold and Ramachandra Guha, 49-85. Delhi: Oxford University Press, 1995.

Botkin, B. Daniel. *Discordant Harmonies: A New Ecology for the Twenty-First Century*. New York: Oxford University Press, 1990. pp. 16-38.

Bulliet, Richard W. "History and Animal Energy in the Arid Zone." In *Water on Sand: Environmental Histories of the Middle-East and North Africa*, edited by Alan Mikhail, 51-70. New York: Oxford University Press, 2013.

Clemencon, Raymond. "Pushing past neo-liberalism: rethinking global change negotiations." In *Routledge Handbook of Climate Change and Society*, Edited by Constance Lever Tracy, 453-72. London and New York: Routledge, 2010.

Deloche, Jean. *Transport and Communication in India Prior to Steam Locomotion*, Vol-I, 226-254. Delhi: Oxford University Press, 1993.

Dorsey, Kurk. "National Sovereignty, the International Whaling Commission, and the Save the Whales Movement." In *Nation-States and the Global Environment: New Approaches to international Environmental History*, edited by Erika Marie Bsumek, David Kinkela and Mark Atwood Lawrance, 43-61. New York: Oxford University Press, 2013.

Gadgil, Madhav and Ramachandra Guha. "Conquest and control." In *This Fissured Land: An ecological History of India*, edited by Madhav Gadgil and Ramachandra Guha 113-45. Delhi: Oxford University Press, 1992.

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Milly, P.C.D., Julio Betancourt, Malin Falkenmark, Robert M. Hirsch, Zbigniew W. Kundzewicz, Dennis Lettenmaier, Ronald J. Stouffer. "Stationarity Is Dead: Whither Water Management." *Science* 319, (2008): 573-74.

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Rangarajan, Mahesh. "Introduction," in *Environmental Issues in India: A Reader*, edited by Mahesh Rangarajan, xiii-xxvii. Delhi: Pearson, 2007.

Roy, Dunu. 'Environmentalism and Political Economy', in *Environmental Issues in India: A Reader*, Edited by Mahesh Rangarajan, 521-29. Delhi: Pearson, 2007.

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Worster, Donald. "Doing Environmental History." *The Ends of the Earth: Perspectives on Modern Environmental History*, edited by Donald Worster and Alfred Crosby, 1-14. Cambridge: Cambridge University Press, 1988.

SUGGESTED READINGS

Aberth, John. "Harnessing the Nature." In *An Environmental History of the Middle Ages: The Crucible of Nature*, edited by John Aberth, 28-40. London and New York: Routledge, 2013.

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Davis, Diana K. "Enclosing Nature in North Africa: National Parks and the politics of Environmental History." In *Water on Sand: Environmental Histories of the Middle-East and North Africa*, edited by Alan Mikhail, 159-79. New York: Oxford University Press, 2013.

Divyabhanusinh, "At the Court of Great Mughals." In *India's Environmental History, Vol-1, From Ancient Times to the Colonial Period: A Reader*, edited by Mahesh Rangarajan and K Sivaramakrishnan, 269-95. Ranikhet: Permanent Black, 2012.

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Finley, Cernel. "Global Borders and the Fish That Ignore them: The Cold War Roots of Overfishing." In *Nation-States and the Global Environment: New Approaches to international Environmental History*, Edited by Erika Marie Bsumek, David Kinkela and Mark Atwood Lawrance, 62-75. New York: Oxford University Press, 2013.

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Lewis, Simon L. and Mark, A Maslin. "Defining the Anthropocene." *Nature* 519, (2015): 171-80.

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DISSERTATION

Course Code: HIS2637

Credit Units: 09

Course Objective

The aim of the dissertation is to provide you with an opportunity to further your intellectual and personal development in your chosen field by undertaking a significant practical unit of activity, having an educational value at a level commensurate with the award of your degree. The dissertation can be defined as a scholarly inquiry into a problem or issues, involving a systematic approach to gathering and analysis of information / data, leading to production of a structured report.

Chapter Scheme and distribution of marks:

Chapter 1: Introduction – 10 marks

Chapter 2: Conceptual or Theoretical Framework – 25 marks

Chapter 3: Presentation, Analysis & Findings -- 25 marks

Chapter 4: Conclusions -- 10 marks

Chapter 5: Bibliography-- 5marks

The Components of a Dissertation

A Dissertation should have the following components:

- 1) **Cover Page:** This should contain the title of the dissertation, to whom it is submitted, for which degree, the name of the author, name of the supervisor, year of submission of the work and name of the University.
- 2) **Acknowledgement:** Various organizations and individuals who might have provided assistance /co-operation during the process of carrying out the study.
- 3) **Table of Content:** Page-wise listing of the main contents in the report, i.e., different Chapters and its main Sections along with their page numbers.
- 4) **Body of the Report:** The body of the report should have these four logical divisions
 - a)**Introduction:** This will cover the background, rationale/ need / justification, brief review of literature, objectives, methodology (the area of the study, sample, type of study, tools for data collection, and method of analysis), Limitations of the Study, and Chapter Planning.
 - b)**Conceptual Framework:** (relating to the topic of the Dissertation).
 - c) **Presentation of Data, Analysis and Findings:** (using the tools and techniques mentioned in the methodology).
 - d)**Conclusion and Recommendations:** In this section, the concluding observations based on the main findings and suggestions are to be provided.
- 5) **Bibliography or References:** This section will include the list of books and articles which have been used in the work, and in writing the report.
- 6) **Annexures:** Questionnaires (if any), relevant reports, etc.
(The main text of the Dissertation should normally be in the range of 5000 words. However, there may be annexure in addition to the main text)

Steps of the Dissertation Work

Step I: Selection of the topic should be made keeping the following points into consideration:

- Suitability of the topic.
- Relevance of the topic
- Time available at the disposal.
- Feasibility of data collection within the given time limit.
- Challenges involved in the data collection (time & cost involved in the data collection, possibility of getting responses, etc.)

Step II: Finalisation of the Topic and preparation of Dissertation Proposal in consultation with the Supervisor.

Step III: Collection of information and data relating to the topic and analysis of the same.

Step IV: Writing the dissertation dividing it into suitable chapters, viz.,

Chapter 1: Introduction,

Chapter 2: Conceptual and Theoretical Framework

Chapter 3: Analysis & Findings

Chapter 4: Conclusions

Step V: The following documents are to be attached with the Dissertation:

1) Approval letter from the supervisor (Annexure-IA)

2) Student's declaration (Annexure-IB)

3) Certificate from the Competent Authority of the Organisation / Institution, if the student undertakes the Dissertation Work in any Organisation / Institution.

Annexures,

References / Bibliography

Guidelines for evaluation:

- Each of the students has to undertake a topic individually under the supervision of a teacher and to submit the same following the guidelines stated below.
- Language of Dissertation and Viva-Voce Examination has to be English. The Dissertation must be typed and hard bound.
- Failure to submit the Dissertation or failure to appear at the Viva-voce Examination will be treated as "Absent" in the Examination. He /she has to submit the Dissertation and appear at the Viva-Voce Examination in the subsequent years (within the time period as per University Rules).
- No marks will be allotted on the Dissertation unless a candidate appears at the Viva-Voce Examination. Similarly, no marks will be allotted on Viva-Voce Examination unless a candidate submits his/her Dissertation.
- Evaluation of the Dissertation to be done jointly by one internal expert and one external expert with equal weightage, i.e., average marks of the internal and external experts will be allotted to the candidate.
- A candidate has to qualify in the Dissertation separately, obtaining a minimum marks of 40 (Dissertation and Viva-Voce taken together) in paper 3.5.
- Marking Scheme for Dissertation and Viva-Voce Examination:

Dissertation	Power Point Presentation & Viva
75 marks	25 marks

Bachelor of Arts Political Science (Honors)

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Curriculum & Scheme of Examination

2022

AMITY UNIVERSITY HARYANA

GURUGRAM

A handwritten signature in blue ink, appearing to read 'Anil', is positioned above the official stamp of the Deputy Dean.

Prof. (Dr.) Anil Kumar
Deputy Dean Academics
Amity University Haryana
Manesar, Gurugram
Haryana-122413

A handwritten signature in blue ink is positioned above the official stamp of the Registrar.

Registrar
Amity University Haryana
Manesar Gurgaon-122413

INDIAN NATIONALISM

Course Code: POL2101

Credit Units: 05

Course Objective

The course will seek to provide the student with a basic yet meaningful understanding of the political scenario that led to the struggle for India's independence. It would endeavor to cover the entire duration of the growth of nationalism in India till the attainment of independence in 1947.

Course Content

Module-I: Origins and meaning of nationalism

Module-II: Emergence of nationalism in India

Historiography of Indian Nationalism, Agrarian Society and Peasant Discontent, The New Middle Class and the Emergence of Nationalism, Causes of nationalism in India, Foundation of the Indian National Congress, The moderate Congress: objectives and methods

Module-III: Early Nationalism: Discontent and Dissension

The Moderates and Economic Nationalism, Hindu Revivalism and Politics, Muslim Politics and the Foundation of the Muslim League, Patriotism in literature

Module-IV: Roots of extremism

The Swadeshi Movement in Bengal- 1905-1908, Extremism in other provinces, Repression, conciliation, and divide and rule, War and Indian politics, Bhagat Singh, Surya Sen and the Revolutionary Terrorists

Module-V: Movements from below

Tribal Movements, Moplahs, Deccan Riots, Caste consciousness, Communal consciousness, Labour

Module-VI: The Age of Gandhian Politics

Limited Self Government, 1909-1919, The Arrival of Mahatma Gandhi, Champaran, Kheda, Ahmedabad, Khilafat and Non-Cooperation Movements, Civil Disobedience Movement, The Rowlatt Satyagraha, The Act of 1935 and the Princely States


Module-VII: Independence and Partition

Simla Conference, The Cabinet Mission, Quit India Movement, The turbulent forties, The Mountbatten Plan, Freedom and Partition, Communal holocaust and peasant rebellion, Post-Partition violence, Impact of violence on politics of India and Pakistan, Integration of States

Examination Scheme

Components	A	P	A/TP	CT	EE
Weightage (%)	5	10	5	10	70

(A : Attendance ; P : Presentation ; A/TP : Assignment/Term Paper ; CT : Class Test ; EE : External Examination)


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Text and References

Text:

- Anderson, Benedict. 1983. *Imagined Communities: Reflections on the Origin and Spread of Nationalism*. USA/UK: Verso, New Left Books.
- Bandyopadhyay, Shekhar. 2004. *From Plassey to Partition: A History of Modern India*. New Delhi: Cambridge University Press.
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- Sarkar, Sumit. 1983. *Modern India 1885-1947*. New Delhi: Macmillan.

References:

- Chatterjee, Partha. 1993. *The Nation and its Fragments: Colonial and Post-colonial histories*. New Delhi: Oxford University Press.
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- Bayly, C A. 1998. *Origins of Nationality in South Asia: Patriotism and Ethical Government in the Making of Modern India*. New Delhi: Oxford University Press.
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- Jalal, Ayesha and Sugata Bose. 1997. "Exploding Communalism: The Politics of Muslim Identity in South Asia". In *Nationalism, Democracy, and Development: State and Politics in India*. UK: Cambridge University Press.
- Guha, Ranajit. 1982. *Subaltern Studies: Writings on South Asian History and Society*, Volume I. UK: Oxford University Press.
- Prakash, Gyan. 1992. *Another Reason: Science and the Imagination of Modern India*. Princeton: Princeton University Press.
- Gandhi, M K. 1997. *Hind Swaraj and Other Writings*. New Delhi: Oxford University Press.

BRITISH COLONIALISM IN INDIA

Course Code: POL2102

Credit Units: 05

Course Objective

The purpose of this course is to help the students understand India's colonial past. The importance and relevance of understanding this past is the fact that the roots of many political institutions and ideas, social and economic structures that are central to politics in India today can be traced back to this past. The course seeks to achieve this understanding by studying colonialism in India from different perspectives that reveal different facets of colonialism in India: social-economic, political, religious, legal, and educational.

Course Content

Module-I: Imperialism and colonialism

Brief History of Global and Indian imperialism; Major Perspectives on Colonialism – Liberalism, Marxism, Post-colonialism

Module-II: Foundations of Colonial Rule in India

Consolidation of British power in India; Police and Civil Administration; Legal Foundations of the Colonial State; Issues related to the sovereignty and relations with British Parliament and major constitutional developments

Module-III: Economy and Society

Impact on Agriculture, land relations and ecology; the 'Deindustrialization' Debate

Module-IV: Religion and Society

Colonial Ideology of Indian Improvement/'civilizing mission': Orientalists and the Anglicists (Utilitarians and Missionaries); Shaping Communities: Census and Enumeration; Colonialism and the Gender question

Module-V: Education

Teaching the Colonial Subject: Education; The New Middle Class

Module-VI: Early Indian Responses

Peasant and Tribal Uprisings; The 1857 Rebellion

Examination Scheme

Components	A	P	A/TP	CT	EE
Weightage (%)	5	10	5	10	70

(A : Attendance ; P : Presentation ; A/TP : Assignment/Term Paper ; CT : Class Test ; EE : External Examination)



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Text and References

Text:

- Bandopadhyay, S. 2004. *From Plassey to Partition: A History of Modern India*. New Delhi: Orient Longman.
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- Datta, G. Sobhanlal. 2007. 'Imperialism and Colonialism: Towards a Postcolonial Understanding', in Dasgupta, Jyoti Bhusan (ed.) *Science, Technology, Imperialism and War*. New Delhi: Centre for Studies in Civilization Publication and DK.
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References:

- Thapar, R. 2000. 'Interpretations of Colonial History: Colonial, Nationalist, Post-colonial', in DeSouza, P.R. (ed.) *Contemporary India: Transitions*. New Delhi: Sage Publications.
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- Singha, R. 1998. *Despotism of Law*. New Delhi: Oxford University Press.
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- Seth, S. 2008. *Subject Lessons: The Western Education of Colonial India*. New Delhi: Oxford University Press.
- Cohn, B. 1987. 'The Census, Social Structure and Objectification of society', in Cohn, Bernard. *An Anthropologist Among Historians and Other Essays*. New Delhi: Oxford University Press.

POLITICAL PHILOSOPHY-I

Course Code: POL2103

Credit Unit: 05

Course Objective

The course aims at (i) introducing the students to concepts and concerns that are of key significance to philosophical thought and practice, (ii) helping the students understand the meaning, need and approaches to political philosophy, (iii) studying and analyzing the political philosophies of stalwarts such as Plato and Aristotle with reference to the early Greek political setting.

Course Content

Module-I: An Introduction to Political Philosophy

An Introduction to Philosophy; Meaning, Nature and Method of Political Philosophy

Module-II: Democracy

Concept; Active Citizens and Democracy; The Problem of Minority; Conclusion.

Module-III: Liberty

Meaning and Significance of Liberty; Freedom and the Limits of Government; Analysis.

Module-IV: Justice

Meaning and Need of Justice; The Significance of Procedure; Are There Any Universal Theories of Justice?; Conclusive Analysis.

Module-V: Greek Political Thought and Practicum

Greek Political Legacy; Plato; Aristotle; Machiavelli; A Study of Current Trends in Political Thought and Practicum.

Examination Scheme

Components	A	P	A/TP	CT	EE
Weightage (%)	5	10	5	10	70

(A : Attendance ; P : Presentation ; A/TP : Assignment/Term Paper ; CT : Class Test ; EE : External Examination)


Text & References:

Text:

Bird, Colin. 2006. *An Introduction to Political Philosophy*. New Delhi: Cambridge University Press.

Boucher, Dand P Kelly (eds).2003. *Political Thinkers: From Socrates to the Present*. New York: Oxford University Press.

Nelson, B.2008. *Western Political Thought*. New Delhi: Pearson Longman.


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References:

- Kukathas, Ch. and G F Gaus(eds.). 2004. *Handbook of Political Theory*. New Delhi: Sage Publications.
- Cranston, Maurice. 1964. *Western Political Philosophers*. London: Foutana.
- Skoble, AJand T R Machan.2007. *Political Philosophy: Essential Selections*. New Delhi: Pearson Education.
- Strauss, Land J Cropsey(eds.). 1987. *History of Political Philosophy*. 2nd Edition. Chicago: Chicago University Press.
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POLITICAL PHILOSOPHY-II

Course Code: POL2202

Credit Unit: 04

Course Objective

This paper aims at helping the students understand the concepts, trends and issues in modern western political philosophy. Thus (i) the first module would help the students gain an analytical overview of modern western political thought and (ii) the other three modules would work towards imbuing the students with an in-depth sight into some perennial issues of politico-philosophical significance. Towards the latter end, the second, third and fourth modules would include a study and analysis of the political philosophies of Hobbes, Locke and Rousseau.

Course Content

Module-I: Modern Western Philosophy: An Introduction

Modern Western Philosophy- An Introduction; Natural Rights; Utilitarianism; Liberals and Conservatives; Anarchists and Socialists; Justice; A Deeper Sense of Politics; Global Politics

Module-II: Hobbes

Human Nature and the State of Nature; The Role and Powers of the Sovereign; Secular Moralism and Role of Social Contract

Module-III: Locke

Doctrine of Natural Law, Legitimate Regime, Property and the Class State

Module-IV: Rousseau

The Social Contract: Its Problem and Assumptions; The General Will and the Questions of Stability

Examination Scheme

Components	A	P	A/TP	CT	EE
Weightage (%)	5	10	5	10	70

(A : Attendance ; P : Presentation ; A/TP : Assignment/Term Paper ; CT : Class Test ; EE : External Examination)

Text & References:

Text:

Rawls, John and Samuel Freeman. 2007. *Lectures on the History of Political Philosophy*. Cambridge MA: Belknap Press.

Hudelson, Richard. 1999. *Modern Political Philosophy*. Armonk NY: M.E. Sharpe.

Kenny, Anthony. 2006. *The Rise of Modern Philosophy*. New York: Oxford University Press.

References:

Zagorin, Perez. 2009. *Hobbes and the Law of Nature*. Princeton, New Jersey: Princeton University Press.

Harrison, Ross. 2003. *Hobbes, Locke and Confucian Matierpiece: An Examination of Seventeenth Century Political –Philosophy*. New York: Cambridge University Press.

Broome, J.H. 1963. *Rousseau: A Study of His Thought*. London: Edward Arnold.

CURRENT THEMES IN INDIAN POLITICS

Course Code: POL2204

Credit Units: 03

Course Objective

The course would attempt to appreciate the various political processes active in contemporary India and understand their implications for the social and political future of the country. It would prepare the students to critically evaluate contemporary and modern Indian politics and encourage evaluative thinking. Class lectures would be aided by regular group discussions, class debates and interactive question and answer sessions.

Course Content

Module-I: The Nature and Functioning of Democracy

The Parliamentary System: An Evaluation; Democracy: Social and Economic Dimensions; The Changing Nature of the Party System; The Nature of Coalition Politics; Transformative Nature of Electoral Processes in India

Module-II: Key themes in Indian Politics

Why Is Secularism Important for India; Contemporary Debates on Nationalism; Hindu Nationalism and its Impact on the Polity

Module-III: Current Political Scenarios

Dimensions of Indian Federalism; Democratic Decentralization and Panchayati Raj; The Changing Nature of Public Administration; Judicial Reforms in Modern India; The Changing Face of the Civil Society; India in the Global Strategic Environment

Examination Scheme

Components	A	P	A/TP	CT	EE
Weightage (%)	5	10	5	10	70

(A : Attendance ; P : Presentation ; A/TP : Assignment/Term Paper ; CT : Class Test ; EE : External Examination)


Texts and References

Texts :

Chandhoke, Neera and Praveen Priyadarshi. 1999. *Contemporary India: Economy, Society, Politics*. New Delhi : Pearson Learning.

Rothermund, Deitmar. 2013. *Contemporary India: Political, Economic and Social Development*. New Delhi : Pearson Learning.

Hasan, Zoya, S N Jha, and Rasheeduddin Khan. 1989. *The State, Political Process, and Identity: Reflections on Modern India*. New Delhi : Sage Publications.


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References :

- Kothari, R. 1970. *Politics in India*. New Delhi: Orient Blackswan.
Kohli, A. 2001. *The Success of India's Democracy*. New Delhi: Cambridge University Press.
Kohli, A. 1988. *India's Democracy*. New Delhi: Orient Longman.
Bhambri, C P. 1998. *The Indian State: Fifty Years*. New Delhi: Shipra.
Brass, P. 1994. *Politics in India Since Independence*. New Delhi: Cambridge University Press.
Kashyap, S C. 1992. *Our Parliament*. New Delhi: National Book Trust.
Kothari, R. 1967. *Party System and Election Studies*. Bombay: Asia Publishing House.



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TERM PAPER

Course Code: POL2231

Credit Units: 02

Objective

The objective of this course is to judge the understanding as well as application of the knowledge gained by the students. The aim of the term paper is to provide the students with an opportunity to further enhance their knowledge of politics by undertaking hands-on research on a topic of their choice. The topics selected by the students must be commensurate with the ongoing courses pertaining to the semester in question.


A term paper is primarily a record of intelligent reading in several sources on a particular subject. The students will choose the topic at the beginning of the session in consultation with the faculty assigned.

Guidelines:

1. The term paper will be related to contemporary politics and related philosophical injunctions and the topic(s) will be given by the department.
2. The presentation of the term paper is scheduled to be held before the commencement of Semester examinations.
3. The paper will carry 100 marks that will be marked on the basis of understanding and organization of content based on the literature review. The Bibliography shall form an important part of the paper.
4. Examples of a few broad areas for Term Paper (List is indicative, not exhaustive)
 - Issues of caste in Indian politics
 - State and democracy
 - Internal security scenario
 - Theories of secularism
 - Justice and related themes
 - Multicultural societies
 - Feminist critique of Indian politics
 - Media and politics
 - Cultural imperialism

Evaluation Scheme

Organisation and relevance of content	Literature Review	Bibliography	Presentation	Total
30	30	20	20	100


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ELECTIONS AND ELECTORAL POLITICS

Course Code: POL2206

Credit Units: 01

Course Objective

The objective of the course would be to inculcate a basic understanding of the intricacies of the process that culminates in the dance of democracy at the end of the term of the incumbent government. The course would seek to provide the students with a clear picture of the specific themes that govern the conduct of elections and the manner in which various political parties respond to the call for polls.

Course Content

Module-I : Brief History of Elections in India

Elections in India since 1947 ; Electoral reforms ; Election Commission : challenges and issues

Module-II : Study of Indian Elections : an overview

Case studies ; Comparative approaches ; Electoral process ; voter registration ; absentee voting

Module-III : Political debates in the study of elections

Scientific dilemmas ; Political issues

Examination Scheme

Components	A	P	A/TP	CT	EE
Weightage (%)	5	10	5	10	70

(A : Attendance ; P : Presentation ; A/TP : Assignment/Term Paper ; CT : Class Test ; EE : External Examination)

Texts and References


Texts :

Ahuja, M L. 1998. *Elections and Electoral Processes in India- 1952-1998*. New Delhi : Mittal Publications.

Kumar, Arun. 2000. *Elections in India*. New Delhi : Neha Publications.

References :

Roy, Meenu. 2000. *Electoral politics in India: election process and outcomes, voting behaviour and current trends*. New Delhi : Deep & Deep Publications.


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REVIEW OF CONTEMPORARY LITERATURE-I

Course Code: POL2230

Credit Units: 02

Course Objective

The objective of this concentration elective is to inculcate reading habit along with value addition to the existing understanding of the subject. The book would be a kind of knowledge enhancer that would envision the student about some current thoughts related to the discipline. The book reading and its critical analysis would help broaden the intellectual horizon of the student. A contemporary and relevant book will be selected by the concerned department.

Guidelines

The student is expected to thoroughly go through the discipline related prescribed book with the objective of critically reviewing each aspect and character of the book. The student is supposed to have a detailed insight into the following:


- Content
- Writing style
- Information/learning
- Content handling
- Characters(if any)
- Thematic Clarity

The report is to be submitted in about 3000 words on A4 size sheets, Font 12pt., Times New Roman, 1.5 spacing. Headings in Font Size 16

Examination Scheme

Components	A	P	A/TP	CT	EE
Weightage (%)	5	10	5	10	70

(A : Attendance ; P : Presentation ; A/TP : Assignment/Term Paper ; CT : Class Test ; EE : End-Term Examination)


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PROJECT (WITH PRESENTATION AND EVALUATION)

Course Code: POL2232

Credit Units: 03

Course Objective

The major objective of this course would remain development of the ability to undertake independent research on any topic of political or socio-economic of relevance and produce an intellectual treatise which enhances future knowledge and provides a basis for further investigative work. The course would emphasise on the methodology of research.

Methodology of Project

The project would be designed to encourage original research and at the same time provide the students with an opportunity to work on political issues that affect the everyday life of the students and those who live around them. For example, students could observe and assess the impact of impending elections on people in their constituency from the socio political point of view. Their observations could be reecorded in the form of project report followed by a presentation.

Guidelines for Project Report

1. **Length of the report** : The project report should not exceed 5000 words in length (excluding Bibliography and Annexures).
2. **Contents of the report** :
 - a. Cover page
 - b. Acknowledgements
 - c. Table of Contents
 - d. Introduction
 - e. Review of readings
 - f. Findings and analysis
 - g. Conclusions
 - h. Bibliography or References
 - i. Annexures
3. **Steps for completion of project** :
 - a. Finalization of topic in consultation with faculty
 - b. Introductory presentation with research objectives and questions specified
 - c. Field work
 - d. Preparation of project report
 - e. Submission of project report
 - f. Final Presentation and viva

Possible research topics

1. Select coverage of any political issue of importance and trace its development through news reports published in any reputed newspaper (English/Hindi).
2. Prepare a research report on the impact of elections in your constituency.
3. Prepare a report on the representation of terrorism in Hindi films. The report should contain a list of films viewed with full details.
4. Select any philosophical issue of your choice and attempt to bring out your own conclusions based on your reading of the various texts on that issue.

Examination Scheme

Project Report	Power Point Presentation & Viva
75 marks	25 marks


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STATE POLITICS IN INDIA

Course Code: POL2302

Credit Units: 04

Course Objective

The course will seek to define historical legacies and current themes in the development of politics in the states of India. It would provide the student within-depth understanding of the democratic processes in practice in various states and encourage them to understand the politics of states better. A study of politics and political processes in states also pertains to the exigencies of coalition politics at the centre.

Course Content

Module-I : Regions and Regionalism

Regional cultures in Indian Civilization ; States Reorganization Commission ; Integration and ethnic conflict ; Movements for state autonomy : Jharkhand and Uttarakhand

Module-II : Political Parties and Electoral Politics in the States

Congress Party in Uttar Pradesh ; BJP's expansion and coalition strategies ; Regionalization of Indian Politics ; Telugu Desam Party in Andhra Pradesh ; Changing Nature of Tamil Nadu ; Asom Gana Parishad in Assam ; Politics of the left in West Bengal

Module-III : Social Movements and Politics in the States

Decline of Backward Caste Politics in North India ; Bahujan Samaj Party and Subaltern Mobilization in Uttar Pradesh ; Ethnic Minorities in Majoritarian Indian Polity

Module-IV: Economic Reforms and Indian Politics

India's federal economy ; Globalization and State Disparities in India ; India's special economic zones : protest politics and growth patterns ; Reforms and economic growth in Indian states

Examination Scheme

Components	A	P	A/TP	CT	EE
Weightage (%)	5	10	5	10	70

(A : Attendance ; P : Presentation ; A/TP : Assignment/Term Paper ; CT : Class Test ; EE : External Examination)


Texts and References

Texts :

Pai, Sudha. 2013. *Handbook of Politics in Indian States : Regions, Parties and Electoral Reforms*. New Delhi : Oxford University Press.

Narain, Iqbal. 1976. *State Politics in India*. Meerut : Meenakshi Prakashan.

Weiner, Myron. 1968. *State Politics in India*. Princeton : Princeton University Press.


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References :

Jenkins, Rob. 2004. *Regional Reflections : Comparing Politics across India's States*. New Delhi : Oxford University Press.

Yadav, Yogendra. 2000. 'Understanding the Second Democratic Upsurge: Trends of Bahujan Participation in Electoral Politics in the 1990s', in Francine R. Frankel, Zoya Hasan, Rajeev Bhargava and Balveer Arora (eds.), *Transforming India*. New Delhi : Oxford University Press.

Yadav, Yogendra and Suhas Palshikar. 2003. 'From Hegemony to Convergence: Party System and Electoral Politics in the Indian States – 1952-2002'. *Journal of the Indian School of Political Economy*, January-June.



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POLITICS OF POST-COLONIAL STATES

Course Code: POL2303

Credit Units: 04

Course Objective

The objective of the course is to delineate the specific features of post-colonial states and their development patterns. The students would be exposed to world-class literature on both the definition of the post-colonial state as well as the trajectory of political processes as they developed in those states, for a better and complete understanding of national as well as international politics.

Course Content

Module-I : Definition of post-colonial state

Europe as an instrument of colonialism ; historical trajectory of post-colonial states ; debates modernity in post-colonial states ; democratic institutions in post-colonial states

Module-II : Development of the post-colonial state in Africa

Ghana ;Kenya ; South Africa ; Democratic Republic of Congo ; Algeria

Module-III : Political processes in post-colonial states in Latin America

Argentina ; Brazil ; Bolivia

Module-IV : Post-colonial states in Asia

Pakistan ; Bangladesh ; Sri Lanka ; Nepal

Examination Scheme

Components	A	P	A/TP	CT	EE
Weightage (%)	5	10	5	10	70

(A : Attendance ; P : Presentation ; A/TP : Assignment/Term Paper ; CT : Class Test ; EE : External Examination)

Texts and References

Texts :

Young, Crawford. 2012. *The Post-Colonial State in Africa : Fifty Years of Independence, 1960-2010*. Madison : University of Wisconsin Press.

Moraña, Mabel, Enrique Dussel, Carlos A. Jáuregui. 2008. *Coloniality at Large: Latin America and the Postcolonial Debate (Latin America Otherwise)*. Duke University Press.

Shastri, Amita and A. Jeyaratnam Wilson. 2001. *The Post-Colonial States of South Asia : Democracy, Development, and Identity*. New Delhi : Palgrave Macmillan.

References :

Gardezi, Hassan M. 1985. 'The Post-Colonial State in South Asia: The Case of Pakistan'. *Comparative Studies of South Asia, Africa and the Middle East* 5(2): 1-7.

Forrest, Joshua B. Nationalism in Post-Colonial States. In *After Independence : Making and Protecting the Nation in Post-Colonial and Post-Communist States*, edited by Lowell W Barrington. University of Michigan Press. (<http://www.press.umich.edu/pdf/0472098985-ch2.pdf>)

SUMMER PROJECT EVALUATION

Course Code: POL2335

Credit Units: 03

Objective

The aim of the project is to provide the students with an opportunity to further their intellectual and personal development in the chosen field by undertaking a significant practical unit of activity. The project can be defined as a scholarly inquiry into a problem or issues, involving a systematic approach to gathering and analysis of information / data, leading to production of a structured report.

Chapter Scheme and distribution of marks:

Chapter 1: Introduction – 10 marks

Chapter 2: Brief Review of Literature – 25 marks

Chapter 3: Research Findings and Analysis – 25 marks

Chapter 4: Conclusions – 10 marks

Chapter 5: Bibliography – 05 marks

Components of a Project Report

The outcome of Project Work is the Project Report. A project report should have the following components:

1) Cover Page: This should contain the title of the project proposal, to whom it is submitted, for which degree, the name of the author, name of the supervisor, year of submission of the project work, name of the University.

2) Acknowledgement: Various organizations and individuals who might have provided assistance /co-operation during the process of carrying out the study.

3) Table of Content: Page-wise listing of the main contents in the report, i.e., different Chapters and its main Sections along with their page numbers.

4) Body of the Report: The body of the report should have these four logical divisions

a) Introduction: This will cover the background, rationale/ need / justification, objectives, methodology (the area of the study, sample, type of study, tools for data collection, and method of analysis), Limitations of the Study, and Chapter Planning.

b) Brief Review of Literature: (relating to the topic of the Project).

c) Research Findings and Analysis: (using the tools and techniques mentioned in the methodology).

d) Conclusions: In this section, the concluding observations based on the main findings and suggestions are to be provided.

5) Bibliography or References: This section will include the list of books and articles which have been used in the project work, and in writing a project report.

6) Annexures: Questionnaires (if any), relevant reports, etc.

(The main text of the Project should normally be in the range of 5000 words. However, there may be annexure in addition to the main text)

The Steps of a Project Report

STEP I : Selection of the topic for the project by taking following points into consideration:

- Suitability of the topic
- Relevance of the topic
- Time available for completion


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- Feasibility of data collection within the given time limit
- Challenges involved in data collection (time & cost involved in the data collection, possibility of getting responses, etc.)

STEP II: Finalisation of the Topic and preparation of Project Proposal in consultation with the Supervisor

STEP III: Collection of information and data relating to the topic and analysis of the same

STEP IV: Writing the report dividing it into suitable chapters, viz.,

Chapter 1: Introduction,

Chapter 2: Brief Review of Literature

Chapter 3: Research Findings and Analysis

Chapter 4: Conclusions

Chapter 5: Bibliography


STEP V: The following documents are to be attached with the Final Project Report.

- Approval letter from the supervisor (Annexure-IA)
- Student's declaration (Annexure-IB)
- Certificate from the Competent Authority of the Organisation / Institution, if the student undertakes the Project Work in any Organisation / Institution.

Guidelines for evaluation:

- Each of the students has to undertake a Project individually under the supervision of a teacher and to submit the same following the guidelines stated below.
- Language of Project Report and Viva-Voce Examination may be English. The Project Report must be typed and hard bound.
- Failure to submit the Project Report or failure to appear at the Viva-voce Examination will be treated as "Absent" in the Examination. He /she has to submit the Project Report and appear at the Viva-Voce Examination in the subsequent years (within the time period as per University Rules).
- No marks will be allotted on the Project Report unless a candidate appears at the Viva-Voce Examination. Similarly, no marks will be allotted on Viva-Voce Examination unless a candidate submits his/her Project Report.
- Evaluation of the Project Work to be done jointly by one internal expert and one external expert with equal weightage, i.e., average marks of the internal and external experts will be allotted to the candidate. The evaluation scheme shall be as follows:

Project Report	Power Point Presentation & Viva
75 marks	25 marks


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Student's Declaration

Ihereby declare that the Project Work with the title (in block letters).....
submitted by me for the partial fulfilment of the degree of B.A. Honours in Political Science is my original work and has not been submitted earlier to any other University /Institution for the fulfilment of the requirement for any course of study.
I also declare that no chapter of this manuscript in whole or in part has been incorporated in this report from any earlier work done by others or by me. However, extracts of any literature which has been used for this report has been duly acknowledged providing details of such literature in the references.

Signature of Supervisor:

Signature of Student
Name

Registration No.

Place:
Date:

POLITICS AND MEDIA

Course Code: POL2304

Credit Units: 03

Course Objective

To provide students with an overarching perspective on the various processes at play in the manner in which the media – print and visual – transform into vehicles of politics. The course will, through exploration of several case studies pertaining to various types of media, encourage the students to critically analyse media messages, both print and visual.

Course Content

Module-I : Theories of the mass media

Agenda Setting Theory ; Cultivation Theory ; Dependency Theory ; Hypodermic Needle Theory ; Knowledge Gap ; Media Richness Theory ; Medium Theory ; Spiral of Silence ; Two Step Flow Theory ; Uses and Gratifications Approach ; Priming ; Framing

Module-II : Print media and politics

Brief history of newspapers in India ; Growth of print media in India ; print media and Indian political parties ; democratic processes and print media

Module-III : Television news media and politics

Brief history of television media in India ; Growth of Television news media in india ; democratic politics and television media : perspectives and trends

Examination Scheme

Components	A	P	A/TP	CT	EE
Weightage (%)	5	10	5	10	70

(A : Attendance ; P : Presentation ; A/TP : Assignment/Term Paper ; CT : Class Test ; EE : External Examination)


Texts and References

Texts :

McQuail, Dennis. 2010. *McQuail's Mass Communication Theory*. New Delhi : Sage Publications.
Jeffrey, Robin. 2000. *India's Newspaper Revolution : Capitalism, Politics and the Indian Language Press, 1977-99*. New Delhi : Oxford University Press.
Mehta, Nalin. 2008. *Television in India: Satellites, Politics and Cultural Change*. New Delhi : Routledge.

References :

Sahay, Uday. 2006. *Handbook of the Media in Contemporary India*. New Delhi : Oxford University Press.
Batabyal, Somnath, Angad Chowdhry, Meenu Gaur, Matti Pohjonen. 2011. *Indian Mass Media and Politics of Change*. New Delhi : Routledge.


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REVIEW OF CONTEMPORARY LITERATURE-II

Course Code: POL2330

Credit Units: 02

Course Objective

The objective of this concentration elective is to inculcate reading habit along with value addition to the existing understanding of the subject. The book would be a kind of knowledge enhancer that would envision the student about some current thoughts related to the discipline. The book reading and its critical analysis would help broaden the intellectual horizon of the student. A contemporary and relevant book will be selected by the concerned department.

Guidelines

The student is expected to thoroughly go through the discipline related prescribed book with the objective of critically reviewing each aspect and character of the book. The student is supposed to have a detailed insight into the following:


- Content
- Writing style
- Information/learning
- Content handling
- Characters(if any)
- Thematic Clarity

The report is to be submitted in about 3000 words on A4 size sheets, Font 12pt., Times New Roman, 1.5 spacing. Headings in Font Size 16

Examination Scheme

Components	A	P	A/TP	CT	EE
Weightage (%)	5	10	5	10	70

(A : Attendance ; P : Presentation ; A/TP : Assignment/Term Paper ; CT : Class Test ; EE : End-Term Examination)


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TERM PAPER

Course Code: POL2331

Credit Units: 02

Objective

The objective of this course is to judge the understanding as well as application of the knowledge gained by the students. The aim of the term paper is to provide the students with an opportunity to further enhance their knowledge of politics by undertaking hands-on research on a topic of their choice. The topics selected by the students must be commensurate with the ongoing courses pertaining to the semester in question.

A term paper is primarily a record of intelligent reading in several sources on a particular subject. The students will choose the topic at the beginning of the session in consultation with the faculty assigned.


Guidelines:

1. The term paper will be related to contemporary politics and related philosophical injunctions and the topic(s) will be given by the department.
2. The presentation of the term paper is scheduled to be held before the commencement of Semester examinations.
3. The paper will carry 100 marks that will be marked on the basis of understanding and organization of content based on the literature review. The Bibliography shall form an important part of the paper.
4. Examples of a few broad areas for Term Paper (List is indicative, not exhaustive)

- Issues of caste in Indian politics
- State and democracy
- Internal security scenario
- Theories of secularism
- Justice and related themes
- Multicultural societies
- Feminist critique of Indian politics
- Media and politics
- Cultural imperialism
- Plato's Republic

Evaluation Scheme

Organisation and relevance of content	Literature Review	Bibliography	Presentation	Total
30	30	20	20	100


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PROJECT (WITH PRESENTATION AND EVALUATION)

Course Code: POL2332

Credit Units: 03

Course Objective

The major objective of this course would remain development of the ability to undertake independent research on any topic of political or socio-economic of relevance and produce an intellectual treatise which enhances future knowledge and provides a basis for further investigative work. The course would emphasise on the methodology of research.

Methodology of Project

The project would be designed to encourage original research and at the same time provide the students with an opportunity to work on political issues that affect the everyday life of the students and those who live around them. For example, students could observe and assess the impact of impending elections on people in their constituency from the socio political point of view. Their observations could be reecorded in the form of project report followed by a presentation.

Guidelines for Project Report

Length of the report : The project report should not exceed 5000 words in length (excluding Bibliography and Annexures).

Contents of the report :

- Cover page
- Acknowledgements
- Table of Contents
- Introduction
- Review of readings
- Findings and analysis
- Conclusions
- Bibliography or References
- Annexures

Steps for completion of project :

- Finalization of topic in consultation with faculty
- Introductory presentation with research objectives and questions specified
- Field work
- Preparation of project report
- Submission of project report
- Final Presentation and viva

Possible research topics

- Select coverage of any political issue of importance and trace its development through news reports published in any reputed newspaper (English/Hindi).
- Prepare a research report on the impact of elections in your constituency.
- Prepare a report on the representation of terrorism in Hindi films. The report should contain a list of films viewed with full details.
- Select any philosophical issue of your choice and attempt to bring out your own conclusions based on your reading of the various texts on that issue.

Examination Scheme

Project Report	Power Point Presentation & Viva
75 marks	25 marks

RELIGION AND POLITICS IN INDIA

Course Code: POL2404

Credit Units: 03

Course Objective

The course would attempt to provide the students with quality understanding of the interstices of religion and politics in modern India, with the roots of the current issues lying firmly in movements, events as well as processes witnessed during the colonial period. It would also inculcate in the student an appreciation of the various ways in which politics interacts with religion in Indian society.

Course Content

Module-I : Secularism in a religious society

Definitions and theories of secularism ; Historical Evolution of Secularism in India ; India as a secular state ; Functioning of Indian Secularism

Module-II : Hindu Nationalism

Hindu Nationalism as a social movement ; Militant Social Movement Phase (1989-1992) ; the RSS as a Hindu Nationalist Sect and their political model

Module-III : Persistence of Hindu-Muslim conflict

Congress policy towards Muslims ; Muslim grievances in North India ; Muslim politics and voting behaviour ; Hindu-Muslim polarization ; Hindu consciousness and Hindu-Muslim conflict

Examination Scheme

Components	A	P	A/TP	CT	EE
Weightage (%)	5	10	5	10	70

(A : Attendance ; P : Presentation ; A/TP : Assignment/Term Paper ; CT : Class Test ; EE : External Examination)


Texts and References

Texts :

Brass, Paul R. 1990. *The Politics of India Since Independence*. New Delhi : Cambridge University Press.
Kohli, Atul. 2001. *The Success of India's Democracy*. New Delhi : Cambridge University Press.
Jayal, Neeraj Gopal and Pratap Bhanu Mehta. 2010. *The Oxford Companion to Politics in India*. New Delhi : Oxford University Press.

References :

Jaffrelot, Christophe. 2010. *Religion, Caste and Politics in India*. New Delhi : Primus and Ratna Sagar.
Hasan, Zoya. 2011. *Politics of Inclusion : Castes, Minorities and Affirmative Action*. New Delhi : Oxford University Press.


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PROJECT (WITH PRESENTATION AND EVALUATION)

Course Code: POL2432

Credit Units: 03

Course Objective

The major objective of this course would remain development of the ability to undertake independent research on any topic of political or socio-economic of relevance and produce an intellectual treatise which enhances future knowledge and provides a basis for further investigative work. The course would emphasise on the methodology of research.

Methodology of Project

The project would be designed to encourage original research and at the same time provide the students with an opportunity to work on political issues that affect the everyday life of the students and those who live around them. For example, students could observe and assess the impact of impending elections on people in their constituency from the socio political point of view. Their observations could be reecorded in the form ofproject report followed by a presentation.

Guidelines for Project Report

Length of the report : The project report should not exceed 5000 words in length (excluding Bibliography and Annexures).

Contents of the report :

- Cover page
- Acknowledgements
- Table of Contents
- Introduction
- Review of readings
- Findings and analysis
- Conclusions
- Bibliography or References
- Annexures

Steps for completion of project :

- Finalization of topic in consultation with faculty
- Introductory presentation with research objectives and questions specified
- Field work
- Preparation of project report
- Submission of project report
- Final Presentation and viva

Possible research topics

- Select coverage of any political issue of importance and trace its development through news reports published in any reputed newspaper (English/Hindi).
- Prepare a research report on theimpact of elections in your constituency.
- Prepare a report on the representation of terrorism in Hindi films. The report should contain a list of films viewed with full details.
- Select any philosophical issue of your choice and attempt to bring out your own conclusions based on your reading of the various texts on that issue.

Examination Scheme

Project Report	Power Point Presentation & Viva
75 marks	25 marks

TERM PAPER

Course Code:POL2431

Credit Units: 02

Objective

The objective of this course is to judge the understanding as well as application of the knowledge gained by the students. The aim of the term paper is to provide the students with an opportunity to further enhance their knowledge of politics by undertaking hands-on research on a topic of their choice. The topics selected by the students must be commensurate with the ongoing courses pertaining to the semester in question.


A term paper is primarily a record of intelligent reading in several sources on a particular subject. The students will choose the topic at the beginning of the session in consultation with the faculty assigned.

Guidelines:

1. The term paper will be related to contemporary politics and related philosophical injunctions and the topic(s) will be given by the department.
2. The presentation of the term paper is scheduled to be held before the commencement of Semester examinations.
3. The paper will carry 100 marks that will be marked on the basis of understanding and organization of content based on the literature review. The Bibliography shall form an important part of the paper.
4. Examples of a few broad areas for Term Paper (List is indicative, not exhaustive)
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 - State and democracy
 - Internal security scenario
 - Theories of secularism
 - Justice and related themes
 - Multicultural societies
 - Feminist critique of Indian politics
 - Media and politics
 - Cultural imperialism

Evaluation Scheme

Organisation and relevance of content	Literature Review	Bibliography	Presentation	Total
30	30	20	20	100


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REVIEW OF CONTEMPORARY LITERATURE-III

Course Code: POL2430

Credit Units: 02

Course Objective

The objective of this concentration elective is to inculcate reading habit along with value addition to the existing understanding of the subject. The book would be a kind of knowledge enhancer that would envision the student about some current thoughts related to the discipline. The book reading and its critical analysis would help broaden the intellectual horizon of the student. A contemporary and relevant book will be selected by the concerned department.

Guidelines

The student is expected to thoroughly go through the discipline related prescribed book with the objective of critically reviewing each aspect and character of the book. The student is supposed to have a detailed insight into the following:


- Content
- Writing style
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- Content handling
- Characters(if any)
- Thematic Clarity

The report is to be submitted in about 3000 words on A4 size sheets, Font 12pt., Times New Roman, 1.5 spacing. Headings in Font Size 16

Examination Scheme

Components	A	P	A/TP	CT	EE
Weightage (%)	5	10	5	10	70

(A : Attendance ; P : Presentation ; A/TP : Assignment/Term Paper ; CT : Class Test ; EE : End-Term Examination)


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CINEMA AND POLITICS IN INDIA

Course Code: POL2405

Credit Units: 03

Course Objective

To facilitate deeper understanding of the manner in which politics infiltrates the narratives of popular films to create a cultural consciousness conforming to the dominant political discourse. To make visual cultures compelling and interesting for the students. The unique feature of the course would be teaching through viewing of films.

Course Content

Module-I : History of Cinema in India

Evolution of Bombay cinema ; Development of genres and ideologies ; Hindi Cinema in the post-1947 period ; Representation in Hindi cinema

Module-II : Communal Politics and Hindi cinema

Concept of 'cinematic imagination' ; Representation in cinematic narratives ; Reading *Sarfarosh*, *Fiza* ; *Mission Kashmir* ; *Black Friday*

Module-III : Current themes in cinema and politics

Cinema and the dominant discourse ; representation in hostile scenarios ; cultural mobilization and cinema ; Viewing *Kahaani*, *Jodha Akbar*, *Veer Zaara* ; *Rang De Basanti*

Examination Scheme

Components	A	P	A/TP	CT	EE
Weightage (%)	5	10	5	10	70

(A : Attendance ; P : Presentation ; A/TP : Assignment/Term Paper ; CT : Class Test ; EE : External Examination)

Texts and References

Texts :

Prasad, M Madhava. 1998. *Ideology of the Hindi Film: A Historical Construction*. New Delhi: Oxford University Press.

Dwyer, Rachel and Patel, Divya. 2002. "Indian cinema". *Cinema India: the visual culture of Hindi film*. London: Oxford University Press.

References :

Freitag, Sandra B. 2001. "Visions of the Nation: theorizing the nexus between creation, consumption, and participation in the public sphere". In *Pleasure and the Nation: the history, politics and consumption of public culture in India*, edited by Rachel Dwyer and Christopher Pinney. London: Oxford University Press.

Barnouw, Eric and Krishnaswamy, S. 1980. *Indian Film*. New York: Oxford University Press, Second Edition.

Kesavan, Mukul. 1994. "Urdu, Awadh, and the Tawaif: the Islamic roots of Hindi cinema". In *Forging Identities: gender, communities and the state*, edited by Zoya Hasan. New Delhi: Kali for Women.

WORKSHOP ON CONTEMPORARY POLITICS

Course Code: POL2433

Credit Units: 01

Course Objective

The course would facilitate students to engage with political issues of their choice and discuss the same with fellow students so that perspectives emerge and the development of varied points of view are encouraged. Students would also be encouraged to prepare and make presentations in class and share thoughts on politics and political issues.

Format of Workshop

1. The workshop would be a culmination of class discussions on various emerging issues in Indian and global politics.
2. Students would prepare and make presentations on any one topic of their choice.
3. The presentation would be followed by question and answer session in which other students and invited faculty members would participate.
4. The workshop would be held on a convenient date and day so that several members of the faculty could take part in it.

Guidelines for workshop

Step 1 : Selection of topic for workshop presentation : The students would select a topic of relevance in consultation with the faculty.


Step 2 : Selection of a date/day/venue for workshop : The workshop would be organized and managed entirely by the students. The faculty would play the role of advisors. From selection of suitable date and venue to inviting AUH faculty and officials for the workshop, students would be in charge of the smooth conduct of the workshop.

Step 3 : Preparation for workshop presentation : Once the topic is selected, students would start gathering relevant material for the presentation during the workshop. Since the presentation would be followed by questions and answers, the students have to be prepared for a tough session. Faculty will facilitate the collection of material and preparation of the presentation.

Step 4 : Submission of presentation : Students would submit their presentations in hard copy format for evaluation purposes.

Examination Scheme

Power Point Presentation and Q&A	Participation and organization
75 marks	25 marks


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INDIA'S FOREIGN POLICY

Course Code: POL2503

Credit Units: 05

Course Objective

To provide an in-depth overview of the development of India's foreign policy particularly with reference to the contemporary scenario characterised by global terrorism and violence. To evaluate and discuss the methods of engaging with South Asia and the world that India has adopted over the years.

Course Content

Module-I : Features and perspectives

Foreign policy and national interest ; principles and objectives

Module-II : Non-alignment

The genesis of non-alignment ; India and non-alignment ; non-aligned movement and its impact on international relations ; contemporary relevance of non-aligned movement

Module-III : India-Pakistan Relations

The early years (1947-62) ; major developments leading to the 1971 conflict ; India-Pakistan relations in 1980s ; Kashmir conflict and Indo-Pak relations ; global terrorism and its impact on India-Pakistan relations ; contemporary trends in India-Pakistan relations

Module-IV : India's relations with other states in South Asia

India's policy towards Bangladesh ; India and Nepal ; India's foreign policy towards Sri Lanka : history, the Tamil question and contemporary trends

Module-V : India-China Relations

Evolution of India's China Policy ; India-China relations through the years ; major events and conflicts ; economic relations between India and China ; contemporary perspectives on India-China Relations

Module-VI : India's policy towards the rest of the world

Southeast Asia in Indian Foreign Policy ; India-Iranian Relations ; India's policy towards Israel ; India's relations with Korea ; India-Japan Relations ; India's relations with Russia ; India and the United States


Module-VII : Issues in India's foreign policy

Evolution of India's Nuclear Policy ; India's foreign economic policies ; domestic and international influences on India's energy policy

Examination Scheme

Components	A	P	A/TP	CT	EE
Weightage (%)	5	10	5	10	70

(A : Attendance ; P : Presentation ; A/TP : Assignment/Term Paper ; CT : Class Test ; EE : External Examination)


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Texts and References

Texts :

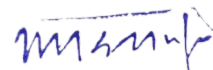
- Ganguly, Sumit. 2011. *India's Foreign Policy*. New Delhi : Oxford University Press.
Dubey, Muchkund. 2012. *India's Foreign Policy : Coping with the changing world*. New Delhi : Pearspon Education.
Khanna, V N. 2010. *Foreign Policy of India*. New Delhi : Vikas Publishing House.

References :

- Dutt, V P. 1999. *India's Foreign Policy in a Changing World*. New Delhi : Vikas Publishing House.
Shukla, Vatsala. 2005. *India's Foreign Policy in the New Millennium*. New Delhi : Atlantic.
Balakrishnan, T K. 2010. *India's Foreign Policy : problems and paradoxes*. New Delhi : Mohini Publishers and Distributors.
Mattoo, Amitabh and Happymon Jacob. 2010. *Shaping India's Foreign Policy*. New Delhi : Har Anand Publications.



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READING KARL MARX

Course Code: POL2504

Credit Units: 03

Course Objective

To provide the students with an indepth understanding of one of the foremost political thinkers of our time—Karl Marx through a reading of some of his key works such as *Das Kapital*, *German Ideology*, and *The Communist Manifesto*. The course will concentrate on indepth reading of relevant portions of the works cited above and the global implications of the same.

Course Content

Module-I : Early Writings of Karl Marx

Early literary works ; Critique of Hegel (1844) ; Thesis on Feuerbach (1845)

Module-II : *German Ideology* (1845)

Key concepts ; Idealism and Materialism ; Real Basis of Ideology ; Proletarians and Communism

Module-III : *The Communist Manifesto* (1848)

Bourgeois and Proletarians ; Proletarians and Communists ; Socialist and Communist Literature

Module-IV : *Capital* (1867)

The Two Factors of a Commodity : Use Value and Value ; Labour and Commodities ; The Form of Value ; Fetishism of Commodities

Module-V : Key Concepts in Marx's Writings

Productions and wages ; Profits ; Currency ; Supply and Demand ; Wages and Prices ; Value and Labour ; Production of Surplus Value ; Struggle between Capital and Labour and its Results

Examination Scheme

Components	A	P	A/TP	CT	EE
Weightage (%)	5	10	5	10	70

(A : Attendance ; P : Presentation ; A/TP : Assignment/Term Paper ; CT : Class Test ; EE : External Examination)

Texts and References

Texts :

Marx, Karl. 1844. *Critique of Hegel's Philosophy of Right*. Published by Oxford University Press in 1970.

Karl, Marx. 1845. *Thesis on Feuerbach*. Published in Brussels. Translated in Cyril Smith in 2002.

Karl, Marx. 1845. *German Ideology*. From Marx-Engels Collected Works, Volume 5.

Karl, Marx. 1848. *The Communist Manifesto*. Marx/Engels Selected Works, Vol. One, Progress Publishers, Moscow, 1969.

References :

Bottomore, T B and Maximilien Rubel. *Karl Marx : Selected Writings in Sociology and Social Philosophy*.

Freedman, Robert (Ed). *Marx on Economics*.

Fischer, Ernst and Franz Marek. *Marx in his own words*.

CIVIL SOCIETY IN INDIA

Course Code: POL2505

Credit Units: 02

Course Objective

The course would identify the importance of a vibrant civil society in a democratic polity and attempt to underline the same for the students through re-reading and teaching. Students would be provided with both the theoretical aspects as well as the current and practical scenario with regard to the development of a civil society in India.

Course Content

Module-I : Civil Society as the 'Third Sphere'

Civil society and governance ; Critique of civil society as Third Sphere ; Indian perspective on civil society ; the crisis of governance ; civil society and the goal of good governance ; corruption and the Right to Information

Module-II : Civil Society in Practice in India

Save the Chilika Movement in Orissa ; Case study of the Chhattisgarh Mukti Morcha ; Democratic governance, civil society and Dalit protest ; governance and the subalterns ; the pavement dwellers of Mumbai ; land distribution for Kol tribals in Uttar Pradesh

Module-III : Case Study of Aam Aadmi Party in Delhi

Genesis of the movement and development ; from movement to political party ; movement-politics interface ; reflections on election results for Aam Aadmi Party

Examination Scheme

Components	A	P	A/TP	CT	EE
Weightage (%)	5	10	5	10	70

(A : Attendance ; P : Presentation ; A/TP : Assignment/Term Paper ; CT : Class Test ; EE : External Examination)

Texts and References

Texts :

Tandon, Rajesh and Ranjita Mohanty. 2003. *Does Civil Society Matter ? Governance in Contemporary India*. New Delhi : Sage Publications.

Rosenblum, Nancy M and Robert C Post. 2001. *Civil Society and Government*. Princeton University Press.

References :

Chandhoke, Neera. 2005. *State and Civil Society : explorations in political theory*. New Delhi : Sage Publications.

Kaviraj, Sudipta and Sunil Khilnani. 2001. *Civil Society : History and possibilities*. New Delhi : Cambridge University Press.

Gudavarthy, Ajay. 2012. *Reframing Democracy and Agency in India : interrogating political society*. New Delhi : Anthem Press.

TERM PAPER

Course Code: POL2531

Credit Units: 02

Objective

The objective of this course is to judge the understanding as well as application of the knowledge gained by the students. The aim of the term paper is to provide the students with an opportunity to further enhance their knowledge of politics by undertaking hands-on research on a topic of their choice. The topics selected by the students must be commensurate with the ongoing courses pertaining to the semester in question.


A term paper is primarily a record of intelligent reading in several sources on a particular subject. The students will choose the topic at the beginning of the session in consultation with the faculty assigned.

Guidelines:

1. The term paper will be related to contemporary politics and related philosophical injunctions and the topic(s) will be given by the department.
2. The presentation of the term paper is scheduled to be held before the commencement of Semester examinations.
3. The paper will carry 100 marks that will be marked on the basis of understanding and organization of content based on the literature review. The Bibliography shall form an important part of the paper.
4. Examples of a few broad areas for Term Paper (List is indicative, not exhaustive)
 - Issues of caste in Indian politics
 - State and democracy
 - Internal security scenario
 - Theories of secularism
 - Justice and related themes
 - Multicultural societies
 - Feminist critique of Indian politics
 - Media and politics
 - Cultural imperialism

Evaluation Scheme

Organisation and relevance of content	Literature Review	Bibliography	Presentation	Total
30	30	20	20	100


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REVIEW OF CONTEMPORARY LITERATURE-IV

Course Code: POL2530

Credit Units: 02

Course Objective

The objective of this concentration elective is to inculcate reading habit alongwith value addition to the existing understanding of the subject. The book would be a kind of knowledge enhancer that would envision the student about some current thoughts related to the discipline. The book reading and its critical analysis would help broaden the intellectual horizon of the student. A contemporary and relevant book will be selected by the concerned department.

Guidelines

The student is expected to thoroughly go through the discipline related prescribed book with the objective of critically reviewing each aspect and character of the book. The student is supposed to have a detailed insight into the following:


- Content
- Writing style
- Information/learning
- Content handling
- Characters(if any)
- Thematic Clarity

The report is to be submitted in about 3000 words on A4 size sheets, Font 12pt., Times New Roman, 1.5 spacing. Headings in Font Size16

Examination Scheme

Components	A	P	A/TP	CT	EE
Weightage (%)	5	10	5	10	70

(A : Attendance ; P : Presentation ; A/TP : Assignment/Term Paper ; CT : Class Test ; EE : End-Term Examination)


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POST-COLD WAR WORLD POLITICS

Course Code: POL2506

Credit Units: 03

Course Objective

To provide a theoretical understanding of politics as it developed in the post-Cold War scenario particularly with regard to the politics of the United States of America vis-a-vis the rest of the world, the shifting of the power blocks, and the growth of anti-American sentiment in certain parts of the world. The course would also encourage students to read contemporary literature on emerging international political scenarios.

Course Content

Module-I : Overview of the post-Cold War decade

Historical background of US foreign policy ; US relations with EU ; brief history of US interventions in West Asia, South East Asia and the Middle East

Module-II : Post-Cold War American Politics

Key institutional players ; lobbies and their importance in American politics ; media and public opinion in US ; America's position in a globalized economy

Module-III : America and the Arab/Muslim World

Historical development of politics of the Arab/Muslim world ; why the Arabs/Muslims hate America ? US intervention and international war against terrorism

Examination Scheme

Components	A	P	A/TP	CT	EE
Weightage (%)	5	10	5	10	70

(A : Attendance ; P : Presentation ; A/TP : Assignment/Term Paper ; CT : Class Test ; EE : External Examination)

Texts and References

Texts :

Cameron, Fraser. 2002. *US Foreign Policy after the Cold War: Global Hegemon or Reluctant Sheriff?* London: Routledge.

Jentleson, Bruce W. 2000. *American Foreign Policy: The Dynamics of Choice in the 21st Century*. W.W. Norton & Company.

References :

Antizzo, Glenn J. 2010. *U.S. Military Intervention in the Post-Cold War Era : How to Win America's Wars in the Twenty-first Century*. LSU Press.

Lewis, Bernard. 1990. "The Roots of Muslim Rage". *The Atlantic Online*, September. Details available at <http://www.theatlantic.com/past/issues/90sep/rage.htm>.

Mamdani, Mahmood. 2004. "Introduction: Modernity and Violence". *Good Muslim, Bad Muslim: Islam, the USA, and the Global War against Terror*. New Delhi: Permanent Black.

Huntington, Samuel P. 1993. "The Clash of Civilizations?" *Foreign Affairs* 72 (3) Summer: 22. Details available at <http://www.foreignaffairs.com/articles/48950/samuel-p-huntington/the-clash-of-civilizations>.

Said, Edward W. 2000. "The Clash of Definitions". In *Reflections on Exile and Other Essays*. Cambridge, Massachusetts: Harvard University Press.

PROJECT (WITH PRESENTATION AND EVALUATION)

Course Code: POL2532

Credit Units: 03

Course Objective

The major objective of this course would remain development of the ability to undertake independent research on any topic of political or socio-economic of relevance and produce an intellectual treatise which enhances future knowledge and provides a basis for further investigative work. The course would emphasise on the methodology of research.

Methodology of Project

The project would be designed to encourage original research and at the same time provide the students with an opportunity to work on political issues that affect the everyday life of the students and those who live around them. For example, students could observe and assess the impact of impending elections on people in their constituency from the socio political point of view. Their observations could be reecorded in the form of project report followed by a presentation.

Guidelines for Project Report

Length of the report : The project report should not exceed 5000 words in length (excluding Bibliography and Annexures).

Contents of the report :

- Cover page
- Acknowledgements
- Table of Contents
- Introduction
- Review of readings
- Findings and analysis
- Conclusions
- Bibliography or References
- Annexures

Steps for completion of project :

- Finalization of topic in consultation with faculty
- Introductory presentation with research objectives and questions specified
- Field work
- Preparation of project report
- Submission of project report
- Final Presentation and viva

Possible research topics

- Select coverage of any political issue of importance and trace its development through news reports published in any reputed newspaper (English/Hindi).
- Prepare a research report on the impact of elections in your constituency.
- Prepare a report on the representation of terrorism in Hindi films. The report should contain a list of films viewed with full details.
- Select any philosophical issue of your choice and attempt to bring out your own conclusions based on your reading of the various texts on that issue.

Examination Scheme

Project Report	Power Point Presentation & Viva
75 marks	25 marks

COMPARATIVE GOVERNMENT AND POLITICS

Course Code:POL2601

Credit Units: 04

Course Objective

The core objective of the course is to impart an understanding of comparative forms of government and politics in countries with parliamentary as well as presidential forms of government. At the end of the course the student will be able to distinguish between forms and nature of governments in various countries and draw comparisons between political systems.

Course Content

Module-I : Theoretical background

Political concepts ; The State ; Democracy and democratic political regimes ; Authoritarian rule ; Theoretical approaches ; Structural-Functional Analysis ; System Analysis ; Constitutionalism

Module-II : Forms of politics

Political culture ; political communication ; political participation

Module-III : Elements of Political Systems

Political Parties ; Interest Groups ; Elections ; Voters

Module-IV : Institutions

Constitution and law ; Multilevel governance ; Legislatures ; Political Executive ; Bureaucracy and Public Administration

Module-V : Policy and Methods

Policy Process ; Comparative Methods

Module-VI : Comparative political structures and processes

United States ; United Kingdom ; China ; Pakistan

Examination Scheme

Components	A	P	A/TP	CT	EE
Weightage (%)	5	10	5	10	70

(A : Attendance ; P : Presentation ; A/TP : Assignment/Term Paper ; CT : Class Test ; EE : External Examination)

Texts and References

Texts :

Hague, Rod and Martin Harrop. 2013. *Comparative Government and Politics : an introduction*. London : Palgrave Macmillan.

Samuels, David J. 2013. *Comparative Politics*. Minnesota : Pearson.

Almond, G et al. 2011. *Comparative Politics Today* (9th Edition). New Delhi : Pearson.


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References :

- Alex de Tocqueville. 1964. *Democracy in America*, 2 Vols. Bombay : Popular Prakashan.
- Akbar S.Ahmad. 2002. *Discovering Islam*. UK : Routledge.
- Bagehot W. 1963. *The English Constitution*. London : Fontana.
- Blondel, J. 1980. *An Introduction to Comparative Government*. London : Weiden & Nicholson.
- Blondel, J. 1973. *Comparative Legislatures*. Engle WoodChiffs NJ : Prentice Hall.
- Derbyshire, I. 1991. *Politics in China*. London : Chambers.
- Dicey, A. 1969. *Introduction to the Study of the Law of the Constitution*, 10th edn. London : Macmillan.
- Finer, H. 1969. *Theory and Practice of Modern Government*. London : Methuen.
- Flamming J. et.al. 1990. *American Politics in a Changing World*. Pacific Groove, California : Brooks Cole.
- Gittings J. 1989. *China Changes Face: The Road from Revolution 1949-89*. London, Oxford : Oxford University Press.
- Griffith E.S. 1983. *The American System of Government*, 6th edn. London : Methuen.
- Harding H. 1987. *China's Second Revolution: Reform after Mao*. Washington D.C : Brookings Institution.
- Holmes I. 1997. *Post Communism: An Introduction*. Cambridge : Polity.
- Hu nor H.C. 1973. *An Introduction to Chinese Politics*. London : David Charles.
- John L. Esposito, John Obert Voll. 1996. *Islam and Democracy*. US : Oxford University.
- Khanna V.N. 2004. *Comparative Study of Government and Politics*. New Delhi : R. Chand & Co.
- Lijphart A. 1994. *Electoral System and Party System*. New Haven C. T: Yale University Press.
- Mackerra C. and A. Yorke. 1991. *The Cambridge Handbook of Contemporary China*. Cambridge : Cambridge University Press.



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DISSERTATION

Course Code: POL2637

Credit Units: 09

Course Objective

The aim of the dissertation is to provide you with an opportunity to further your intellectual and personal development in your chosen field by undertaking a significant practical unit of activity, having an educational value at a level commensurate with the award of your degree. The dissertation can be defined as a scholarly inquiry into a problem or issues, involving a systematic approach to gathering and analysis of information / data, leading to production of a structured report.

Chapter Scheme and distribution of marks:

Chapter 1: Introduction – 10 marks

Chapter 2: Conceptual or Theoretical Framework – 25 marks

Chapter 3: Presentation, Analysis & Findings -- 25 marks

Chapter 4: Conclusions -- 10 marks

Chapter 5: Bibliography-- 5marks

The Components of a Dissertation

A Dissertation should have the following components:

- 1) **Cover Page:** This should contain the title of the dissertation, to whom it is submitted, for which degree, the name of the author, name of the supervisor, year of submission of the work and name of the University.
- 2) **Acknowledgement:** Various organizations and individuals who might have provided assistance /co-operation during the process of carrying out the study.
- 3) **Table of Content:** Page-wise listing of the main contents in the report, i.e., different Chapters and its main Sections along with their page numbers.
- 4) **Body of the Report:** The body of the report should have these four logical divisions
 - a) **Introduction:** This will cover the background, rationale/ need / justification, brief review of literature, objectives, methodology (the area of the study, sample, type of study, tools for data collection, and method of analysis), Limitations of the Study, and Chapter Planning.
 - b) **Conceptual Framework:** (relating to the topic of the Dissertation).
 - c) **Presentation of Data, Analysis and Findings:** (using the tools and techniques mentioned in the methodology).
 - d) **Conclusion and Recommendations:** In this section, the concluding observations based on the main findings and suggestions are to be provided.
- 5) **Bibliography or References:** This section will include the list of books and articles which have been used in the work, and in writing the report.
- 6) **Annexures:** Questionnaires (if any), relevant reports, etc.
(The main text of the Dissertation should normally be in the range of 5000 words. However, there may be annexure in addition to the main text)

Steps of the Dissertation Work

Step I: Selection of the topic should be made keeping the following points into consideration:

- Suitability of the topic.
- Relevance of the topic
- Time available at the disposal.

- Feasibility of data collection within the given time limit.
- Challenges involved in the data collection (time & cost involved in the data collection, possibility of getting responses, etc.)

Step II: Finalisation of the Topic and preparation of Dissertation Proposal in consultation with the Supervisor.

Step III: Collection of information and data relating to the topic and analysis of the same.

Step IV: Writing the dissertation dividing it into suitable chapters, viz.,

Chapter 1: Introduction,

Chapter 2: Conceptual and Theoretical Framework

Chapter 3: Analysis & Findings

Chapter 4: Conclusions

Step V: The following documents are to be attached with the Dissertation:

1) Approval letter from the supervisor (Annexure-IA)

2) Student's declaration (Annexure-IB)

3) Certificate from the Competent Authority of the Organisation / Institution, if the student undertakes the Dissertation Work in any Organisation / Institution.


Annexures,

References / Bibliography

Guidelines for evaluation:

- Each of the students has to undertake a topic individually under the supervision of a teacher and to submit the same following the guidelines stated below.
- Language of Dissertation and Viva-Voce Examination has to be English. The Dissertation must be typed and hard bound.
- Failure to submit the Dissertation or failure to appear at the Viva-voce Examination will be treated as "Absent" in the Examination. He /she has to submit the Dissertation and appear at the Viva-Voce Examination in the subsequent years (within the time period as per University Rules).
- No marks will be allotted on the Dissertation unless a candidate appears at the Viva-Voce Examination. Similarly, no marks will be allotted on Viva-Voce Examination unless a candidate submits his/her Dissertation.
- Evaluation of the Dissertation to be done jointly by one internal expert and one external expert with equal weightage, i.e., average marks of the internal and external experts will be allotted to the candidate.
- A candidate has to qualify in the Dissertation separately, obtaining a minimum marks of 40 (Dissertation and Viva-Voce taken together) in paper 3.5.
- Marking Scheme for Dissertation and Viva-Voce Examination:

Dissertation	Power Point Presentation & Viva
75 marks	25 marks


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Cover Page / Title page

**Project Report on
Title of the Project**

XXXXXXXXXXXXXXXXXXXX

**(Submitted for the partial fulfilment for the award of Degree of B.A. Honours in
Political Science
To
Amity School of Liberal Arts**

Submitted by

**Name of the Candidate :.....
Registration No.
Name of the College
College Roll No.**

**Supervised by
Name of the Supervisor:
Designation**

Month & Year of Submission

University Logo and Name



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Student's Declaration

Ihereby declare that the Project Work with the title (in block letters).....

submitted by me for the partial fulfilment of the degree of B.A. Honours in Political Science is my original work and has not been submitted earlier to any other University /Institution for the fulfilment of the requirement for any course of study.

I also declare that no chapter of this manuscript in whole or in part has been incorporated in this report from any earlier work done by others or by me. However, extracts of any literature which has been used for this report has been duly acknowledged providing details of such literature in the references.

Signature of Supervisor:

Signature of Student
Name

Registration No.

Place:

Date:



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READING VIVEKANANDA

Course Code: POL2603

Credit Unit: 03

Course Objective

This paper intends to familiarize the students with the life and political thought of Swami Vivekananda. It begins with a life sketch of the Indian stalwart and proceeds with an intensive analysis of his political thought. It concludes with a critical and contemporary evaluation of the political philosophy of the thinker.

Course Content

Module-I: Swami Vivekananda: An Introduction

Life Sketch; An Overview of Political Philosophy.

Module-II: Political Thought of Swami Vivekananda

Metaphysical Foundations; Freedom; Philosophy of History; Social Philosophy.

Module-III: Analysis

Vivekananda and Nationalism; Contemporary relevance.

Examination Scheme

Components	A	P	A/TP	CT	EE
Weightage (%)	5	10	5	10	70

(A : Attendance ; P : Presentation ; A/TP : Assignment/Term Paper ; CT : Class Test ; EE : External Examination)

Text & References:

Text:

Sharma, Urmila and S.K. Sharma. 1996. *Indian Political Thought*. New Delhi: Atlantic Publishers and Distributors.

Singh, M.P. and Himanshu Roy. 2012. *Indian Political Thought: Themes and Thinkers*. New Delhi: Pearson.

Ghoshal, U.N. 1959. *A History of Indian Political Ideas: The Ancient Period and the Period of Transition to the Middle Ages*. London: Oxford University Press.

References:

Sharma, Jyotirmaya. 2013. *A Restatement of Religion: Swami Vivekananda and the Making of Hindu Nationalism*. Yale: Yale University Press.

Complete works of Swami

Vivekananda http://www.ramakrishnavivekananda.info/vivekananda/complete_works.htm

READING AMBEDKAR

Course Code: POL2604

Credit Units: 03

Course Objective

To cultivate a nuanced understanding of the life and works of the man who oversaw the drafting of the Indian Constitution – Dr B R Ambedkar. The course will also attempt to inculcate in the students an appreciation of Dr Ambedkar as a product of social inequalities and the overcoming of discrimination to attain great intellectual heights.

Course Content

Module-I : Early life and writings

Early times ; struggle for education ; higher learning ; thoughts on the organization of the downtrodden ; conflict and controversy with Congress

Module-II : Annihilation of Caste

Background of composition ; key concepts and arguments ; defining caste discrimination ; social reform in Ambedkar's writings

Module-III : Writings on caste

Castes in India : their genesis, mechanism and development ; What Path to Salvation ?; Essays on Untouchables and Untouchability : Social, Political, Religious ; Manu and the Shudras ; Who were the Shudras ?

Module-IV : Political Writings

Ranade, Gandhi and Jinnah ; Communal Deadlock and a way to solve it ; What Congress and Gandhi have done to the Untouchables ; Pakistan or the Partition of India ; Notes on Parliamentary Procedure ; The Problem of Political Suppression

Examination Scheme


Components	A	P	A/TP	CT	EE
Weightage (%)	5	10	5	10	70

(A : Attendance ; P : Presentation ; A/TP : Assignment/Term Paper ; CT : Class Test ; EE : External Examination)

Texts and References

Texts :

Rodrigues, Valerian. 2004. *The Essential Writings of B R Ambedkar*. New Delhi : Oxford University Press.


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Referenes :

Ambedkar, B R. 1944. *Annihilation of Caste*. Sources :

<http://ccnmtl.columbia.edu/projects/mmt/ambedkar/>

Ambedkar, B R. 1916. *Castes in India : their genesis, mechanism and development*

- *What Path to Salvation ?*
- *Essays on Untouchables and Untouchability : Social, Political, Religious*
- *Manu and the Shudras*
- 1946. *Who were the Shudras ?*

Sources : <http://www.ambedkar.org/>

Ambedkar, B R. 1943. *Ranade, Gandhi and Jinnah*

- 1945. *Communal Deadlock and a way to solve it*
- 1945. *What Congress and Gandhi have done to the Untouchables*
- 1945. *Pakistan or the Partition of India*
- *Notes on Parliamentary Procedure*
- *The Problem of Political Suppression*

Sources : <http://www.ambedkar.org/>



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MODERN THEMES IN GENDER

Course Code:POL2605

Credit Units: 01

Course Objective

The course would encourage discussions on concepts like patriarchy and other issues concerning gender. The students would be imparted relevant knowledge on the gender imbalance particularly in India and the urgent need for a rethinking of social mores and the imagination of gender.

Course Content

Module-I : Theoretical Background

Classical approaches and their critiques ; Poststructuralist and post-modernist approaches ; Theories of identity and gender ; patriarchy and its criticisms

Module-II : Women's Movement

Historical roots of the Women's movement ; women's resistance to gender-based oppression ; mobilization of women

Module-III : Current themes in Gender

Changes in gender relations ; gender and division of labour ; gender and political violence ; gendered discourse on nationalism

Examination Scheme

Components	A	P	A/TP	CT	EE
Weightage (%)	5	10	5	10	70

(A : Attendance ; P : Presentation ; A/TP : Assignment/Term Paper ; CT : Class Test ; EE : External Examination)

Texts and References

Texts :

Momsen, Janet. 2009. *Gender and Development*. London : Routledge.

Wharton, Amy S. 2005. *The Sociology of Gender : An Introduction to Theory and Research*. Wiley.


References :

The Gender Book. 2013. <http://www.thegenderbook.com/>

Forbes, Geraldine. 2004. *Women in Modern India*. New Delhi : Cambridge University Press.

Kumar, Radha. 2000. *The History of Doing: An Illustrated Account of Movements for Women's Rights and Feminism in India, 1800-1990*. New Delhi : Zubaan Books.

Menon, Nivedita. 2001. *Gender and Politics in India*. New Delhi : Oxford University Press.


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POLITICAL VIOLENCE: CONCEPTS AND TRENDS

Course Code: POL2606

Credit Units: 03

Course Objective

The primary objective of this course is to foster awareness of the critical role played by politics and the violence arising out of politics in societies. The course would provide examples and illustrations from across the world, beginning from the efficacy conflicts, both high and low intensity, in establishing regimes and driving political order in nation states.

Course Content

Module-I : Theoretical background

Concepts and definitions ; forms of collective violence ; difference between high and low intensity conflicts ; 'non-state actors' and political violence

Module-II : Wars as political violence

What is a war ? ; causes of wars ; overt and covert wars ; case studies from Vietnam, Somalia and Latin America

Module-III : Terrorism as political violence

Definitions of terrorism ; forms and methods of terrorism ; brief history of terrorist movements ; causes of terrorism ; domestic vs. Global terrorism ; case studies from Jammu and Kashmir

Module-IV : Ideological violence

Maoism as political violence ; brief history of Maoism in India ; causes of the rise of Maoism ; current debates around Maoism ; case studies from Andhra Pradesh, Maharashtra and Chhattisgarh

Examination Scheme

Components	A	P	A/TP	CT	EE
Weightage (%)	5	10	5	10	70

(A : Attendance ; P : Presentation ; A/TP : Assignment/Term Paper ; CT : Class Test ; EE : External Examination)

Texts and References

Texts :

Gurr, Ted Robert. 2011. *Why Men Rebel* (Fortieth Anniversary Edition). New York : Paradigm Publishers.

Kalyvas, Stathis N. 2006. *The Logic of Violence in Civil War* (Cambridge Studies in Comparative Politics). London : Cambridge University Press.

References :

Enders, Walter and Todd Sandler. 2011. *The Political Economy of Terrorism*. London : Cambridge University Press.

Scott, James C. 1987. *Weapons of the Weak : Everyday forms of peasant Resistance*. USA : Yale University Press.

Mukherjee, Nirmalangshu. 2013. *The Maoists in India*. India : Aramyllis.

Paul, Santosh. 2013. *The Maoist Movement in India : Perspectives and Counterperspectives*. New Delhi : Routledge.

REVIEW OF CONTEMPORARY LITERATURE-V

Course Code: POL2630

Credit Units: 02

Course Objective

The objective of this concentration elective is to inculcate reading habit alongwith value addition to the existing understanding of the subject. The book would be a kind of knowledge enhancer that would envision the student about some current thoughts related to the discipline. The book reading and its critical analysis would help broaden the intellectual horizon of the student. A contemporary and relevant book will be selected by the concerned department.

Guidelines

The student is expected to thoroughly go through the discipline related prescribed book with the objective of critically reviewing each aspect and character of the book. The student is supposed to have a detailed insight into the following:


- Content
- Writing style
- Information/learning
- Content handling
- Characters(if any)
- Thematic Clarity

The report is to be submitted in about 3000 words on A4 size sheets, Font 12pt., Times New Roman, 1.5 spacing. Headings in Font Size16

Examination Scheme

Components	A	P	A/TP	CT	EE
Weightage (%)	5	10	5	10	70

(A : Attendance ; P : Presentation ; A/TP : Assignment/Term Paper ; CT : Class Test ; EE : End-Term Examination)


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TERM PAPER

Course Code:POL2631

Credit Units: 02

Objective

The objective of this course is to judge the understanding as well as application of the knowledge gained by the students. The aim of the term paper is to provide the students with an opportunity to further enhance their knowledge of politics by undertaking hands-on research on a topic of their choice. The topics selected by the students must be commensurate with the ongoing courses pertaining to the semester in question.


A term paper is primarily a record of intelligent reading in several sources on a particular subject. The students will choose the topic at the beginning of the session in consultation with the faculty assigned.

Guidelines:

1. The term paper will be related to contemporary politics and related philosophical injunctions and the topic(s) will be given by the department.
2. The presentation of the term paper is scheduled to be held before the commencement of Semester examinations.
3. The paper will carry 100 marks that will be marked on the basis of understanding and organization of content based on the literature review. The Bibliography shall form an important part of the paper.
4. Examples of a few broad areas for Term Paper (List is indicative, not exhaustive)
 - Issues of caste in Indian politics
 - State and democracy
 - Internal security scenario
 - Theories of secularism
 - Justice and related themes
 - Multicultural societies
 - Feminist critique of Indian politics
 - Media and politics
 - Cultural imperialism

Evaluation Scheme

Organisation and relevance of content	Literature Review	Bibliography	Presentation	Total
30	30	20	20	100


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PROJECT (WITH PRESENTATION AND EVALUATION)

Course Code: POL2632

Credit Units: 03

Course Objective

The major objective of this course would remain development of the ability to undertake independent research on any topic of political or socio-economic of relevance and produce an intellectual treatise which enhances future knowledge and provides a basis for further investigative work. The course would emphasise on the methodology of research.

Methodology of Project

The project would be designed to encourage original research and at the same time provide the students with an opportunity to work on political issues that affect the everyday life of the students and those who live around them. For example, students could observe and assess the impact of impending elections on people in their constituency from the socio political point of view. Their observations could be reecorded in the form of project report followed by a presentation.

Guidelines for Project Report

Length of the report : The project report should not exceed 5000 words in length (excluding Bibliography and Annexures).

Contents of the report :

- Cover page
- Acknowledgements
- Table of Contents
- Introduction
- Review of readings
- Findings and analysis
- Conclusions
- Bibliography or References
- Annexures

Steps for completion of project :

- Finalization of topic in consultation with faculty
- Introductory presentation with research objectives and questions specified
- Field work
- Preparation of project report
- Submission of project report
- Final Presentation and viva

Possible research topics

- Select coverage of any political issue of importance and trace its development through news reports published in any reputed newspaper (English/Hindi).
- Prepare a research report on the impact of elections in your constituency.
- Prepare a report on the representation of terrorism in Hindi films. The report should contain a list of films viewed with full details.
- Select any philosophical issue of your choice and attempt to bring out your own conclusions based on your reading of the various texts on that issue.

Examination Scheme

Project Report	Power Point Presentation & Viva
75 marks	25 marks

Bachelor of Arts English (Honors)

FLEXILEARN

-Freedom to design your degree



Curriculum & Scheme of Examination

2022

AMITY UNIVERSITY HARYANA

GURUGRAM

A handwritten signature in blue ink, appearing to read 'Anil'.

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A handwritten signature in blue ink, appearing to read 'Manesar'.

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RESEARCH METHODOLOGY-I

Course Code: ENG2205

Credit Units: 01

Course Objective:

This paper proposes to introduce student to the philosophy and mechanics of research, to train them in the use of language, style and discourses suitable for dissertation writing, to help them acquire both a theoretical thrust and hands-on experience in writing research proposals before they embark on the execution of the thesis proper.

Module-I: Introduction

Meaning and Definition of Research

The nature of inquiry in Social Sciences and Humanities

The relationship between Scholarship, Criticism and Research

Textual Criticism

Literary History

Examination Scheme:

Components	Assignment	Sessional	Presentation	EE
Weightage (%)	15	10	05	70

Texts and References

- Bateson, F.W. The Scholar Critic 2. Thorpe, James.
- Gibaldi, Joseph. MLA Handbook
- Brooks, C. and Warren, R.P. Modern Rhetoric
- Lodge, David. Modes of Modern Writing
- Kaplan, R.B. The Conduct of Inquiry: Methodology of Behavioural Sciences, San Francisco, 1964. Form and Style in Thesis Writing


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RESEARCH METHODOLOGY-II

Course Code: ENG2304

Credit Units: 01

Course Objective:

This paper proposes to introduce student to the philosophy and mechanics of research, to train them in the use of language, style and discourses suitable for dissertation writing to help them acquire both a theoretical thrust and hands-on experience in writing research proposals before they embark on the execution of the thesis proper.

Module-I: The Mechanics of Research

The Mechanics of dissertation Writing

Data Collection – Primary and Secondary Sources.

Procedure in Literary Research e-learning and Research

Module-II: Language, Style and Types of Discourses

The Style suitable for a Literary Thesis

Narration Argumentation

Exposition Description

Examination Scheme:

Components	Assignment	Sessional	Presentation	EE
Weightage (%)	15	10	05	70

Texts and References

- Bateson, F.W. The Scholar Critic 2. Thorpe, James.
- Gibaldi, Joseph. MLA Handbook
- Brooks, C. and Warren, R.P. Modern Rhetoric
- Lodge, David. Modes of Modern Writing
- Kaplan, R.B. The Conduct of Inquiry: Methodology of Behavioural Sciences, San Francisco, 1964. Form and Style in Thesis Writing


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SUMMER PROJECT EVALUATION

Course Code: ENG2335

Credit Units: 03

Summer Project is primarily a research work. It involves academic reading of several sources and writing on a particular topic relating to the core course or courses of the program. It is a scholarly inquiry into academic problems or issues. It should involve a systematic approach to gathering and analysis of information/ideas, leading to production of a structured report. The research topic should hold significant academic value commensurate with level of the Program.

GUIDELINES FOR SUMMER PROJECT REPORT

Topic

The topic of the paper will be of the student's choice with consent of the Supervisor. It must be relevant to the content of the course, but it should be treated in greater depth than it is covered in class. Focus is of the utmost importance. Too broad a topic will either lead to superficial treatment or an unnecessarily long paper; too narrow a topic will lead to a lack of source material and redundancy. Make sure the subject focuses on one question or topic so that the paper has a definite purpose. Composing an introduction and conclusion can be a good test of the cohesiveness of the subject. The domain can include Literature, Linguistics, Applied Linguistics, English Language Teaching and other related areas.

Synopsis of Summer Project Report

A Synopsis of the Summer Project Report should be submitted to the Board of Studies of the Institute. The Board, after deliberation, will suggest changes and modifications and will assign a supervisor from amongst the teaching faculty of the Institute. The synopsis should include the following –


- Title of Summer Project Report
- Introduction
- Problems of Research
- Objectives of Research
- Tentative Chapter Division
- Suggested readings

Source Material and References

Presenting your own ideas in a Summer Project Report is acceptable and even encouraged. However, the paper must be based on facts and opinions from authoritative sources and these sources must be given proper credit. A minimum of three published sources is required, and ten or more is typical. Direct quotes must be placed inside quotation marks or in indented sections and should be used sparingly. Paraphrasing is better in most cases.

There are two popular ways to cite references. One is to place superscripted numbers in the text with corresponding footnotes at the bottom of the page or endnotes at the end of the paper. More typical of scientific papers is to place the author and year in parentheses (Heaton, 1984). In either case you need a bibliography of all cited sources at the end of the paper with author(s), year, title, publication or publisher, volume, and pages. These should be in alphabetical order by name of the primary author. Preference however should be given to MLA Style Sheet.

Be sure to find source materials that are specific to your topic, either books or journal articles. Textbooks are usually too general and should be avoided. The libraries have published and computerized indexes that can be used to find relevant sources. See the Supervisor or a reference librarian if you are unfamiliar with these resources.


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Plagiarism is the presenting of someone else's wording or ideas as one's own and is a violation of university policy. If you use someone else's words or ideas, you must give them proper credit. You must also obtain permission from the Supervisor before using your Summer Project Report for more than one course.

Length and Format

Length is not important; 40 to 60 pages of 1.5 spaced text is a good target. The title, author, course, and date should be typed onto a cover sheet.. Illustrations are not required but are often useful in explaining graphical concepts and in giving the paper character. The bibliography should be the last section of the paper. The entire report has to be submitted in two spiral bound copies.

Grading

Students are required to make two submissions: a first draft and a final draft prior to final submission. The first draft is not to be a "rough" draft; it should be a completed, typed paper like you would ordinarily submit. I will read it carefully, offer suggestions for improvement, give it a grade, and return it to you promptly. The final draft, which is worth a larger share of the points, is your chance to respond to the suggestions and submit an improved paper. This, I hope, will make the writing of a Summer Project Report more of a learning experience. We strongly suggest using a word processor so that the final draft can be created by editing rather than complete retyping.

Grading is based on both research content and presentation. Your paper should demonstrate that you have gained a level of expertise in the subject by studying the relevant literature. Your presentation should be clean and convincing with proper use of paragraphs, complete sentences, and correct grammar, spelling, and punctuation. Make your Summer Project Report look and sound professional.

Evaluation of Project Work

Sl. No.	Evaluated by	Criteria	Marks
1	Institution	Quality Depth & Breadth of analysis, Coverage, Scope and content Project fulfillment Data collection ability in the field (if any) Scope of Implementati on.	50
2	Board of Examiners	Viva-voce Examination	50
3		Total	100

Project Schedule

Registration

First week of the last academic month

Allotment of Faculty Guide takes place in accordance to the area of interest / stream chosen by the student at the time of registration.

Approval of Project Topic

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Week following the 'week of registration'

Submission of Synopsis to Faculty Guide

Prior to the completion of End-Term Examination. The synopsis could be submitted any time after the allotment of project topic but certainly must be before completion of last examination.

Duration of Project

The project stretches for the full duration of the Semester break


Submission of Report

First Draft – After 20 Days from the commencement of the project

Second Draft – 20 days after submission of the first draft.

The first and second reports could be submitted through e-mail or any other medium as per the consent of faculty guide.

Final Draft – Within second week of rejoining of institution


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RESEARCH METHODOLOGY-III

Course Code: ENG2410

Credit Units: 01

Course Objective:

This paper proposes to introduce student to the philosophy and mechanics of research, to train them in the use of language, style and discourses suitable for dissertation writing to help them acquire both a theoretical thrust and hands-on experience in writing research proposals before they embark on the execution of the thesis proper.

Module-I: Basics of Research

- Research Objectives
- Literature Review
- Research Gap
- Research Hypothesis

Module-II: The Mechanics of Research

- The Mechanics of dissertation Writing
- Data Collection – Primary and Secondary Sources.
- Methods of data collection : Questionnaire, Interview, observation, document analysis
- Methods of data analysis : Descriptive Statistics
- Procedure in Literary Research e-learning and Research

Examination Scheme:

Components	Assignment	Sessional	Presentation	EE
Weightage (%)	15	10	05	70

Texts and References:

- Bateson, F.W. The Scholar Critic 2. Thorpe, James.
- Gibaldi, Joseph. MLA Handbook
- Brooks, C. and Warren, R.P. Modern Rhetoric
- Lodge, David. Modes of Modern Writing
- Kaplan, R.B. The Conduct of Inquiry: Methodology of Behavioural Sciences, San Francisco, 1964. Form and Style in Thesis Writing



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FEMINIST WRITINGS

Course Code: ENG2408

Credit Units: 03

Course Objective: This course will enable the students to explore woman's role, status, self-image, and history in literature written by women. It is based on the principles of feminism and includes all literary works centering on a woman's struggle for equality and to be accepted as a human being, before becoming a victim of gender stereotypes

Text:

1. Virginia Woolf – A Room of One's Own
2. Simone de Beauvoir – The Second Sex
3. Kate Millett - Sexual Politics

Examination Scheme:

Components	Assignment	Sessional	Presentation	EE
Weightage (%)	15	10	05	70

Text & References:

Recommended Readings:

- Woolf, Virginia. A Room of One's Own. Broadview Press, 2001.
- Beauvoir, Simone de. The Second Sex. Trans. H. M. Parshley. Vintage Books (Random House). 1952.
- Millett, Kate. Sexual Politics, Garden City, New York: Doubleday, 1970.


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CONTEMPORARY LITERATURE

Course Code: ENG2502

Credit Units: 04

Course Objective:

Contemporary literature is an important area of study in the contemporary English Literary Studies. The texts will be discussed in terms of key aspects, including: colonial and post-colonial experience; national, cultural, and racial identity; voice; language; political writing; gender and colonization; exile; and imperialism. Discussing texts in their historical and cultural contexts, the course aims to give students both a broad knowledge of Contemporary literature and in-depth understanding of specific texts and issues.

Text:


1. Gabriel García Márquez- Chronicle of a Death Foretold
2. Pablo Neruda-Tonight I Can Write , The Way Spain Was
3. Derek Walcott - A Far Cry from Africa, Names
4. Margaret Atwood- Spelling, This is a Photograph of Me, Procedures for Underground

Examination Scheme:

Components	Assignment	Sessional	Presentation	EE
Weightage (%)	15	10	05	70

Text & References:

- Binod Mishra, Explorations in Australian Literature. Sarup & Sons.
- Elleke Boehmer, Colonial and Postcolonial Literatures: Migrant Metaphors. Oxford.
- Lazarus, The Cambridge Companion to Postcolonial Studies. Cambridge University Press.


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INDIAN WOMEN WRITING

Course Code: ENG2506

Credit Units: 03

Course Objective:

To introduce a variety of writings by Indian women writers and to explore the breadth of those writings from artistic and historical perspectives. To enable students to analyze and discuss literary texts by familiarizing them with basic approaches and concepts used in literary study. The students will explore woman's role, status, self-image, and history in literature written by women.

Text:

1. Anita Desai - Voices in the City
2. Nayan tara Sahgal - Storm in Chandigarh
3. Bharati Mukherjee - Jasmine

Examination Scheme:

Components	Assignment	Sessional	Presentation	EE
Weightage (%)	15	10	05	70

Text & References:

- Voices in the City by Anita Desai
- The Fiction of Anita Desai by R.K.Dhawan
- Storm in Chandigarh by Nayantara Sahgal
- The Fictional Milieu of Nayantara Sahgal: A Feminist Perspective by Asha Choubey
- Jasmine by Bharati Mukherjee
- Bharati Mukherjee: Critical Perspectives by Somdatta Mandal


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LITERATURE & GENDER

Course Code: ENG2605

Credit Units: 03

Course Objective

The course introduces students to representations of gender and sexuality in literary works. The content includes theory of gender and sexual identity; influence of gender and sexual identities on literary expression, and influence of literature on gender and sexual identities; terminology and methods of literary analysis and evaluation.

Text:

- Oscar Wilde - The Picture of Dorian Gray
- Virginia Woolf - Mrs. Dalloway
- Kate Chopin - The Awakening

Examination Scheme:

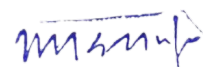
Components	Assignment	Sessional	Presentation	EE
Weightage (%)	15	10	05	70

Text & References:

- Art and Morality: A Defence of “The Picture of Dorian Gray”, Edited by Stuart Mason
- Virginia Woolf: The Major Novels by John Batchelor
- Virginia Woolf: A Critical Memoir by Winifred Holtby
- Virginia Woolf: A Feminist Slant by Jane Marcus
- Kate Chopin’s The Awakening: A Sourcebook by Janet Beer and Elizabeth Nolan



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DISSERTATION

Course Code: ENG2637

Credit Units: 07

The aim of the dissertation is to provide you with an opportunity to further your intellectual and personal development in your chosen field by undertaking a significant practical unit of activity, having an educational value at a level commensurate with the award of your degree. The dissertation can be defined as a scholarly inquiry into a problem or issues, involving a systematic approach to gathering and analysis of information / data, leading to production of a structured report. The Dissertation will help students deal with literary problems and issues and they will learn to demonstrate critical thinking in research and writing.

Chapter Scheme and distribution of marks:

Chapter 1: Introduction – 10 marks

Chapter 2: Conceptual Framework/ National/International Scenario – 25 marks

Chapter 3: Presentation, Analysis & Findings -- 25 marks

Chapter 4: Conclusion & Recommendations -- 10 marks

Chapter 5: Bibliography-- 5marks

The Components of a Dissertation

A Dissertation should have the following components:

- 1) **Cover Page:** This should contain the title of the, to whom it is submitted, for which degree, the name of the author, name of the supervisor, year of submission of the work and name of the University.
- 2) **Acknowledgement:** Various organizations and individuals who might have provided assistance /co-operation during the process of carrying out the study.
- 3) **Table of Content:** Page-wise listing of the main contents in the report, i.e., different Chapters and its main Sections along with their page numbers.
- 4) **Body of the Report:** The body of the report should have these four logical divisions
 - a) **Introduction:** This will cover the background, rationale/ need / justification, brief review of literature, objectives, methodology (the area of the study, sample, type of study, tools for data collection, and method of analysis), Limitations of the Study, and Chapter Planning.
 - b) **Conceptual Framework / National and International Scenario:** (relating to the topic of the Dissertation).
 - c) **Presentation of Data, Analysis and Findings:** (using the tools and techniques mentioned in the methodology).
 - d) **Conclusion and Recommendations:** In this section, the concluding observations based on the main findings and suggestions are to be provided.
- 5) **Bibliography or References:** This section will include the list of books and articles which have been used in the work, and in writing the report.
- 6) **Annexures:** Questionnaires (if any), relevant reports, etc.
(The main text of the Dissertation should normally be in the range of 5000 words. However, there may be annexure in addition to the main text)

Steps of the Dissertation Work

Step I: Selection of the topic should be made keeping the following points into consideration:

- Suitability of the topic.
- Relevance of the topic
- Time available at the disposal.
- Feasibility of data collection within the given time limit.

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- Challenges involved in the data collection (time & cost involved in the data collection, possibility of getting responses, etc.)

Step II: Finalisation of the Topic and preparation of Dissertation Proposal in consultation with the Supervisor.

Step III: Collection of information and data relating to the topic and analysis of the same.

Step IV: Writing the report dividing it into suitable chapters, viz.,

Chapter 1: Introduction,

Chapter 2: Conceptual Framework / National & International Scenario,

Chapter 3: Analysis & Findings

Chapter 4: Conclusion and Recommendations.

Step V: The following documents are to be attached with the Dissertation:

1) Approval letter from the supervisor (Annexure-IA)

2) Student's declaration (Annexure-IB)

3) Certificate from the Competent Authority of the Organisation / Institution, if the student undertakes the Dissertation Work in any Organisation / Institution.

Annexures,

References / Bibliography

Guidelines for evaluation:

- Each of the students has to undertake a topic individually under the supervision of a teacher and to submit the same following the guidelines stated below.
- Language of Dissertation and Viva-Voce Examination has to be English. The Dissertation must be typed and hard bound.
- Failure to submit the Dissertation or failure to appear at the Viva-voce Examination will be treated as "Absent" in the Examination. He /she has to submit the Dissertation and appear at the Viva-Voce Examination in the subsequent years (within the time period as per University Rules).
- No marks will be allotted on the Dissertation unless a candidate appears at the Viva-Voce Examination. Similarly, no marks will be allotted on Viva-Voce Examination unless a candidate submits his/her Dissertation.
- Evaluation of the Dissertation to be done jointly by one internal expert and one external expert with equal weightage, i.e., average marks of the internal and external experts will be allotted to the candidate.
- A candidate has to qualify in the Dissertation separately, obtaining a minimum marks of 40 (Dissertation and Viva-Voce taken together) in paper 3.5.
- Marking Scheme for Dissertation and Viva-Voce Examination:

Dissertation	Power Point Presentation & Viva
75 marks	25 marks



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Cover Page / Title page

Project Report on

Title of the Project

XXXXXXXXXXXXXXXXXXXX

**(Submitted for the partial fulfilment for the award of Degree of B.A. Honours in
English**

To

Amity School of Liberal Arts

Submitted by

Name of the Candidate :.....

Registration No.

Name of the Department

University Roll No.

Supervised by

Name of the Supervisor:

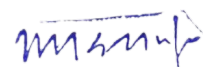
Designation

Month & Year of Submission

University Logo and Name



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Registrar
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(Annexure-IB)

Student's Declaration

Ihereby declare that the Project Work with the title (in block letters).....

submitted by me for the partial fulfilment of the degree of B.A. Honours in English is my original work and has not been submitted earlier to any other University /Institution for the fulfilment of the requirement for any course of study.

I also declare that no chapter of this manuscript in whole or in part has been incorporated in this report from any earlier work done by others or by me. However, extracts of any literature which has been used for this report has been duly acknowledged providing details of such literature in the references.

Signature of Supervisor:

Signature of Student
Name

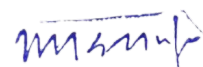
Registration No.

Place:

Date:



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COMMUNICATION SKILLS - COURSES BEING OFFERED IN VARIOUS PROGRAMMES



Achieving Academic Excellence

**Programme Structure
Curriculum & Scheme of Examination**



AMITY UNIVERSITY HARYANA

Anil

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PROGRAMME STRUCTURE - COMMUNICATION SKILLS COURSES BEING OFFERED IN VARIOUS PROGRAMMES

UNDERGRADUATE -4 YEAR PROGRAMMES

Semester	Course Code	Course Title	Lectures (L) Hours per week	Tutorial (T) Hours per week	Practical (P) Hours per week	Total Credits
1	CSS2152	English-I	1	-	-	1
2	CSS2252	English-II	1	-	-	1
3	CSS2151	Effective Listening	1	-	-	1
4	CSS2251	Presentation Skills	1	-	-	1
5	CSS2351	Reading and Comprehension	1	-	-	1
6	CSS2451	Corporate Communication	1	-	-	1
7	CSS2551	Employability Skills	1	-	-	1
8	CSS2651	Workplace Communication	1	-	-	1

UNDERGRADUATE -3YEAR PROGRAMMES

Semester	Course Code	Course Title	Lectures (L) Hours per week	Tutorial (T) Hours per week	Practical (P) Hours per week	Total Credits
1	CSS2151	Effective Listening	1	-	-	1
2	CSS2251	Presentation Skills	1	-	-	1
3	CSS2351	Reading and Comprehension	1	-	-	1
4	CSS2451	Corporate Communication	1	-	-	1
5	CSS2551	Employability Skills	1	-	-	1
6	CSS2651	Workplace Communication	1	-	-	1

POSTGRADUATE PROGRAMMES

Semester	Course Code	Course Title	Lectures (L) Hours per week	Tutorial (T) Hours per week	Practical (P) Hours per week	Total Credits
1	CSS4151	Basics of Communication	1	-	-	1
2	CSS4251	Corporate Communication	1	-	-	1
3	CSS4351	Interpersonal Communication	1	-	-	1
4	CSS4451	Cross Cultural Communication	1	-	-	1

POSTGRADUATE PROGRAMME –MBA (EXECUTIVE)

Semester	Course Code	Course Title	Lectures (L) Hours per week	Tutorial (T) Hours per week	Practical (P) Hours per week	Total Credits
1	CSS4152	Managerial Communication	3	-	-	3

UNDERGRADUATE –INTEGRATED LAW PROGRAMMES (BA LLB, B.COM LLB, BBA LLB)

Semester	Course Code	Course Title	Lectures (L) Hours per week	Tutorial (T) Hours per week	Practical (P) Hours per week	Total Credits
3	CSS2151	Effective Listening	1	-	-	1
4	CSS2251	Presentation Skills	1	-	-	1
5	CSS2351	Reading and Comprehension	1	-	-	1
6	CSS2451	Corporate Communication	1	-	-	1
7	CSS2551	Employability Skills	1	-	-	1
8	CSS2651	Workplace Communication	1	-	-	1

INTEGRATED PROGRAMMES (UNDERGRADUATE-POSTGRADUATE)

Semester	Course Code	Course Title	Lectures (L) Hours per week	Tutorial (T) Hours per week	Practical (P) Hours per week	Total Credits
1	CSS2152	English-I	1	-	-	1
2	CSS2252	English-II	1	-	-	1
3	CSS2151	Effective Listening	1	-	-	1
4	CSS2251	Presentation Skills	1	-	-	1
5	CSS2351	Reading and Comprehension	1	-	-	1
6	CSS2451	Corporate Communication	1	-	-	1
7	CSS2551	Employability Skills	1	-	-	1
8	CSS2651	Workplace Communication	1	-	-	1
9	CSS4351	Interpersonal Communication	1	-	-	1
10	CSS4451	Cross Cultural Communication	1	-	-	1

SYLLABUS - COMMUNICATION SKILLS- COURSES BEING OFFERED IN VARIOUS PROGRAMMES

SYLLABUS-UNDERGRADUATE-4 YEAR PROGRAMMES

Syllabus - First Semester

ENGLISH-I

Course Code: CSS2152

Credit Units: 1

Course Objective:

The course is intended to give a foundation of English Language. The literary texts are indented to help students to inculcate creative & aesthetic sensitivity and critical faculty through comprehension, appreciation and analysis of the prescribed literary texts. It will also help them to respond form different perspectives.

Course Contents:

Module I: Vocabulary

Use of Dictionary

Use of Words: Diminutives, Homonyms & Homophones

Module II: Essentials of Grammar - I

Articles

Parts of Speech

Tenses

Module III: Communication

The process and importance

Principles & benefits of Effective Communication

Module IV: Spoken English Communication

Speech Drills

Pronunciation and accent

Stress and Intonation

Module V: Short Stories

Of Studies, by Francis Bacon

Dream Children, by Charles Lamb

The Necklace, by Guy de Maupassant

A Shadow, by R.K.Narayan

Glory at Twilight, Bhabani Bhattacharya


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Examination Scheme:

Components	Written	CAF	V/P	GD/Extempore	A
Weightage	40	25	20	10	5

CAF- Communication Assessment File, **V/P**- Viva/Presentation, **GD**- Group Discussion, **A**- Attendance

Text & References:

- MadhulikaJha, Echoes, Orient Long Man
- Ramon & Prakash, Business Communication, Oxford.
- Sydney Greenbaum Oxford English Grammar, Oxford.
- M. Ashraf Rizvi ,Effective Technical Communication, Tata McGraw Hill
- AnjaneeSethi&BhavanaAdhikari, Business Communication, Tata McGraw Hill

Syllabus – Second Semester

ENGLISH-II

Course Code: CSS2252

Credit Units: 1

Course Objective:

The course is intended to give a foundation of English Language. The literary texts are indented to help students to inculcate creative & aesthetic sensitivity and critical faculty through comprehension, appreciation and analysis of the prescribed literary texts. It will also help them to respond form different perspectives.

Course Contents:

Module I: Essentials of Grammar - II

Sentence Structure

Subject -Verb agreement

Punctuation

Module II: Communication Skills-I

Developing listening skills

Developing speaking skills

Module III: Communication Skills-II

Developing Reading Skills

Developing writing Skills

Module IV: Written English communication

Progression of Thought/ideas

Structure of Paragraph

Structure of Essays

Module V: Poems

All the Worlds a Stage

Shakespeare

To Autumn

Keats

O! Captain, My Captain.

Walt Whitman

Where the Mind is Without Fear

Rabindranath Tagore


Psalm of Life

H.W. Longfellow

Examination Scheme:

Components	Written	CAF	V/P	GD/Extempore	A
Weightage	40	25	20	10	5

CAF- Communication Assessment File, V/P- Viva/Presentation, GD- Group Discussion, A- Attendance


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Text & References:

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- Ramon & Prakash, Business Communication, Oxford.
- Sydney Greenbaum Oxford English Grammar, Oxford.
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- Anjanee Sethi & Bhavana Adhikari, Business Communication, Tata McGraw Hill



Syllabus – Third Semester

EFFECTIVE LISTENING

Course Code: CSS2151

Credit Units: 1

Course Objective:

To develop a deep understanding of the fundamentals of communication, and to improve communication skills by appreciating the importance of listening and learning essential techniques to improve the same.

Course Contents:

Module I: Fundamentals of Communication

Role and purpose of communication: *7 C's of communication*

Barriers to effective communication

Forms of Communication: one-to-one, informal and formal

Module II: Listening Skills

The process, importance and types of listening

Effective Listening: Principles and Barriers

Module III: Enhancing Listening Skills

Paraphrasing

Summarizing

Guidelines to increase listening

Activities to enhance listening


Examination Scheme:

Components	Written Test	CAF	V/P	GD/Extempore	A
Weightage (%)	40	25	20	10	5

CAF- Communication Assessment File, V/P- Viva/Presentation, GD- Group Discussion, A- Attendance

Text & References:

- Ramon & Prakash, Business Communication, Oxford.
- Sydney Greenbaum Oxford English Grammar, Oxford.
- Successful Communications, Malra Treece (Allyn and Bacon)
- Effective Technical Communication, M. Ashraf Rizvi.
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Syllabus – Fourth Semester

PRESENTATION SKILLS

Course Code: CSS2251

Credit Units: 1

Course Objective:

To develop good presentation skills by learning the essential steps for its planning and preparation, and effective use of verbal & non-verbal communication for delivering a business presentation.

Course Contents:

Module I: Social Communication Skills

Conversational English

Appropriateness

Building rapport

Module II: Context Based Speaking

In general situations

In specific professional situations

Discussion and associated vocabulary

Simulations/Role Play

Module III: Non Verbal Communication

Relevance and effective usage

Para language

Chronemics

Haptics

Proxemics

Body language

Object language

Module IV: Business Presentation

Audience Analysis

Preparing effective PowerPoint presentation


Delivering of presentation

Handling questions

Examination Scheme:

Components	Written Test	CAF	V/P	GD/Extempore	A
Weightage (%)	40	25	20	10	5

CAF- Communication Assessment File, **V/P-** Viva/Presentation, **GD-** Group Discussion, **A-** Attendance


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Text & References:

- Working in English, Jones, Cambridge
- Business Communication, Raman –Prakash, Oxford
- Speaking Personally, Porter-Ladousse, Cambridge
- Speaking Effectively, Jermy Comfort, et.al, Cambridge
- Anjanee Sethi & Bhavana Adhikari, Business Communication, Tata McGraw Hill



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Syllabus - Fifth Semester

READING AND COMPREHENSION

Course Code: CSS2351

Credit Units: 01

Course Objective:

To facilitate development of good reading & comprehension skills by deepening vocabulary, and refining academic language proficiency

Course Contents:

Module I: Effective Reading

Process, types and reading rate adjustment
Tips for improving reading skills
Reading Comprehension

Module II: Business/Technical Language Development

Advanced Grammar: Syntax, Tenses, Voices
Advanced Vocabulary skills: Jargons, Terminology, Colloquialism

Module III: Business Communication

Reading Business/ Technical press
Researching for Business /Technology

Module IV: Activities

News reading
Picture reading
Review of a book/journal

Examination Scheme:

Components	Written Test	CAF	V/P	GD/Extempore	A
Weightage (%)	40	25	20	10	5

CAF- Communication Assessment File, V/P- Viva/Presentation, GD- Group Discussion, A- Attendance

Text & References:

- Business Communication, Raman –Prakash, Oxford
- Creative English for Communication, Krishnaswamy N, Macmillan
- Business Vocabulary in Use: Advanced Macmillan, Cambridge
- Effective Technical Communication, M. Ashraf Rizvi.
- Anjanee Sethi & Bhavana Adhikari, Business Communication, Tata McGraw Hill

Syllabus – Sixth Semester

CORPORATE COMMUNICATION

Course Code: CSS2451

Credit Units: 01

Course Objective:

To develop competencies to form written communication strategies necessary in the workplace, and to execute them for effective communication

Course Contents:

Module I: Introduction to Writing Skills

Effective Writing Skills
Avoiding Common Errors
Paragraph Writing
Note Taking
Writing Assignments

Module II: Letter Writing

Types
Formats

Module III: Official Correspondence

Memo, Notice and Circulars
Agenda and Minutes

Module IV: Report Writing

Purpose and Scope of a Report
Fundamental Principles of Report Writing
Project Report Writing
Summer Internship Reports

Module V: Social Networking

Advantages
Opportunities
Making Contacts

Examination Scheme:

Components	Written Test	CAF	V/P	GD/Extempore	A
Weightage (%)	40	25	20	10	5

CAF- Communication Assessment File, V/P- Viva/Presentation, GD- Group Discussion, A- Attendance

Text & References:

- Business Communication, Raman –Prakash, Oxford
- Creative English for Communication, Krishnaswamy N, Macmillan
- Textbook of Business Communication, Ramaswami S, Macmillan
- Working in English, Jones, Cambridge
- A Writer's Workbook Fourth edition, Smoke, Cambridge
- Effective Writing, Withrow, Cambridge
- Writing Skills, Coe/Rycroft/Ernest, Cambridge
- Anjanee Sethi & Bhavana Adhikari, Business Communication, Tata McGraw Hill

Syllabus – Seventh Semester

EMPLOYABILITY SKILLS

Course Code: CSS2551

Credit Units: 01

Course Objective:

To enhance employability skills of the learners by enabling them to write effective resume and face the interview with confidence.

Course Contents:

Module I

Introduction to Public Speaking
Business Conversation
Effective Public Speaking
Art of Persuasion

Module II: Interviews

Types of Interview
Styles of Interview
Facing Interviews-Fundamentals and Practice Session
Conducting Interviews- Fundamentals and Practice Session
Mock interview sessions

Module III

Resume Writing
Covering Letters
Interview Follow Up Letters

Module IV

Assessment through employability score card

Module V: Business Etiquette

Introduction
Dressing up
Exchanging Business card
Shaking hands
Dining etiquette

Examination Scheme:

Components	Written Test	CAF	V/P	GD/Extempore	A
Weightage (%)	40	25	20	10	5

CAF- Communication Assessment File, V/P- Viva/Presentation, GD- Group Discussion, A- Attendance

Text & References:

- Jermy Comfort, Speaking Effectively, et.al, Cambridge
- Krishnaswamy, N, Creative English for Communication, Macmillan
- Raman Prakash, Business Communication, Oxford.
- Taylor, Conversation in Practice
- AnjaneeSethi&BhavanaAdhikari, Business Communication, Tata McGraw Hill

Syllabus – Eighth Semester

WORKPLACE COMMUNICATION

Course Code: CSS2651

Credit Units: 01

Course Objective:

The course is designed to empower students to carry out day to day communication at work place by adequate understanding of various types of communication and use of technology to facilitate efficient interpersonal communication.

Course Contents:

Module I: Dynamics of Group Discussion

Introduction,
Methodology
Role Functions
Mannerism
Guidelines

Module II: Communication through Electronic Channels

Introduction
Technology based Communication Tools
Video Conferencing
Web Conferencing
Selection of the Effective Tool
E-mails, Fax etc.

Module III: Professional Skills

Negotiations
Meetings
Email writing
Telephonic Skills


Examination Scheme:

Components	Written Test	CAF	V/P	GD/Extempore	A
Weightage (%)	40	25	20	10	5

CAF- Communication Assessment File, V/P- Viva/Presentation, GD- Group Discussion, A- Attendance

Text & References:

- Jermy Comfort, Speaking Effectively, et.al, Cambridge
- Krishnaswamy, N, Creative English for Communication, Macmillan
- Raman Prakash, Business Communication, Oxford.
- Taylor, Conversation in Practice,
- Anjanee Sethi & Bhavana Adhikari, Business Communication, Tata McGraw Hill


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SYLLABUS - UNDERGRADUATE-3 YEAR PROGRAMMES

Syllabus – First Semester

EFFECTIVE LISTENING

Course Code: CSS2151

Credit Units: 01

Course Objective:

To develop a deep understanding of the fundamentals of communication, and to improve communication skills by appreciating the importance of listening and learning essential techniques to improve the same.

Course Contents:

Module I: Fundamentals of Communication

Role and purpose of communication: 7 C's of communication

Barriers to effective communication

Forms of Communication: one-to-one, informal and formal

Module II: Listening Skills

The process, importance and types of listening

Effective Listening: Principles and Barriers

Module III: Enhancing Listening Skills

Paraphrasing

Summarizing

Guidelines to increase listening

Activities to enhance listening

Examination Scheme:

Components	Written Test	CAF	V/P	GD/Extempore	A
Weightage (%)	40	25	20	10	5

CAF- Communication Assessment File, V/P- Viva/Presentation, GD- Group Discussion, A- Attendance

Text & References:

- Ramon & Prakash, Business Communication, Oxford.
- Sydney Greenbaum Oxford English Grammar, Oxford.
- Successful Communications, Malra Treece (Allyn and Bacon)
- Effective Technical Communication, M. Ashraf Rizvi.
- Anjanee Sethi & Bhavana Adhikari, Business Communication, Tata McGraw Hill

Syllabus – Second Semester

PRESENTATION SKILLS

Course Code: CSS2251

Credit Units: 01

Course Objective:

To develop good presentation skills by learning the essential steps for its planning and preparation, and effective use of verbal & non-verbal communication for delivering a business presentation.

Course Contents:

Module I: Social Communication Skills

Conversational English

Appropriateness

Building rapport

Module II: Context Based Speaking

In general situations

In specific professional situations

Discussion and associated vocabulary

Simulations/Role Play

Module III: Non Verbal Communication

Relevance and effective usage

Para language

Chronemics

Haptics

Proxemics

Body language

Object language

Module IV: Business Presentation

Audience Analysis

Preparing effective PowerPoint presentation

Delivering of presentation

Handling questions

Examination Scheme:

Components	Written Test	CAF	V/P	GD/Extempore	A
Weightage (%)	40	25	20	10	5

CAF- Communication Assessment File, V/P- Viva/Presentation, GD- Group Discussion, A- Attendance

Text & References:

- Working in English, Jones, Cambridge
- Business Communication, Raman –Prakash, Oxford
- Speaking Personally, Porter-Ladousse, Cambridge
- Speaking Effectively, Jermy Comfort, et.al, Cambridge
- Anjanee Sethi & Bhavana Adhikari, Business Communication, Tata McGraw Hill

Syllabus – Third Semester

READING AND COMPREHENSION

Course Code: CSS2351

Credit Units: 01

Course Objective:

To facilitate development of good reading & comprehension skills by deepening vocabulary, and refining academic language proficiency

Course Contents:

Module I: Effective Reading

Process, types and reading rate adjustment

Tips for improving reading skills

Reading Comprehension

Module II: Business/Technical Language Development

Advanced Grammar: Syntax, Tenses, Voices

Advanced Vocabulary skills: Jargons, Terminology, Colloquialism

Module III: Business Communication

Reading Business/ Technical press

Researching for Business /Technology

Module IV: Activities

News reading

Picture reading

Review of a book/journal

Examination Scheme:

Components	Written Test	CAF	V/P	GD/Extempore	A
Weightage (%)	40	25	20	10	5

CAF- Communication Assessment File, V/P- Viva/Presentation, GD- Group Discussion, A- Attendance

Text & References:

- Business Communication, Raman –Prakash, Oxford
- Creative English for Communication, Krishnaswamy N, Macmillan
- Business Vocabulary in Use: Advanced Mascull, Cambridge
- Effective Technical Communication, M. Ashraf Rizvi.
- Anjanee Sethi & Bhavana Adhikari, Business Communication, Tata McGraw Hill

Syllabus – Fourth Semester

CORPORATE COMMUNICATION

Course Code: CSS2451

Credit Units: 01

Course Objective:

To develop competencies to form written communication strategies necessary in the workplace, and to execute them for effective communication

Course Contents:

Module I: Introduction to Writing Skills

Effective Writing Skills
Avoiding Common Errors
Paragraph Writing
Note Taking
Writing Assignments

Module II: Letter Writing

Types
Formats

Module III: Official Correspondence

Memo, Notice and Circulars
Agenda and Minutes

Module IV: Report Writing

Purpose and Scope of a Report
Fundamental Principles of Report Writing
Project Report Writing
Summer Internship Reports

Module V: Social Networking

Advantages
Opportunities
Making Contacts

Examination Scheme:

Components	Written Test	CAF	V/P	GD/Extempore	A
Weightage (%)	40	25	20	10	5

CAF- Communication Assessment File, **V/P-** Viva/Presentation, **GD-** Group Discussion, **A-** Attendance

Text & References:

- Business Communication, Raman –Prakash, Oxford
- Creative English for Communication, Krishnaswamy N, Macmillan
- Textbook of Business Communication, Ramaswami S, Macmillan
- Working in English, Jones, Cambridge
- A Writer's Workbook Fourth edition, Smoke, Cambridge
- Effective Writing, Withrow, Cambridge
- Writing Skills, Coe/Rycroft/Ernest, Cambridge
- Anjanee Sethi & Bhavana Adhikari, Business Communication, Tata McGraw Hill

Syllabus – Fifth Semester

EMPLOYABILITY SKILLS

Course Code: CSS2551

Credit Units: 01

Course Objective:

To enhance employability skills of the learners by enabling them to write effective resume and face the interview with confidence.

Course Contents:

Module I

Introduction to Public Speaking
Business Conversation
Effective Public Speaking
Art of Persuasion

Module II: Interviews

Types of Interview
Styles of Interview
Facing Interviews-Fundamentals and Practice Session
Conducting Interviews- Fundamentals and Practice Session
Mock interview sessions

Module III

Resume Writing
Covering Letters
Interview Follow Up Letters

Module IV

Assessment through employability score card

Module V: Business Etiquette

Introduction
Dressing up
Exchanging Business card
Shaking hands
Dining etiquette

Examination Scheme:

Components	Written Test	CAF	V/P	GD/Extempore	A
Weightage (%)	40	25	20	10	5

CAF- Communication Assessment File, **V/P-** Viva/Presentation, **GD-** Group Discussion, **A-** Attendance

Text & References:

- Jermy Comfort, Speaking Effectively, et.al, Cambridge
- Krishnaswamy, N, Creative English for Communication, Macmillan
- Raman Prakash, Business Communication, Oxford.
- Taylor, Conversation in Practice
- Anjanee Sethi & Bhavana Adhikari, Business Communication, Tata McGraw Hill

Syllabus – Sixth Semester

WORKPLACE COMMUNICATION

Course Code: CSS2651

Credit Units: 01

Course Objective:

The course is designed to empower students to carry out day to day communication at work place by adequate understanding of various types of communication and use of technology to facilitate efficient interpersonal communication.

Course Contents:

Module I: Dynamics of Group Discussion

Introduction,
Methodology
Role Functions
Mannerism
Guidelines

Module II: Communication through Electronic Channels

Introduction
Technology based Communication Tools
Video Conferencing
Web Conferencing
Selection of the Effective Tool
E-mails, Fax etc.

Module III: Professional Skills

Negotiations
Meetings
Email writing
Telephonic Skills

Examination Scheme:

Components	Written Test	CAF	V/P	GD/Extempore	A
Weightage (%)	40	25	20	10	5

CAF- Communication Assessment File, V/P- Viva/Presentation, GD- Group Discussion, A- Attendance

Text & References:

- Jermy Comfort, Speaking Effectively, et.al, Cambridge
- Krishnaswamy, N, Creative English for Communication, Macmillan
- Raman Prakash, Business Communication, Oxford.
- Taylor, Conversation in Practice,
- Anjanee Sethi & Bhavana Adhikari, Business Communication, Tata McGraw Hill

SYLLABUS – POSTGRADUATE PROGRAMMES

Syllabus - First Semester

BASICS OF COMMUNICATION

Course Code: CSS4151

Credit Units: 01

Course Objective:

It is rightly said, one cannot ‘not communicate’. This course is designed to facilitate our young Amitians to communicate effectively by emphasizing on practical communication through refurbishing their existing language skills and also to bring one and all to a common take-off level.

Course Contents:

Module I: Fundamentals of communication

Relevance of communication
Effective communication
Models of communication
Effective use of language

Module II: Tools of communication

Proficiency in English – The international
Language of business
Building vocabulary
(Denotative & connotative)
Extensive vocabulary drills
(Synonyms / Antonyms / Homonyms)
One Word substitution
Idioms & phrases
Mechanics and Semantics of sentences
Writing sentences that really communicate
(Brevity, Clarity, and Simplicity)
Improving the tone and style of sentences

Module III: Barriers to Effective use of language

Avoiding clichés
Removing redundancies
Getting rid of ambiguity
Euphemism
Jargons
Code switching

Examination Scheme:

Components	Written Test	CAF	V/P	GD/Extempore	A
Weightage (%)	40	25	20	10	5

CAF- Communication Assessment File, V/P- Viva/Presentation, GD- Group Discussion, A- Attendance

Text & References:

- Working in English, Jones, Cambridge
- Business Communication, Raman – Prakash, Oxford
- Echoes: JhaMadhulika: Orient Longman
- Practical English Usage, Swan M, Cambridge
- Business Communication- Sethi, BhavanaAdhikari, Tata McGraw Hill



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Syllabus - Second Semester

CORPORATE COMMUNICATION

Course Code: CSS4251

Credit Units: 01

Course Objective:

This course is designed to hone the Corporate Communication skills of the budding managers and enable them to be an integral part of the corporate communication network. The Verbal Communication (oral and written) will be the lingua franca of this endeavor.

Course Contents:

Module I: Communication in Practice

Verbal Communication
Communication Networks
Developing writing skills
Inter-office communication
The business letters
E mail – Netiquette (étiquette on the mail)
Intra-office communication
Memos
Notices
Circulars
Agenda and Minutes
Business Report writing
Resume writing

Module II: Cross Functional Communication

Marketing/ integrated marketing communication
Project management communication
Human Resource communication
Financial Communication

Module III: Communication for Public Relations

Functions and activities of PR
Reputation Management
Building Corporate Image and Identity
Negotiation Techniques

Examination Scheme:

Components	Written Test	CAF	V/P	GD/Extempore	A
Weightage (%)	40	25	20	10	5

CAF- Communication Assessment File, V/P- Viva/Presentation, GD- Group Discussion, A- Attendance

Text & References:

- Business Communication, Raman – Prakash, Oxford
- The Oxford Handbook of Commercial Correspondence, Ashley A, Oxford Business Communication for Managers: An Advanced Approach, Penrose, Thomson
- Business Communication, Krizan, Thomson
- Understanding Human Communication, 9/e, Adler R Oxford
- Business Communication- Sethi, BhavanaAdhikari, Tata McGraw Hill



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Syllabus - Third Semester

INTERPERSONAL COMMUNICATION

Course Code: CSS4351

Credit Units: 01

Course Objective:

‘Actions speak louder than words.’ Every business communicator needs to understand the nuances of ‘body language and voice.’ This course is designed to enable the young Amitian to decipher the relevance of Kinesics, Proxemics and Para Language that cater to the fundamental requirements of effective business presentations and speeches.

Course Contents:

Module I: Non - Verbal Communication

Principles of non- verbal communication

Kinesics

Proxemics

Paralanguage and visible code

Module II: Speaking Skills

Pronunciation drills (Neutralizing regional pulls)

Conversational English

Guidelines to an effective presentation

Module III: Interviews and GDs

Note:

1 written test of 20 marks of one hour duration will be conducted. Also, each student will be required to make a presentation for 20 marks over and above the teaching hours. They will have to be programmed accordingly.

Examination Scheme:

Components	Written Test	CAF	V/P	GD/Extempore	A
Weightage (%)	40	25	20	10	5

CAF- Communication Assessment File, V/P- Viva/Presentation, GD- Group Discussion, A- Attendance

Text & References:

- Business Communication, Raman – Prakash, Oxford
- Business Communication for Managers: An Advanced Approach, Penrose, Thomson
- Business Communication, Krizan, Thomson
- Understanding Human Communication, 9/e, Adler R Oxford
- Business Communication- Sethi, Adhikari, Tata McGraw Hill

Syllabus - Fourth Semester

CROSS CULTURAL COMMUNICATION

Course Code: CSS4451

Credit Units: 01

Course Objective:

The influx of multinationals, FDIs and Retail Management makes global communication a harsh reality and offers cultural communication challenges. This course is designed to inculcate trans-cultural communication skills among the young Amityians.

Course Contents:

Module I: Importance of Culture in Communication

Principles of effective cross cultural communication
Developing Communication Competence

Module II: Barriers to effective communication

Sender, Receiver and Situation related barriers
Measures to overcome the barriers
Listening skills

Module III: Cross cultural communication

Characteristics of culture
Social differences
Contextual differences
Nonverbal differences
Ethnocentrism

Examination Scheme:

Components	Written Test	CAF	V/P	GD/Extempore	A
Weightage (%)	40	25	20	10	5

CAF- Communication Assessment File, V/P- Viva/Presentation, GD- Group Discussion, A- Attendance

Text & References:

- Business Communication, Raman – Prakash, Oxford
- Business Communication for Managers: An Advanced Approach, Penrose, Thomson
- Understanding Human Communication, 9/e, Adler R Oxford
- Business Communication- Sethi, Adhikari, Tata McGraw Hill

SYLLABUS – POSTGRADUATE PROGRAMME (MBA-EXECUTIVE)

Syllabus - First Semester

MANAGERIAL COMMUNICATION

Course Code CSS4152

Credit Units: 03

Course Objective:

This course is designed to provide the business professionals an overview of the broad categories of Business communication and to impart managerial knowledge in oral and written communication to help them develop their managerial communication competence.

Course Content:

Module I: Introduction

Relevance of Communication
Principles of effective communication
Forms of Communication
Effective use of language

Module II: Managerial Writing Strategies

The managerial communication process
Levels of managerial communication
Critical errors in communication
Channels of Communication

Inter Office communication

Business Letters
Emails
Netiquette

Intra Office Communication

Memos
Notices
Circulars
Minutes
Report Writing

Module III: Preparing For Interview

Resume Writing
Group Discussion(s)
Making formal presentations

Interviews:

Types of Interviews
Styles of Interview
Conducting Interviews
Mock Interviews

Module IV: Strategies for Understanding Messages

Non Verbal Communication

Intercultural Managerial Communication

- Ethnocentrism
- Ethno relativism

Conflict Management

Examination Scheme

Components	Viva	Presentations	CT/Quiz	MCAF	Attendance
Weightage	20	20	20	35	5

MCAF - Management Communication Assessment File

Text & References:

- Business Communication, Raman – Prakash, Oxford
- Business Communication for Managers: An Advanced Approach, Penrose, Thomson
- Business Communication, Krizan, Thomson
- Understanding Human Communication, 9/e, Adler R Oxford
- Business Communication- Sethi, Adhikari, Tata McGraw Hill

Web Sources

- www.shkaminski.com/Classes/Handouts/Communication
- www.communicationskills.co.in
- www.hodu.com
- writingforresults.net

SYLLABUS – UNDERGRADUATE INTEGRATED LAW PROGRAMMES (BA LLB, B.COM LLB & BBA LLB)

Syllabus - Third Semester

EFFECTIVE LISTENING

Course Code: CSS2151

Credit Units: 1

Course Objective:

To develop a deep understanding of the fundamentals of communication, and to improve communication skills by appreciating the importance of listening and learning essential techniques to improve the same.

Course Contents:

Module I: Fundamentals of Communication

Role and purpose of communication: *7 C's of communication*

Barriers to effective communication

Forms of Communication: one-to-one, informal and formal

Module II: Listening Skills

The process, importance and types of listening

Effective Listening: Principles and Barriers

Module III: Enhancing Listening Skills

Paraphrasing

Summarizing

Guidelines to increase listening

Activities to enhance listening

Examination Scheme:

Components	Written Test	CAF	V/P	GD/Extempore	A
Weightage (%)	40	25	20	10	5

CAF- Communication Assessment File, V/P- Viva/Presentation, GD- Group Discussion, A- Attendance

Text & References:

- Ramon & Prakash, Business Communication, Oxford.
- Sydney Greenbaum Oxford English Grammar, Oxford.
- Successful Communications, MalraTreece (Allyn and Bacon)
- Effective Technical Communication, M. Ashraf Rizvi.
- Anjanee Sethi & Bhavana Adhikari, Business Communication, Tata McGraw Hill

Syllabus - Fourth Semester

PRESENTATION SKILLS

Course Code: CSS2251

Credit Units: 1

Course Objective:

To develop good presentation skills by learning the essential steps for its planning and preparation, and effective use of verbal & non-verbal communication for delivering a business presentation.

Course Contents:

Module I: Social Communication Skills

Conversational English

Appropriateness

Building rapport

Module II: Context Based Speaking

In general situations

In specific professional situations

Discussion and associated vocabulary

Simulations/Role Play

Module III: Non Verbal Communication

Relevance and effective usage

Para language

Chronemics

Haptics

Proxemics

Body language

Object language

Module IV: Business Presentation

Audience Analysis

Preparing effective PowerPoint presentation

Delivering of presentation

Handling questions

Examination Scheme:

Components	Written Test	CAF	V/P	GD/Extempore	A
Weightage (%)	40	25	20	10	5

CAF- Communication Assessment File, V/P- Viva/Presentation, GD- Group Discussion, A- Attendance

Text & References:

- Working in English, Jones, Cambridge
- Business Communication, Raman –Prakash, Oxford
- Speaking Personally, Porter-Ladousse, Cambridge
- Speaking Effectively, Jermy Comfort, et.al, Cambridge
- Anjaneesethi&BhavanaAdhikari, Business Communication, Tata McGraw Hill

Syllabus – Fifth Semester

READING AND COMPREHENSION

Course Code: CSS2351

Credit Units: 01

Course Objective:

To facilitate development of good reading & comprehension skills by deepening vocabulary, and refining academic language proficiency.

Course Contents:

Module I: Effective Reading

Process, types and reading rate adjustment
Tips for improving reading skills
Reading Comprehension

Module II: Business/Technical Language Development

Advanced Grammar: Syntax, Tenses, Voices
Advanced Vocabulary skills: Jargons, Terminology, Colloquialism

Module III: Business Communication

Reading Business/ Technical press
Researching for Business /Technology

Module IV: Activities

News reading
Picture reading
Review of a book/journal

Examination Scheme:

Components	Written Test	CAF	V/P	GD/Extempore	A
Weightage (%)	40	25	20	10	5

CAF- Communication Assessment File, **V/P-** Viva/Presentation, **GD-** Group Discussion, **A-** Attendance

Text & References:

- Business Communication, Raman –Prakash, Oxford
- Creative English for Communication, Krishnaswamy N, Macmillan
- Business Vocabulary in Use: Advanced Macmillan, Cambridge
- Effective Technical Communication, M. Ashraf Rizvi.
- Anjanee Sethi & Bhavana Adhikari, Business Communication, Tata McGraw Hill

Syllabus - Sixth Semester

CORPORATE COMMUNICATION

Course Code: CSS2451

Credit Units: 01

Course Objective:

To develop competencies to form written communication strategies necessary in the workplace, and to execute them for effective communication.

Course Contents:

Module I: Introduction to Writing Skills

Effective Writing Skills
Avoiding Common Errors
Paragraph Writing
Note Taking
Writing Assignments

Module II: Letter Writing

Types
Formats

Module III: Official Correspondence

Memo, Notice and Circulars
Agenda and Minutes

Module IV: Report Writing

Purpose and Scope of a Report
Fundamental Principles of Report Writing
Project Report Writing
Summer Internship Reports

Module V: Social Networking

Advantages
Opportunities
Making Contacts

Examination Scheme:

Components	Written Test	CAF	V/P	GD/Extempore	A
Weightage (%)	40	25	20	10	5

CAF- Communication Assessment File, V/P- Viva/Presentation, GD- Group Discussion, A- Attendance

Text & References:

- Business Communication, Raman –Prakash, Oxford
- Creative English for Communication, Krishnaswamy N, Macmillan
- Textbook of Business Communication, Ramaswami S, Macmillan
- Working in English, Jones, Cambridge
- A Writer's Workbook Fourth edition, Smoke, Cambridge
- Effective Writing, Withrow, Cambridge
- Writing Skills, Coe/Rycroft/Ernest, Cambridge
- Anjanee Sethi & Bhavana Adhikari, Business Communication, Tata McGraw Hill



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Syllabus - Seventh Semester

EMPLOYABILITY SKILLS

Course Code: CSS2551

Credit Units: 01

Course Objective:

To enhance employability skills of the learners by enabling them to write effective resume and face the interview with confidence.

Course Contents:

Module I

Introduction to Public Speaking
Business Conversation
Effective Public Speaking
Art of Persuasion

Module II: Interviews

Types of Interview
Styles of Interview
Facing Interviews-Fundamentals and Practice Session
Conducting Interviews- Fundamentals and Practice Session
Mock interview sessions

Module III

Resume Writing
Covering Letters
Interview Follow Up Letters

Module IV

Assessment through employability score card

Module V: Business Etiquette

Introduction
Dressing up
Exchanging Business card
Shaking hands
Dining etiquette

Examination Scheme:

Components	Written Test	CAF	V/P	GD/Extempore	A
Weightage (%)	40	25	20	10	5

CAF- Communication Assessment File, **V/P-** Viva/Presentation, **GD-** Group Discussion, **A-** Attendance

Text & References:

- Jermy Comfort, Speaking Effectively, et.al, Cambridge
- Krishnaswamy, N, Creative English for Communication, Macmillan
- Raman Prakash, Business Communication, Oxford.
- Taylor, Conversation in Practice
- Anjanee Sethi & Bhavana Adhikari, Business Communication, Tata McGraw Hill

Syllabus - Eighth Semester

WORKPLACE COMMUNICATION

Course Code: CSS2651

Credit Units: 01

Course Objective:

The course is designed to empower students to carry out day to day communication at work place by adequate understanding of various types of communication and use of technology to facilitate efficient interpersonal communication.

Course Contents:

Module I: Dynamics of Group Discussion

Introduction,
Methodology
Role Functions
Mannerism
Guidelines

Module II: Communication through Electronic Channels

Introduction
Technology based Communication Tools
Video Conferencing
Web Conferencing
Selection of the Effective Tool
E-mails, Fax etc.

Module III: Professional Skills

Negotiations
Meetings
Email writing
Telephonic Skills

Examination Scheme:

Components	Written Test	CAF	V/P	GD/Extempore	A
Weightage (%)	40	25	20	10	5

CAF- Communication Assessment File, **V/P-** Viva/Presentation, **GD-** Group Discussion, **A-** Attendance

Text & References:

- Jermy Comfort, Speaking Effectively, et.al, Cambridge
- Krishnaswamy, N, Creative English for Communication, Macmillan
- Raman Prakash, Business Communication, Oxford.
- Taylor, Conversation in Practice,
- Anjane Sethi & Bhavana Adhikari, Business Communication, Tata McGraw Hill

SYLLABUS – INTEGRATED PROGRAMMES (UNDERGRADUATE-POSTGRADUATE)

Syllabus - First Semester

ENGLISH-I

Course Code: CSS2152

Credit Units: 1

Course Objective:

The course is intended to give a foundation of English Language. The literary texts are indented to help students to inculcate creative & aesthetic sensitivity and critical faculty through comprehension, appreciation and analysis of the prescribed literary texts. It will also help them to respond form different perspectives.

Course Contents:

Module I: Vocabulary

Use of Dictionary

Use of Words: Diminutives, Homonyms & Homophones

Module II: Essentials of Grammar - I

Articles

Parts of Speech

Tenses

Module III: Communication

The process and importance

Principles & benefits of Effective Communication

Module IV: Spoken English Communication

Speech Drills

Pronunciation and accent

Stress and Intonation

Module V: Short Stories

Of Studies, by Francis Bacon

Dream Children, by Charles Lamb

The Necklace, by Guy de Maupassant

A Shadow, by R.K.Narayan

Glory at Twilight, Bhabani Bhattacharya

Examination Scheme:

Components	Written	CAF	V/P	GD/Extempore	A
Weightage (%)	40	25	20	10	5

CAF- Communication Assessment File, V/P- Viva/Presentation, GD- Group Discussion, A- Attendance

Text & References:

- Madhulika Jha, Echoes, Orient Long Man
- Ramon & Prakash, Business Communication, Oxford.
- Sydney Greenbaum Oxford English Grammar, Oxford.
- M. Ashraf Rizvi ,Effective Technical Communication, Tata McGraw Hill
- Anjanee Sethi & Bhavana Adhikari, Business Communication, Tata McGraw Hill



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Syllabus - Second Semester

ENGLISH-II

Course Code: CSS2252

Credit Units: 1

Course Objective:

The course is intended to give a foundation of English Language. The literary texts are indented to help students to inculcate creative & aesthetic sensitivity and critical faculty through comprehension, appreciation and analysis of the prescribed literary texts. It will also help them to respond form different perspectives.

Course Contents:

Module I: Essentials of Grammar - II

Sentence Structure

Subject -Verb agreement

Punctuation

Module II: Communication Skills-I

Developing listening skills

Developing speaking skills

Module III: Communication Skills-II

Developing Reading Skills

Developing writing Skills

Module IV: Written English communication

Progression of Thought/ideas

Structure of Paragraph

Structure of Essays

Module V: Poems

All the Worlds a Stage

Shakespeare

To Autumn

Keats

O! Captain, My Captain.

Walt Whitman

Where the Mind is Without Fear

Rabindranath Tagore

Psalm of Life

H.W. Longfellow

Examination Scheme:

Components	Written	CAF	V/P	GD/Extempore	A
Weightage (%)	40	25	20	10	5

CAF- Communication Assessment File, V/P- Viva/Presentation, GD- Group Discussion, A- Attendance

Text & References:

- MadhulikaJha, Echoes, Orient Long Man
- Ramon & Prakash, Business Communication, Oxford.
- Sydney Greenbaum Oxford English Grammar, Oxford.
- M. Ashraf Rizvi ,Effective Technical Communication, Tata McGraw Hill
- Anjanee Sethi & Bhavana Adhikari, Business Communication, Tata McGraw Hill

Syllabus - Third Semester

EFFECTIVE LISTENING

Course Code: CSS2151

Credit Units: 1

Course Objective:

To develop a deep understanding of the fundamentals of communication, and to improve communication skills by appreciating the importance of listening and learning essential techniques to improve the same.

Course Contents:

Module I: Fundamentals of Communication

Role and purpose of communication: *7 C's of communication*

Barriers to effective communication

Forms of Communication: one-to-one, informal and formal

Module II: Listening Skills

The process, importance and types of listening

Effective Listening: Principles and Barriers

Module III: Enhancing Listening Skills

Paraphrasing

Summarizing

Guidelines to increase listening

Activities to enhance listening


Examination Scheme:

Components	Written Test	CAF	V/P	GD/Extempore	A
Weightage (%)	40	25	20	10	5

CAF- Communication Assessment File, V/P- Viva/Presentation, GD- Group Discussion, A- Attendance

Text & References:

- Ramon & Prakash, Business Communication, Oxford.
- Sydney Greenbaum Oxford English Grammar, Oxford.
- Successful Communications, Malra Treece (Allyn and Bacon)
- Effective Technical Communication, M. Ashraf Rizvi.
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Syllabus - Fourth Semester

PRESENTATION SKILLS

Course Code: CSS2251

Credit Units: 1

Course Objective:

To develop good presentation skills by learning the essential steps for its planning and preparation, and effective use of verbal & non-verbal communication for delivering a business presentation.

Course Contents:

Module I: Social Communication Skills

Conversational English

Appropriateness

Building rapport

Module II: Context Based Speaking

In general situations

In specific professional situations

Discussion and associated vocabulary

Simulations/Role Play

Module III: Non Verbal Communication

Relevance and effective usage

Para language

Chronemics

Haptics

Proxemics

Body language

Object language

Module IV: Business Presentation

Audience Analysis

Preparing effective PowerPoint presentation

Delivering of presentation

Handling questions

Examination Scheme:

Components	Written Test	CAF	V/P	GD/Extempore	A
Weightage (%)	40	25	20	10	5

CAF- Communication Assessment File, **V/P-** Viva/Presentation, **GD-** Group Discussion, **A-** Attendance

Text & References:

- Working in English, Jones, Cambridge
- Business Communication, Raman –Prakash, Oxford
- Speaking Personally, Porter-Ladousse, Cambridge
- Speaking Effectively, Jermy Comfort, et.al, Cambridge
- AnjaneeSethi&BhavanaAdhikari, Business Communication, Tata McGraw Hill

Syllabus - Fifth Semester

READING AND COMPREHENSION

Course Code: CSS2351

Credit Units: 01

Course Objective:

To facilitate development of good reading & comprehension skills by deepening vocabulary, and refining academic language proficiency.

Course Contents:

Module I: Effective Reading

Process, types and reading rate adjustment

Tips for improving reading skills

Reading Comprehension

Module II: Business/Technical Language Development

Advanced Grammar: Syntax, Tenses, Voices

Advanced Vocabulary skills: Jargons, Terminology, Colloquialism

Module III: Business Communication

Reading Business/ Technical press

Researching for Business /Technology

Module IV: Activities

News reading

Picture reading

Review of a book/journal

Examination Scheme:

Components	Written Test	CAF	V/P	GD/Extempore	A
Weightage (%)	40	25	20	10	5

CAF- Communication Assessment File, V/P- Viva/Presentation, GD- Group Discussion, A- Attendance

Text & References:

- Business Communication, Raman –Prakash, Oxford
- Creative English for Communication, Krishnaswamy N, Macmillan
- Business Vocabulary in Use: Advanced Mascull, Cambridge
- Effective Technical Communication, M. Ashraf Rizvi.
- Anjanee Sethi & Bhavana Adhikari, Business Communication, Tata McGraw Hill

Syllabus - Sixth Semester

CORPORATE COMMUNICATION

Course Code: CSS2451

Credit Units: 01

Course Objective:

To develop competencies to form written communication strategies necessary in the workplace, and to execute them for effective communication.

Course Contents:

Module I: Introduction to Writing Skills

Effective Writing Skills
Avoiding Common Errors
Paragraph Writing
Note Taking
Writing Assignments

Module II: Letter Writing

Types
Formats

Module III: Official Correspondence

Memo, Notice and Circulars
Agenda and Minutes

Module IV: Report Writing

Purpose and Scope of a Report
Fundamental Principles of Report Writing
Project Report Writing
Summer Internship Reports


Module V: Social Networking

Advantages
Opportunities
Making Contacts

Examination Scheme:

Components	Written Test	CAF	V/P	GD/Extempore	A
Weightage (%)	40	25	20	10	5

CAF- Communication Assessment File, **V/P-** Viva/Presentation, **GD-** Group Discussion, **A-** Attendance


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Text & References:

- Business Communication, Raman –Prakash, Oxford
- Creative English for Communication, Krishnaswamy N, Macmillan
- Textbook of Business Communication, Ramaswami S, Macmillan
- Working in English, Jones, Cambridge
- A Writer's Workbook Fourth edition, Smoke, Cambridge
- Effective Writing, Withrow, Cambridge
- Writing Skills, Coe/Rycroft/Ernest, Cambridge
- Anjanee Sethi & Bhavana Adhikari, Business Communication, Tata McGraw Hill



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Syllabus - Seventh Semester

EMPLOYABILITY SKILLS

Course Code: CSS2551

Credit Units: 01

Course Objective:

To enhance employability skills of the learners by enabling them to write effective resume and face the interview with confidence.

Course Contents:

Module I

Introduction to Public Speaking
Business Conversation
Effective Public Speaking
Art of Persuasion

Module II: Interviews

Types of Interview
Styles of Interview
Facing Interviews-Fundamentals and Practice Session
Conducting Interviews- Fundamentals and Practice Session
Mock interview sessions

Module III

Resume Writing
Covering Letters
Interview Follow Up Letters

Module IV

Assessment through employability score card

Module V: Business Etiquette

Introduction
Dressing up
Exchanging Business card
Shaking hands
Dining etiquette

Examination Scheme:

Components	Written Test	CAF	V/P	GD/Extempore	A
Weightage (%)	40	25	20	10	5

CAF- Communication Assessment File, V/P- Viva/Presentation, GD- Group Discussion, A- Attendance

Text & References:

- Jermy Comfort, Speaking Effectively, et.al, Cambridge
- Krishnaswamy, N, Creative English for Communication, Macmillan
- Raman Prakash, Business Communication, Oxford.
- Taylor, Conversation in Practice
- AnjaneeSethi&BhavanaAdhikari, Business Communication, Tata McGraw Hill

Syllabus – Eighth Semester

WORKPLACE COMMUNICATION

Course Code: CSS2651

Credit Units: 01

Course Objective:

The course is designed to empower students to carry out day to day communication at work place by adequate understanding of various types of communication and use of technology to facilitate efficient interpersonal communication.

Course Contents:

Module I: Dynamics of Group Discussion

Introduction,
Methodology
Role Functions
Mannerism
Guidelines

Module II: Communication through Electronic Channels

Introduction
Technology based Communication Tools
Video Conferencing
Web Conferencing
Selection of the Effective Tool
E-mails, Fax etc.

Module III: Professional Skills

Negotiations
Meetings
Email writing
Telephonic Skills

Examination Scheme:

Components	Written Test	CAF	V/P	GD/Extempore	A
Weightage (%)	40	25	20	10	5

CAF- Communication Assessment File, **V/P-** Viva/Presentation, **GD-** Group Discussion, **A-** Attendance

Text & References:

- Jermy Comfort, Speaking Effectively, et.al, Cambridge
- Krishnaswamy, N, Creative English for Communication, Macmillan
- Raman Prakash, Business Communication, Oxford.
- Taylor, Conversation in Practice,
- Anjaneesethi&BhavanaAdhikari, Business Communication, Tata McGraw Hill

Syllabus – Ninth Semester

INTERPERSONAL COMMUNICATION

Course Code: CSS4351

Credit Units: 01

Course Objective:

‘Actions speak louder than words.’ Every business communicator needs to understand the nuances of ‘body language and voice.’ This course is designed to enable the young Amitian to decipher the relevance of Kinesics, Proxemics and Para Language that cater to the fundamental requirements of effective business presentations and speeches.

Course Contents:

Module I: Non - Verbal Communication

Principles of non- verbal communication

Kinesics

Proxemics

Paralanguage and visible code

Module II: Speaking Skills

Pronunciation drills (Neutralizing regional pulls)

Conversational English

Guidelines to an effective presentation

Module III: Interviews and GDs

Note:

1 written test of 20 marks of one hour duration will be conducted. Also, each student will be required to make a presentation for 20 marks over and above the teaching hours. They will have to be programmed accordingly.

Examination Scheme:

Components	Written Test	CAF	V/P	GD/Extempore	A
Weightage (%)	40	25	20	10	5

CAF- Communication Assessment File, V/P- Viva/Presentation, GD- Group Discussion, A- Attendance

Text & References:

- Business Communication, Raman – Prakash, Oxford
- Business Communication for Managers: An Advanced Approach, Penrose, Thomson
- Business Communication, Krizan, Thomson
- Understanding Human Communication, 9/e, Adler R Oxford
- Business Communication- Sethi, Adhikari, Tata McGraw Hill

Syllabus - Tenth Semester

CROSS CULTURAL COMMUNICATION

Course Code: CSS4451

Credit Units: 01

Course Objective:

The influx of multinationals, FDIs and Retail Management makes global communication a harsh reality and offers cultural communication challenges. This course is designed to inculcate trans-cultural communication skills among the young Amityians.

Course Contents:

Module I: Importance of Culture in Communication

Principles of effective cross cultural communication
Developing Communication Competence

Module II: Barriers to effective communication

Sender, Receiver and Situation related barriers
Measures to overcome the barriers
Listening skills

Module III: Cross cultural communication

Characteristics of culture
Social differences
Contextual differences
Nonverbal differences
Ethnocentrism

Examination Scheme:

Components	Written Test	CAF	V/P	GD/Extempore	A
Weightage (%)	40	25	20	10	5

CAF- Communication Assessment File, V/P- Viva/Presentation, GD- Group Discussion, A- Attendance

Text & References:

- Business Communication, Raman – Prakash, Oxford
- Business Communication for Managers: An Advanced Approach, Penrose, Thomson
- Understanding Human Communication, 9/e, Adler R Oxford
- Business Communication- Sethi, Adhikari, Tata McGraw Hill

ENGLISH LITERATURE

Programme Structure

Course Code	Course Title	Lecture (L) Hours /Week	Tutorial (T) Hours /Week	Total Credits
ENG2151	Shakespearean Comedy	2	1	3
ENG2251	Romantic Poetry	2	1	3
ENG2351	The Novels of England	2	1	3
ENG2451	The English Novels of India	2	1	3
ENG2551	Genre Fiction	2	1	3
ENG2651	Contemporary Literature	2	1	3
	TOTAL			18



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ENGLISH LITERATURE

Syllabus - Semester First

SHAKESPEAREAN COMEDY

Course Code: ENG2151

Credit Units: 03

Text:


1. Shakespeare - A Midsummer Night's Dream
2. Shakespeare - The Tempest
3. Shakespeare - Twelfth Night

Examination Scheme:

Components	CT	S	A	EE
Weightage (%)	15	10	05	70

Text & References:

- Ali, Amir. Basic Introduction to Shakespeare. Oxford University Press.
- Clemen, Wolfgang. *Shakespeare's Dramatic Art: Collected Essays*. New York: Routledge, 2005.
- Smith, Emma. *Shakespeare's Comedies: A Guide to Criticism*. Blackwell Publishers, 2004.
- Eagleton, Terry. *Shakespeare and Society: Critical Studies in Shakespearean Drama*. 1967.
- Bryant, J.A., Jr. *Shakespeare and the Uses of Comedy*. 1986.
- Mangan, Michael. *A Preface to Shakespeare's Comedies, 1594-1603*. 1996.


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Syllabus – Semester Second

ROMANTIC POETRY

Course Code: ENG2251

Credit Units: 03

Text:

- | | | | |
|----|-------------------------|---|---|
| 1. | William Wordsworth | - | Tintern Abbey, Ode on the Intimations of Immortality. |
| 2. | Samuel Taylor Coleridge | - | Ode to Dejection, Kubla Khan. |
| 3. | Shelley | - | Ode to the West Wind. |

Examination Scheme:

Components	CT	S	A	EE
Weightage (%)	15	10	05	70

Text & References:

- Roe, Nichole: Romanticism. Oxford University Press.
- Wolfson, Susan J: Cambridge Companion to Keats. Cambridge University Press.
- Fraser, George Sutherland: John Keats: Odes: A Casebook. Macmillan.
- Robinson, Daniel: A Century of Sonnets: The Romantic Era Revival. Oxford University Press.



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Syllabus – Semester Third

THE NOVELS OF ENGLAND

Course Code: ENG2351

Credit Units: 03

Text:


1. Jonathan Swift - Gulliver's Travels
2. Jane Austen - Pride and Prejudice
3. Charles Dickens - Hard Times

Examination Scheme:

Components	CT	S	A	EE
Weightage (%)	15	10	05	70

Text & References:

- John Richetti. Cambridge Companion to the Eighteenth Century Novel. Cambridge Univ. Press
- Wilbur L Cross. Development Of The English Novel


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Syllabus - Semester Fourth

THE ENGLISH NOVELS OF INDIA

Course Code: ENG2451

Credit Units: 03

Text:

1. R.K. Narayan - The Guide
2. Salman Rushdie - Midnight's Children
3. Amitav Ghosh - The Shadow Lines

Examination Scheme:

Components	CT	S	A	EE
Weightage (%)	15	10	05	70

Text & References:

- Iyengar K.R. Srinivas. Indian Writing in English. Advent Books Division
- Daiches D. Critical Approaches to English Literature. Orient Black Swan.
- V. Padma. Fiction as Window: Critiquing the Indian Literary Cultural Ethos since the 1980. Orient Blackswan.
- Dodiya Jaydesinh. Indian Women Novelists in English. Sarup and sons.



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Syllabus - Semester Fifth

GENRE FICTION

Course Code: ENG2551

Credit Units: 03

Text:


1. Science Fiction Isaac Asinov Foundation
2. Children's Fiction Lewis Carroll Through the Looking Glass
3. Detective Fiction Agatha Christie The Murder of Roger Ackroyd

Examination Scheme:

Components	CT	S	A	EE
Weightage (%)	15	10	05	70

Text & References:

- Christopher Pawling, 'Popular Fiction: Ideology or Utopia?,' Popular Fiction and Social Change, ed. Christopher Pawling (London: Macmillan, 1984).
- Umberto Eco, 'Narrative Structure in Fleming,' in the Study of Popular Culture: A Sourcebook, ed. Bob Ashley (London: Pinter, 1989), pp. 124-34.
- Darko Suvin, 'On Teaching SF Critically,' from Positions and Presuppositions in Science Fiction, (London: Macmillan), pp. 86 – 96.
- Felicity Hughes, 'Children's Literature: Theory and Practice,' ELH. 45 (1978), pp. 542-62.


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Syllabus - Semester Sixth

CONTEMPORARY LITERATURE

Course Code: ENG2651

Credit Units: 03

Text:


1. D. H. Lawrence - Sons and Lovers
2. Joseph Conrad - Lord Jim
3. James Joyce - Portrait of an Artist as a Young Man

Examination Scheme:

Components	CT	S	A	EE
Weightage (%)	15	10	05	70

Text & References:

- Sagar, Keith, The Art of D. H. Lawrence, Cambridge University Press, 1975
- Sander, Scott Russell, D. H. Lawrence: The World of the Five Major Novels, Viking Press, 1974
- H. Stape, ed., The Cambridge Companion to Joseph Conrad, Cambridge University Press, 2006
- Brady, Philip and James F. Carens, eds. Critical Essays on James Joyce's A Portrait of the Artist as a Young Man, New York: G. K. Hall, 1998.
- Wollaeger, Mark A., ed. James Joyce's A Portrait of the Artist as a Young Man: A Casebook, Oxford, New York, 2003.


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FRENCH STUDIES


PREAMBLE

Amity University aims to achieve academic excellence by providing multi-faceted education to students. The University has designed a system that would provide rigorous academic programme with necessary skills to enable them to excel in their careers.

This booklet contains the Programme Structure, the Detailed Curriculum and the Scheme of Examination. The Programme Structure includes the courses (Value-added Course: FL- French and Minor track courses), arranged semester wise. The importance of each course is defined in terms of credits attached to it. The credit units attached to each course has been further defined in terms of contact hours i.e. Lecture Hours (L), Tutorial Hours (T), Practical Hours (P). Towards earning credits in terms of contact hours, 1 Lecture and 1 Tutorial per week are rated as 1 credit each and 2 Practical hours per week are rated as 1 credit. Thus, for example, an L-T-P structure of 3-0-0 will have 3 credits, 3-1-0 will have 4 credits, and 3-1-2 will have 5 credits.

The Curriculum and Scheme of Examination of each course includes the course objectives, course contents, scheme of examination and the list of text and references. The scheme of examination defines the various components of evaluation and the weightage attached to each component. The different codes used for the components of evaluation and the weightage attached to them are:

<u>Components</u>	<u>Codes</u>	<u>Weightage (%)</u>
Case Discussion/ Presentation/ Analysis	C	05 - 10
Home Assignment	H	05 - 10
Project	P	05 - 10
Seminar	S	05 - 10
Viva	V	05 - 10
Quiz	Q	05 - 10
Class Test	CT	10 - 15
Attendance	A	05
End Semester Examination	EE	70


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PROGRAMME OBJECTIVE

This programme is designed for the students who opt for French as a Minor **in addition to taking French as Foreign Language (Value-added Course).**

This programme aims at providing an understanding of the basics of French grammar and phonetics.

Students get sensitized towards different “registres de langue” and are able to distinguish formal and informal language right from the beginning and use appropriate language while communicating in the professional and business world.


Through various listening and speaking exercises this course enables the students to quickly take position as a foreigner speaking French and establish contacts and communicate in oral and written language.

This programme also provides an insight into French literature. By furnishing information on select socio-cultural aspects of France, this programme creates a backdrop for a better understanding of the language and the people.

This programme focuses on developing all four language skills of reading, writing, listening and speaking. Through training in various activities it enhances the critical/ creative thinking and encourages the learners to think spontaneously in French.



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FRENCH STUDIES

Programme Structure


Course Code	Course Title	Lectures (L) Hours per week	Tutorial (T) Hours per week	Practical (P) Hours per week	Total Credits
LAN2161	Professional French for Business-1	2	1	-	3
LAN2261	Professional French for Business-2	2	1	-	3
LAN2361	Professional French for Business-3	2	1	-	3
LAN2461	Professional French for Business-4	2	1	-	3
LAN2561	Introduction to French Literature & Select Socio-Cultural aspects of France	2	1	-	3
LAN2661	French Through Activities	2	1	-	3
	TOTAL				18

Prerequisites:

1. The student should have opted for French as FL
2. In each semester the student should opt for the course offered without skipping any course. They are expected to follow the sequence. These courses cannot be opted for independently as OE in any semester.



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Syllabus - Semester First

PROFESSIONAL FRENCH FOR BUSINESS-1 (FRANÇAIS PROFESSIONNEL ET DES AFFAIRES-1)

Course Code: LAN2161

Credit Units: 03

Course Objective:

- This course aims at providing an understanding of the basics of French grammar and phonetics. Students get sensitized towards different “registres de langue” and are able to distinguish formal and informal language right from the beginning and use appropriate language while communicating in the professional and business world.
- Through various listening and speaking exercises this course enables the students to quickly take position as a foreigner speaking French and establish contacts and speak about things.

Course Contents:

Module I: Entrer en contact et faire connaissance

Actes de Communication :

S'adresser poliment à quelqu'un, se présenter, présenter quelqu'un, présenter une entreprise, présenter des renseignements personnels

Module II: Parler des objets

Actes de Communication :

Parler des objets, exprimer ses besoins, expliquer les usages des objets, situer les objets, faire des descriptions, comparer et exprimer ses préférences \

Grammaire :

1. articles indéfinis, masculin et féminin des noms, pluriel des noms
2. pronoms sujets, et toniques, on, c'est/il est + profession, qui est-ce ? qu'est-ce que?
3. masculin et féminin des adjectifs de nationalité
4. verbes parler, habiter, s'appeler, être, avoir, aller faire, connaître, vendre,
5. article défini, complément du nom avec de, quel interrogatif
6. pour + infinitif, il manque...
7. verbe avoir, ne...pas/pas de, question avec est-ce que ?, question négative, réponse “oui/ non/ si”
8. prépositions de lieu, il y a/qu'est-ce qu'il y a
9. adjectifs possessifs (un seul possesseur) accord et place des adjectifs qualificatifs
10. comparatifs et superlatifs

Examination Scheme:

Components	CT	V	Att.	EE
Weightage (%)	15	10	5	70

Text & References:

Text:

Le livre à suivre : Penfornis, Jean-Luc. Français.Com (Débutant). Paris: Clé International, 2007.

References:

Tauzin, Béatrice et Dubois Anne-Lyse. Objectif Express 1. Paris: Hachette, 2009.

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Syllabus - Semester Second

PROFESSIONAL FRENCH FOR BUSINESS-2 (FRANÇAIS PROFESSIONNEL ET DES AFFAIRES-2)

Course Code: LAN2261

Credit Units: 03

Course Objective:

To enable the students to

- plan, prepare, talk about time schedules, schedule meetings
- take appointments, confirm, anticipate or postpone appointments
- discuss work habits, frequency of actions, weather
- talk about travel, make reservations at hotel, buy tickets
- understand and give instructions, directions, advice

Course Contents:

Module I: Emploi du Temps

Actes de Communication :

Demander et donner l'heure, des horaires, raconter sa journée, parler de ses habitudes au travail, de ses loisirs, dire la date, parler du temps qu'il fait, fixer rendez-vous (au téléphone par e-mail)

Module II: Voyage

Actes de Communication :

Faire des réservations –un billet de train, une chambre d'hôtel, régler la note, expliquer un itinéraire, parler de ses déplacements, exprimer un conseil, une interdiction, une obligation, acheter un billet de train, consulter un tableau d'horaires

Grammaire:

1. question avec à quelle heure ? adjectifs interrogatifs, démonstratifs
2. verbes pronominaux au présent
3. adverbes de fréquence, pourquoi... ? Parce que .../pour infinitif
4. expressions indiquant la date, le lundi, lundi prochain
5. verbes impersonnels, il faut+ infinitif, il est interdit de + infinitif
6. adjectifs possessifs (plusieurs possesseurs), adjectif tout
7. impératif affirmatif et négatif
8. les prépositions à et de : à et en + moyen de transport, en/au+pays, aller à/venir de
9. verbes pouvoir /devoir+infinitif,
10. verbes : dormir, venir, partir, questions avec d'où, où, par où, à quel, de quel

Examination Scheme:

Components	CT	V	Att.	EE
Weightage (%)	15	10	5	70

Text&References:

Text:

Le livre à suivre : Penfornis, Jean-Luc. Français.Com (Débutant). Paris: Clé International, 2007.

References:

Tauzin, Béatrice et Dubois Anne-Lyse. Objectif Express 1. Paris: Hachette, 2009.

Syllabus - Semester Third

PROFESSIONAL FRENCH FOR BUSINESS-3 (FRANÇAIS PROFESSIONNEL ET DES AFFAIRES-3)

Course Code: LAN2361

Credit Units: 03

Course Objective:

To furnish linguistic tools

- to talk about work and problems related to work
- to perform simple communicative tasks (explaining a setback, asking for a postponement of appointment, give instructions, place orders, reserve)
- to acquaint themselves with the current social communication skills
- Oral (dialogue, telephone conversation)
- Written (e-mails, reply to messages)

Course Contents: Unité 5, 6: pp. 74 to 104

Module I: Déjeuner d'affaires

Actes de Communication :

Manger au restaurant, comprendre un menu, commander , engager une conversation téléphonique, parler de sa formation, de son expérience, de ses compétences, raconter des événements passés, consulter sa boîte e-mails, répondre aux messages

Module II: Problèmes

Actes de Communication :

Identifier un problème, demander des précisions, expliquer un contretemps, déplacer un rendez-vous, demander de l'aide (par téléphone, par e-mail), donner des instructions, expliquer un problème, suggérer une solution

Grammaire:

1. articles partitifs, un peu de, beaucoup de, une bouteille de, un morceau de...
2. futur proche, passé récent, verbes appeler, savoir et connaître (au présent)
3. passé composé avec avoir, affirmatif, négation et interrogatif
4. passé composé avec être, accord du participe passé
5. pronoms COD, COI, impératif et place du pronom et impératif des verbes pronominaux
6. négations (ne...rien, ne...personne, ne...plus, ne...pas encore, trop/pas assez,)
7. passé composé des verbes pronominaux
8. si/quand+présent, être en train de,
9. interrogations qu'est-ce que/ qu'est-ce qui/qui est-ce que/qui est-ce qui
10. verbe devoir au conditionnel présent

Examination Scheme:

Components	CT	V	Att.	EE
Weightage (%)	15	10	5	70

Text & References:

Text:

Le livre à suivre : Penfornis, Jean-Luc. Français.Com (Débutant). Paris: Clé International, 2007.

References:

Tauzin, Béatrice et Dubois Anne-Lyse. Objectif Express 1. Paris: Hachette, 2009.

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Syllabus - Semester Fourth

PROFESSIONAL FRENCH FOR BUSINESS-4 (FRANÇAIS PROFESSIONNEL ET DES AFFAIRES-4)

Course Code: LAN2461

Credit Units: 03

Course Objective:

- To strengthen the language of the students in both oral and written
- To provide the students with the linguistic tools
- to use the basic tenses – present, past and future
- to express emotion
- to accomplish simple tasks of day-to-day programmes
- to prepare a résumé and to appear for interviews

Course Contents: Unité 7: pp. 106 -120

Rédiger un résumé : Français.Com, Intermédiaire- p.98

Passer un entretien d'embauche : Français.Com, Intermédiaire – p.100

Module I: Tranches de vie

Actes de Communication :

Evoquer un souvenir, raconter dans le passé, rapporter des événements marquants d'une vie professionnelle, expliquer une situation de stress, donner son avis, faire des projets

Contenu grammatical : 1. formation de l'imparfait, emploi du passé composé et de l'imparfait

2. pronoms : y, chacun (/ chaque)

3. pronoms relatifs «qui, que, où » et mise en relief

4. pronom « en » de quantité

5. futur simple

6. indicateurs de temps : depuis, il y a, pendant, pour, en

7. propositions complétives : je pense que..., je crois que ...

Module II: Faire le point

Actes de Communication : Rappel

Grammaire: Révision

Examination Scheme:

Components	CT	V	Att.	EE
Weightage (%)	15	10	5	70

Text & References:

Text:

Le livre à suivre : Penfornis, Jean-Luc. Français.Com (Débutant). Paris: Clé International, 2007.

References:

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Syllabus - Semester Fifth

INTRODUCTION TO FRENCH LITERATURE & SELECT SOCIO-CULTURAL ASPECTS OF FRANCE (INTRODUCTION À LA LITTÉRATURE FRANÇAISE ET À CERTAINS ASPECTS SOCIOCULTURELS DE France)

Course Code: LAN2561

Credit Units: 03

Course Objective:

The student gets an insight into various literary genres through extracts of novels, plays, and poems of renowned French writers. They also get acquainted with select socio-cultural aspects of France.

Course Contents:

Module I: Théâtre

Le bourgeois gentilhomme – **Molière**
Le Cid – **Corneille**
Phèdre – **Racine**
En attendant Godot – **Samuel Beckett**

Module II: Roman / Récit

Madame Bovary – **Gustave Flaubert**
L'Etranger – **Albert Camus**

Module III: Poésie

Le Lac (Méditations) – **Alphonse Lamartine**
Vieille Chanson du Jeune Temps (Les Contemplations) – **Victor Hugo**
Correspondances – **Baudelaire**
Pour faire le portrait d'un oiseau – **Jacques Prévert**
Liberté – **Paul Elouard**

Module IV: Aspects socioculturels de France

Introduction à l'histoire contemporaine, le système politique, les institutions et la géographie, les pays francophones
Peinture, cinéma, sculpture, architecture, musique et gastronomie

Examination Scheme:

Components	CT	V	Att.	EE
Weightage (%)	15	10	5	70

Text & References:

- P.G. Castex, P. Surer, et G. Becker. Histoire de la Littérature Française. Paris: Hachette, 1974.
- Deshusses, Pierre, Léon Karlson et Paulette Thomander. Dix Siècles de Littérature Française. Paris: Collection Bordas, 1991.


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Syllabus - Semester Sixth

FRENCH THROUGH ACTIVITIES (FRANÇAIS À TRAVERS DES ACTIVITÉS)

Course Code: LAN2661

Credit Units: 03

Course Objective:

- To introduce plays, songs, poems and films with the purpose of helping students to read, listen, write, speak and think in French spontaneously; learn the content and be able to find new meanings through analysis, evaluation, synthesis and application
- To launch students on their personal course of learning through training in activities like acting, reciting poems, appreciating cinematography and writing film reviews
- To empower them to develop skills independently and to develop critical/ creative thinking

Course Contents:

Module I: Le français à travers des chansons

Exercices de grammaire, de vocabulaire, de dictée, de phonétique tout en écoutant/ en apprenant à chanter des chansons françaises d'hier et d'aujourd'hui

Module II: Le français à travers des pièces de théâtre

Jeu de rôles, scènes de la vie quotidiennes

Monologues

Pièces de théâtre classiques ou modernes - extraits

Module III : Le français à travers des films

Langage cinématographique et petite grammaire du cinéma

Critique/ appréciation des films

Module IV: Le français à travers des contes/ des fables

Contes populaires et traditionnels français

Fables de Jean de la Fontaine


Examination Scheme:

Components	Class Test	Attd.	End Term*
Weightage (%)	25	5	70

*All evaluation will be activity based.

Text & References:

Material compiled by ASL


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GERMAN STUDIES

PREAMBLE

Amity University aims to achieve academic excellence by providing multi-faceted education to students. The University has designed a system that would provide rigorous academic programme with necessary skills to enable them to excel in their careers.

This booklet contains the Programme Structure, the Detailed Curriculum and the Scheme of Examination. The Programme Structure includes the courses (Value-added Course: FL- German and Minor track courses), arranged semester wise. The importance of each course is defined in terms of credits attached to it. The credit units attached to each course has been further defined in terms of contact hours i.e. Lecture Hours (L), Tutorial Hours (T), Practical Hours (P). Towards earning credits in terms of contact hours, 1 Lecture and 1 Tutorial per week are rated as 1 credit each and 2 Practical hours per week are rated as 1 credit. Thus, for example, an L-T-P structure of 3-0-0 will have 3 credits, 3-1-0 will have 4 credits, and 3-1-2 will have 5 credits.

The Curriculum and Scheme of Examination of each course includes the course objectives, course contents, scheme of examination and the list of text and references. The scheme of examination defines the various components of evaluation and the weightage attached to each component. The different codes used for the components of evaluation and the weightage attached to them are:

<u>Components</u>	<u>Codes</u>	<u>Weightage (%)</u>
Case Discussion/ Presentation/ Analysis	C	05 - 10
Home Assignment	H	05 - 10
Project	P	05 - 10
Seminar	S	05 - 10
Viva	V	05 - 10
Quiz	Q	05 - 10
Class Test	CT	10 - 15
Attendance	A	05
End Semester Examination	EE	70



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PROGRAMME OBJECTIVE

This programme is designed for the students who opt for German a Minor **in addition to taking German Foreign Language (Value-added Course).**

This programme aims at providing an understanding of the basics of German grammar and phonetics.

Students get sensitized towards different “Sprache Register” and are able to distinguish formal and informal language right from the beginning and use appropriate language while communicating in the professional and business world.

Through various listening and speaking exercises this course enables the students to quickly take position as a foreigner speaking German and establish contacts and communicate in oral and written language.

This programme also provides an insight into German literature. By furnishing information on select socio-cultural aspects of Germany, this programme creates a backdrop for a better understanding of the language and the people.

This programme focuses on developing all four language skills of reading, writing, listening and speaking. Through training in various activities it enhances the critical/ creative thinking and encourages the learners to think spontaneously in German.



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GERMAN STUDIES

Programme Structure

Course Code	Course Title	Lectures (L) Hours per week	Tutorial (T) Hours per week	Practical (P) Hours per week	Total Credits
LAN2162	Professional German for Business-1	2	1	-	3
LAN2262	Professional German for Business-2	2	1	-	3
LAN2362	Professional German for Business-3	2	1	-	3
LAN2462	Professional German for Business-4	2	1	-	3
LAN2562	Introduction to German Literature & Select Socio-Cultural aspects of Germany	2	1	-	3
LAN2662	German Through Activities	2	1	-	3
	TOTAL				18

Prerequisites:

- The student should have opted for German as FL
- In each semester the student should opt for the course offered without skipping any course. They are expected to follow the sequence. These courses cannot be opted for independently as OE in any semester.


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Syllabus - Semester First

PROFESSIONAL GERMAN FOR BUSINESS-1 (Deutsch-1)

Course Code: LAN2162

Credit Units: 03

Course Objective: The complete course provides a comprehensive operational capability in the workplace. The course presents a variety of scenarios from various professional fields and work areas regarding the daily work and give professional language and intercultural skills.

Course objective of this semester is to enable students speak on following topics.

- i) How to pronounce names, address and the professions.
- ii) To be acquainted with the people.
- iii) To ask, how to reach your destination.
- iv) To welcome the guests.
- v) To ask/confirm/deny an appointment.
- vi) To tell the time.

Course Contents: Kapitel 1, 2, 3- pp. 9-50

Inhalt: Kapitel 1: Erster Kontakt

- i) GutenTag!
- ii) Familie und Beruf.
- iii) Die Gruppe Allianz.
- iv) Karten,Ausweis,Scheine
- v) Neue Kollegen

Kapitel 2:Besucher Kommen


- i) Wiewar die Reise?
- ii) Herzlich willkommen!
- iii) Die Leutesind da!
- iv) Wer sind die Leute?
- v) Kate Carlosbeginntihr Praktikum.

Kapitel 3:Leute

- i) MeineFamilie.
- ii) Auf einem Seminar
- iii) EineVerabredung.
- iv) Freizeit und Hobbys.

KommunikationsAufgabe:

- i) Eine andere Person und sich vorstellen.
- ii) Über den Berufund die Familiesprechen.
- iii) Über die Teilnehmer von einem Seminar sprechen.
- iv) Visitenkarten und Ausweise lesen und verstehen.
- v) Informationen zur Personen fragen.
- vi) Über die Reisesprechen.
- vii) Ein Programm planen.
- viii) Um eineFührung/Informationsmaterial bitten.
- ix) ÜberAufgaben und Termine sprechen.
- x) EinPraktikumsplan besprechen.
- xi) Einen Praktikump an machen.
- xii) Verwandtschaft bezeichnung ernennen.


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- xiii) Personen beschreiben.
- xiv) Sich verabreden.
- xv) E-Mails lesen.
- xvi) Über die Freizeit und seine Hobbys sprechen.

Grammatik Inhalt:

- i) Verben in Präsens(ich,er/sie/Sie)
- ii) Possesivartikel:mein,sein/ihr
- iii) Adverben(und,aber,oder,auch,schon,erst,noch)
- iv) Präsens/Präteritum:haben und ein.
- v) Zeitangaben:Wann/Wie lange?
- vi) Negation:nicht/kein
- vii) Verben mit Vokaländerung:e→i(e)

Examination Scheme

Component Codes	CT	V	Att.	EE
Weightage (%)	15	10	5	70

Text & References:

Becker, Braunert et al. UnternehmenDeutsch,Stuttgart: ErnstKlettSprachen, 2011.



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Syllabus - Semester Second

PROFESSIONAL GERMAN FOR BUSINESS-2 (Deutsch-2)

Course Code: LAN2262

Credit Units: 03

Course Objective: To enable students speak on following topics.

- i) To advise and to choose.
- ii) To book and to reserve.
- iii) To describe the route.
- iv) To describe any organisation.
- v) To organise the work.
- vi) To compare things/persons/equipments.

Course Contents: Kapitel 4, 5, 6- pp. 51-92

Kapitel 4:Bedarf,Bestellung,kauf

- i) Wir brauchen einen Drucker
- ii) Ich möchte einen Wagenmieten.
- iii) Das Angebot.
- iv) Im Tagunshotel.'
- v) Die Dienstreise.

Kapitel 5:ImBüro and Unterwegs.


- i) Das Praktikanten büro.
- ii) Entschuldigung,wie kommeIch von hier zum....?
- iii) Und was machen wir mit....?
- iv) Unterwegs zur Firma Rohla.
- v) Vor der Messe.

Kapitel 6:Namen,Zahlen,Daten,Fakten

- i) Das Mercedes-Benz Kundencenter Bremen.
- ii) Chrono.data GmbH& Co. KG
- iii) Die Arbeitsorganisation in der Rückware.
- iv) Drucker und Regale.
- v) Was für einTypbinich?

Kommunikationsaufgabe:

- i) Wünsche ausdrücken.
- ii) Waren vergleichen.
- iii) Beraten,auswählen.
- iv) Bestellen,buchen ,reservieren.
- v) Kleidungsstücke auswählen.
- vi) Fahrpläne verstehen.
- vii) Den Wegbeschreiben.


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Grammatik Inhalt:

- i) haben, brauchen
- ii) unbestimmter Artikel ein-/Negation kein
- iii) Ich hätte möchte/würde gern
- iv) Imperativ mit Sie und du
- v) Personalpronomen: Akkusativ
- vi) Wo für/für wen?

Examination Scheme

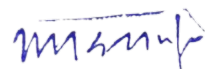
Component Codes	CT	V	Att.	EE.
Weightage (%)	15	10	5	70

Text & References:

Becker, Braunert et al. Unternehmen Deutsch. Stuttgart: Ernst Klett Sprachen, 2011.



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Syllabus - Semester Third

PROFESSIONAL GERMAN FOR BUSINESS-3 (Deutsch-3)

Course Code: LAN2362

Credit Units: 03

Course Objective:

To get the students acquainted with the current business communication skills in oral and written.

- i) To read job advertisement and then to evaluate it.
- ii) To call up someone.
- iii) To plan an appointment.
- iv) To inform and to justify the change of appointment.
- v) To distribute, to accept and to refuse the assignment.
- vi) To plan a business trip.

Course Contents: Kapitel 7 & 8- pp. 93-106

Inhalt: Kapitel 7 : Aufstellensuchen

- i) Versicherungen
- ii) Welche Stelle passt?
- iii) Das Home-Office von Frau Hörbiger
- iv) Drei Versicherungen, drei Länder
- v) Zwei Städte

Kapitel 8: Tagesplan, Wochenplan

- i) Aufgaben über Aufgaben
- ii) Herr Sommer, Sie sollen.....
- iii) Reiseplanung
- iv) Viel zu tun
- v) Ein verrückter Tag-nichts hat geklappt!

Kommunikationsaufgabe:

- i) Versicherungen vergleichen
- ii) Stellenanzeigen lesen und vergleichen
- iii) Stellenanzeigen bewerten
- iv) Ein Home-Office einrichten
- v) Telefonieren
- vi) Über Versicherungen sprechen und vergleichen

Grammatik Inhalt:

- i) Steigerung: Komparativ, Superlativ
- ii) Indefinit Pronomen
- iii) Adjektivdeklinations mit dem bestimmten Artikel.
- iv) Komparativ und Superlativ als Attribut.
- v) Modalverb: sollen
- vi) Nebensatz mit weil
- vii) Präsens und Präteritum der Modalverben:
wollen, müssen, können, dürfen, sollen


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Examination Scheme

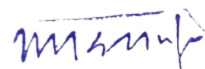
Component Codes	CT	V	Att.	EE.
Weightage (%)	15	10	5	70

Text & References:

Becker, Braunert et al. UnternehmenDeutsch. Stuttgart: Ernst Klett Sprachen, 2011.



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Syllabus - Semester Fourth

PROFESSIONAL GERMAN FOR BUSINESS-4 (Deutsch-4)

Course Code: LAN2462

Credit Units: 03

Course Objective:

To strengthen both oral and written language of students .To fine tune the grammar in application, to use modalverbs/ genitivecase.

- i) To comprehend the instructions.
- ii) To use the equipment and to work with program.
- iii) To speak about disturbances and their causes.
- iv) To complain about errors, defects and damages.
- v) To find the solutions of problems.
- vi) To explain the colleague his/her task.
- vii) To write an invitation.

Course Contents: Kapitel, 9 &10- pp. 121-148

Inhalt Unit 9: Sechs Freunde

- i) Einweisung für Frau Carlson
- ii) Was ist da passiert?
- iii) Hilfe,der Computer spinnt!
- iv) Störungen beseitigen,Defekte und Schäden beheben
- v) Reparatur oder Neukauf?

Unit 10:


- i) Willkommen bei uns!
- ii) Kleine Feiern
- iii) Ach,das ist interessant
- iv) Die Verabschiedung

Kommunikationsaufgabe:

- i) Anweisungen verstehen
- ii) Geräte bedienen,mit Programmen arbeiten.
- iii) Über Störungen,Beschädigungen,Defekte sprechen
- iv) Über Störungen und ihre Ursachen sprechen.
- v) Störungen,Defekte beheben.
- vi) Störungen reklamieren und Problem lösungen finden.
- vii) Einen Mitarbeiter und seine Aufgabe vorstellen.

Grammatik Inhalt:

- i) (Verbal-) Adjective
- ii) Nebensatz mit dass
- iii) Ursache und Folge:weil/deshalb
- iv) Verb:werden im Präsens
- v) Esist.../es wird


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Examination Scheme

Component Codes	CT	V	Att.	EE.
Weightage (%)	15	10	5	70

Text & References:

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Syllabus - Semester Fifth

INTRODUCTION TO THE GERMAN LITERATURE AND SOCIO CULTURALASPECTS OF GERMANY (Einführung in die Literatur und der sozio-kulturelle Aspekt Deutschlands Deutsch-5)

Course Code: LAN2562

Credit Units: 03

Course Objective:

To introduce the students to various literary genres through extracts of novels, plays, and poems of renowned German writers. They also get acquainted with select socio-cultural aspects of Germany.

Course Contents:

Module I: Einführung des soziokulturellenAspektDeutschlands

Einführung in die Zeitgeschichte das politische System, Institutionen und Geographie, deutschsprachige Ländern . Malerei, Film, Skulptur, Architektur, Musik und Gastronomie .

Module II: Gedichte:

1. Die Teilung der Erde- Friedrich Schiller
2. Willkommen und Abschied- Johann Wolfgang von Goethe
3. An meine Mutter – Heinrich Heine

Module III: Kurze Geschichte:


1. Das Brot: Wolfgang Borchert.
2. Die Küchenuhr : Wolfgang Borchert
3. Popp und Mingel : Marie Luise Kaschnitz
4. Aschenputtel: Grimm Bruder
5. Der Froschkönig: Grimm Bruder

Examination Scheme

Component Codes	CT	V	Att.	EE.
Weightage (%)	15	10	5	70

Text & References:

Allo Allkemper, Norbert Otto Eke. Eine Einführung in die Literaturwissenschaft. Stuttgart: Wilhelm Fink GmbH & Co. Verlag-KG, 2004


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Syllabus - Semester Sixth

GERMAN THROUGH ACTIVITIES (Deutsch durch Aktivitäten Deutsch-6)

Course Code: LAN2662

Credit Units: 03

Course Objective:

To introduce plays, songs, poems and films with the purpose of helping students to read, listen, write, speak and think in German spontaneously; learn the content and be able to find new meanings through analysis, evaluation, synthesis and application.

To launch students on their personal course of learning through training in activities like acting, reciting poems, appreciating cinematography and writing film reviews.

To empower them to develop skills independently and to develop critical/ creative thinking.

Course Content:

Module I: Deutsch durch Aktivitäten:

Rollenspiel- Szenen des täglichen Lebens ,Monologe .Das klassische und modern Spiele - Auszüge

Module II: Deutsch durch Lieder

Grammatik, Wortschatz, Diktat, Phonetik , Lernen durch Hören, deutsche Lieder von gestern und heute.

Module III: Deutsch durch die Filme.

Kurz Film Sprache und Grammatik des Films

Kritiker / Filme

Module IV: Deutsch und das typische deutsche Essen.

Beliebte und traditionelle deutsche Gerichte, ,Rezepte für Gerichte und Lebensmittel Wortschatz.


Examination Scheme

Component Codes	CT	Att.	EE.*
Weightage (%)	25	5	70

Text & References:

Material compiled by ASL

*All evaluation will be activity based.


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HISTORY

Programme Structure

Course Code	Course Title	Lectures (L) Hours per week	Tutorial (T) Hours per week	Practical (P) Hours per week	Total Credits
HIS2151	History of Ancient India	3	-	-	3
HIS2251	History of Medieval India	3	-	-	3
HIS2351	History of Modern India	3	-	-	3
HIS2451	The Ancient World	3	-	-	3
HIS2551	Rise of the Modern West	3	-	-	3
HIS2651	History of the World from Mid 20 th Century to the 21 st Century	3	-	-	3
	TOTAL				18



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HISTORY

Syllabus - Semester First

HISTORY OF ANCIENT INDIA

Course Code: HIS2151

Credit Units: 03

Course Objective

This course is aimed at acquainting students with the basics of Indian history beginning from the pre-historic period to the early phase of medieval India.

Course Contents

Module-I: Reconstructing Ancient Indian History, Prehistory and Proto-history

Sources of Ancient Indian history, Paleolithic, Mesolithic, Neolithic periods, Pre-Indus Civilizations

Module-II: The Indus Valley Civilization

Origin, main excavated sites and their characteristics, system of town planning, socio-religious and economic history, causes of decline

Module-III: Vedic Period, Caste System and the Emergence of New Religious Orders

Four Vedas and literature of Later Vedic period like Upanishadas, Brahmanas, Sutras and Dharmashastras, etc, rise of Buddhism and Jainism, causes, spread and decline

Module-IV: The Mauryan Empire

Sources, Sixteen Mahajanapadas, Magadhan to Mauryan period, Hariyanka dynasty, Shishunaga and Nandas, political administration, socio-religious and economic conditions, art and architecture, decline of the Mauryan Empire

Module-V: Kushana Empire and Gupta Empire

Shungas, Kanvas and Kushanas, Kanishka and Mahayana Buddhism, Gandhara, Mathura and Amravati Schools of Art, Trade and Silk Route

Module-VI: India under Harsha, Post- Harsha period

Vardhans and Satvahanas, early-medieval period and feudalism

Examination Scheme

Components	A	A/TP	CT	EE
Weightage (%)	5	15	10	70

(A : Attendance ; A/TP : Assignment/ Term Paper ; CT : Class Test ; EE : Endterm Examination)

Texts and References

- Thapar, Romila, Early India, Penguin, 2002
- Sharma, R.S., India's Ancient Past, Oxford University Press, 2011
- Jha, D.N., Ancient India in Historical Outline, Manohar Publishers, 2008
- Upinder Singh, History of Ancient and Early Medieval India, Pearson, 2008


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Syllabus - Semester Second

HISTORY MEDIEVAL INDIA

Course Code: HIS2251

Credit Units: 03

Course Objective

This course is aimed at acquainting students with the basics of medieval Indian history beginning from the Sultanate period to the decline of the Mughal Empire in the 18th century.

Course Contents

Module-I: Political and Economic Developments in the Sultanate Period

Coming of the Turks to India, Dynastic history—Ilbari Turks, Khaljis, Tughlaqs, Sayyids, and Lodhis, socio-political and economic developments, emergence of new institutions, nobility and new ruling elite, economic developments—urban revolution and rural revolution

Module-II: Socio-religious Movements in the Sultanate Period, Art and Architecture

Bhakti—origins, nirguna and saguna bhakti, Sufism—origins, silsilahs and impact on Indian society, developments in architecture

Module-III: Mughal India Part-I

The Early Mughals—Babur and Humayun, period of Akbar and Jahangir, political developments, new institutions, territorial integration, economic developments

Module-IV: Mughal India Part-II

Period of Shah Jahan and Aurangzeb—political developments, new institutions, territorial integration, economic developments

Module-V: Cultural Developments during the Mughal Period

Paintings, architecture, music, calligraphy, patronage of the arts

Module-VI: Fall of the Mughal Empire

Causes for the fall of the Mughal Empire, theories—old and new, rise of regional polities, coming of the British

Examination Scheme

Components	A	A/TP	CT	EE
Weightage (%)	5	15	10	70

(A : Attendance ; A/TP : Assignment/ Term Paper ; CT : Class Test ; EE : Endterm Examination)

Texts and References

- Chandra Satish, Medieval India Vol. I and II, Haranand Publications Pvt. Lt, 2001
- Kumar Sunil, Emergence of the Delhi Sultanate, Permanent Black, 2010
- Habib Irfan, Medieval India I: Researches in the History of India, Oxford University Press, 1998



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Syllabus - Semester Third

HISTORY OF MODERN INDIA

Course Code: HIS2351

Credit Units: 03

Course Objective

This course is aimed at acquainting students with the basics of modern Indian history beginning from the period of British imperialism to the partition of India, and the emergence of the new Indian state.

Course Contents

Module-I : Economic Developments

Land Revenue, Trade, Drain of Wealth, Growth of Modern Industry

Module-II: Popular Resistance- The Revolt of 1857

Causes of the Revolt, major participants, debates and historiography

Module-III: Socio-religious Reform Movements

The socio-religious movements of the 19th century- Brahmo Samaj, Prarthana Samaj, Arya Samaj, Ramakrishna Mission, debates on reform and revival

Module-IV: Nationalism, Mahatma Gandhi and the National Movement, India's Walk to Freedom

Gandhi's idea of nationalism and freedom, satyagrahas, Ahmedabad Mill Strike, Non-cooperation and Khilafat movement, Civil Disobedience movement

Module-V: Partition and Independence

Quit India movement, Cripps Mission, Mountbatten Plan, Partition riots, impact of partition on India

Module-VI: Emergence of a New State

India after partition, new developments, framing of the Constitution, Five-Year Plans

Examination Scheme

Components	A	A/TP	CT	EE
Weightage (%)	5	15	10	70

(A : Attendance ; A/TP : Assignment/ Term Paper ; CT : Class Test ; EE : Endterm Examination)

Texts and References

- Bandopadhyay, Sekhar, From Plassey to Partition, Orient Blackswan, 2004
- Sarkar, Sumit, Modern India, Pearson India, 2014
- Chandra Bipan, Panikkar K.N., Mukherjee Mridula, Mahajan Sucheta, and Mukherjee Aditya, India's Struggles for Independence

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Syllabus - Semester Fourth

THE ANCIENT WORLD

Course Code: HIS2451

Credit Units: 03

Course Objective

This course is aimed at acquainting students with the basics of world history beginning from pre-history to the Greco-Roman civilizations. The political, social, economic, and cultural aspects of all the phases will be covered as part of this course.

Course Contents

Module-I: Pre-History- Paleolithic and Mesolithic phases

Human evolution, Paleolithic- sites, tools, main characteristic features, Mesolithic- sites, tools, main characteristic features

Module-II: Neolithic Revolution

The beginning of agriculture, revolutionary change, sites, tools, main characteristic features

Module-III: Bronze Age Civilizations-Mesopotamia

Geographical setting, phases in the development of the civilization, polity, economy, society, culture

Module-IV: Bronze Age Civilizations- Egypt

Geographical setting, phases in the development of the civilization, polity, economy, society, culture

Module-V: Greek Civilization

Geographical setting, phases in the development of the civilization, polity, economy, society, culture

Module-VI: Roman Civilization

Geographical setting, phases in the development of the civilization, polity, economy, society, culture

Examination Scheme

Components	A	A/TP	CT	EE
Weightage (%)	5	15	10	70

(A : Attendance ; A/TP : Assignment/ Term Paper ; CT : Class Test ; EE : Endterm Examination)

Texts and References

- Amar Farooqui, *Early Social Formations*
- Glyn Daniel, *First Civilizations*



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Syllabus - Semester Fifth

RISE OF THE MODERN WEST

Course Code: HIS2551

Credit Units: 03

Course Objective

This course is aimed at acquainting students with the basics of World history, beginning from the Renaissance to the Industrial Revolution. All the important themes and landmark events in world history will be covered as part of this course.

Course Contents

Module-I: The Age of Renaissance

Period of the Renaissance in Europe, spread, major characteristic features, major artistic developments- paintings and sculptures, debates and recent historiography

Module-II: The Age of Reformation

Period of Reformation- background and origins, Martin Luther and the Reformation in Germany, Reformation outside Germany, nature of Reformation, legacy of the Reformation, debates and recent historiography

Module-III: Origins of Modern Politics- The French Revolution

Historiographical trends, causes, phases of the revolution, Age of the Republic, economic and political policies, role of women, impact of the revolution

Module-IV: The American Revolution

Historiographical trends, causes, important events, ideology of the revolution, impact of the revolution

Module-V: British Industrial Revolution

Historiographical trends, factors for the emergence of industrialization, major technological developments, economic impact, socio-political impact

Examination Scheme

Components	A	A/TP	CT	EE
Weightage (%)	5	15	10	70

(A : Attendance ; A/TP : Assignment/ Term Paper ; CT : Class Test ; EE : Endterm Examination)

Texts and References

- Meenaxi Phukan, *Rise of the Modern West: Social and Economic History of Early Modern Europe*
- J. R. Hale, *Renaissance Europe*
- Christopher Hill, *A Century of Revolutions*



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Syllabus - Semester Sixth

HISTORY OF THE WORLD FROM MID-20TH CENTURY TO THE 21ST CENTURY

Course Code: HIS2651

Credit Units: 03

Course Objective

This course is aimed at acquainting students with the history of the two world wars and the post-war events. All the important themes and landmark events will be covered as part of this course.

Course Contents

Module-I: World War I

Causes; political, economic, military, social developments; end of the war and the Treaty of Versailles

Module-II: Inter-War Period

Rise of Nazism in Germany, rise of Fascism in Italy, Stalinist Russia

Module-III: World War II

Causes; political, economic, military, social developments; end of the war and reconstruction of Europe

Module-IV: Liberation from Colonial Rule

End of colonial rule in Latin America, Arab World, Africa and South-East Asia

Module-V: Cold War

Power blocks- USA and USSR, political and economic developments

Module-VI: Rise of USA as a World Power

Reasons for the emergence of US as a world power, historiographical trends, political developments in the post-Cold War period, economic supremacy

Examination Scheme

Components	A	A/TP	CT	EE
Weightage (%)	5	15	10	70

(A : Attendance ; A/TP : Assignment/ Term Paper ; CT : Class Test ; EE : Endterm Examination)

Texts and References

- David Stevenson, 1914-1918: The History of the First World War, Penguin Books, UK, 2004
- Ross F. Collins, World War One
- Samuel L.A. Marshall, World War I
- Bernard Bailyn, The Ideological Origins of the American Revolution
- R.P. Kaushik, Significant Themes in American History



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KOREAN STUDIES

Programme Structure-2018

Course Code	Course Title	Lecture (L) Hours /Week	Tutorial (T) Hours /Week	Total Credits
LAN2165	Introduction to Korean History & Geography	3	-	3
LAN2265	Korean Cultural Perspectives	3	-	3
LAN2365	Modern History of Korea & Introduction to Korean Language	3	-	3
LAN2465	Contemporary Korea	3	-	3
LAN2565	Polity and Economy of Korea	3	-	3
LAN2665	Themes in Korean Literature	3	-	3
	TOTAL			18



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KOREAN STUDIES

Course Objective:

The course is designed to give a broad geographical, historical, cultural and social background of Korea. This will give the students an insight into the major events- historical, political and cultural- of Korean society extending from pre-history era till date. This course explores how today's Korea came into existence and what role does it play in world, especially in East Asia. The course will highlight the various cultural aspects also like Korean festival, cuisine, cinema, music and theatre.

Besides this, the course brings out the various phases of contemporary Korea dealing with colonial legacy, anti-colonial movements, social, political and economic agenda; liberation and division; emerging political, economic and administrative structures; Korean war and aftermath; pace, pattern and processes of socio-economic transformation in the peninsula, Government (s) and politics in the peninsula etc. Exercises also involve practical analysis of material and articles dealing with current issues related to Korea. Texts related to economic, social, and political issues of contemporary Korea are read, analysed and discussed. Besides written examination, grading will also be based on active class discussion and participation.

Besides this, the students are also given introductory lectures on Korea's relations with its neighbours like China, Russia and Japan and also with important strategic partners like USA and India.



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KOREAN STUDIES

Syllabus - Semester First

INTRODUCTION TO KOREAN HISTORY AND GEOGRAPHY

Course Code: LAN2165

Credit Units: 03

History

- Prehistory and Gojoseon
- Proto-Three Kingdoms
- Three Kingdoms
- North-South States Period
- Goryeo dynasty
- Joseon dynasty
- Korean Empire

Geography

- Location
- Area
- Demography
- Rivers
- Mountains

Syllabus - Semester Second

KOREAN CULTURAL PERSPECTIVES

Course Code: LAN2265

Credit Units: 03

Culture

- Attire
- Gastronomy
- Monuments
- Dance/song
- Society
- Loisir



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Syllabus - Semester Third

MODERN HISTORY OF KOREA AND INTRODUCTION TO KOREAN LANGUAGE

Course Code: LAN2365

Credit Units: 03

History

- Japanese occupation and Japan-Korea Annexation
- Division
- Korean War

Language

- Introduction to the history of Korean language
- Introduction to the writing system
- Basic Korean expressions and day to day situations

Syllabus - Semester Fourth

CONTEMPORARY KOREA

Course Code: LAN2465

Credit Units: 03

Korea in International affairs

- Indo-Korea relations
- R.O.K- US relations
- R.O.K- China relations
- R.O.K- Japan relations
- R.O.K- Russia relations
- R.O.K- D.P.R.K relations

Geography

- Strategic benefits and disadvantages

Syllabus - Semester Fifth


POLITY AND ECONOMY OF KOREA

Course Code: LAN2565

Credit Units: 03

Politics

- National government
- Political parties and elections
- Latest elections
- Political pressure groups and leaders
- Administrative divisions
- International organization participation


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Business Korean

- The miracle on Han
- Chaebol
- Leading Business Houses
- Business culture

Syllabus - Semester Sixth

THEMES IN KOREAN LITERATURE

Course Code: LAN2665

Credit Units: 03

Themes in Korean Literature


- History of Korean literature
- Oral literature
- Modern day Korean literature
- Korean literature abroad

Examination Scheme:

Components	CT	S	A	EE
Weightage (%)	15	10	05	70

Text & References:

- Extracts from various Handbooks including 'Facts About Korea', tourism booklets, books on Korean culture and heritage, Korean culture related websites etc.
- History of Korea by Han Woo Keun
- New History of Korea by Lee Ki- Baek
- Shin Young-Ha, Social history of Korea
- Shin, Gyegyun. 1999. Korean Life. Seoul: Korean Textbook Co.
- Korean Culture & Information Service. 1995. Guide to Korean Culture. Seoul: KCIS.
- A Text Book of Korean Culture by Vyjayanti Raghavan, J.M. Kim & Ravikesh, New Delhi: Manak Publishers
- Academy of Korean Studies. 2005. Exploring Korean History through World Heritage. Seoul: AKS.
- Shin, Gyegyun. 1999. Korean Life. Seoul: Korean Textbook Co.
- Korean Culture & Information Service. 1995. Guide to Korean Culture. Seoul: KCIS.
- 30 Years of Diplomatic Relations between India and Korea, Embassy of R.O.K
- Recent News Articles and internet sources
- Articles from Korean Newspapers and Journals
- Facts About Korea
- Excerpts from Political analysts


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Master of Arts English

FLEXILEARN

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Curriculum & Scheme of Examination

2022

AMITY UNIVERSITY HARYANA

GURUGRAM

A handwritten signature in blue ink, appearing to read 'Anil'.

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A handwritten signature in blue ink, appearing to read 'Manesar'.

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RESEARCH METHODOLOGY-I

Course Code: ENG4206

Credit Units: 01

Course Objective:

This paper proposes to introduce student to the philosophy and mechanics of research, to train them in the use of language, style and discourses suitable for dissertation writing, to help them acquire both a theoretical thrust and hands-on experience in writing research proposals before they embark on the execution of the thesis proper.

Module-I: The Philosophy of Research

The Philosophy, Meaning and Definition of Research

The nature of inquiry in Physical Sciences, Social Sciences and Humanities.

The relationship between Scholarship, Criticism and Research.

Interpretation

Textual Criticism

Literary History

Module-II: Project Proposals: Theory and Practice

The Identification of a Research Problem / Research Gap

The problems faced by a Research Scholar.

Parts of a Project Proposal

Preparing Minor Project Proposals

Examination Scheme:

Components	TP	Sessional	Presentation	EE
Weightage (%)	10	10	05	70

Texts and References

- Bateson, F.W. The Scholar Critic 2. Thorpe, James.
- Gibaldi, Joseph. MLA Handbook
- Brooks, C. and Warren, R.P. Modern Rhetoric
- Lodge, David. Modes of Modern Writing
- Kaplan, R.B. The Conduct of Inquiry: Methodology of Behavioural Sciences, San Francisco, 1964. Form and Style in Thesis Writing



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RESEARCH METHODOLOGY-II

Course Code: ENG4305

Credit Units: 02

Course Objective:

This paper proposes to introduce student to the philosophy and mechanics of research, to train them in the use of language, style and discourses suitable for dissertation writing, to help them acquire both a theoretical thrust and hands-on experience in writing dissertation before they embark on the execution of the thesis proper.

Module-I: Language, Style and Types of Discourses

The Style suitable for a Literary Thesis

Narration Argumentation

Exposition Description

Module-II: Research Objectives

Literature Review

Research Plan

Research Hypothesis

Module-III: The Mechanics of Research

The Mechanics of dissertation Writing

Data Collection – Primary and Secondary Sources.

Methods of data collection : Questionnaire, Interview, observation, document analysis

Methods of data analysis : Descriptive Statistics

Procedure in Literary Research e-learning and Research

Examination Scheme:

Components	TP	Sessional	Presentation	EE
Weightage (%)	10	10	05	70

Texts and References

- Bateson, F.W. The Scholar Critic 2. Thorpe, James.
- Gibaldi, Joseph. MLA Handbook
- Brooks, C. and Warren, R.P. Modern Rhetoric
- Lodge, David. Modes of Modern Writing
- Kaplan, R.B. The Conduct of Inquiry: Methodology of Behavioural Sciences, San Francisco, 1964. Form and Style in Thesis Writing


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SUMMER PROJECT EVALUATION

Course Code: ENG4335

Credit Units: 03

Summer Project is primarily a research work. It involves academic reading of several sources and writing on a particular topic relating to the core course or courses of the program. It is a scholarly inquiry into academic problems or issues. It should involve a systematic approach to gathering and analysis of information/ideas, leading to production of a structured report. The research topic should hold significant academic value commensurate with level of the Program.

GUIDELINES FOR SUMMER PROJECT REPORT

Topic

The topic of the paper will be of the student's choice with consent of the Supervisor. It must be relevant to the content of the course, but it should be treated in greater depth than it is covered in class. Focus is of the utmost importance. Too broad a topic will either lead to superficial treatment or an unnecessarily long paper; too narrow a topic will lead to a lack of source material and redundancy. Make sure the subject focuses on one question or topic so that the paper has a definite purpose. Composing an introduction and conclusion can be a good test of the cohesiveness of the subject. The domain can include Literature, Linguistics, Applied Linguistics, English Language Teaching and other related areas.

Synopsis of Summer Project Report

A Synopsis of the Summer Project Report should be submitted to the Board of Studies of the Institute. The Board, after deliberation, will suggest changes and modifications and will assign a supervisor from amongst the teaching faculty of the Institute. The synopsis should include the following –

1. Title of Summer Project Report
2. Introduction
3. Problems of Research
4. Objectives of Research
5. Tentative Chapter Division
6. Suggested readings

Source Material and References

Presenting your own ideas in a Summer Project Report is acceptable and even encouraged. However, the paper must be based on facts and opinions from authoritative sources and these sources must be given proper credit. A minimum of three published sources is required, and ten or more is typical. Direct quotes must be placed inside quotation marks or in indented sections and should be used sparingly. Paraphrasing is better in most cases.

There are two popular ways to cite references. One is to place superscripted numbers in the text with corresponding footnotes at the bottom of the page or endnotes at the end of the paper. More typical of scientific papers is to place the author and year in parentheses (Heaton, 1984). In either case you need a bibliography of all cited sources at the end of the paper with author(s), year, title, publication or publisher, volume, and pages. These should be in alphabetical order by name of the primary author. Preference however should be given to MLA Style Sheet.

Be sure to find source materials that are specific to your topic, either books or journal articles. Textbooks are usually too general and should be avoided. The libraries have published and computerized indexes that can be used to find relevant sources. See the Supervisor or a reference librarian if you are unfamiliar with these resources.

Plagiarism is the presenting of someone else's wording or ideas as one's own and is a violation of university policy. If you use someone else's words or ideas, you must give them proper credit. You


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must also obtain permission from the Supervisor before using your Summer Project Report for more than one course.

Length and Format

Length is not important; 40 to 60 pages of 1.5 spaced text is a good target. The title, author, course, and date should be typed onto a cover sheet.. Illustrations are not required but are often useful in explaining graphical concepts and in giving the paper character. The bibliography should be the last section of the paper. The entire report has to be submitted in two spiral bound copies.

Grading

Students are required to make two submissions: a first draft and a final draft prior to final submission. The first draft is *not* to be a "rough" draft; it should be a completed, typed paper like you would ordinarily submit. I will read it carefully, offer suggestions for improvement, give it a grade, and return it to you promptly. The final draft, which is worth a larger share of the points, is your chance to respond to the suggestions and submit an improved paper. This, I hope, will make the writing of a Summer Project Report more of a learning experience. We strongly suggest using a word processor so that the final draft can be created by editing rather than complete retyping.

Grading is based on both research content and presentation. Your paper should demonstrate that you have a gained a level of expertise in the subject by studying the relevant literature. Your presentation should be clean and convincing with proper use of paragraphs, complete sentences, and correct grammar, spelling, and punctuation. Make your Summer Project Report look and sound professional.

Evaluation of Project Work

Sl. No.	Evaluated by	Criteria	Marks
1	Institution	<ul style="list-style-type: none">✓ Quality✓ Depth & Breadth of analysis,✓ Coverage,✓ Scope and content✓ Project fulfillment✓ Data collection ability in the field (if any)✓ Scope of Implementation.	50
2	Board of Examiners	Viva-voce Examination	50
3		Total	100

Project Schedule

1. Registration

First week of the last academic month

Allotment of Faculty Guide takes place in accordance to the area of interest / stream chosen by the student at the time of registration.


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2. Approval Of Project Topic

Week following the 'week of registration'

3. Submission Of Synopsis To Faculty Guide

Prior to the completion of End -Term Examination. The synopsis could be submitted any time after the allotment of project topic but certainly must be before completion of last examination.

4. Duration of Project

The project stretches for the full duration of the Semester break

5. Submission of Report

First Draft – After 20 Days from the commencement of the project

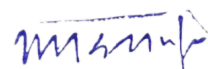
Second Draft – 20 days after submission of the first draft.

The first and second reports could be submitted through e-mail or any other medium as per the consent of faculty guide.

Final Draft – Within second week of rejoining of institution



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LITERARY THEORY

Course Code: ENG4401

Credit Units: 05

Course Objective:

This course will familiarize students with the study of major twentieth-century theories and applications. In this course, Historical, formalist, archetypal, psychoanalytic, Marxist, reader-response, New Historicist, feminist, postcolonial perspectives will be dealt. The course will enable students to comment on various theories and apply them to works of literature and aspects of contemporary culture.

Text:

Immanuel Kant	:	“What Is Enlightenment?”
Simone De Beauvoir	:	‘Introduction’ of <i>The Second Sex</i>
Foucault	:	“What is an Author?” from <i>The Essential Works of Foucault</i>
Jacques Lacan	:	Return to Freud: The Real, The Symbolic and The Imaginary
Ferdinand de Saussure	:	Course in General Linguistics (Major Concepts)
Derrida	:	<i>Structure, Sign, and Play in the Discourse of the Human Sciences</i>
Bill Ashcroft	:	‘Cutting the Ground: Critical Models of Post Colonial Literatures’, from <i>The Empire Writes Back</i> .
Edward Said	:	<i>Orientalism</i> : Introduction.
Homi Bhabha	:	‘How Newness enters the world: Postmodern space, Post Colonial times and the trials of cultural translation’, in <i>the Location Of Culture</i>
Gayatri Chakraborti Spivak	:	<i>Can the Subaltern Speak?</i>

Examination Scheme:

Components	TP	S	Presentation	EE
Weightage (%)	10	10	05	70

Recommended Readings:

- Amritjit Singh, Peter Schmidt, Postcolonial Theory and the United States: Race, Ethnicity, and Literature, 2000
- Henry Schwarz, Sangeeta Ray edited, *A Companion to Postcolonial Studies*.
- J A Cuddon, *A Dictionary of Literary Terms and Literary Theory*, 1998
- Jacques Lacan *Return to Freud: The Real, The Symbolic and The Imaginary* New York University Press
- Leroy Searle & Hazard Adams *Critical Theory Since Plato*, 3rd Edition, Cengage, 2005
- Bhabha, Homi, *Location of Culture*, Rutledge; 1 edition 1994
- Beauvoir Simone De ‘Introduction’ of *The Second Sex*, Vintage
- Saussure Ferdinand de *Course in General Linguistics*, McGraw-Hill, 1965
- Said Edward, *Orientalism*, Vintage 1969
- Spivak Gayatri Chakraborti *Can the Subaltern Speak?* Turia & Kant, 2007

AMERICAN LITERATURE


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Course Code: ENG4402

Credit Units: 05

Course Objective:

This course will examine American Literature from the late 18th through the 19th century till the 20th century. In particular, it will focus on the relation of aesthetic innovation to the cultural milieu. The course will address these in the context of questions of genre and forms and changing understandings of gender, race, and nationalism.

Text:


Walt Whitman	:	Songs of Myself (Section 1, 2, 3, 5, 6, 7, 11, 24,
		25, 32, 44, 49, 51, 52)
Nathaniel Hawthorne	:	The Scarlet Letter
Edgar Allan Poe	:	Philosophy of Composition, The Raven
Dylan Thomas	:	Under Milkwood
Henry Thoreau	:	Walden
Mark Twain	:	Adventures of Huckleberry Finn
Edward Albee	:	Who's Afraid of Virginia Woolf?
Ralph Emerson	:	Complete Essays – Self- Reliance, Pursuit of Happiness
Ernest Hemingway	:	Farewell to Arms

Examination Scheme:

Components	TP	Sessional	Presentation	EE
Weightage (%)	10	10	05	70

Recommended Readings:

- Winthrop, Jordan D., et. al. The Americans: The History of a People and a Nation. Evanston: McDougal, Littell & Co., 1989.
- P. Zweig, Walt Whitman: The Making of a Poet (1984); D. S. Reynolds, Walt Whitman's America (1995).
- Bell, Michael Davitt. The Problem of American Realism. Chicago: U of Chicago P, 1993.
- Becker, George, ed. and introd. Documents of Modern Literary Realism. Princeton: Princeton University Press, 1963.
- Berthoff, Werner. The Ferment of Realism: American Literature, 1884-1919. New York: Free Press, 1965.
- Chase, Richard. The American Novel and Its Tradition. Garden City, N. Y.: Doubleday Anchor, 1957.
- Anderson and K. M. Sanderson, ed., Mark Twain: The Critical Heritage (1972).
- Stuart Levine and Susan Levine ed., The Short Fiction of Edgar Allan Poe, Urbana: University of Illinois, 1976, 1990.
- Linda Wagner-Martin ed., Hemingway: Eight Decades of Criticism. Michigan State University Press, 2009.


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EUROPEAN COMEDY

Course Code: ENG4403

Credit Units: 05

Course Objective:

The course will introduce trends and issues related to European drama through study of the prescribed texts; develop critical arguments of local issues in relation to wider structures of individual plays and to generically structured theatre. The students will also be encouraged to make critical understanding of national and cross-national concepts of dramatic practice and identify the relationships between drama and wider philosophical, cultural and political issues.

Text:

Cervantes	:	Don Quixote Vol - I
Rabelais	:	The Histories of Gargantua and Pantagorel
Moliere	:	The Misanthrope
Bakhtin	:	The Grotesque
George Meredith	:	Comedy
Henry Bergson	:	Laughter

Examination Scheme:

Components	TP	Sessional	Presentation	EE
Weightage (%)	10	10	05	70

Recommended Readings:

- Gregory Dobrov, Figures of Play: Greek Drama & Metafictional Poetics, 2000.
- Ian Watt, Myths of Modern Individualism: Faust, Don Quixote, Don Juan, Robinson Crusoe, 1997



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ANCIENT GREEK AND LATIN LITERATURE IN TRANSLATION

Course Code: ENG4407

Credit Units: 05

Course Objective:

Identify texts, contexts, and authors—and thematic, genre-based and stylistic hallmarks of those texts and authors within the early literary traditions. Understand, discuss and interpret key texts, ideas, themes, and aesthetic modalities and explain how the texts, ideas, themes and modalities arose within a given cultural or historic context. Recognize and discuss significant genre and stylistic aspects of those texts. Relate their knowledge of ancient texts and belief systems to enduring issues and values in contemporary societies, including their own.

Text:

Homer	:	The Iliad
Sophocles	:	Oedipus Rex
Aristophanes	:	The Frog
Ovid	:	Metamorphoses – Story of Phaeon (Book II); The Rape of Proserpine (Book V) Story of Pygmalion the Statue (Book X); The region of Augustus in Which He Flourished (Book XV)
Marcus Aurelius	:	The Meditations – Book I to V

Examination Scheme:

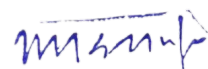
Components	TP	Sessional	Presentation	EE
Weightage (%)	10	10	05	70

Recommended Readings

- A Companion to Greek Tragedy by Justina Gregory, Blackwell Publishing
- The Cambridge Companion to Greek Tragedy (Cambridge Companions to Literature) (Paperback) by P. E. Easterling
- Greek Tragedy in Action, Oliver Taplin, Routledge, 2003
- Gender and Politics in Greek Tragedy, Michael X. Zelenak, Peter Lang Publishing, 1998
- Greek Tragedy: A Literary Study, H. D. F. Kitto, Methuen, 1939
- Greek and Roman Comedy: Translations and Interpretations of Four Representative Plays, Edited by Shawn O'Bryhim, Translated by George Fredric Franko, Timothy Moore, Shawn O'Bryhim, and Douglas Olson



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20TH CENTURY INDIAN ENGLISH LITERATURE

Course Code: ENG4404

Credit Units: 05

Course Objective:

This course will attempt to explore issues of contemporary Indian English. The aim is to open the students to the varieties of social and literary provocation at work in the texts prescribed and at the same time trace the changes in style, themes and its ideologies in the contemporary Indian English Writings. Students will be encouraged to - appreciate the sheer linguistic vitality of Indian English Writings; understand how the Indian subcontinent has been imaginatively reworked in recent Indian English writing and assess the cross-cultural impact of such reinvention.

Text:


Raja Rao	:	Kanthapura
Anita Desai	:	In the Lighthouse
Amitav Ghosh	:	The Glass Palace
Salman Rushdie	:	Midnight's Children
Girish Karnad	:	Tughlaq
Nissim Ezekiel	:	Background Casually; Poet, Lover, Birdwatcher.
A.K. Ramanujan	:	Obituary; A River.
Kamla Das	:	The Descendants; A Hot Noon in Malabar.

Examination Scheme:

Components	TP	Sessional	Presentation	EE
Weightage (%)	10	10	05	70

Recommended Readings:

- Singh, R. S. Indian Novel in English. Rep. Humanities Press Inc. Atlantic Highlands, New Jersey. 1978
- Iyengar, K. R. Srinivasa. Indian Writing in English. Rep Asia Publishing House. New York, New York. 1973.
- Krishnaswamy, Shantha. The Woman in Indian Fiction in English (1950-80). Ashish Publishing House. New Delhi, India. 1984.
- Sara Suleri, The Rhetoric of English India, University of Chicago Press, 1993.
- M. D. Fletcher ed., Reading Rushdie: Perspectives on the Fiction of Salman Rushdie, ISBN, Netherlands, 1994
- Tabish Kahir, Babu Fictions: Alienation in Contemporary Indian English Novels, Oxford UP, 2001.
- T.S. Anand edited, Modern Indian English Fiction. New Delhi, Creative Books, 2002.
- K.V. Surendran, Indian English Fiction: New Perspectives, New Delhi, Sarup & Sons, 2002.
- Walsh, William. Indian Literature in English. Longman, London. 1990
- N. S. Pradham Ed. Major Indian Novels: An Evaluation. Rep by Humanities Press Inc., Atlantic Highlands, New Jersey. 1986.


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LINGUISTICS AND ENGLISH LANGUAGE TEACHING

Course Code: ENG4406

Credit Units: 05

Course Objective:

This paper aims to provide the learner the basic knowledge of Linguistics. This course will introduce the intricacies of language and linguistics to the students focusing on the application of linguistic knowledge in language teaching. The focus of the paper is also to introduce the learners with difference in language learning and language acquisition.

Introduction: What is language? Characteristics of human language; Linguistics: Definition and explanation; Importance and applications of linguistics; Levels of language study.

Phonetics and Phonology: Difference between Phonetics and Phonology; Classification of sound system; Articulation and Production of sounds; Tone, Accent and Stress.

Sociolinguistics: Language; Dialect; Registers; Bilingualism; Multilingualism.

Language Acquisition: Theories of language acquisitions; Stages of language acquisition; Problems of language acquisition.


Methods of Language Teaching and Learning: Grammar Translation; Audio – Visual; Immersion (Total and Partial); Direct Method; Communicative Language Teaching.

Examination Scheme:

Components	TP	Sessional	Presentation	EE
Weightage (%)	10	10	05	70

Text & References:

- Adams, V.1973. *An Introduction to Modern English Word Formation*. London: Longman
- Chomsky, N., and M. Halle. 1968. *The sound pattern of English*. New York: Harper and Row.
- Lyons J, 1977. *Semantics*. 2 Vols. Cambridge: Cambridge University Press.
- Crystal D. 1997. *Encyclopedia of Language*: 2nd Vol., Cambridge: Cambridge University Press


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DISSERTATION

Course Code: ENG4437

Credit Units: 03

GUIDELINES FOR DISSERTATION

The aim of the dissertation is to provide you with an opportunity to further your intellectual and personal development in your chosen field by undertaking a significant practical unit of activity, having an educational value at a level commensurate with the award of your degree

The dissertation can be defined as a scholarly inquiry into a problem or issues, involving a systematic approach to gathering and analysis of information / data, leading to production of a structured report.

Selecting the Dissertation Topic

It is usual to give you some discretion in the choice of topic for the dissertation and the approach to be adopted. You will need to ensure that your dissertation is related to your field of specialization.

Deciding this is often the most difficult part of the dissertation process, and perhaps, you have been thinking of a topic for some time.

It is important to distinguish here between 'dissertation topic' and 'dissertation title'. The topic is the specific area that you wish to investigate. The title may not be decided until the dissertation has been written so as to reflect its content properly.

Few restrictions are placed on the choice of the topic. Normally we would expect it to be:

- relevant to business, defined broadly;
- related to one or more of the subjects or areas of study within the core program and specialisation stream;
- clearly focused so as to facilitate an in-depth approach, subject to the availability of adequate sources of information and to your own knowledge;
- of value and interest to you and your personal and professional development.

Planning the Dissertation

This will entail following:

- Selecting a topic for investigation.
- Establishing the precise focus of your study by deciding on the aims and objectives of the dissertation, or formulating questions to be investigated. Consider very carefully what is worth investigating and its feasibility.
- Drawing up initial dissertation outlines considering the aims and objectives of the dissertation. Workout various stages of dissertation
- Devising a timetable to ensure that all stages of dissertation are completed in time. The timetable should include writing of the dissertation and regular meetings with your dissertation guide.

The Dissertation plan or outline

It is recommended that you should have a dissertation plan to guide you right from the outset. Essentially, the dissertation plan is an outline of what you intend to do, chapter wise and therefore should reflect the aims and objectives of your dissertation.

There are several reasons for having a dissertation plan

- It provides a focus to your thoughts.
- It provides your faculty-guide with an opportunity, at an early stage of your work, to make constructive comments and help guide the direction of your research.
- The writing of a plan is the first formal stage of the writing process, and therefore helps build up your confidence.


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- In many ways, the plan encourages you to come to terms with the reading, thinking and writing in a systematic and integrated way, with plenty of time left for changes.
- Finally, the dissertation plan generally provides a revision point in the development of your dissertation report in order to allow appropriate changes in the scope and even direction of your work as it progresses.

Keeping records

This includes the following:

- Making a note of everything you read; including those discarded.
- Ensuring that when recording sources, author's name and initials, date of publication, title, place of publication and publisher are included. (You may consider starting a card index or database from the outset). Making an accurate note of all quotations at the time you read them.
- Make clear what is a direct quotation and what is your paraphrase.

Dissertation format

All students must follow the following rules in submitting their dissertation.

- Front page should provide title, author, Name of degree/diploma and the date of submission.
- Second page should be the table of contents giving page references for each chapter and section.
- The next page should be the table of appendices, graphs and tables giving titles and page references.
- Next to follow should be a synopsis or abstract of the dissertation (approximately 500 words) titled: **Executive Summary**.
- Next is the 'acknowledgements'.
- Chapter I should be a general introduction, giving the background to the dissertation, the objectives of the dissertation, the rationale for the dissertation, the plan, methodological issues and problems. The limitations of the dissertation should also be hinted in this chapter.
- Other chapters will constitute the body of the dissertation. The number of chapters and their sequence will usually vary depending on, among others, on a critical review of the previous relevant work relating to your major findings, a discussion of their implications, and conclusions, possibly with a suggestion of the direction of future research on the area.
- After this concluding chapter, you should give a list of all the references you have used. These should be cross - references with your text. For articles from journals, the following details are required e.g.

Draper P and Pandyal K. 1991, The Investment Trust Discount Revisited, Journal of Business Finance and Accounting, Vol18, No6, Nov, pp 791-832.

For books, the following details are required:

Levi, M. 1996, International Financial Management, Prentice Hall, New York, 3rd Ed, 1996

- Finally, you should give any appendices. These should only include relevant statistical data or material that cannot be fitted into the above categories.

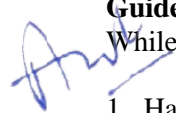
The Layout Guidelines for the Dissertation:

- A4 size Paper
- Font: Arial (10 points) or Times New Roman (12 points)
- Line spacing: 1.5
- Top and bottom margins: 1 inch/ 2.5 cm; left and right margins: 1.25 inches/ 3 cm

Guidelines for the Assessment of the Dissertation

While evaluating the dissertation, faculty guide will consider the following aspects:

1. Has the student made a clear statement of the objective or objective(s).


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2. If there is more than one objective, do these constitute parts of a whole?
3. Has the student developed an appropriate analytical framework for addressing the problem at hand.
4. Is this based on up-to-date developments in the topic area?
5. Has the student collected information / data suitable to the frameworks?
6. Are the techniques employed by the student to analyse the data / information appropriate and relevant?
7. Has the student succeeded in drawing conclusion from the analysis?
8. Do the conclusions relate well to the objectives of the project?
9. Has the student been regular in his work?
10. Layout of the written report.

Assessment Scheme:

Continuous Evaluation:

40%

(Based on Abstract, Regularity,
Adherence to initial plan, Records etc.)

Final Evaluation: Based on,
Contents & Layout of the Report,
Conceptual Framework,
Objectives & Methodology and
Implications & Conclusions

60%

25

10

10

15



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PERFORMING ARTS

Programme Structure-2019

Course Code	Course Title	Lecture (L) Hours /Week	Tutorial (T) Hours /Week	Practical (P) Hours/Week	Total Credits
PAR2151	Introduction to Performing Arts	2	-	2	3
PAR2251	Dynamics of Dance, Music & Theatre	2	-	2	3
PAR2351	Social relevance of Dance, Music & Drama in Contemporary Indian Scene	2	-	2	3
PAR2451	Indian Folk Arts	2	-	2	3
PAR2551	Modern Indian Performing Arts	2	-	2	3
PAR2651	Arts, Aesthetic & Society	2	-	2	3
	TOTAL				18



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PERFORMING ARTS

OBJECTIVES OF PROGRAM

AMITY CENTRE FOR PERFORMING ARTS Amity School of Liberal Arts offers **Open Elective Course in PERFORMING ARTS**. This open elective course in Performing Arts is envisioned for students who have a flair for dance/music/theatre and are looking for structured intervention at the UG level. The course hopes to give a strong platform for our students to develop a passion for the Arts, sharpen their artistic skills and broaden their theoretical base.

The course attempts to transcend the definition of art across content and context while reaching out to individuals and communities. While the focus will be predominantly within the parameters of dance, music and theatre.

The primary aim of the course is not to make students experts in one art form or the other, but introduce them to the possibilities with art and to help them get an integrated sense of art. It is desirable that every student continues to work under an artist/group in one art form or the other outside the curriculum, toward long term development.

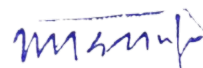
Note : The medium of instruction and examination for the course would be Hindi and English.

Objectives:-

- To address a spectrum of art concerns
- To give a base in dance, music and theatre
- To stimulate a composite sense of art
- To foster a blend of practical and theoretical understanding and practice in the arts
- To enable identification and growth opportunities in chosen field of dance/music/theatre



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PERFORMING ARTS

Syllabus - Semester First

INTRODUCTION TO PERFORMING ARTS

Course Code: PAR2151

Credit Units: 03

Course Objectives:

To give a strong base in the respective areas of dance, music and theatre.
To expose them to the terms and practice in the field.

Course Contents:

Module-I: Introduction to Performing Arts

- What is Performance?
- Performing Art and art of Performance.
- Nature and Structure of Performance.
- Dance- Theory/ practical.
- Music - Theory/ practical.
- Theatre - Theory/ practical.

Module-II: Introduction to Indian Classical dance Forms

Theory-

- Bharathanatyam
- Kathak
- Kathakali
- Kuchipudi
- Manipuri
- Mohiniattam
- Odissi
- Sattriya

Practical-


Teen Tal(Kathak)

- Simple Tatkar with Ekgun, Dugan and Chougan layakaries.
- Guru-Vandana , Thaata , Tehai , Tora/Tukra Chakardhar Tukda , Kavita.
- 2 Small semi classical dance in Dadra and Kahrawa Tal.

Module-III: Tradition of Indian Music

Theory-

- Definition of Sangeet.
 - Hindustani (Vocal/ Instrumental)


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- Carnatic (Vocal/ Instrumental)
- Classification of musical instruments – Structure and playing techniques of Harmoniyam , Naad ,Tanpura , shruti and Tabla.
- Definitions and Explanation of Musical terms such as: Dhvani, Sangeet, Swar, Laya, Raag, Taal, Shuddh- Vikrit, Chal-Achal, Mandra-Madhya-Taar, Sthayee – Antara, Aroha- Avaroha, Raag Jati, Tal Jati, Alap-Tan, Varn, Alankar, Pakad, Bandish, Vilambit-Madhya-Drut, Matra, Theka, Vibhag, Tali, Khali, Sam ,Dhrupad, Dhamar , Khyal ,Khyal , Thumri. Tappa , Saragam , Geet , Tarana.

Practical-

- Sargam Exercises
- Sargam Patterns to study rhythms
- Scale exercises
- Bhajan , Geet , Ghazal
- Alankars (atleast ten alankaras in all Ragas of varying nature)
- Sight singing or playing of written notations and writing notations on listening
- Tala – Keherwa , Dadra
- Tabla lesson-1
- Guitar lesson-1

Module-IV: Theatre

Theory-


- Overview of Theatre.
- What is Theatre?
- Thorough knowledge of Bharata's Natyashastra, and its relevance to an influence on Indian Classical Theatre. Origin, aim and nature of Sanskrit natya according to Bharata and later commentators.
- The types of theatres and their construction according to Natyashastra.

Practical-

- Basic Understanding of Voice and Speech.
- Breathing Exercises.
- Exercises in Volume and Pitch.
- Pronunciation.
- Diction.
- Intonation.
- Emotional Expression.
- Types of Stage.
- Reading : Prose Passages, Story Telling, Tongue-Twister.
- Play-reading and working on a scene for performance.

Module-V: Workshop and Presentation

- Dance-workshop /guest- lecture .
- Music- workshop / guest-lecture.
- Theatre –workshop / guest – lecture.


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Examination Scheme:

Continuous Assessment /Internal Assessment					End Term Examination	
Components	Class Test	Home Assignment	Class Performance	Attendance	Theory	Practical
Weightage(%)	10	5	10	5	30	40

Recommended Books

Reference Books– Dance

- **Dance dialects of India** -Ragini Devi
- **Indian Classical dance Tradition in transition** – Leela Venkatarama
- **Nritanjali** – an introduction to hindu Dancing - Sri .Ragini

Reference Books– Music

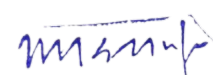
- **Raga Vigyan (All the parts)** Pt. V.N. Patwardhan
- **Raag Parichay** – Harish Chandra Srivastava – Part 1,2&3
- **Sangeet Vishaal** – Vasant(for theory only)
- **Sangeet Bodh** – Dr Sharacchandra Shridhar Paranjpe, Madhya Pradesh Hindi Granth Academy .
- **Raag Parichay** – Sangeet Sadan Prakashan Allahabad
- **Sangeet Visharad** – Sangeet Karyalaya Hatharas

Reference books – Theatre

- **Natyashastra** – Prof Brojmohan chaturvedi .
- **Performance Tradition in India** – SurseshAwasthi, Ed, Year 2009, ISBN 978-81-237-3618-1
- **From the Wings**(Notes on Indian Theatre) – Nemichandra Jain
- **What we do – Working in the Theatre** – Bo Metzler – Publishers – Infinity Publishing. Com



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Syllabus - Semester Second

DYNAMICS OF DANCE, MUSIC & THEATRE

Course Code: PAR2251

Credit Units: 03

Course Objectives:

To understand the dynamic nature of the three forms - dance, music and theatre.

To provide deeper understanding of the subject.

Course Contents:

Module-I: History of Dance

Theory-

- History and technique of Indian dance from the ancient times till modern times to be gathered from different sources like Literature , Epigraphy , Sculpture , Iconography, Painting and religious thought. This entails a thorough study of the Natyashastra and relevant texts.
- History of Kathak Dance.
- Gharanas of Kathak Dance.

Practical-

Teental (Kathak)

- Tatkar in Teental in Ekgun, Dugun and Chaugun Layakari.
- Ganesh Vandna.
- Thaat, Simple Amad ,Tihai , Tora/ Tukra , Chakardar Tukra , Paran , Chakardhar Paran , Kavita , Gat. Bhava – Ched Chad & Shingar, Paltas.
- Brief Introduction to Tintala, Dadra , Kaharwa and Jhaptal.

Module-II: Understanding the dynamics of Music

Theory-

- Raga- Introduction ,Definition , Lakshan and classification in Indian Music,
- Thaat- Introduction , Names and Swar of ten Thaats.
- Comparative study of Raga – Thaats.
- Non-detail terms: Aashrraya Raga ,Sangeet; two main systems of Indian Music; Naad, Saptak; Thaats; Alankar; Raga, Janak-Janya Ragas and Ashraya raga; Vadi, Samvadi, Anuvadi, Vivadi; Aroha, Avaroha, Pakad; Chal and Achal Swara.
- Asthayi, Antara; Taan, Alaap; Matra, Vibhag,Taal, Avartan, Sam, Tali, Khali,

Practical-

- Saragam practice
- Detailed and intensive study of the following ragas - Yaman , Bilaval , Khamaj. with Alap, Swaravistar, Sargam,one lakshan geet , one Saragam geet , One Chhota Khyal or Razakhani Gat.
- Taal- Teen tal ,Ektal.


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Module-III: Instrumental Music

Theory-

- Description of the five taals – Teental, Ektal, chowtal, Dadra and Keharwa, writing them in Thah and Dugun in Taal notation.
- Knowledge of musical notation system of Pt.V.N. Bhatkhande and Vishnu Digambar (swara and Taal-lipi).
- Introducing Guitar

Practical-

- Handling of the instrument; correct posture and finger movement. Playing of 10 alankars in Thah, Dugun and Chaugun.
- Table lesson -2
- Guitar lesson -2

Module-IV: Ancient Practice of Natya

Theory-

- Origin & Development of Classical Indian Theatre.
- Introduction to Natyashastra.,Dasharupaka.
- Rasa & Bhava Theory.
- Kinds of Acting.-Nayak and Naika Bheda.,Natyadharmi & Lokadharmi.
- Sanskrit Plays – Kalidas.

Practical-

- Working on Body, Mind, Voice.
- Theatre design - Direction, Stage Mgt, Sets and Props, Costumes, Light and Sound, Backstage.
- Natyashastra : Angika Abhinaya, Vachika Abhinaya, Aaharya Abhinaya and Satvika Abhinaya.
- Tools and Training of an Actor: Physical : Body and Voice, Psychological – Intellect and Emotional.
- Reading one Shakespeare Play.
- Yoga and pranayam .

Module-V: Workshop and Presentation

- Dance-workshop /guest- lecture .
- Music- workshop / guest-lecture.
- Theatre –workshop / guest – lecture .
- Rehearsals towards class room performance of Dance , Music and Theatre.

Examination Scheme:

Continuous Assessment /Internal Assessment					End Term Examination	
Components	Class Test	Home Assignment	Class Performance	Attendance	Theory	Practical
Weightage(%)	10	5	10	5	30	40


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Recommended Books

Reference Books – Dance

- **AbhinayaDarpana**– Nandi Keshwaran.
- **Naatyasastra** – Unni.

Reference Books – Music

- **Raga Vigyan (All the parts)** Pt. V.N. Patwardhan
- **Raag Parichay** – Harish Chandra Srivastava – Part 1,2&3
- **Sangeet Vishaal** – Vasant(for theory only)
- **Sangeet Bodh** – Dr Sharacchandra Shridhar Paranjpe, Madhya Pradesh Hindi Granth Academy .
- **Raag Parichay** – Sangeet Sadan Prakashan Allahabad
- **Sangeet Visharad** – Sangeet Karyalaya Hatharas

Reference books – Theatre

- **Minding the Body and Mending the Mind**- Joan Borysenko, Ph.D, publishers- The bantam Books.
- **All about Theatre** - Off Stage– by Chris Hogget.
- **A Phaidon Theatre Manual (Series)** – Phaidon Press Ltd, London.
- **An Actor Prepares** – Stanislavsky.



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Syllabus - Semester Third

SOCIAL RELEVANCE OF DANCE, MUSIC & DRAMA IN CONTEMPORARY INDIAN SCENE

Course Code: PAR2351

Credit Units: 03

Course Objectives:

The paper is a deeper exploration of identified Art form. The overall aim is to arrive at a platform to integrate and understand the inter-relation of Performing arts - to create an aesthetic experience for the artist and audience

Course Contents:

Module-I: Kathak

Theory-

- Study of following terms. Kavit, Vandana, Gat, Gat Nikas, Premalu , Nagma, Nritya, Nritya and Natya.
- Simple knowledge of Kathak Dance.
- Brief study of Abhinay and its four parts.
- Laya and its types with special reference to Indian Dances.
- Knowledge of Six Eyebrow movements and Nine Head Gestures.

Practical-

Teental & Jhaptal –

- Thaata , Aamad ,Tehai , Tora/Tukar , Chakardhar Tukra .
- Practised of prescribed material of Teen taal and Jhaptal with Tali and Khali.
- Practical knowledge of Aasanyukt Mudras.
- Detail Practical knowledge of Sanyukt Mudras based on Abhinay Darpan.

Module-II: Fundamentals of Vocal Music

Theory-

Raga Samaya (Time), Parmel praveshak Raga, Margi – Deshi Sangeet .
Shruti, Swar – Vibhajan.

Varna : Sthayi, Arohi, Avarhi, Sanchari, Alnkar (Palta), Kana Swara, Meend Vilom, anulom Ghaseet, Soot, Khatka, Murki, Gamak.

Practical-

- One chhota Khyal or Razakhani Gat, with Alap and Tana in
 - Bhupali ,Bihag ,Alhaiya – Bilaval ,Bhairav
- Light music
- Tala- Jhaptal , Chaartala


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Module-III: Instrumental & Tabla

Theory-

- Detailed knowledge of the following Talas with Dugan and Chaugun
- **Study of Talas:** - Dadra, Kaharwa, Trital, Ektal, Jhaptal, Chautal, Roopak
- Introduction to western instruments.

Practical-

- Table lesson - 3
- Start playing some western instruments.
- Guitar lesson-3

Module-IV: Play

Theory-

- Reading Different Type Of Plays And Analysis (Either Sanskrit/ Greek/ Modern/ Absurd Play)
- Analysing The Play By Looking Separately Its Structure, Plot, Characters, Themes And style.

Practical-

20-25 Minutes One Act Play By The Students.

Module-V: Workshop and presentation

- Dance-workshop /guest- lecture .
- Music- workshop / guest-lecture.
- Theatre –workshop / guest – lecture .
- Rehearsals towards class room performance of Dance , Music and Theatre.

Examination Scheme:

Continuous Assessment /Internal Assessment					End Term Examination	
Components	Class Test	Home Assignment	Class Performance	Attendance	Theory	Practical
Weightage(%)	10	5	10	5	30	40

Recommended Books

Reference books Dance-

- **Kathak Shingar** - T.R. Azad
- **Bhatiya Sanskrit Mei Kathak Parampara** - Mandvi Singh Kathak
- **Nritya Shiksha** (part- 2) - Puru Dadhicha
- **Kathak saunderyatmak Shastriya Nritya** – Shikha Khare

Reference books Music-

- **Raga Vigyan (All the parts)** Pt. V.N. Patwardhan
- **Raag Parichay** – Harish Chandra Srivastava – Part 1,2&3
- **Sangeet Vishaal** – Vasant(for theory only)
- **Sangeet Bodh** – Dr Sharacchandra Shridhar Paranjpe, Madhya Pradesh Hindi Granth Academy .

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- **Raag Parichay** – Sangeet Sadan Prakashan Allahabad
- **Sangeet Visharad** – Sangeet Karyalaya Hatharas

Reference books Theatre-

- **The Theatre: An Introduction** , By Oscar G. Brockett.
- **Play Production** , By Henning Nelms,
- **Natyashastrada Adhyaaya Sangraha**, By Adya Rangacharya.
- **Samskrutha Nataka**, by A.R.Krishna Shastri



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Syllabus - Semester Fourth

INDIAN FOLK ARTS

Course Code: PAR2451

Credit Units: 03

Course Objective:

The paper aims at a practical and formal introduction for the Folk Culture of India. To the identified performance stage after basic training in Folk dance, Folk music and, Folk theatre.

Course Contents:

Module-I: Folk Dance of India

Theory -

- What is folk Dance ?
- Origin and Development of Folk Dance in India.
- Different Folk Dance forms of India.
- Popular Folk Dances of India

Practical-

Practical work involving learning and research about Folk Dance related to the students' own region.

Module-II: Folk Music of India

Theory-

- What is folk music?
- Origin and Development of Folk Music in India.
- Different Folk musical forms of India.

Practical-

Practical work involving learning and research about Folk Music related to the students' own region.

Module-III: Folk Instrument of India

Theory-

Folk Instruments of India.
Folk Music and Popular Culture.
Folk artists of India

Practical-

Practical work with students regional forms (learning from each other)
Table lesson -4
Guitar lesson-4

Module-IV: Folk Theatre of India

Theory-

- What is folk Theatre?
- Origin and Development of Folk Theatre in India.
- Different Folk Art Forms in India.
- Folk Art :- Chhau/ Paika/ Hunta/ Barao/ Mundari/ Domkach Etc.

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Practical-

Folk Theatre of India, Theatre in awareness building, Publicity, Street Theatre, theatre in Human Recourse Development, Education & Therapy.

Module-V: Workshop and presentation

- Dance-workshop /guest- lecture .
- Music- workshop / guest-lecture.
- Theatre –workshop / guest – lecture .
- Rehearsals towards class room performance of Dance , Music and Theatre.

Examination Scheme:

Continuous Assessment /Internal Assessment					End Term Examination	
Components	Class Test	Home Assignment	Class Performance + Project	Attendance	Theory	Practical
Weightage(%)	10	5	10	5	35	35

Recommended Books

Reference books Kathak-

- **Kathak Nritya** – L.N Garg
- **Kathak Nritya Shiksha part 1 & 2** - Puru Dadhicha
- **Kathak Darpan** - T.R. Azad
- **Bhartiya Sanskriti me Kathak Parampra-** Mandvi Singh
- **Himachal ke Lok Naritya-** Hari Ram Justa

Reference books Music-

- **Bharatiya Sangitmala Part – I, II, III** Pt. Y.S. Pandit Mirashibuva
- **Abhinava Sangita Shiksha** Pt. S.N. Ratanjhankar
- **Abhinava Geetamanjri** Pt. S.N. Ratanjhankar Part – I, II, I
- **History of Indian Music** Swami Prajnanananda
- **Historical Study of Indian Music** Swami Prajnanananda
- **Musical Instrumental of India** B.C. Deva
- **Svara Aur Ragon Ke Vekas men Vadyon KaYogadan** Indrani Chakravarti

Reference books Theatre-

- **The Theatre: An Introduction** , By Oscar G. Brockett.
- **Play Production** , By Henning Nelms,
- **Rangabhoomi Kaipidi.** By N.S. Venkataram
- **Costume in Theatre.** By James Laver.



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Syllabus - Semester Fifth

MODERN INDIAN PERFORMING ARTS

Course Code: PAR2551

Credit Units: 03

Course Objective:

The course is a deeper exploration of identified Art form. The overall aim is to arrive at a platform to integrate and understand the inter-relation of Performing arts - to create an aesthetic experience for the artist and audience.

Course Contents:

Module-I: Dance

Theory-

- Development of Kathak Dance during Mughal and Hindu period
- Study of Dashavtaras.
- Elementary knowledge of Rasa and their application in Dance.
- A study of Tandav and Lasya.
- Importance of Make-Up, Costumes and Instruments in Kathak Dance.
- Relationship between Dance and Religion
- Dance Theory on basics of Kathak and Contemporary Dance
- Introduction to Contemporary Dance
- Short Biography and Contribution to Dance

Practical-

- Kathak – fusion Dance
- Indian Contemporary Dance
- Shuddh – Kathak

Module-II: Music

Theory-

- History of western music.
- Brief introduction to western notation system
- Contribution of Pt. V.D. Paluskar and Pt. V.N. Bhatkhande
- Rabindra Sangeet - Different Forms of Rabindra sangeet
- Life Sketch of Rabindra Nath Tagore with Special reference to his Musical Quality

Practical-

- Forms of compositions – Dhamar, (Hori) Tarana, thumri , Bhajan.
- Laxangeet and Sargam geet in Raga Yaman and Bhaivav
- Rag – bhimpalasi , bageshri.
- Tala- Ada Chuttaal , Tilwada.
- Contribution & life sketch – Vidushi Annapurna Devi, Vidushi Kishori Amonkar.


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Module-III: Instrumental Music

Theory-

- Names of different parts (components) of the Tanpura with the help of a simple sketch. Tuning and handling of the instrument.

Practical-

- Play western Instruments
- Playing of Thekas of the following six Taals with development: two kaayadas and its four paltas with tihai in Teentaal, One tukda in each ,Jhaptaal and Ektaal, one paran in chaartaal, two kismen each in Dadra and KeharwaTaal.
- Simple developments of Taals - Taali, Khali etc. on hands.
- Guitar lesson – 5
- Table lesson -5

Module-V: Introduction to Modern Theatre (Indian & World)

Theory

- Origin and Development of Modern after Romanticism.
- Trends and Concepts of Modern Indian Theatre
- Modern Indian Theatre- Practice
- Realistic and Non-Realistic Theatre

Practical-

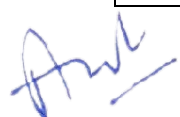
- Practice: Dialogue delivery
- Nav rasa
- Yoga & pranayam
- Movement
- Rhythm and Tempo

Module-V: Workshop and presentation

- Dance-workshop /guest- lecture .
- Music- workshop / guest-lecture.
- Theatre –workshop / guest – lecture .
- Rehearsals towards class room performance of Dance , Music and Theatre.

Examination Scheme:

Continuous Assessment /Internal Assessment					End Term Examination	
Components	Class Test	Home Assignment	Class Performance + Project	Attendance	Theory	Practical
Weightage(%)	10	5	10	5	30	40


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Recommended Books:

- Reference books Kathak-
- **Kathak Nritya** Shiksha part - 2 – Dr. Vidya Nidhi
- **Kathak Darpan** -. T.R. Azad
- **Kathak Shingar** - . T.R. Azad
- **Kathak Nritya (Part 1&2)** – Dr. Vidhi Naggar

Reference books Music-

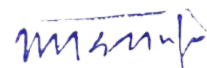
- **Bharatiya Sangita men Tala Aur Rupa** Vidhana . Subhadra Chaudhary
- **Rasa Siddhanta**- Prem Lata Sharma
- **Musical Instrumental of India** -B.C. Deva
- **Svara Aur Ragon Ke Vekas men Vadyon KaYogadan** - Indrani Chakravarti
- **Musical Instruments** Carl Geiringer
- **Msical Instruments in Indian Scupture** -G.H. Tarlekar & J. NaliniTarlekar

Reference books Theatre-

- **The Theatre: An Introduction** , By Oscar G. Brockett.
- **Play Production** , By Henning Nelms,
- **Rangabhoomi Kaipidi**. By N.S. Venkataram
- **Scenic Design and Stage Lighting**. by Seldon and Sellman.
- **Costume in Theatre**. By James Laver.
- **Stage Make-up**. By Richard Carson.



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Syllabus - Semester Sixth

ARTS, AESTHETIC & SOCIETY

Course Code: PAR2651

Credit Units: 03

Course Objectives:

- To advance the knowledge and skill level of the Performing Arts.
- To provide a platform to practically experiment and exhibit the learning of the Performing Arts.
- To provide a deeper knowledge and skill of the Dance , Music and Theatre.
- To provide a learning framework.

Course Contents:

Module-I: Dance

Theory-

- Detailed study of Nritya, Natya and Nritya.
- Rasa and Bhava and their importance in Kathak Dance
- Detailed study of Kathak Dance by following the sequence of Dance.
- Detailed study of Folk and Classical Dance and their comparison.
- Brief study of Thumari and Bhajan in Dance.
- Essay on:- Importance of Dance in Human life , Dance and Nature

Practical-

- One advance Tatkar variety with atleast ten variations. Ekgun, Dugun, Chaugun of Tatkar in Ektaal, Four Tukras, three Parans, Two Chakkardhar, Amad, Thehai and Kavita in any of Teental. Ability to play Harmonium and Theka of Teen Tal. Ability to write notation and Padhant on hands of the above mentioned Taals.
- Practical demonstration of any Taal of your choice.
- Practical demonstration of Teen Taal.

Module-II: Science of Music

Theory-

- Vibration And Frequency, Pitch And Its Relation With vibrator, Vocal And Instrumental Range Of Sound, Amplitude, Timbre, Qualities Of Musical And Unmusical Overtones (Swayambhu Swara), Echo, Reverberation And Resonance Of Sound.
- Concept of Aesthetics in Music (By Indian and Western scholars)
- Contribution of Scholars In Indian Music.

Prominent Gharanas of Dhrupad and Khyal –

Origin And Development of Gharanas In Hindustani Vocal Music. Four Banis of Dhrupad. Study of Popular Gharanas of Dhrupad. Study of Popular Gharanas of Khyal. Merits And Demerits of Gharanas System.



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Practical-

Preparing for performance - Individual and group

- Classical music
- Created music – Based on emotions, topics and themes
- Practical Knowledge of Critical and Comparative analysis of Ragas and Talas of the Prescribed Course.
- Ragas :Desh, Aasavari , Malkauns .
- Talas :Jhaptal, Rupak, Addha with Thah, Dugun, Tigun and Chaugun
- Layakari, Vilambit Khyal in any one of the Prescribe Ragas.Drut Khyal in all the Ragas with Aalap and Taan.
- Light Music

Module-III: Instrumental Music

Theory-

- Brief description of four eminent instrumentalists (present or recent past).
- Non-detail terms: Names of 10 Pranas, AadiLaya (Only in Dadra and Keharwa),
- Lehra (Nagma), Paran, Uthan, Chakkardar Tukda, Dumdar and Bedum Tihai, Gat,Padhant,
- Detailed topics: Origin and development of Tabla, Basic 10 Varnas (Syllables) of Tabla,
- Writing in Taal notation, Thekas, in Thah, Dugun,
- Tigun and Chaugun, of all Taals .
- Names of different parts (components) of the Tabla with the help of a simple sketch. Tuning of the instrument.

Practical-

- Technique of producing bols on Tabla like Tirkit, Kran, etc.
- Development of following Taals: Teental , uthan, , new kaydas and its paltas with tihai, Rela, Chakardaar Tukda, Damdar and Bedam Tihai, Roopak , Tihai, Sooltaal ,Tihai, Teevra Taal , Paran, Deepchandi Taal, Tilwada Taal (only Theka).
- Guitar lesson -6
- Table lesson -6

Module-IV: Theatre

Theory-

- The Art and Craft of Acting –The Physical Actor and the Emotional Actor.
- Natyashastra : Angika Abhinaya, Vachika Abhinaya, Aaharya Abhinaya and Satvika Abhinaya.
- Tools and Training of an Actor: Physical : Body and Voice, Psychological – Intellect and Emotional.
- Learning Various Subjects Through Theatre.
- Significance Of Fairy Tales, Moral Stories, Allegories
- And Inspirational Stories

Practical-

- A Full Length Play Performed By The Students And Directed By The Faculty Or Guest Faculty.
- Theatre As A Community Event.
- Theatre For Development.
- A Project Report Based On Working With any Community


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Module-V: Workshop / Project

- Dance – Workshop / Project
- Music- Workshop / Project
- Theatre- Workshop / Project
- Rehearsals towards class room performance of Dance , Music and Theatre

Examination Scheme:

Continuous Assessment /Internal Assessment					End Term Examination	
Components	Class Test	Home Assignment	Class Performance + Project	Attendance	Theory	Practical
Weightage(%)	10	5	10	5	35	35

Recommended Books

Reference books Kathak-

- **Kathak Nritya Shiksha** part - 2 – Dr. Vidya Nidhi
- **Kathak Darpan** -. T.R. Azad
- **Kathak Shingar** - . T.R. Azad
- **Kathak Nritya (Part 1&2)** – Dr. Vidhi Naggar

Reference books Music-

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Reference books Theatre-

- **The Theatre: An Introduction** , By Oscar G. Brockett.
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PHYSICAL EDUCATION & SPORTS MANAGEMENT

Programme Structure

Course Code	Course Title	Lecture (L) Hours Per Week	Tutorial (T) Hours Per Week	Practical (P) Hours Per Week	Total Credits
PED2151	Health Education and Sports Science	2	-	2	3
PED2251	Human Anatomy and Exercise	2	-	2	3
PED2351	Sports Training and Conditioning	2	-	2	3
PED2451	Basics of Sports Management	2	-	2	3
PED2551	Sports Psychology	2	-	2	3
PED2651	Sports Medicine	2	-	2	3
	TOTAL				18



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PHYSICAL EDUCATION & SPORTS MANAGEMENT

Syllabus - Semester First

HEALTH EDUCATION AND SPORTS

Course Code: PED2151

Credit Units: 03

Course Objective: - The aim of the course is to teach students about the rules for the preservation and development of their physical, mental and emotional health, which will be help to improve the standard of health and fitness status of the individual/community/society.

Part-A

Module I: Health Education

- 1.1. Introduction of Health Education
- 1.2. Safety and Security (Hygiene and Precaution)
- 1.3. Individual and Family Health
- 1.4. Food and Nutrition

Module-II Physical Fitness and Wellness

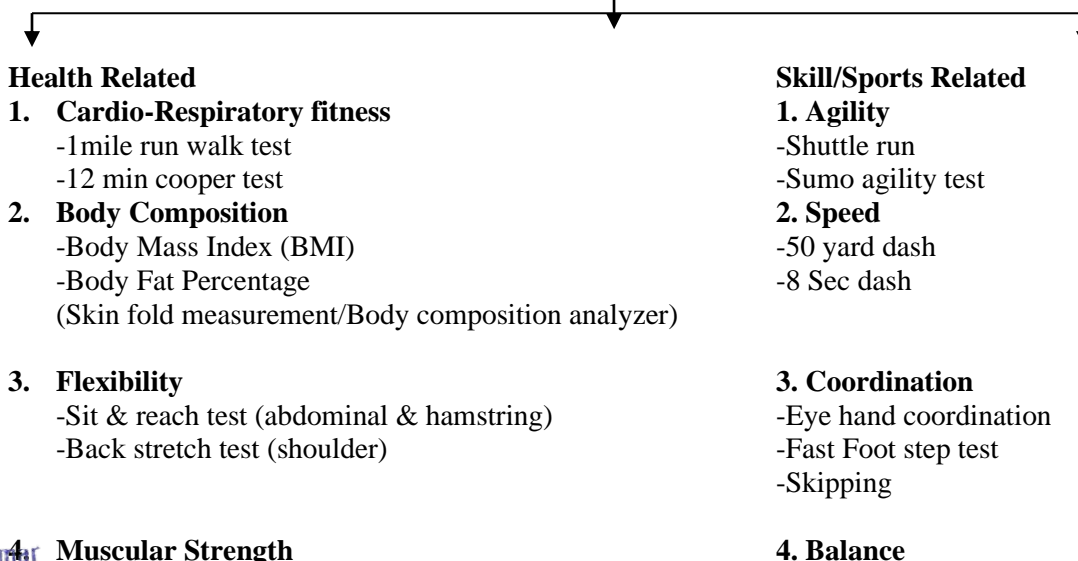
- 2.1. Meaning and Definition of Physical fitness and wellness
- 2.2. Types of Physical Fitness and Wellness
- 2.3. Importance of Physical fitness and Wellness
- 2.4. Healthy diet schedule (Pre-Match-Post)

Module-III Human Posture

- 4.1 What is a good Posture
- 4.2. Posture deformities
- 4.3. Types of Posture deformity
- 4.4. Remedies of Posture deformities by exercise and Yoga

Part-B

Fitness Assessment (Practical)



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- Pull ups or pushups with weight (boys)
- Flex arm hang (girls)
- Grip Strength Test
- Bench press

- Static Balance Test
- Dynamic Balance Test

5. Muscular Endurance

- Sit-ups
- Pull ups and push ups

5. Power

- Standing Broad Jump

6. Reaction Time

- Nelson Scale test

Fundamental Skills of Game/Sport

Basketball

- ❖ History, Rule and Regulation of Sports
- ❖ Basic and Specific Skills
- ❖ Techniques and Tactics

Examination Scheme:

Components	FA	CA	CP	A	EE
Weightage	10	10	5	5	70

Internal Assessment: 30

{FA=Fitness Assessment (10 Marks), CA=Competition Assignment (10Marks), CP=Class Presentation (5Marks), A=Attendance (5Marks)}

External Assessment: 70

Part-A: Theory = 35

Part-B: Practical Examination = 35

- (1) General Fitness Test (5 marks)
- (2) Sports Specific Test (10 Marks)
- (3) Project File (10 Marks)
- (4) Viva (10 Marks)



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Syllabus - Semester Second

HUMAN ANATOMY AND EXERCISE

Course Code: PED2251

Credit Units: 03

Course Objective: - The aim of the course is to provide the knowledge of cell, tissues, organs and systems, microscopic structure of cell, Human body and their internal system and the effect of sports or exercise on their system.

Part –A

Module -I Introduction of Various Human Systems

- 1.1. Meaning and concept of anatomy, need and importance of anatomy for the athlete/non-athlete
- 1.2. Brief introduction of various systems cell, tissues, organs and systems, microscopic structure of cell,

Module -II Effect of Exercise on various systems

- 1.1. Muscular System, Cardio-vascular system, Respiratory system, Nervous system, Reproductive system, Urinary system, Digestive system)

Module-III Fatigue

- 3.1. Concept, cause and systems of fatigue
- 3.2. Remedial measure to overcome fatigue
- 3.3. Importance of Warming-up in sports
- 3.4. Importance of Limber down in sports

Part-B

Fitness Assessment (Practical)

Health Related

1. Cardio-Respiratory fitness

- 1 mile run walk test
- 12 min cooper test

2. Body Composition

- Body Mass Index (BMI)
- Body Fat Percentage
- (Skin fold measurement/Body composition analyzer)

3. Flexibility

- Sit & reach test (abdominal & hamstring)
- Back stretch test (shoulder)

4. Muscular Strength

- Pull ups or pushups with weight (boys)
- Flex arm hang (girls)
- Grip Strength Test
- Bench press

Skill/Sports Related

1. Agility

- Shuttle run
- Sumo agility test

2. Speed

- 50 yard dash
- 8 Sec dash

3. Coordination

- Eye hand coordination
- Fast Foot step test
- Skipping

4. Balance

- Static Balance Test
- Dynamic Balance Test


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5. Muscular Endurance

Sit-ups
Pull ups and push ups

5. Power

-Standing Broad Jump

6. Reaction Time

-Nelson Scale test

Fundamental Skills of Game/Sport

Football

- ❖ History, Rule and Regulation
- ❖ Basic and Specific Skills
- ❖ Techniques and Tactics

Examination Scheme:

Components	FA	CA	CP	A	EE
Weightage	10	10	5	5	70

Internal Assessment: 30

{FA=Fitness Assessment (10 Marks), CA=Competition Assignment (10Marks), CP=Class Presentation (5Marks), A=Attendance (5Marks)}

External Assessment: 70

Part-A: Theory = 35

Part-B: Practical Examination = 35

- (1) General Fitness Test (5 marks)
- (2) Sports Specific Test (10 Marks)
- (3) Project File (10 Marks)
- (4) Viva (10 Marks)



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Syllabus - Semester Third

SPORTS TRAINING AND CONDITIONING

Course Code: PED2351

Credit Units: 03

Course Objective: - The aim of the course to provide the scientific knowledge of sports training and conditioning which help to the athlete or non athlete for develop their physical efficiency and performance.

Part-A

Module-I Introduction

- 1.1. Introduction of Sports Training
- 1.2. Meaning and Definition of Sports Training
- 1.3. Principle of Sports Training
- 1.4. Significance of Sports Training

Module-II Motor Components

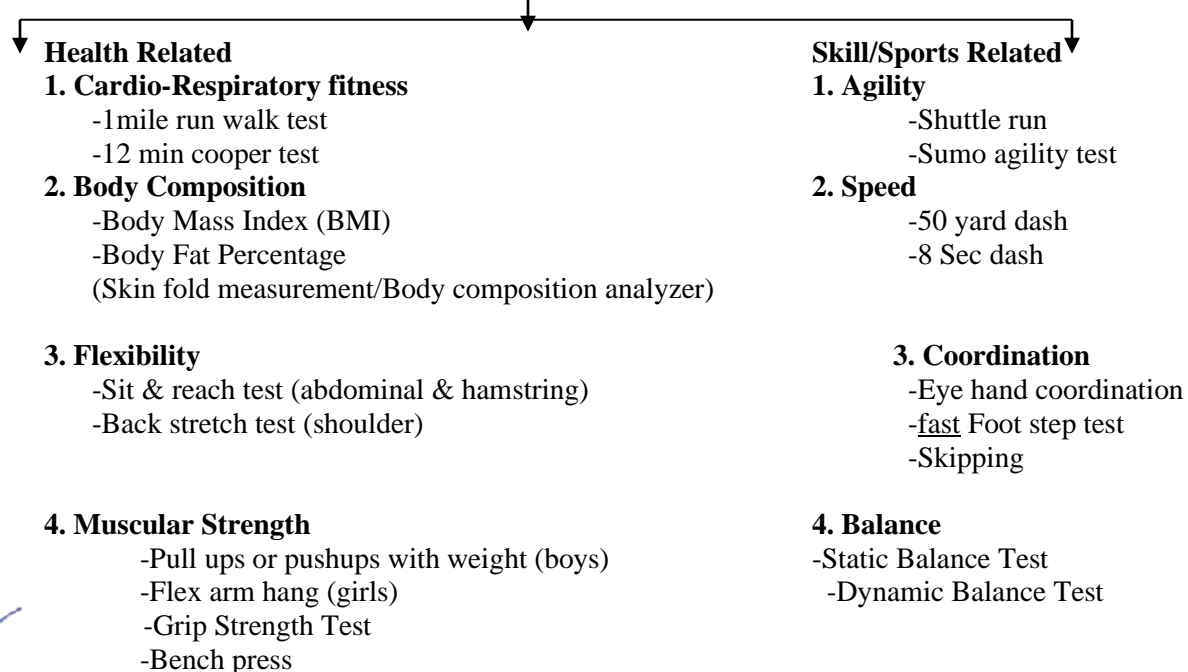
- 2.1. Introduction
- 2.2. Speed
- 2.3. Strength
- 2.4. Endurance
- 2.5. Flexibility and Coordination

Module-III Methods to develop various motor components

- 3.1. Development of Speed
- 3.2. Development of Strength
- 3.3. Development of Endurance.
- 3.4. Development of Flexibility and Coordination.

Part-B

Fitness Assessment (Practical)



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5. Muscular Endurance

Sit-ups
Pull ups and push ups

5. Power

-Standing Broad Jump

6. Reaction Time

-Nelson Scale test

b. Fundamental Skills of Game/Sport

Athletics

- ❖ History, Rule and Regulation
- ❖ Basic and Specific Skills
- ❖ Techniques and Tactics

Examination Scheme:

Components	FA	CA	CP	A	EE
Weightage	10	10	5	5	70

Internal Assessment: 30

{FA=Fitness Assessment (10 Marks), CA=Competition Assignment (10Marks), CP=Class Presentation (5Marks), A=Attendance (5Marks)}

External Assessment: 70

Part-A: Theory = 35

Part-B: Practical Examination = 35

- (1) General Fitness Test (5 marks)
- (2) Sports Specific Test (10 Marks)
- (3) Project File (10 Marks)
- (4) Viva (10 Marks)



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Syllabus - Semester Fourth

BASICS OF SPORTS MANAGEMENT

Course Code: PED2451

Credit Units: 03

Course Objective: - The aim of this course is to provide the management and organizational skill to the students for organizes any sports/competition or events by giving the practical assignments.

Part -A

Module-I Sports management and planning in sports

- 1.1 Brief introduction of Sports Management
- 1.2 Management of Intramural and extramural competition
- 1.3. Types of Planning
- 1.4. Principle of planning
- 1.5. Importance of Effective Planning

Module-II Controlling

- 2.1. Introduction of Controlling
- 2.2. Definition and Nature of Controlling
- 2.3. Steps of Controlling
- 2.4 Principle of Effective Control
- 2.5. Importance of Controlling in Physical Education and Sports

Module-III Budgeting and Stocking in Sports

- 2.1. Introduction
- 2.2. Definition of Budget and Stocking
- 2.3. Principles of Effective Budget
- 2.4. Steps in Constructing/ Preparation of Budget in Physical Education and Sports
- 2.5. Presentation of Budget Maintenance of Stocks
- 2.6. Financial Management

Part-B

Fitness Assessment (Practical)

Health Related

1. Cardio-Respiratory fitness

- 1 mile run walk test
- 12 min cooper test

2. Body Composition

- Body Mass Index (BMI)
- Body Fat Percentage
- (Skin fold measurement/Body composition analyzer)

3. Flexibility

- Sit & reach test (abdominal & hamstring)
- Back stretch test (shoulder)

4. Muscular Strength

- Pull ups or pushups with weight (boys)
- Flex arm hang (girls)

Skill/Sports Related

1. Agility

- Shuttle run
- Sumo agility test

2. Speed

- 50 yard dash
- 8 Sec dash

3. Coordination

- Eye hand coordination
- fast Foot step test
- Skipping

4. Balance

- Static Balance Test
- Dynamic Balance Test


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-Grip Strength Test
-Bench press

5. Muscular Endurance

Sit-ups
Pull ups and push ups

5. Power

-Standing Broad Jump

6. Reaction Time

-Nelson Scale test

Fundamental Skills of Game/Sport

Volleyball & Throw Ball

- ❖ History, Rule and Regulation of
- ❖ Basic and Specific Skills
- ❖ Techniques and Tactics

Examination Scheme:

Components	FA	CA	CP	A	EE
Weightage	10	10	5	5	70

Internal Assessment: 30

{FA=Fitness Assessment (10 Marks), CA=Competition Assignment (10Marks), CP=Class Presentation (5Marks), A=Attendance (5Marks)}

External Assessment: 70

Part-A: Theory = 35

Part-B: Practical Examination = 35

- (1) General Fitness Test (5 marks)
- (2) Sports Specific Test (10 Marks)
- (3) Project File (10 Marks)
- (4) Viva (10 Marks)



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Syllabus - Semester Fifth

SPORTS PSYCHOLOGY

Course Code: PED2551

Credit Units: 03

Course objective: - The objective of this course is to facilitate the understanding of how psychological factors influence involvement and performance in sports setting. The course will explore such topics as Achievement motivation, Goal setting in sports.

Part-A

Module-I Introduction of Sports Psychology

- 1.1. Meaning, nature and scope of Sports Psychology in Physical Education and Sports
- 1.2. Importance of Sports Psychology in Physical Education and Sports

Module-II Achievement Motivation

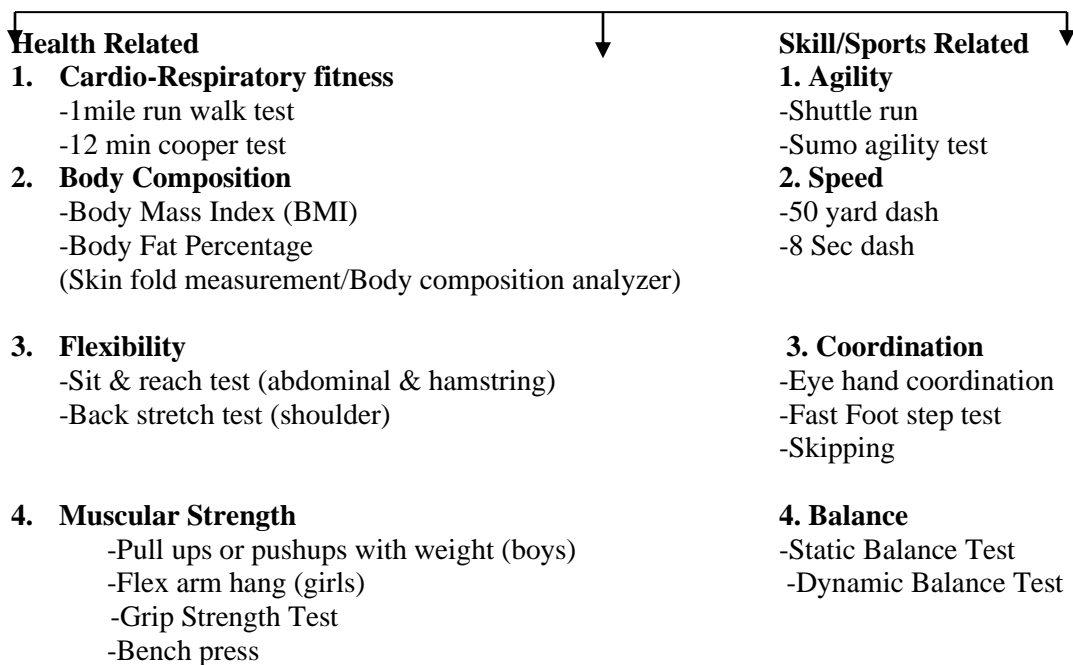
- 2.1. Meaning and definition of achievement motivation
- 2.2. Types of Motivation
- 2.3. Significance of achievement motivation in the field of Physical Education and Sports

Module-III Goal Setting

- 3.1. Introduction
- 3.2. Types of Goal Setting
- 3.3. Significance of Goal Setting in the field of Physical Education and Sports

Part-B

Fitness Assessment (Practical)




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5. Muscular Endurance

Sit-ups
Pull ups and push ups

5. Power

-Standing Broad Jump

6. Reaction Time

-Nelson Scale test

1. Fundamental Skills of Game/Sport

Cricket

- ❖ History, Rule and Regulation of
- ❖ Basic and Specific Skills
- ❖ Techniques and Tactics

Examination Scheme:

Components	FA	CA	CP	A	EE
Weightage	10	10	5	5	70

Internal Assessment: 30

{FA=Fitness Assessment (10 Marks), CA=Competition Assignment (10Marks), CP=Class Presentation (5Marks), A=Attendance (5Marks)}

External Assessment: 70

Part-A: Theory = 35

Part-B: Practical Examination = 35

- (1) General Fitness Test (5 marks)
- (2) Sports Specific Test (10 Marks)
- (3) Project File (10 Marks)
- (4) Viva (10 Marks)



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Syllabus - Semester Sixth

SPORTS MEDICINE

Course Code: PED2651

Credit Units: 03

Course objective: - The aim of the course is to provide scientific knowledge of sports medicine, care of sports injuries, rehabilitation process and prevention of drugs in sports. This course also enhance the visibility of athletes by provide the comprehensive, diverse and educational experience in the field of sports medicine.

Part-A

Module –I First-Aids

- 1.1. Basic of First-Aids
- 1.2. Preparing to respond to a health emergency –location and availability to your sports arena
- 1.3. Preparing to respond to a health emergency –location and availability to your work place

Module –II Sports Injuries & Rehabilitation

- 2.1. Introduction
- 2.2. Types of Sports Injuries
- 2.3. Cause of Sports Injuries
- 2.4. Rehabilitation of Sports Injuries
 - Prevention and Management of Sports injuries by therapeutic modalities and Massage

Module –III Drug Abuse in Sports

- 3.1. Introduction
- 3.2. Meaning and Definition of Doping
- 3.3. Classification of Doping
- 3.4. Doping Method
- 3.5. The prevention of Doping in Sports

Part-B

Fitness Assessment (Practical)

Health Related

1. Cardio-Respiratory fitness

- 1 mile run walk test
- 12 min cooper test

2. Body Composition

- Body Mass Index (BMI)
- Body Fat Percentage
- (Skin fold measurement/Body composition analyzer)

3. Flexibility

- Sit & reach test (abdominal & hamstring)
- Back stretch test (shoulder)

4. Muscular Strength

- Pull ups or pushups with weight (boys)

Skill/Sports Related

1. Agility

- Shuttle run
- Sumo agility test

2. Speed

- 50 yard dash
- 8 Sec dash

3. Coordination

- Eye hand coordination
- ~~fast~~ Foot step test
- Skipping

4. Balance

- Static Balance Test


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-Flex arm hang (girls)
Test

-Grip Strength Test
-Bench press

5. Muscular Endurance

Sit-ups
Pull ups and push ups

-Dynamic Balance

5. Power

-Standing Broad Jump

6. Reaction Time

-Nelson Scale test

Fundamental Skills of Game/Sport

Racquet Sports

- ❖ History, Rule and Regulation of
- ❖ Basic and Specific Skills
- ❖ Techniques and Tactics

Examination Scheme:

Components	FA	CA	CP	A	EE
Weightage	10	10	5	5	70

Internal Assessment: 30

{FA=Fitness Assessment (10 Marks), CA=Competition Assignment (10Marks), CP=Class Presentation (5Marks), A=Attendance (5Marks)}

External Assessment: 70

Part-A: Theory = 35

Part-B: Practical Examination = 35

- (1) General Fitness Test (5 marks)
- (2) Sports Specific Test (10 Marks)
- (3) Project File (10 Marks)
- (4) Viva (10 Marks)



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POLITICAL STUDIES

Programme Structure

Course Code	Course Title	Lecture (L) Hours Per Week	Tutorial (T) Hours Per Week	Practical (P) Hours Per Week	Total Credits
POL2151	Indian National Movement	3	-	-	3
POL2251	Indian State and Politics after Independence	3	-	-	3
POL2351	State Politics in India	3	-	-	3
POL2451	Politics and Media	3	-	-	3
POL2551	South Asia: Political Perspectives	3	-	-	3
POL2651	Post-Cold War World Politics	3	-	-	3
	TOTAL				18



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POLITICAL STUDIES

Syllabus - Semester First

INDIAN NATIONAL MOVEMENT

Course Code: POL2151

Credit Units: 03

Course Objectives:

The course will seek to provide the student with a basic yet meaningful understanding of the political scenario that led to the struggle for India's independence. It would endeavour to cover the entire duration of the growth of nationalism in India till the attainment of independence in 1947.

Course Contents

Module-I: Emergence of nationalism in India

Agrarian Society and Peasant Discontent, The New Middle Class and the Emergence of Nationalism, Foundation of the Indian National Congress, The moderate Congress: objectives and methods

Module-II: Early Nationalism: Discontent and Dissension

The Moderates and Economic Nationalism, Hindu Revivalism and Politics, Muslim Politics and the Foundation of the Muslim League

Module-III: Roots of extremism

The Swadeshi Movement in Bengal- 1905-1908, Extremism in other provinces, Repression, conciliation, and divide and rule, War and Indian politics, Bhagat Singh, Surya Sen and the Revolutionary Terrorists

Module-IV: The Age of Gandhian Politics

Limited Self Government, 1909-1919, The Arrival of Mahatma Gandhi, Champaran, Kheda, Ahmedabad, Khilafat and Non-Cooperation Movements, Civil Disobedience Movement, The Rowlatt Satyagraha, The Act of 1935 and the Princely States

Module-V: Independence and Partition

Simla Conference, The Cabinet Mission, Quit India Movement, The turbulent forties, The Mountbatten Plan, Freedom and Partition, Communal holocaust and peasant rebellion, Post-Partition violence, Impact of violence on politics of India and Pakistan, Integration of States

Examination Scheme

Components	A	P	A/TP	CT	EE
Weightage (%)	5	10	5	10	70

(A : Attendance ; P : Presentation ; A/TP : Assignment/Term Paper ; CT : Class Test ; EE : External Examination)


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Text and References

Text:

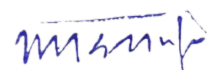
Benedict Anderson, *Imagined Communities: Reflections on the Origin and Spread of Nationalism*, 1983
Shekhar Bandyopadhyay, *From Plassey to Partition: A History of Modern India*, 2004
Bipan Chandra, Mridula Mukherjee, Aditya Mukherjee, K N Panicker and Sucheta Mahajan, *India's Struggle for Independence*, 1989
Sumit Sarkar, *Modern India 1885-1947*, 1983

References:

Partha Chatterjee, *The Nation and its Fragments: Colonial and Post-colonial histories*, 1993
Ashish Nandy, *The Illegitimacy of Nationalism: Rabindranath Tagore and the Politics of the Self*, 1994
C A Bayly, *Origins of Nationality in South Asia: Patriotism and Ethical Government in the Making of Modern India*, 1998
Tapan Raychaudhuri, "Indian Nationalism as Animal Politics", *The Historical Journal* 22(3): 747-63, 1979
Ayesha Jalal and Sugata Bose, "Exploding Communalism: The Politics of Muslim Identity in South Asia", in *Nationalism, Democracy, and Development: State and Politics in India*, 1997
Ranajit Guha, *Subaltern Studies: Writings on South Asian History and Society*, Volume I, 1982
Gyan Prakash, *Another Reason: Science and the Imagination of Modern India*, 1992
M K Gandhi, *Hind Swaraj and Other Writings*, 1997



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Syllabus - Semester Second

INDIAN STATE AND POLITICS AFTER INDEPENDENCE

Course Code: POL2251

Credit Units: 03

Course Objectives:

To provide the student with a comprehensive background of the political scenario as it developed after independence in 1947. To understand processes that shaped independent India such as the Constitution of India, the Executive and the Legislature, electoral politics and political parties, federalism and the federal structure, communalism and communal politics, linguistic movements etc.

Course Contents:

Module-I: The Indian Constitution

Making of India's Constitution: Perspectives from the Constituent Assembly, Indian Constitution: Features, Socio-economic basis and philosophy and the Preamble, Major Amendments: Trends and rationale

Module-II: Fundamental Rights and Directive Principles

Fundamental Rights, Directive Principles of State Policy

Module-III: Organs of the Government

The Union Executive: the President, Prime Minister, Cabinet, Governor, Parliamentary form of government: The Lok Sabha and the Rajya Sabha, Supreme Court: Judicial Review and Judicial Activism

Module-IV: Federalism in India

Nature of Indian Federalism, Centre-State relations, Issues of state autonomy, Panchayati Raj and Urban Local Bodies

Module-V: Political Parties and Electoral Processes

Political Parties and Pressure Groups, Election Commission, Electoral Reforms

Module-VI: Major Issues in Indian Politics

Caste, religion, language, region, Problems of illiteracy, regional imbalance, environmental degradation, and poverty alleviation, Development strategy and liberalization

Examination Scheme

Components	A	P	A/TP	CT	EE
Weightage (%)	5	10	5	10	70

(A : Attendance ; P : Presentation ; A/TP : Assignment/Term Paper ; CT : Class Test ; EE : External Examination)


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Text and References

Text:

Jayal, Neerja Gopal and Pratap Bhanu Mehta. 2011. *The Oxford Companion to Politics in India* (Student Edition). New Delhi: Oxford University Press.

Basu, D. 2013. *Introduction to the Constitution of India*. New Delhi: Lexis Nexis.

Kohli, A. 2001. *The Success of India's Democracy*. New Delhi: Cambridge University Press.

Brass, P. 1994. *Politics in India Since Independence*. New Delhi: Cambridge University Press.

References:

Kothari, R. 1970. *Politics in India*. New Delhi: Orient Blackswan.

Kohli, A. 1988. *India's Democracy*. New Delhi: Orient Longman.

Bhambri, C P. 1998. *The Indian State: Fifty Years*. New Delhi: Shipra.

Kashyap, S C. 1992. *Our Parliament*. New Delhi: National Book Trust.

Kothari, R. 1967. *Party System and Election Studies*. Bombay: Asia Publishing House.

Chanda, A. 1965. *Federalism in India: A Study of Union-State Relations*. London: George Allen and Unwin.

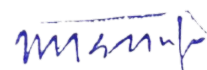
Austin, G. 1979. 'The Constituent Assembly: Microcosm in Action', in *The Indian Constitution: Cornerstone of a Nation*. New Delhi: Oxford University Press.

Chaube, S.K. 1973. *Constituent Assembly of India*. Delhi: People's Publishing House.

Austin, G. 2000. 'The Social Revolution and the First Amendment', in *Working a Democratic Constitution*. New Delhi: Oxford University Press.



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Syllabus - Semester Third

STATE POLITICS IN INDIA

Course Code: POL2351

Credit Units: 03

Course Objectives:

The course will seek to define historical legacies and current themes in the development of politics in the states of India. It would provide the student within-depth understanding of the democratic processes in practice in various states and encourage them to understand the politics of states better. A study of politics and political processes in states also pertains to the exigencies of coalition politics at the centre.

Course Contents :

Module-I : Regions and Regionalism

Regional cultures in Indian Civilization ; States Reorganization Commission ; Integration and ethnic conflict ; Movements for state autonomy : Jharkhand and Uttarakhand

Module-II : Political Parties and Electoral Politics in the States

Congress Party in Uttar Pradesh ; BJP's expansion and coalition strategies ; Regionalization of Indian Politics ; Telugu Desam Party in Andhra Pradesh ; Changing Nature of Tamil Nadu ; Asom Gana Parishad in Assam ; Politics of the left in West Bengal

Module-III : Social Movements and Politics in the States

Decline of Backward Caste Politics in North India ; Bahujan Samaj Party and Subaltern Mobilization in Uttar Pradesh ; Ethnic Minorities in Majoritarian Indian Polity

Module-IV: Economic Reforms and Indian Politics

India's federal economy ; Globalization and State Disparities in India ; India's special economic zones : protest politics and growth patterns ; Reforms and economic growth in Indian states

Examination Scheme

Components	A	P	A/TP	CT	EE
Weightage (%)	5	10	5	10	70

(A : Attendance ; P : Presentation ; A/TP : Assignment/Term Paper ; CT : Class Test ; EE : External Examination)

Texts and References

Texts :

Pai, Sudha. 2013. *Handbook of Politics in Indian States : Regions, Parties and Electoral Reforms*. New Delhi : Oxford University Press.

Narain, Iqbal. 1976. *State Politics in India*. Meerut : Meenakshi Prakashan.

Weiner, Myron. 1968. *State Politics in India*. Princeton : Princeton University Press.

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References :

Jenkins, Rob. 2004. *Regional Reflections : Comparing Politics across India's States*. New Delhi : Oxford University Press.

Yadav, Yogendra. 2000. 'Understanding the Second Democratic Upsurge: Trends of Bahujan Participation in Electoral Politics in the 1990s', in Francine R. Frankel, Zoya Hasan, Rajeev Bhargava and Balveer Arora (eds.), *Transforming India*. New Delhi : Oxford University Press.

Yadav, Yogendra and Suhas Palshikar. 2003. 'From Hegemony to Convergence: Party System and Electoral Politics in the Indian States – 1952-2002'. *Journal of the Indian School of Political Economy*, January-June.



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Syllabus - Semester Fourth

POLITICS AND MEDIA

Course Code: POL2451

Credit Units: 03

Course Objectives:

To provide students with an overarching perspective on the various processes at play in the manner in which the media – print and visual – transform into vehicles of politics. The course will, through exploration of several case studies pertaining to various types of media, encourage the students to critically analyse media messages, both print and visual.

Course Contents :

Module-I : Theories of the mass media

Agenda Setting Theory ; Cultivation Theory ; Dependency Theory ; Hypodermic Needle Theory ; Knowledge Gap ; Media Richness Theory ; Medium Theory ; Spiral of Silence ; Two Step Flow Theory ; Uses and Gratifications Approach ; Priming ; Framing

Module-II : Print media and politics

Brief history of newspapers in India ; Growth of print media in India ; print media and Indian political parties ; democratic processes and print media

Module-III : Television news media and politics

Brief history of television media in India ; Growth of Television news media in india ; democratic politics and television media : perspectives and trends

Examination Scheme

Components	A	P	A/TP	CT	EE
Weightage (%)	5	10	5	10	70

(A : Attendance ; P : Presentation ; A/TP : Assignment/Term Paper ; CT : Class Test ; EE : External Examination)

Texts and References

Texts :

McQuail, Dennis. 2010. *McQuail's Mass Communication Theory*. New Delhi : Sage Publications.

Jeffrey, Robin. 2000. *India's Newspaper Revolution : Capitalism, Politics and the Indian Language Press, 1977-99*. New Delhi : Oxford University Press.

Mehta, Nalin. 2008. *Television in India: Satellites, Politics and Cultural Change*. New Delhi : Routledge.

References :

Sahay, Uday. 2006. *Handbook of the Media in Contemporary India*. New Delhi : Oxford University Press.

Batabyal, Somnath, Angad Chowdhry, Meenu Gaur, Matti Pohjonen. 2011. *Indian Mass Media and Politics of Change*. New Delhi : Routledge.

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Syllabus - Semester Fifth

SOUTH ASIA: POLITICAL PERSPECTIVES

Course Code: POL2551

Credit Units: 03

Course Objectives:

The course would attempt to inculcate understanding of the various political processes at work in South Asia, particularly states like Pakistan, Bangladesh, Sri Lanka and Nepal. It will supplement the South Asia unit from the core paper on post-colonial states and their development after independence. This course will focus primarily on two countries in South Asia – Pakistan and Sri Lanka.

Course Contents :

Module-I : Institutions and Political Processes in South Asia

Development of post-colonial institutions ; historical development and current debates in democracy in South Asia ; role of military in post-colonial societies in South Asia

Module-II : State and Polity in Pakistan

Democracy and electoral process ; Islamization and cultural change ; the army and its role in political process ; Pakistan's foreign policy ; issues of internal security and terrorism

Module-III : State and Polity in Sri Lanka

Democratic institutions and their functioning ; role of the military ; the Tamil issue ; internal security and terrorism ; Sri Lanka's foreign policy

Examination Scheme

Components	A	P	A/TP	CT	EE
Weightage (%)	5	10	5	10	70

(A : Attendance ; P : Presentation ; A/TP : Assignment/Term Paper ; CT : Class Test ; EE : External Examination)

Texts and References

Texts :

Brass, Paul R. 2010. *Routledge Handbook Of South Asian Politics: India, Pakistan, Bangladesh, Sri Lanka, And Nepal*. USA : Routledge.

Reference :

Newman, Edward, Itty Abraham, and Meredith L. Weiss. 2010. *Political Violence in South and Southeast Asia: Critical Perspectives*. UNU Press.



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Syllabus - Semester Sixth

POST-COLD WAR WORLD POLITICS

Course Code: POL2651

Credit Units: 03

Course Objectives:

To provide a theoretical understanding of politics as it developed in the post-Cold War scenario particularly with regard to the politics of the United States of America vis-a-vis the rest of the world, the shifting of the power blocks, and the growth of anti-American sentiment in certain parts of the world. The course would also encourage students to read contemporary literature on emerging international political scenarios.

Course Contents :

Module-I : Overview of the post-Cold War decade

Historical background of US foreign policy ; US relations with EU ; brief history of US interventions in West Asia, South East Asia and the Middle East

Module-II : Post-Cold War American Politics

Key institutional players ; lobbies and their importance in American politics ; media and public opinion in US ; America's position in a globalized economy

Module-III : America and the Arab/Muslim World

Historical development of politics of the Arab/Muslim world ; why the Arabs/Muslims hate America? US intervention and international war against terrorism

Examination Scheme

Components	A	P	A/TP	CT	EE
Weightage (%)	5	10	5	10	70


(A : Attendance ; P : Presentation ; A/TP : Assignment/Term Paper ; CT : Class Test ; EE : External Examination)

Texts and References

Texts :

Cameron, Fraser. 2002. *US Foreign Policy after the Cold War: Global Hegemon or Reluctant Sheriff?* London: Routledge.

Jentleson, Bruce W. 2000. *American Foreign Policy: The Dynamics of Choice in the 21st Century*. W.W. Norton & Company.


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References :

Antizzo, Glenn J. 2010. *U.S. Military Intervention in the Post-Cold War Era : How to Win America's Wars in the Twenty-first Century*. LSU Press.

Lewis, Bernard. 1990. "The Roots of Muslim Rage". *The Atlantic Online*, September. Details available at <http://www.theatlantic.com/past/issues/90sep/rage.htm>.

Mamdani, Mahmood. 2004. "Introduction: Modernity and Violence". *Good Muslim, Bad Muslim: Islam, the USA, and the Global War against Terror*. New Delhi: Permanent Black.

Huntington, Samuel P. 1993. "The Clash of Civilizations?" *Foreign Affairs* 72 (3) Summer: 22. Details available at <http://www.foreignaffairs.com/articles/48950/samuel-p-huntington/the-clash-of-civilizations>.

Said, Edward W. 2000. "The Clash of Definitions". In *Reflections on Exile and Other Essays*. Cambridge, Massachusetts: Harvard University Press.



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QUEBEC STUDIES

Programme Structure-2018

Course Code	Course Title	Lecture (L) Hours /Week	Tutorial (T) Hours /Week	Total Credits
LAN2164	Introduction to the French North America- a short history of Quebec	3	-	3
LAN2264	Quebec Society Culture and Language	3	-	3
LAN2364	Quebec in the World Affairs	3	-	3
LAN2464	Political Economy of Quebec	3	-	3
LAN2564	Introduction to Major Literary Movements in Quebec-I	3	-	3
LAN2664	Introduction to Major Literary Movements in Quebec-II	3	-	3
	TOTAL			18



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QUEBEC STUDIES

The course will be open to all the undergraduate students of AUG, especially students pursuing B.A (H) French and students learning French as FL.

Description of the Course

The **Introduction to Study of Quebec** attempts to study a society that is overwhelmingly majority francophone in an anglophone American sphere. This course will do a survey of geographical, historical, demographical, cultural, political and social developments in Québec, from the French conquest to the present. The course is intended to provide students with a broad understanding of the narrative of Quebec history and to improve their knowledge of many important issues that have defined and continue to define and redefine Quebec, including the North American Free Trade Agreement, the evolution of the Canadian constitutional debate, the reform of social programs, provincial linguistic policies, native issues, regional differences and relations between the anglophone, allophone and francophone communities (the Ottawa-Paris-Quebec triangle).

Organization of the Course

The weekly lectures (3hrs per week), learning responses, videos, clips, forum, and the weekly mandatory readings are an integral part of this course. It will also include workshop by faculty from Quebec. Movie screening and other cultural exposure will be organized in collaboration with Quebec Bureau Mumbai. The course will be spread up to two semesters.

Who can attend?

Open to all the undergraduate student of AUG. Students learning French (B.A Hons./ FL) will have additional benefit.

Why to attend?

- Quebec government has special provision of fees waiver for Indian students. The knowledge of Quebec society, its institution and education system will help students to better explore higher education opportunity and work possibility in Quebec as the knowledge of this course will add to the extra immigration point (like the knowledge of French).
- Knowing about the business prospects in Quebec will help students who wants to set up their own business or expand their reach to American continent. Quebec can be helpful to penetrate US market also as they do share lot of commonalities in business culture.



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QUEBEC STUDIES

Syllabus - Semester First

INTRODUCTION TO THE FRENCH NORTH AMERICA – A SHORT HISTORY OF QUEBEC

Course Code: LAN2164

Credit Units: 03

PERIODS IN THE HISTORY OF QUÉBEC: SOCIAL PHENOMENA

- Origins till colonization : The experience of the Indigenous peoples and the colonization attempts
- French conquest: The evolution of colonial society under French rule
- The change of empire and British North America Act

Syllabus - Semester Second

QUEBEC SOCIETY, CULTURE AND LANGUAGE

Course Code: LAN2264

Credit Units: 03

Quebec society, culture and language

- Period of Grande Noirceur/Great Darkness
- Quiet Revolution: The modernization of Québec. Official Language Act
- Contemporary Quebec: culture, arts and cinema

Syllabus - Semester Third

QUEBEC IN THE WORLD AFFAIRS

Course Code: LAN2364

Credit Units: 03

Quebec in the world affairs

- *Vive le Québec libre*: Evolution of international relations of Québec.
- The province as global player: Québec and *la Francophonie*
- Quebec-Paris-Ottawa triangle; presence of France in Quebec
- Ottawa-Quebec-Washington: presence of Quebec in United States



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Syllabus - Semester Fourth

POLITICAL ECONOMY OF QUEBEC

Course Code: LAN2464

Credit Units: 03

Political economy of Quebec

- Politics of social and economic development in Quebec
- Legal tradition, national identity and Quebec Exceptionalism
- business culture of Quebec
- Quebec vs Canadian business culture

Syllabus - Semester Fifth

INTRODUCTION TO MAJOR LITERARY MOVEMENTS IN QUEBEC-I

Course Code: LAN2564

Credit Units: 03

Introduction to major literary movements in Quebec- I

- Evolution of French language
- Early literature, 1830–60
- The literary movement of 1860
- The Montreal School, 1895–1935

Syllabus - Semester Sixth

INTRODUCTION TO MAJOR LITERARY MOVEMENTS IN QUEBEC-II

Course Code: LAN2664

Credit Units: 03

Introduction to major literary movements in Quebec-II

- World War II and the postwar period, 1935–60
- The "Quiet Revolution"
- The Quiet Revolution of French Canadian minorities
- Contemporary trends
- The cosmopolitan culture of French Canada and Quebec

Examination Scheme:

Components	CT	S	A	EE
Weightage (%)	15	10	05	70

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References: Material compiled by the department

Text book:

- Rudy, Jarrett, et al. *Quebec questions: Quebec studies for the twenty-first century*. Oxford University Press, 2010.
- Dickinson, John A., and Brian Young. *A short history of Quebec*. McGill-Queen's Press-MQUP, 2008.

Audio-visual:

- Viewing of feature film “Mon Oncle Antoine”
- Viewing of documentary film “Québec My Country Mon Pays”
- Viewing of documentary short “ The Oka Legacy ”



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SANSKRIT

Programme Structure-2019

Course Code	Course Title	Lecture (L) Hours /Week	Tutorial (T) Hours /Week	Practical (P) Hours/Week	Total Credits
SKT2151	Introduction to Sanskrit Language	3	-	-	3
SKT2251	General Introduction to Vedic Literature & Conversational Sanskrit	3	-	-	3
SKT2351	General Introduction to Sanskrit Literature & Sanskrit Conversation	3	-	-	3
SKT2451	Sanskrit Language & Indian Culture	3	-	-	3
SKT2551	Introduction to Sanskrit Linguistics	3	-	-	3
SKT2651	General Introduction to Indian Philosophy & Sanskrit Grammar	3	-	-	3
	TOTAL				18


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SANSKRIT

OBJECTIVES OF THE PROGRAM

AMITY CENTRE FOR SANSKRIT AND INDIC STUDIES under the aegis of Amity School of Liberal Arts (ASLA) offers **SANSKRIT** as of the **Open Elective Courses**. This course intends to make the learners aware of the fact that Sanskrit is the gateway of the ancient Indian wisdom and is a perennial source of inspiration for national integrity and universal brotherhood.

This course aims to improve the Reading, Writing, Speaking and Listening skills in Sanskrit learners. It also aims to enable them to appreciate different forms and genres of Sanskrit literature and to become aware of the rich intellectual tradition of India.

Note: The medium of instruction and examination for the course would be Hindi, Sanskrit and English.



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SANSKRIT

Syllabus - Semester First

INTRODUCTION TO SANSKRIT LANGUAGE

Course Code: SKT2151

Credit Units: 03

Course Objectives:

To enable the students to understand the importance and relevance of Sanskrit language and to provide the students with an insight about the mechanism of the Sanskrit language.

Course Contents:

Module-I: Introduction to Sanskrit and its importance

- An introduction to Sanskrit language
- Importance and relevance of Sanskrit language.
- Special features of Sanskrit language.

Module-II: Sanskrit Orthography

- Alphabets of Sanskrit language
- Phonetics of the Sanskrit language
- Articulation of Sanskrit Sounds : Vowels, Consonants and Semi-vowels .
- Identifying the word-endings.
- Maheshwar Sutra
Concept of Māheśvara-sūtra and Pratyāhāra, Sanskrit alphabets: places of articulation and articulatory efforts. On the basis of Laghusiddhāntakaumudī.

शब्द रूप तथा धातु रूप

शब्द रूप - देव , फल , लता , मुनि , नदी ,मति ,वरि ,साधू ,धेनु , मधु , वधू , मातृ , पितृ , कर्तृ ,आत्मन् ,

विद्वस् , जगत्।

धातु रूप - परस्मैपदी धातु - पठ् , गम् , अस् , लिख्

आत्मनेपदी धातु - सेव् , रुच् , वृत्

Module-III: Sanskrit Texts

- Reading and discussion upon the stories and about Sanskrit text Panchtantra.
- Text Reading (Grammar, Translation, Explanation), Message, Purpose of this text.

Module-IV: Verbal Form (लकार बोध)

- Tense – Present tense, Future tense ,Past tense .
- Learning, memorizing and understanding the conjugation of verbs & words and speculations of Sanskrit grammar.
- Studying purush ,vachan, karak and vibhakti and general use of them.

Module-V: Language Formation

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- Reading understanding and practicing simple sentences of the Sanskrit language from Saral Sanskrit Shikshan.
- Listing and using name of objects in Sanskrit.
- Listing of Tatsam (Sanskrit) words from Hindi.
- Enlisting sentences for general conversation.

Student Learning Outcomes:

Students who complete this course will be able to know and explain features of Sanskrit language . They will illustrate the importance of this language . They will read simple Sanskrit sentences and make similar sentences in verbal and written forms .They will also start reading and understanding the simple text from Sanskrit.

Examination Scheme :

Continuous Assessment /Internal Assessment					End Term Examination
Components	Class Test	Home Assignment	Class Performance	Attendance	EE
Weightage(%)	10	10	5	5	70

Recommended Books

Text Book

रचनानुवादकौमुदी	कपिलदेवद्विवेदी , विश्वविद्यालयप्रकाशन वाराणसी।
संस्कृत शिक्षणसरणी	आचार्यरामशास्त्री,परिमलपब्लिकेशन्स दिल्ली।
अनुवादकला अथवा वागव्यवहारदर्श	चारुदेवशास्त्री – मोतीलालबनारसीदास दिल्ली।
व्याकरणचंद्रोदय (खंड १ - ५)	चारुदेवशास्त्री ,मोतीलालबनारसीदास दिल्ली।
सरलसंस्कृतशिक्षण	भारतीय विद्याभवन नईदिल्ली
पंचतंत्र	विष्णु शर्मा
लघुसिद्धान्तकौमुदी	धरानन्द शास्त्री दिल्ली

Reference Book

संस्कृत सहचर	राधामोहन पाण्डेय स्टूडेंट्सफ्रेंड्स पटना।
सम्भाषण सन्देश	संस्कृतभारतीबेंगलुरु।
संस्कृत-हिन्दीकोश	वामन शिवरामआष्टे
प्रारंभिक संस्कृतव्याकरण	शिप्रापब्लिकेशन।।
पाणिनिशिक्षा	मोतीलालबनारसीदास।
Composition and Essay	RanjiUpadyay ,Cowkhambavidyabhava.
Higher Sanskrit Grammar	M.R.Kale,MotiLalBanarsidas,Delhi.2007

Syllabus - Semester Second

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GENERAL INTRODUCTION TO VEDIC LITERATURE & CONVERSATIONAL SANSKRIT

Course Code: SKT2251

Credit Units: 03

Course Objectives :

This course aims to get students acquainted with the history of Sanskrit literature from Vedic literature to Purāṇa. It also intends to give an outline of use of Sanskrit language and to make students aware of morals and ethics in Indian culture through Vedic texts.

Course Contents:

Module-I: Vedic Literature

- A general introduction of Vedic Samhita (Rigveda , Yajurveda , Samaveda , Atharvaveda - time subject - matter , philosophy and social life).
- A general introduction of Brahman ,Aaranyak , Upanishad , Vedanga and Purana.

Module-II: Introduction to Indian cultural Traditions

- Ancient Indian Education System
- Status of women in ancient Indian society.
- Dharm –dharmshastra

Module-III: Communicative words in Sanskrit

- Listing and using names of objects, fruits, flower and animals in Sanskrit.
- Preparing a dictionary of Sanskrit words, verbs
- Memorizing Sankhyavacaka Shabd.

Module-IV: Introductory Grammar

- Learning memorizing and understanding the Verb , Phonetics of the Sanskrit Language and speculation of Sanskrit grammar.
- An introduction to all types of सन्धि.
- Making new sentences for general conversation.
- Translation practice on various topics of daily life

Module-V: Prefixes and Suffixes

- प्रत्यय का सामान्य परिचय

कृत प्रत्यय - तव्यत्, तव्य, अनीयर्, यत्, ण्यत्, क्यप्, ण्वुल्, तृच्, अण्, क्त, क्तवत्, शत्, शानच्, तुमुन्, घञ्, अच्, क्तिन्, क्त्वा (ल्यप्), ल्युट् .

तद्धित प्रत्यय - मत्वर्थीय- मतुप्, इनि, ठन्। अपत्यार्थक- अण्, इञ्, ढक् .
भावकर्मार्थक- त्व, तल्, इमनिच्, ष्यञ्। Others तरप्, तमप्, ईयसुन्, इष्टन्, तसिल्,

Student Learning Outcomes:

Students who complete this course will be able to understand simple Sanskrit. They will Come to know about specific texts of contemporary importance will enable them to understand the salient features of Indian culture and make their firsthand viewpoint about these scriptures.

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Examination Scheme :

Continuous Assessment /Internal Assessment					End Term Examination
Components	Class Test	Home Assignment	Class Performance	Attendance	EE
Weightage(%)	10	10	5	5	70

Recommended Books


Text Book

रचनानुवादकौमुदी	कपिलदेवद्विवेदी , विश्वविद्यालयप्रकाशन वाराणसी।
वृहद अनुवाद चन्द्रिका	कपिलदेव द्विवेदी , विश्वविद्यालय प्रकाशन वाराणसी
संस्कृत शिक्षणसरणी	आचार्यरामशास्त्री,परिमलपब्लिकेशन्स दिल्ली।
अनुवादकला अथवा वाग्व्यवहारदर्श	चारुदेवशास्त्री – मोतीलालबनारसीदास दिल्ली।
व्याकरणचंद्रोदय (खंड१ - ५)	चारुदेवशास्त्री ,मोतीलालबनारसीदास दिल्ली।
सरलसंस्कृतशिक्षण	भारतीय विद्याभवन नईदिल्ली
पंचतंत्र -	भीमसेन शास्त्री
लघु सिद्धांत कौमुदी-	धरानन्द शास्त्री दिल्ली

Reference Book

संस्कृत सहचर	राधामोहन पाण्डेय स्टूडेंट्सफ्रेंड्स पटना।
सम्भाषण सन्देश	संस्कृतभारतीबेंगलुरु।
संस्कृत-हिन्दीकोश	वामन शिवरामआष्टे
प्रारंभिक संस्कृतव्याकरण	शिप्रापब्लिकेशन।।
पाणिनिशिक्षा	मोतीलालबनारसीदास।
Composition and Essay	Ranji Upadyay, Cowkhambavidyabhava.
Higher Sanskrit Grammar,	M.R. Kale, MotiLal Banarsidas, Delhi.2007

Syllabus - Semester Third


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GENERAL INTRODUCTION TO SANSKRIT LITERATURE AND SANSKRIT CONVERSATION

Course Code: SKT2351

Credit Units: 03

Course Objective:

This course aims to get the students acquainted with the outline of Sanskrit literature. It has two sections:
(i) Literature (poetry, prose and play) and
(ii) Survey of literature. In literature segment two most famous plays of Sanskrit have been introduced, which not only reflect the poetic excellence, but also depict contemporary society.

Course Contents:

Module-I: Bhagvad Gita

- Bhagavadgītā – IIInd Chapter, verses, 11, 13, 16, 18, 20, 22, 23, 24, 25 and 27.
- Gītā; Ch. 12- Text Reading (Grammar, Translation, Explanation),
- Philosophy of devotion.

Module-II: Classical Sanskrit literature : An introduction / overview

- Rāmāyaṇa Mahābhārata,
- **Bhāsa**, - **Svapnavasavadattam** Introduction, Author, Story, Unique features / Style of Bhāsa
- **Kālidāsa**, - **Abhijñānashakuntalam** Introduction, Author, story, Personification of nature, Language, and other problems related to texts.

Module-III: Oral and Written Practice in Sanskrit

- Reading prose content from the syllabus loudly with sense in dialogue mode
- Reading poetry from the syllabus loudly with proper tone and intonation
- Writing prose and poetry from the course content for practice

Module-IV: Translation in and from Sanskrit

- Translation of Hindi / English text in Sanskrit and vice versa.
- Writing short passages in Sanskrit.

Module-V: Media and Art in Sanskrit

- Magazines and Newspapers, Media – Radio, TV, Internet, blogs, important sites, Sanskrit Wikipedia (general awareness only).
- Script writing, News editing/ writing.(Sanskrit only)
- Music and Dancing in the context of नाट्यशास्त्र
Concept of Music - *Saṅgīta*,
Concept of Instrument – *Vādya*
Concept of Dance - *Nṛtya*,
Concept of Rhythm – *Tāla*,
Inter-relation among Painting, Dancing and Music
Importance of music in drama,

Note: It is expected to understand the concepts in the light of Viṣṇudharmottara Purāṇa; Part-III, Chapter 36-43, Citrasūtra; and Classical Indian Dance in Literature & The Arts, Kapila Vatsyayan, SangeetNatak Academy, New Delhi (Chapter I, pp. 5-22, Chapter V pp.333-344) only selected portions.

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Students Learning Outcome:

After completing the course the students will be able to understand the outline of Sanskrit Literature. They will be able to read, write and speak sentences in Sanskrit .They will be able to know Sanskrit Media and Indian classical- Arts.

Examination Scheme :

Continuous Assessment /Internal Assessment					End Term Examination
Components	Class Test	Home Assignment	Class Performance	Attendance	EE
Weightage(%)	10	10	5	5	70

Suggested Readings:**Text Books**

अभिज्ञानशाकुन्तलम् (कालिदास) :

श्रीमद्भगवद्गीता,
श्रीमद्भगवद्गीता
स्वप्नवासदत्तम्
भारतकालीनकलाएँ
भारतीयनाट्य ;स्वरूपऔरपरंपरा -

- सुबोधचन्द्र पंत, मोतीलाल बनारसीदास, दिल्ली.
- सुरेन्द्रदेव शास्त्री, रामायणलाल बेनीप्रसाद, इलाहाबाद.
- व्याख्याकार - मदनमोहनअग्रवाल,चौखम्बासंस्कृत प्रतिष्ठान दिल्ली।
- एस राधाकृष्णन कृत हिंदीअनुवाद ,राजपालएण्डसन्स दिल्ली।
- एम आर काले , मोतीलाल बनारसीदास नई दिल्ली।
- भारतेन्दुमिश्र ,प्रतिभाप्रकाशनदिल्ली२००४
- राधावल्लभत्रिपाठी , हरिसिंहगौरविश्वविद्यालय , सागर -१९८८

Reference Books

उपाध्याय, बलदेव

तिवारी, रमाशंकर

द्विवेदी, हजारी प्रसाद

शर्मा, उमाशङ्कर (ऋषि)

तिलक बालगंगाधर

Dikshit,Ratnamayi

Keith,A.B.

Keith,A.B.

- संस्कृत साहित्य का इतिहास, शारदा निकेतन, वाराणसी.

- वैदिक साहित्य और संस्कृति, वाराणसी.

महाकवि कालिदास, चौखम्बा विद्याभवन, वाराणसी.

कालिदास की लालित्य योजना, राजकमल प्रकाशन, दिल्ली.

संस्कृत साहित्य का इतिहास, चौखम्बा भारती अकादमी, वाराणसी, 1999.

श्रीमद्भगवद्गीतारहस्य और कर्मयोगशास्त्र ,अपोलोप्रकाशन।

Women in Sanskrit Dramas, Meherchand Lacchman Das, Delhi-6.

History of Sanskrit Literature, MLBD,Delhi.

Sanskrit Drama, Oxford University Press, London,1970.

Syllabus - Semester Four

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SANSKRIT LANGUAGE & INDIAN CULTURE

Course Code: SKT2451

Credit Units: 03

Course Objectives:

The aim of this course is to develop the inner urge of knowing of Indian culture with various aspects of the ancient Sanskrit texts , and to make students to converse in Sanskrit language.

Course Contents:

Module-I: Introduction to Sanskrit Culture

- What is Culture?
- Characteristic / Salient features of Indian Culture.
- Read and discuss Hymns of Sangathan sukta of Rigveda.
- Read and discuss Hymns of Shiv Sanklap Sukta of Yajurveda.
- Collecting remembering sentences of wisdom in Sanskrit with Hindi meaning.

Module-II: Basic Tenets of Sanskrit Culture

- Collecting 15 Sanskrit Mottos of various Institution and Government Departments, translating them into Hindi.
- Reading and discussion upon Varn system and Ashram system.
- Reading and discussion upon four purusharthas.
- Introduction to the eight types of Marriage.

Module-III: Sanskrit Text

- Niti Shatakam of Bhrtihari (10 verses of **murkh paddhti** and 10 verses of **vidwat paddhti**)

Module-IV: Introductory Grammar

- Memorizing complex conjugations and speculations of Sanskrit.
- Making and practicing sentences of Sanskrit
- Writing short notes on general topics of daily life.

Module-V: Conversing in Sanskrit

- Preparing a dictionary of Sanskrit words, verbs
- Writing and presenting interviews and description in Sanskrit.
- Translation of Unseen passage from Sanskrit into Hindi.

Student Learning Outcome:

Students who complete this course will be able to enlist the Sanskrit Mottos of various institutions. They will be able to explain the basic tenets of Sanskrit culture. They will be able to read, write and speak sentences in Sanskrit. Chanting of verses from Niti Shatak and telling their verbal meaning as well as detailed description will be ensured.

Examination Scheme :

Continuous Assessment /Internal Assessment	End Term Examination
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Components	Class Test	Home Assignment	Class Performance	Attendance	EE
Weightage(%)	10	10	5	5	70

Suggested Readings:

Text Books

रचनानुवादकौमुदी	कपिलदेव द्विवेदी , विश्वविद्यालयप्रकाशन वाराणसी।
संस्कृतशिक्षणसरणी	आचार्य रामशास्त्री,परिमलपब्लिकेशन्स दिल्ली।
वैदिकसाहित्यऔरसंस्कृति	बलदेवउपाध्याय- शारदामंदिर वाराणसी
भारतीयसंस्कृतिकाउत्थान	रामजीउपाध्याय, चौखम्बाविद्याभवन वाराणसी।
वेदोंमेंभारतीयसंस्कृति	आद्यादत्त-ठाकुर ,हिंदीसमिति लखनऊ।
मनुस्मृति	पंडित रामेश्वर भट्ट , राष्ट्रीय संस्कृत संस्थान ,नई दिल्ली
नीतिशतकम्	डॉ विष्णु दत्त शर्मा शास्त्री , ज्ञान प्रकाशन मेरठ

Reference Books

संस्कृति के चार अध्याय , दिनकररामधारीसिंह –लोकभारतीप्रकाशन इलाहाबाद।
भारतीय संस्कृति सर्वपल्ली राधाकृष्णन
धर्म समाजऔरसंस्कृति , श्रीमालीकृष्णमोहन ग्रंथशिल्पीप्राइवेट।
भारत की राष्ट्रियसंस्कृति , हुसैनएसआबिद नेशनलबुकट्रस्ट नईदिल्ली
Ancient Indian Education R.K. Mukherjee -MLBD,Delhi .
History of Sanskrit Literature- A.B.KITH (हिंदीअनुवाद- मंगलदेवशास्त्री ,मोतीलालबनारसीदासदिल्ली।

Syllabus - Semester Fifth



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INTRODUCTION TO SANSKRIT LINGUISTICS

Course Code: SKT2551

Credit Units: 03

Course Objectives:

The aim of this course is to teach students the basics of Sanskrit linguistics. This will also describe the families of languages prevalent in the world and place of Sanskrit therein, and to get acquainted with the basic rules of translation and translate the texts of Hindi and English into Sanskrit.

Course Contents:

Module-I: Introduction to linguistics.

- Introduction to linguistics and Classification of languages.

Module-II: Linguistics and Sanskrit language

- Place of Sanskrit language in the classification of languages.
- Read Special features of Sanskrit language, and reading about language family -Sanskrit and Indo – European family.

Module-III: Translation

Rules for Translation into Sanskrit from Hindi and English

- Cases and Case-endings
- Sanskrit Voices : Concept, types and rules
- Application of compounds and numeral words
- Application of suffixes

Concept of Voice, nature of active voice (*kartr-vācya*), passive voice (*karma-vācya*) and impersonal passive voice (*bhāva-vācya*), Rules of voice change and Changing voice of simple sentences specially with reference to verbal terms, *kṛtya*-suffixes & *niṣṭhā*-suffixes.

Translation from Hindi/English into Sanskrit (Translation of passages and independent sentences) .

Module-IV: Essay

- Art of Essay writing : Structure-formation like introduction, main body, conclusion etc. by the points and sub-points and uses of appropriate references.
- Traditional Essays based on the issues and topics related to the subjects like Sanskrit Language, Culture, Veda, Rāmāyaṇa, Mahābhārata, Upaniṣad, Gītā, Renowned Sanskrit Poets and their poetic excellence.
- Contemporary Essays based on the issues and topics related to the subjects like entertainment, sports, national and international affairs and problems.

Module-V: Language Formation

- Preparing a dictionary of Sanskrit words, verbs
- Collect paragraphs from texts like *Pañcatantra*, *Hitopadeśa* etc. and translate them into Hindi/English.
- Collect paragraphs from daily national newspapers and translate them into Sanskrit.

Student Learning Outcome:

After completing the course the students will be able to enlist the school of language and place of Sanskrit there in .They explain the basic rules of translation. They will be able to translate the texts of Hindi and English into Sanskrit .

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Examination Scheme :

Continuous Assessment /Internal Assessment					End Term Examination
Components	Class Test	Home Assignment	Class Performance	Attendance	EE
Weightage(%)	10	10	5	5	70

Suggested Readings:

Text Books

बृहदअनुवादचन्द्रिका चक्रधरनौटियाल, मोतीलालबनारसीदास दिल्ली।
तुलनात्मकभाषाविज्ञान भोलानाथतिवारी , मोतीलालबनारसीदास दिल्ली।
भाषाविज्ञान भोलानाथतिवारी-, किताबमहल इलाहाबाद।
भाषाविज्ञानकीभूमिका देवेन्द्रनाथशर्मा, राधाकृष्णनप्रकाशन दिल्ली।

Reference Books

संस्कृतकाभाषाशास्त्रीयअध्यय भोलानाथव्यास , चौखम्बाविद्याभवन दिल्ली।
संस्कृत निबंधशतकम्कपिलदेवद्विवेदी -,विश्वविद्यालयप्रकाशन वाराणसी।
संस्कृतका ऐतिहासिक एवं डी .डी .शर्मा, हरियाणासाहित्यअकादमीचंडीगढ़।
व्याकरणचंद्रोदय चारुदेवशास्त्री - (भाग -1,2,3)मोतीलालबनारसीदास।

Linguistic introduction to Sanskrit B.K Ghosh–, Sanskrit pustakbhandar , Kolkata.
Modern Linguistic-S.K Varma., Oxford university press Delhi .

Higher Sanskrit Grammar .Kale , MLBD, Delhi (Hindi Translation)

The Students' Guide to Sanskrit Composition, V.S Apte, Chowkhamba Sanskrit Series, Varanasi
(Hindi Translation also available)

Syllabus - Semester Sixth


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GENERAL INTRODUCTION TO INDIAN PHILOSOPHY & SANSKRIT GRAMMAR

Course Code: SKT2651

Credit Units: 03

Course Objectives:

This course aims to get the students acquainted with the basic approach to study philosophy. To enable students to form and use sentences of the Sanskrit languages and to make students aware about morals and ethics of Indian culture through Sanskrit texts.

Course Contents:

Module-I: Schools of Indian Philosophy

Salient features of Indian Philosophy, Vedic and Non-vedic Schools of Indian Philosophy and their basic doctrines as given below:-

- Sāṃkhya - prakṛti, guṇatraya&puruṣa
- Yoga - Concept of yoga and its eight steps, samādhi, Īśvara&kaivalya
- Mīmāṃsā – Dharma &adharma, bhāvanā, apūrva, vidhi and niṣedha
- Vedānta – Brahma, Īśvara, māyā, jīvaand jagat
- Nyāya-Vaiśeṣika – seven padārthas, four pramāṇas and paramāṇukāraṇvāda
- Bauddha – Four-fold āryasatya, anātmavādaand kṣaṇikatvavāda
- Jaina – Anekāntavāda, syādvāda
- Cārvāka – materialism and basic ethics

Module-II: Yogasutra - Concentration

- Concept of Yoga : (Yogasūtra, 1.2)
- Restriction of fluctuations by practice (abhyāsa) and passionlessness (vairāgya) :(Yogasūtra, 1.12-16)
- Eight aids to Yoga (aṣṭāṅgayoga) : (Yogasūtra, 2.29, 30,32, 46, 49, 50; 3.1-4).
- Yoga of action (kriyāyoga) : (Yogasūtra, 2.1)
- Introduction to the system of Asanas and Pranayama.

Module-III: Sanskrit Grammar

- Memorizing complex conjugations and speculations of Sanskrit .
- Practicing and Memorizing Sandhi, Samas,Pratyay,and Karak.
- Making and practicing sentences of Sanskrit
Writing short notes on general topics of daily life

Module-IV: Language Formation

- Preparing a dictionary of Sanskrit words, verbs
- An introduction to computational Sanskrit
- Framing sentences of general conversation
- Writing of sentences on various topics

Module-V: Conversational Sanskrit

- Listing sentences of general conversation.
- Interaction within and out of class using Sanskrit sentences.
- Conversational practice of the various topics.

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Students Learning Outcome:

Students who complete this program will be able to understand Sanskrit language. Students will be able to discussion on various aspects of Art of living and Indian philosophy. The students will be able to speak Sanskrit in their class.

Examination Scheme :

Continuous Assessment /Internal Assessment					End Term Examination
Components	Class Test	Home Assignment	Class Performance	Attendance	EE
Weightage(%)	10	10	5	5	70

Recommended Books**Text Books**

भारतीय दर्शन चंद्रधर शर्मा
वैदिकसाहित्य और संस्कृति बलदेवउपाध्याय शारदामंदिर वाराणसी
भारतीयदर्शन बलदेवउपाध्याय चौखम्भाओरिएण्टल दिल्ली।
भारतीय दर्शन राधाकृष्णन
पातञ्जलयोगदर्शन हरिहरानंद राजकमलप्रकाशन दिल्ली।

Reference Books

भारतीयदर्शन की रुपरेखा हरेंद्रप्रसादसिन्हा मोतीलालबनारसीदास दिल्ली।
भारतीयदर्शन की प्रमुखसमस्या ,महेशभारती
Higher Sanskrit Grammar M.R .Kale MLBD, Delhi (Hindi Translation)
Introduction to Indian Philosophy Chatterjee S.C & D.M. Dutta , Calcutta University .
Outline of Indian Philosophy M Hiriyanna London (Hindi , English)
History of Indian philosophy S.N Dasgupta MLBD, Delhi


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SPANISH STUDIES

PREAMBLE

Amity University aims to achieve academic excellence by providing multi-faceted education to students. The University has designed a system that would provide rigorous academic programme with necessary skills to enable them to excel in their careers.

This booklet contains the Programme Structure, the Detailed Curriculum and the Scheme of Examination. The Programme Structure includes the courses (Value-added Course: FL- Spanish and Minor track courses), arranged semester wise. The importance of each course is defined in terms of credits attached to it. The credit units attached to each course has been further defined in terms of contact hours i.e. Lecture Hours (L), Tutorial Hours (T), Practical Hours (P). Towards earning credits in terms of contact hours, 1 Lecture and 1 Tutorial per week are rated as 1 credit each and 2 Practical hours per week are rated as 1 credit. Thus, for example, an L-T-P structure of 3-0-0 will have 3 credits, 3-1-0 will have 4 credits, and 3-1-2 will have 5 credits.

The Curriculum and Scheme of Examination of each course includes the course objectives, course contents, scheme of examination and the list of text and references. The scheme of examination defines the various components of evaluation and the weightage attached to each component. The different codes used for the components of evaluation and the weightage attached to them are:

<u>Components</u>	<u>Codes</u>	<u>Weightage (%)</u>
Case Discussion/ Presentation/ Analysis	C	05 - 10
Home Assignment	H	05 - 10
Project	P	05 - 10
Seminar	S	05 - 10
Viva	V	05 - 10
Quiz	Q	05 - 10
Class Test	CT	10 - 15
Attendance	A	05
End Semester Examination	EE	70



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PROGRAMME OBJECTIVE

This programme is designed for the students who opt for Spanish as a Minor **in addition to taking Spanish as Foreign Language (Value-added Course).**

This programme aims at providing an understanding of the basics of Spanish grammar and phonetics.

Students get sensitized towards different “registros de lengua” and are able to distinguish formal and informal language right from the beginning and use appropriate language while communicating in the professional and business world.

Through various listening and speaking exercises this course enables the students to quickly take position as a foreigner speaking Spanish and establish contacts and communicate in oral and written language.

This programme also provides an insight into Spanish literature. By furnishing information on select socio-cultural aspects of Spain, this programme creates a backdrop for a better understanding of the language and the people.

This programme focuses on developing all four language skills of reading, writing, listening and speaking. Through training in various activities it enhances the critical/ creative thinking and encourages the learners to think spontaneously in Spanish.



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SPANISH STUDIES

Programme Structure

Course Code	Course Title	Lectures (L) Hours per week	Tutorial (T) Hours per week	Practical (P) Hours per week	Total Credits (18)
LAN2163	*EFE Professional Spanish for Business-I	2	1	-	3
LAN2263	EFE Professional Spanish for Business-II	2	1	-	3
LAN2363	EFE Professional Spanish for Business-III	2	1	-	3
LAN2463	EFE Professional Spanish for Business-IV	2	1	-	3
LAN2563	Introduction to Spanish Literature & Select Socio-Cultural aspects of Spain	2	1	-	3
LAN2663	Spanish Through Activities	2	1	-	3
	TOTAL				18

*EFE- Español para Fines Específicos (Spanish for specific purposes)

Prerequisites:

1. The student should have opted for Spanish as FL
2. In each semester the student should opt for the course offered without skipping any course. They are expected to follow the sequence. These courses cannot be opted for independently as OE in any semester.



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Syllabus - Semester First

EFE PROFESSIONAL SPANISH FOR BUSINESS-I

(Español I)

Course Code: LAN2163

Credit Units: 03

Course Objective:

To familiarize the students with the Spanish language with its phonetic system, its accents
To enable them

- i) To greet and introduce themselves
- ii) To furnish basic information/ fill in forms
- iii) To identify things and talk about things

This course will help them in building their foundation in four language skills which is reading, writing, listening and speaking.

Course Contents: Unidad 1, 2, 3- pp. 10-36, Números del 0 al 1000

Contenido léxico: Unidad 1: En clase de Español

- i) Adjetivos de nacionalidad
- ii) Nombres de países

Unidad 2: Datos Personales

- i) Nombres propios, profesiones, estudios y lugares de trabajo
- ii) Abreviaturas de direcciones

Unidad 3: El mundo de la empresa

- i) Tipo de empresa, actividades, etc.

Tarea Comunicativa :

- i) Preguntar a sí mismo o una persona
- ii) Presentar las cosas y compañía
- iii) Expresar una opinión (a mi juicio, en mi opinión, me parece que, opino que etc)
- iv) Pedir y dar información sobre empresas
- v) Expresar cierta inseguridad o duda ante una información.
- vi) Expresar acuerdo o desacuerdo ante una propuesta.

Contenido Gramatical:

- i) El alfabeto español
- ii) El Presente de Indicativo del verbo ser y llamarse
- iii) Los demostrativos: este, esta, estos, estas, esto
- iv) El Presente de los verbos regulares e irregulares.
- v) Preguntar con qué, el pronombre relativo que
- vi) La preposición en + lugar, el número de los sustantivos
- vii) Los posesivos: mi, tu, su, nuestro/a/os/as
- viii) El artículo indefinido plural (unos/unas)
- ix) Ser + descripción de una empresa, estar en + lugar

Examination Scheme

Component Codes	Class Test	Viva	Attd.	End Term
Weightage (%)	15	10	5	70

Text & References:

EL Libro para seguir: González, Marisa et al. *Socios I Libro del alumno*. Barcelona: Difusión, 2007.

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Syllabus - Semester Second

EFE PROFESSIONAL SPANISH FOR BUSINESS-II

(Español II)

Course Code: LAN2263

Credit Units: 03

Course Objective: To enable students

- i) To talk about places and location, time schedule, weather
- ii) To express preferences, needs
- iii) To perform simple communicative tasks like placing orders, making inquiries and giving/asking for directions.
- iv) To familiarize the students with verbs, conjugation of verbs in present tense.

Course Contents: Unidad 4, 5, 6- pp. 36-56

Contenido Lexico: Unidad 4: Le Presento al director general

- i) Adjetivos de carácter
- ii) Cargos y departamentos
- iii) Relaciones de parentesco

Unidad 5: De gestiones

- i) Establecimientos y servicio
- ii) Objetos de oficina

Unidad: 6: Lugares para trabajar, lugares para vivir

- i) Características de un piso
- ii) Objetos de oficina
- iii) Instalaciones y servicios de un hotel

Tarea Comunicativa :

- i) Hablar del cargo de alguien.
- ii) Pedir y dar la hora
- iii) Hablar del horario de un establecimiento y la dirección.
- iv) Preguntar por el precio y cantidades de las cosas en el mercado—adjetivos como bueno, malo, caro, barato etc.

Contenido Gramatical:

- i) El Presente de Indicativo del verbo estar, el género y el número de los adjetivos, muy, bastante, un poco +adjetivo
- ii) La negación, articulo, definidos (el, la, los, las), preguntas con qué, dónde, de dónde y cómo, preposiciones y locuciones de lugar: en, entre, cerca de.
- iii) La forma impersonal hay, la diferencia entre estar y hay
- iv) El Presente de Indicativo de los verbos irregulares con cambio vocálico: o>ue(poder) e>ie(cerrar)
- v) Tener que+Infinitivo, verbo preferir y querer, contraste entre ser y estar, verbo gustar
- vi) La concordancia del adjetivo, el presente de indicativo de preferir y querer.
- vii) Contraste entre ser y estar, los cuantificadores del adjetivo.
- viii) La comparación: más /menos+adjetivo+que, más /menos+sustantivo+que.
- ix) El superlative:el/la/los/las, más /menos+adjetivo+que

Examination Scheme

Component Codes	Class Test	Viva	Attd.	End Term
Weightage (%)	15	10	5	70

El Libro para seguir: González, Marisa et al. *Socios I Libro del alumno*. Barcelona: Difusión, 2007.

Syllabus - Semester Third

EFE PROFESSIONAL SPANISH FOR BUSINESS-III

(Español III)

Course Code: LAN2363

Credit Units: 03

Course Objective:

To get the students acquainted with the current social communication skills in oral and written

To furnish linguistic tools

- i) To take an appointment
- ii) To enquire and give information about different cities of Spain
- iii) To talk about work habits and preferences (verbs like to want/ prefer)
- iv) To present Spanish companies

Course Contents: Unidad 7, 8- pp. 66-76

Contenido léxico:Unidad 7 Agenda de trabajo

- i) Actividades cotidianas
- ii) Las partes del día
- iii) Los días de la semana
- iv) Proponer y concertar una cita
- v) Rechazar una propuesta , justificarse , plantear una alternativa , expresar consejo
- vi) Curriculum vitae

Unidad 8: Citas y reuniones

- i) Hábitos alimentarios
- ii) Platos típicos
- iii) Los ingredientes de un plato.

Tarea Comunicativa: i) Hablar de acciones habituales y del horario.

- i) Expresar gustos y preferencias de trabajo
- ii) Proponer y rechazar una cita a compañeros del trabajo o invitar a unos clientes.
- iii) Conversación entre un camarero y dos clientes.
- iv) Expresar obligación y consejo
- v) Enfrentar la entrevista de trabajo: presentar a si mismo, estudios, practicas, experiencia profesional, preparación para entrevista, simulación de entrevista.

Contenido Gramatical:

- i) El presente de indicativo de empezar, querer, preferir, poder, dormir, salir etc
- ii) Con+ pronombres personales: conmigo, contigo
- iii) Marcadores de frecuencia y secuencia; siempre, casi siempre, a veces, nunca y primero, después, luego
- iv) La construcción es que...
- v) Tener que + Infinitivo
- vi) Por la mañana/tarde/noche, a/al mediodía
- vii) El verbo gustar, los pronombres de Objeto Indirecto, las fechas
- viii) A mí también /tampoco, a mí, sí/no
- ix) Expresiones para invitar y proponer algo

Examination Scheme

Component Codes	Class Test	Viva	Attd.	End Term
Weightage (%)	15	10	5	70

Text & References: El Libro para seguir: González, Marisa et al. *Socios I Libro del alumno*. Barcelona: Difusión, 2007.

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Syllabus - Semester Fourth

EFE PROFESSIONAL SPANISH FOR BUSINESS-IV

(Español IV)

Course Code: LAN2463

Credit Units: 03

Course Objective:

To strengthen the language of the students in both oral and written. To fine tune the grammar in application, to use present, present continuous tenses. To provide the students with the know-how

- i) To express emotion
- ii) To talk about experiences
- iii) To talk about the qualities and defects of people

Course Contents: Unidad 9, 10- pp. 86-96

Contenido Léxico Unidad 9: Productos y proyectos

- i) Colores, materiales, tamaño de los productos.
- ii) Estaciones del año.

Unidad 10: Claves del éxito

- i) Las claves para tener éxito en una empresa de nueva creación.
- ii) Acuerdo y desacuerdo.
- iii) Balances y resultados de una empresa
- iv) Calidades en una persona para sacar buen trabajo.

Tarea Comunicativa:

- i) Describir los productos: material, color, función, precio.
- ii) Expresar planes y experiencias.
- iii) Hablar de los proyectos de empresa y como les gusta trabajar.
- iv) Expresar una hipótesis: imagina que están haciendo sus compañeros de trabajo.
- v) Habla de las prioridades en un trabajo.
- vi) Cosas positivas y negativas para una empresa.

Contenido Grammatical:

- i) Estar+Gerundio, ir a +Infinitivo
- ii) Pronombres de Objeto Directo:lo,la,los,las
- iii) Más/menos/igual de/adjetivo + que , tan + adjetivo + como
- iv) Verbos+mas/menos/igual/lo mismo + que, mas/menos+sustantivo+como
- v) El/la/los/las mismo/a/os/as+sustantivo+que
- vi) Marcadores temporales de futuro :el/la próximo/a, dentro de..etc.
- vii) La preposición en como marcador temporal
- viii) Es de + material, sirve para+ función
- ix) Seguro que, me imagino que, a lo mejor, quizá
- x) El pretérito perfecto, participios regulares e irregulares, marcadores con pretérito perfecto: hoy, este mes, alguna vez, nunca, etc., ya todavía no.
- xi) Formulas para valorar hechos pasados: muy bien, regular, fatal, etc
- xii) Conectores: debido a, porque, por eso, pero, sin embargo, etc.
- xiii) Lo más/ menos importante es...

Examination Scheme

Component Codes	Class Test	Viva	Attd.	End Term
Weightage (%)	15	10	5	70

Text & References:

El Libro para seguir: González, Marisa et al. Socios I Libro del alumno. Barcelona: Difusión, 2007.

Syllabus - Semester Fifth

INTRODUCTION TO SPANISH LITERATURE & SELECT SOCIO-CULTURAL ASPECTS OF SPAIN

(Introducción a la literatura y el aspecto socio cultural de España, Español V)

Course Code: LAN2563

Credit Units: 03

Course Objective:

To introduce the students to various literary genres through extracts of novels, plays, and poems of renowned Spanish writers. They also get acquainted with select socio-cultural aspects of Spain.

Course Contents:

Module I: Introducción al aspecto socio cultural de España

Introducción a la historia contemporánea, el sistema de la política, las instituciones y la geografía, los países de habla hispana. Pintura, cine, escultura, arquitectura, música y gastronomía.

Module II: Teatro

Autos de los Reyes Magos - **Ramón Menéndez Pidal**

Vida es Sueños- **Calderón de la Barca**

El Tragaluz – **Antonio Buero Vallejo**

Module III: Novela e Historia

La Celestina- **Fernando de Rojas**

Lazarillo de Tormes- **Anónimo**

El Conde Lucanor- **Don Juan Manuel**

Vuelve Usted Mañana- **Mariano José de Larra**

Module IV: Poesía

Yo soy un hombre sincero – **José Martí**

La Paloma– **Rafael Alberti**

Nanas de Cebolla– **Miguel Hernández**

Examination Scheme

Component Codes	Class Test	Viva	Attd.	End Term
Weightage (%)	15	10	5	70

Text & References:

El Libro para seguir: Quesada, Sebastián et al. *Imágenes de España*. Madrid : Edelsa, 2001. 2007.

Libros para referencia: Don Juan Manuel, El Conde Lucanor. Letras Hispánicas : Catedra; 22 edition (January 1, 2006) (Book 53)

Syllabus - Semester Sixth

SPANISH THROUGH ACTIVITIES (Español a través de las actividades, Español VI)

Course Code: LAN2663

Credit Units: 03

Course Objective:

To introduce plays, songs, poems and films with the purpose of helping students to read, listen, write, speak and think in Spanish spontaneously; learn the content and be able to find new meanings through analysis, evaluation, synthesis and application

To launch students on their personal course of learning through training in activities like acting, reciting poems, appreciating cinematography and writing film reviews

To empower them to develop skills independently and to develop critical/ creative thinking

Course Contents:

Module I: Español a través del teatro

Escenas de juego de roles de la vida cotidiana, monólogos.

Reproduce clásico y moderno - Extractos

Module II: Español a través de canciones

Ejercicios de gramática, vocabulario, dictados, fonética mientras escuchar / aprender a cantar canciones españolas de ayer y de hoy.

Module III: Español a través de las películas

Lenguaje cinematográfico y poca gramática del cine

Críticos / películas

Module IV: Español a través de la comida

Platos populares y tradicionales españoles. Recetas de platos y vocabulario de comida.

Examination Scheme

Component Codes	Class Test	Attd.	End Term*
Weightage (%)	25	5	70

*All evaluation will be activity based.

Text & References:


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TAGORE STUDIES

PREAMBLE

Tagore Studies will be a mainly Activity, Presentation and Seminar-based **Learner-Centric** Course that will offer the option of taking it up as a Minor Discipline (all six courses for 18 Credits) or One-at-a-time Course (3 Credits) under Open Elective Choice where the participants would be able to engage themselves in

- *Making a Choice, as to which Course/Courses to opt for* (for instance, someone from Fine Arts and Aesthetics background may like to opt for 'Tagore as a Culture Icon with special reference to his Painting' or 'Tagore and Mass Media,' whereas a Literature candidate may like to go for 'Tagore as a Poet' and 'Tagore as a Fiction Writer.' Students enrolled in Mass Media and Communication may love to get connected to 'Tagore and Mass Media' as well as 'Tagore as a Fiction Writer.' Those from the History orientation may like to opt for the 'Cultural History' area under 'Tagore as a Cultural Icon' module).
- *Collaboration* within or across disciplines to create a joint appraisal/critique/text which could then be presented before the class for internal evaluation – by the faculty and remaining students together – in a peer review mode together.)
- *Communication* would be tested on the oral or ppt presentations that a participant may like to make on any aspect of Tagore in a Colloquium model where one person communicates and the others on the panel comment, agree, differ or substantiate etc where their performance is evaluated.
- *Critical thinking* with respect to the issues raised by Tagore in the areas on Religion, Societal Practices, Nation Building, or Politics (especially in ENG2652) on which a participant may like to write an end-semester Term Paper.
- *Creativity* in performing a text, or putting up a play for the larger University community, or writing a sequel to or a new text/story/poem/essay creatively – or translating Tagore into one's own language based on his English versions.

COURSE OVERVIEW

It is expected that students cutting across disciplines should be interested in ENG2152 as an Open Elective course, just as students in History would like to opt for ENG2252 as well as ENG2352. Students under Mass Media and Communication may like opting for ENG2652 module whereas the students in Literature programme may find all or at least ENG2352, ENG2452 and ENG2552 to be attractive.



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TAGORE STUDIES

Programme Structure

Course Code	Course Title	Lecture (L) Hours /Week	Tutorial (T) Hours /Week	Total Credits
ENG2152	Rabindranath Tagore in the 21 st Century	3	-	3
ENG2252	Tagore- Autobiographies and Biographical Sketches	3	-	3
ENG2352	Tagore as a Cultural Icon - Tagore as a Painter & Performer	3	-	3
ENG2452	Tagore as a Poet	3	-	3
ENG2552	Tagore as a Fiction Writer	3	-	3
ENG2652	Tagore and Mass Media	3	-	3
	TOTAL			18



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TAGORE STUDIES

Syllabus - Semester First

RABINDRANATH TAGORE IN THE 21ST CENTURY

Course Code: ENG2152

Credit Units: 03

Theme:

The face of the world is changing, and as time passes, the changes are visible with a lot of disturbing images. But each time one feels an element of doom and despair, one's faith is rekindled to see that there are thinkers and doers like Tagore who firmly believed that ultimately the truth and beauty would prevail. It is not surprising to see Einstein sharing the same beliefs as the doyen of Indian literature, Rabindranath Tagore (1861-1941). Einstein had said: 'The ideals which have lighted my way, and time after time have given me new courage to face life cheerfully have been kindness, beauty, and truth.' The progress of mankind is crucially dependent on this realization. In exchanges with Einstein, Tagore had commented: "The progress of our soul is like a perfect poem. It has an infinite idea which once realized makes all movements full of meaning and joy. But if we detach its movements from that ultimate idea, if we do not see the infinite rest and only see the infinite motion, then existence appears to us a monstrous evil, impetuously rushing towards an unending aimlessness." No amount of personal loss could make Tagore deviate from his own trajectory of working for his own country, his own times and for his own mother tongue – Bangla, or Bengali that holds together two nations, India and Bangladesh. He knew that after the dark comes light, as he said: "Clouds come floating into my life, no longer to carry rain or usher storm, but to add color to my sunset sky." Tagore's relevance today will be focused under this course.

Course Coverage:

Module-1: Contributions of Tagore and Relevance of Tagore Today

- The current economic recession and financial crises in the world, and the continuing problems of religious polarization, militarism and hostilities – Tagore's warning and predictions
- Compassionate humanism and Composite Culture in India
- Nationalism and Internationalism.
- Tagore and Education at all levels

Module-2: Tagore's works – An Introduction to the range and variety

- Number of works: A Chronological Account
- The genre of publications and the range
- Variations of the same works and the *Bichitra Variorum*

Module-3: Translation and Dissemination of Tagore's works

- Tagore's own Translations
- Authentic Translation of Tagore by others

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- Other Indian Languages & Foreign Languages Translation – A brief account

Module-4: Tagore and International Personalities

- Tagore, Yeats and Rothenstein
- Tagore and Einstein
- Tagore and Romain Rolland
- Tagore and Leonard Elmhirst
- Tagore and Victoria Ocampo

Examination Scheme:

Components	CT/OP	AS/LC	A	EE
Weightage (%)	20	05	05	70

CT/OP: Class Test/Oral Presentation, AS/LC: Assignments/Library Consultation, A: Attendance, EE: End-Term Examination

Learning Outcomes: (of the Course)

Through this course, we are made aware as to why Tagore was critical of the de-humanizing economic systems, which, supported by educational methods based principally on competitions and rote-learning, fail miserably in generating creative and sensible individuals ready to think beyond the texts. Tagore's own practical project was to show the way for a modernized and less restrictive form of society that does not shun or abandon traditional values, but one that comprise networks of self sustaining groups, villages, or communities, where children and young people are encouraged to develop their natural curiosity and creativity, and to express themselves freely with body and mind. Tagore's approach to education and rural reconstruction, if implemented widely as he intended, could lead to a radical redesign of society, a turning of the world upside down. For both planners and thinkers, it is important to see the relevance of Tagore's arguments beyond his own time.

At the end of the course students will be able to: (Definitive Outcomes)

- Understand the text used,
- Talk about the text,
- Think about issues raised by Tagore through his writings,
- Work with his ideas, and
- Raise new issues in the changing contexts to see the relevance of Tagore's messages.

Resources:

Main Text:

- Bhattacharya, Krishnachandra. (1931). 'Swaraj in Ideas,' Ashutosh Memorial Lecture. *Visva-Bharati Quarterly* 20, 103-114.
- Crolick, Sandy. (2010). 'Crisis in civilization and Cultural criticism'. March issue, *Ezinearticles*. Url: (<http://ezinearticles.com/?The-Crisis-of-Civilization-And-Cultural-Criticism&id=3876540>)
- Das Gupta, Uma, ed. (2006). Rabindranath Tagore: My Life in My Words. New Delhi: Penguin/Viking.
- Das Gupta, Uma & Anandatup Ray (2009) Rabindranath Tagore & His Contemporary Relevance. Parabaas at <https://www.parabaas.com/rabindranath/articles/pContemporaryTagore.html>
- Singh, Udaya Narayana. (2011a). Man at The Centre Of Universe - Tagore's Ideas On Complete Education. *India Perspectives*, 24.1. MEA, New Delhi.
- Singh, Udaya Narayana. (2012a). 'U-Topos & Tagore: Inaugural Talk' in Konrad Meisig, ed. *Utopias from Asia: An International and Inter-disciplinary Symposium in Santiniketan on the*

occasion of the 150th Birthdy Anniversary of Rabindranath Tagore (An Asian Impact Activity In Memorium of Momoyo Okura). Weisbaden: Harrassowitz Verlag. Xvii-xxvi.

- Singh, Udaya Narayana & Navdeep Suri, eds. (2011). *Rabindranath Tagore: A Commemorative Volume*. 1861-1941. New Delhi: Public Diplomacy Division, Ministry of External Affairs, Government of India.
- Tagore, Rabindranath. (1928). *Letters to a Friend*, edited with two introductory essays by C.F.Andrews. London: George Allen & Unwin; 1929. New York: The Macmillan Company. Also in Sisir Kumar Das, ed. 1994. *The English Writings of Rabindranath Tagore: Vol III: A Miscellany*. New Delhi: Sahitya Akademi.
- Tagore, Rabindranath. (1929) 'Ideals of Education', *Viśva-Bhārati Quarterly*, April-July 73-74
- Tagore, Rabindranath. (1931) *The Religion of Man*. Kolkata: Granthan Vibhaga, Visva-Bharati. Reprinted (1970). London: Unwine Books
- Thompson, Edward. (1921). *Rabindranath Tagore: His Life and Works*. Kolkata: YMCA, 1921; rpt. 1961.

Additional Texts:

- Dev Sen, Nabaneeta. 2006. 'Crisis in Civilization and a Poet's Alternatives: Education as one alternative weapon' (www.parabas.com Special Rabindranath Tagore section) Paper presented at an International Seminar on Tagore's Philosophy of Education, organized by Chicago University Law School, at Ramkrishna Mission Institute of Culture in Kolkata on 29 March 2006
- Dutta, Krishna & Robinson, Andrew. (1995). *Rabindranath Tagore: The Myriad-Minded Man*, New York: Saint Martin's Press.
- Singh, Udaya Narayana. (2013a). Tagore redrawing the *Boundaries*: In other words, Crossing the limits of language. In Sanjukta Dasgupta & Chinmoy Guha, eds. *Tagore: At Home in the World*, New Delhi: Sage. 3-12. An earlier version: (2010) Retrieved from <http://www.museindia.com/viewarticle.asp?myr=2010&issid=33&id=2130> in *Muse India* portal [ISSN: 0975-1815];

Other Readings:

- Singh, Udaya Narayana. 2006. *India Writes: A Story of Multilingual and Pluricultural Society*. New Delhi: National Book Trust. 154 pp. Frankfurt Book Fair, Guest of Honor Publication.
- Tagore, Rabindranath. (2008). *Sadhana* (1935), In *The English Writings of Rabindranath Tagore* (Vol 2, pp. 19-26). Ed. by Sisir Kumar Das. New Delhi: Sahitya Akademi. Originally, (1916/1922). *Sādhana: The Realisation of Life*. New York: The Macmillan Company.
- Chatterjee, Ramananda et al, eds. (1931). *The Golden Book of Tagore*. Calcutta: The Golden Book Committee.



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Syllabus - Semester Second

TAGORE- AUTOBIOGRAPHIES AND BIOGRAPHICAL SKETCHES

Course Code: ENG2252

Credit Units: 03

Theme:

In this section, we shall first look into Tagore's 1912-work *Jibansmriti*, the English translation of which, *My Reminiscences*, was published by Macmillan in 1917 under Surendranath Tagore's translation. Here Tagore describes the early years of his life; his experiences of loneliness, love, and loss. Tagore's emergence as a poet could also be read about here. In this work, he introduces his family circle and describes his experience with the formal education against which he rebelled. In a published lecture, titled "My School" (*The Modern Review*, 1931), Tagore speaks of his mission to revolutionize education by rearing young minds in harmony with nature. His autobiographical texts capture a child's-eye view of a mysterious, fascinating world in which fantasy blends seamlessly with reality. In a portion, he also describes his first encounters with death, the poignancy.

Tagore's book - *Talks in China* (1925) which was largely autobiographical, contextualizing his life in relation to the broad historical trends of the time, came up after he was invited by Liang Chi-Chao, president of the University Lecture Association of Beijing in April–May 1924. This will also be touched upon.

Tagore's *Chhelebelā (Boyhood Days)* was published in 1940, in response to a request to write something for young readers, where Tagore embarked on this delightful account of his childhood and adolescence.

When Rabindranath Tagore passed away in 1941 he left behind thousands of pages of poetry, prose, plays, essays, letters, humorous pieces, autobiographical writings, and travel literature. An astonishing number of these works remain of interest to us even today. In a letter in *Chhinnapatra (Torn Leaves)*, 92, Tagore confesses that though poetry has been for him "a kind of secret and forbidden delight," he has also found pleasure in writing short fiction, writing "in the form of a diary or some such genre," as well as producing polemical pieces. He affirms that it is "very important to cross swords with our people on social issues," although this offers him a pleasurable dilemma: "I don't want to disappoint any of my Muses." His growing awareness of and talent for theater and performing arts, including music and dance were all discussed here.

Finally, in *Atmaparichay (Self-Recognition)*, 1943, a collection of six introspective essays published posthumously, Tagore reveals some other aspects of himself – when he says: "It is not easy to know oneself. It is difficult to organize life's various experiences into a unified whole."

Course Coverage:

Module-1: The Childhood days – Growing up and De-schooling (1861-78)

- Prince Dwarkanath Tagore, Raja Rammohun Ray & Bankimchandra
- Debendranath Tagore and the Jorasanko Family
- Early Childhood, Loss of Mother and the influence of elder brothers
- Giving up Schooling and Self-education

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Module-2: Tagore and his says of the Youth – Creative Urge (1878-1889)

- Tagore's "education" in England
- Begins to write and publish poetry
- Marriage, Children and Death in the family
- In Eastern Part of Bengal and Contacts

Module-3: Tagore as an Administrator and Institution Builder (1890-1913)

- Tagore's Management of Estate and Rural reconstruction
- Moves to Santiniketan to set up a School
- Tagore as an essayist and participation in nation building
- Spurt in poetic creativity and Short Stories
- The Nobel Prize

Module-4: Tagore's Discovery of the Self (1914-1941)

- Establishment of 'Sriniketan' and the experiments
- Tagore and Gandhi relationship
- Numerous travels abroad and Belles letters
- Tagore's influence over the contemporaries
- Tagore's philosophy

Examination Scheme:

Components	CT/OP	AS/LC	A	EE
Weightage (%)	20	05	05	70

CT/OP: Class Test/Oral Presentation, AS/LC: Assignments/Library Consultation, A: Attendance, EE: End-Term Examination

Learning Outcomes: (of the Course)

There could be several reasons as to why one benefits immensely from reading biographies and autobiographies. These texts help us see where we are going and where we need to go to because they allow us to *stand on the shoulders of giant scholars and performers*. Sir Isaac Newton wrote in a letter (in 1670) to his friend Robert Hooke, "If I have seen further, it is by standing on the shoulders of giants" That is exactly what reading biographies can do for you – allow you to see further. Then, George Santayana had warned us in 1905, "Those who cannot remember the past are condemned to repeat it." Therefore, the best way of taking advantage from others is by reading about their lives. There may not be a direct lesson as you will have to discover for yourself as to what lessons are there to learn. It is therefore a way of promoting 'self-help' based on the stories and experiences of others. It is, as if, Tagore would mentor you from a distance in finding answers to your own questions in life. It is difficult to generalize but all smart people, and all great leaders read biographies. Their personal libraries are likely to have a few biography and memoir and autobiography.

At the end of the course students will be able to: (Definitive Outcomes)

- (i) Learn how to write a daily journals of their own activities and make it a habit which could be of great use in future.
- (ii) Learn how to jot down great ideas for use at an appropriate time.
- (iii) Come out of agony and depression to see that finally truth does prevail and perseverance pays.
- (iv) Will come to know of many unanswered questions about history of the era mentioned in the books.

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(v) Find a lot of materials and quotable quotes for use in later days.

Resources:

Main Text:

- Alam, F. & Radha Rani Chakravarty, eds. (2011), *The Essential Tagore*, Harvard University Press & Visva-Bharati.
- Das Gupta, Uma. (2004). *Rabindranath Tagore: A Biography*. New Delhi: Oxford University Press.
- Kripalani, Krishna. (1962). *Rabindranath Tagore: A Biography*. New York: Grove Press.
- Tagore, Rabindranath (1916), *Sādhana: The Realisation of Life*, Macmillan
- Tagore, Rabindranath (1917) *My Reminiscences*. New York: Macmillan.
- Tagore, Rabindranath (1930), *The Religion of Man*, Macmillan
- Tagore, Rabindranath (2005), *My Boyhood Days* [Tr from *Chelebelā*, 1940]. Kolkata: Rupa & Co.

Additional Texts:

- Ayyub, A. S. (1980), *Tagore's Quest*, Kolkata: Papyrus.
- Henn, Katherine. (1985). *Rabindranath Tagore: A Bibliography*. ATLA Bibliography Series, 13; London: The American Theological Library Association.
- Kripalani, K. (2005), *Tagore—A Life*, National Book Trust of India
- Sigi, R. (2006), *Gurudev Rabindranath Tagore—A Biography*, Diamond Books.
- Som, R. (2010), *Rabindranath Tagore: The Singer and His Song*,
- Thompson, E. (1926), *Rabindranath Tagore: Poet and Dramatist*, Pierides Press.
- Stewart, T. K. & Twichell, C. (translator) (2003), *Rabindranath Tagore: Lover of God*, Lannan Literary Selections, Copper Canyon Press.

Other Readings:

- Das, Sisir Kumar. (2007). *Atmajibani: Jibani O Rabindranath* (Autobiography: Biography and Tagore, in Bengali). Kolkata,
- Radice, W. (translator) (1995), *Rabindranath Tagore: Selected Poems* (1st ed.), London: Penguin (published 1 June 1995).
- Radice, W (translator) (2004), *Particles, Jottings, Sparks: The Collected Brief Poems*, Angel Books (published 28 December 2004).
- Mukhopadhyay, Prabhatkumar and Kshitis Roy, eds. (1961). *Rabindranath Tagore: A Centenary Volume, 1861–1961*, Foreword by S. Radhakrishnan. New Delhi: Sahitya Akademi.



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Syllabus - Semester Third

TAGORE AS A CULTURAL ICON - TAGORE AS A PAINTER & PERFORMER

Course Code: ENG2352

Credit Units: 03

Theme:

This unit will take us back to look at our cultural history – particularly at the way it unfolded itself during the last few hundred years. When we were beginning to negotiate with the western world, we lacked either the will or the vision, or perhaps both, in constructing our own cultural landscape. As a civilization in India, we had the required talent, the native intuition and appropriate knowledge to create our own pathways. But while under the British rule, we failed to communicate this wisdom and originality, because we fell into the trap of believing that we must build, promote and practice a medium of expression that should be understood by our western readers or viewers. That forced us to adopt the medium of English and its styles of expression. These we then decided to introduce in our education system that would be open only to the elites and the middle class gentry. It was not at all surprising, therefore, that along with English poetry and drama, the average neo-educated Indians began to adore the life-style and culture of their British masters, including their music, taste, dress, and even sports. We had been at an interesting cross-road of history when Tagore had emerged as an indigenous Cultural Icon that could match with the best in the west. Tagore's advent came as a boon to both civil society in India and to our cultural fields. How Tagore emerged as a Cultural Icon in a subjugated country is discussed here with copious examples from different fields of culture and literature to which he had contributed.

Course Coverage:

Module-1: Indian Cultural History and Emergence of Tagore

- 18th-19th Century Bengal and the British Indian Rule
- Cultural, Social, Intellectual and Artistic Re-awakening

Module-2: Doodling, Designs and the Brand Santiniketan

- Doodling on poetry copy-books with Hand-writing and Erasure aesthetics
- Masks, Faces and Designs
- Bringing in Designers Andre Karpeles and Stella Kramrisch (1896-1993)
- Abanindranath Tagore

Module-3: Tagore's Experiments in Painting & Creating an Arts School

- The range of Tagore's Paintings
- Painting nature and mystic landscapes
- Merger of the Familiar and the Unknown
- Dramatic Figures and Scenes

Module-4: Tagore as a Playwright and his experiments in Music and Dance

- From 'Valmiki Pratibha' (1881) to 'Visarjan' (1890) to 'The Post-Office' (1912)
- The Sung Poetry and his own Musical experiments with fusion

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Examination Scheme:

Components	CT/OP	AS/LC	A	EE
Weightage (%)	20	05	05	70

CT/OP: Class Test/Oral Presentation, AS/LC: Assignments/Library Consultation, A: Attendance, EE: End-Term Examination

Learning Outcomes: (of the Course)

The fallacy in the perception that the 'Eastern' or so-called 'Oriental' Culture remains static – visibly recognizable over a long period of history began to change to become more like the 'Western' culture with the advent of the English rule and education will be clear with these lectures. The stereotype of the 'Unchanging East' and the meek acceptance of the meaning of 'Progress' or 'Development' as a move towards 'Material Culture' need to be demystified. A very practical advice that Tagore had given to those who are worried about this area could be seen in his statement: "You have to judge progress according to its aim. A railway train makes its progress towards the terminus station – it is a movement. But a full grown tree has no definite movement of that kind. Its progress is the inward progress of life. It lives, with its aspiration towards light tingling in its leaves and creeping in its silent sap." How Tagore had created a fusion of the best traditions of the west and the east in his plays and music to emerge as a Cultural Icon of our time is explained in this course.

At the end of the course students will be able to: (Definitive Outcomes)

- Appreciate Tagore's contribution in national reawakening that happened in the 19th Century India;
- Be exposed to some of the finest musical experiments and scores where words touching one's soul and tunes appealing to one's senses get enmeshed;
- How plays could be used as instruments in social awakening or in protest movements could be clear from this course
- How education could change the face of our Society and Humanity will be appreciated.

Resources:**Main Text:**

- Clothey, Fred (2006). *Religion in India: A historical introduction*. London New York: Routledge.
- Keay, John. (2011), *India: A History*, 2nd Ed – Revised and Updated, Grove Press / Harper Collins,
- Henderson, Carol E. (2002). *Culture and Customs of India*. Greenwood Publishing Group.
- Lal, Ananda. (2001), *Rabindranath Tagore: Three Plays*. Oxford University Press.
- O'Connell, Kathleen M. & Joseph T. O'Connell, eds. (2009), *Rabindranath Tagore: Reclaiming a Cultural Icon*. Kolkata: Visva-Bharati Granthan Vibhaga.
- Parimoo, Ratan. (1973) *The Paintings of Three Tagores: Abanindranath, gaganendranath and Rabindranath – Chronology and Comparative Study*. Vadodara: MS University.
- Sarvabhutananda, Swami et al, eds. *Proceedings of the International Seminar on Cultural Unity of India*; Feb 16-19, 2013; Kolkata: Ramakrishna Mission Institute of Culture.
- Sivakumar, Raman, ed. (2011) *Rabindra Chitravali*, 4 Vols. Pratikshan, Kolkata & Visva-Bharati, Santiniketan
- Sivakumar, R. (2011). *The Last Harvest: Paintings of Rabindranath*. Ahmedabad: Mapin.
- Som, Reba (2009). *Rabindranath Tagore: The Singer and his Song*. New Delhi, India: Penguin Books (Viking).

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Additional Texts:

- Dalmia, Vasudha and Rashmi Sadana (editors), *The Cambridge Companion to Modern Indian Culture*, Cambridge University Press,
- Walia, Shelly. URL: <https://qz.com/603884/portraits-of-some-of-indias-oldest-indigenous-tribes/>

Other Readings:

- Bhattacharya, Sabyasachi, ed. (1997), *The Mahatma and the Poet: Letters and Debates between Gandhi and Tagore: 1915-1941*. New Delhi: National Book Trust.
- Chaki-Sarkar, Manjusree. (2003) 'Tagore and the Modernization of the Indian Dance.' In Sunil Kothari ed *New Directions in Indian Dance*. Mumbai: Marg Publications.
- Robinson, Andrew. (1989). *The Art of Rabindranath Tagore*. London: Andre Deutsch.



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Syllabus - Semester Fourth

TAGORE AS A POET

Course Code: ENG2452

Credit Units: 03

Theme:

Noted American author, Pearl Buck wrote about Tagore's poetry: "In a very real sense he was a world poet...He spoke out of his own soul and mind and heart. To him beauty is eternal and invincible, the indispensable source of refreshment for the soul, the mind, the heart of mankind." Rabindranath began writing poems at the age of 6 and as a young boy studied the classical poetry of Kalidasa. He also studied the Upanishads, languages and modern sciences. He was sent to England in 1878 to become a barrister, but he returned by 1880 without completing his education. His marriage to Mrinalini Devi, and his later assignment to look after his family's estates in the areas now in Bangladesh, allowed him a productive period of writing poetry, plays and short stories. When he joined Santiniketan (in West Bengal) to found an ashram, which became a world school, the opportunity grew further. Tagore thus emerged as Asia's first Nobel Prize winner for literature in 1913 for his book – 'The Song Offerings: Gitanjali'. As a creative genius and a seer-poet, he also played a crucial role in the cultural renaissance of India and Bengal in the 19th and early 20th Century.

Although he was inspired by notable poet Biharilal Chakrabarty and acknowledged him as his poetry-guru, his own poetry was undeniably unique. This was evident right from his first published volume of poetry entitled "Sandhyasangeet" (or Evening Songs) which came out in 1882. When his greatest source of inspiration - his sister-in-law Kadambari Devi, a wise and brilliant woman of her time, passed away in 1885, it inflicted a deep wound on Rabindranath. This sense of loss finds expression in many of his works, from "Kori O Komal" (1886) to several others. Rabindranath also wrote "Prabhat Sangeet" (or Morning songs) soon. The poems of love in this collection also symbolized the naissance of Rabindranath's personal view of God. The history of the completion that which Rabindranath was talking of, may be found in several other anthologies - "Naivedya", "Utsarga" and "Kheya", as also in "Chitra", "Kalpana" and "Khanika" – and subsequent works of his, until 'Gitanjali' (1910). Poems of yearning for the Divine, an immense craving for the Infinite, form an integral part of the temperament of the lyrical poems of "Gitanjali". In 1913, the English edition of "Gitanjali" was published with an introduction by English poet, W. B. Yeats. The rest is history. This course will also present a glimpse of the post-Gitanjali poetic creations of Tagore which took a completely different turn.

Course Coverage:

Module-1: Early Phase of Tagore's Poetry

- The Prabhat Sangeet (1883) and the Sandhya Sangeet (1882) days
- The 'Kari o Komal' (1886), 'The Manasi' (1890) and the 'Chitra' & 'Chaitali' (1896) phase

Module-2: The 'Gitanjali' Period

- 'Kanika' (1899), 'Kshanika' (1900) and the Bengali Original 'Gitanjali' (1910)
- Making of the English Gitanjali (1912)
- The sequels – 'Gitimalya' (1914) and 'Gitali' (1914)

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Module-3: The Poetic Plays

- The 'Chitrangada' (1892) – based on the epic story of the Maha-Bharata
- The 'Chandalika' (1938) – touching upon the issue of caste prejudices
- The Card Country, or 'Tasher Desh' (1933)

Module 4: Later Phase of Tagore's Poetry

- Punascha' (1932) and 'Parishesh' (1932)
- 'Shesh Saptak' (1935), Patraput (1936) and Shyamali (1936)
- 'Shesh Kotha' (1940) and 'Rogshajyay' (1941)
- Poetry on Paintings – 'Bichitrita' 91933)

Examination Scheme:

Components	CT/OP	AS/LC	A	EE
Weightage (%)	20	05	05	70

CT/OP: Class Test/Oral Presentation, AS/LC: Assignments/Library Consultation, A: Attendance, EE: End-Term Examination

Learning Outcomes: (of the Course)

Going through this course will make the participants appreciate the position of Tagore, namely, that since Man did not have any choice as to his origin and his state, i.e. his environ, and because the human mind is not contented with what is given, man likes to create, construct and set up himself and all that is around him in the way he likes. This works as a driving force for all in literature and art. Because man was not born complete, he wants to get over his incompleteness by creativity. Yet another learning outcome will be to realize what Tagore mentions in his essay, 'The Significance of Literature.' Through his poems, Tagore makes an attempt to define the various worlds that he places before him as a thinker-author – some real, and some unreal; some approachable through 'language', and some that employ a "language that is beyond language". This Utopia expressed in his mystic poetry becomes clearer when we see him saying:

"The world becomes another world in our mind. In this world exist not only the color, shape, sound, and other attributes of the other world, but also our likes and dislikes, our fear and wonder, our pleasure and grief. Our mind, through its various processes, suffuses the outside world differently... This act of the mind enables us to individualize external reality... Through the color and shape of their mind, the external world assumes variegated shapes... This world is more precious to the imaginative individual than the outside world or the human world. The mind helps this world to become more suitable for access into people's hearts, rendering it unique for consumption... Thus there is a difference between the outside world and the human world. The human world does not inform us of what is black and white and what is large and small. It tells us of what is dear and vile, what is beautiful and ugly, and what is good and bad in different ways."

It is the nature of the human mind and the human world that get truly reflected in his poetry – which the participants will be able to discover through this course.

In particular, a few of Tagore's poems in English translation would be discussed here from 'The Fountain's Awakening' to 'The dark Night of Sorrows.' Tagore's songs (over 2500 compositions) that belong to another genre of poetry will also be presented and discussed here, since Tagore had himself declared that music being the most abstract of all the arts, just as mathematics was in the region of science, musical expression was the purest and most unimpeded form of creative expression. And it is in

his songs that the evolution of the poet from what he called a state of being into one of becoming is best captured.

At the end of the course students will be able to: (Definitive Outcomes)

- (i) Comprehend the influences on Tagore by the poetic tradition of India
- (ii) Read and recite a few major poems in English translation and be exposed to some fine recorded recitations of original poems
- (iii) Understand the problems and nuances of poetic translation of Tagore texts – based on translations done by the poet himself and by the others
- (iv) Be exposed to a variety of poems – with so much of thematic and stylistic variations

Resources:

Main Text:

- Alam, Fakrul & Radha Chakravarty, eds. (2011) *The Essential Tagore*. Harvard University Press & Visva-Bharati.
- Hogan, Patrick Colm & Lalita Pandit, eds. () *Rabindranath Tagore: Universality and Tradition*. Madison, Teaneck: Fairleigh Dickinson University Press.
- Jelnikar, Ana. (2008). “W. B. Yeats’s (Mis) Reading of Tagore: Interpreting an Alien Culture,” *University of Toronto Quarterly* 77:4 (Fall no, 2008).
- Kabir, Humayun (1959). ‘Tagore's Poetry’. *Indian Literature* Vol. 2, No. 1 (Oct. 1958—Mar. 1959), pp. 5-20
- Singh, Udaya Narayana. (2013/2016). *The Original Gitanjali*. Andorra: AnimaViva multilingüe SL, Escaldes – Engordany, Principat d’Andorra. Indian edn., Kolkata, Delhi: E-Lekhan Foundation.

Additional Texts:

- Aronson, Alex. (1943). *Rabindranath Through Western Eyes*. Kolkata.
- Zahurul Haque, Abu Saeed. (1981) *Folklore and Nationalism in Rabindranath Tagore*. Dhaka: Bangla Academy.

Other Readings:

- Mukherjee, Sujit. (1964). *Passage to America: The Reception of Rabindranath Tagore in the United States, 1912–1941*. Kolkata: Bookland.



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Syllabus - Semester Fifth

TAGORE AS A FICTION WRITER

Course Code: ENG2552

Credit Units: 03

Theme:

Rabindranath Tagore is a poet dramatist, novelist, actor, composer, educator, painter, and a Philosopher. In a word he is the Leonardo-da-Vinci of our Renaissance True to the Indian Tradition, his own philosophical vision was depicted in his essays, stories as well as in his fiction. Tagore's short stories emerged at a time when this genre was not so well-cultivated in India, and they have given rise to many films later. The stories often deal with apparently simple subject matter: commoners, whereas his non-fiction writings dealt with history, linguistics, and spirituality. Well-known also as travelogue writer, his *Europe Jatri Patro* ('Letters from Europe') are a treat to read. His career as a story-teller through dramatic mode began with *Balmiki Pratibha* in 1881 but soon he came up with *Bisarjan* (1890). His later dramas such as *Dak-ghar* ('The Post Office, 1912) or *Raktakarabi* ('Red Oleanders' 1926) were more philosophical and allegorical. The dance dramas such as *Chandalika* (1938), *Shyama* (1939), and *Chitrangada* (1905) are still extremely popular. This unit will also give an introduction to Tagore's well-known novels – *Chokher bali* (1903), *Noukadubi* (1906), *Gora* (1910), *Chaturanga* (1916), *Ghare Baire* (1916), *Jogajog* (1929), *Char Adhyay* (1933), and *Shesher Kabita* (1929) etc.

Course Coverage:

Module-1: Tagore's Initial Texts leading to his 'Galpaguccha'

- 'Bou-Thakuranir Hat' (1883) and 'Rajarshi' (1887)
- The beginning of his short stories from 1891 – 'Byabadhan', 'Khokababur Pratyabartan', 'Postmaster' (1891);
- 'Dena-paona', 'Ekti Asharhe Galpo' and 'Kabuliwalla' (all 1891-92);
- 'Kshudhita Pashan' & 'Ichapuran' (1895)

Module-2: Selected Novella – Initial Phase

- 'Nashtanir' (1901);
- 'Chokher Bali' (1902);
- 'Noukadubi' (1906)

Module-3: Selected Novels – Later Phase

- *Gora* (1910)

Module-4: Poet as a Story-teller – Experiments in Fusion

- *Ghare Baire* (1916)
- *Shesher Kavita* (1929)


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Examination Scheme:

Components	CT/OP	AS/LC	A	EE
Weightage (%)	20	05	05	70

CT/OP: Class Test/Oral Presentation, AS/LC: Assignments/Library Consultation, A: Attendance, EE: End-Term Examination

Learning Outcomes: (of the Course)

This course will provide a thorough and in-depth knowledge of Tagore's profound understanding of human emotions, values and social systems in nineteenth and twentieth century Bengal. More importantly, the man-woman relationships dramatized in Tagore's novels and plays will provide the learners with a glimpse of the turbulences and upheavals that in turn will enable to comprehend the larger politics of gender, sexuality and patriarchy in various guises. One will gradually have a critical acumen to realize the play of hierarchies in the past and the contemporary times. Also, a reading of Tagore's novels will make one aware of his humanist thinking that undermined the parochialism and jingoist nationalism. Tagore's broader humane worldview that repudiated ultra-nationalist excesses is very relevant for today. His plays and novels show that though he argued fiercely against the bonds of colonialism, he warned against the excesses of nationalism. For him "the idea of the nation is one of the most powerful anesthetics that man has invented." So, no wonder, going through this course one will not only revisit the colonial/ national histories, changing roles and status of women but also will grasp the working of social dynamics in different forms in the current era.

At the end of the course students will be able to: (Definitive Outcomes)

- Appreciate Tagore's take on nationalist and colonial histories.
- Understand Tagore's lyrical humanism and how that is pertinent in a world of strife and conflict
- Explore the representation of women and how it is related to the feminist studies.
- Unravel how fiction can be written as a mode of beauty and truth as well as to radically critique the systemic ideologies.

Resources:

Main Text:

- Chaudhuri, Amit. (2008) *Clearing a Space: Reflections on India, Literature and Culture*. Delhi and Ranikhet: Permanent Black.
- Nussbaum, Martha C. (1996) *For Love of Country?*, edited by Joshua Cohen for Boston Review. Boston: Beacon Press.
- Sen, Amartya. (2005) "Tagore and His India," reprinted in *The Argumentative Indian: Writings on Indian History, Culture and Identity*. London: Allen Lane/Penguin, 89–120.
- Tagore, Rabindranath (2009). *Gora*. India: Penguin.
- Tagore, Rabindranath (2005). *Home and the World*. India: Penguin Classics
- Tagore, Rabindranath (2004). *Chokher Bali*. Kolkata: Rupa Publishers
- Tagore, Rabindranath (2012). *Red Oleanders*. Kolkata: Niyogi Books Private Ltd
- Tagore, Rabindranath (2012). *Selected Stories*. India: Maple Press

Additional Texts:

- Chakrabarti, Santosh (2004). *Studies in Tagore: Critical Essays*. New Delhi: Atlantic
- Chanda, Singh Geetanjali (2008). *Indian Women in the House of Fiction*. New Delhi: Zubaan
- Chatterjee, Indira (2007). *A Thematic Study of Tagore's Novels*. Gurgaon: Shubhi.
- Chatterjee, Bhabatosh (1996). *Rabindranath Tagore and Modern Sensibility*. Delhi: Oxford University Press

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- Dutta, P. K (2004). Rabindranath Tagore's *The Home and the World: A Critical Companion*. New Delhi: Permanent Black
- Sen, Krishna & Tapati Gupta, eds. (2006). *Tagore and Modernity*, Kolkata: Dasgupta & Co.

Other Readings:

- Bandyopadhyay, Asit (2004). "Rabindranath Tagore: Novelist, Short Story Writer and Essayist." *Studies on Rabindranath Tagore*. Ed. Mohit K. Ray. New Delhi: Atlantic.
- Basu, Rajasri (2012). Ed. *Women and Tagore*. New Delhi: Abhijeet
- Dasgupta, Sanjukta (2017). *Remembering Rabindranath*. Retrieved from <http://www.museindia.com/focuscontent.asp?issid=33&id=2157> in *Muse India* portal [ISSN: 0975-1815]
- Dutta, Ram (2009). *Celebrating Tagore*. New Delhi: Allied.
- Mukhopadhyay, Subhas (1999). *Tagore Without Bounds: Samvastar Lecture XII*. New Delhi: Sahitya Academi
- Roy, Soumitra (2017). *Tagore's Ghore Baire*. Retrieved from <http://www.museindia.com/focuscontent.asp?issid=33&id=2135> in *Muse India* portal [ISSN: 0975-1815]
- Raj. G. V (1983). *Tagore: The Novelist*. New Delhi: Sterling.



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Syllabus - Semester Sixth

TAGORE AND MASS MEDIA

Course Code: ENG2652

Credit Units: 03

Theme:

Very few are aware that Rabindranath Tagore had himself dabbled into screenplay writing in the early days of Indian cinema. The silent era Orient Pictures film '*Balidan*' (1927) directed by Naval Gandhi and based on Tagore-play '*Bisarjan*' (known in English as '*Sacrifice*'), had its screenplay written jointly by Jamshed Ratnagar and Rabindranath Tagore. This commercially successful film was set in the fictional kingdom of Tippera, and involved clashes between a progressive-minded King and a "tradition-bound priest.

'*Natir Puja*' (*The dancing girl's worship*, 1932) - based on a recording of his 1926 dance-drama - is the only film where Rabindranath Tagore is credited as the director. Produced by B.N.Sircar of the New Theatre's Group, it was shot in four days where Tagore had himself enacted a small role. Although it was not a commercial success, the prints of the film were destroyed in a fire at the New Theatres. Though recently, attempts have been made to restore the film.

Tapan Sinha's Bengali version of Tagore-story '*Kabuliwala*' (1957) was remade in Hindi in 1961 – with the lead role being played by Chhabi Biswas in Bengali and Balraj Sahni in Hindi. Both versions were immensely successful aesthetically as well as commercially. The music was scored by Pt Ravi Shankar for the Bengali version and by Salil Choudhury for the Hindi version. It received two National Film Awards in 1956 and the Silver Bear Extraordinary Prize of the Jury in the Berlin Film Festival. The story was translated from Bangla into English by the Irish woman Margaret Elizabeth Noble, more popularly known to the world as Sister Nivedita.

Satyajit Ray's '*Teen kanya*' (literally, 'The Three Daughters') was a tribute to Tagore in his centenary year – 1961 as it was made out of three stories by the Master – 'Postmaster', 'Monihara' ("The Lost Jewels'), and 'Samapti' ('The Conclusion') – awarded as the best film at the National level and also honored at the Berlin Film Festival. The common thread seems to be three extraordinary women and their tale of love and affection.

'*Dak Ghar*', a 1912-play by Tagore, rendered into English by W.B.Yeats, and translated and performed in Spanish, French, German and Polish in Europe, was made into a Hindi film in 1965 – directed by Zul Vellani, produced by the Children's Film Society.

Many other successful films could be named – such as Kumar Shahani's 1997-film '*Char Adhyay*' produced by NFDC – based on Tagore's 1934 novel, and remade recently as a successful Bengali commercial film – '*Elar Char Adhyay*' (2012) directed by Bappaditya Bandopadhyay. In between, the same novel became the subject matter of another film – '*Chaturanga*' (2008) directed by Suman Mukherjee

There was yet another classic Tagore film that was remade – Satyajit Ray's '*Charulata*' (1964), with Soumitra Chatterji, Madhabi Mukherjee and Shailen Banerjee - remade by Agnidev Chatterji in 2012 with Rituparna Sengupta, Arjun Chakraborty and Kaushik Sen. Ray had received the Silver Bear as the

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Best Director in the 15th Berlin International Festival in 1965 for this film and also Golden Lotus Award nationally in the same year.

There were some more movies with double versions – such as Tagore's story '*Naukadubi*' ('The Wreck') being made as '*Ghunghat*' (1960) by Ramanand Sagar under a Gemini Studio production where Bharat Bhushan, Leela Chitnis, Pradeep Kumar, Bina Rai, Asha Parekh etc acted. The film went on to get two Filmfare awards. In 2011, Rituporno Ghosh made it in Bengali under the original title – '*Noukadubi*' – produced by Subhash Ghai, and it was premiered as the opening film of the *Indian Panorama* section during the 41st International Film Festival of India (IFFI), Goa on 24 November 2010, in the year that marked Rabindranath Tagore's 150th birth anniversary.

Course Coverage:

In this unit, memorable films and other performances made out of Tagore's works will be introduced, viewed and discussed, and a few documentary films on Tagore will be shown as a part of the course. Evaluation pattern will differ from the other courses under Tagore Studies.

Module-1: Satyajit Ray and Rituparna Ghosh on Tagore's Biopic plus some other Documentaries on Tagore & Discussions

Module-2: Memorable films – *Charulata* (Satyajit Ray 1964)

Module-3: *Chokher Bali* (Rituparno Ghosh, 2003)

Module-4: *Ghare Baire* (Satyajit Ray, 1985)

Module-5: Multiple versions of Tagore films – '*Kabuliwala*', '*Char Ahay*', '*Charulata*' etc.

Examination Scheme:

Components	CT/OP	AS/LC	A	EE
Weightage (%)	20	05	05	70

CT/OP: Class Test/Oral Presentation, AS/LC: Assignments/Library Consultation, A: Attendance, EE: End-Term Examination

Learning Outcomes: (of the Course)

Tagore has been a source of inspiration to generations of filmmakers and theatre performers. Be it his songs, poems, short stories, novels, or plays, his works attracted many. Even recently, a few film-directors such as Sekhar Das (*Jogajog*) and Suman Ghosh (*Kadambari*) came up with elements from tagore stories or from his life. Subhabrata Chatterjee's debut Bengali film, *Monihara*, based on Tagore's short story was another example. Suman Mukherjee of '*Chaturanga*'-fame was working on his next film, *Shesher Kabita*, based on Tagore's novel of the same name. Tagore's influence on the Bengali television too can't be denied. A television series, *Chokher Bali*, based on Tagore's work, which was launched recently, too has found many takers.

This being the pervasive influence of Tagore on Mass Media, a student with interest in cinematography, screenplay or direction and production would be incomplete without being exposed to a course such as this. It would also bring out the best in the candidate in appreciating or critiquing film and television classics.

At the end of the course students will be able to: (Definitive Outcomes)

- (i) The Social Reformist in Tagore could be understood better through this course. His political ideas would be clearer.
- (ii) The stunningly contemporary elements in Tagore's stories would be possible to use in further studies and works by the candidates.

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- (iii) The issues of gender equality and women's emancipation would be appreciated through this course.
- (iv) Since Tagore's translation do not match the quality of his originals, the cinematic translations in the inter-semiotic endeavors make it easier for us to appreciate his genius.

Resources:

Main Text:

- Asaduddin, M & Anuradha Ghosh. (2012) *Filming Fiction: Tagore, Premchand*. New Delhi: Oxford University Press.
- Barnouw, Eric (1981) 'Lives of a Bengal Filmmaker: Satyajit Ray of Calcutta.' *The Quarterly Journal of the Library of Congress*, Vol. 38, No. 2 (SPRING 1981), pp. 60-77
- Chakravorty, Mrinalini. (2012). Picturing "The Postmaster": Tagore, Ray, and the Making of an Uncanny Modernity. *Framework: The Journal of Cinema and Media*, Vol. 53, No. 1 (SPRING 2012), pp. 117-146 (Wayne State University Press).
- Dasgupta, Sanjukta, Sudeshna Charkavarti, and Mary Mathew. (2013), *Radical Rabindranath: Nation, family and gender in Tagore's fiction and films*. New Delhi: Orient Blackswan.
- Hogan, Patrick Colm. (2008). *Understanding Indian Movies: Culture, Cognition, and Cinematic Imagination*. (Austin, TX: University of Texas P [Cognitive Approaches to Literature and Culture Series], 2008)
- Sen, I. (2014). Review of Sanjukta Dasgupta et al, in *Sociological Bulletin*, 63(2), 328-330.
- Sengoopta, Chandak. (1993) 'THE MOVIES: Satyajit Ray: The Plight of the Third-World Artist.' *The American Scholar*, Vol. 62, No. 2 (Spring 1993), pp. 247-254
- Yadav, Anubha. (2012). 'From Textual Image to Image-Text.' *Indian Literature*, 56.4: 253-55.

Additional Texts:

- Benegal, Shyam. (2012) 'Talkies, Movies, Cinema.' *India International Centre Quarterly*, Vol. 38, No. 3/4, The Golden Thread: Essays in Honour of C.D. Deshmukh (WINTER 2011 - SPRING 2012), pp. 354-369.
- Chatterjee, Partha (2012) 'Indian Cinema: Then and Now.' *India International Centre Quarterly*, Vol. 39, No. 2 (AUTUMN 2012), 45-53.
- Emmie Te Nijenhuis (1974). *Indian Music: History and Structure..* BRILL Academic.
- Kapila Vatsyayan (1977). *Classical Indian dance in literature and the arts*. Sangeet Natak Akademi.
- Lago, Mary & Ronald Warwick, eds. (1989). *Rabindranath Tagore: perspectives in time*. Basingstoke and London: Macmillan Press.
- Sen, Mrinal. (1997). 'Rambling Thoughts.' *Social Scientist*, Vol. 25, No. 3/4 (Mar. - Apr.) 19-26.

Other Readings:

- Dasgupta, Chidananda. (2002), 'Cinema, Marxism and the Mother Goddess.' *India International Centre Quarterly*, Vol. 28, No. 4, Special Commemorative Volume: 40 Years — a Look Back (Winter 2001/Spring 2002), pp. 122-133.
- Hogan, Patrick. (1993) 'Historical Economies of race and Gender in Bengal: Ray and Tagore on the Home and the World.' *Journal of South Asian Literature*, Vol. 28, No. 1/2, MISCELLANY (Spring, Fall 1993), pp. 23-43
- Mehta, Tarla. (1995). *Sanskrit Play Production in Ancient India*. Motilal Banarsidass.
- Kundu, Kalyan, Sakti Bhattacharya, and Kalyan Sircar, eds. (1990). *Rabindranath and the British Press (1912-1941)*. London: Tagore Centre.


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B.Sc.(Hons.)Nursing

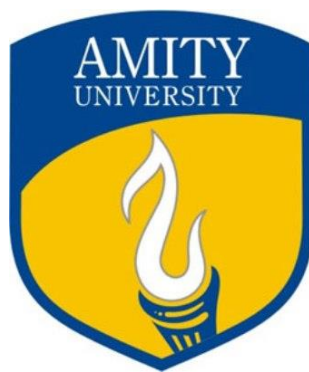
DURATION- FOUR YEARS FULL TIME

PROGRAM STRUCTURE

CURRICULUM

&

SCHEME OF EXAMINATION 2022



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SYLLABUS
COMMUNICATIVE ENGLISH

PLACEMENT: I SEMESTER

THEORY: 2 Credits (40 hours)


DESCRIPTION: The course is designed to enable students to enhance their ability to speak and write the language (and use English) required for effective communication in their professional work. Students will practice their skills in verbal and written English during clinical and classroom experience.

COMPETENCIES: On completion of the course, the students will be able to

1. Identify the significance of Communicative English for healthcare professionals.



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2. Apply the concepts and principles of English Language use in professional developments such as pronunciation, vocabulary, grammar, paraphrasing, voice modulation, Spelling, pause and silence.
3. Demonstrate attentive listening in different hypothetical situations.
4. Converse effectively, appropriately and timely within the given context and the individual or team they are communicating with either face to face or by other means.
5. Read, interpret and comprehend content in text, flow sheet, framework, figures, tables, reports, anecdotes etc.
6. Analyse the situation and apply critical thinking strategies.
7. Enhance expression through writing skills.
8. Apply LSRW (Listening, Speaking, Reading and Writing) Skill in combination to learn, teach, educate and share information, ideas and results.

COURSE OUTLINE

T–Theory

Unit	Time (Hrs)	Learning Outcomes	Content	Teaching/ Learning Activities	Assessment Methods
I	3(T)	Identify the significance of communicative English	Communication <ul style="list-style-type: none"> • What is communication? • What are communication roles of listeners, speakers, readers and writers as healthcare professionals? 	<ul style="list-style-type: none"> • Definitions with examples, illustrations and explanations • Identifying competencies/communicative strategies in LSRW • Reading excerpt on the above and interpreting them through tasks 	<ul style="list-style-type: none"> • Checking for understanding through tasks
II	5(T)	Describe concepts and principles of Language (English) use in professional development such as pronunciation, vocabulary, grammar, paraphrasing, voice modulation, spelling, pause and silence	Introduction to LSRGW <ul style="list-style-type: none"> • L–Listening: Different types of listening • S– Speaking: Understanding Consonants, Vowels, Word and Sentence Stress, Intonation • R–Reading: Medical vocabulary, • Gr – Grammar: Understanding tenses, linkers • W – Writing simple sentences and short paragraphs – emphasis on correct grammar 	<ul style="list-style-type: none"> • Exercises on listening to news, announcements, telephone conversations and instructions from others • Information on fundamentals of Speech – Consonant, Vowel, Stress and Intonation with tasks based on these through audio/video and texts • Reading a medical dictionary/ glossary of medical terms with matching exercises • Information on tenses and basic concepts of correct grammar 	<ul style="list-style-type: none"> • Through check your understanding exercises

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through fill in the
blanks, true/false ques-
tions

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Unit	Time (Hrs)	Learning Outcomes	Content	Teaching/ Learning Activities	Assessment Methods
III	5(T)	Demonstrate attentive listening in different hypothetical situations	Attentive Listening <ul style="list-style-type: none"> Focusing on listening in different situations – announcements, descriptions, narratives, instructions, discussions, demonstrations Reproducing Verbatim Listening to academic talks/lectures Listening to presentation 	<ul style="list-style-type: none"> Listening to announcements, news, documentaries with tasks based on listening With multiple choice, Yes/No and fill in the blank activities 	<ul style="list-style-type: none"> Checking individually against correct answers Listening for specific information Listening for overall meaning and instructions Listening to attitudes and opinions Listening to audio, video and identify keypoints
IV	9(T)	Converse effectively, appropriately and timely within the given context and the individual or team they are communicating with either face to face or other means	Speaking–Effective Conversation <ul style="list-style-type: none"> Conversation situations – informal, formal and neutral Factors influencing way of speaking – setting, topic, social relationship, attitude and language Greetings, introductions, requesting, asking for and giving permission, speaking personally and casual conversations Asking for information, giving instructions and directions Agreeing and disagreeing, giving opinions Describing people, places, events and things, narrating, reporting & reaching conclusions Evaluating and comparing Complaints and suggestions Telephone conversations Delivering presentations 	<ul style="list-style-type: none"> Different types of speaking activities related to the content Guided with prompts and free discussions Presentation techniques Talking to peers and other adults. Talking to patients and Patient attenders Talking to other healthcare professionals Classroom conversation Scenario based learning tasks 	<ul style="list-style-type: none"> Individual and group/peer assessment through live speaking tests Presentation of situation in emergency and routine Handoff Reporting in doctors/nurses' rounds Case presentation Face to face oral communication Speaking individually (Nurse to nurse/patient/doctor) and to others in the group
V	5(T)	Read, interpret and comprehend content in text, flow sheet, framework, figures, tables, reports, and codes	<ul style="list-style-type: none"> Reading Reading strategies, reading notes and messages Reading relevant articles and news items Vocabulary for everyday activities, abbreviations and medical vocabulary Understanding visuals, graphs, figures and notes on instructions 	<ul style="list-style-type: none"> Detailed tasks and exercises on reading for information, inference and evaluation Vocabulary games and puzzles Medical lexis 	<ul style="list-style-type: none"> Telephonic talking Reading/summarizing/justifying answers orally Patient document Doctor's prescription of care Journal writing

Unit	Time (Hrs)	Learning Outcomes	Content	Teaching/ Learning Activities	Assessment Methods
			<ul style="list-style-type: none"> Reading reports and interpreting them Using idioms and phrases, spotting errors, vocabulary for presentations Remedial Grammar 	<ul style="list-style-type: none"> Grammar activities 	<ul style="list-style-type: none"> reading and interpretation Notes/Reports
VI	5(T)	Enhance expression through writing skills	Writing Skills <ul style="list-style-type: none"> Writing patient history Note taking Summarising Anecdotal records Letter writing Diary/Journal writing Report writing Paper writing skills Abstract writing 	<ul style="list-style-type: none"> Writing tasks with focus on task fulfilment, coherence and cohesion, appropriate vocabulary and correct grammar Guided and free tasks Different kinds of letter writing tasks 	<ul style="list-style-type: none"> Paper based assessment by the teacher/trainer against set band descriptors Presentation of situation Documentation Report writing Paper writing skills Verbatim reproducing Letter writing Resume/CV
VII	8(T)	Apply LSRW skill in combination to learn, teach, educate and share information, ideas and results	LSRW Skills <ul style="list-style-type: none"> Critical thinking strategies for listening and reading Oral reports, presentations Writing instructions, letters and reports Error analysis regarding LSRW 	<ul style="list-style-type: none"> Valuating different options/multiple answers and interpreting decisions through situational activities Demonstration – individually and in groups Group Discussion Presentation Role Play 	<ul style="list-style-type: none"> Consolidated assessment orally and through written tasks/exercises

• Writing reports

APPLIED ANATOMY

PLACEMENT: I SEMESTER

THEORY: 3 Credits (60 hours)

DESCRIPTION: The course is designed to assist student to recall and further acquire the knowledge of the normal structure of human body, identify alteration in an anatomical structure with the emphasis on clinical application to practice nursing.

COMPETENCIES: On completion of the course, the students will be able to

- Describe anatomical terms.
- Explain the general and microscopic structure of each system of the body.
- Identify relative positions of the major body organs as well as their general anatomic locations.
- Explore the effect of alterations in structure.
- Apply knowledge of anatomic structures to analyze clinical situations and therapeutic applications.

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COURSE OUTLINE

T –

Unit	Time (Hrs)	Learning Outcomes	Theory Co	Teaching/ Learning Activities	Assessment Methods
I	8(T)	<p>Define the terms relative to the anatomical position</p> <p>Describe the anatomical planes</p> <p>Define and describe the terms used to describe movements</p> <p>Organization of human body and structure of cell, tissues, membranes and glands</p> <p>Describe the types of cartilage</p>	<p>Content</p> <p>Introduction to anatomical terms and organization of the human body</p> <ul style="list-style-type: none"> • Introduction to anatomical terms relative to position – anterior, ventral, posterior/dorsal, superior, inferior, median, lateral, proximal, distal, superficial, deep, prone, supine, palmar and plantar • Anatomical planes (axial/transverse/horizontal, sagittal/vertical plane and coronal/frontal/oblique plane) • Movements (flexion, extension, abduction, adduction, medial rotation, lateral rotation, inversion, eversion, supination, pronation, plantar flexion, dorsal flexion and circumduction) • Cell structure, Cell division • Tissue – definition, types, characteristics, classification, location • Membrane, glands – classification and structure • Identify major surface and bony landmarks in each body region, Organization of human body • Hyaline, fibrocartilage, elastic cartilage • Features of skeletal, smooth and cardiac muscle • Application and implication in nursing 	<ul style="list-style-type: none"> • Lecture cum Discussion • Use of models • Video demonstration • Use of microscopes/slides • Lecture cum Discussion • Video/Slides • Anatomical Torso 	<ul style="list-style-type: none"> • Quiz • MCQ • Short answer
II	6(T)	<p>Compare and contrast the features of skeletal, smooth and cardiac muscle</p> <p>Describe the structure of respiratory system</p> <p>Identify the muscles of respiration and examine their contribution to the mechanism of breathing</p>	<p>The Respiratory system</p> <ul style="list-style-type: none"> • Structure of the organs of respiration • Muscles of respiration • Application and implication in nursing 	<ul style="list-style-type: none"> • Lecture cum Discussion • Models • Video/Slides 	<ul style="list-style-type: none"> • Short answer • Objective type

Unit	Time (Hrs)	Learning Outcomes	Content	Teaching/ Learning Activities	Assessment Methods
III	6(T)	Describe the structure of digestive system	The Digestive system <ul style="list-style-type: none"> • Structure of alimentary canal and accessory organs of digestion • Application and implications in nursing 	<ul style="list-style-type: none"> • Lecture cum Discussion • Video/Slides • Anatomical Torso 	<ul style="list-style-type: none"> • Short answer • Objective type
IV	6(T)	Describe the structure of circulatory and lymphatic system.	The Circulatory and Lymphatic system <ul style="list-style-type: none"> • Structure of blood components, blood vessels – Arterial and Venous system • Position of heart relative to the associated structures • Chambers of heart, layers of heart • Heart valves, coronary arteries • Nerve and blood supply to heart • Lymphatic tissue • Veins used for IV injections 	<ul style="list-style-type: none"> • Lecture • Models • Video/Slides 	<ul style="list-style-type: none"> • Short answer • MCQ
V	4(T)	Identify the major endocrine glands and describe the structure of endocrine glands	<ul style="list-style-type: none"> • Application and implication in nursing The Endocrine system <ul style="list-style-type: none"> • Structure of Hypothalamus, Pineal Gland, Pituitary gland, Thyroid, Parathyroid, Thymus, Pancreas and Adrenal glands 	<ul style="list-style-type: none"> • Lecture • Models/charts 	<ul style="list-style-type: none"> • Short answer • Objective type
VI	4(T)	Describe the structure of various sensory organs	The Sensory organs <ul style="list-style-type: none"> • Structure of skin, eye, ear, nose and tongue 	<ul style="list-style-type: none"> • Lecture • Explain with Video/models/charts 	<ul style="list-style-type: none"> • Short answer • MCQ
VII	10 (T)	Describe anatomical position and structure of bones and joints Identify major bones that make up the axial and appendicular skeleton Classify the joints Identify the application and implications in nursing Describe the structure of muscle	<ul style="list-style-type: none"> • Application and implications in nursing The Musculoskeletal system: The Skeletal system <ul style="list-style-type: none"> • Anatomical positions • Bones – types, structure, growth and ossification • Axial and appendicular skeleton • Joints – classification, major joints and structure • Application and implications in nursing 	<ul style="list-style-type: none"> • Review – discussion • Lecture • Discussions • Explain using charts, skeleton and loose bones and torso • Identifying muscles involved in nursing procedures in lab 	<ul style="list-style-type: none"> • Short answer • Objective type

Unit	Time (Hrs)	Learning Outcomes	Content	Teaching/ Learning Activities	Assessment Methods
		Apply the knowledge in performing nursing procedures/skills	The Muscular system <ul style="list-style-type: none"> • Types and structure of muscles • Muscle groups – muscles of the head, neck, thorax, abdomen, pelvis, upper limb and lower limbs • Principal muscles – deltoid, biceps, triceps, respiratory, abdominal, pelvic floor, pelvic floor muscles, gluteal muscles and vastus lateralis • Major muscles involved in nursing procedures 		
VIII	5(T)	Describe the structure of renal system	The Renal system <ul style="list-style-type: none"> • Structure of kidney, ureters, bladder, urethra • Application and implication in nursing 	<ul style="list-style-type: none"> • Lecture • Models/charts 	<ul style="list-style-type: none"> • MCQ • Short answer
IX	5(T)	Describe the structure of reproductive system	The Reproductive system <ul style="list-style-type: none"> • Structure of male reproductive organs • Structure of female reproductive organs • Structure of breast 	<ul style="list-style-type: none"> • Lecture • Models/charts 	<ul style="list-style-type: none"> • MCQ • Short answer
X	6(T)	Describe the structure of nervous system including the distribution of the nerves, nerve plexuses Describe the ventricular system	The Nervous system <ul style="list-style-type: none"> • Review Structure of neurons • CNS, ANS and PNS (Central, autonomic and peripheral) • Structure of brain, spinal cord, cranial nerves, spinal nerves, peripheral nerves, functional areas of cerebral cortex • Ventricular system – formation, circulation, and drainage • Application and implication in nursing 	<ul style="list-style-type: none"> • Lecture • Explain with models • Video slides 	<ul style="list-style-type: none"> • MCQ • Short answer

Note: Few lab hours can be planned for visits, observation and handling (less than 1 credit lab hours are not specified separately)

APPLIED PHYSIOLOGY

PLACEMENT: I SEMESTER

THEORY: 3 Credits (60 hours)

DESCRIPTION: The course is designed to assist student to acquire comprehensive knowledge of the normal functions of the organ systems of the human body to facilitate understanding of physiological basis of health, identify alteration in functions and provide the student with the necessary physiological knowledge to practice nursing.

COMPETENCIES: On completion of the course, the students will be able to

1. Develop understanding of the normal functioning of various organ systems of the body.
2. Identify the relative contribution of each organ system towards maintenance of homeostasis.
3. Describe the effect of alterations in functions.
4. Apply knowledge of physiological basis to analyze clinical situations and therapeutic applications.

COURSE OUTLINE

T–Theory

Unit	Time(Hrs)	Learning Outcomes	Content	Teaching/ Learning Activities	Assessment Methods
I	4(T)	Describe the physiology of cell, tissues, membranes and glands	General Physiology–Basic concepts <ul style="list-style-type: none"> Cell physiology including transportation across cell membrane Body fluid compartments, Distribution of total body fluid, intracellular and extracellular compartments, major electrolytes and maintenance of homeostasis Cell cycle Tissue–formation, repair Membranes and glands –functions Application and implication in nursing 	<ul style="list-style-type: none"> Review– discussion Lecture cum Discussion Video demonstrations 	<ul style="list-style-type: none"> Quiz MCQ Short answer
II	6(T)	Describe the physiology and mechanism of respiration Identify the muscles of respiration and examine their contribution to the mechanism of breathing	Respiratory system <ul style="list-style-type: none"> Functions of respiratory organs Physiology of respiration Pulmonary circulation–functional features Pulmonary ventilation, exchange of gases Carriage of oxygen and carbon-dioxide, Exchange of gases in tissue Regulation of respiration Hypoxia, cyanosis, dyspnea, periodic breathing Respiratory changes during exercise Application and implication in nursing 	<ul style="list-style-type: none"> Lecture Video slides 	<ul style="list-style-type: none"> Essay Short answer MCQ
III	8(T)	Describe the functions of digestive system	Digestive system <ul style="list-style-type: none"> Functions of the organs of digestive tract Saliva– composition, regulation of secretion and functions of saliva Composition and function of gastric juice, mechanism and regulation of gastric secretion Composition of pancreatic juice, function, regulation of pancreatic secretion Functions of liver, gall bladder and pancreas Composition of bile and function Secretion and function of small and large intestine Movements of alimentary tract Digestion in mouth, stomach, small intestine, large intestine, absorption of food Application and implications in nursing 	<ul style="list-style-type: none"> Lecture Essay Short answer MCQ 	<ul style="list-style-type: none"> Short answer
IV	6(T)	Explain the function of the	Circulatory and Lymphatic system <ul style="list-style-type: none"> Functions of heart, conduction system, 		

Unit	Time (Hrs)	Learning Outcomes	Content	Teaching/ Learning Activities	Assessment Methods
		heart, and physiology of circulation	cardiac cycle, Stroke volume and cardiac output • Blood pressure and Pulse • Circulation – principles, factors influencing blood pressure, pulse • Coronary circulation, Pulmonary and systemic circulation • Heart rate – regulation of heart rate • Normal value and variations • Cardiovascular homeostasis in exercise and posture • Application and implication in nursing	• Discussion • Video/Slides	• MCQ
V	5(T)	Describe the composition and functions of blood	Blood • Blood – Functions, Physical characteristics • Formation of blood cells • Erythropoiesis – Functions of RBC, RBC life cycle • WBC – types, functions • Platelets – Function and production of platelets • Clotting mechanism of blood, clotting time, bleeding time, PTT • Hemostasis – role of vasoconstriction, platelet plug formation in hemostasis, coagulation factors, intrinsic and extrinsic pathways of coagulation • Blood groups and types • Functions of reticuloendothelial system, immunity • Application in nursing	• Lecture • Discussion • Videos	• Essay • Short answer • MCQ
VI	5(T)	Identify the major endocrine glands and describe their functions	The Endocrine system • Functions and hormones of Pineal Gland, Pituitary gland, Thyroid, Parathyroid, Thymus, Pancreas and Adrenal glands. • Other hormones • Alterations in disease	• Lecture • Explain using charts	• Short answer • MCQ
VII	4(T)	Describe the structure of various sensory organs	• Application and implication in nursing The Sensory Organs • Functions of skin • Vision, hearing, taste and smell • Errors of refraction, aging changes	• Lecture • Video	• Short answer • MCQ
VIII	6(T)		• Application and implications in nursing Musculoskeletal system	• Lecture	• Structured essay

Unit	Time (Hrs)	Learning Outcomes	Content	Teaching/ Learning Activities	Assessment Methods
		bones, joints, various types of muscles, its special properties and nerves supplying them	<ul style="list-style-type: none"> Bones–Functions, movements of bones of axial and appendicular skeleton, Bone healing Joints and joint movements Alteration of joint disease Properties and Functions of skeletal muscles – mechanism of muscle contraction Structure and properties of cardiac muscles and smooth muscles Application and implication in nursing 	<ul style="list-style-type: none"> Discussion Videopresentation 	<ul style="list-style-type: none"> Short answer MCQ
IX	4(T)	Describe the physiology of renal system	Renal system <ul style="list-style-type: none"> Function of kidney in maintaining homeostasis GFR Function of ureters, bladder and urethra Micturition Regulation of renal function Application and implication in nursing 	<ul style="list-style-type: none"> Lecture Charts and models 	<ul style="list-style-type: none"> Short answer MCQ
X	4(T)	Describe the structure of reproductive system	The Reproductive system <ul style="list-style-type: none"> Female reproductive system– Menstrual cycle, function and hormones of ovary, oogenesis, fertilization, implantation, Functions of breast Male reproductive system– Spermatogenesis, hormones and its functions, semen Application and implication in providing nursing care 	<ul style="list-style-type: none"> Lecture Explain using charts, models, specimens 	<ul style="list-style-type: none"> Short answer MCQ
XI	8(T)	Describe the functions of brain, physiology of nerve stimulus, reflexes, cranial and spinal nerves	<ul style="list-style-type: none"> Nervous system Overview of nervous system Review of types, structure and function of neurons Nerve impulse Review functions of Brain-Medulla, Pons, Cerebrum, Cerebellum Sensory and Motor Nervous system Peripheral Nervous system Autonomic Nervous system Limbic system and higher mental Functions- Hippocampus, Thalamus, Hypothalamus Vestibular apparatus Functions of cranial nerves Autonomic functions 	<ul style="list-style-type: none"> Lecture cum Discussion Videoslides 	<ul style="list-style-type: none"> Brief structured essays Short answer MCQ Critical reflection

Unit	Time(Hrs)	Learning Outcomes	Content	Teaching/Learning	Assessment
			<ul style="list-style-type: none"> Reflexes CSF formation, composition, circulation of CSF, blood brain barrier and blood CSF barrier Application and implication in nursing 		

Note: Few lab hours can be planned for visits, observation and handling (less than 1 credit lab hours are not specified separately)

APPLIED SOCIOLOGY

PLACEMENT: I SEMESTER

THEORY: 3 Credits (60 hours)

DESCRIPTION: This course is designed to enable the students to develop understanding about basic concepts of sociology and its application in personal and community life, health, illness and nursing.

COMPETENCIES: On completion of the course, the students will be able to

1. Identify the scope and significance of sociology in nursing.
2. Apply the knowledge of social structure and different culture in a society in identifying social needs of sick clients.
3. Identify the impact of culture on health and illness.
4. Develop understanding about types of family, marriage and its legislation.
5. Identify different types of caste, class, social change and its influence on health and health practices.
6. Develop understanding about social organization and disorganization and social problems in India.
7. Integrate the knowledge of clinical sociology and its uses in crisis intervention.

COURSE OUTLINE

T-Theory

Unit	Time (Hrs)	Learning Outcomes	Content	Teaching/ Learning Activities	Assessment Methods
I	1	(T) Describe the scope and significance	Introduction <ul style="list-style-type: none"> Definition, nature and scope of sociology Significance of sociology in nursing 	<ul style="list-style-type: none"> Lecture Discussion 	<ul style="list-style-type: none"> Essay Short answer
II	15	(T) Describe the individualization, Groups, processes of Socialization, social change and its importance	Social structure <ul style="list-style-type: none"> Basic concept of society, community, association and institution Individual and society Personal disorganization Social group – meaning, characteristics, and classification. Social processes – definition and forms, Co-operation, competition, conflict, accommodation, assimilation, isolation Socialization – characteristics, process, agencies of socialization Social change – 	<ul style="list-style-type: none"> Lecture cum Discuss 	<ul style="list-style-type: none"> Essay Short answer Objective type

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Unit	Time (Hrs)	Learning Outcomes	Content	Teaching/ Learning Activities	Assessment Methods
			<ul style="list-style-type: none"> • Structure and characteristics of urban, rural and tribal community. • Major health problems in urban, rural and tribal communities • Importance of social structure in nursing profession 		
III	8(T)	Describe culture and its impact on health and disease	Culture <ul style="list-style-type: none"> • Nature, characteristic and evolution of culture • Diversity and uniformity of culture • Difference between culture and civilization • Culture and socialization • Transcultural society • Culture, Modernization and its impact on health and disease 	<ul style="list-style-type: none"> • Lecture • Panel discussion 	<ul style="list-style-type: none"> • Essay • Short answer
IV	8(T)	Explain family, marriage and legislation related to marriage	Family and Marriage <ul style="list-style-type: none"> • Family – characteristics, basic need, types and function of family • Marriage – forms of marriage, social custom relating to marriage and importance of marriage • Legislation on Indian marriage and family. • Influence of marriage and family on health and health practices 	<ul style="list-style-type: none"> • Lecture 	<ul style="list-style-type: none"> • Essay • Short answer • Case study report
V	8(T)	Explain different types of caste and classes in society and its influence on health	Social Stratification <ul style="list-style-type: none"> • Introduction – Characteristics & forms of stratification • Function of stratification • Indian caste system – origin and characteristics • Positive and negative impact of caste in society. • Class system and status • Social mobility – meaning and types • Race – concept, criteria of racial classification • Influence of class, caste and race system on health. 	<ul style="list-style-type: none"> • Lecture • Panel discussion 	<ul style="list-style-type: none"> • Essay • Short answer • Objective type
VII	15(T)	Explains social organization, disorganization, social problems and role of nurse in reducing social problems	Social organization and disorganization <ul style="list-style-type: none"> • Social organization – meaning, elements and types • Voluntary associations • Social system – definition, types, role and status as structural element of social system. • Interrelationship of institutions • Social control – meaning, aims and process of social control 	<ul style="list-style-type: none"> • Lecture • Group discussion • Observational visit 	<ul style="list-style-type: none"> • Essay • Short answer • Objective type • Visit report

Unit	Time (Hrs)	Learning Outcomes	Content	Teaching/ Learning Activities	Assessment Methods
			<ul style="list-style-type: none"> • Social norms, moral and values • Social disorganization – definition, causes, Control and planning • Major social problems – poverty, housing, food supplies, illiteracy, prostitution, dowry, Child labour, child abuse, delinquency, crime, substance abuse, HIV/AIDS, COVID-19 • Vulnerable group – elderly, handicapped, minority and other marginal group. • Fundamental rights of individual, women and children • Role of nurse in reducing social problem and enhance coping 		
VII	5(T)	Explain clinical sociology and its application in the hospital and community	<ul style="list-style-type: none"> • Social welfare programs in India <p>Clinical sociology</p> <ul style="list-style-type: none"> • Introduction to clinical sociology • Sociological strategies for developing services for the abused <p>• Use of clinical sociology in crisis intervention</p>	<ul style="list-style-type: none"> • Lecture, • Group discussion • Roleplay 	<ul style="list-style-type: none"> • Essay • Short answer

APPLIED PSYCHOLOGY


PLACEMENT: I SEMESTER

THEORY: 3 Credits (60 Hours)

DESCRIPTION: This course is designed to enable the students to develop understanding about basic concepts of psychology and its application in personal and community life, health, illness and nursing. It further provides students opportunity to recognize the significance and application of soft skills and self-empowerment in the practice of nursing.

COMPETENCIES: On completion of the course, the students will be able to

1. Identify the importance of psychology in individual and professional life.
2. Develop understanding of the biological and psychological basis of human behaviour.
3. Identify the role of nurse in promoting mental health and dealing with altered personality.
4. Perform the role of nurses applicable to the psychology of different age groups.
5. Identify the cognitive and affective needs of clients.
6. Integrate the principles of motivation and emotion in performing the role of nurse in caring for emotionally sick client.
7. Demonstrate basic understanding of psychological assessment and nurse's role.
8. Apply the knowledge of soft skills in workplace and society.
9. Apply the knowledge of self-empowerment in workplace, society and personal life.


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COURSE OUTLINE


T–Theory

Unit	Time (Hrs)	Learning Outcomes	Content	Teaching/ Learning Activities	Assessment Methods
I	2(T)	Describe scope, branches and significance of psychology in nursing	Introduction <ul style="list-style-type: none"> Meaning of Psychology <ul style="list-style-type: none"> Development of psychology – Scope, branches and methods of psychology Relationship with other subjects <ul style="list-style-type: none"> Significance of psychology in nursing Applied psychology to solve everyday issues 	<ul style="list-style-type: none"> Lecture cum Discussion 	<ul style="list-style-type: none"> Essay Short answer
II	4(T)	Describe biology of human behaviour	Biological basis of behavior–Introduction <ul style="list-style-type: none"> Body mind relationship Genetics and behaviour Inheritance of behaviour Brain and behaviour. Psychology and sensation – sensory process – normal and abnormal 	<ul style="list-style-type: none"> Lecture Discussion 	<ul style="list-style-type: none"> Essay Short answer
III	5(T)	Describe mentally healthy person and defense mechanisms	Mental health and mental hygiene <ul style="list-style-type: none"> Concept of mental health and mental hygiene Characteristic of mentally healthy person Warning signs of poor mental health Promotive and preventive mental health strategies and services Defense mechanism and its implication Frustration and conflict – types of conflicts and measurements to overcome Role of nurse in reducing frustration and conflict and enhancing coping Dealing with ego 	<ul style="list-style-type: none"> Lecture Case discussion Roleplay 	<ul style="list-style-type: none"> Essay Short answer Objective type
IV	7(T)	Describe psychology of people in different age groups and role of nurse	Developmental psychology <ul style="list-style-type: none"> Physical, psychosocial and cognitive development across life span – Prenatal through early childhood, middle to late childhood through adolescence, early and mid-adulthood, late adulthood, death and dying Role of nurse in supporting normal growth and development across the lifespan Psychological needs of various groups in health and sickness – Infancy, childhood, adolescence, adulthood and old age 	<ul style="list-style-type: none"> Lecture Group discussion 	<ul style="list-style-type: none"> Essay Short answer

Unit	Time (Hrs)	Learning Outcomes	Content	Teaching/ Learning Activities	Assessment Methods
			children <ul style="list-style-type: none"> Psychology of vulnerable individuals – challenged, women, sick etc. Role of nurse with vulnerable groups 		
V	4(T)	Explain personality and role of nurse in identification and improvement in altered personality	Personality <ul style="list-style-type: none"> Meaning, definition of personality Classification of personality Measurement and evaluation of personality – Introduction Alteration in personality Role of nurse in identification of individual personality and improvement in altered personality 	<ul style="list-style-type: none"> Lecture Discussion Demonstration 	<ul style="list-style-type: none"> Essay and short answer Objective type
VI	16(T)	Explain cognitive process and their applications	Cognitive process <ul style="list-style-type: none"> Attention – definition, types, determinants, duration, degree and alteration in attention Perception – Meaning of Perception, principles, factors affecting perception, Intelligence – Meaning of intelligence – Effect of heredity and environment in intelligence, classification, Introduction to measurement of intelligence tests – Mental deficiencies Learning – Definition of learning, types of learning, Factors influencing learning – Learning process, Habit formation Memory – meaning and nature of memory, factors influencing memory, methods to improve memory, forgetting Thinking – types, level, reasoning and problem solving. Aptitude – concept, types, individual differences and variability Psychometric assessment of cognitive processes – Introduction 	<ul style="list-style-type: none"> Lecture Discussion 	<ul style="list-style-type: none"> Essay and short answer Objective type
VII	6(T)	Describe motivation, emotion, attitude and role of nurse in emotionally sick client	Motivation and emotional processes <ul style="list-style-type: none"> Alteration in cognitive processes Motivation – meaning, concept, types, theories of motivation, motivation cycle, biological and special motives Emotions – Meaning of emotions, development of emotions, alteration of emotion, emotions in sickness – handling emotions in self and other 	<ul style="list-style-type: none"> Lecture Group discussion 	<ul style="list-style-type: none"> Essay and short answer Objective type

Unit	Time (Hrs)	Learning Outcomes	Content	Teaching/ Learning Activities	Assessment Methods
			<ul style="list-style-type: none"> • Attitudes – Meaning of attitudes, nature, factor affecting attitude, attitudinal change, Role of attitude in health and sickness • Psychometric assessment of emotions and attitude – Introduction • Role of nurse in caring for emotionally sick client 		
VIII	4(T)	Explains psychological assessment and tests and role of nurse	Psychological assessment and tests – introduction <ul style="list-style-type: none"> • Types, development, characteristics, principles, uses, interpretation • Role of nurse in psychological assessment 	<ul style="list-style-type: none"> • Lecture • Discussion • Demonstration 	<ul style="list-style-type: none"> • Short answer • Assessment of practice
IX	10(T)	Explain concept of soft skill and its application in workplace and society	Application of soft skill <ul style="list-style-type: none"> • Concept of soft skill • Types of soft skill – visual, aural and communication skill • The way of communication • Building relationship with client and society • Interpersonal Relationships (IPR): Definition, Types, and Purposes, Interpersonal skills, Barriers, Strategies to overcome barriers • Survival strategies – managing time, coping stress, resilience, work – life balance • Applying soft skill to workplace and society – Presentation skills, social etiquette, telephone etiquette, motivational skills, teamwork etc. 	<ul style="list-style-type: none"> • Lecture • Group discussion • Roleplay • Refer/Complete soft skills module 	<ul style="list-style-type: none"> • Essay and short answer
X	2(T)	Explain self-empowerment	<ul style="list-style-type: none"> • Use of soft skill in nursing Self-empowerment <ul style="list-style-type: none"> • Dimensions of self-empowerment • Self-empowerment development • Importance of women's empowerment in society • Professional etiquette and personal grooming 	<ul style="list-style-type: none"> • Lecture • Discussion 	<ul style="list-style-type: none"> • Short answer • Objective type

• Role of nurse in empowering others


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NURSING FOUNDATION - I (including First Aid

module)PLACEMENT: I SEMESTER

THEORY: 6Credits(120hours)

PRACTICUM:SkillLab:2Credits(80hours)andClinical:2Credits(160hours)



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DESCRIPTION: This course is designed to help novice nursing students develop knowledge and competencies required to provide evidence-based, comprehensive basic nursing care for adult patients, using nursing process approach.

COMPETENCIES: On completion of the course, the students will be able to

1. Develop understanding about the concept of health, illness and scope of nursing within health care services.
2. Apply values, code of ethics and professional conduct in professional life.
3. Apply the principles and methods of effective communication in establishing communication links with patients, families and other health team members.
4. Develop skill in recording and reporting.
5. Demonstrate competency in monitoring and documenting vital signs.
6. Describe the fundamental principles and techniques of infection control and biomedical waste management.
7. Identify and meet the comfort needs of the patients.
8. Perform admission, transfer, and discharge of a patient under supervision applying the knowledge.
9. Demonstrate understanding and application of knowledge in caring for patients with restricted mobility.
10. Perform first aid measures during emergencies.
11. Identify the educational needs of patients and demonstrate basic skills of patient education.

***Mandatory Module used in Teaching/Learning:**

First Aid: 40 Hours (including Basic CPR)

COURSE OUTLINE

T–Theory, SL – Skill Lab

	Unit Time (Hrs)	Learning Outcomes	Content	Teaching/ Learning Activities	Assessment Methods
I	5(T)	Describe the concept of health and illness	Introduction to health and illness <ul style="list-style-type: none"> • Concept of Health – Definitions (WHO), Dimensions • Maslow's hierarchy of needs • Health–Illness continuum • Factors influencing health • Causes and risk factors for developing illnesses • Illness–Types, illness behavior • Impact of illness on patient and family 	<ul style="list-style-type: none"> • Lecture • Discussion 	<ul style="list-style-type: none"> • Essay • Short answer • Objective type
II	5(T)	Describe the levels of illness prevention and care, health care services	Health Care Delivery Systems– Introduction of Basic Concepts & Meanings <ul style="list-style-type: none"> • Levels of Illness Prevention – Primary (Health Promotion), Secondary and Tertiary • Level of Care – Primary, Secondary and Tertiary • Types of health care agencies/ services – Hospitals, clinics, Hospice, rehabilitation centres, extended care facilities 	<ul style="list-style-type: none"> • Lecture • Discussion 	<ul style="list-style-type: none"> • Essay • Short answer • Objective type

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- Hospitals–Types, Organization and

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Unit	Time (Hrs)	Learning Outcomes	Content	Teaching/ Learning Activities	Assessment Methods
			<p>Functions</p> <ul style="list-style-type: none"> Healthcare teams in hospitals – members and their role 		
III	12(T)	<p>Trace the history of Nursing</p> <p>Explain the concept, nature and scope of nursing</p> <p>Describe values, code of ethics and professional conduct for nurses in India</p>	<p>History of Nursing and Nursing as a profession</p> <ul style="list-style-type: none"> History of Nursing, History of Nursing in India Contributions of Florence Nightingale Nursing – Definition – Nurse, Nursing, Concepts, philosophy, objectives, Characteristics, nature and Scope of Nursing/ Nursing practice, Functions of nurse, Qualities of a nurse, Categories of nursing personnel Nursing as a profession – definition and characteristics/criteria of profession Values – Introduction – meaning and importance Code of ethics and professional conduct for nurses – Introduction 	<ul style="list-style-type: none"> Lecture Discussion Case discussion Role plays 	<ul style="list-style-type: none"> Essay Short answers Objective type
IV	8(T) 3(SL)	<p>Describe the process, principles, and types of communication</p> <p>Explain therapeutic, non-therapeutic and professional communication</p> <p>Communicate effectively with patients, their families and team members</p>	<p>Communication and Nurse Patient Relationship</p> <ul style="list-style-type: none"> Communication – Levels, Elements and Process, Types, Modes, Factors influencing communication Methods of effective communication/therapeutic communication techniques Barriers to effective communication/non-therapeutic communication techniques Professional communication Helping Relationships (Nurse Patient Relationship) – Purposes and Phases Communicating effectively with patient, families and team members Maintaining effective human relations and communication with vulnerable groups (children, women, physically and mentally challenged and elderly) 	<ul style="list-style-type: none"> Lecture Discussion Role play and video film on Therapeutic Communication 	<ul style="list-style-type: none"> Essay Short answer Objective type
V	4(T) 2(SL)	<p>Describe the purposes, types and techniques of recording and reporting</p> <p>Maintain records and reports accurately</p>	<p>Documentation and Reporting</p> <ul style="list-style-type: none"> Documentation – Purposes of Reports and Records Confidentiality Types of Client records/Common Record-keeping forms Methods/Systems of documentation/Recording 	<ul style="list-style-type: none"> Lecture Discussion Demonstration 	<ul style="list-style-type: none"> Essay Short answer Objective type

Unit	Time (Hrs)	Learning Outcomes	Content	Teaching/ Learning Activities	Assessment Methods
			<ul style="list-style-type: none"> Guidelines for documentation Do's and Don'ts of documentation/Legal guidelines for Documentation/Recording Reporting – Change of shift reports, Transfer reports, Incident reports 		
VI	15(T) 20(SL)	<p>Describe principles and techniques of monitoring and maintaining vital signs</p> <p>Assess and record vital signs accurately</p>	<p>Vital signs</p> <ul style="list-style-type: none"> Guidelines for taking vital signs Body temperature– <ul style="list-style-type: none"> Definition, Physiology, Regulation, Factors affecting body temperature Assessment of body temperature – sites, equipment and technique Temperature alterations – Hyperthermia, Heat Cramps, Heat Exhaustion, Heat stroke, Hypothermia Fever/Pyrexia – Definition, Causes, Stages, Types Nursing Management <ul style="list-style-type: none"> Hot and Cold applications Pulse: <ul style="list-style-type: none"> Definition, Physiology and Regulation, Characteristics, Factors affecting pulse Assessment of pulse – sites, equipment and technique Alterations in pulse Respiration: <ul style="list-style-type: none"> Definition, Physiology and Regulation, Mechanics of breathing, Characteristics, Factors affecting respiration Assessment of respirations – technique Arterial Oxygen saturation Alterations in respiration Blood pressure: <ul style="list-style-type: none"> Definition, Physiology and Regulation, Characteristics, Factors affecting BP Assessment of BP – sites, equipment and technique, Common Errors in BP Assessment Alterations in Blood Pressure 	<ul style="list-style-type: none"> Lecture Discussion Demonstration & Re-demonstration 	<ul style="list-style-type: none"> Essay Short answer Objective type Document the given values of temperature, pulse, and respiration in the graphicsheet OSCE
VII	3(T)	Maintain equipment and linen	<ul style="list-style-type: none"> Documenting Vital Signs Equipment and Linen <ul style="list-style-type: none"> Types – Disposables and reusable <ul style="list-style-type: none"> Linen, rubber goods, glassware, metal, plastics, furniture Introduction – Indent, maintenance, Inventory 		

Unit	Time (Hrs)	Learning Outcomes	Content	Teaching/ Learning Activities	Assessment Methods
VIII	10(T) 3(SL)	Describe the basic principles and techniques of infection control and biomedical waste management	Introduction to Infection Control in Clinical Setting <ul style="list-style-type: none"> • Nature of infection • Chain of infection • Types of infection • Stages of infection • Factors increasing susceptibility to infection • Body defenses against infection – Inflammatory response & Immune response • Healthcare associated infection (Nosocomial infection) Introductory concept of Asepsis – Medical & Surgical Asepsis <p>Precautions</p> <ul style="list-style-type: none"> • Hand Hygiene • (Hand washing and use of hand Rub) • Use of Personal Protective Equipment (PPE) • Standard precautions <p>Biomedical Waste management</p> <ul style="list-style-type: none"> • Types of hospital waste, waste segregation and hazards – Introduction 	<ul style="list-style-type: none"> • Lecture • Discussion • Demonstration • Observation of autoclaving and other sterilization techniques • Video presentation on medical & surgical asepsis 	<ul style="list-style-type: none"> • Essay • Short answer • Objective type
IX	15(T) 15(SL)	Identify and meet the comfort needs of the patients	Comfort, Rest & Sleep and Pain <ul style="list-style-type: none"> • Comfort <ul style="list-style-type: none"> ○ Factors Influencing Comfort ○ Types of beds including latest beds, purposes & bed making ○ Therapeutic positions ○ Comfort devices • Sleep and Rest <ul style="list-style-type: none"> ○ Physiology of sleep ○ Factors affecting sleep ○ Promoting Rest and sleep ○ Sleep Disorders • Pain (Discomfort) <ul style="list-style-type: none"> ○ Physiology ○ Common cause of pain ○ Types ○ Assessment – pain scales and narcotic scales 	<ul style="list-style-type: none"> • Lecture • Discussion • Demonstration & Re-demonstration 	<ul style="list-style-type: none"> • Essay • Short answer • Objective type • OSCE

Unit	Time (Hrs)	Learning Outcomes	Content	Teaching/ Learning Activities	Assessment Methods
			<ul style="list-style-type: none"> ○ Pharmacological and Non-pharmacological pain relieving measures – Use of narcotics, TENS devices, PCA ○ Invasive techniques of pain management ○ Any other newer measures ○ CAM (Complementary & Alternative healing Modalities) 		
X	5(T) 3(SL)	Describe the concept of patient environment	Promoting Safety in Health Care Environment <ul style="list-style-type: none"> ● Physical environment – Temperature, Humidity, Noise, Ventilation, Light, Odor, • Demonstration Pest control ● Reduction of Physical hazards – fire, accidents ● Fall Risk Assessment ● Role of nurse in providing safe and clean environment ● Safety devices – <ul style="list-style-type: none"> ○ Restraints – Types, Purposes, Indications, Legal Implications and Consent, Application of Restraints – Skill and Practice guidelines ○ Other Safety Devices – Siderails, Grabbars, Ambu alarms, non-skid slippers etc. 	<ul style="list-style-type: none"> ● Lecture ● Discussion ● Demonstration 	<ul style="list-style-type: none"> ● Essay ● Short answer ● Objective type
XI	6(T) 2(SL)	Explain and perform admission, transfer, and discharge of a patient	Hospital Admission and discharge <ul style="list-style-type: none"> ● Admission to the hospital Unit and preparation of unit <ul style="list-style-type: none"> ○ Admission bed ○ Admission procedure ○ Medico-legal issues ○ Roles and Responsibilities of the nurse ● Discharge from the hospital <ul style="list-style-type: none"> ○ Types – Planned discharge, LAMA and Abscond, Referrals and transfers ○ Discharge Planning ○ Discharge procedure ○ Medico-legal issues ○ Roles and Responsibilities of the nurse 	<ul style="list-style-type: none"> ● Lecture ● Discussion ● Demonstration 	<ul style="list-style-type: none"> ● Essay ● Short answer ● Objective type
XII	8(T) 10(SL)	Demonstrate skill in caring for patients with restricted mobility	Mobility and Immobility <ul style="list-style-type: none"> ○ Care of the unit after discharge ● Elements of Normal Movement, Alignment & Posture, Joint Mobility, Balance, Coordinated Movement 	<ul style="list-style-type: none"> ● Lecture ● Discussion ● Demonstration & 	<ul style="list-style-type: none"> ● Essay ● Short answer ● Objective

Unit	Time (Hrs)	Learning Outcomes	Content	Teaching/ Learning Activities	Assessment Methods
			<ul style="list-style-type: none"> • Principles of body mechanics • Factors affecting Body Alignment and activity • Exercise – Types and benefits • Effects of Immobility • Maintenance of normal Body Alignment and Activity • Alteration in Body Alignment and mobility • Nursing interventions for impaired Body Alignment and Mobility – assessment, types, devices used, method <ul style="list-style-type: none"> ○ Range of motion exercises ○ Muscle strengthening exercises ○ Maintaining body alignment – positions ○ Moving ○ Lifting ○ Transferring ○ Walking • Assisting clients with ambulation • Care of patients with Immobility using Nursing process approach • Care of patients with casts and splints 	Re-demonstration	type • OSCE
XIII	4(T) 2(SL)	Describe the principles and practice of patient education	Patient education <ul style="list-style-type: none"> • Patient Teaching – Importance, Purposes, Process • Integrating nursing process in patient teaching 	• Discussion • Role plays	• Essay • Short answer • Objective type
XIV	20(T) 20(SL)	Explain and apply principles of First Aid during emergencies	First Aid* <ul style="list-style-type: none"> • Definition, Basic Principles, Scope & Rules • First Aid Management <ul style="list-style-type: none"> ○ Wounds, Hemorrhage & Shock ○ Musculoskeletal Injuries – Fractures, Dislocation, Muscle injuries ○ Transportation of Injured persons ○ Respiratory Emergencies & Basic CPR ○ Unconsciousness ○ Foreign Bodies – Skin, Eye, Ear, Nose, Throat & Stomach ○ Burns & Scalds ○ Poisoning, Bites & Stings ○ Frostbite & Effects of Heat ○ Community Emergencies 	• Lecture • Discussion • Demonstration & Re-demonstration • Module completion • National Disaster Management Authority (NDMA) / Indian Red Cross Society (IRCS) First Aid module	• Essay • Short answer • Objective type • OSCE

*Mandatory module

CLINICAL PRACTICUM

Clinical Practicum: 2 Credits (160 hours), 10 weeks × 16 hours per week

PRACTICE COMPETENCIES: On completion of the clinical practicum, the students will be able to

1. Maintain effective human relations (projecting professional image)
2. Communicate effectively with patient, families and team members
3. Demonstrate skills in techniques of recording and reporting
4. Demonstrate skill in monitoring vital signs
5. Care for patients with altered vital signs
6. Demonstrate skill in implementing standard precautions and use of PPE
7. Demonstrate skill in meeting the comfort needs of the patients
8. Provide a safe and clean environment
9. Demonstrate skill in admission, transfer, and discharge of a patient
10. Demonstrate skill in caring for patients with restricted mobility
11. Plan and provide appropriate health teaching following the principles
12. Acquire skills in assessing and performing First Aid during emergencies.

SKILL LAB

Use of Mannequins and Simulators

S.No.	Competencies	Mode of Teaching
1.	Therapeutic Communication and Documentation	Role Play
2.	Vital signs	Simulator/Standardized patient
3.	Medical and Surgical Asepsis	Videos/Mannequin
4.	Pain Assessment	Standardized patient
5.	Comfort Devices	Mannequin
6.	Therapeutic Positions	Mannequin
7.	Physical Restraints and Siderails	Mannequin
8.	ROM Exercises	Standardized patient
9.	Ambulation	Standardized patient
10.	Moving and Turning patients in bed	Mannequin
11.	Changing position of helpless patients	Mannequin/Standardized patient
12.	Transferring patients bed to stretcher/wheelchair	Mannequin/Standardized patient
13.	Admission, Transfer, Discharge & Health Teaching	Role Play



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CLINICAL POSTINGS – General Medical/Surgical

Wards 10 weeks × 16 hours/week = 160 Hours

Clinical Unit	Duration (in Weeks)	Learning Outcomes	Procedural Competencies/Clinical Skills (Supervised Clinical Practice)	Clinical Requirements	Assessment Methods
General Medical/ Surgical wards	2	Maintain effective human relations (projecting professional image) Communicate effectively with patient, families and team members Demonstrate skills in techniques of recording and reporting	Communication and Nurse-patient relationship • Maintaining Communication with patient and family and interpersonal relationship • Documentation and Reporting ○ Documenting patient care and procedures ○ Verbal report ○ Written report		• OSCE
	2	Demonstrate skill in monitoring vital signs Care for patients with altered vital signs Demonstrate skill in implementing standard precautions and use of PPE	Vital signs • Monitor/measure and document vital signs in a graphic sheet ○ Temperature (oral, tympanic, axillary) ○ Pulse (Apical and peripheral pulses) ○ Respiration ○ Blood pressure ○ Pulse oximetry • Interpret and report alteration • Cold Applications – Cold Compress, Ice cap, Tepid Sponging • Care of equipment – thermometer, BP apparatus, Stethoscope, Pulse oximeter <i>Infection control in Clinical settings</i> • Hand hygiene • Use of PPE	• Care of patients with alterations in vital signs-1	• Assessment of clinical skills using checklist • OSCE
	3	Demonstrate skill in meeting the comfort needs of the patients	Comfort, Rest & Sleep, Pain and Promoting Safety in Health Care Environment <i>Comfort, Rest & Sleep</i> • Bedmaking- ○ Open ○ Closed ○ Occupied ○ Post-operative		• Assessment of clinical skills using checklist • OSCE

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Clinical Unit	Duration (in Weeks)	Learning Outcomes	Procedural Competencies/Clinical Skills (Supervised Clinical Practice)	Clinical Requirements	Assessment Methods
			<ul style="list-style-type: none"> ○ Cardiac bed ○ Fracture bed ● Comfort devices <ul style="list-style-type: none"> ○ Pillows ○ Over bed table/cardiactable ○ Backrest ○ Bed Cradle ● Therapeutic Positions <ul style="list-style-type: none"> ○ Supine ○ Fowlers (low, semi, high) ○ Lateral ○ Prone ○ Sims ○ Trendelenburg ○ Dorsal recumbent ○ Lithotomy ○ Knee chest <p><i>Pain</i></p> <ul style="list-style-type: none"> ● Pain assessment and provision for comfort <p><i>Promoting Safety in Health Care Environment</i></p> <ul style="list-style-type: none"> ● Care of Patient's Unit ● Use of Safety devices: <ul style="list-style-type: none"> ○ Side Rails ● Restraints (Physical) ● Fall risk assessment and Post Fall Assessment <p>Hospital Admission and discharge, Mobility and Immobility and Patient education</p> <p><i>Hospital Admission and discharge</i></p> <p>Perform & Document:</p> <ul style="list-style-type: none"> ● Admission ● Transfer ● Planned Discharge 	● Fall risk assessment-1	
	2	Demonstrate skill in admission, transfer, and discharge of a patient	<p>Hospital Admission and discharge, Mobility and Immobility and Patient education</p> <p><i>Hospital Admission and discharge</i></p> <p>Perform & Document:</p> <ul style="list-style-type: none"> ● Admission ● Transfer ● Planned Discharge 		<ul style="list-style-type: none"> ● Assessment of clinical skills using checklist ● OSCE
		Demonstrate skill in caring for patients with restricted mobility	<p><i>Mobility and Immobility</i></p> <ul style="list-style-type: none"> ● Range of Motion Exercises ● Assist patient in: <ul style="list-style-type: none"> ○ Moving 	● Individual teaching-1	<ul style="list-style-type: none"> ● Assessment of clinical skills using checklist ● OSCE

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Clinical Unit	Duration (in Weeks)	Learning Outcomes	Procedural Competencies/Clinical Skills (Supervised Clinical Practice)	Clinical Requirements	Assessment Methods
		Plan and provide appropriate health teaching following the principles	<ul style="list-style-type: none"> ○ Turning ○ Logrolling ● Changing position of helpless patient ● Transferring (Bed to and from chair/wheelchair/stretcher) 		
	1	Demonstrates skills in assessing and performing First Aid during emergencies	First Aid and Emergencies <ul style="list-style-type: none"> ● Bandaging Techniques <ul style="list-style-type: none"> ○ Basic Bandages: <ul style="list-style-type: none"> ▪ Circular ▪ Spiral ▪ Reverse-Spiral ▪ Recurrent ▪ Figure of Eight ○ Special Bandages: <ul style="list-style-type: none"> ▪ Caplin ▪ Eye/Ear Bandage ▪ Jaw Bandage ▪ Shoulder Spica ▪ Thumb spica ▪ Triangular Bandage/Sling (Head & limbs) ▪ Binders 	<ul style="list-style-type: none"> ● Module completion National Disaster Management Authority (NDMA) First Aid module (To complete it in clinicals if not completed during lab) 	<ul style="list-style-type: none"> ● Assessment of clinical skills using checklist ● OSCE (first

APPLIED BIOCHEMISTRY

PLACEMENT: II SEMESTER

THEORY: 2 credits (40 hours) (includes lab hours also)

DESCRIPTION: The course is designed to assist the students to acquire knowledge of the normal biochemical composition and functioning of human body, its alterations in disease conditions and to apply this knowledge in the practice of nursing.

COMPETENCIES: On completion of the course, the students will be able to

1. Describe the metabolism of carbohydrates and its alterations.
2. Explain the metabolism of lipids and its alterations.
3. Explain the metabolism of proteins and amino acids and its alterations.
4. Explain clinical enzymology in various disease conditions.
5. Explain acid-base balance, imbalance and its clinical significance.
6. Describe the metabolism of hemoglobin and its clinical significance.
7. Explain different function tests and interpret the findings.
8. Illustrate the immunochemistry.

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COURSE OUTLINE

T–Theory

	Unit Time (Hrs)	Learning Outcomes	Content	Teaching/ Learning Activities	Assessment Methods
I	8(T)	Describe the metabolism of carbohydrates and its alterations	Carbohydrates <ul style="list-style-type: none"> • Digestion, absorption and metabolism of carbohydrates and related disorders • Regulation of blood glucose • Diabetes Mellitus – type 1 and type 2, symptoms, complications & management in brief • Investigation of Diabetes Mellitus <ul style="list-style-type: none"> ○ OGTT–Indications, Procedure, Interpretation and types of GTT curve ○ Mini GTT, extended GTT, GCT, IVGTT ○ HbA1c (Only definition) • Hypoglycemia–Definition & causes 	<ul style="list-style-type: none"> • Lecture cum Discussion • Explain using charts and slides • Demonstration of laboratory tests 	<ul style="list-style-type: none"> • Essay • Short answer • Very short answer
II	8(T)	Explain the metabolism of lipids and its alterations	Lipids <ul style="list-style-type: none"> • Fatty acids–Definition, classification • Definition & Clinical significance of MUFA & PUFA, Essential fatty acids, Trans fatty acids • Digestion, absorption & metabolism of lipids & related disorders • Compounds formed from cholesterol • Ketone bodies (name, types & significance only) • Lipoproteins–types & functions (metabolism not required) • Lipid profile 	<ul style="list-style-type: none"> • Lecture cum Discussion • Explain using charts and slides • Demonstration of laboratory tests 	<ul style="list-style-type: none"> • Essay • Short answer • Very short answer
III	9(T)	Explain the metabolism of amino acids and proteins Identify alterations in disease conditions	<ul style="list-style-type: none"> • Atherosclerosis (in brief) Proteins <ul style="list-style-type: none"> • Classification of amino acids based on nutrition, metabolic rate with examples • Digestion, absorption & metabolism of protein & related disorders • Biologically important compounds synthesized from various amino acids (only names) • Inborn errors of amino acid metabolism – only aromatic amino acids (in brief) • Plasma protein – types, function & normal values • Causes of proteinuria, hypoproteinemia, hyper-gammaglobulinemia • Principle of electrophoresis, normal & abnormal electrophoretic patterns (in 	<ul style="list-style-type: none"> • Lecture cum Discussion • Explain using charts, model and slides 	<ul style="list-style-type: none"> • Essay • Short answer • Very short answer

Unit	Time (Hrs)	Learning Outcomes	Content	Teaching/ Learning Activities	Assessment Methods
			brief)		
IV	4(T)	Explain clinical enzymology in various disease conditions	Clinical Enzymology <ul style="list-style-type: none"> • Isoenzymes – Definition & properties • Enzymes of diagnostic importance in <ul style="list-style-type: none"> ○ Liver Diseases – ALT, AST, ALP, GGT ○ Myocardial infarction – CK, cardiotroponins, AST, LDH ○ Muscular diseases – CK, Aldolase ○ Bone diseases – ALP ○ Prostate cancer – PSA, ACP 	<ul style="list-style-type: none"> • Lecture cum Discussion • Explain using charts and slides 	<ul style="list-style-type: none"> • Essay • Short answer • Very short answer
V	3(T)	Explain acid base balance, imbalance and its clinical significance	Acid base maintenance <ul style="list-style-type: none"> • pH – definition, normal value • Regulation of blood pH – blood buffer, respiratory & renal • ABG – normal values • Acid base disorders – types, definition & causes 	<ul style="list-style-type: none"> • Lecture cum Discussion • Explain using charts and slides 	<ul style="list-style-type: none"> • Short answer • Very short answer
VI	2(T)	Describe the metabolism of hemoglobin and its clinical significance	Heme catabolism <ul style="list-style-type: none"> • Heme degradation pathway • Jaundice – type, causes, urine & blood investigations (vandenbergt test) 	<ul style="list-style-type: none"> • Lecture cum Discussion • Explain using charts and slides 	<ul style="list-style-type: none"> • Short answer • Very short answer
VII	3(T)	Explain different function tests and interpret the findings	Organ function tests (biochemical parameters & normal values only) <ul style="list-style-type: none"> • Renal • Liver 	<ul style="list-style-type: none"> • Lecture cum Discussion • Visit to Lab 	<ul style="list-style-type: none"> • Short answer • Very short answer
VIII	3(T)	Illustrate the immunochemistry	<ul style="list-style-type: none"> • Thyroid Immunochemistry <ul style="list-style-type: none"> • Structure & functions of immunoglobulin • Investigations & interpretation – ELISA 	<ul style="list-style-type: none"> • Explain using charts and slides • Lecture cum Discussion • Explain using charts and slides • Demonstration of laboratory tests 	<ul style="list-style-type: none"> • Short answer • Very short answer

Note: Few lab hours can be planned for observation and visits (Less than 1 credit, lab hours are not specified separately).

APPLIED NUTRITION AND DIETETICS

PLACEMENT: II SEMESTER

THEORY: 3 credits (60

hours) Theory: 45 hours

Lab: 15 hours

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DESCRIPTION: The course is designed to assist the students to acquire basic knowledge and understanding of the principles of Nutrition and Dietetics and apply this knowledge in the practice of Nursing.

COMPETENCIES: On completion of the course, the students will be able to

1. Identify the importance of nutrition in health and wellness.
2. Apply nutrient and dietary modifications in caring patients.
3. Explain the principles and practices of Nutrition and Dietetics.
4. Identify nutritional needs of different age groups and plan a balanced diet for them.
5. Identify the dietary principles for different diseases.
6. Plan a therapeutic diet for patients suffering from various disease conditions.
7. Prepare meals using different methods and cookery rules.

COURSE OUTLINE

T–Theory

Unit	Time (Hrs)	Learning Outcomes	Content	Teaching/ Learning Activities	Assessment Methods
I	2(T)	Define nutrition and its relationship to Health	Introduction to Nutrition <i>Concepts</i> <ul style="list-style-type: none"> • Definition of Nutrition & Health • Malnutrition – Under Nutrition & Over Nutrition • Role of Nutrition in maintaining health • Factors affecting food and nutrition <i>Nutrients</i> <ul style="list-style-type: none"> • Classification • Macro & Micronutrients • Organic & Inorganic • Energy Yielding & Non-Energy Yielding <i>Food</i> <ul style="list-style-type: none"> • Classification – Food groups • Origin 	<ul style="list-style-type: none"> • Lecture cum Discussion 	<ul style="list-style-type: none"> • Essay • Short answer • Very short answer
II	3(T)	Describe the classification, functions, sources and recommended daily allowances (RDA) of Explain BMR and factors affecting BMR	Carbohydrates <ul style="list-style-type: none"> • Composition – Starches, sugar and cellulose • Recommended Daily Allowance (RDA) • Dietary sources • Functions Energy <ul style="list-style-type: none"> • Unit of energy – Kcal • Basal Metabolic Rate (BMR) • Factors affecting BMR 	<ul style="list-style-type: none"> • Lecture cum Discussion • Charts/Slides • Models • Display of food 	<ul style="list-style-type: none"> • Essay • Short answer • Very short answer
III	3(T)	Describe the classification, Functions, sources	Proteins <ul style="list-style-type: none"> • Composition 	<ul style="list-style-type: none"> • Lecture cum Discussion 	<ul style="list-style-type: none"> • Essay • Short answer • Very short answer

Unit	Time (Hrs)	Learning Outcomes	Content	Teaching/ Learning Activities	Assessment Methods
		and RDA of proteins.	<ul style="list-style-type: none"> • Eight essential amino acids • Functions • Dietary sources • Protein requirements – RDA 	<ul style="list-style-type: none"> • Models • Display of food items 	answer
IV	2(T)	Describe the classification, Functions, sources and RDA of fats	Fats <ul style="list-style-type: none"> • Classification – Saturated & unsaturated • Calorie value • Functions • Dietary sources of fats and fatty acids • Fat requirements – RDA 	<ul style="list-style-type: none"> • Lecture cum Discussion • Charts/Slides • Models • Display of food items 	<ul style="list-style-type: none"> • Essay • Short answer • Very short answer
V	3(T)	Describe the classification, functions, sources and RDA of vitamins	Vitamins <ul style="list-style-type: none"> • Classification – fat soluble & water soluble • Fat soluble – Vitamins A, D, E, and K • Water soluble – Thiamine (vitamin B1), Riboflavin (vitamin B2), Nicotinic acid, Pyridoxine (vitamin B6), Pantothenic acid, Folic acid, Vitamin B12, Ascorbic acid (vitamin C) • Functions, Dietary Sources & Requirements – RDA of every vitamin 	<ul style="list-style-type: none"> • Lecture cum Discussion • Charts/Slides • Models • Display of food items 	<ul style="list-style-type: none"> • Essay • Short answer • Very short answer
VI	3(T)	Describe the classification, functions, sources and RDA of minerals	Minerals <ul style="list-style-type: none"> • Classification – Major minerals (Calcium, phosphorus, sodium, potassium and magnesium) and Trace elements • Functions • Dietary Sources • Requirements – RDA 	<ul style="list-style-type: none"> • Lecture cum Discussion • Charts/Slides • Models • Display of food items 	<ul style="list-style-type: none"> • Short answer • Very short answer
VII	7(T) 8(L)	Describe and plan balanced diet for different age groups, pregnancy, and lactation	Balanced diet <ul style="list-style-type: none"> • Definition, principles, steps • Food guides – Basic Four Food Groups • RDA – Definition, limitations, uses • Food Exchange System • Calculation of nutritive value of foods • Dietary fibre Nutrition across lifecycle <ul style="list-style-type: none"> • Meal planning/Menu planning – Definition, principles, steps • Infant and Young Child Feeding (IYCF) guidelines – breastfeeding, infant foods 	<ul style="list-style-type: none"> • Lecture cum Discussion • Meal planning • Lab session on <ul style="list-style-type: none"> ○ Preparation of balanced diet for different categories ○ Low cost nutritious dishes 	<ul style="list-style-type: none"> • Short answer • Very short answer

Unit	Time (Hrs)	Learning Outcomes	Content	Teaching/ Learning Activities	Assessment Methods
			<p>Children, adolescents and elderly</p> <ul style="list-style-type: none"> • Diet in pregnancy – nutritional requirements and balanced diet plan • Anemia in pregnancy – diagnosis, diet for anemic pregnant women, iron & folic acid supplementation and counseling • Nutrition in lactation – nutritional requirements, diet for lactating mothers, complementary feeding/weaning 		
VIII	6(T)	Classify and describe the common nutritional deficiency disorders and identify nurses' role in assessment, management and prevention	<p>Nutritional deficiency disorders</p> <ul style="list-style-type: none"> • Protein energy malnutrition – magnitude of the problem, causes, classification, signs & symptoms, Severe acute malnutrition (SAM), management & prevention and nurses' role • Childhood obesity – signs & symptoms, assessment, management & prevention and nurses' role • Vitamin deficiency disorders – vitamin A, B, C & D deficiency disorders – causes, signs & symptoms, management & prevention and nurses' role • Mineral deficiency diseases – iron, iodine and calcium deficiencies – causes, signs & symptoms, management & prevention and nurses' role <p>Therapeutic diets</p> <ul style="list-style-type: none"> • Definition, Objectives, Principles • Modifications – Consistency, Nutrients, • Feeding techniques. 	<ul style="list-style-type: none"> • Lecture cum Discussion • Charts/Slides • Models 	<ul style="list-style-type: none"> • Essay • Short answer • Very short answer
IX	4(T) 7(L)	Principles of diets in various diseases	<ul style="list-style-type: none"> • Diet in Diseases – Obesity, Diabetes Mellitus, CVD, Underweight, Renal diseases, Hepatic disorders, Constipation, Diarrhea, Pre and Post-operative period <p>Cookery rules and preservation of nutrients</p> <ul style="list-style-type: none"> • Cooking – Methods, Advantages and Disadvantages • Preservation of nutrients • Measures to prevent loss of nutrients during preparation • Safe food handling and Storage of foods • Food preservation • Food additives and food adulteration 	<ul style="list-style-type: none"> • Lecture cum Discussion • Meal planning • Lab session on preparation of therapeutic diets 	<ul style="list-style-type: none"> • Essay • Short answer • Very short answer
X	3(T)	Describe the rules and preservation of nutrients	<ul style="list-style-type: none"> • Prevention of Food Adulteration Act (PFA) • Food standards 	<ul style="list-style-type: none"> • Lecture cum Discussion • Charts/Slides 	<ul style="list-style-type: none"> • Essay • Short answer • Very short answer

Unit	Time (Hrs)	Learning Outcomes	Content	Teaching/ Learning Activities	Assessment Methods
XI	4(T)	Explain the methods of nutritional assessment and nutrition education	Nutritional assessment and nutrition education <ul style="list-style-type: none"> Objectives of nutritional assessment Methods of assessment – clinical examination, anthropometry, laboratory & biochemical assessment, assessment of dietary intake including Food frequency questionnaire (FFQ) method Nutrition education – purposes, principles and methods 	<ul style="list-style-type: none"> Lecture cum Discussion Demonstration Writing nutritional assessment report 	<ul style="list-style-type: none"> Essay Short answer Evaluation of Nutritional assessment report
XII	3(T)	Describe nutritional problems in India and nutritional programs	National Nutritional Programs and role of nurse <ul style="list-style-type: none"> Nutritional problems in India National nutritional policy National nutritional programs – Vitamin A Supplementation, Anemia Mukd Bharat Program, Integrated Child Development Services (ICDS), Mid-day Meal Scheme (MDMS), National Iodine Deficiency Disorders Control Program (NIDDCP), Weekly Iron Folic Acid Supplementation (WIFS) and others as introduced Role of nurse in every program 	<ul style="list-style-type: none"> Lecture cum Discussion 	<ul style="list-style-type: none"> Essay Short answer Very short answer
XIII	2(T)	Discuss the importance of food hygiene and food safety Explain the Acts related to food safety	Food safety <ul style="list-style-type: none"> Definition, Food safety considerations & measures Food safety regulatory measures in India – Relevant Acts Five keys to safer food Food storage, food handling and cooking General principles of food storage of food items (ex. milk, meat) Role of food handlers in foodborne diseases Essential steps in safe cooking practices 	<ul style="list-style-type: none"> Guided reading on related acts 	<ul style="list-style-type: none"> Quiz Short answer

Foodborne diseases and food poisoning are dealt in Community Health Nursing I.

NURSING FOUNDATION - II (including Health Assessment)

Module) PLACEMENT: II SEMESTER

THEORY: 6 Credits (120 hours)

PRACTICUM: Skill Lab: 3 Credits (120 hours), Clinical: 4 Credits (320 hours)

DESCRIPTION: This course is designed to help novice nursing students develop knowledge and competencies required to provide evidence-based, comprehensive basic nursing care for adult patients, using nursing process approach.

COMPETENCIES: On completion of the course, the students will be able to

- Develop understanding about fundamentals of health assessment and perform health assessment in supervised clinical settings

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2. Demonstrate fundamental skills of assessment, planning, implementation and evaluation of nursing care using Nursing process approach in supervised clinical settings
3. Assess the Nutritional needs of patients and provide relevant care under supervision
4. Identify and meet the hygienic needs of patients
5. Identify and meet the elimination needs of patient
6. Interpret findings of specimen testing applying the knowledge of normal values
7. Promote oxygenation based on identified oxygenation needs of patients under supervision
8. Review the concept of fluid, electrolyte balance integrating the knowledge of applied physiology
9. Apply the knowledge of the principles, routes, effects of administration of medications in administering medication
10. Calculate conversions of drugs and dosages within and between systems of measurements
11. Demonstrate knowledge and understanding in caring for patients with altered functioning of sense organs and unconsciousness
12. Explain loss, death and grief
13. Describe sexual development and sexuality
14. Identify stressors and stress adaptation modes
15. Integrate the knowledge of culture and cultural differences in meeting the spiritual needs
16. Explain the introductory concepts relevant to models of health and illness in patient care

***Mandatory Module used in Teaching/Learning:**

Health Assessment Module: 40 hours

COURSE OUTLINE

T – Theory, SL – Skill Lab

	Unit Time (Hrs)	Learning Outcomes	Content	Teaching/ Learning Activities	Assessment Methods
I	20(T) 20(SL)	Describe the purpose and process of health assessment and perform assessment under supervised clinical practice	Health Assessment <ul style="list-style-type: none"> • Interview techniques • Observation techniques • Purposes of health assessment • Process of Health assessment <ul style="list-style-type: none"> ○ Health history ○ Physical examination: <ul style="list-style-type: none"> ▪ Methods: Inspection, Palpation, Percussion, Auscultation, Olfaction ▪ Preparation for examination: patient and unit ▪ General assessment ▪ Assessment of each body system ▪ Documenting health assessment findings 	<ul style="list-style-type: none"> • Modular Learning • *Health Assessment Module • Lecture • Discussion 	<ul style="list-style-type: none"> • Essay • Short answer • Objective type • OSCE
II	13(T) 8(SL)	Describe assessment, planning,	The Nursing Process <ul style="list-style-type: none"> • Critical Thinking Competencies, • cum Discussion • Demonstration 		<ul style="list-style-type: none"> • Essay • Short answer

implementation
and evaluation of
nursing care using
Nursing process

Attitudes for Critical Thinking, Level of
critical thinking in Nursing

- Nursing Process Overview
 - ed
Clinical Practice
- of
care plan

- Demonstration

- Objectivity type



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Unit	Time (Hrs)	Learning Outcomes	Content	Teaching/ Learning Activities	Assessment Methods
		approach	<ul style="list-style-type: none"> ○ Assessment <ul style="list-style-type: none"> ces, Methods ▪ Organizing Data ▪ Validating Data ▪ Documenting Data ○ Nursing Diagnosis <ul style="list-style-type: none"> ▪ Identification of client problems, risks and strengths ▪ Nursing diagnosis statement – parts, Types, Formulating, Guidelines for formulating Nursing Diagnosis ▪ NANDA approved diagnoses ▪ Difference between medical and nursing diagnosis ○ Planning <ul style="list-style-type: none"> ▪ Types of planning ▪ Establishing Priorities ▪ Establishing Goals and Expected Outcomes – Purposes, types, guidelines, Components of goals and outcome statements ▪ Types of Nursing Interventions, Selecting interventions: Protocols and Standing Orders ▪ Introduction to Nursing Intervention Classification and Nursing Outcome Classification ▪ Guidelines for writing care plan ○ Implementation <ul style="list-style-type: none"> ▪ Process of Implementing the plan of care ▪ Types of care – Direct and Indirect ○ Evaluation <ul style="list-style-type: none"> ▪ Evaluation Process, Documentation and Reporting <p>Nutritional needs</p>		
III	5(T) 5(SL)	Identify and meet the Nutritional needs of patients	<ul style="list-style-type: none"> • Importance • Factors affecting nutritional needs • Assessment of nutritional status • <i>Review:</i> special diets – Solid, Liquid, Soft • <i>Review</i> on therapeutic diets • Care of patient with Dysphagia, 	<ul style="list-style-type: none"> • Lecture • Discussion • Demonstration • Exercise • Supervised Clinical practice 	<ul style="list-style-type: none"> • Essay • Short answer • Objective type • Evaluation of nutritional assessment & diet planning

Unit	Time (Hrs)	Learning Outcomes	Content	Teaching/ Learning Activities	Assessment Methods
			Anorexia, Nausea, Vomiting <ul style="list-style-type: none"> Meeting Nutritional needs: Principles, equipment, procedure, indications <ul style="list-style-type: none"> Oral Enteral: Nasogastric/ Orogastric Introduction to other enteral feeds – types, indications, Gastrostomy, Jejunostomy Parenteral – TPN (Total Parenteral Nutrition) 		
IV	5(T) 15(SL)	Identify and meet the hygienic needs of patients	Hygiene <ul style="list-style-type: none"> Factors Influencing Hygienic Practice Hygienic care: Indications and purposes, effects of neglected care <ul style="list-style-type: none"> Care of the Skin – (Bath, feet and nail, Hair Care) Care of pressure points Assessment of Pressure Ulcers using Braden Scale and Norton Scale Pressure ulcers – causes, stages and manifestations, care and prevention Perineal care/ Meatal care Oral care, Care of Eyes, Ears and Nose including assistive devices (eyeglasses, contact lenses, dentures, hearing aid) 	<ul style="list-style-type: none"> Lecture Discussion Demonstration 	<ul style="list-style-type: none"> Essay Short answer Objective type OSCE
V	10(T) 10(SL)	Identify and meet the elimination needs of patient	Elimination needs <ul style="list-style-type: none"> Urinary Elimination <ul style="list-style-type: none"> Review of Physiology of Urine Elimination, Composition and characteristics of urine Factors Influencing Urination Alteration in Urinary Elimination Facilitating urine elimination: assessment, types, equipment, procedures and special considerations Providing urinal/bedpan Care of patients with <ul style="list-style-type: none"> Condom drainage Intermittent Catheterization Indwelling Urinary catheter and urinary drainage Urinary diversions Bladder irrigation 	<ul style="list-style-type: none"> Lecture Discussion Demonstration 	<ul style="list-style-type: none"> Essay Short answer Objective type OSCE

Unit	Time (Hrs)	Learning Outcomes	Content	Teaching/ Learning Activities	Assessment Methods
			<ul style="list-style-type: none"> Bowel Elimination <ul style="list-style-type: none"> Review of Physiology of Bowel Elimination, Composition and characteristics of feces Factors affecting Bowel elimination Alteration in Bowel Elimination Facilitating bowel elimination: Assessment, equipment, procedures <ul style="list-style-type: none"> Enemas Suppository Bowel wash Digital Evacuation of impacted feces Care of patients with Ostomies (Bowel Diversion Procedures) 		
VI	3(T) 4 (SL)	<p>Explain various types of specimens and identify normal values of tests</p> <p>Develop skill in specimen collection, handling and transport</p>	<p>Diagnostic testing</p> <ul style="list-style-type: none"> Phases of diagnostic testing (pre-test, intra-test & post-test) in Common investigations and clinical implications <ul style="list-style-type: none"> Complete Blood Count Serum Electrolytes LFT Lipid/Lipoprotein profile Serum Glucose – AC, PC, HbA1c Monitoring Capillary Blood Glucose (Glucometer Random Blood Sugar – GRBS) Stool Routine Examination Urine Testing – Albumin, Acetone, pH, Specific Gravity Urine Culture, Routine, Timed Urine Specimen Sputum culture Overview of Radiologic & Endoscopic Procedures 	<ul style="list-style-type: none"> Lecture Discussion Demonstration 	<ul style="list-style-type: none"> Essay Short answer Objective type
VII	11(T) 10 (SL)	Assess patients for oxygenation needs, promote oxygenation and provide care during oxygen therapy	<p>Oxygenation needs</p> <ul style="list-style-type: none"> Review of Cardiovascular and Respiratory Physiology Factors affecting respiratory functioning Alterations in Respiratory Functioning Conditions affecting <ul style="list-style-type: none"> Airway Movement of air 	<ul style="list-style-type: none"> Lecture Discussion Demonstration & Re-demonstration 	<ul style="list-style-type: none"> Essay Short answer Objective type

Unit	Time (Hrs)	Learning Outcomes	Content	Teaching/ Learning Activities	Assessment Methods
			<ul style="list-style-type: none"> ○ Diffusion ○ Oxygentransport ● Alterationsinoxygenation ● Nursinginterventionstopromoteoxygenation: assessment, types,equipmentused& procedure ○ Maintenanceofpatentairway ○ Oxygenadministration ○ Suctioning–oral, tracheal ○ Chestphysiotherapy– Percussion,Vibration&Posturaldrainage ○ CareofChestdrainage– principles& purposes ○ PulseOximetry– Factorsaffecting measurement of oxygensaturation using pulse oximeter,Interpretation ● Restorative&continuingcare ○ Hydration ○ Humidification ○ Coughingtechniques ○ Breathingexercises ○ Incentivespirometry 		
VIII	5(T) 10(SL)	Describe theconcept of fluid,electrolytebalance	Fluid,Electrolyte,andAcid–BaseBalances <ul style="list-style-type: none"> ● ReviewofPhysiologicalRegulationofFluid, Electrolyte and Acid-BaseBalances ● FactorsAffectingFluid,ElectrolyteandAcid-BaseBalances ● Disturbancesinfluidvolume: <ul style="list-style-type: none"> ○ Deficit <ul style="list-style-type: none"> ▪ Hypovolemia ▪ Dehydration ○ Excess <ul style="list-style-type: none"> ▪ Fluidoverload ▪ Edema ● Electrolyteimbalances(hypoandhyper) <ul style="list-style-type: none"> ○ Acid-baseimbalances <ul style="list-style-type: none"> ▪ Metabolic–acidosis&alkalosis ▪ Respiratory–acidosis&alkalosis ○ Intravenoustherapy 	<ul style="list-style-type: none"> ● Lecture ● Discussion ● Demonstration 	<ul style="list-style-type: none"> ● Essay ● Shortanswer ● Objectivetype ● Problemsolving – calculations

Unit	Time (Hrs)	Learning Outcomes	Content	Teaching/ Learning Activities	Assessment Methods
			<ul style="list-style-type: none"> Peripheral venipuncture sites Types of IV fluids Calculation for making IV fluid plan Complications of IV fluid therapy Measuring fluid intake and output Administering Blood and Blood components Restricting fluid intake Enhancing Fluid intake 		
IX	20(T) 22(SL)	<p>Explain the principles, routes, effects of administration of medications</p> <p>Calculate conversions of drugs and dosages within and between systems of measurements</p> <p>Administer oral and topical medication and document accurately under supervision</p>	<p>Administration of Medications</p> <ul style="list-style-type: none"> Introduction – Definition of Medication, Administration of Medication, Drug Nomenclature, Effects of Drugs, Forms of Medications, Purposes, Pharmacodynamics and Pharmacokinetics Factors influencing Medication Action Medication orders and Prescriptions Systems of measurement Medication dose calculation Principles, 10 rights of Medication Administration Errors in Medication administration Routes of administration Storage and maintenance of drugs and Nurses responsibility Terminologies and abbreviations used in prescriptions and medication orders Developmental considerations Oral, Sublingual and Buccal routes: Equipment, procedure Introduction to Parenteral Administration of Drugs – Intramuscular, Intravenous, Subcutaneous, Intradermal: Location of site, Advantages and disadvantages of the specific sites, Indication and contraindications for the different routes and sites. Equipment – Syringes & needles, cannulas, Infusion sets – parts, types, sizes Types of vials and ampoules, Preparing Injectable medicines from vials and ampoules Care of equipment: decontamination and disposal of syringes, needles, 	<ul style="list-style-type: none"> Lecture Discussion Demonstration & Re-demonstration 	<ul style="list-style-type: none"> Essay Short answer Objective type OSCE

Unit	Time (Hrs)	Learning Outcomes	Content	Teaching/ Learning Activities	Assessment Methods
			infusion sets o Prevention of Needle-Stick Injuries • Topical Administration: Types, purposes, site, equipment, procedure o Application to skin & mucous membrane o Direct application of liquids, Gargle and swabbing the throat o Insertion of Drug into body cavity: Suppository/ medicated packing in rectum/vagina o Instillations: Ear, Eye, Nasal, Bladder, and Rectal o Irrigations: Eye, Ear, Bladder, Vaginal and Rectal o Spraying: Nose and throat • Inhalation: Nasal, oral, endotracheal/tracheal (steam, oxygen and medications) – purposes, types, equipment, procedure, recording and reporting of medications administered • Other Parenteral Routes: Meaning of epidural, intrathecal,		
X	5(T) 6(SL)	Provide care to patients with altered functioning of sense organs and unconsciousness in supervised clinical practice components of sensory experience – Reception, Perception & Reaction • Arousal Mechanism • Factors affecting sensory function • Assessment of Sensory alterations – sensory deficit, deprivation, overload & sensory poverty • Management o Promoting meaningful communication (patients with Aphasia, artificial airway & Visual and Hearing impairment) Care of Unconscious Patients • Unconsciousness: Definition, causes & risk factors, pathophysiology, stages of Unconsciousness, Clinical Manifestations • Assessment and nursing management of patient with unconsciousness, complications	intraosseous, intraperitoneal, intrapleural, intra-arterial Sensory needs • Introduction • Demonstration	• Lecture • Discussion • Objective type	• Essay • Short answer

Unit	Time (Hrs)	Learning Outcomes	Content	Teaching/ Learning Activities	Assessment Methods
XI	4(T) 6(SL)	Explain loss, death and grief	Care of Terminally ill, death and dying <ul style="list-style-type: none"> Loss – Types Grief, Bereavement & Mourning Types of Grief responses Manifestations of Grief Factors influencing Loss & Grief Responses Theories of Grief & Loss – Kubler Ross 5 Stages of Dying The R Process model (Rando's) Death – Definition, Meaning, Types (Brain & Circulatory Deaths) Signs of Impending Death Dying patient's Bill of Rights Care of Dying Patient Physiological changes occurring after Death Death Declaration, Certification Autopsy Embalming Last office/Death Care Counseling & supporting grieving relatives Placing body in the Mortuary Releasing body from Mortuary Overview – Medico-legal Cases, Advanced directives, DNI/DNR, Organ Donation, Euthanasia 	<ul style="list-style-type: none"> Lecture Discussion Case discussions Death care/last office 	<ul style="list-style-type: none"> Essay Short answer Objective type
XII	3(T)	Develop basic understanding of self-concept	PSYCHOSOCIAL NEEDS (A-D) A. Self-concept <ul style="list-style-type: none"> Introduction Components (Personal Identity, Body Image, Role Performance, Self Esteem) Factors affecting Self Concept 	<ul style="list-style-type: none"> Lecture Discussion Demonstration Case Discussion/Role play 	<ul style="list-style-type: none"> Essay Short answer Objective type
XIII	2(T)	Describe sexual development and sexuality	<ul style="list-style-type: none"> Nursing Management B. Sexuality <ul style="list-style-type: none"> Sexual development throughout life Sexual health Sexual orientation Factors affecting sexuality 	<ul style="list-style-type: none"> Lecture Discussion 	<ul style="list-style-type: none"> Essay Short answer Objective type

Unit	Time (Hrs)	Learning Outcomes	Content	Teaching/ Learning Activities	Assessment Methods
			<ul style="list-style-type: none"> Prevention of STIs, unwanted pregnancy, avoiding sexual harassment and abuse Dealing with inappropriate sexual behavior 		
XIV	2(T) 4(SL)	Describe stress and adaptation	C. Stress and Adaptation – Introductory concepts <ul style="list-style-type: none"> Introduction Sources, Effects, Indicators & Types of Stress Types of stressors Stress Adaptation – General Adaptation Syndrome (GAS), Local Adaptation Syndrome (LAS) Manifestation of stress – Physical & psychological Coping strategies/Mechanisms Stress Management <ul style="list-style-type: none"> Assist with coping and adaptation Creating therapeutic environment Recreational and diversion therapies 	<ul style="list-style-type: none"> Lecture Discussion 	<ul style="list-style-type: none"> Essay Short answer Objective type
XV	6(T)	<p>Explain culture and cultural norms</p> <p>Integrate cultural differences and spiritual needs in providing care to patients under supervision</p>	D. Concepts of Cultural Diversity and Spirituality <ul style="list-style-type: none"> Cultural diversity <ul style="list-style-type: none"> Cultural Concepts – Culture, Subculture, Multicultural, Diversity, Race, Acculturation, Assimilation Transcultural Nursing Cultural Competence Providing Culturally Responsive Care Spirituality <ul style="list-style-type: none"> Concepts – Faith, Hope, Religion, Spirituality, Spiritual Wellbeing Factors affecting Spirituality Spiritual Problems in Acute, Chronic, Terminal illnesses & Near-Death Experience Dealing with Spiritual Distress/Problems 	<ul style="list-style-type: none"> Lecture Discussion 	<ul style="list-style-type: none"> Essay Short answer Objective type
XVI	6(T)	<p>Explain the significance of nursing theories</p> <p>Analysing & Definition, Purposes, Types of selected nursing theories – Nightingale, Orem, Roy</p> <p>Use of theories in nursing practice</p>	Nursing Theories: Introduction <ul style="list-style-type: none"> Short answer Objective type <p>Discussion of theories with examples, Overview of</p>	<ul style="list-style-type: none"> Lecture 	<ul style="list-style-type: none"> Essay

Analysing & Definition, Purposes, Types of selected nursing theories – Nightingale, Orem, Roy

Use of theories in nursing practice

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CLINICAL PRACTICUM

Clinical: 4 Credits (320 hours)

PRACTICE COMPETENCIES: On completion of the course, the student will be able to

1. Perform health assessment of each body system
2. Develop skills in assessment, planning, implementation and evaluation of nursing care using Nursing process approach
3. Identify and meet the Nutritional needs of patients
4. Implement basic nursing techniques in meeting hygienic needs of patients
5. Plan and Implement care to meet the elimination needs of patient
6. Develop skills in instructing and collecting samples for investigation.
7. Perform simple lab tests and analyze & interpret common diagnostic values
8. Identify patients with impaired oxygenation and demonstrate skill in caring for patients with impaired oxygenation
9. Identify and demonstrate skill in caring for patients with fluid, electrolyte and acid-base imbalances
10. Assess, plan, implement & evaluate the basic care needs of patients with altered functioning of sense organs and unconsciousness
11. Care for terminally ill and dying patients

SKILL LAB

Use of Mannequins and Simulators

S.No.	Competencies	Mode of Teaching
1.	Health Assessment Nutritional	Standardized
2.	Assessment	Patient Standardized
3.	Sponge bath, oral hygiene, perineal care	Na Patient Mannequin
4.	soga strictube feeding	Trainer/
5.	Providing bed pan &	Simulator Mannequin C
6.	urinal Catheter care	atheterization
7.	Bowel wash, enema, insertion of suppository	Trainer Simulator/Man
8.	Oxygen administration – facemask, venture mask, nasal prongs	nequin
9.	Administration of medication through P arenteral route – IM, SC, ID, IV	IM injection trainer, ID injection trainer, IV arm (Trainer)
10.	Last Office	Mannequin

CLINICAL POSTINGS – General Medical/Surgical

Wards (16 weeks × 20 hours per week = 320 hours)

Clinical Unit	Duration (Weeks)	Learning Outcomes	Procedural Competencies/Clinical Skills (Supervised Clinical Practice)	Clinical Requirements	Assessment Methods
General Medical/ Surgical wards	3	Perform health assessment of each body system	Health Assessment <ul style="list-style-type: none"> Nursing/Health history taking Perform physical examination 	<ul style="list-style-type: none"> History Taking – 2 Physical examination – 2 	<ul style="list-style-type: none"> Assessment of clinical skills using check OSCE

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Clinical Unit	Duration (Weeks)	Learning Outcomes	Procedural Competencies/Clinical Skills (Supervised Clinical Practice)	Diagnostic testing	Clinical Requirements
			<ul style="list-style-type: none"> Body systems Use various methods of physical examination – Inspection, Palpation, Percussion, Auscultation, Olfaction Identification of system wise deviations 		<ul style="list-style-type: none"> Nursing process – 1
	1	Develop skills in assessment, planning, implementation and evaluation of nursing care using Nursing process approach	<ul style="list-style-type: none"> Documentation of findings The Nursing Process <ul style="list-style-type: none"> Prepare Nursing care plan for the patient based on the given case scenario 		<ul style="list-style-type: none"> Nutritional Assessment and Clinical Presentation – 1
	2	Identify and meet the Nutritional needs of patients Implement basic nursing techniques in meeting hygienic needs of patients	Nutritional needs, Elimination needs & Diagnostic testing <i>Nutritional needs</i> <ul style="list-style-type: none"> Nutritional Assessment Preparation of Nasogastric tube feed Nasogastric tube feeding <i>Hygiene</i> <ul style="list-style-type: none"> Care of Skin & Hair: <ul style="list-style-type: none"> Sponge Bath/Bed bath Care of pressure points & back massage Pressure sore risk assessment using Braden/Norton scale <ul style="list-style-type: none"> Hair wash Pediculosis treatment 		<ul style="list-style-type: none"> Pressure sore assessment – 1 Clinical Presentation on Care of patient with Constipation – 1
	2	Plan and Implement care to meet the elimination needs of patient Develop skills in instructing and collecting samples for investigation.	<ul style="list-style-type: none"> Oral Hygiene Perineal Hygiene Catheter care Elimination needs <ul style="list-style-type: none"> Providing <ul style="list-style-type: none"> Urinal Bedpan Insertion of Suppository Enema Urinary Catheter care Care of urinary drainage 		<ul style="list-style-type: none"> Lab values – interpretation

Assessment Methods

- Assessment

of clinical

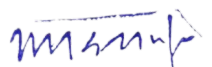
skills using written

- OSCE

- OSCE



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Clinical Unit	Duration (Weeks)	Learning Outcomes	Procedural Competencies/Clinical Skills (Supervised Clinical Practice)	Clinical Requirements	Assessment Methods
		Perform simple lab tests and analyze & interpret common diagnostic values	<ul style="list-style-type: none"> Specimen Collection <ul style="list-style-type: none"> Urinary routine and culture Stool routine Sputum Culture Perform simple Lab Tests using reagent strips <ul style="list-style-type: none"> Urine – Glucose, Albumin, Acetone, pH, Specific gravity 		
	3	<p>Identify patients with impaired oxygenation and demonstrate skill in caring for patients with impaired oxygenation</p> <p>Identify and demonstrate skill in caring for patients with fluid, electrolyte and acid–base imbalances</p>	<ul style="list-style-type: none"> Blood–GRBS Monitoring <p>Oxygenation needs, Fluid, Electrolyte, and Acid – Base Balances</p> <p><i>Oxygenation needs</i></p> <ul style="list-style-type: none"> Oxygen administration methods <ul style="list-style-type: none"> Nasal Prongs Face Mask/Venturi Mask Steam inhalation Chest Physiotherapy Deep Breathing & Coughing Exercises Oral Suctioning <p><i>Fluid, Electrolyte, and Acid – Base Balances</i></p> <ul style="list-style-type: none"> Maintaining intake/output chart Identify & report complications of IV therapy Observe Blood & Blood Component therapy Identify & 		<ul style="list-style-type: none"> Assessment of clinical skills using checklist OSCE Assessment of clinical skills using checklist OSCE
	3	<p>Explain the principles, routes, effects of administration of medications</p> <p>Calculate conversions of drugs and dosages within and between systems of measurements</p>	<p>Report Complications of Blood & Blood Component therapy</p> <p>Administration of Medications</p> <ul style="list-style-type: none"> Calculate Drug Dosages Preparation of lotions & solutions Administer Medications <ul style="list-style-type: none"> Oral Topical Inhalation Parenteral Intradermal Subcutaneous 		<ul style="list-style-type: none"> Assessment of clinical skills using checklist OSCE

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Administer drugs by the following routes–
Oral, Intradermal,

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Clinical Outcomes	Duration Unit	Learning (Weeks)	Procedural Competencies/Clinical Skills (Supervised Clinical Practice)	Clinical Requirements	Assessment Methods
		Subcutaneous, Intra muscular, Intra Venous Topical, inhalation	<ul style="list-style-type: none"> Instillations <ul style="list-style-type: none"> Eye, Ear, Nose –instillation of medicated drops, nasal sprays, irrigations 		
	2	Assess, plan, implement & evaluate the basic care needs of patients with altered functioning of sense organs and unconsciousness Care for terminally ill and dying patients	Sensory Needs and Care of Unconscious patients, Care of Terminally ill, death and dying <i>Sensory Needs and Care of Unconscious patients</i> <ul style="list-style-type: none"> Assessment of Level of Consciousness using Glasgow Coma Scale <i>Terminally ill, death and dying</i> <ul style="list-style-type: none"> Death Care 	<ul style="list-style-type: none"> Nursing rounds on care of patient with altered sensorium 	<ul style="list-style-type: none"> Assessment of clinical skills using checklist Assessment of clinical skills using checklist

HEALTH/NURSING INFORMATICS AND TECHNOLOGY

PLACEMENT: II SEMESTER


THEORY: 2 Credits (40 hours)

PRACTICAL/LAB: 1 Credit (40 hours)

DESCRIPTION: This course is designed to equip novice nursing students with knowledge and skills necessary to deliver efficient informatics-led health care services.

COMPETENCIES: On completion of the course, the students will be able to

- Develop a basic understanding of computer application in patient care and nursing practice.
- Apply the knowledge of computer and information technology in patient care and nursing education, practice, administration and research.
- Describe the principles of health informatics and its use in developing efficient healthcare.
- Demonstrate the use of information system in healthcare for patient care and utilization of nursing data.
- Demonstrate the knowledge of using Electronic Health Records (EHR) system in clinical practice.
- Apply the knowledge of interoperability standards in clinical setting.
- Apply the knowledge of information and communication technology in public health promotion.
- Utilize the functionalities of Nursing Information System (NIS) system in nursing.
- Demonstrate the skills of using data in management of healthcare.
- Apply the knowledge of the principles of digital ethical and legal issues in clinical practice.
- Utilize evidence-based practices in informatics and technology for providing quality patient care.
- Update and utilize evidence-based practices in nursing education, administration, and practice.


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COURSE OUTLINE

T–Theory, P/L–Lab

	Unit Time (Hrs)		Learning Outcomes	Content	Teaching/ Learning Activities	Assessment Methods
	T	P/L				
I	10	15	Describe the importance of computer and technology in patient care and nursing practice	Introduction to computer applications for patient care delivery system and nursing practice <ul style="list-style-type: none"> Use of computers in teaching, learning, research and nursing practice 	<ul style="list-style-type: none"> Lecture Discussion Practical session Supervised clinical practice on EHR use Participate in data analysis using statistical package with statistician Visit to hospitals with different hospital management systems 	(T) <ul style="list-style-type: none"> Short answer Objective type Visit reports Assessment of assignments
			Demonstrate the use of computer and technology in patient care, nursing education, practice, administration and research.	<ul style="list-style-type: none"> Windows, MS office: Word, Excel, PowerPoint Internet Literature research 		(P) <ul style="list-style-type: none"> Assessment of skills using check list
II	4	5	Describe the principles of health informatics Explain the ways data, knowledge and information can be used for effective healthcare	<ul style="list-style-type: none"> Statistical packages Hospital management information system Principles of Health Informatics <ul style="list-style-type: none"> Health informatics – needs, objectives and limitations Use of data, information and knowledge for more effective healthcare and better health 	<ul style="list-style-type: none"> Lecture Discussion Practical session Work in groups with health informatics team in a hospital to extract nursing data and prepare report 	(T) <ul style="list-style-type: none"> Essay Short answer Objective type questions
III	3	5	Describe the concepts of information system in health Demonstrate the use of health information system in hospitals setting	Information Systems in Healthcare <ul style="list-style-type: none"> Introduction to the role and architecture of information systems in modern healthcare environments 	<ul style="list-style-type: none"> Lecture Discussion Demonstration Practical session Working group with nurse leaders to understand the hospital information system 	(T) <ul style="list-style-type: none"> Essay Short answer Objective type
IV	4	4	Explain the use of electronic health records in nursing practice	Shared Care & Electronic Health Records <ul style="list-style-type: none"> Challenges of capturing rich patient histories in a computable 	<ul style="list-style-type: none"> Lecture Discussion Practice on Simulated 	(T) <ul style="list-style-type: none"> Essay Short answer

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ctronic health
records standards
and interoperability

form

- Latest global developments and standards to enable lifelong electronic health records to be integrated from disparate systems.

EHR system

- Practical session
- Visit to health informatics department of a hospital to understand the use of EHR in nursing practice

- Objective type (P)
- Assessment of skills using checklist



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Unit	Time (Hrs)		Learning Outcomes	Content	Teaching/ Learning Activities	Assessment Methods
	T	P/L				
					<ul style="list-style-type: none"> Prepare a report on current EHR standards in Indian setting 	
V	3		Describe the advantages and limitations of health informatics in maintaining patient safety and risk management	<u>Patient Safety & Clinical Risk</u> <ul style="list-style-type: none"> Relationship between patient safety and informatics Function and application of the risk management process 	<ul style="list-style-type: none"> Lecture Discussion 	(T) <ul style="list-style-type: none"> Essay Short answer Objective type
VI	3	6	Explain the importance of knowledge management Describe the standardized languages used in health informatics	<u>Clinical Knowledge & Decision Making</u> <ul style="list-style-type: none"> Role of knowledge management in improving decision-making in both the clinical and policy contexts Systematized Nomenclature of Medicine, Clinical Terms, SNOMED CT to ICD-10-CM Map, standardized nursing terminologies (NANDA, NOC), Omaha system. 	<ul style="list-style-type: none"> Lecture Discussion Demonstration Practical session Work in groups to prepare a report on standardized languages used in health informatics. Visit the health informatics department to understand the standardized languages used in hospital setting 	(T) <ul style="list-style-type: none"> Essay Short answer Objective type
VII	3		Explain the use of information and communication technology in patient care Explain the application of public health informatics	<u>eHealth: Patients and the Internet</u> <ul style="list-style-type: none"> Use of information and communication technology to improve or enable personal and public healthcare Introduction to public health informatics and role of nurses 	<ul style="list-style-type: none"> Lecture Discussion Demonstration 	<ul style="list-style-type: none"> Essay Short answer Objective type Practical exam
VIII	3	5	Describe the functions of nursing information system Explain the use of healthcare data in management of health care organization	<u>Using Information in Healthcare Management</u> <ul style="list-style-type: none"> Components of Nursing Information System (NIS) Evaluation, analysis and presentation of healthcare data to inform decisions in the management of health-care organizations 	<ul style="list-style-type: none"> Lecture Discussion Demonstration on simulated NIS software Visit to health informatics department of the hospital to understand use of healthcare data in decision making 	(T) <ul style="list-style-type: none"> Essay Short answer Objective type
IX	4		Describe the ethical and legal issues in health care informatics	<u>Information Law & Governance</u> <ul style="list-style-type: none"> 	<ul style="list-style-type: none"> Lecture 	(T)

in Clinical Practice

- Ethical-legal issues pertaining to healthcare information in contemporary clinical practice
- Ethical-legal issues related to
 - Discussion
 - Case discussion
 - Roleplay
 - Essay
 - Short answer
 - Objective type


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Unit	Time Outcomes(Hrs)		Content	Teaching/ Learning Activ	Assessment Methods
	T	P/L			
			related to nursing informati	digital health applied to nursing	
X	3		<p>Explain the relevance of evidence-based practices in providing quality healthcare</p> <p><u>Healthcare Quality & Evidence Based Practice</u></p> <ul style="list-style-type: none"> Use of scientific evidence in improving the quality of healthcare and technical and professional informatics standards 	<ul style="list-style-type: none"> Lecture Discussion Case study 	<p>(T)</p> <ul style="list-style-type: none"> Essay Short answer Objective type

SKILLS

- Utilize computer in improving various aspects of nursing practice.
- Use technology in patient care and professional advancement.
- Use data in professional development and efficient patient care.
- Use information system in providing quality patient care.
- Use the information system to extract nursing data.
- Develop skill in conducting literature review.

APPLIED MICROBIOLOGY AND INFECTION CONTROL INCLUDING SAFETY

PLACEMENT: III SEMESTER

THEORY: 2 Credits (40 hours)

PRACTICAL: 1 Credit (40 hours) (Lab/Experiential Learning –L/E)

SECTION A: APPLIED MICROBIOLOGY


THEORY: 20 hours

PRACTICAL: 20 hours (Lab/Experiential Learning –L/E)

DESCRIPTION: This course is designed to enable students to acquire understanding of fundamentals of Microbiology, compare and contrast different microbes and comprehend the means of transmission and control of spread by various microorganisms. It also provides opportunities for practicing infection control measures in hospital and community settings.

COMPETENCIES: On completion of the course, the students will be able to:

- Identify the ubiquity and diversity of microorganisms in the human body and the environment.
- Classify and explain the morphology and growth of microbes.
- Identify various types of microorganisms.
- Explore mechanisms by which microorganisms caused disease.
- Develop understanding of how the human immune system counteracts infection by specific and non-specific mechanisms.
- Apply the principles of preparation and use of vaccines in immunization.
- Identify the contribution of the microbiologist and the microbiology laboratory to the diagnosis of infection.


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COURSE OUTLINE

T–Theory, L/E–Lab/Experiential Learning

Unit	Time		Learning Outcomes	Content	Teaching/ Learning Activities	Assessment Methods
	(Hrs)	T P				
I	3		Explain concepts and principles of microbiology and its importance in nursing	Introduction: <ul style="list-style-type: none"> Importance and relevance to nursing Historical perspective Concepts and terminology Principles of microbiology 	<ul style="list-style-type: none"> Lecture cum Discussion 	<ul style="list-style-type: none"> Short answer Objective type
II	10	10(L/E)	Describe structure, classification, morphology and growth of bacteria. Identify Microorganisms	General characteristics of Microbes: <ul style="list-style-type: none"> Structure and classification of Microbes Morphological types <ul style="list-style-type: none"> Size and form of bacteria Motility Colonization Growth and nutrition of microbes Temperature Moisture Blood and body fluids Laboratory methods for identification of Microorganisms Types of Staining – simple, differential (Gram's, AFB), special – capsular staining (negative), spore, LPCB, KOH mount. Culture and media preparation – solid and liquid. Types of media – semi synthetic, synthetic, enriched, enrichment, selective and differential media. Pure culture techniques – tube dilution, pour, spread, streak plate. Anaerobic cultivation of bacteria 	<ul style="list-style-type: none"> Lecture cum Discussion Demonstration Experiential Learning through visual 	<ul style="list-style-type: none"> Short answer Objective type
III	4	6(L/E)	Describe the different disease-producing organisms	Pathogenic organisms <ul style="list-style-type: none"> Micro-organisms: Cocci – gram positive and gram negative; Bacilli – gram positive and gram negative Viruses Fungi: Superficial and Deep mycoses Parasites Rodents & Vectors <ul style="list-style-type: none"> Characteristics, Source, portal of entry, transmission of infection, Identification of disease-producing micro-organisms 	<ul style="list-style-type: none"> Lecture cum Discussion Demonstration Experiential learning through visual 	<ul style="list-style-type: none"> Short answer Objective type
IV	3	4(L/E)	Explain the concept of	Immunity	<ul style="list-style-type: none"> Lecture 	<ul style="list-style-type: none"> Short answer Objective type

Unit	Time(Hrs)		Learning Outcomes	Content	Teaching/Learning	Assessment
	T	P				
			immunity, hypersensitivity and immunization	<ul style="list-style-type: none"> Immunity: Types, classification Antigen and antibody reaction Hypersensitivity reactions Serological tests Immunoglobulins: Structure, types & properties Vaccines: Types & classification, storage and handling, cold chain, Immunization for various diseases 	<ul style="list-style-type: none"> Discussion Demonstration Visit to observe vaccine storage 	type • Visit report

SECTION B: INFECTION CONTROL & SAFETY

THEORY: 20 hours

PRACTICAL/LAB: 20 hours (Lab/Experiential Learning–L/E)

DESCRIPTION: This course is designed to help students to acquire knowledge and develop competencies required for fundamental patient safety and infection control in delivering patient care. It also focuses on identifying patient safety indicators, preventing and managing hospital-acquired infections, and following universal precautions.

COMPETENCIES: The students will be able to:

- Develop knowledge and understanding of Hospital-acquired Infections (HAI) and effective practices for prevention.
- Integrate the knowledge of isolation (Barrier and reverse barrier) techniques in implementing various precautions.
- Demonstrate and practice steps in Hand washing and appropriate use of different types of PPE.
- Illustrate various disinfection and sterilization methods and techniques.
- Demonstrate knowledge and skills in specimen collection, handling and transport to optimize the diagnosis for treatment.
- Incorporate the principles and guidelines of Bio-Medical waste management.
- Apply the principles of Antibiotic stewardship in performing the nurses' role.
- Identify patient safety indicators and perform the role of nurse in the patient safety audit process.
- Apply the knowledge of International Patient Safety Goals (IPSG) in the patient care settings.
- Identify employee safety indicators and risk of occupational hazards.
- Develop understanding of the various safety protocols and adhere to those protocols.

COURSE OUTLINE

T–Theory, L/E–Lab/Experiential Learning

Unit	Time(Hrs)		Learning	Content	Teaching/ Learning Activ	Assessment Methods
	T	P				
I	2	2(E)	Summarize the evidence based and effective patient care practices for the prevention of common health care associated infections in the health care	HAI (Hospital-acquired Infection) <ul style="list-style-type: none"> Hospital-acquired infection Bundle approach <ul style="list-style-type: none"> Prevention of Urinary Tract Infection (UTI) Prevention of Surgical Site Infection (SSI) Prevention of Ventilator 	<ul style="list-style-type: none"> Lecture & Discussion Experiential 	<ul style="list-style-type: none"> Knowledge assessment MCQ Short answer

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Unit	Time		Learning Outcomes	Content	Teaching/ Learning Activities	Assessment Methods
	(Hrs)	T P				
			setting	Associated events (VAE) - Prevention of Central Line Associated Blood Stream Infection (CLABSI) • Surveillance of HAI – Infection control team & Infection control committee		
II	3	4(L)	Demonstrate appropriate use of different types of PPEs and the critical use of risk assessment	Isolation Precautions and use of Personal Protective Equipment (PPE) • Types of isolation system, standard precaution and transmission-based precautions (Direct Contact, Droplet, Indirect) • Epidemiology & Infection prevention – CDC guidelines • Effective use of PPE	• Lecture • Demonstration & Re-demonstration	• Performance assessment • OSCE
III	1	2(L)	Demonstrate the hand hygiene practice and its effectiveness in infection control	Hand Hygiene • Lecture • Types of Hand hygiene. • Hand washing and use of alcohol hand rub • Moments of Hand Hygiene	• Lecture • Types of Hand hygiene. • Hand washing and use of alcohol hand rub • Moments of Hand Hygiene	• Performance sample • Staff precautions in handling specimens BMW (Bio Medical Waste Management)
IV	1	2(E)	Illustrates disinfection and sterilization in the health care setting	Disinfection and sterilization • Definitions • Types of disinfection and sterilization • Environment cleaning • Equipment Cleaning • Guides on use of disinfectants • Spaulding's principle Specimen Collection (Review) • Principle of specimen collection	• WHO hand hygiene promotion Disinfection and sterilization • Definitions • Types of disinfection and sterilization • Environment cleaning • Equipment Cleaning • Guides on use of disinfectants • Spaulding's principle Specimen Collection (Review) • Principle of specimen collection	Laundry management process and infection control and prevention
V	1		Illustrate on what, when, how, why specimens are collected to optimize the diagnosis for treatment and management.	Specimen Collection (Review) • Principle of specimen collection	• Principle of specimen collection	
VI	2	2(E)	Explain on Bio Medical waste management & laundry management	• Types of specimens • Collection technique and special considerations • Appropriate containers • Transportation of the	• Types of specimens • Collection technique and special considerations • Appropriate containers • Transportation of the	

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• Demonstration & Re-demonstration	assessment	• Checklist
• Lecture		
• Discussion	• Short answer	• Knowledge
• Experiential learning through visit	• Objectivity	• Assessment
• Discussion		
	• Knowledge	• Ability
• Discussion	• Leadership	• Oral
• Demonstration	• Evaluation	• Answer
• Experiential learning through	• Qualitative	• Performance
	• Peer	
	• Formative	
	• Summative	
	• Assessment	


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Unit	Time		Learning Outcomes	Content	Teaching/ Learning Activities	Assessment Methods
	(Hrs)	T P				
				<ul style="list-style-type: none"> Wastemanagementprocessandi nfectionprevention Staffprecautions Laundrymanagement Country ordinance and BMWNational guidelines 2017:Segregation of wastes, Colourcoded waste containers, wastecollection&storage, Packagi ng&labeling, Transportation 	visit	assessment
VII	2		<p>ExplainindetailA about Antibioticstewa rdship,AMR</p> <p>DescribeMRSA /MDRO and itspreventi on</p>	<p>Antibioticstewardship</p> <ul style="list-style-type: none"> ImportanceofAntibiotic Stewardship Anti-MicrobialResistance PreventionofMRSA,MDROinhe althcare setting 	<ul style="list-style-type: none"> Lecture Discussion Writtenassignment –Recent AMR(Antimic robialresistanc e)guidelines 	<ul style="list-style-type: none"> Shortanswer Objectivetype Assessment ofassignment
VIII	3	5(L/E)	<p>Enlistthepatient safetyindicators followedina healthcare organizationand theroleofnurse inthepatient safety auditprocess</p> <p>Captures andanalyzesi ncidents andevents forqualityim provement</p>	<p>PatientSafetyIndicators</p> <ul style="list-style-type: none"> CareofVulnerablepatients PreventionofIatrogenicinjury Careof lines,drainsandtubing's Restrain policy and care – PhysicalandChemical Blood&blood transfusionpolicy PreventionofIVComplication PreventionofFall PreventionofDVT Shiftingandtransportingofpatients Surgicalsafety Care coordination event related to medication reconciliation andadministration Preventionofcommunicationerrors PreventionofHAI Documentation <p>IncidentsandadverseEvents</p> <ul style="list-style-type: none"> Capturingofincidents RCA(RootCauseAnalysis) CAPA(CorrectiveandPreventiveA ction) Reportwriting 	<ul style="list-style-type: none"> Lecture Demonstration Experiential learning 	<ul style="list-style-type: none"> Knowledge assessment Performance assessment Checklist/OSCE

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Unit	Time		Learning Outcomes	Content	Teaching/ Learning Activities	Assessment Methods
	(Hrs)	T P				
					<ul style="list-style-type: none"> • Roleplay • Inquiry Based Learning 	<ul style="list-style-type: none"> • Objectivity type
IX	1		Enumerate IPSG and application of the goals in the patient care settings.	IPSG (International Patients safety Goals) <ul style="list-style-type: none"> • Identify patient correctly • Improve effective communication • Improve safety of High Alert medication • Ensure safe surgery • Reduce the risk of healthcare associated infection • Reduce the risk of patient harm resulting from falls • Reduce the harm associated with clinical alarm system 	<ul style="list-style-type: none"> • Lecture • Roleplay 	<ul style="list-style-type: none"> • Objectivity type
X	2	3(L/E)	Enumerate the various safety protocols and its applications	Safety protocol <ul style="list-style-type: none"> • 5S (Sort, Set in order, Shine, Standardize, Sustain) • Radiation safety • Laser safety • Fire safety <ul style="list-style-type: none"> - Types and classification of fire - Fire alarms - Fire fighting equipment • HAZMAT (Hazardous Materials) safety <ul style="list-style-type: none"> - Types of spill - Spillage management - MSDS (Material Safety Data Sheets) • Environmental safety <ul style="list-style-type: none"> - Risk assessment - Aspect impact analysis - Maintenance of Temp and Humidity (Department wise) - Audits • Emergency Codes 	<ul style="list-style-type: none"> • Lecture • Demonstration/ Experiential learning 	<ul style="list-style-type: none"> • Mock drills • Post tests • Checklist
XI	2		Explain importance of employee safety	<ul style="list-style-type: none"> • Role of Nurse in times of disaster Employee Safety Indicators <ul style="list-style-type: none"> • Vaccination • Needle stick injuries (NSI) 	<ul style="list-style-type: none"> • Lecture • Discussion 	<ul style="list-style-type: none"> • Knowledge assessment by short answer

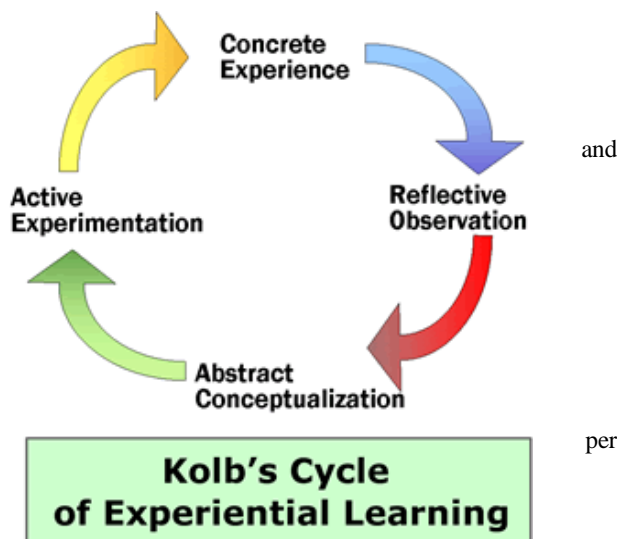
Unit	Time(Hrs)		Learning	Content	Teaching/ Learning Activ	Assessment Methods
	T	P				
			indicators Identify risk of occupational hazards, prevention and post exposure prophylaxis.	prevention <ul style="list-style-type: none"> • Fall prevention • Radiation safety • Annual health check Healthcare Worker Immunization Program and management of occupational exposure <ul style="list-style-type: none"> • Occupational health ordinance • Vaccination program for healthcare staff • Needle stick injuries and prevention and post exposure prophylaxis 	<ul style="list-style-type: none"> • Lecture method • Journal review 	objective type <ul style="list-style-type: none"> • Short answer

*Experiential Learning:

Experiential learning is the process by which knowledge is created through the process of experience in the clinical field. Knowledge results from the combination of grasping

transforming experience. (Kolb, 1984). The experiential learning cycle begins with an experience that the student has had, followed by an opportunity to reflect on that experience. Then students may conceptualize and draw conclusions about what they experienced and observed, leading to future actions in which the student experiments with different behaviors. This begins the new cycle as the students have new experiences based on their experimentation. These steps may occur in nearly any order as the learning progresses. As

the need of the learner, the concrete components and conceptual components can be in different order as they may require a variety of cognitive and affective behaviors.



PHARMACOLOGY-I

PLACEMENT: III SEMESTER

THEORY: I Credit (20 hours)

DESCRIPTION: This course is designed to enable students to acquire understanding of Pharmacodynamics, Pharmacokinetics, principles of therapeutics and nursing implications.

COMPETENCIES: On completion of the course, the students will be able to

1. Describe pharmacodynamics and pharmacokinetics.
2. Review the principles of drug calculation and administration.
3. Explain the commonly used antiseptics and disinfectants.
4. Describe the pharmacology of drugs acting on the GI system.
5. Describe the pharmacology of drugs acting on the respiratory system.
6. Describe drugs used in the treatment of cardiovascular and blood disorders.
7. Explain the drugs used in the treatment of endocrine system disorders.
8. Describe the drugs acting on skin and drugs used to treat communicable diseases.

COURSE OUTLINE

T–Theory

Unit	Time (Hrs)	Learning Outcomes	Content	Teaching/Learning Activities	Assessment Methods
I	3(T)	Describe Pharmacodynamics, Pharmacokinetics, Classification, principles of administration of drugs	Introduction to Pharmacology <ul style="list-style-type: none"> Definitions & Branches Nature & Sources of drugs Dosage Forms and Routes of drug administration Terminology used Classification, Abbreviations, Prescription, Drug Calculation, Weights and Measures <i>Pharmacodynamics</i>: Actions, Drug Antagonism, Synergism, Tolerance, Receptors, Therapeutic, adverse, toxic effects, pharmacovigilance <i>Pharmacokinetics</i>: Absorption, Bioavailability, Distribution, Metabolism, Interaction, Excretion Review: Principles of drug administration and treatment individualization <ul style="list-style-type: none"> Factors affecting dose, route etc. Indian Pharmacopoeia: Legal Issues, Drug Laws, Schedule Drugs Rational Use of Drugs 	<ul style="list-style-type: none"> Lecture cum Discussion Guided reading and written assignment on schedule drugs 	<ul style="list-style-type: none"> Short answer Objective type Assessment of assignments
II	1(T)	Describe antiseptics, and disinfectants & nurse's responsibilities	<ul style="list-style-type: none"> Principles of Therapeutics Pharmacology of commonly used antiseptics and disinfectants <ul style="list-style-type: none"> Antiseptics and Disinfectants Composition, action, dosage, route, indications, contraindications, Drug interactions, side effects, adverse effects, toxicity and role of nurse 	<ul style="list-style-type: none"> Lecture cum Discussion Drug study/presentation 	<ul style="list-style-type: none"> Short answer Objective type
III	2(T)	Describe drugs acting on gastrointestinal system & nurse's responsibilities	Drugs acting on G.I. system <ul style="list-style-type: none"> Pharmacology of commonly used drugs <ul style="list-style-type: none"> Emetics and Antiemetics Laxatives and Purgatives Antacids and antipeptic ulcer drugs Anti-diarrhoeals – Fluid and electrolyte therapy, Furazolidone, dicyclomine Composition, action, dosage, route, indications, contraindications, drug interactions, side effects, adverse effects, toxicity and role of nurse 	<ul style="list-style-type: none"> Lecture cum Discussion Drug study/presentation 	<ul style="list-style-type: none"> Short answer Objective type

Unit	Time (Hrs)	Learning Outcomes	Content	Teaching/Learning Activities	Assessment Methods
IV	2(T)	Describe drugs acting on respiratory system & nurse's responsibilities	Drugs acting on respiratory system <ul style="list-style-type: none"> • Pharmacology of commonly used <ul style="list-style-type: none"> ○ Antiasthmatics – Bronchodilators (Salbutamol inhalers) ○ Decongestants ○ Expectorants, Antitussives and Mucolytics ○ Broncho-constrictors and Antihistamines • Composition, action, dosage, route, indications, contraindications, drug interactions, side effects, adverse effects, toxicity and role of nurse 	<ul style="list-style-type: none"> • Lecture cum Discussion • Drug study/presentation 	<ul style="list-style-type: none"> • Short answer • Objective type
V	4(T)	Describe drugs used on cardio-vascular system & nurse's responsibilities	Drugs used in treatment of Cardiovascular system and blood disorders <ul style="list-style-type: none"> • Haematinics, & treatment of anaemia and antiadrenergics • Cholinergic and anticholinergic • Adrenergic Drugs for CHF & vasodilators • Antianginals • Antiarrhythmics • Antihypertensives • Coagulants & Anticoagulants • Antiplatelets & thrombolytics • Hypolipidemics • Plasma expanders & treatment of shock • Drugs used to treat blood disorders • Composition, action, dosage, route, indications, contraindications, drug interactions, side effects, adverse effects, toxicity and role of nurse 	<ul style="list-style-type: none"> • Lecture cum Discussion • Drug study/presentation 	<ul style="list-style-type: none"> • Short answer • Objective type
VI	2(T)	Describe drugs used in treatment of endocrine system disorders	Drugs used in treatment of endocrine system disorders <ul style="list-style-type: none"> • Insulin & oral hypoglycemics • Thyroid and anti-thyroid drugs • Steroids <ul style="list-style-type: none"> ○ Corticosteroids ○ Anabolic steroids • Calcitonin, parathormone, vitamin D3, calcium metabolism ○ Calcium salts 	<ul style="list-style-type: none"> • Lecture cum Discussion • Drug study/presentation 	<ul style="list-style-type: none"> • Short answer • Objective type

Unit	Time (Hrs)	Learning Outcomes	Content	Teaching/Learning Activities	Assessment Methods
VII	1(T)	Describe drugs used in skin diseases & nurse's responsibilities	Drugs used in treatment of integumentary system <ul style="list-style-type: none"> • Antihistaminics and antipruritics • Topical applications for skin- Benzylbenzoate, Gamma BHC, Clotrimazole, Miconazole, Silver Sulphadiazine (burns) • Composition, action, dosage, route, indications, contraindications, drug interactions, side effects, adverse effects, toxicity and role of nurse 	<ul style="list-style-type: none"> • Lecture cum Discussion • Drug study/presentation 	<ul style="list-style-type: none"> • Short answer • Objective type
VIII	5(T)	Explain drug therapy/chemotherapy of specific infections & infestations & nurse's responsibilities	Drugs used in treatment of communicable diseases (common infections, infestations) <ul style="list-style-type: none"> • General Principles for use of Antimicrobials • Pharmacology of commonly used drugs: <ul style="list-style-type: none"> ○ Penicillin, Cephalosporins, Aminoglycosides, Macrolide & broad spectrum antibiotics, Sulfonamides, quinolones, Misc. antimicrobials • Anaerobic infections • Antitubercular drugs, • Antileprosy drugs • Antimalarials • Antiretroviral drugs • Antiviral agents • Anthelmintics, Antiscabies agents • Antifungal agents • Composition, action, dosage, route, indications, contraindications, Drug interactions, side effects, adverse effects, toxicity and role of nurse 	<ul style="list-style-type: none"> • Lecture cum Discussion • Drug study/presentation 	<ul style="list-style-type: none"> • Short answer • Objective type

PATHOLOGY -I

PLACEMENT: III SEMESTER

THEORY: 1 Credit (20 hours) (includes lab hours also)

DESCRIPTION: This course is designed to enable students to acquire knowledge of pathology of various disease conditions, understanding of genetics, its role in causation and management of defects and diseases and to apply this knowledge in practice of nursing.

COMPETENCIES: On completion of the course, the students will be able to

1. Apply the knowledge of pathology in understanding the deviations from normal to abnormal pathology.
2. Rationalize the various laboratory investigations in diagnosing pathological disorders.
3. Demonstrate the understanding of the methods of collection of blood, body cavity fluids, urine and feces for various tests.

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4. Apply the knowledge of genetics in understanding the various pathological disorders.
5. Appreciate the various manifestations in patients with diagnosed genetic abnormalities.
6. Rationalize the specific diagnostic tests in the detection of genetic abnormalities.
7. Demonstrate the understanding of various services related to genetics.

COURSE OUTLINE

T-Theory

Unit	Time (Hrs)	Learning Outcomes	Content	Teaching/ Learning Activities	Assessment Methods
I	8(T)	Define the common terms used in pathology Identify the deviations from normal to abnormal structure and functions of body system	Introduction <ul style="list-style-type: none"> Importance of the study of pathology Definition of terms in pathology Cell injury: Etiology, pathogenesis of reversible and irreversible cell injury, Necrosis, Gangrene Cellular adaptations: Atrophy, Hypertrophy, Hyperplasia, Metaplasia, Dysplasia, Apoptosis Inflammation: <ul style="list-style-type: none"> Acute inflammation (Vascular and Cellular events, systemic effects of acute inflammation) Chronic inflammation (Granulomatous inflammation, systemic effects of chronic inflammation) Wound healing Neoplasia: Nomenclature, Normal and Cancer cell, Benign and malignant tumors, Carcinoma in situ, Tumor metastasis: general mechanism, routes of spread and examples of each route Circulatory disturbances: Thrombosis, embolism, shock Disturbance of body fluids and electrolytes: Edema, Transudates and Exudates 	<ul style="list-style-type: none"> Lecture Discussion Explaining using slides Explain with clinical scenarios 	<ul style="list-style-type: none"> Short answer Objective type
II	5(T)	Explain pathological changes in disease conditions of various systems	Special Pathology Pathological changes in disease conditions of selected systems: <ol style="list-style-type: none"> Respiratory system <ul style="list-style-type: none"> Pulmonary infections: Pneumonia, Lung abscess, pulmonary tuberculosis Chronic Obstructive Pulmonary Disease: Chronic bronchitis, Emphysema, Bronchial Asthma, Bronchiectasis Tumors of Lungs Cardio-vascular system <ul style="list-style-type: none"> Atherosclerosis Ischemia and Infarction. Rheumatic Heart Disease 	<ul style="list-style-type: none"> Lecture Discussion Explaining using slides, X-rays and scans Visit to pathology lab, endoscopy unit and OT 	<ul style="list-style-type: none"> Short answer Objective type

Unit	Time (Hrs)	Learning Outcomes	Content	Teaching/ Learning Activities	Assessment Methods
			<ul style="list-style-type: none"> • Infective endocarditis 3. Gastrointestinal tract <ul style="list-style-type: none"> • Peptic ulcer disease (Gastric and Duodenal ulcer) • Gastritis-HPylori infection • Oral mucosa: Oral Leukoplakia, Squamous cell carcinoma • Esophageal cancer • Gastric cancer • Intestinal: Typhoid ulcer, Inflammatory Bowel Disease (Crohn's disease and Ulcerative colitis), Colorectal cancer 4. Liver, Gall Bladder and Pancreas <ul style="list-style-type: none"> • Liver: Hepatitis, Amoebic Liver abscess, Cirrhosis of Liver • Gall bladder: Cholecystitis. • Pancreas: Pancreatitis • Tumors of liver, Gall bladder and Pancreas 5. Skeletal system <ul style="list-style-type: none"> • Bone: Bone healing, Osteoporosis, Osteomyelitis, Tumors • Joints: Arthritis - Rheumatoid arthritis and Osteoarthritis 6. Endocrine system <ul style="list-style-type: none"> • Diabetes Mellitus • Goitre • Carcinoma thyroid 		
III	7(T)	Describe various laboratory tests in assessment and monitoring of disease conditions	Hematological tests for the diagnosis of blood disorders <ul style="list-style-type: none"> • Blood tests: Hemoglobin, White cell and platelet counts, PCV, ESR • Coagulation tests: Bleeding time (BT), Prothrombin time (PT), Activated Partial Prothrombin Time (APTT) • Blood chemistry • Blood bank: <ul style="list-style-type: none"> ○ Blood grouping and cross matching ○ Blood components ○ Plasmapheresis ○ Transfusion reactions <p>Note: Few lab hours can be planned for observation and visits (Less than 1 credit, lab hours are not specified separately)</p>	<ul style="list-style-type: none"> • Lecture • Discussion • Visit to clinical lab, biochemistry lab and blood bank 	<ul style="list-style-type: none"> • Short answer • Objective type

ADULT HEALTH NURSING-

WITH INTEGRATED PATHOPHYSIOLOGY (including BCLS module) PLACEMENT: III SEMESTER

THEORY: 7 Credits (140 hours)

PRACTICUM: Lab/Skill Lab (SL) – 1 Credit (40 hours) Clinical – 6 Credits (480 hours)

DESCRIPTION: This course is designed to equip the students to review and apply their knowledge of Anatomy, Physiology, Biochemistry and Behavioral sciences in caring for adult patients with Medical/Surgical disorders using nursing process approach and critical thinking. It also intends to develop competencies required for assessment, diagnosis, treatment, nursing management, and supportive/palliative care to patients with various Medical/Surgical disorders.

COMPETENCIES: On completion of Medical/Surgical Nursing course, students will be able to

1. Explain the etiology, pathophysiology, manifestations, diagnostic studies, treatments and complications of common medical and surgical disorders.
2. Perform complete health assessment to establish a database for providing quality patient care and integrate the knowledge of anatomy, physiology and diagnostic tests in the process of data collection.
3. Identify nursing diagnoses, list them according to priority and formulate nursing care plan.
4. Perform nursing procedures skillfully and apply scientific principles while giving comprehensive nursing care to patients.
5. Integrate knowledge of pathology, nutrition and pharmacology in caring for patients experiencing various medical and surgical disorders.
6. Identify common diagnostic measures related to the health problems with emphasis on nursing assessment and responsibilities.
7. Demonstrate skill in assisting/performing diagnostic and therapeutic procedures.
8. Demonstrate competencies/skills to patients undergoing treatment for medical/surgical disorders.
9. Identify the drugs used in treating patients with medical/surgical conditions.
10. Plan and give relevant individual and group education on significant medical/surgical topics.
11. Maintain a safe environment for patients and the health care personnel in the hospital.
12. Integrate evidence-based information while giving nursing care to patients.

COURSE CONTENT

T–Theory, L/SL –Lab/Skill Lab

Unit	Time Outcomes (Hrs)	Learning Outcomes (Hrs)	Content	Teaching/Learning Activities	Assessment Methods
I	6(T) 4(L/SL)	Narrate the evolution of medical/surgical nursing Apply nursing process in caring for patients with medical/surgical problems Execute the role of a nurse in various medical/surgical Develop skills in assessment and care of wound	Introduction <ul style="list-style-type: none">• Evolution and trends of medical and surgical nursing• International classification of diseases• Roles and responsibility of a nurse in medical and surgical settings<ul style="list-style-type: none">○ Outpatient department○ In-patient unit○ Intensive care unit• Introduction to medical and surgical emergencies<ul style="list-style-type: none">○ Inflammation, infection○ Wound healing – stages, influencing factors	<ul style="list-style-type: none">• Lecture cum discussion• Demonstration & Practice session• Roleplay• Visit to outpatient department, inpatient and	<ul style="list-style-type: none">• Short Answer• OSCE

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Unit	Time (Hrs)	Learning Outcomes	Content	Teaching/ Learning Activities	Assessment Methods
		Develop competency in providing pre and postoperative care	<ul style="list-style-type: none"> Wound care and dressing technique Care of surgical patient <ul style="list-style-type: none"> pre-operative post-operative Alternative therapies used in caring for patients with Medical Surgical Disorders 		
II	15(T) 4(L/SL)	<p>Explain organizational set up of the operating theatre</p> <p>Differentiate the role of scrub nurse and circulating nurse</p> <p>Describe the different positioning for various surgeries</p> <p>Apply principles of asepsis in handling the sterile equipment</p> <p>Demonstrate skill in scrubbing procedures</p> <p>Demonstrate skill in assessing the patient and document accurately the surgical safety checklist</p> <p>Develop skill in assisting with selected surgeries</p> <p>Explain the types, functions, and nursing considerations for different types of anaesthesia</p>	<p>Intraoperative Care</p> <ul style="list-style-type: none"> Organization and physical set up of the operation theatre <ul style="list-style-type: none"> Classification O.T Design Staffing Members of the OT team Duties and responsibilities of the nurse in OT Position and draping for common surgical procedures Instruments, sutures and suture materials, equipment for common surgical procedures Disinfection and sterilization of equipment Preparation of sets for common surgical procedures Scrubbing procedures – Gowning, masking and gloving Monitoring the patient during the procedures Maintenance of the therapeutic environment in OT Assisting in major and minor operation, handling specimen Prevention of accidents and hazards in OT Anaesthesia – types, methods of administration, effects and stages, equipment & drugs Legal aspects 	<ul style="list-style-type: none"> Lecture cum Discussion Demonstration, Practice session, and Case Discussion Visit to receiving bay 	<ul style="list-style-type: none"> Caring for patient intraoperatively Submit a list of disinfectants used for instruments with the action and precaution
III	6(T) 4(L/SL)	<p>Identify the signs and symptoms of shock and electrolyte imbalances</p> <p>Develop skills in managing fluid and electrolyte imbalances</p>	<p>Nursing care of patients with common signs and symptoms and management</p> <ul style="list-style-type: none"> Fluid and electrolyte imbalance Shock Pain 	<ul style="list-style-type: none"> Lecture, discussion, demonstration Case discussion 	<ul style="list-style-type: none"> Short answer MCQ Case report

Unit	Time (Hrs)	Learning Outcomes	Content	Teaching/ Learning Activities	Assessment Methods
		Perform pain assessment and plans for the nursing management	and stomach care		and physical assessment • GI investigations • Common GI disorders:
IV	18(T) 4(L)	Demonstrate skill in respiratory assessment Differentiates different breath sounds and list the indications Explain the etiology, pathophysiology, clinical manifestations, diagnostic tests, and medical, surgical, nutritional, and nursing management of common respiratory problems Describe the health behaviour to be adopted in preventing respiratory illnesses		Nursing Management of patients with respiratory problems • Review of anatomy and physiology of respiratory system • Nursing Assessment – history taking, physical assessment and diagnostic tests • Common respiratory problems: ○ Upper respiratory tract infections ○ Chronic obstructive pulmonary diseases ○ Asthma ○ Pleural effusion, Empyema ○ Bronchiectasis	○ Oral cavity: lips, gums and teeth ○ GI: Bleeding, Infections, Inflammation, tumors, Obstruction, Perforation & Peritonitis ○ Peptic & duodenal ulcer, ○ Mal-absorption, Appendicitis, Hernias ○ Hemorrhoids, fissures, Fistulas ○ Pancreas: inflammation, cysts, and tumors
V	16(T) 5(L)	Explain the etiology, pathophysiology, clinical manifestations, diagnostic tests, and medical, surgical, nutritional, and nursing management of gastrointestinal disorders Demonstrate skill in gastrointestinal assessment Prepare patient for upper and lower gastrointestinal investigations		○ Pneumonia ○ Lung abscess ○ Cyst and tumors ○ Chest Injuries ○ Acute respiratory distress syndrome ○ Pulmonary embolism • Health behaviour to prevent respiratory illness Nursing Management of patients with disorder of digestive system • Review of anatomy and physiology of GI system	

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- Lecture,discussion,
 - Demonstration
 - Practicesession
 - Casepresentation
 - VisittoPFTLab
 - Essay
 - Shortanswer
 - OSCE

- Lecture,Discussion
- Demonstration,
- Roleplay
- Problem BasedLearning
- Visittostomaclinic
- Shortanswer
- Quiz
- OSCE



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Unit	Time (Hrs)	Learning Outcomes	Content	Teaching/ Learning Activities	Assessment Methods
		Demonstrate skill in different feeding techniques	<ul style="list-style-type: none"> ○ Liver: inflammation, cysts, abscess, cirrhosis, portal hypertension, hepatic failure, tumors ○ Gallbladder: inflammation, Cholelithiasis, tumors ● Gastric decompression, gavage and stomach care, different feeding techniques ● Alternative therapies, drugs used in treatment of disorders of digestive system 		
VI	20(T) 5(L)	<p>Explain the etiology, pathophysiology, clinical manifestations, diagnostic tests, and medical, surgical, nutritional, and nursing management of cardiovascular disorders</p> <p>Demonstrate skill in cardiovascular assessment</p> <p>Prepare patient for invasive and non-invasive cardiac procedures</p> <p>Demonstrate skill in monitoring and interpreting clinical signs related to cardiac disorders</p> <p>Complete BLS/BCLS module</p>	<p>Nursing Management of patients with cardiovascular problems</p> <ul style="list-style-type: none"> ● Review of anatomy and physiology of cardiovascular system ● Nursing Assessment: History and Physical assessment ● Invasive & non-invasive cardiac procedures ● Disorders of vascular system- Hypertension, arteriosclerosis, Raynaud's disease, aneurysm and peripheral vascular disorders ● Coronary artery diseases: coronary atherosclerosis, Angina pectoris, myocardial infarction ● Valvular disorders: congenital and acquired ● Rheumatic heart disease: pericarditis, myocarditis, endocarditis, cardiomyopathies ● Cardiac dysrhythmias, heart block ● Congestive heart failure, cor pulmonale, pulmonary edema, cardiogenic shock, cardiac tamponade 	<ul style="list-style-type: none"> ● Lecture, discussion ● Demonstration ● Practice session ● Case Discussion ● Health education ● Drug Book/presentation ● Completion of BCLS Module 	<ul style="list-style-type: none"> ● Care plan ● Drug record ● BLS/ BCLS evaluation
VII	7(T) 3(L)	<p>Explain the etiology, pathophysiology, clinical manifestations, diagnostic tests, and medical, surgical, nutritional, and nursing management of hematological disorders</p> <p>Interpret blood reports</p>	<p>Nursing Management of patients with disorders of blood</p> <ul style="list-style-type: none"> ● Cardiopulmonary arrest ● Review of Anatomy and Physiology of blood ● Nursing assessment: history, physical assessment & Diagnostic tests ● Anemia, Polycythemia ● Bleeding Disorders: clotting factor defects and platelet defects, thalassemia, leukemia, leukopenia, 	<ul style="list-style-type: none"> ● Field visit to blood bank ● Counseling 	<ul style="list-style-type: none"> ● Interpretation of blood reports ● Visit report

Unit	Time (Hrs)	Learning Outcomes	Content	Teaching/ Learning Activities	Assessment Methods
		Prepare and provide health education on blood donation	agranulocytosis • Lymphomas, myelomas		
VIII	8(T) 2(L)	Explain the etiology, pathophysiology, clinical manifestations, diagnostic tests, and medical, surgical, nutritional, and nursing management of endocrine disorders Demonstrates skill in assessment of endocrine mellitus organ dysfunction Prepare and provide health education on diabetic diet	Nursing management of patients with disorders of endocrine system • Review of anatomy and physiology of endocrine system • Nursing Assessment – History and Physical assessment • Disorders of thyroid and Parathyroid, Adrenal and Pituitary (Hyper, Hypo, tumors) • Diabetes	• Lecture, discussion, demonstration • Practice session • Case Discussion • Health education	• Prepare health education on self-administration of insulin • Submits diabetic diet plan
IX	8(T) 2(L)	Demonstrate skill in insulin administration Explain the etiology, pathophysiology, clinical manifestations, diagnostic tests, and medical, surgical, nutritional, and nursing management of disorders of integumentary system Demonstrate skill in integumentary assessment Demonstrate skill in medicated bath Prepare and provide health education on skin care	Nursing management of patients with disorders of Integumentary system • Review of anatomy and physiology of skin • Nursing Assessment: History and Physical assessment • Infection and infestations; Dermatitis • Dermatoses; infectious and Non-infectious • Acne, Allergies, Eczema & Pemphigus • Psoriasis, Malignant melanoma, Alopecia • Special therapies, alternative therapies • Drugs used in treatment of disorders of integumentary system	• Lecture, discussion • Demonstration • Practice session • Case Discussion	• Drug report • Preparation of Home care plan
X	16(T) 4(L)	Explain the etiology, pathophysiology, clinical manifestations, diagnostic tests, and medical, surgical, nutritional, and nursing management of musculoskeletal disorders	Nursing management of patients with musculoskeletal problems • Review of Anatomy and physiology of the musculoskeletal system • Nursing Assessment: History and physical assessment, diagnostic tests • Musculoskeletal trauma: Dislocation, fracture, sprain, strain,	• Lecture/ • Discussion • Demonstration • Case Discussion • Health education	• Nursing care plan • Prepare health teaching on care of patient with cast

Unit	Time (Hrs)	Learning Outcomes	Content	Teaching/ Learning Activities	Assessment Methods
		<p>Demonstrate skill in musculoskeletal assessment</p> <p>Prepare patient for radiological and non-radiological investigations of musculoskeletal system</p> <p>Demonstrate skill in crutch walking and splinting</p> <p>Demonstrate skill in care of patient with replacement surgeries</p>	<p>contusion, amputation</p> <ul style="list-style-type: none"> Musculoskeletal infections and tumors: Osteomyelitis, benign and malignant tumour Orthopedic modalities: Cast, splint, traction, crutch walking Musculoskeletal inflammation: Bursitis, synovitis, arthritis Special therapies, alternative therapies Metabolic bone disorder: Osteoporosis, osteomalacia and Paget's disease Spinal column defects and deformities – tumor, prolapsed intervertebral disc, Pott's spine Rehabilitation, prosthesis Replacement surgeries 		
XI	20(T) 3(L)	<p>Prepare and provide health education on bone healing</p> <p>Explain the etiology, pathophysiology, clinical manifestations, diagnostic tests, and medical, surgical, nutritional, and nursing management of patients with communicable diseases</p> <p>Demonstrate skill in barrier and reverse barrier techniques</p> <p>Demonstrate skill in execution of different isolation protocols</p>	<p>Nursing management of patients with Communicable diseases</p> <ul style="list-style-type: none"> Overview of infectious diseases, the infectious process Nursing Assessment: History and Physical assessment, Diagnostic tests Tuberculosis Diarrhoeal diseases, hepatitis A-E, Typhoid Herpes, chickenpox, Smallpox, Measles, Mumps, Influenza Meningitis Gangrene Leprosy Dengue, Plague, Malaria, Chikungunya, swine flu, Filariasis Diphtheria, Pertussis, Tetanus, Poliomyelitis COVID-19 Special infection control measures: Notification, Isolation, Quarantine, Immunization 	<ul style="list-style-type: none"> Lecture, discussion, demonstration Practical session Case Discussion/seminar Health education Drug Book/presentation Refer TB Control & Management module 	<ul style="list-style-type: none"> Prepares and submits protocol on various isolation techniques

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CLINICAL PRACTICUM

CLINICAL PRACTICUM: 6 Credits (480 hours) - 18 weeks × 27 hours

PRACTICE COMPETENCIES: On completion of the clinical practicum, the students will be able to apply nursing process and critical thinking in delivering holistic nursing care including rehabilitation to the adult patients undergoing surgery, with shock and fluid and electrolyte imbalance and with selected medical & surgical conditions i.e., Gastrointestinal, Respiratory, Endocrine, Orthopedic, Dermatology and Cardiovascular disorders.

The students will be competent to:

- Utilize the nursing process in providing care to the sick adults in the hospital:
 - Perform complete health assessment to establish a database for providing quality patient care.
 - Integrate the knowledge of diagnostic tests in the process of data collection.
 - Identify nursing diagnoses and list them according to priority.
 - Formulate nursing care plan, using problem-solving approach.
 - Apply scientific principles while giving nursing care to patients.
 - Perform nursing procedures skillfully on patients.
 - Establish/develop interpersonal relationship with patients and family members.
 - Evaluate the expected outcomes and modify the plan according to the patient needs.
- Provide comfort and safety to adult patients in the hospital.
- Maintain a safe environment for patients during hospitalization.
- Explain nursing actions appropriately to the patients and family members.
- Ensure patient safety while providing nursing procedures.
- Assess the educational needs of the patient and their family related to medical and surgical disorders and provide appropriate health education to patients.
- Provide pre, intra and post-operative care to patients undergoing surgery.
- Integrate knowledge of pathology, nutrition and pharmacology for patients experiencing various medical and surgical disorders.
- Integrate evidence-based information while giving nursing care to patients.
- Demonstrate the awareness of legal and ethical issues in nursing practice.

I. NURSING MANAGEMENT OF PATIENTS WITH MEDICAL CONDITIONS

A. Skill Lab

Use of manikins and simulators

- Intravenous therapy
- Oxygen through mask
- Oxygen through nasal prongs
- Venturi mask
- Nebulization
- Chest physiotherapy

B. Clinical Postings

Clinical	Duration Learning area/unit (weeks)	Outcomes	Procedural Competencies/ Clinical Skills	Clinical Requirements	Assessment Methods
General	4	Develop skill in medical intravenous injection administration	<ul style="list-style-type: none">Intravenous therapy<ul style="list-style-type: none">IV cannulationIV maintenance and monitoringAdministration of IV medication	<ul style="list-style-type: none">Care Study-1Health education presentation/Care	<ul style="list-style-type: none">Clinical evaluationOSCECare Study

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		Assist with diagnostic procedures Develop skill in the management of patients with Respiratory problems Develop skill in managing patients with metabolic abnormality	<ul style="list-style-type: none"> Care of patient with Central line Preparation and assisting and monitoring of patients undergoing diagnostic procedures such as thoracentesis, Abdominal paracentesis Management of patients with respiratory problems Administration of oxygen through mask, nasal prongs, venturi mask Pulse oximetry Nebulization Chest physiotherapy Postural drainage Oropharyngeal suctioning Care of patient with chest drainage Diet Planning <ul style="list-style-type: none"> High Protein diet Diabetic diet Insulin administration 	note)-1	evaluation <ul style="list-style-type: none"> Care Note/Clinical presentation
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• Monitoring GRBS

II. NURSING MANAGEMENT OF PATIENTS WITH SURGICAL CONDITIONS

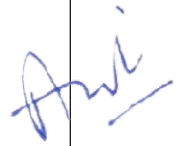
A. Skill Lab

Use of manikins and simulators

- Nasogastric aspiration
- Surgical dressing
- Suture removal
- Colostomy care/ileostomy care
- Enteral feeding

B. Clinical Postings

Clinical	Duration Learning area/unit (Weeks)	Outcomes	Procedural Competencies/ Clinical Skills	Clinical Requirements	Assessment Methods
General surgical wards	4	Develop skill in caring for patients during pre- and post- Assist with diagnostic procedures Develop skill in managing patient with Gastro-	<ul style="list-style-type: none"> Pre-Operative care Immediate Post-operative care Post-operative exercise Pain assessment Pain Management Assisting diagnostic procedure and after care of patients undergoing <ul style="list-style-type: none"> Colonoscopy ERCP Endoscopy Liver Biopsy 	<ul style="list-style-type: none"> Care study-1 Health teaching 	<ul style="list-style-type: none"> Clinical evaluation, OSCE Care study Care note/Clinical presentation


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		Develop skill in wound management	<ul style="list-style-type: none"> • Nasogastric aspiration • Gastrostomy/Jejunostomy feeds • Ileostomy/Colostomy care • Surgical dressing • Suture removal • Surgical soak • Sitz bath • Care of drain 		
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III. NURSING MANAGEMENT OF PATIENTS WITH CARDIAC CONDITIONS

A. Skill Lab

Use of manikins and simulators

- Cardiovascular assessment
- Interpreting ECG
- BLS/BCLS
- CPR
- ABG analysis
- Taking blood sample
- Arterial blood gas analysis – interpretation

B. Clinical Postings

Clinical area/unit	Duration (Weeks)	Learning Outcomes	Procedural Competencies/ Clinical Skills	Clinical Requirements	Assessment Methods
Cardiology wards	2	<p>Develop skill in management of patients with cardiac problems</p> <p>Develop skill in management of patients with disorders of blood</p>	<ul style="list-style-type: none"> • Cardiac monitoring • Recording and interpreting ECG • Arterial blood gas analysis – interpretation • Administer cardiac drugs • Preparation and after care of patients for cardiac catheterization • CPR • Collection of blood sample for: <ul style="list-style-type: none"> ○ Blood grouping/cross matching ○ Blood sugar ○ Serum electrolytes • Assisting with blood transfusion • Assisting for bone marrow aspiration • Application of anti-embolism stockings (TED hose) • Application/maintenance of sequential compression device 	<ul style="list-style-type: none"> • Cardiac assessment – 1 • Drug presentation – 1 	<ul style="list-style-type: none"> • Clinical evaluation • Drug presentation

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IV. NURSING MANAGEMENT OF PATIENTS WITH DISORDERS OF INTEGUMENTARY SYSTEM

A. Skill Lab

Use of manikins and
simulators. Application of topical medication
on

B. Clinical Postings

Clinical area/unit	Duration (Weeks)	Learning Outcomes	Procedural Competencies/Clinical Skills	Clinical Requirements	Assessment Methods
Dermatology wards	1	Develop skill in management of patients with disorders of integumentary system	<ul style="list-style-type: none"> Intradermal injection - Skin allergy testing Application of topical medication 		<ul style="list-style-type: none"> Clinical evaluation

V. NURSING MANAGEMENT OF PATIENTS WITH COMMUNICABLE DISEASES

A. Skill Lab

- Barrier Nursing
- Reverse Barrier Nursing
- Standard precautions

B. Clinical Postings

Clinical area/unit	Duration (Weeks)	Learning Outcomes	Procedural Competencies/Clinical Skills	Clinical Requirements	Assessment Methods
Isolation ward	1	Develop skill in the management of patients requiring isolation	<ul style="list-style-type: none"> Barrier Nursing Reverse barrier nursing Standard precautions (Universal precaution), use of PPE, needle stick and sharp injury prevention, Cleaning and disinfection, Respiratory hygiene, waste disposal and safe injection practices 	<ul style="list-style-type: none"> Care Note-1 	<ul style="list-style-type: none"> Clinical evaluation Care note

VI. NURSING MANAGEMENT OF PATIENTS WITH MUSCULOSKELETAL PROBLEMS

A. Skill Lab

Use of manikins and simulators

- Range of motion exercises
- Muscle strengthening exercises
- Crutch walking

B. Clinical Postings

Clinical area/unit	Duration (Weeks)	Learning Outcomes	Procedural Competencies/Clinical Skills	Clinical Requirements	Assessment Methods
Orthopedic wards	2	Develop skill in management of patients with musculoskeletal problems	<ul style="list-style-type: none"> Preparation of patient with Myelogram/CT/MRI Assisting with application & removal of POP/Cast Preparation, assisting and aftercare 	<ul style="list-style-type: none"> Care Note-1 	<ul style="list-style-type: none"> Clinical evaluation, Care note

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			traction/skeletal traction • Care of orthotics • Muscle strengthening exercises • Crutch walking • Rehabilitation		
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VII. NURSING MANAGEMENT OF PATIENTS IN THE OPERATING ROOMS

A. Skill Lab

Use of manikins and simulators

- Scrubbing, gowning and gloving
- Orientation to instruments for common surgeries
- Orientation to suture materials
- Positioning

B. Clinical Postings

Clinical area/unit	Duration (Weeks)	Learning Outcomes	Procedural Competencies/ Clinical Skills	Clinical Requirements	Assessment Methods
Operation theatre	4	Develop skill in caring for intraoperative patients	• Position and draping • Preparation of operation table • Setup of trolley with instrument • Assisting in major and minor operation • Disinfection and sterilization of equipment • Scrubbing procedures – Gowning, masking and gloving • Intraoperative monitoring	• Assist as • Clinical circulatory nurse – 4 • Positioning & draping – 5 • Assist as scrub nurse in major surgeries – 4	nurse – evaluation • OSCE

PHARMACOLOGY-II

including Fundamentals of Prescribing Module

PLACEMENT: IV SEMESTER

THEORY: 3 Credits (60 hours)

DESCRIPTION: This course is designed to enable students to acquire understanding of Pharmacodynamics, Pharmacokinetics, principles of therapeutics & nursing implications. Further it develops understanding of fundamental principles of prescribing in students.

COMPETENCIES: On completion of the course, the students will be able to

1. Explain the drugs used in the treatment of ear, nose, throat and eye disorders.
2. Explain the drugs used in the treatment of urinary system disorders.
3. Describe the drugs used in the treatment of nervous system disorders.
4. Explain the drugs used for hormonal replacement and for the pregnant women during antenatal, intra natal and postnatal period.
5. Explain the drugs used to treat emergency conditions and immuned disorders.
6. Discuss the role and responsibilities of nurse towards safe administration of drugs used to treat disorders of various systems with basic understanding of pharmacology.
7. Demonstrate understanding about the drugs used in an alternative system of medicine.
8. Demonstrate understanding about the fundamental principles of prescribing.

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COURSE OUTLINE

T–Theory

	Unit Time (Hrs)	Learning Outcomes	Content	Teaching/ Learning Activities	Assessment Methods
I	4(T)	Describe drugs used in disorders of ear, nose, throat and eye and nurses' responsibilities	Drugs used in disorders of ear, nose, throat & Eye <ul style="list-style-type: none"> Antihistamines Topical applications for eye (Chloramphenicol, Gentamycin eyedrops), ear (Sodaglycerin, boric acid), nose and buccal cavity-chlorhexidine mouthwash Composition, action, dosage, route, indications, contraindications, drug interactions, side effects, adverse effects, toxicity and role of nurse 	<ul style="list-style-type: none"> Lecture cum Discussion Drug study/presentation 	<ul style="list-style-type: none"> Short answer Objective type
II	4(T)	Describe drugs acting on urinary system & nurse's responsibilities	Drugs used on urinary system <ul style="list-style-type: none"> Pharmacology of commonly used drugs <ul style="list-style-type: none"> Renin-angiotensin system Diuretics and antidiuretics Drugs toxic to kidney Urinary antiseptics Treatment of UTI – acidifiers and alkalinizers Composition, action, dosage, route, indications, contraindications, drug interactions, side effects, adverse effect toxicity and role of nurse 	<ul style="list-style-type: none"> Lecture cum Discussion Drug study/presentation 	<ul style="list-style-type: none"> Short answer Objective type
III	10 (T)	Describe drugs used on nervous system & nurse's responsibilities	Drugs acting on nervous system <ul style="list-style-type: none"> Basis & applied pharmacology of commonly used drugs Analgesics and anaesthetics <ul style="list-style-type: none"> Analgesics: Non-steroidal anti-inflammatory (NSAID) drugs Antipyretics Opioids & other central analgesics <ul style="list-style-type: none"> General (techniques of GA, pre-anesthetic medication) & local anesthetics Gases: oxygen, nitrous oxide, carbon-dioxide & others Hypnotics and sedatives Skeletal muscle relaxants Antipsychotics Mood stabilizers 	<ul style="list-style-type: none"> Lecture cum Discussion Drug study/presentation 	<ul style="list-style-type: none"> Short answer Objective type

Unit	Time (Hrs)	Learning Outcomes	Content	Teaching/ Learning Activities	Assessment Methods
			<ul style="list-style-type: none"> Antidepressants Antianxiety Drugs Anticonvulsants Drugs for neurodegenerative disorders & miscellaneous drugs Stimulants, ethyl alcohol and treatment of methyl alcohol poisoning Composition, action, dosage, route, indications, contraindications, drug interactions, side effects, 		
IV	5(T)	Describe drugs used for hormonal disorder & supplementation, contraception & medical termination of pregnancy & nurse's responsibilities	adverse effect, toxicity and role of nurse Drugs used for hormonal, disorders and supplementation, contraception and medical termination of pregnancy <ul style="list-style-type: none"> Estrogens and progesterones <ul style="list-style-type: none"> Oral contraceptives and hormone replacement therapy Vaginal contraceptives Drugs for infertility and medical termination of pregnancy <ul style="list-style-type: none"> Uterine stimulants and relaxants Composition, actions dosage route indications contraindications, 	<ul style="list-style-type: none"> Lecture cum Discussion Drug study/presentation 	<ul style="list-style-type: none"> Short answer Objective type
V	3(T)	Develop understanding about important drugs used for women before, during and after labour	drugs interactions, side effects, adverse effects, toxicity and role of nurse Drugs used for pregnant women during antenatal, labour and postnatal period <ul style="list-style-type: none"> Tetanus prophylaxis Iron and Vit K1 supplementation Oxytocin, Misoprostol Ergometrine Methyl prostaglandin F2-alpha 	<ul style="list-style-type: none"> Lecture cum Discussion Drug study/presentation 	<ul style="list-style-type: none"> Short answer Objective type
VI	10(T)	Describe drugs used in Miscellaneous deaddiction, emergency, poisoning, vitamins & mineral supplementation, drugs used for immunization & immune-suppression & nurse's responsibilities	<ul style="list-style-type: none"> Magnesium sulphate Calcium gluconate Miscellaneous <ul style="list-style-type: none"> Drugs used for deaddiction Drugs used in CPR and emergency-adrenaline, Chlorpheniramine, hydrocortisone, Dexamethasone IV fluids & electrolytes replacement Common poisons, drugs used for treatment of poisoning <ul style="list-style-type: none"> Activated charcoal 	<ul style="list-style-type: none"> Lecture cum Discussion Drug study/presentation 	<ul style="list-style-type: none"> Short answer Objective type

Unit	Time (Hrs)	Learning Outcomes	Content	Teaching/ Learning Activities	Assessment Methods
			<ul style="list-style-type: none"> ○ Ipecac ○ Antidotes, ○ Anti-snake venom (ASV) • Vitamins and minerals supplementation • Vaccines & sera (Universal immunization programs schedules) • Anticancer drugs: Chemotherapeutic drugs commonly used • Immuno-suppressants and Immunostimulants 		
VII	4(T)	Demonstrate awareness of common alternative systems of medicine	Introduction to drugs used in alternative systems of medicine <ul style="list-style-type: none"> • Ayurveda, Homeopathy, Unani and Siddha etc. • Drugs used for common ailments 	<ul style="list-style-type: none"> • Lecture cum Discussion • Observational visit 	<ul style="list-style-type: none"> • Short answer • Objective type
VIII	20(T)	Demonstrate understanding about fundamental principles of prescribing	Fundamental principles of prescribing <ul style="list-style-type: none"> • Prescriptive role of nurse practitioners: Introduction • Legal and ethical issues related to prescribing • Principles of prescribing • Steps of prescribing • Prescribing competencies 	<ul style="list-style-type: none"> • Completion of module on Fundamental principles of prescribing 	<ul style="list-style-type: none"> • Short answer • Assignments evaluation

PATHOLOGY-II AND GENETICS

PLACEMENT: IV SEMESTER

THEORY: 1 Credit (20 hours) (Includes lab hours also)

DESCRIPTION: This course is designed to enable students to acquire knowledge of pathology of various disease conditions, understanding of genetics, its role in causation and management of defects and diseases and to apply this knowledge in practice of nursing.

COMPETENCIES: On completion of the course, the students will be able to

1. Apply the knowledge of pathology in understanding the deviations from normal to abnormal pathology
2. Rationalize the various laboratory investigations in diagnosing pathological disorders
3. Demonstrate the understanding of the methods of collection of blood, body cavity fluids, urine and feces for various tests
4. Apply the knowledge of genetics in understanding the various pathological disorders
5. Appreciate the various manifestations in patients with diagnosed genetic abnormalities
6. Rationalize the specific diagnostic tests in the detection of genetic abnormalities.
7. Demonstrate the understanding of various services related to genetics.


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COURSE OUTLINE

T–Theory

	Unit Time (Hrs)	Learning Outcomes	Content	Teaching/ Learning Activities	Assessment Methods
I	5(T)	Explain pathological changes in disease conditions of various systems	Special Pathology: Pathological changes in disease conditions of selected systems 1. Kidneys and Urinary tract <ul style="list-style-type: none"> Glomerulonephritis Pyelonephritis Renal calculi Cystitis Renal Cell Carcinoma Renal Failure (Acute and Chronic) 2. Male genital systems <ul style="list-style-type: none"> Cryptorchidism Testicular atrophy Prostatic hyperplasia Carcinoma penis and Prostate. 3. Female genital system <ul style="list-style-type: none"> Carcinoma cervix Carcinoma of endometrium Uterine fibroids Vesicular mole and Choriocarcinoma Ovarian cyst and tumors 4. Breast <ul style="list-style-type: none"> Fibrocystic changes Fibroadenoma Carcinoma of the Breast 5. Central nervous system <ul style="list-style-type: none"> Meningitis. Encephalitis Stroke 	<ul style="list-style-type: none"> Lecture Discussion Explain using slides, X-rays and scans Visit to pathology lab, endoscopy unit and OT 	<ul style="list-style-type: none"> Short answer Objective type
II	5(T)	Describe the laboratory tests for examination of body cavity fluids, urine and faeces	<ul style="list-style-type: none"> Tumors of CNS Clinical Pathology <ul style="list-style-type: none"> Examination of body cavity fluids: <ul style="list-style-type: none"> Methods of collection and examination of CSF and other body cavity fluids (sputum, wound discharge) specimen for various clinical pathology, biochemistry and microbiology tests 	<ul style="list-style-type: none"> Lecture Discussion Visit to clinical lab and biochemistry lab 	<ul style="list-style-type: none"> Short answer Objective type

Unit	Time (Hrs)	Learning Outcomes	Content	Teaching/Learning	Assessment
			<ul style="list-style-type: none"> • Analysis of semen: <ul style="list-style-type: none"> ○ Sperm count, motility and morphology and their importance in infertility • Urine: <ul style="list-style-type: none"> ○ Physical characteristics, Analysis, Culture and Sensitivity • Faeces: <ul style="list-style-type: none"> ○ Characteristics ○ Stool examination: Occult blood, Ova, Parasite and Cyst, Reducing substance etc. ○ Methods and collection of urine and faeces for various tests 		

GENETICS COURSE

OUTLINE

T-Theory

	Unit Time (Hrs)	Learning Outcomes	Content	Teaching/ Learning Activities	Assessment Methods
I	2(T)	Explain nature, principles and perspectives of heredity	Introduction: <ul style="list-style-type: none"> • Practical application of genetics in nursing • Impact of genetic condition on families • Review of cellular division: mitosis and meiosis • Characteristics and structure of genes • Chromosomes: sex determination • Chromosomal aberrations • Patterns of inheritance • Mendelian theory of inheritance • Multiple alleles and blood groups • Sex-linked inheritance • Mechanism of inheritance 	<ul style="list-style-type: none"> • Lecture • Discussion • Explain using slides 	<ul style="list-style-type: none"> • Short answer • Objective type
II	2(T)	Explain maternal, prenatal and genetic influences on development of defects and diseases	<ul style="list-style-type: none"> • Errors in transmission (mutation) • Maternal, prenatal and genetic influences on development of defects and diseases • Conditions affecting the mother: genetic and infections • Consanguinity atopy • Prenatal nutrition and food allergies • Maternal age 	<ul style="list-style-type: none"> • Lecture • Discussion • Explain using slides 	<ul style="list-style-type: none"> • Short answer • Objective type

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Unit	Time (Hrs)	Learning Outcomes	Content	Teaching/ Learning Activities	Assessment Methods
			<ul style="list-style-type: none"> • Maternal drug therapy • Prenatal testing and diagnosis • Effect of Radiation, drugs and chemicals • Infertility • Spontaneous abortion • Neural Tube Defects and the role of folic acid in lowering the risks • Down syndrome (Trisomy 21) 		
III	2(T)	Explain the screening methods for genetic defects and diseases in neonates and children	Genetic testing in the neonates and children <ul style="list-style-type: none"> • Screening for <ul style="list-style-type: none"> ○ Congenital abnormalities ○ Developmental delay ○ Dysmorphism 	<ul style="list-style-type: none"> • Lecture • Discussion • Explain using slides 	<ul style="list-style-type: none"> • Short answer • Objective type
IV	2(T)	Identify genetic disorder in adolescents and adults	Genetic conditions of adolescents and adults <ul style="list-style-type: none"> • Cancer genetics: Familial cancer • Inborn errors of metabolism • Blood group alleles and hematological disorders • Genetic haemochromatosis • Huntington's disease 	<ul style="list-style-type: none"> • Lecture • Discussion • Explain using slides 	<ul style="list-style-type: none"> • Short answer • Objective type
V	2(T)	Describe the role of nurse in genetic services and counselling	Services related to genetics <ul style="list-style-type: none"> • Mental illness • Genetic testing • Genetic therapy • Genetic counseling • Legal and Ethical issues • Role of nurse 	<ul style="list-style-type: none"> • Lecture • Discussion 	<ul style="list-style-type: none"> • Short answer • Objective type

ADULT HEALTH NURSING - II WITH INTEGRATED PATHOPHYSIOLOGY including Geriatric Nursing AND PALLIATIVE CARE MODULE

PLACEMENT: IV SEMESTER

THEORY: 7 Credits (140 hours)

PRACTICUM: Lab/Skill Lab (SL): 1 Credit (40 hours) Clinical: 6 Credits (480 hours)

DESCRIPTION: This course is designed to equip the student to review and apply their knowledge of Anatomy, Physiology, Biochemistry and Behavioral sciences in caring for adult patients with Medical/Surgical disorders – using nursing process approach. It also intends to develop competencies required for assessment, diagnosis, treatment, nursing management, and supportive/palliative and rehabilitative care to adult patients with various Medical/Surgical disorders.

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COMPETENCIES: On completion of the course the students will apply nursing process and critical thinking in delivering holistic nursing care with selected Medical and Surgical conditions.

At the completion of Adult Health Nursing II course, students will

1. Explain the etiology, pathophysiology, manifestations, diagnostic studies, treatments and complications of selected common medical and surgical disorders.
2. Perform complete health assessment to establish a database for providing quality patient care and integrate the knowledge of diagnostic test in the process of data collection.
3. Identify diagnoses, list them according to priority and formulate nursing care plan.
4. Perform nursing procedure skillfully and apply scientific principles while giving comprehensive nursing care to patients.
5. Integrate knowledge of anatomy, physiology, pathology, nutrition and pharmacology in caring for patients experiencing various medical and surgical disorders.
6. Identify common diagnostic measures related to the health problems with emphasis on nursing assessment and responsibilities.
7. Demonstrate skill in assisting/performing diagnostic and therapeutic procedures.
8. Demonstrate competencies/skill to patients undergoing treatment for medical surgical disorders.
9. Identify the drugs used in treating patients with selected medical surgical conditions.
10. Plan and provide relevant individual and group education on significant medical surgical topics.
11. Maintain a safe environment for patients and the health care personnel in the hospital.

COURSE OUTLINE

T–Theory, L/SL –Lab/Skill Lab

	Unit Time (Hrs)	Learning Outcomes	Content	Teaching/ Learning Activities	Assessment Methods
I	12(T) 4(SL)	Explain the etiology, pathophysiology, Throat clinical manifestations, diagnostic measures and medical, surgical, nutritional and nursing management of patients with ENT disorders	<p>Nursing management of patient with disorders of Ear, Nose and Throat, (Includes etiology, pathophysiology, clinical manifestations, diagnostic measures and medical, surgical, nutritional and nursing management)</p> <ul style="list-style-type: none"> • Review of anatomy and physiology of the ear, nose and throat • History, physical assessment, and diagnostic tests • Ear <ul style="list-style-type: none"> ○ External ear: deformities otalgia, foreign bodies and tumors ○ Middle ear: impacted wax, tympanic membrane perforation, otitis media, and tumors ○ Inner ear: Meniere's disease, labyrinthitis, ototoxicity tumors • Upper respiratory airway infections: Rhinitis, sinusitis, tonsillitis, laryngitis 	<ul style="list-style-type: none"> • Lecture and discussion • Demonstration of hearing aids, nasal packing, medication administration • Visit to audiology and speech clinic 	<ul style="list-style-type: none"> • MCQ • Short answer • Essay • OSCE • Assessment of skill (using checklist) • Quiz • Drug book

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- Epistaxis, Nasal obstruction, laryngeal obstruction
- Deafness and its management

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Unit	Time (Hrs)	Learning Outcomes	Content	Teaching/ Learning Activities	Assessment Methods
II	12(T) 4(SL)	<p>Explain the etiology, pathophysiology, clinical manifestations, diagnostic measures and management of patients with disorder of eye</p> <p>Describe eye donation, banking and transplantation</p>	<p>Nursing management of patient with disorder of eye</p> <ul style="list-style-type: none"> • Review of anatomy and physiology of the eye • History, physical assessment, diagnostic assessment <p>Eye Disorders</p> <ul style="list-style-type: none"> • Eyelids: infection, deformities • Conjunctiva: inflammation and infection, bleeding • Cornea: inflammation and infection • Lens: cataract • Glaucoma • Retinal detachment • Blindness • Eye donation, banking and transplantation 	<ul style="list-style-type: none"> • Lecture and discussion • Demonstration of visual aids, lens, medication administration • Visit to eye bank 	<ul style="list-style-type: none"> • MCQ • Short Essay • OSCE • Drug book
III	15(T) 4(L/SL)	<p>Explain the etiology, pathophysiology, clinical manifestations, diagnostic tests, and medical, surgical, nutritional, and nursing management of Kidney and urinary system disorders</p> <p>Demonstrate skill in genital/urinary assessment</p> <p>Prepare patient for genital/urinary investigations</p> <p>Prepare and provide health education</p>	<p>Nursing management of patient with Kidney and Urinary problems</p> <ul style="list-style-type: none"> • Review of Anatomy and physiology of the genitourinary system • History, physical assessment, diagnostic tests • Urinary tract infections: acute, chronic, lower, upper • Nephritis, nephrotic syndrome • Renal calculi • Acute and chronic renal failure • Disorders of ureter, urinary bladder and Urethra • Disorders of prostate: inflammation, infection, stricture, obstruction, and Benign Prostate Hypertrophy 	<ul style="list-style-type: none"> • Lecture cum Discussion • Demonstration • Case Discussion • Health education • Drug book • Field visit – Visit to hemodialysis unit 	<ul style="list-style-type: none"> • MCQ • Short Note • Long essay • Case report • Submit health teaching on prevention of urinary calculi
IV	6(T)	<p>on prevention of renal calculi</p> <p>Explain the etiology, pathophysiology, clinical manifestations, diagnostic tests, and medical, surgical, nutritional, and nursing management of male reproductive disorders</p>	<p>Nursing management of disorders of male reproductive system</p> <ul style="list-style-type: none"> • Review of Anatomy and physiology of the male reproductive system 	<ul style="list-style-type: none"> • Lecture, Discussion • Case Discussion • Health education 	<ul style="list-style-type: none"> • Short essay

Unit	Time (Hrs)	Learning Outcomes	Content	Teaching/ Learning Activities	Assessment Methods
			Orchitis <ul style="list-style-type: none"> Sexual dysfunction, infertility, contraception Male Breast Disorders: gynecomastia, tumor, climacteric changes 		
V	10(T) 4(SL)	Explain the etiology, pathophysiology, clinical manifestations, surgery types, diagnostic measures and management of patients with disorder of burns/cosmetic surgeries and its significance	Nursing management of patient with burns, reconstructive and cosmetic surgery <ul style="list-style-type: none"> Review of anatomy and physiology of the skin and connective tissues History, physical assessment, assessment of burns and fluid & electrolyte loss Burns Reconstructive and cosmetic surgery for burns, congenital deformities, injuries and cosmetic purposes, gender reassignment Legal and ethical aspects Special therapies: LAD, vacuum dressing, Laser, liposuction, skin health rejuvenation, use of dermafilters 	<ul style="list-style-type: none"> Lecture and discussion Demonstration of burn wound assessment, vacuum dressing and fluid calculations Visit to burn rehabilitation centers 	<ul style="list-style-type: none"> OSCE Short notes
VI	16(T) 4(L/SL)	Explain the etiology, pathophysiology, clinical manifestations, diagnostic measures and management of patients with neurological disorders	Nursing management of patient with neurological disorders <ul style="list-style-type: none"> Review of anatomy and physiology of the neurological system History, physical and neurological assessment, diagnostic tests Headache, Head injuries Spinal injuries: Paraplegia, Hemiplegia, Quadriplegia Spinal cord compression: herniation of intervertebral disc Intracranial and cerebral aneurysms Meningitis, encephalitis, brain abscess, neuro-cysticercosis Movement disorders: Chorea, Seizures & Epilepsies Cerebrovascular disorders: CVA Cranial, spinal neuropathies: Bell's palsy, trigeminal neuralgia Peripheral Neuropathies 	<ul style="list-style-type: none"> Lecture and discussion Demonstration of physiotherapy, neuro Myasthenia gravis & Multiple sclerosis 	<ul style="list-style-type: none"> OSCE Short notes Essay assessment, tracheostomy care Visit to rehabilitation center, long term care clinics, EEG, NCV study unit, Drug book

Unit	Time (Hrs)	Learning Outcomes	Content	Teaching/ Learning Activities	Assessment Methods
			<ul style="list-style-type: none"> • Rehabilitation of patient with neurological deficit 		
VII	12(T) 4(L/SL)	<p>Explain the etiology, pathophysiology, clinical manifestations, diagnostic tests, and medical, surgical, nutritional, and nursing management of immunological disorders</p> <p>Prepare and provide health education on prevention of HIV infection and rehabilitation</p> <p>Describe the national infection control programs</p>	<p>Nursing management of patients with Immunological problems</p> <ul style="list-style-type: none"> • Review of Immune system • Nursing Assessment: History and Physical assessment • HIV & AIDS: Epidemiology, Transmission, Prevention of Transmission and management of HIV/AIDS • Role of Nurse; Counseling, Health education and home care consideration and rehabilitation • National AIDS Control Program – NACO, various national and international agencies for infection control 	<ul style="list-style-type: none"> • Lecture, discussion • Case Discussion/ seminar • Refer Module on HIV/AIDS 	
VIII	12(T) 4(L/SL)	<p>Explain the etiology, pathophysiology, types, clinical manifestations, staging, diagnostic measures and management of patients with different cancer, treatment modalities including new treatment</p>	<p>Nursing management of patient with Oncological conditions</p> <ul style="list-style-type: none"> • Structure and characteristics of normal and cancer cells • History, physical assessment, diagnostic tests • Prevention screening early detection warning signs of cancer • Epidemiology, etiology, classification, Pathophysiology, staging clinical manifestations, diagnosis, treatment modalities and medical and surgical nursing management of Oncological condition • Common malignancies of various body system eye, ear, nose, larynx, breast, cervix, ovary, uterus, sarcoma, renal, bladder, kidney, prostate Brain, Spinal cord. • Oncological emergencies • Modalities of treatment: Chemotherapy, Radiotherapy: Radiation safety, AERB regulations, Surgical intervention, Stem cell and bone marrow transplant, Immunotherapy, Gene therapy • Psychological aspects of cancer: anxiety, depression, insomnia, anger 	<ul style="list-style-type: none"> • Lecture and discussion • Demonstration of chemotherapy preparation and administration • Visit to BMT, radiotherapy units (linear accelerator, brachytherapy, etc.), nuclear medicine unit 	<ul style="list-style-type: none"> • OSCE • Essay • Quiz • Drug book • Counseling, health teaching

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- Supportive care
- Hospice care

- Completion of palliative care

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Unit	Time (Hrs)	Learning Outcomes	Content	Teaching/ Learning Activities	Assessment Methods
IX	15(T) 4(L/SL)	Explain the types, policies, guidelines, prevention and management of disaster and the etiology, pathophysiology, clinical manifestations, diagnostic measures and management of patients with acute emergencies	Nursing management of patient in Emergency and Disaster situations Disaster Nursing <ul style="list-style-type: none"> • Concept and principles of disaster nursing, Related Policies • Types of disaster: Natural and manmade • Disaster preparedness: Team, guidelines, protocols, equipment, resources • Etiology, classification, Pathophysiology, staging, clinical manifestation, diagnosis, treatment modalities and medical and surgical nursing management of patient with medical and surgical emergencies – Poly trauma, Bites, Poisoning and Thermal emergencies 	module during clinical hours (20 hours) <ul style="list-style-type: none"> • Lecture and discussion • Demonstration of disaster preparedness (Mock drill) and triaging • Field visit to local disaster management centers or demo by fire extinguishers • Group presentation (role play, skit, concept mapping) on different emergency care • Refer Trauma care management/ ATCN module 	<ul style="list-style-type: none"> • OSCE • Case presentations and case study
X	10(T)	Explain the Concept, physiological changes, and psychosocial problems of ageing Describe the nursing management of the elderly	<ul style="list-style-type: none"> • Principles of emergency management • Medical legal aspects Nursing care of the elderly <ul style="list-style-type: none"> • History and physical assessment • Aging process and age-related body changes and psychosocial aspects • Stress and coping in elder patient • Psychosocial and sexual abuse of elderly • Role of family and formal and non-formal caregivers • Use of aids and prosthesis (hearing aids, dentures) • Legal and ethical issues 	<ul style="list-style-type: none"> • Guided reading on National Disaster Management Authority (NDMA) guidelines • Lecture and discussion • Demonstration of communication with visual and hearing impaired • Field visit to old age homes 	<ul style="list-style-type: none"> • OSCE • Case presentations • Assignment on family systems of India focusing on geriatric population
XI	15(T) 8(L/SL)	Explain the etiology, pathophysiology, clinical manifestations, diagnostic measures and management of patients in critical care units	<ul style="list-style-type: none"> • National programs for elderly, privileges, community programs and health services • Home and institutional care Nursing management of patients in critical care units <ul style="list-style-type: none"> • Principles of critical care nursing • Organization: physical set-up, policies, staffing norms 	<ul style="list-style-type: none"> • National programs for elderly, privileges, community programs and health services • Home and institutional care • Lecture and discussion • Demonstration on the use of • Protocols, equipment and supplies 	<ul style="list-style-type: none"> • Objectivetype • Short notes • Case

- Clinical practice in

presentations

- Assessment of skill on monitoring of



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Unit	Time (Hrs)	Learning Outcomes	Content	Teaching/ Learning Activities	Assessment Methods
			<ul style="list-style-type: none"> • Use and application of critical care biomedical equipment: ventilators, cardiac monitors, defibrillators, infusion pump, Resuscitation equipment and any other • Advanced Cardiac Life support • Nursing management of critically ill patient • Transitional care • Ethical and Legal Aspects • Breaking Bad News to Patients and/or their families: Communication with patient and family • End of life care 	different ICUs	patients in ICU. <ul style="list-style-type: none"> • Written assignment on ethical and legal issues in critical care
XII	5(T)	Describe the etiology, pathophysiology, clinical manifestations, diagnostic measures and management of patients with occupational/industrial health disorders	Nursing management of patients with occupational and industrial disorders <ul style="list-style-type: none"> • History, physical examination, Diagnostic tests • Occupational diseases and management 	<ul style="list-style-type: none"> • Lecture and discussion • Industrial visit 	<ul style="list-style-type: none"> • Assignment on industrial health hazards

CLINICAL PRACTICUM

CLINICAL PRACTICUM: 6 Credits (480 Hours) – 20 weeks × 24 hours

PRACTICE COMPETENCIES: On completion of the clinical practicum, the students will develop proficiency in applying nursing process and critical thinking in rendering holistic nursing care including rehabilitation to the adult/geriatric patients admitted in Critical Care Units, undergoing cosmetic and reconstructive surgery and with selected medical & surgical disorders of ear, nose, throat, eye, Genitourinary, reproductive, immunologic, nervous systems and in emergency/disaster conditions.

The students will become competent to

1. Utilize the nursing process in providing care to the sick adults in the hospital
 - a. Perform complete health assessment to establish a database for providing quality patient care.
 - b. Integrate the knowledge of diagnostic tests in patient assignment.
 - c. Identify nursing diagnoses and list them according to priority.
 - d. Formulate nursing care plan, using problem-solving approach.
 - e. Apply scientific principles while giving nursing care to patients.
 - f. Develop skill in performing nursing procedures applying scientific principle.
 - g. Establish/develop interpersonal relationship with patients and family members.
 - h. Evaluate the expected outcomes and modify the plan according to the patient needs.
2. Provide comfort and safety to adult patients in the hospital.
3. Maintain a safe environment for patients during hospitalization.
4. Explain nursing actions appropriately to the patients and family members.
5. Ensure patient safety while providing nursing procedures.
6. Assess the educational needs of the patient and their family related to medical and surgical disorders and provide appropriate health education to patients.



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7. Provide pre, intra and post-operative care to patients undergoing surgery.
8. Integrate knowledge of pathology, nutrition and pharmacology for patients experiencing selected medical and surgical disorders.
9. Integrate evidence-based information while giving nursing care to patients.
10. Demonstrate the awareness of legal and ethical issues in nursing practice.

I. Nursing Management of Patients with ENT Disorders

A. Skill Lab

Use of manikins and simulators

- Tracheostomy care
- Instilling Ear and Nasal medications
- Bandage application

B. Clinical Postings

Clinical	Duration Learning area/unit (weeks)	Outcomes	Procedural Competencies/Clinical Skills	Clinical Requirements	Assessment Methods
ENT Ward care and OPD	2	Provide topatients with Educate the patients and their family	<ul style="list-style-type: none"> • Examination of ear, nose, throat and History taking • Applying bandages to Ear, Nose • Tracheostomy care • Preparation of patient, assisting and monitoring of patients undergoing diagnostic procedures <ul style="list-style-type: none"> ◦ Auditory screening tests ◦ Audiometric tests • Preparing the patient and assisting in special procedures like Anterior/posterior nasal packing, Ear Packing and Syringing • Preparation and after care of patients undergoing ENT surgical procedures 	<ul style="list-style-type: none"> • ENT assessment –1 • Case study/Clinical presentation –1 	<ul style="list-style-type: none"> • Clinical evaluation • OSCE • Case report study/ Clinical presentation

II. Nursing Management of Patients with Eye Conditions

A. Skill Lab

Use of manikins and simulators

- Instilling Eye medications
- Eye irrigation
- Eye bandage

B. Clinical Postings

Clinical	Duration Learning area/unit (weeks)	Outcomes	Procedural Competencies/Clinical Skills	Clinical Requirements	Assessment Methods
Ophthalmology skill unit	2	Develop in providing care to patients Educate the patients	<ul style="list-style-type: none"> • History taking, Examination of eyes and interpretation • Assisting procedures <ul style="list-style-type: none"> ◦ Visual acuity ◦ Fundoscopy, retinoscopy, ophthalmoscopy, tonometry, 	<ul style="list-style-type: none"> • Eye assessment –1 • Health teaching • Case study/Clinical presentation –1 	<ul style="list-style-type: none"> • Clinical evaluation • OSCE • Clinical presentation

		their families • Pre and post-operative care		
		<ul style="list-style-type: none"> • Instillation of drops/ medication • Eye irrigation • Application of eye bandage • Assisting with foreign body removal 		

III. Nursing Management of Patients with Kidney and Urinary System Disorders

A. Skill Lab

Use of manikins and simulators

- Assessment: kidney & urinary system
- Preparation: dialysis
- Catheterization and care

B. Clinical Postings

Clinical area/unit	Duration (weeks)	Learning Outcomes	Procedural Competencies/Clinical Skills	Clinical Requirements	Assessment Methods
Renal ward/nephrology ward including Dialysis unit	2	Develop skill in Management of patients with urinary, male reproductive problems	<ul style="list-style-type: none"> • Assessment of kidney and urinary system <ul style="list-style-type: none"> ○ History taking ○ Physical examination ○ Testicular self-examination ○ Digital rectal exam • Preparation and assisting with diagnostic and therapeutic procedures <ul style="list-style-type: none"> ○ Cystoscopy, Cystometrogram, ○ Contrast studies: IVP etc. ○ Peritoneal dialysis ○ Hemodialysis, ○ Lithotripsy ○ Specific tests: Semen analysis, gonorrhea test, Renal/Prostate Biopsy etc. • Catheterization: care • Bladder irrigation • I/O recording and monitoring • Ambulation and exercise 	<ul style="list-style-type: none"> • Assessment – 1 • Drug presentation – 1 • Care study/Clinical presentation – 1 • Preparing and assisting in hemodialysis 	<ul style="list-style-type: none"> • Clinical evaluation • Care plan • OSCE • Quiz • Drug presentation

IV. Nursing Management of Patients with Burns and Reconstructive Surgery

A. Skill Lab

Use of manikins and simulators

- Assessment of burn wound
- Wound dressing

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B. Clinical Postings

Clinical area/unit	Duration (weeks)	Learning Outcomes	Procedural Competencies/Clinical Skills	Clinical Requirements	Assessment Methods
Burns unit/reconstructive surgical unit	2	Develop skill in burns assessment and providing care to patients with different types of burns Develop skill in providing care to patients with different types of cosmetic	<ul style="list-style-type: none">Assessment of burnsFirst aid of burnsFluid & electrolyte replacement therapySkincareCare of Burn wounds<ul style="list-style-type: none">BathingDressingPre-operative and post-operative care of patientsCaring of skin graft and postoperative care	<ul style="list-style-type: none">burn wound assessment-1care	<ul style="list-style-type: none">Clinical evaluation,Care study/case report

V. Nursing Management of Patients with neurological disorders

A. Skill Lab

Use of manikins and simulators

- Range of motion exercises
- Muscle strengthening exercises
- Crutch walking

B. Clinical Postings

Clinical area/unit	Duration	Learning Outcomes	Procedural Competencies/Clinical Skills	Clinical Requirements	Assessment Methods
Neurology-medical/ Surgery wards	3	Develop skill in Management of patients with Neurological problems	<ul style="list-style-type: none">History taking; Neurological ExaminationPatient monitoringPrepare and assist for various invasive and non-invasive diagnostic proceduresRange of motion exercises, muscle strengtheningCare of medical, surgical and rehabilitative patients	<ul style="list-style-type: none">Neuro-assessment-1Case study/case presentation-1Drug	<ul style="list-style-type: none">Clinical evaluationNeuroassessmentOSCECase report/presentation

VI. Nursing Management of Patients with Immunological Disorders

A. Skill Lab

- Barrier Nursing
- Reverse Barrier Nursing


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B. Clinical Postings

Clinical area/unit	Duration (weeks)	Learning Outcomes	Procedural Competencies/ Clinical Skills	Clinical Requirements	Assessment Methods
Isolation ward/Medical ward	1	Develop skill in • Management of patients with immunological disorders	• History taking the • Immunological status assessment (e.g. HIV) and Interpretation of specific tests • Caring of patients with low immunity • Practicing of standard safety measures, precautions/barrier nursing/reverse barrier/isolation	• Assessment of immune status • Teaching of isolation to patient and family • Nutritional management • Care Note-1	• Care note • Quiz • Health Teaching

VII. Nursing Management of Patients with disorders of Oncological conditions**A. Skill Lab****Use of manikins and simulators**

- Application of topical medication
- Administration of chemotherapy

B. Clinical Postings

Clinical area/unit	Duration (weeks)	Learning Outcomes	Procedural Competencies/ Clinical Skills	Clinical Requirements	Assessment Methods
Oncology wards (including day care radiotherapy unit)	3	Develop skill in • providing care to patients with oncological disorders	• History taking & physical examination of cancer patients • Screening for common cancers: TNM classification • Preparation, assisting and after care patients undergoing diagnostic procedures – Biopsies/FNAC – Papsmear – Bone-marrow aspiration • Various modalities of treatment – Chemotherapy – Radiotherapy – Pain management – Stomach therapy – Hormonal therapy – Immunotherapy – Gene therapy – Alternative therapy • Stomach care and feeding • Caring of patients treated with nuclear medicine • Rehabilitation	• Assessment-1 • Care study/clinical presentation-1 • Pre and post-operative care of patient with various modes of cancer treatment • Teaching on BSE to family members • Visit to palliative care unit	• Clinical evaluation • Care study • Quiz • Drug book

VIII. Nursing Management of Patients in emergency conditions

A. Skill Lab

Use of manikins and simulators

- Assessment: primary and secondary survey
- Trauma care: bandaging, wound care, splinting, positions

B. Clinical Postings

Clinical area/unit	Duration Skills (weeks)	Learning Outcomes	Procedural Competencies/ Clinical Outcomes	Clinical Requirements	Assessment Methods
Emergency room/Emergency unit	2	Develop skill in providing care to patients with emergency health problems	<ul style="list-style-type: none"> • Practicing triage in emergency • Primary and secondary survey in emergency • Examination, investigations & their interpretations in emergency & disaster situations • Emergency care of medical and traumatic injury patients • Documentations, assisting in legal procedures in emergency unit • Managing crowd • Counseling the patient and family in dealing with grieving & bereavement 	<ul style="list-style-type: none"> • Triage • Immediate care • Use of emergency • Quiz 	<ul style="list-style-type: none"> • Clinical evaluation

IX. Nursing Management of geriatric patients

A. Skill Lab

Use of manikins and simulators

- Use of assistive safety devices

B. Clinical Postings

Clinical area/unit	Duration (weeks)	Learning Outcomes	Procedural Competencies/ Clinical Skills	Clinical Requirements	Assessment Methods
Geriatric ward	1	Develop skill in taking geriatric assessment and providing care to Geriatric patients with	<ul style="list-style-type: none"> • History and assessment of 	<ul style="list-style-type: none"> • Geriatric assessment-1 • Care of normal and geriatric patient with illness • Fall risk assessment-1 • Functional status assessment-1 	<ul style="list-style-type: none"> • Clinical evaluation • Care plan

X. Nursing Management of Patients in critical care units

A. Skill Lab

Use of manikins and simulators

- Assessment critically ill
- ET tube setup-suction
- TT suction
- Ventilator setup
- Chest drainage
- Bag mask ventilation

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- Central & Peripheral line
- Pacemaker

B. Clinical Postings

Clinical area/unit	Duration (weeks)	Learning Outcomes	Procedural Competencies/Clinical Skills	Clinical Requirements	Assessment Methods
Critical Care Unit	2	Develop skill in assessment of critically ill and providing care to patients with critical health conditions	<ul style="list-style-type: none"> • Assessment of critically ill patients • Assisting in arterial puncture, ET tube intubation & extubation • ABG analysis & interpretation - respiratory acidosis, respiratory alkalosis, metabolic acidosis, metabolic alkalosis • Setting up of Ventilator modes and settings and care of patient on a ventilator • Setup of trolley with instruments • Monitoring and maintenance of Chest drainage system • Bag and mask ventilation • Assisting and maintenance of Central and peripheral lines invasive • Setting up of infusion pump, defibrillator, • Drug administration - infusion, intracardiac, intrathecal, epidural, • Monitoring pacemaker • ICU care bundle • Management of the dying patient in the ICU 	<ul style="list-style-type: none"> • Hemodynamic monitoring • Different scales used in ICU • Communicating with critically ill patients 	<ul style="list-style-type: none"> • Clinical evaluation • OSCE • RASS scale assessment • Use of VAE bundle VAP, CAUTI, BSI • Case Presentation

PROFESSIONALISM, PROFESSIONAL VALUES & ETHICS INCLUDING BIOETHICS PLACEMENT:

IV SEMESTER

THEORY: 1 Credit (20 hours)

DESCRIPTION: This course is designed to help students to develop an understanding of professionalism and demonstrate professional behavior in their workplace with ethics and professional values. Further the students will be able to identify ethical issues in nursing practice and participate effectively in ethical decision making along with health team members.

COMPETENCIES: On completion of this course, the students will be able to

1. Describe profession and professionalism.
2. Identify the challenges of professionalism.
3. Maintain respectful communication and relationship with other health team members, patients and society.
4. Demonstrate professional conduct.
5. Describe various regulatory bodies and professional organizations related to nursing.
6. Discuss the importance of professional values in patient care.
7. Explain the professional values and demonstrate appropriate professional values in nursing practice.
8. Demonstrate and reflect on the role and responsibilities in providing compassionate care in the healthcare setting.
9. Demonstrate respect, human dignity and privacy and confidentiality to self, patients and their caregivers and other health team members.
10. Advocate for patients' wellbeing, professional growth and advancing the profession.
11. Identify ethical and bioethical concerns, issues and dilemmas in nursing and healthcare.
12. Apply knowledge of ethics and bioethics in ethical decision making along with health team members.
13. Protect and respect patient's rights.

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COURSE OUTLINE

T-Theory

	Unit Time (Hrs)	Learning Outcomes	Content	Teaching/ Learning Activities	Assessment Methods
I	5(T)	<p>Discuss nursing as a profession</p> <p>Describe the concepts and attributes of professionalism</p> <p>Identify the challenges of professionalism</p> <p>Maintain respectful communication and relationship with other health team members, patients and society</p> <p>Demonstrate professional conduct</p> <p>Respect and maintain professional boundaries between patients, colleagues and society</p> <p>Describe the roles and responsibilities of regulatory bodies and professional organizations</p>	<p>PROFESSIONALISM</p> <p>Profession</p> <ul style="list-style-type: none"> • Definition of profession • Criteria of a profession • Nursing as a profession <p>Professionalism</p> <ul style="list-style-type: none"> • Definition and characteristics of professionalism • Concepts, attributes and indicators of professionalism • <i>Challenges of professionalism</i> <ul style="list-style-type: none"> ○ Personal identity vs professional identity ○ Preservation of self-integrity: threat to integrity, Deceiving patient: withholding information and falsifying records ○ Communication & Relationship with team members: Respectful and open communication and relationship pertaining to relevant interests for ethical decision making ○ Relationship with patients and society <p>Professional Conduct</p> <ul style="list-style-type: none"> • Following ethical principles • Adhering to policies, rules and regulation of the institutions • Professional etiquettes and behaviours • Professional grooming: Uniform, Dress code • Professional boundaries: Professional relationship with the patients, caregivers and team members <p>Regulatory Bodies & Professional Organizations: Roles & Responsibilities</p> <ul style="list-style-type: none"> • <i>Regulatory bodies:</i> Indian Nursing Council, State Nursing Council • <i>Professional Organizations:</i> Trained Nurses Association of India (TNAI), Student Nurses Association (SNA), Nurses League of Christian Medical Association of India, International Council of Nurses (ICN) and International Confederation of Midwives 	<ul style="list-style-type: none"> • Lecture cum Discussion • Debate • Roleplay • Case based discussion • Lecture cum Discussion • Visit to INC, SNC, TNAI 	<ul style="list-style-type: none"> • Short answer • Essay • Objective type • Visit reports

Unit	Time (Hrs)	Learning Outcomes	Content	Teaching/ Learning Activities	Assessment Methods
II	5(T)	<p>Discuss the importance of professional values</p> <p>Distinguish between personal values and professional values</p> <p>Demonstrate appropriate professional values in nursing practice</p>	<p>PROFESSIONAL VALUES</p> <ul style="list-style-type: none"> • Values: Definition and characteristics of values • Value clarification • Personal and professional values • Professional socialization: Integration of professional values with personal values <p>Professional values in nursing</p> <ul style="list-style-type: none"> • Importance of professional values in nursing and health care • Caring: definition, and process • Compassion: Sympathy Vs empathy, Altruism • Conscientiousness • Dedication/devotion to work • Respect for the person-Human dignity • Privacy and confidentiality: Incidental disclosure • Honesty and integrity: Truth telling • Trust and credibility: Fidelity, Loyalty • Advocacy: Advocacy for patients, work environment, nursing education and practice, and for advancing the profession 	<ul style="list-style-type: none"> • Lecture cum Discussion • Value clarification exercise • Interactive learning • Story telling • Sharing experiences • Scenario based discussion 	<ul style="list-style-type: none"> • Short answer • Essay • Assessment of student's behavior with patients and families
III	10(T)	<p>Define ethics & bioethics</p> <p>Explain ethical principles</p> <p>Identify ethical concerns</p> <p>Ethical issues and dilemmas in healthcare</p>	<p>ETHICS & BIOETHICS</p> <p>Definitions: Ethics, Bioethics and Ethical Principles</p> <ul style="list-style-type: none"> • Beneficence • Non-maleficence: Patient safety, protecting patient from harm, Reporting errors • Justice: Treating each person as equal • Care without discrimination, equitable access to care and safety of the public • Autonomy: Respects patients' autonomy, Self-determination, Freedom of choice <p>Ethical issues and ethical dilemma: Common ethical problems</p> <ul style="list-style-type: none"> • Conflict of interest • Paternalism • Deception • Privacy and confidentiality 	<ul style="list-style-type: none"> • Lecture cum discussion • Group discussion with examples • Flipping/ self-directed learning • Role play • Story telling • Sharing experiences • Case based Clinical discussion • Role modeling • Group exercise on ethical decision-making following steps on a given scenario • Assignment 	<ul style="list-style-type: none"> • Short answer • Essay • Quiz • Reflective diary • Case report • Attitude test • Assessment of assignment

Unit	Time (Hrs)	Learning Outcomes	Content	Teaching/ Learning Activities	Assessment Methods
			<ul style="list-style-type: none"> • Valid consent and refusal • Allocation of scarce nursing resources • Conflicts concerning new technologies • Whistle-blowing • <i>Beginning of life issues</i> <ul style="list-style-type: none"> ○ Abortion ○ Substance abuse ○ Fetal therapy ○ Selective delectation ○ Intrauterine treatment of fetal conditions ○ Mandated contraception ○ Fetal injury ○ Infertility treatment • <i>End of life issues</i> <ul style="list-style-type: none"> ○ End of life ○ Euthanasia ○ Do Not Resuscitate (DNR) • <i>Issues related to psychiatric care</i> <ul style="list-style-type: none"> ○ Noncompliance ○ Restrain and seclusion ○ Refuse to take food 		
		Explain process of ethical decision making and apply knowledge of ethics and bioethics in making ethical decisions			
		Explain code of ethics stipulated by ICN and INC			


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Unit	Time (Hrs)	Learning Outcomes	Content	Teaching/ Learning Activities	Assessment Methods
		<p>Discuss the rights of the patients and families to make decisions about healthcare</p> <p>Protect and respect patients' rights</p>	<p>Process of ethical decision making</p> <ul style="list-style-type: none"> • Assess the situation (collect information) • Identify the ethical problem • Identify the alternative decisions • Choose the solution to the ethical decision • Implement the decision • Evaluate the decision <p>Ethics committee: Roles and responsibilities</p> <ul style="list-style-type: none"> • Clinical decision making • Research <p>Code of Ethics</p> <ul style="list-style-type: none"> • International Council of Nurses (ICN) • Indian Nursing Council <p>Patients' Bill of Rights-17 patients' rights (MoH & FW, GoI)</p> <ol style="list-style-type: none"> 1. Right to emergency medical care 2. Right to safety and quality care according to standards 3. Right to preserve dignity 4. Right to non-discrimination 5. Right to privacy and confidentiality 6. Right to information 7. Right to records and reports 8. Right to informed consent 9. Right to second opinion 10. Right to patient education 11. Right to choose alternative treatment options if available 12. Right to choose source for obtaining medicines or tests 13. Right to proper referral and transfer, which is free from perverse commercial influences 14. Right to take discharge of patient or receive body of deceased from hospital 15. Right to information on the rates to be charged by the hospital for each type of service provided and facilities available on a prominent display board and a brochure 16. Right to protection for patients involved in clinical trials, biomedical and health research 17. Right to be heard and seek redressal 		

CHILD HEALTH NURSING-I

PLACEMENT: V SEMESTER

THEORY: 3 Credits (60 hours)

PRACTICUM: Lab/Skill Lab: 1 Credit (40 hours) Clinical: 2 Credits (160 hours)

DESCRIPTION: This course is designed for developing an understanding of the modern approach to child-care, identification, prevention and nursing management of common health problems of neonates and children.

COMPETENCIES: On completion of the course, the students will be able to

1. Develop understanding of the history and modern concepts of child health and child-care.
2. Explore the national child welfare services, national programs and legislation in the light of National Health Policy 2017.
3. Describe the role of preventive pediatrics and perform preventive measures towards accidents.
4. Participate in national immunization programs/Universal Immunization Program (UIP).
5. Identify the developmental needs of children and provide parental guidance.
6. Describe the principles of child health nursing and perform child health nursing procedures.
7. Demonstrate competencies in newborn assessment, planning and implementation of care to normal and high-risk newborn including neonatal resuscitation.
8. Apply the principles and strategies of Integrated management of neonatal and childhood illness (IMNCI).
9. Apply the knowledge of pathophysiology and provide nursing care to children with respiratory system disorders.
10. Identify and meet childhood emergencies and perform child CPR.

COURSE OUTLINE

T–Theory, L/SL –Lab/Skill Lab

Unit	Time (Hrs)	Learning Outcomes	Content	Teaching/ Learning Activities	Assessment Methods
I	10(T) 10(L)	Explain the modern concept of child-care Describe National policy, programs and legislation in relation to child health & welfare Describe role of preventive pediatrics	Introduction: Modern concepts of child-care <ul style="list-style-type: none"> • Historical development of child health • Philosophy and modern concept of child-care • Cultural and religious considerations in child-care • National policy and legislations in relation to child health and welfare • National programs and agencies related to welfare services to the children • Internationally accepted rights of the child • Changing trends in hospital care, preventive, promotive and curative aspects of child health • <i>Preventive pediatrics:</i> <ul style="list-style-type: none"> ○ Concept ○ Immunization ○ Immunization programs and cold 	<ul style="list-style-type: none"> • Lecture • Discussion • Short answer • Demonstration of common pediatric procedures 	<ul style="list-style-type: none"> • Objective type • Assessment of skills with checklist

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Unit	Time (Hrs)	Learning Outcomes	Content	Teaching/ Learning Activities	Assessment Methods
		<p>List major causes of death during infancy, early & late childhood</p> <p>Differentiate between an adult and child in terms of illness and response</p> <p>Describe the major functions & role of the pediatric nurse in caring for a hospitalized child.</p> <p>Describe the principles of child health nursing and perform child health nursing procedures</p>	<p>chain.</p> <ul style="list-style-type: none"> ○ Care of under-five and Under-five Clinics/Well-baby clinics ○ Preventive measures towards accidents ● Child morbidity and mortality rates ● Difference between an adult and child which affects response to illnesses ○ Physiological ○ Psychological ○ Social ○ Immunological ● Hospital environment for sick child ● Impact of hospitalization on the child and family ● Communication techniques for children ● Grief and bereavement ● The role of a child health nurse in caring for a hospitalized child ● Principles of pre and postoperative care of infants and children. <p><i>Child Health Nursing procedures:</i></p> <ul style="list-style-type: none"> ● Administration of medication: oral, I/M, & I/V ● Calculation of fluid requirement ● Application of restraints ● Assessment of pain in children. 		
II	12(T)	<p>Describe the normal growth and development of children at different ages</p> <p>Identify the need of children at different ages & provide parental guidance</p> <p>Identify the nutritional needs of children at different ages & ways</p>	<ul style="list-style-type: none"> ○ FACES pain ratings scale ○ FLACC scale ○ Numerical scale <p>The Healthy Child</p> <ul style="list-style-type: none"> ● Definition and principles of growth and development ● Factors affecting growth and development ● Growth and development from birth to adolescence ● Growth and developmental theories (Freud, Erickson, Jean Piaget, Kohlberg) ● The needs of normal children through the 	<ul style="list-style-type: none"> ● Lecture ● Discussion ● Short answer <p>stages of development and parental guidance</p>	<ul style="list-style-type: none"> ● Demonstration ● Developmental study of infant and children ● Observation study of normal & sick child ● Field visit to Anganwadi, child guidance clinic ● Video on breastfeeding

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- Objectivetype
 - Assessment offield visits
anddevelopmentalstudyreports



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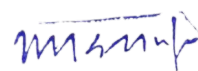
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Unit	Time (Hrs)	Learning Outcomes	Content	Teaching/ Learning Activities	Assessment Methods
		of meeting needs Identify the role of play for normal & sick children	<ul style="list-style-type: none"> Nutritional needs of children and infants <ul style="list-style-type: none"> breastfeeding exclusive breastfeeding Supplementary/artificial feeding and weaning Baby friendly hospital concept Types and value of play and selection of play material 	<ul style="list-style-type: none"> Clinical practice/field Refer/consult MAA Mothers absolute affection program for breast feeding module (National Guideline) 	
III	15(T) 20(L)	Provide care to normal and high-risk neonates Perform neonatal resuscitation Recognize and manage common neonatal problems	Nursing care of neonate: • Appraisal of Newborn <ul style="list-style-type: none"> Nursing care of a normal newborn/essential newborn care Neonatal resuscitation Nursing management of low birth weight baby Kangaroo mother care Nursing management of common neonatal disorders <ul style="list-style-type: none"> Hyperbilirubinemia Hypothermia Hyperthermia Metabolic disorder Neonatal infections Neonatal seizures Respiratory distress syndrome Retinopathy of Prematurity 	<ul style="list-style-type: none"> Modular based teaching: ENBC and FBNC module (oral drills, videos, self-evaluation exercises) Workshop on neonatal resuscitation: NRP module Demonstration Practice Session Clinical practice Lecture Discussion 	<ul style="list-style-type: none"> OSCE Short answer Objective type
IV	10(T) 5(L)	Apply principles and strategies of IMNCI	<ul style="list-style-type: none"> Organization of neonatal care unit Neonatal equipment Integrated management of neonatal and childhood illnesses	Modular based teaching: IMNCI module	<ul style="list-style-type: none"> OSCE
V	8(T)	Describe the etiology, pathophysiology, clinical manifestation and nursing management of children with disorders of respiratory, and endocrine system	Nursing management in common childhood diseases Respiratory system: <ul style="list-style-type: none"> Identification and Nursing management of congenital malformations <ul style="list-style-type: none"> Congenital disorders: Tracheo-esophageal 	<ul style="list-style-type: none"> Clinical practice/field Lecture Discussion fistula, Diaphragmatic hernia 	Short answer <ul style="list-style-type: none"> Demonstration Practice session Clinical practice

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- Objectivetype
 - Assessment ofskills
withchecklist



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Unit	Time (Hrs)	Learning Outcomes	Content	Teaching/Learning	Assessment
			<ul style="list-style-type: none"> Others: Acute nasopharyngitis, Tonsillitis, Croup, Bronchitis, Bronchiolitis, Pneumonia, Asthma <p>Endocrine system:</p> <ul style="list-style-type: none"> Juvenile Diabetes mellitus, Hypothyroidism 		
	5(L)	child-hood emergencies and perform child C	<ul style="list-style-type: none"> Accidents – causes and prevention, Poisoning, Foreign bodies, Hemorrhage, Burns and Drowning PLS (AHA Guidelines) 	<ul style="list-style-type: none"> Lecture Discussion Demonstration PLS Module/ Workshop 	<ul style="list-style-type: none"> OSCE

CHILD HEALTH NURSING - I & II CLINICAL (3 Credits – 240

hours) **PLACEMENT:** V & VI SEMESTER

PRACTICUM: Skill Lab: 1 Credit (40 hours)

Clinical: V SEMESTER – 2 Credits (160

hours) VI SEMESTER –

1 Credit (80 hours)

PRACTICE COMPETENCIES: On completion of the course, the students will be able to

1. Perform assessment of children: health, developmental & anthropometric.
2. Provide nursing care to children with various medical disorders.
3. Provide pre & postoperative care to children with common pediatric surgical conditions/malformation.
4. Perform immunization as per NIS.
5. Provide nursing care to critically ill children.
6. Give health education/nutritional education to parents.
7. Counsel parents according to identified counseling needs.

Skill Lab

Use of Manikins and

Simulators PLS, CPAP, Endotracheal

Suction **Pediatric Nursing Procedures:**

dures:

- Administration of medication – Oral, IM & IV
- Oxygen administration
- Application of restraints
- Specimen collection
- Urinary catheterization and drainage
- Ostomy care
- Feeding – NG, gastrostomy, Jejunostomy
- Wound dressing

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CLINICAL POSTINGS

8 weeks × 30 hours per week (5 weeks + 3 weeks)

Clinical area/unit	Duration (Weeks)	Learning Outcomes	Procedural Competencies/Clinical Skills	Clinical Requirements	Assessment Methods
Pediatric Medical Ward	V Sem – 2 weeks VI Sem – 1 week	<ul style="list-style-type: none"> • Provide nursing care to children with various medical disorders 	<ul style="list-style-type: none"> • Taking pediatric history • Physical examination & assessment of children • Administration of oral, I/M, & I/V medicine/fluids • Calculation of fluid replacement • Preparation of different strengths of I/V fluids • Application of restraints • Administration of O₂ inhalation by different methods • Baby bath/sponge bath • Feeding children by Katorispoon, Paladai cup • Collection of specimens for common investigations • Assisting with common diagnostic procedures • Teaching mothers/parents <ul style="list-style-type: none"> ○ Malnutrition ○ Oral rehydration therapy ○ Feeding & Weaning ○ Immunization schedule • Play therapy 	<ul style="list-style-type: none"> • Nursing care plan – 1 • Case study presentation – 1 • Health talk – 1 	<ul style="list-style-type: none"> • Assess performance with rating scale • Assess each skill with checklist OSCE/OSPE • Evaluation of case study/presentation & health education session • Completion of activity record
Pediatric Surgical Ward	V Sem – 2 weeks VI Sem – 1 week	<ul style="list-style-type: none"> • Recognized different pediatric surgical conditions/malformations • Provide pre & post-operative care to children with common pediatric surgical conditions/malformation • Counsel & educate parents 	<ul style="list-style-type: none"> • Calculation, preparation & administration of I/V fluids • Bowel wash, insertion of suppositories • Care for ostomies: <ul style="list-style-type: none"> ○ Colostomy Irrigation ○ Ureterostomy ○ Gastrostomy ○ Enterostomy • Urinary catheterization & drainage • Feeding <ul style="list-style-type: none"> ○ Naso-gastric ○ Gastrostomy 	<ul style="list-style-type: none"> • Nursing care plan – 1 • Case study/presentation – 1 	<ul style="list-style-type: none"> • Assess performance with rating scale • Assess each skill with checklist OSCE/OSPE • Evaluation of case study/presentation • Completion of activity record

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Clinical area/unit	Duration (Weeks)	Learning Outcomes	Procedural Competencies/Clini	Clinical Requirements	Assessment Methods
			<ul style="list-style-type: none"> ○ Jejunostomy ● Care of surgical wounds <ul style="list-style-type: none"> ○ Dressing ○ Suture removal 		
Pediatric OPD/ Immunization room	V Sem– 1 week	<ul style="list-style-type: none"> ● Perform assessment of children: health, developmental & anthropometric ● Perform immunization ● Give health education/nutritional education 	<ul style="list-style-type: none"> ● Assessment of children <ul style="list-style-type: none"> ○ Health assessment ○ Developmental assessment ○ Anthropometric assessment ○ Nutritional assessment ● Immunization ● Health/Nutritional education 	<ul style="list-style-type: none"> ● Growth and developmental study: <ul style="list-style-type: none"> Infant– 1 Toddler– 1 Preschooler–1 Schooler–1 Adolescent–1 	<ul style="list-style-type: none"> ● Assess performance with ratings scale ● Completion of activity record
NICU & PICU	V Sem– 1 week	<ul style="list-style-type: none"> ● Provide nursing care to critically ill children 	<ul style="list-style-type: none"> ● Care of a baby in incubator/warmer ● Care of a child on ventilator, CPAP ● Endotracheal Suction ● Chest Physiotherapy ● Administration of fluids within fusion pumps ● Total Parenteral Nutrition ● Phototherapy Monitoring ● ng of ● babies Recording & rep ● orting 	<ul style="list-style-type: none"> ● Newborn assessment–1 ● Nursing Care Plan– 1 	<ul style="list-style-type: none"> ● Assess performance with ratings scale ● Evaluation of observation report ● Completion of activity record

MENTAL HEALTH NURSING -I

PLACEMENT: V SEMESTER

THEORY: 3 Credits (60 hours)

PRACTICUM: Clinical: 1 Credit (80 hours)

DESCRIPTION: This course is designed to develop basic understanding of the principles and standards of mental health nursing and skill in application of nursing process in assessment and care of patients with mental health disorders.

COMPETENCIES: On completion of the course, the students will be competent to

1. Trace the historical development of mental health nursing and discuss its scope.
2. Identify the classification of the mental disorders.
3. Develop basic understanding of the principles and concepts of mental health nursing.

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4. Apply the Indian Nursing Council practice standards for psychiatric mental health nursing in supervised clinical settings.
5. Conduct mental health assessment.
6. Identify and maintain therapeutic communication and nurse-patient relationship.
7. Demonstrate knowledge of the various treatment modalities and therapies used in mental disorders.
8. Apply nursing process in delivering care to patients with mental disorders.
9. Provide nursing care to patients with schizophrenia and other psychotic disorders based on assessment findings and treatment/therapies used.
10. Provide nursing care to patients with mood disorders based on assessment findings and treatment/therapies used.
11. Provide nursing care to patients with neurotic disorders based on assessment findings and treatment/therapies used.

COURSE OUTLINE

T-Theory

	Unit Time (Hrs)	Learning Outcomes	Content	Teaching/Learning Activities	Assessment Methods
I	6(T)	Describe the historical development & current trends in mental health nursing Discuss the scope of mental health nursing Describe the concept of normal & abnormal behaviour	Introduction <ul style="list-style-type: none"> • Perspectives of Mental Health and Mental Health Nursing, evolution of mental health services, treatments and nursing practices • Mental health team • Nature & scope of mental health nursing • Role & functions of mental health nurse in various settings and factors affecting the level of nursing practice • Concepts of normal and abnormal behaviour 	<ul style="list-style-type: none"> • Lecture cum Discussion 	<ul style="list-style-type: none"> • Essay • Short answer
II	10(T)	Define the various terms used in mental health Nursing Explain the classification of mental disorders Explain the psychodynamic aspects of maladaptive behaviour Discuss the etiological factors & psychopathology of mental disorders Explain the principles and standards of Mental Health Nursing Describe the conceptual models of mental health nursing	Principles and Concepts of Mental Health Nursing <ul style="list-style-type: none"> • Definition: mental health nursing and terminology used • Classification of mental disorders: ICD 11, DSM 5, Geropsychiatry manual classification • Review of personality development, defense mechanisms • Etiology bio-psycho-social factors • Psychopathology of mental disorders: review of structure and function of brain, limbic system and abnormal neurotransmission • Principles of Mental Health Nursing • Ethics and responsibilities • Practice Standards for Psychiatric Mental Health Nursing (INC practice standards) • Conceptual models and the role of nurse: <ul style="list-style-type: none"> ○ Existential model 	<ul style="list-style-type: none"> • Lecture cum Discussion • Explain using Charts • Review of personality development 	<ul style="list-style-type: none"> • Essay • Short answer

Unit	Time (Hrs)	Learning Outcomes	Content	Teaching/Learning Activities	Assessment Methods
			<ul style="list-style-type: none"> ○ Psychoanalytical models ○ Behavioural model ○ Interpersonal model ● Preventive psychiatry and rehabilitation		
III	6(T)	Describe nature, purpose and process of assessment of mental health status	Mental Health Assessment <ul style="list-style-type: none"> ● History taking ● Mental status examination ● Minimal status examination ● Neurological examination ● Investigations: Related Blood chemistry, EEG, CT & MRI ● Psychological tests 	<ul style="list-style-type: none"> ● Lecture cum Discussion ● Demonstration ● Practice session ● Clinical practice 	<ul style="list-style-type: none"> ● Essay ● Short answer ● Assessment of mental health status
IV	6(T)	Identify therapeutic communication & techniques Describe therapeutic relationship	Therapeutic Communication and Nurse-Patient Relationship <ul style="list-style-type: none"> ● Therapeutic communication: Types, techniques, characteristics and barriers ● Therapeutic nurse-patient relationship ● Interpersonal relationship- ● Elements of nurse-patient contract, ● Review of technique of IPR- Johari window ● Therapeutic impasse and its management 	<ul style="list-style-type: none"> ● Lecture cum Discussion ● Demonstration ● Role Play ● Process recording ● Simulation (video) 	<ul style="list-style-type: none"> ● Essay ● Short answer ● OSCE
V	10(T)	Describe therapeutic impasse and its interventions Explain treatment modalities and therapies used in mental disorders and role of the nurse	Treatment modalities and therapies used in mental disorders <ul style="list-style-type: none"> ● Physical therapies: Psychopharmacology, ● Electroconvulsive therapy ● Psychological Therapies: Psychotherapy, Behaviour therapy, CBT ● Psychosocial: Group therapy, Family therapy, Therapeutic Community, Recreational therapy, Art therapy (Dance, Music etc), Occupational therapy ● Alternative & Complementary: Yoga, Meditation, Relaxation ● Consideration for special populations 	<ul style="list-style-type: none"> ● Lecture cum Discussion ● Demonstration ● Groupwork ● Practice session ● Clinical practice 	<ul style="list-style-type: none"> ● Essay ● Short answer ● Objective type
VI	8(T)	Describe the etiology, psychodynamics/pathology, clinical manifestations, diagnostic criteria and management of patients with Schizophrenia, and other psychotic disorders	Nursing management of patient with Schizophrenia, and other psychotic disorders <ul style="list-style-type: none"> ● Prevalence and incidence ● Classification ● Etiology, psychodynamics, clinical manifestation, diagnostic criteria/formulations 	<ul style="list-style-type: none"> ● Lecture and Discussion ● Case discussion ● Case presentation ● Clinical practice 	<ul style="list-style-type: none"> ● Essay ● Short answer ● Assessment of patient management problems

Unit	Time (Hrs)	Learning Outcomes	Content	Teaching/Learning Activities	Assessment Methods
			Nursing process <ul style="list-style-type: none"> • Nursing Assessment: History, Physical and mental assessment • Treatment modalities and nursing management of patients with Schizophrenia and other psychotic disorders • Geriatric considerations and considerations for special populations • Follow up and home care and rehabilitation 		
VII	6(T)	Describe the etiology, psychodynamics, clinical manifestations, diagnostic criteria and management of patients with mood disorders	Nursing management of patient with mood disorders <ul style="list-style-type: none"> • Prevalence and incidence • Mood disorders: Bipolar affective disorder, mania depression and dysthymia etc. • Etiology, psychodynamics, clinical manifestation, diagnosis • Nursing Assessment History, Physical and mental assessment • Treatment modalities and nursing management of patients with mood disorders • Geriatric considerations/ considerations for special populations • Follow-up and home care and rehabilitation 	<ul style="list-style-type: none"> • Lecture and Discussion • Case discussion • Case presentation • Clinical practice 	<ul style="list-style-type: none"> • Essay • Short answer • Assessment of patient management problems
VIII	8(T)	Describe the etiology, psychodynamics, clinical manifestations, diagnostic criteria and management of patients with neurotic, stress related and somatization disorders	Nursing management of patient with neurotic, stress related and somatization disorders <ul style="list-style-type: none"> • Prevalence and incidence • classifications • Anxiety disorders – OCD, PTSD, Somatoform disorders, Phobias, Dissociative and Conversion disorders • Etiology, psychodynamics, clinical manifestation, diagnostic criteria/formulations • Nursing Assessment: History, Physical and mental assessment • Treatment modalities and nursing management of patients with neurotic and stress related disorders • Geriatric considerations/ considerations for special populations • Follow-up and home care and rehabilitation 	<ul style="list-style-type: none"> • Lecture and Discussion • Case discussion • Case presentation • Clinical practice Short answer • Assessment of patient 	<ul style="list-style-type: none"> • Essay management problems

CLINICAL
PRACTICUM MENTAL HEALTH NURSING - I & II

PLACEMENT: SEMESTER V & VI

MENTAL HEALTH NURSING - I – 1 Credit (80 hours)

MENTAL HEALTH NURSING - II – 2 Credits (160 hours)

PRACTICE COMPETENCIES: On completion of the course, the students will be able to:

1. Assess patients with mental health problems/disorders
2. Observe and assist in various treatment modalities or therapies
3. Counsel and educate patients and families
4. Perform individual and group psychoeducation
5. Provide nursing care to patients with mental health problems/disorders
6. Motivate patients in the community for early treatment and follow-up
7. Observe the assessment and care of patients with substance abuse disorders in the addiction centre.

CLINICAL POSTINGS

(8 weeks × 30 hours per week = 240 hours)

Clinical Area/Unit	Duration (Weeks)	Learning Outcomes	nursing care for patients with various	Skills/ Procedural Competencies	• Observe and assist in various therapies
Psychiatric OPD	2	<ul style="list-style-type: none"> • Assess patients with mental health problems • Observe and assist in therapies • Counsel and educate patients, and families 		<ul style="list-style-type: none"> • History taking • Perform mental status examination (MSE) • Observe/practice Psychometric assessment • Perform Neurological examination 	<ul style="list-style-type: none"> • Parental teaching for child with mental deficiency • History taking • Mental status examination (MSE) • Neurological examination • Assisting in psychometric
Child Guidance clinic	1	<ul style="list-style-type: none"> • Assess children with various mental health problems • Counsel and educate children, families and significant others 		<ul style="list-style-type: none"> • Observing and assisting in therapies • Individual and group psycho-education <ul style="list-style-type: none"> ▪ Mental hygiene practice education 	
Inpatient ward	4	<ul style="list-style-type: none"> • Assess patients with mental health problems 		<ul style="list-style-type: none"> ▪ Family psycho-education • History & mental status examination • Observe/practice psychometric assessment 	

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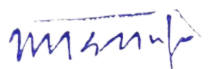
Clinical Requirements	Assessments	with the following	rt
•History taking and Mental status examination –2	•Mental status examination	•Evaluation of patient's mental status	•Completion of activity record
•Health education –1	•Mental status examination	•Evaluation of patient's mental status	•Assess performance with ratings scale
•Observation report of OPD	•Mental status examination	•Evaluation of patient's mental status	•Assess each skill with checklist
•Casework –1	•Mental status examination	•Evaluation of patient's mental status	•Evaluation of the observation report
•Observation report of different therapies – 1	•Mental status examination	•Evaluation of patient's mental status	•Assess performance with ratings scale
•Give care to 2-3 patients with various mental disorders	•Mental status examination	•Evaluation of patient's mental status	•Assess each skill with checklist
•Case study –1	•Mental status examination	•Evaluation of patient's mental status	

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Clinical Area/Unit	Duration (Weeks)	Learning Outcomes	Skills/Procedural Competencies	Clinical Requirements	Assessments Methods
		<ul style="list-style-type: none"> mental health problems • Assist in various therapies • Counsel and educate patients, families and significant others 	<ul style="list-style-type: none"> assessment • Recording therapeutic communication • Administration of medications • Assist Electro-Convulsive Therapy (ECT) • Participating in all therapies • Preparing patients for Activities of Daily Living (ADL) • Conducting admission and discharge counselling • Counseling and teaching patients and families 	<ul style="list-style-type: none"> • Care plan • Clinical presentation-1 • Process recording -2 • Maintain drug book 	<ul style="list-style-type: none"> • Evaluation of the case study, care plan, clinical presentation, process recording • Completion of activity record
Community psychiatry & Deaddiction centre	1	<ul style="list-style-type: none"> • Identify patients with various mental disorders • Motivate patients for early treatment and followup • Assist in followup clinic • Counsel and educate patient, family and community • Observe the assessment and care of patients at deaddiction centre 	<ul style="list-style-type: none"> • Conduct home visit and casework • Identifying individuals with mental health problems • Assisting in organizations of Mental Health camp • Conducting awareness meetings for mental health & mental illness • Counseling and Teaching family members, patients and community • Observing deaddiction care 	<ul style="list-style-type: none"> • Casework-1 • Observation report on field visits • Visit to deaddiction centre 	<ul style="list-style-type: none"> • Assess performance with rating scale • Evaluation of case work and observation report • Completion of activity record

COMMUNITY HEALTH NURSING-I including Environmental Science & Epidemiology

PLACEMENT: V SEMESTER

THEORY: 5 Credits (100 hours) includes Lab hours also

PRACTICUM: Clinical: 2 Credits (160 hours)

DESCRIPTION: This course is designed to help students develop broad perspectives of health, its determinants, about community health nursing and understanding about the health care delivery services, health care policies and regulations in India. It helps the students to develop knowledge and understanding of environmental science. It further helps them to apply the principles and concepts of BCC and health education for health promotion and maintenance of health within the community in wellness and illness continuum. It helps students to practice Community Health Nursing for the individuals, family and groups at rural, urban and tribal settings by applying principles of community health nursing and epidemiological approach. It also helps the students to develop knowledge and competencies required to screen, assess, diagnose, manage and refer clients appropriately in various health care settings. It prepares the students to provide primary health care to clients of all ages in the community, DH, PHC, CHC, SC/HWC and develop beginning skills in participating in all the National Health Programs.

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COMPETENCIES: On completion of the course, the students will be able to

1. Explore the evolution of public health in India and community health nursing
2. Explain the concepts and determinants of health
3. Identify the level of prevention and health problems of India
4. Develop basic understanding about the health care planning and the present health care delivery system in India at various levels
5. Locate the significance of primary health care and comprehensive primary health care as part of current health care delivery system focus
6. Discuss health care policies and regulations in India
7. Demonstrate understanding about an overview of environmental science, environmental health and sanitation
8. Demonstrate skill in nutritional assessment for different age groups in the community and provide appropriate nutritional counseling
9. Provide health education to individuals and families applying the principles and techniques of behavior change appropriate to community settings
10. Describe community health nursing approaches and concepts
11. Describe the role and responsibilities of community health nursing personnel
12. Utilize the knowledge and skills in providing comprehensive primary health care across the life span at various settings
13. Make effective home visits applying principles and methods used for home visiting
14. Use epidemiological approach in community diagnosis
15. Utilize the knowledge of epidemiology, epidemiological approaches in caring for people with communicable and non-communicable diseases
16. Investigate an epidemic of communicable diseases
17. Assess, diagnose, manage and refer clients for various communicable and non-communicable diseases appropriately at the primary health care level
18. Identify and perform the roles and responsibilities of nurses in implementing various national health programs in the community for the prevention, control and management of communicable and non-communicable diseases particularly in screening, identification, primary management and referral to a health facility/First Referral Unit (FRU)

COURSE OUTLINE

T–Theory

Unit	Time (Hrs)	Learning Outcomes	Content	Teaching/Learning Activities	Assessment Methods
I	4(T)	Define public health, community health and community health nursing Explain the evolution of public health in India and scope of community health nursing Explain various concepts of health and disease, dimensions and determinants of health	Concepts of Community Health and Community Health Nursing • Definition of public health,	• Lecture • Discussion • Explain using chart, graphs	• Short answer • Essay • Objective type

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community health and community health nursing

- Public health in India and its evolution and Scope of community health nursing

• *Review:* Concepts of Health & Illness/
disease: Definition, dimensions and determinants
of health and disease

• Natural history of disease

• Levels of prevention: Primary, Secondary &

• Community needs assessment (Field)
• Survey reports
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- Explain using examples



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Unit	Time (Hrs)	Learning Outcomes	Content	Teaching/Learning Activities	Assessment Methods
		problems of India	tertiary prevention – Review • Health problems (Profile) of India		
II	8(T)	Describe health planning and its steps, and various health plans, and committees Discuss health care delivery system in India at various levels Describe SDGs, primary health care and comprehensive primary health care (CPHC) Explain health care policies and regulations in India	Health Care Planning and Organization of Health Care at various levels • Health planning steps • Health planning in India: various committees and commissions on health and family welfare and Five Year plans • Participation of community and stakeholders in health planning • Health care delivery system in India: Infrastructure and Health sectors, Delivery of health services at sub-centre (SC), PHC, CHC, District level, state level and national level • Sustainable development goals (SDGs), Primary Health Care and Comprehensive Primary Health Care (CPHC): elements, principles • CPHC through SC/Health Wellness Center (HWC) • Role of MLHP/CHP • National Health Care Policies and Regulations ○ National Health Policy (1983, 2002, 2017) ○ National Health Mission (NHM): National Rural Health Mission (NRHM), National Urban Health Mission (NUHM), NHM ○ National Health Protection Mission (NHPM) ○ Ayushman Bharat ○ Universal Health Coverage	• Lecture • Discussion • Field visits to CHC, PHC, SC/Health Wellness Centers (HWC) • Directed reading	• Short answer • Essay • Evaluation of Field visit reports & presentation

Unit	Time (Hrs)	Learning Outcomes	Content	Teaching/Learning Activities	Assessment Methods
		conservation of natural resources	Sanitation <ul style="list-style-type: none"> • <i>Natural resources</i>: Renewable and non-renewable resources, natural resources and associated problems: Forest resources, water resources, mineral resources, food resources, energy resource and land resources • Role of individuals in conservation of natural resources, and equitable use of resources for sustainable lifestyles • <i>Ecosystem</i>: Concept, structure and functions of ecosystems, Types & Characteristics – Forest ecosystem, Grassland ecosystem, Desert ecosystem, Aquatic ecosystem, Energy flow in ecosystem • <i>Biodiversity</i>: Classification, value of bio-diversity, threats to biodiversity, conservation of biodiversity • <i>Environmental pollution</i>: Introduction, causes, effects and control measures of Air pollution, Water pollution, Soil pollution, Marine pollution, Noise pollution, Thermal pollution, nuclear hazards & their impact on health • <i>Climate change, global warming</i>: ex. heat wave, acid rain, ozone layer depletion, waste land reclamation & its impact on health • <i>Social issues and environment</i>: sustainable development, urban problems related to energy, water and environmental ethics • Acts related to environmental protection and preservation 	<ul style="list-style-type: none"> • Discussion • Debates on environmental protection and preservation • Explain using Charts, graphs, Models, films, slides • Directed reading • Visit to water supply & purification sites • divisional reports 	<ul style="list-style-type: none"> • Essay
		Describe ecosystem, its structure, types and functions			
		Explain the classification, value and threats to biodiversity			
		Enumerate the causes, effects and control measures of environmental pollution			
		Discuss about climate change, global warming, acid rain, and ozone layer depletion			
		Enumerate the role of an individual in increasing awareness about social issues			

Unit	Time (Hrs)	Learning Outcomes	Content	Teaching/Learning Activities	Assessment Methods
		<p>List the Acts related to environmental protection and preservation</p> <p>Describe the concept of environmental health and sanitation</p> <p>Describe water conservation, rainwater harvesting and watershed management</p> <p>Explain waste management</p>	<p>Sanitation</p> <ul style="list-style-type: none"> • Concept of environment health and sanitation • Concept of safe water, sources of water, waterborne diseases, water 	<p>Observe rainwater harvesting purification processes, household purification of water</p> <ul style="list-style-type: none"> • Physical and chemical standards of drinking water quality and tests for assessing bacteriological quality of water • Concepts of water conservation: rain water harvesting and watershed management • Solid waste management, human excreta disposal & management and sewage disposal and management • Commonly used insecticides and pesticides 	<p>plants</p> <ul style="list-style-type: none"> • Visit to sewage disposal and treatment sites, and waste disposal sites
IV	7(T)	<p>Describe the various nutrition assessment methods at the community level</p> <p>Plan and provide diet plans for all age groups including therapeutic diet</p>		<p>Nutrition Assessment and Nutrition Education</p> <ul style="list-style-type: none"> • <i>Review of Nutrition</i> <ul style="list-style-type: none"> ○ Concepts, types ○ Meal planning: aims, steps & diet plan for different age groups ○ Nutrition assessment of individuals, families and community by using appropriate methods • Planning suitable diet for individuals and families according to local availability of foods, dietary habits and economic status • General nutritional advice • Nutrition education: purpose, principles & methods and Rehabilitation 	<ul style="list-style-type: none"> • Lecture • Discussion • Demonstration • Roleplay • Market visit • Nutritional assessment for different age groups • Lecture • Discussion

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Unit	Time (Hrs)	Learning Outcomes	Content	Teaching/Learning Activities	Assessment Methods
		<p>the national nutrition programs and</p> <p>Identify early the food borne diseases, and perform initial management and referral appropriately</p>	<ul style="list-style-type: none"> • Review: Nutritional deficiency disorders • National nutritional policy & programs in India • Food Borne Diseases and Food Safety • Food borne diseases • Definition, & burden, Causes and classification • Signs & Symptoms • Transmission of food borne pathogens & toxins • Early identification, initial management and referral • Food poisoning & food intoxication • Epidemiological features/ clinical characteristics, Types of food poisoning • Food intoxication-features, preventive & control measures • Public health response to food borne diseases 	<ul style="list-style-type: none"> • Field visits to milk purification plants, slaughterhouse • Refer Nutrition module-BPCCHN Block 2-unit I & UNIT 5 	<ul style="list-style-type: none"> • Field visit reports
V	6(T)	<p>Describe behaviour change communication skills</p> <p>Counsel and provide health education to individuals, families and community for promotion of healthy lifestyle practices</p>	<ul style="list-style-type: none"> • Communication management and Health Education • Behaviour change communication skills <ul style="list-style-type: none"> ○ communication ○ Human behaviour ○ Health belief model: concepts & definition, ways to influence behaviour ○ Steps of behaviour change ○ Techniques of behaviour change: Guiding principles in planning BCC activity ○ Steps of BCC ○ Social and Behaviour Change Communication strategies (SBCC): techniques to collect social history from clients ○ Barriers to effective 	<ul style="list-style-type: none"> • Lecture • Discussion • Roleplay • Demonstration: BCC skills • Supervised field practice • Refer: BCC/SBCC module (MoHFW & USAID) 	<ul style="list-style-type: none"> • Short answer • Essay • Performance evaluation of health

Unit	Time (Hrs)	Learning Outcomes	Content	Teaching/Learning Activities	Assessment Methods
		using appropriate method and media	communication, and methods to overcome them • Health promotion and Health education: methods/techniques, and audio-visual aids		educational sessions to individual and families
VI	7(T)	Describe community health nursing approaches and concepts Describe and identify the activities of community health nurse to promote and maintain family health through home visits	Community health nursing approaches, concepts, roles and responsibilities of community health nursing personnel • <i>Approaches:</i> ○ Nursing process ○ Epidemiological approach ○ Problem solving approach ○ Evidence based approach ○ Empowering people to care for themselves • <i>Review:</i> Primary health care and Comprehensive Primary Health Care (CPHC) Home Visits: • Concept, Principles, Process, & Techniques: Bag technique • Qualities of Community Health Nurse • Roles and responsibilities of community health nursing personnel in family health services	• Lecture • Discussion • Demonstration • Role plays • Supervised field practice adolescents, elderly etc.	• Short answer • Essays • Assessment of supervised field practice
VII	10(T)	Explain the specific activities of community health nurse in assisting individuals and groups to promote and maintain their health	personnel in family health services • <i>Review:</i> Principles & techniques of counseling Assisting individuals and families to promote and maintain their health A. <i>Assessment of individuals and families</i> (Review from Child health nursing, Medical surgical nursing and OBG Nursing) • Assessment of children, women,	• Lecture • Discussion • Demonstration • Role plays	

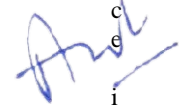
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Unit	Time (Hrs)	Learning Outcomes	Content	Teaching/Learning Activities	Assessment Methods
			<ul style="list-style-type: none"> • Children: Monitoring growth and development, milestones • Anthropometric measurements, BMI • Social development • Temperature and Blood pressure monitoring • Menstrual cycle • Breast self-examination (BSE) and testicles self-examination (TSE) • Warning Signs of various diseases • Tests: Urine for sugar and albumin, blood sugar, Hemoglobin <p><i>B. Provision of health services/primary healthcare:</i></p> <ul style="list-style-type: none"> • Routine check-up, Immunization, counseling, and diagnosis • Management of common diseases at home and health centre level <ul style="list-style-type: none"> ○ Care based on standing orders/protocol approved by MoH&FW ○ Drugs dispensing and injections at health centre <p><i>C. Continue medical care and follow up in community for various diseases/disabilities</i></p> <p><i>D. Carry out therapeutic procedures as prescribed/required for client and family</i></p> <p><i>E. Maintenance of health records and reports</i></p> <ul style="list-style-type: none"> • Maintenance of client records • Maintenance of health records at the facility level • Report writing and documentation of activities carried out during home visits, in the clinics/centres and field visits 		<ul style="list-style-type: none"> • Assessment of procedural skills in lab procedures • Evaluation of records and reports

Provide primary care at home/health centres (HC) using standing orders/protocols as per public health standards/approved by MoH&FW and INC regulation

Develop skill in maintenance of records and reports

• Document and maintain:
• Individual records

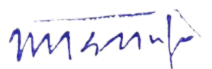
Unit	Time (Hrs)	Learning Outcomes	Content	Teaching/Learning Activities	Assessment Methods
		<p>Develop beginningskills in handlingsocialissues affectingthe health anddevelopment of thefamily</p> <p>Identify and assist thefamilies to utilize thecommunity resourcesappropriately</p>	<p><i>F. Sensitize and handlesocial issues affectinghealthanddevelopmentofthefamily</i></p> <ul style="list-style-type: none"> • Womenempowerment • Womenandchild abuse • Abuseofelders • Femalefoeticide • Commercialsexworkers • Substanceabuse <p><i>G. Utilize communityresources for client andfamily</i></p> <ul style="list-style-type: none"> • Traumaservices • Oldagehomes • Orphanages • Homes for physicallychallenged individuals • Homesfor destitute • Palliativecarecentres • Hospicecarecentres • Assistedlivingfacility 	<ul style="list-style-type: none"> • Familyrecords • Healthcenterrecords • Fieldvisits 	<ul style="list-style-type: none"> • Evaluation offield visitreports
VIII	10(T)	Describe the concepts, approaches and methods of epidemiology	<p>Introduction to Epidemiology – Epidemiological Approaches and Processes</p> <ul style="list-style-type: none"> • Epidemiology: Concept and Definition • Distribution and frequency of disease • Aims & uses of epidemiology • Epidemiological models of causation of disease • Concepts of disease transmission • Modes of transmission: Direct, Indirect and chain of infection • Time trends or fluctuations in disease occurrence • Epidemiological approaches: Descriptive, analytical and experimental 	<ul style="list-style-type: none"> • Lecture • Discussion • Demonstration • Roleplay • Field visits: communicable disease hospital & Entomology office 	<ul style="list-style-type: none"> • Short answer • Essay • Report on visit to communicable disease hospital • Report on visit to entomology office

Unit	Time (Hrs)	Learning Outcomes	Content	Teaching/Learning Activities	Assessment Methods
		Investigate an epidemic of communicable disease	<p>prevention of disease</p> <ul style="list-style-type: none"> Investigation of an epidemic of communicable disease Use of basic epidemiological tools to make community diagnosis for effective planning and intervention 	communicable disease	<ul style="list-style-type: none"> Report and presentation of non-investigations of epidemic of communicable disease
IX	15(T)	<p>Explain the epidemiology of specific communicable diseases</p> <p>Describe the various methods of prevention, control and management of communicable diseases and the role of nurses in screening, diagnosing, primary management and referral to a health facility</p>	<p>Communicable Diseases and National Health Programs</p> <p>1. <i>Communicable Diseases – Vector borne diseases (Every disease will be dealt under the following headlines)</i></p> <ul style="list-style-type: none"> Epidemiology of the following vector borne diseases Prevention & control measures Screening, and diagnosing the following conditions, primary management, referral and followup <ul style="list-style-type: none"> Malaria Filaria Kala-azar Japanese encephalitis Dengue Chikungunya <p>2. <i>Communicable diseases: Infectious diseases (Every disease will be dealt under the following headlines)</i></p> <ul style="list-style-type: none"> Epidemiology of the following infectious diseases Prevention & Control measures Screening, diagnosing the following conditions, primary management, referral and followup <ul style="list-style-type: none"> Leprosy Tuberculosis 	<ul style="list-style-type: none"> Lecture Discussion, Demonstration Roleplay Yelitis 	<ul style="list-style-type: none"> Field visit reports Assessment of family case study Suggested field visits Field practice Assessment of clients with communicable diseases

-
- OSCEassessment
 - Shortanswer
 - Essay



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Unit	Time (Hrs)	Learning Outcomes	Content	Teaching/Learning Activities	Assessment Methods
		Identify the national health programs relevant to communicable diseases and explain the role of nurses in implementation of these programs	<p>and measles</p> <ul style="list-style-type: none"> ○ Enteric fever ○ Viral hepatitis ○ HIV/AIDS/RTI infections ○ HIV/AIDS, and Sexually Transmitted Diseases/ Reproductive tract infections (STIs/RTIs) ○ Diarrhoea ○ Respiratory tract infections ○ COVID-19 ○ Helminthic – soil & food transmitted and parasitic infections – Scabies and pediculosis <p>3. Communicable diseases: Zoonotic diseases</p> <ul style="list-style-type: none"> ● Epidemiology of Zoonotic diseases ● Prevention & control measures ● Screening and diagnosing the following conditions, primary management, referral and follow up <ul style="list-style-type: none"> ○ Rabies: Identify, suspect, primary management and referral to a health facility ● Role of nurses in control of communicable diseases <p>National Health Programs</p> <ol style="list-style-type: none"> 1. UIP: Universal Immunization Program (Diphtheria, Whooping cough, Tetanus, Poliomyelitis, Measles and Hepatitis B) 2. National Leprosy Eradication Program (NLEP) 3. Revised National Tuberculosis Control Program (RNTCP) 4. Integrated Disease Surveillance Program (IDSP): Enteric fever, Diarrhea, Respiratory 		

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Unit	Time (Hrs)	Learning Outcomes	Content	Teaching/Learning Activities	Assessment Methods
			<p>infections and Scabies</p> <p>5. National Aids Control Organization (NACO)</p> <p>6. National Vector Borne Disease Control Program</p> <p>7. National Air Quality Monitoring Program</p> <p>8. Any other newly added program</p>		
X	15(T)	Describe the national health program for the control of non-communicable diseases and the role of nurses in screening, identification, primary management and referral to a health facility	<p>Non-Communicable Diseases and National Health Program (NCD)</p> <ul style="list-style-type: none"> • National response to NCDs (Every disease will be dealt under the following headlines) • Epidemiology of specific diseases • Prevention and control measures • Screening, diagnosing/identification and primary management, referral and follow-up care <p>NCD-1</p> <ul style="list-style-type: none"> ○ Diabetes Mellitus ○ Hypertension ○ Cardiovascular diseases ○ Stroke & Obesity ○ Blindness: Categories of visual impairment and national program for control of blindness ○ Deafness: national program for prevention and control of deafness ○ Thyroid diseases ○ Injury and accidents: Risk factors for Road traffic injuries and operational guidelines for trauma care facility on highways <p>NCD-2 Cancers</p> <ul style="list-style-type: none"> ○ Cervical Cancer ○ Breast Cancer 	<ul style="list-style-type: none"> • Lecture • Discussion • Demonstration • Roleplay • Suggested field visits • Field practice • Assessment of clients with non-communicable diseases 	<ul style="list-style-type: none"> • Field visit reports • Assessment of family case study • OSCE assessment • Short answer • Essay

Unit	Time (Hrs)	Learning Outcomes	Content	Teaching/Learning Activities	Assessment Methods
			<p>Causes, Prevention, Screening, diagnosis – signs, Signs & symptoms, and early management & referral</p> <ul style="list-style-type: none"> ○ Palliative care ○ Role of a nurse in non-communicable disease control program <p>National Health Programs</p> <ul style="list-style-type: none"> • National program for prevention and control of cancer, Diabetes, Cardiovascular Diseases and Stroke (NPCDCS) • National program for control of blindness • National program for prevention and control of deafness • National tobacco control program • Standard treatment protocols used in National Health Programs 	<ul style="list-style-type: none"> • Participation in national health programs 	
XI	3(T)	Enumerate the school health activities and the role/functions of a school health nurse	<p>School Health Services</p> <ul style="list-style-type: none"> • Objectives • Health problems of school children • Components of school health services • Maintenance of school health records • Initiation and planning of school health services • Role of a school health nurse 	<ul style="list-style-type: none"> • Lecture • Discussion • Demonstration • Roleplay • Suggested field visits • Field practice 	<ul style="list-style-type: none"> • Short answer • Essay • Evaluation of health counseling to school children • Screen, diagnose, manage and refer school children • OSCE assessment

Note: Lab hours less than 1 Credit is not specified separately.

CLINICAL PRACTICUM

CLINICAL: 2 Credits (160 hours)

CLINICAL POSTINGS: (4 weeks × 40 hours per week)

Clinical	Duration	Learning Outcomes	Procedural Competencies/ Clinical Skills	Clinical Requirements	Assessment Methods
Urban	2 weeks	Build and	<ul style="list-style-type: none"> • Interviewing skills using communication and 	<ul style="list-style-type: none"> • Community needs • Evaluation of assessment/ Survey 	

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Clinical Area/Unit	Duration (Weeks)	Learning Outcomes	Procedural Competencies/Clinical Skills	Clinical Requirements	Assessment Methods
Rural	2 Weeks	<p>Identify the socio-demographic characteristics, health determinants and resources of a rural and an urban community</p> <p>Observe the functioning and document significant observations</p> <p>Perform nutritional assessment and plan diet plan for adult</p> <p>Educate individuals/family/community on</p> <ul style="list-style-type: none"> - Nutrition - Hygiene - Food hygiene - Healthy lifestyle - Health promotion <p>Perform health assessment for clients of various age groups</p> <p>Maintain records and reports</p>	<p>interpersonal relationship</p> <ul style="list-style-type: none"> • Conducting community needs assessment/survey to identify health determinants of a community • Observations skills • Nutritional assessment skills • Skill in teaching individual/family on: <ul style="list-style-type: none"> ○ Nutrition, including food hygiene and safety ○ Healthy lifestyle ○ Health promotion • Health assessment including nutritional assessment for clients of different age groups • Documentation skills 	<p>– Rural/urban –</p> <p>1 Field visits:</p> <p>SC/HWC, PHC, CHC</p> <ul style="list-style-type: none"> • Water resources & purification site – water quality standards • Rain water harvesting • Sewage disposal • Observation of • milk diary • slaughterhouse – meat hygiene • Observation of nutrition programs • Visit to market • Nutritional assessment of an individual (adult) – 1 • Health teaching (Adult) – 1 • Use of audio-visual aids <ul style="list-style-type: none"> ○ Flashcards ○ Posters ○ Flannel graph ○ Flipcharts • Health assessment of woman – 1, infant/under five – 1, adolescent – 1, adult – 1 • Growth monitoring of under-five children – 1 <p>Document and maintain:</p> <ul style="list-style-type: none"> • Individual record • Family record • Health center record • Community health survey to investigate an epidemic – 1 	<ul style="list-style-type: none"> • Evaluation of field visit and observation reports • Health talk evaluation • Assessment of clinical performance

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Clinical Area/Unit	Duration (Weeks)	Learning Outcomes	Procedural Competencies/Clinical Skills	Clinical Requirements	Assessment Methods
		<p>Investigate epidemic of communicable disease</p> <p>Identify prevalent communicable and non-communicable diseases</p> <p>Screen, diagnose, manage and refer clients with common health problems in the community and refer high risk clients using standing orders/p protocols</p> <p>Participate in implementation of national health programs</p>	<ul style="list-style-type: none"> Investigating an epidemic – Community health survey Screening, diagnosing, primary management of common health problems in the community and referral of high-risk clients to FRUs Conduct home visit Participation in implementation of national health programs 	<p>Screening, diagnosing and primary management and referral:</p> <ul style="list-style-type: none"> Communicable disease – 1 Non-communicable diseases – 1 Home visits – Participation in any two national health programs Participation in school health program – 1 	<p>records</p> <ul style="list-style-type: none"> Clinical performance assessment OSCE Final clinical examination Evaluation of home visit

Participate in school health program

- Participation in school health program

EDUCATIONAL TECHNOLOGY/NURSING

EDUCATION PLACEMENT: V SEMESTER

THEORY: 2 Credits (40 hours)

PRACTICUM: Lab/Practical: 1 Credit (40 hours)

DESCRIPTION: This course is designed to help the students to develop knowledge, attitude and beginning competencies essential for applying basic principles of teaching and learning among individuals and groups both in educational and clinical settings. It also introduces basics of curriculum planning and organization. It further enables students to participate actively in team and collaborative learning.

COMPETENCIES: On completion of the course, the students will become competent to

- Develop basic understanding of theoretical foundations and principles of teaching and learning
- Identify the latest approaches to education and learning
- Initiate self-assessment to identify one's own learning styles
- Demonstrate understanding of various teaching styles that can be used, based on the learners' readiness and generational needs
- Develop understanding of basics of curriculum planning, and organizing
- Analyze and use different teaching methods effectively that are relevant to student population and settings
- Make appropriate decisions in selection of teaching learning activities integrating basic principles

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8. Utilize active learning strategies that enhance critical thinking, team learning and collaboration
9. Engage in team learning and collaboration through interprofessional education
10. Integrate the principles of teaching and learning in selection and use of educational media/technology
11. Apply the principles of assessment in selection and use of assessment and evaluation strategies
12. Construct simple assessment tools/tests integrating cognitive, psychomotor and affective domains of learning that can measure knowledge and competence of students
13. Develop basic understanding of student guidance through mentoring and academic advising
14. Identify difficult situations, crisis and disciplinary/grievance issues experienced by students and provide appropriate counseling
15. Engage in ethical practice in educational as well as clinical settings based on values, principles and ethical standards
16. Develop basic understanding of evidence-based teaching practices

COURSE OUTLINE

T–Theory, P –Practical (Laboratory)

Unit	Time (Hrs.)		Learning Outcomes	Content	Teaching/ Learning Activities	Assessment Methods
	T	P				
I	6	3	<p>Explain the definition, aims, types, approaches and scope of educational technology</p> <p>Compare and contrast the various educational philosophies</p> <p>Explain the teaching learning process, nature, characteristics and principles</p>	<p>Introduction and Theoretical Foundations:</p> <p><i>Education and educational technology</i></p> <ul style="list-style-type: none"> • Definition, aims • Approaches and scope of educational technology • Latest approaches to education: <ul style="list-style-type: none"> ○ Transformational education ○ Relationship based education ○ Competency based education <p><i>Educational philosophy:</i></p> <ul style="list-style-type: none"> • Definition of philosophy, educational philosophy • Comparison of educational philosophies • Philosophy of nursing education <p><i>Teaching learning process:</i></p> <ul style="list-style-type: none"> • Definitions • Teaching learning as a process • Nature and characteristics of teaching and learning • Principles of teaching and learning • Barriers to teaching and learning • Learning theories • Latest approaches to learning <ul style="list-style-type: none"> ○ Experiential learning 	<ul style="list-style-type: none"> • Lecture and discussion 	<ul style="list-style-type: none"> • Quiz

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Unit	Time (Hrs.)		Learning Outcomes	Content	Teaching/ Learning Activities	Assessment Methods
	T	P				
			<p>Describe different methods/strategies of teaching and develop beginning skill in using various teaching methods</p> <p>Explain active learning strategies and participate actively in team and collaborative learning</p>	<p>o Information communication technology (ICT) – ICT used in education</p> <p><i>Teaching methods – Features, advantages and disadvantages</i></p> <ul style="list-style-type: none"> • Lecture, Group discussion, microteaching • Skill lab – simulations, Demonstration & re-demonstration • Symposium, panel discussion, seminar, scientific workshop, exhibitions • Roleplay, project • Field trips • Self-directed learning (SDL) • Computer assisted learning • One-to-one instruction <p><i>Active learning strategies</i></p> <ul style="list-style-type: none"> • Team based learning • Problem based learning • Peer sharing • Case study analysis • Journaling • Debate • Gaming 	<ul style="list-style-type: none"> • Practiceteaching/Microteaching • Exercise (Peer teaching) • Patient teaching session • Construction of game – puzzle • Teaching in groups – interdisciplinary 	<ul style="list-style-type: none"> • Assessment of microteaching
IV	3	3	<p>Enumerate the factors influencing selection of clinical learning experiences</p> <p>Develop skill in using different clinical teaching strategies</p>	<p>• Inter-professional education</p> <p>Teaching in the Clinical Setting – Teaching Methods</p> <ul style="list-style-type: none"> • Clinical learning environment • Factors influencing selection of clinical learning experiences • Practice model • Characteristics of effective clinical teacher • Writing clinical learning outcomes/practice competencies • Clinical teaching strategies – patient assignment – clinical conference, clinical presentation/bedside clinic, Case study/care study, nursing grounds, concept mapping, project, debate, game, role play, PBL, questioning, written assignment, process recording 	<ul style="list-style-type: none"> • Lecture cum discussion • Writing clinical outcomes – assignments in pairs 	<ul style="list-style-type: none"> • Short answer • Assessment of written assignment

Unit	Time (Hrs.)		Learning Outcomes	Content	Teaching/ Learning Activities	Assessment Methods
	T	P				
V	5	5	<p>Explain the purpose, principles and steps in the use of media</p> <p>Categorize the different types of media and describe its advantages and disadvantages</p> <p>Develop skill in preparing and using media</p>	<p>Educational/Teaching Media</p> <ul style="list-style-type: none"> • Media use – Purpose, components, principles and steps • Types of media <ul style="list-style-type: none"> <i>Still visuals</i> <ul style="list-style-type: none"> ○ Non projected – drawings & diagrams, charts, graphs, posters, cartoons, board devices (chalk/whiteboard, bulletin board, flannel board, flip charts, flash cards, still pictures/photographs, printed materials-handout, leaflet, brochure, flyer) ○ Projected – filmstrips, microscope, power point slides, overhead projector <i>Moving visuals</i> <ul style="list-style-type: none"> ○ Video learning resources – videotapes & DVD, blu-ray, USB flash drive ○ Motion pictures/films <i>Realia and models</i> <ul style="list-style-type: none"> ○ Real objects & Models <i>Audio aids/audiomedia</i> <ul style="list-style-type: none"> ○ Audiotapes/Compact discs ○ Radio & Tape recorder ○ Public address system ○ Digital audio <i>Electronic media/computer learning resources</i> <ul style="list-style-type: none"> ○ Computers ○ Web-based video conferencing ○ E-learning, Smart classroom <i>Telecommunication (Distance education)</i> <ul style="list-style-type: none"> ○ Cable TV, satellite broadcasting, video conferencing ○ Telephones – Telehealth/telenursing <i>Mobile technology</i> 	<ul style="list-style-type: none"> • Lecture cum discussion • Preparation of different teaching aids – (Integrate with practice teaching sessions) 	<ul style="list-style-type: none"> • Short answer • Objective type • Assessment of the teaching media prepared
VI	5	3	<p>Describe the purpose, scope, principles in</p> <p>selection of evaluation methods and barriers to evaluation</p> <p>Explain the guidelines to develop assessment</p>	<p>Assessment/Evaluation Methods/Strategies</p> <ul style="list-style-type: none"> • Purposes, scope and principles in selection of assessment methods and types • Barriers to evaluation • Guidelines to develop assessment 	<ul style="list-style-type: none"> • Lecture cum discussion 	<ul style="list-style-type: none"> • Short answer • Objective type

Unit	Time (Hrs.)		Learning Outcomes	Content	Teaching/ Learning Activities	Assessment Methods
	TP					
			<p>tests</p> <p>Develop skill in construction of different tests</p> <p>Identify various clinical evaluation tools and demonstrate skill in selected tests</p>	<p>tests</p> <p><i>Assessment of knowledge:</i></p> <ul style="list-style-type: none"> • Essay type questions, • Short answer questions (SAQ) • Multiple choice questions (MCQ – single response & multiple response) <p><i>Assessment of skills:</i></p> <ul style="list-style-type: none"> • Clinical evaluation • Observation (checklist, rating scales, videotapes) • Written communication – progress notes, nursing care plans, process recording, written assignments • Verbal communication (oral examination) • Simulation • Objective Structured Clinical Examination (OSCE) • Self-evaluation • Clinical portfolio, clinical logs <p><i>Assessment of Attitude:</i></p> <ul style="list-style-type: none"> • Attitude scales <p><i>Assessment tests for higher learning:</i></p> <ul style="list-style-type: none"> • Interpretive questions, hot spot questions, drag and drop and ordered response questions 	<ul style="list-style-type: none"> • Exercise on constructing assessment tool/s 	<ul style="list-style-type: none"> • Assessment of tool/prepared
VII	3	3	<p>Explain the scope, purpose and principles of guidance</p> <p>Differentiate between guidance and counseling</p> <p>Describe the principles, types, and counseling process</p> <p>Develop basic skill of counseling and guidance</p>	<p>Guidance/academic advising, counseling and discipline</p> <p><i>Guidance</i></p> <ul style="list-style-type: none"> • Definition, objectives, scope, purpose and principles • Roles of academic advisor/faculty in guidance <p><i>Counseling</i></p> <ul style="list-style-type: none"> • Difference between guidance and counseling • Definition, objectives, scope, principles, types, process and steps of counseling • Counseling skills/techniques – basics • Roles of counselor • Organization of counseling services 	<ul style="list-style-type: none"> • Lecture cum discussion • Role play on student counseling in different situations • Assignment on identifying situations requiring counseling 	<ul style="list-style-type: none"> • Assessment of performance in role play scenario • Evaluation of assignment

Unit	Time (Hrs.)		Learning Outcomes	Content	Teaching/ Learning Activities	Assessment Methods
	T	P				
			Recognize the importance of preventive counseling and develop skill to respond to disciplinary problems and grievance among students	<ul style="list-style-type: none"> Issues for counseling in nursing students <i>Discipline and grievance in students</i> Managing disciplinary/grievance problems – preventive guidance & counseling Role of students' grievance redressal cell/committee 		
VIII	4	2	<p>Recognize the importance of value-based education</p> <p>Develop skill in ethical decision making and maintain ethical standards for students</p> <p>Introduce knowledge of EBT and its application in nursing education</p>	<p>Ethics and Evidence Based Teaching (EBT) in Nursing Education</p> <p><i>Ethics – Review</i></p> <ul style="list-style-type: none"> Definition of terms Value based education in nursing Value development strategies Ethical decision making Ethical standards for students Student-faculty relationship <p><i>Evidence based teaching – Introduction</i></p> <ul style="list-style-type: none"> Evidence based education process and its application to nursing education 	<ul style="list-style-type: none"> Value clarification exercise Case study analysis (student encountered scenarios) and suggest ethical decision-making steps Lecture cum discussion 	<ul style="list-style-type: none"> Short answer Evaluation of case study analysis Quiz – MCQ

INTRODUCTION TO FORENSIC NURSING AND INDIAN


LAWSPACEMENT: V SEMESTER

THEORY: 1 Credit (20 hours)

DESCRIPTION: This course is designed to help students to know the importance of forensic science in total patient care and to recognize forensic nursing as a specialty discipline in professional nursing practice.

COMPETENCIES: On completion of the course, the students will be able to

1. Identify forensic nursing as an emerging specialty in health care and nursing practice
2. Explore the history and scope of forensic nursing practice
3. Identify forensic team, role and responsibilities of forensic nurse in total care of victim of violence and in preservation of evidence
4. Develop basic understanding of the Indian judicial system and legal procedures


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COURSE OUTLINE

T–Theory

Unit	Time (Hrs)	Learning Outcomes	Content	Teaching/ Learning Activities	Assessment Methods
I	3(T)	Describe the nature of forensic science and discuss issues concerning violence	Forensic Science <ul style="list-style-type: none"> • Definition • History • Importance in medical science • Forensic Science Laboratory Violence <ul style="list-style-type: none"> • Definition • Epidemiology • Source of data 	<ul style="list-style-type: none"> • Lecture cum discussion • Visit to Regional Forensic Science Laboratory 	<ul style="list-style-type: none"> • Quiz–MCQ • Write visit report
II	2(T)	Explain concepts of forensic nursing and scope of practice of forensic nurse	Sexual abuse–child and women Forensic Nursing <ul style="list-style-type: none"> • Definition • History and development for • Scope–setting of practice, areas of practice and subspecialties • Ethical issues 	<ul style="list-style-type: none"> • Lecture cum discussion 	<ul style="list-style-type: none"> • Short answer • Objective type
III	7(T)	Identify members of forensic team and describe role of forensic nurse	<ul style="list-style-type: none"> • Roles and responsibilities of nurse • INC & SNCA Acts Forensic Team <ul style="list-style-type: none"> • Members and their roles Comprehensive forensic nursing care of victim and family <ul style="list-style-type: none"> • Physical aspects • Psychosocial aspects • Cultural and spiritual aspects • Legal aspects • Assist forensic team in care beyond scope of her practice • Admission and discharge/referral/death of victim of violence • Responsibilities of nurse as a witness Evidence preservation–role of nurses	<ul style="list-style-type: none"> • Lecture cum Discussion • Hypothetical/real case presentation • Observation of post-mortem 	<ul style="list-style-type: none"> • Objective type • Short answer • Write report

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• Observation Recognition

• Visit to department forensic medicine

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Unit	Time (Hrs)	Learning Outcomes	Content	Teaching/Learning Activities	Assessment Methods
			<ul style="list-style-type: none"> Collection Preservation Documentation of Biological and other evidence related to criminal/traumatic event Forwarding biological samples for forensic examination 		
IV	3(T)	Describe fundamental rights and human rights commission	Fundamental Rights <ul style="list-style-type: none"> Right of victim Right of accused Human Rights Commission	<ul style="list-style-type: none"> Lecture cum discussion Written Assignment Visit to prison 	<ul style="list-style-type: none"> Short answer Assessment of written assignment Write visit report
V	5(T)	Explain Indian judicial system and laws Discuss the importance	Sources of laws and law-making powers Overview of Indian Judicial System <ul style="list-style-type: none"> JMFC (Judicial Magistrate First Class) District State Apex Civil and Criminal Case Procedures <ul style="list-style-type: none"> IPC (Indian Penal Code) ICPC IE Act (Indian Evidence Act) Overview of POSCO Act	<ul style="list-style-type: none"> Lecture cum discussion Guided reading Lecture cum discussion 	<ul style="list-style-type: none"> Quiz Short answer

CHILD HEALTH NURSING -II

PLACEMENT: VISEMESTER

THEORY: 2 Credits (40 hours)

PRACTICUM: Clinical: 1 Credit (80 hours)

DESCRIPTION: This course is designed for developing an understanding of the modern approach to child-care, identification, prevention and nursing management of common health problems of neonates and children.

COMPETENCIES: On completion of the course, the students will be able to

1. Apply the knowledge of pathophysiology and provide nursing care to children with Cardiovascular, GI, genitourinary, nervous system disorders, orthopedic disorders, eye, ear and skin disorders and communicable diseases
2. Provide care to children with common behavioural, social and psychiatric problems
3. Manage challenged children
4. Identify the social and welfare services for challenged children

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COURSE OUTLINE

T–Theory

Unit	Time (Hrs)	Learning Outcomes	Content	Teaching/ Learning Activities	Assessment Methods
1	20(T)	Describe the etiology, pathophysiology, clinical manifestation and nursing management of children with disorder of cardiovascular, gastrointestinal, genitourinary, and nervous system	Cardiovascular system: <ul style="list-style-type: none"> • Identification and Nursing management of congenital malformations • Congenital heart diseases: Cyanotic and Acyanotic (ASD, VSD, PDA, TOF) • Others: Rheumatic fever and Rheumatic heart disease, Congestive cardiac failure • Hematological conditions: <ol style="list-style-type: none"> a) Congenital: Hemophilia, Thalassemia b) Others: Anemia, Leukemia, Idiopathic thrombocytopenic purpura, Hodgkins and non-hodgkins lymphoma Gastro-intestinal system: <ul style="list-style-type: none"> • Identification and Nursing management of congenital malformations. • Congenital: Cleft lip, Cleft palate, Congenital hypertrophic pyloric stenosis, Hirschsprungs disease (Megacolon), Anorectal malformation, Malabsorption syndrome, Abdominal wall defects, Hernia • Others: Gastroenteritis, Diarrhea, Vomiting, Protein energy malnutrition, Intestinal obstruction, Hepatic diseases, intestinal parasites Genitourinary system: <ul style="list-style-type: none"> • Identification and Nursing management of congenital malformations. • Congenital: Wilms tumor, Extrophy of bladder, Hypospadias, Epispadias, Obstructive uropathy • Others: Nephrotic syndrome, Acute glomerulonephritis, renal failure Nervous system: <ul style="list-style-type: none"> • Identification and Nursing management of congenital malformations <ol style="list-style-type: none"> a) Congenital: Spina bifida, Hydrocephalus. b) Others: Meningitis, Encephalitis, Convulsive disorders (convulsions and seizures), Cerebral palsy head injury 	<ul style="list-style-type: none"> • Lecture and discussion • Demonstration and practice session <p>Refer/consult SAM operational guidelines on facility-based management of children with severe acute malnutrition</p>	<ul style="list-style-type: none"> • Lecture and discussion • Demonstration
II	10(T)	Describe the etiology, pathophysiology, clinical manifestation and nursing	Orthopedic disorders: <ul style="list-style-type: none"> • Clubfoot 		

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- Shortanswer
 - Objectivetype
 - Assessment ofskills
withchecklist

- Shortanswer
- Objectivetype
- Assessmentof



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Unit	Time (Hrs)	Learning Outcomes	Content	Teaching/ Learning Activities	Assessment Methods
		<p>management of children with Orthopedic disorders, eye, ear and skin disorders</p> <p>Explain the preventive measures and strategies for children with communicable diseases</p>	<ul style="list-style-type: none"> • Hip dislocation and • Fracture <p>Disorder of eye, ear and skin:</p> <ul style="list-style-type: none"> • Refractory errors • Otitis media and • Atopic dermatitis <p>Communicable diseases in children, their identification/diagnosis, nursing management in hospital, in home, control & prevention:</p> <ul style="list-style-type: none"> • Tuberculosis • Diphtheria • Tetanus • Pertussis • Poliomyelitis • Measles • Mumps, and • Chickenpox • HIV/AIDS • Dengue fever • COVID-19 	<ul style="list-style-type: none"> • Practice session • Clinical practice 	<p>skills with checklist</p>
III	10(T)	<p>Describe the management of children with behavioral & social problems</p> <p>Identify the social & welfare services for challenged children</p>	<p>Management of behavior and social problems in children</p> <ul style="list-style-type: none"> • Child Guidance clinic • Common behavior disorders in children and management <ul style="list-style-type: none"> ○ Enuresis and Encopresis ○ Nervousness ○ Nail biting ○ Thumb sucking ○ Temper tantrum ○ Stealing ○ Aggressiveness ○ Juvenile delinquency ○ School phobia ○ Learning disability • Psychiatric disorders in children and management <ul style="list-style-type: none"> ○ Childhood schizophrenia ○ Childhood depression ○ Conversion reaction ○ Posttraumatic stress disorder ○ Autism spectrum disorders 	<ul style="list-style-type: none"> • Lecture cum discussion • Field visits to child guidance clinics, school form entally & physically, socially challenged 	<ul style="list-style-type: none"> • Short answer • Objective type • Assessment of field reports

Unit	Time (Hrs)	Learning Outcomes	Content	Teaching/Learning	Assessment
			<ul style="list-style-type: none"> Eating disorder in children and management <ul style="list-style-type: none"> Obesity Anorexia nervosa Bulimia Management of challenged children. <ul style="list-style-type: none"> Mentally Physically Socially Child abuse, Substance abuse Welfare services for challenged children in India 		

CHILD HEALTH NURSING -II-CLINICAL PRACTICUM(1 Credit-80 hours)

Given under Child Health Nursing-I as I & II

MENTAL HEALTH NURSING-II

PLACEMENT: VISEMESTER


THEORY: 1 Credit (40 Hours)

PRACTICUM: Clinical: 2 Credits (160 Hours)

DESCRIPTION: This course is designed to provide the students with basic understanding and skills essential to meet psychiatric emergencies and perform the role of community mental health nurse.

COMPETENCIES: On completion of the course, the students will be able to

1. Apply nursing process in providing care to patients with substance use disorders, and personality and sexual disorders.
2. Apply nursing process in providing care to patients with behavioural and emotional disorders occurring during childhood and adolescence.
3. Apply nursing process in providing care to patients with organic brain disorders.
4. Identify and respond to psychiatric emergencies.
5. Carry out crisis interventions during emergencies under supervision.
6. Perform admission and discharge procedures as per MHCA 2017.
7. Explore the roles and responsibilities of community mental health nurse in delivering community mental health services.


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COURSE OUTLINE

T–Theory

	Unit Time	Learning Outcomes	Content	Teaching/Learning Activities	Assessment Methods
I	6(T)	Describe the etiology, psycho-dynamics, clinical manifestations, diagnostic criteria and management of patients with substance use disorders	Nursing Management of Patients with Substance Use Disorders <ul style="list-style-type: none"> • Prevalence and incidence • Commonly used psychotropic substances: classifications, forms, routes, action, intoxication and withdrawal • Psychodynamics/etiology of substance use disorder (Terminologies: Substance Use, Abuse, Tolerance, Dependence, Withdrawal) • Diagnostic criteria/formulations • Nursing Assessment: History (substance history), Physical, mental assessment and drug and drug assay • Treatment (detoxification, antabuse and narcotic antagonist therapy and harm reduction, Brief interventions, MET, refusal skills, maintenance therapy) and nursing management of patients with substance use disorders • Special considerations for vulnerable population 	<ul style="list-style-type: none"> • Lecture cum discussion • Case discussion • Case presentation • Clinical practice 	<ul style="list-style-type: none"> • Essay • Short answer • Assessment of patient management problems
II	6(T)	Describe the etiology, psycho-dynamics, clinical manifestations, diagnostic criteria and management of patients with personality, and sexual disorders	<ul style="list-style-type: none"> • Follow-up and home care and rehabilitation Nursing Management of Patient with Personality and Sexual Disorders <ul style="list-style-type: none"> • Prevalence and incidence • Classification of disorders • Etiology, psychopathology, characteristics, clinical practice diagnosis • Nursing Assessment: History, Physical and mental health assessment • Treatment modalities and nursing management of patients with personality, and sexual disorders 	<ul style="list-style-type: none"> • Lecture cum discussion • Case discussion • Case presentation • Clinical practice diagnosis 	<ul style="list-style-type: none"> • Essay • Short answer • Assessment of patient management problems
III	8(T)	Describe the etiology, psychopathology, clinical manifestations, diagnostic criteria and management of childhood and adolescent disorders including mental deficiency	<ul style="list-style-type: none"> • Geriatric considerations • Follow-up and home care and rehabilitation Nursing Management of Behavioural & Emotional Disorders occurring during Childhood and Adolescence (Intellectual disability, autism, attention deficit, hyperactive disorder, eating disorders, learning disorder) <ul style="list-style-type: none"> • Prevalence and incidence • Classifications • Etiology, psychodynamics, Characteristics, diagnostic criteria/formulations 	<ul style="list-style-type: none"> • Lecture cum discussion • Case discussion • Case presentation • Clinical practice 	<ul style="list-style-type: none"> • Essay • Short answer • Assessment of patient management problems

Unit	Time (Hrs)	Learning Outcomes	Content	Teaching/Learning Activities	Assessment Methods
			<ul style="list-style-type: none"> •NursingAssessment:History,Physical,mental status examination and IQassessment •Treatment modalities and nursingmanagementofchildhooddisordersincludingintellectualdisability •Follow-upandhomecareandrehabilitation 		
IV	5(T)	Describe theetiology, psycho-pathology, clinicalmanifestations,diagnostic criteriaandmanagementoforganic braindisorders.	<p>Nursing Management of Organic BrainDisorders (Delirium, Dementia, amnesticdisorders)</p> <ul style="list-style-type: none"> •Prevalenceandincidence •Classification • Etiology, psychopathology, clinicalfeatures, diagnosis and Differentialdiagnosis •NursingAssessment:History,Physical,mental andneurologicalassessment •Treatment modalities and nursingmanagementoforganicbraindisorders •Follow-upandhomecareandrehabilitation 	<ul style="list-style-type: none"> •Lecturecumdiscussion •Casediscussion •Casepresentation •Clinicalpractice 	<ul style="list-style-type: none"> •Essay •Shortanswer •Assessmentofpatientmanagementproblems •Shortanswer
V	6(T)	Identify psychiatricemergencies andcarry out crisisintervention	<p>PsychiatricEmergenciesandCrisisIntervention</p> <ul style="list-style-type: none"> •Types of psychiatric emergencies(attemptedsuicide,violence/aggression,stupor, delirium tremens and otherpsychiatric emergencies) and theirmanagements •Maladaptivebehaviourofindividualandgroups, stress, crisisanddisaster(s) •Typesof crisis •Crisisintervention:Principles, TechniquesandProcess <ul style="list-style-type: none"> - Stressreductioninterventionsasperstressadaptation model 	<ul style="list-style-type: none"> •Lecturecumdiscussion •Casediscussion •Casepresentation •Clinicalpractice 	<ul style="list-style-type: none"> •Objectivetype •Shortanswer
VI	4(T)	Explain legalaspects applied inmental healthsettingsandroleofthenurse	<ul style="list-style-type: none"> - Copingenhancement - Techniquesof counseling <p>LegalIssuesinMentalHealthNursing</p> <ul style="list-style-type: none"> •OverviewofIndianLunacyActandTheMentalHealthAct1987 •(ProtectionofChildrenfromSexualOffence) POSCOAct •MentalHealthCareAct(MHCA)2017 •Rightsof mentally illclients •Forensicpsychiatryandnursing •Actsrelatedtonarcoticandpsychotropicsubstancesand illegaldrugtrafficking 	<ul style="list-style-type: none"> •Lecturecumdiscussion •Casediscussion 	<ul style="list-style-type: none"> •Objectivetype

Unit	Time (Hrs)	Learning Outcomes	Content	Teaching/Learning Activities	Assessment Methods
			<ul style="list-style-type: none"> • Admission and discharge procedures as per MHCA 2017 • Role and responsibilities of nurses in implementing MHCA 2017 		
VII	5(T)	Describe the model of preventive psychiatry Describe Community Mental health services and role of the nurse	Community Mental Health Nursing <ul style="list-style-type: none"> • Development of Community Mental Health Services: • National mental health policy viz. National Health Policy • National Mental Health Program • Institutionalization versus Deinstitutionalization • Model of Preventive psychiatry • Mental Health Services available at the primary, secondary, tertiary levels including rehabilitation and nurses' responsibilities • Mental Health Agencies: Government and voluntary, National and International • Mental health nursing issues for special populations: Children, Adolescence, Women Elderly, Victims of violence and abuse, Handicapped, HIV/AIDS etc. 	<ul style="list-style-type: none"> • Lecture cum discussion • Clinical/field practice • Field visits to mental health service agencies 	<ul style="list-style-type: none"> • Short answer • Objective type • Assessment of the field visit reports

CLINICAL PRACTICUM – 2 Credits (80 hours)

Clinical Practicum for Mental Health Nursing - I & II are given under Mental Health Nursing - I Clinical

Practicum NURSING MANAGEMENT AND LEADERSHIP

PLACEMENT: VI Semester

THEORY: 3 Credits (60 hours) includes Lab/Skill Lab hours also

PRACTICUM: Clinical: 1 Credit (80 hours)

DESCRIPTION: This course is designed to enable students to acquire knowledge and competencies in areas of administration, and management of nursing services and education. Further prepares the students to develop leadership competencies and perform their role as effective leaders in an organization.

COMPETENCIES: On completion of the course, the students will be able to

1. Analyze the health care trends influencing development of nursing services and education in India.
2. Describe the principles, functions and process of management applied to nursing.
3. Develop basic understanding and beginning competencies in planning and organizing nursing services in a hospital.
4. Apply the concept of human resource management and identify the job description for all categories of nursing personnel including in service education.
5. Discuss the principles and methods of staffing and scheduling in an individual hospital/nursing unit.
6. Develop skill in management of materials and supplies including inventory control.
7. Develop team working and interprofessional collaboration competencies.
8. Identify effective leadership styles and develop leadership competencies.
9. Utilize the knowledge of principles and line of control and participate in quality management and evaluation activities.
10. Utilize the knowledge related to financial planning in nursing services and education during budgetary process.

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11. Apply the knowledge of nursing informatics in maintenance of records and reports relevant to patient information, nursing care and progress.
12. Demonstrate understanding of the INC guidelines for establishment and accreditation of educational institutions in terms of faculty norms, physical infrastructure and clinical facilities.
13. Demonstrate beginning competencies in planning, organizing and staffing at college including implementation and evaluation of curriculum.
14. Identify the legal issues and laws relevant to nursing practice and education.
15. Apply the knowledge and utilize the various opportunities for professional advancement.

COURSE OUTLINE

T–Theory

Unit	Time (Hrs)	Learning Outcomes	Content	Teaching/Learning Activities	Assessment Methods
I	1(T)	Explore the healthcare development of nursing services and education in India and trends	Health Care and Development of Nursing Services in India <ul style="list-style-type: none"> Current healthcare delivery system of India – review Planning and development of nursing services and education at global and national scenario Recent trends and issues of nursing service and management 	<ul style="list-style-type: none"> Lecture cum discussion Directed reading and written assignment 	<ul style="list-style-type: none"> Short answer Assessment of assignment
II	2(T)	Explain the principles and functions of management applied to nursing Describe the introductory concepts of management as a process	Management Basics Applied to Nursing <ul style="list-style-type: none"> Definitions, concepts and theories of management Importance, features and levels of management Management and administration Functions of management Principles of management Role of a nurse as a manager Introduction to Management Process <ul style="list-style-type: none"> Planning Organizing Staffing Directing/Leading Controlling 	<ul style="list-style-type: none"> Lecture and discussion 	<ul style="list-style-type: none"> MCQ Short answer
III	4 (T)	Describe the essential elements of planning	MANAGEMENT OF NURSING SERVICES Planning Nursing Services <ul style="list-style-type: none"> Vision, Mission, philosophy, objectives Nursing service policies, procedures and manuals Functional and operational planning 	<ul style="list-style-type: none"> Lecture and Discussion Visit to specific hospital/patient care units Demonstration of disaster drill in the respective setting 	<ul style="list-style-type: none"> Formulate Mission & Vision Statement for the nursing department/unit Assessment

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Unit	Time (Hrs)	Learning Outcomes	Content	Teaching/Learning Activities	Assessment Methods
			<ul style="list-style-type: none"> • Strategic planning • Program planning – Gantt chart & milestone chart • Budgeting – concepts, principles, types, • Budget proposal, cost benefit analysis • Planning hospital and patient care unit (Ward) • Planning for emergency and disaster 		<ul style="list-style-type: none"> • of problem-solving exercises • Visit Report
IV	4(T)	Discuss the concepts of organizing including hospital organization	Organizing <ul style="list-style-type: none"> • Organizing as a process – assignment, delegation and coordination • Hospital – types, functions & organization • Organizational development • Organizational structure • Organizational charts • Organizational effectiveness • Hospital administration, Control & line of authority • Hospital statistics including hospital utilization indices • Nursing care delivery systems and trends 	<ul style="list-style-type: none"> • Lecture cum discussion • Comparison of organizational structure of various organizations • Nursing care delivery systems – assignment • Preparation of Organizational chart of hospital/ Nursing services 	<ul style="list-style-type: none"> • Short answer • Assessment of assignment
V	6(T)	Identify the significance of human resource management (HRM) and material management and discuss its elements	<ul style="list-style-type: none"> • Role of nurse in maintenance of effective organizational climate Staffing (Human resource management) <ul style="list-style-type: none"> • Definition, objectives, components and functions Staffing & Scheduling <ul style="list-style-type: none"> • Staffing – Philosophy, staffing activities • Recruiting, selecting, deployment • Training, development, credentialing, retaining, promoting, transfer, terminating, superannuation • Staffing units – Projecting staffing requirements/calculation of requirements of staff resources Nurse:patient ratio, Nurse:Population ratio as per SIU norms/IPH Norms, and Patient classification system • Categories of nursing personnel including job description of all levels 	<ul style="list-style-type: none"> • Lecture and discussion • Role play • Games self-assessment, case discussion and practice session • Calculation of staffing requirements for a specified ward 	<ul style="list-style-type: none"> • Formulate Job • description at different levels of care & compare with existing system • Preparation of duty roster

Unit	Time (Hrs)	Learning Outcomes	Content	Teaching/Learning Activities	Assessment Methods
		<p>Explain the procedure steps of material management</p> <p>Develop managerial skill in inventory control and actively participate in procurement process</p>	<ul style="list-style-type: none"> • Turnover and absenteeism • Staff welfare • Discipline and grievances <p>In-Service Education</p> <ul style="list-style-type: none"> • Nature and scope of in-service education program • Principles of adult learning – review • Planning and organizing in-service educational program • Methods, techniques and evaluation • Preparation of report <p>Material Resource Management</p> <ul style="list-style-type: none"> • Procurement, purchasing process, inventory control & role of nurse • Auditing and maintenance in hospital and patient care unit 	<ul style="list-style-type: none"> • Visit to inventory store of the institution 	<ul style="list-style-type: none"> • Preparation of MMF/records • Preparation of log book & condemnation documents • Visit Report
VI	5 (T)	Describe the important methods of supervision and guidance	<p>Directing and Leading</p> <ul style="list-style-type: none"> • Definition, principles, elements of directing • Supervision and guidance • Participatory management • Inter-professional collaboration • Management by objectives • Team management • Assignments, rotations • Maintenance of discipline • Leadership in management 	<ul style="list-style-type: none"> • Lecture and discussion • Demonstration of record & report maintenance in specific wards/departments 	<ul style="list-style-type: none"> • Assignment on Reports & Records maintained in nursing department/ • Preparation of protocols and manuals
VII	4 (T)	Discuss the significance and changing trends of nursing leadership	<p>Leadership</p> <ul style="list-style-type: none"> • Definition, concepts, and theories • Leadership principles and competencies • Leadership styles: Situational leadership, Transformational leadership • Methods of leadership development • Mentorship/preceptorship in nursing • Delegation, power & politics, empowerment, mentoring and coaching • Decision making and problem solving 	<ul style="list-style-type: none"> • Lecture and discussion • Self-assessment • Report on types of leadership adopted at different levels of health care in the given setting • Problem solving/Conflict management exercise • Observation of managerial roles at different levels (middle level managers-ward in charge, ANS) 	<ul style="list-style-type: none"> • Short answer • Essay • Assessment of exercise/report
		<p>Analyze the different leadership styles and develop leadership competencies</p>			

Unit	Time (Hrs)	Learning Outcomes	Content	Teaching/Learning Activities	Assessment Methods
			<ul style="list-style-type: none"> • Conflict management and negotiation • Implementing planned change 		
VIII	4(T)	Explain the process of controlling and its activities	Controlling <ul style="list-style-type: none"> • Implementing standards, policies, procedures, protocols and practices • Nursing performance audit, patient satisfaction • Nursing grounds, Documentation – records and reports • Total quality management – Quality assurance, Quality and safety • Performance appraisal • Program evaluation review technique (PERT) • Benchmarking, Activity plan (Gantt chart) • Critical path analysis 	<ul style="list-style-type: none"> • Lecture cum discussion • Preparation of policies/protocols for nursing units/department 	<ul style="list-style-type: none"> • Assessment of prepared protocols
IX	4(T)	Explain the concepts of organizational behavior and group dynamics	Organizational Behavior and Human Relations <ul style="list-style-type: none"> • Concepts and theories of organizational behavior • Group dynamics • Review – Interpersonal relationship • Human relations • Public relations in the context of nursing • Relations with professional associations and employee unions • Collective bargaining • Review – Motivation and morale building • Communication in the workplace – assertive communication • Committees 	<ul style="list-style-type: none"> • Lecture and discussion • Role play/ exercise – Group dynamics & human relations 	<ul style="list-style-type: none"> • Short answer • OSCE
X	2 (T)	Describe the financial management related to nursing services	importance in the organization, functioning Financial Management <ul style="list-style-type: none"> • Definition, objectives, elements, functions, principles & scope of financial management • Financial planning (budgeting for nursing department) 	<ul style="list-style-type: none"> • Lecture cum discussion • Budget proposal review • Preparation of budget proposal for a specific department 	<ul style="list-style-type: none"> • Short answer • Essay • Assessment of assignment

Unit	Time (Hrs)	Learning Outcomes	Content	Teaching/Learning Activities	Assessment Methods
			<ul style="list-style-type: none"> Budget and Budgetary process Financial audit 		
XI	1(T)	Review the concepts, principles and methods and use of nursing informatics	Nursing Informatics/ Information Management – Review <ul style="list-style-type: none"> Patient records Nursing records Use of computers in hospital, college and community Telemedicine & Telenursing Electronic Medical Records (EMR), EHR 	<ul style="list-style-type: none"> Review Practice session Visit to departments 	<ul style="list-style-type: none"> Short answer
XII	1(T)	Review personal management terms of management of emotions, stress and resilience	Personal Management – Review <ul style="list-style-type: none"> Emotional intelligence Resilience building Stress and time management – de-stressing Career planning 	<ul style="list-style-type: none"> Review Discussion , labs,	
			MANAGEMENT OF NURSING EDUCATIONAL INSTITUTIONS		
XIII	4(T)	Describe the process of establishing educational institutions and its accreditation guidelines	Establishment of Nursing Educational Institutions <ul style="list-style-type: none"> Indian Nursing Council norms and guidelines – Faculty norms, physical facilities, clinical facilities, curriculum implementation, and evaluation/examination guidelines Coordination with regulatory bodies – INC and State Nursing Council Accreditation – Inspections Affiliation with university/State council/board of examinations 		<ul style="list-style-type: none"> Lecture and discussion Visit to one of the regulatory bodies
XIV	4(T)	Explain the planning and organizing functions of a nursing college	Planning and Organizing <ul style="list-style-type: none"> Philosophy, objectives and mission of the college Organization structure of school/college Review – Curriculum planning Planning teaching and learning experiences, clinical facilities – master plan, timetable and clinical rotation Budget planning – faculty, staff, equipment & supplies, AV aids, Lab equipment, library books, journals, computers and maintenance Infrastructure facilities – college, classrooms, hostel, library 		<ul style="list-style-type: none"> Directed reading – INCC Curriculum Preparation of organizational structure of the college Written assignment – writing philosophy of a teaching department Preparation of master plan, timetable and clinical rotation

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Unit	Time (Hrs)	Learning Outcomes	Content	Teaching/Learning Activities	Assessment Methods
			computerlab,transportfacilities •Records&reportsforstudents,staff,faculty andadministrative •Committeesandfunctioning •Clinicalexperiences		
XV	4(T)	Develop understanding of staffing the college and selecting the students	Staffing and Student Selection <ul style="list-style-type: none"> • Faculty/staff selection, recruitment and placement, job description • Performance appraisal • Faculty development • Faculty/staff welfare • Student recruitment, admission, clinical placement 	<ul style="list-style-type: none"> • Guided reading on faculty norms • Faculty welfare activities report • Writing job description of tutors 	<ul style="list-style-type: none"> • Short answer • Activity report • Assessment of job description
XVI	4(T)	Analyze the leadership and management activities in a educational organization	Directing and Controlling <ul style="list-style-type: none"> • Review – Curriculum implementation and evaluation • Leadership and motivation, supervision – review • Guidance and counseling • Quality management – educational audit • Program evaluation, evaluation of performance • Maintaining discipline • Institutional records and reports – administrative, faculty, staff and students 	<ul style="list-style-type: none"> • Review principles of evaluation • Assignment – Identify disciplinary problems among students • Writing student record 	<ul style="list-style-type: none"> • Short answer • Assessment of assignment and record
XVII	4(T)	Identify various legal issues and laws relevant to nursing practice	PROFESSIONAL CONSIDERATIONS Review – Legal and Ethical Issues <ul style="list-style-type: none"> • Nursing as a profession – Characteristics of a professional nurse • Nursing practice – philosophy, aim and objectives • Regulatory bodies – INC and SNC constitution and functions Review – Professional ethics <ul style="list-style-type: none"> • Code of ethics and professional conduct – INC & ICN • Practice standards for nursing – INC • International Council for Nurses (ICN) Legal aspects in nursing: <ul style="list-style-type: none"> • Consumer protection act, patient rights • Legal terms related to practice, legal 		

Unit	Time (Hrs)	Learning Outcomes	Content	Teaching/Learning Activities	Assessment Methods
			system – types of law, tort law & liabilities • Laws related to nursing practice – negligence, malpractice, breach, penalties • Invasion of privacy, defamation of character • Nursing regulatory mechanisms – registration, licensure, renewal, accreditation, nurse practice act, regulation for nurse practitioner/specialist nursing practice		
XVIII	2(T)	Explain various Professional Advancement for professional advancement	Professional Advancement • Continuing Nursing Education • Career opportunities • Membership with professional organizations – national and international • Participation in research activities • Publications – journals, newspaper	• Prepare journal list available • Assessment in India • Write an article – research/assignments clinical	of

Note: Less than 1 credit lab hours are not specified

CLINICAL PRACTICUM

Clinical: 2 Credits (80 hours) 2 weeks × 40 hours per week = 80 hours

Practice Competencies:

Hospital

1. Prepare organizational chart of hospital/Nursing services/nursing department
2. Calculate staffing requirements for a particular nursing unit/ward
3. Formulate Job description at different levels of care
4. Prepare duty roster for staff/students at different levels
5. Participate in procuring/purchase of equipment & supplies
6. Prepare logbook/MMF for specific equipment/materials
7. Maintain and store inventory and keep daily records
8. Prepare and maintain various records & reports of the settings – incident reports/adverse reports/audit reports
9. Prepare and implement protocols & manuals
10. Participate in supervision, evaluation and conducting in-service education for the staff

College & Hostel

1. Prepare organizational chart of college
2. Formulate job description for tutors
3. Prepare Master plan, timetable and clinical rotation
4. Prepare student anecdotes
5. Participate in planning, conducting and evaluation of clinical teaching

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6. Participate in evaluation of students' clinical experience
7. Participate in planning and conducting practical examination OSCE – end of posting

CLINICAL POSTING: Management experience in hospital & college.

MIDWIFERY/OBSTETRICS AND GYNECOLOGY (OBG) NURSING-I including SB module

PLACEMENT: VISEMESTER

THEORY: 3 Credits (60 hours)

PRACTICUM: Skill Lab: 1 Credit (40 hours); Clinical: 3 Credits (240 hours)

DESCRIPTION: This course is designed for students to develop knowledge and competencies on the concepts and principles of midwifery. It helps them to acquire knowledge and skills in rendering respectful maternity care to women during antenatal, intranatal and postnatal periods in hospitals and community settings. It further helps to develop skills in managing normal neonates and participate in family welfare programs.

COMPETENCIES: On completion of the program, the students will be able to

1. Demonstrate professional accountability for the delivery of nursing care as per INC standards/ICM competencies that are consistent with moral, altruistic, legal, ethical, regulatory and humanistic principles in midwifery practice.
2. Communicate effectively with individuals, families and professional colleagues fostering mutual respect and shared decision making to enhance health outcomes.
3. Recognize the trends and issues in midwifery and obstetrical nursing.
4. Review and describe the anatomy and physiology of human reproductive system and conception.
5. Describe and apply physiology in the management of normal pregnancy, birth and puerperium.
6. Demonstrate competency in providing respectful and evidence-based maternity care for women during the antenatal, intranatal and postnatal period.
7. Uphold the fundamental human rights of individuals when providing midwifery care.
8. Promote physiologic labour and birth, and conduct normal child birth.
9. Provide evidence-based essential newborn care.
10. Apply nursing process approach in caring for women and their families.
11. Describe the methods of contraception and role of nurse/midwife in family welfare services.
12. Recognize the importance of and actively participate in family welfare programs.
13. Provide youth friendly health services and care for women affected by gender-based violence.

COURSE OUTLINE

T–Theory, SL/L–Skill Lab/Lab, C–Clinical

Unit	Time (Hrs)	Learning Outcomes	Content	Teaching/Learning	Assessment
I	8(T)	Explain the history and current scenario of midwifery Review vital health	Introduction to midwifery <ul style="list-style-type: none"> • History of midwifery in India • Current scenario: <ul style="list-style-type: none"> ○ Trends of maternity care in India ○ Midwifery in India – Transformative education for relations transformative midwifery practice in India • Vital health indicators – Maternal mortality ratio, Infant Mortality 	<ul style="list-style-type: none"> • Discussion • Demonstration • Roleplay • Directed reading Quiz and assignment: ICM competencies • Scenario based learning 	<ul style="list-style-type: none"> • Short answer • Objectivity type • Essay

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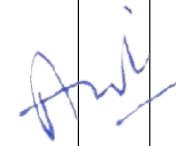


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Unit	Time (Hrs)	Learning Outcomes	Content	Teaching/Learning Activities	Assessment Methods
		<p>indicators</p> <p>Describe the various national health programs related to RMNCH+A</p> <p>Identify the trends and issues in midwifery</p> <p>Discuss the legal and ethical issues relevant to midwifery practice</p>	<p>Neonatal Mortality Rate, perinatal mortality rate, fertility rates</p> <ul style="list-style-type: none"> ○ Maternal death audit • National health programs related to RMNCH+A (Reproductive Maternal Newborn and Child Health + Adolescent Health) <p><i>Current trends in midwifery and OBG nursing:</i></p> <ul style="list-style-type: none"> ○ Respectful maternity and newborn care (RMNC) ○ Midwifery-led care units (MLCU) ○ Women centered care, physiologic birthing and demedicalization of birth ○ Birthing centers, water birth, lotus birth ○ Essential competencies for midwifery practice (ICM) ○ Universal rights of child-bearing women ○ Sexual and reproductive health and rights ○ Women's expectations & choices about care <p><i>Legal provisions in midwifery practice in India:</i></p> <ul style="list-style-type: none"> • INC/MOH & FW regulations • ICM code of ethics • Ethical issues in maternal and neonatal care • Adoption laws, MTP act, Pre-Natal Diagnostic Test (PNDT) Act, Surrogate mothers • Roles and responsibilities of a midwife/Nurse practitioner midwife in different settings (hospital/community) 		
II	6(T) 3(L)	<p>Review the anatomy and physiology of human reproductive system</p>	<p>)</p> <ul style="list-style-type: none"> • Scope of practice for midwives <p>Anatomy and physiology of human reproductive system and conception (Maternal, Fetal & Newborn physiology)</p> <p><i>Review:</i></p> <ul style="list-style-type: none"> • Female organs of reproduction • Female pelvis – bones, joints, ligaments, planes, diameters, landmarks, inclination, pelvic variations • Foetal skull – bones, sutures, 	<ul style="list-style-type: none"> • Lecture • Discussion • Self-directed learning • Models • Videos & films 	<ul style="list-style-type: none"> • Quiz • Short answer • Essay

Unit	Time (Hrs)	Learning Outcomes	Content	Teaching/Learning Activities	Assessment Methods
			fontanelles, diameters, moulding <ul style="list-style-type: none"> • Fetopelvic relationship • Physiology of menstrual cycle, menstrual hygiene • Fertilization, conception and implantation • Embryological development • Placental development and function, placental barrier • Fetal growth and development • Fetal circulation & nutrition 		
III	12(T) 10(L) 40(C)	Provide preconception care to eligible couples Describe the physiology, assessment and management of normal pregnancy Demonstrate knowledge, attitude and skills of midwifery practice throughout 1 st , 2 nd , and 3 rd	Assessment and management of normal pregnancy (ante-natal): Pre-pregnancy Care <ul style="list-style-type: none"> • Review of sexual development (<i>Self Learning</i>) • Socio-cultural aspects of human sexuality (<i>Self Learning</i>) • Preconception care • Pre-conception counseling (including awareness regarding normal birth) Genetic counseling (<i>Self Learning</i>) • Planned parenthood Pregnancy assessment and antenatal care (I, II & III Trimesters) Normal pregnancy <ul style="list-style-type: none"> • Physiological changes during pregnancy • Assess and confirm pregnancy: Diagnosis of pregnancy – Signs, differential diagnosis and confirmatory tests • Review of maternal nutrition & malnutrition • Building partnership with women following RMC protocol • Fathers' engagement in maternity care Ante-natal care: 1st Trimesters <ul style="list-style-type: none"> • Antenatal assessment: History taking, physical examination, breast examination, laboratory investigation • Identification and management of minor discomforts of pregnancy 	<ul style="list-style-type: none"> • Lecture • Discussion • Demonstration • Self-Learning • Health talk • Roleplay • Counseling session • Case discussion/presentation • Simulation • Supervised clinical practice 	<ul style="list-style-type: none"> • Short answer • Objective type • Assessment of skills with checklist • Case study evaluation • OSCE

Unit	Time (Hrs)	Learning Outcomes	Content	Teaching/Learning Activities	Assessment Methods
		trimesters	<ul style="list-style-type: none"> • Antenatal care: as per GoI guidelines • Antenatal counseling (lifestyle changes, nutrition, shared decision making, risky behavior, sexual life during pregnancy, immunization etc.) • Dangers signs during pregnancy • Respectful care and compassionate communication • Recording and reporting: as per the GoI guidelines • Role of Doula/ASHAs <p>II Trimester</p> <ul style="list-style-type: none"> • Antenatal assessment: abdominal palpation, fetal assessment, auscultate fetal heart rate – Doppler and Pinard's stethoscope • Assessment of fetal well-being: DFMC, biophysical profile, Nonstress test, cardio-tocography, USG, Vibro acoustic stimulation, biochemical tests. • Antenatal care • Women centered care • Respectful care and compassionate communication • Health education on IFA, calcium and vitamin D supplementation, glucose tolerance test, etc. • Education and management of physiological changes and discomforts of 2nd trimester • Rh negative and prophylactic anti-D • Referral and collaboration, empowerment • Ongoing risk assessment • Maternal Mental Health <p>III Trimester</p> <ul style="list-style-type: none"> • Antenatal assessment: abdominal palpation, fetal assessment, auscultate fetal heart rate – Doppler and Pinard's stethoscope • Education and management of physiological changes and discomforts of 3rd trimester • Third trimester tests and screening • Fetal engagement in late pregnancy • Childbirth preparation classes 	booklet • Lab tests – performance and interpretation • Demonstration • Roleplay • Demonstration of antenatal assessment	


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Unit	Time (Hrs)	Learning Outcomes	Content	Teaching/Learning Activities	Assessment Methods
			<ul style="list-style-type: none"> • Birth preparedness and complication readiness including micro birth planning • Danger signs of pregnancy – recognition of ruptured membranes • Education on alternative birthing positions – women's preferred choices, birth companion • Ongoing risk assessment • Cultural needs • Women centered care • Respectful and compassionate communication • Health education on exclusive breastfeeding • Role of Doula/ASHA's 	<ul style="list-style-type: none"> • Scenario based learning • Lecture • Simulation • Roleplay • Refer GoI Guidelines • Health talk • Counseling session • Demonstration of birthing positions • Workshop on alternative birthing positions 	
IV	12(T) 12(L) 80(C)	<p>Apply the physiology of labour in promoting normal childbirth</p> <p>Describe the management and care during labour</p> <p>Discuss how to maintain a safe environment for labour</p> <p>Work effectively for pain management during labour</p>	<p>Physiology, management and care during labour</p> <ul style="list-style-type: none"> • Normal labour and birth • Onset of birth/labour • Pervaginal examination (if necessary) • Stages of labour • Organization of labour room – Triage, preparation for birth • Positive birth environment • Respectful care and communication • Drugs used in labour as per GoI guidelines <p>Fist Stage</p> <ul style="list-style-type: none"> • Physiology of normal labour • Monitoring progress of labour using Partograph/labour care guide • Assessing and monitoring fetal wellbeing • Evidence based care during 1st stage of labour (non-pharmacological) • Psychological support – Managing fear • Activity and ambulation during first stage of labour 	<ul style="list-style-type: none"> • Lecture • Discussion • Demonstration • Bedside clinics • Case discussion/presentation • Simulated practice • Supervised Clinical practice – Pervaginal examination, Conduction of normal childbirth • Refer SBA module • LaQshya guidelines • guidelines 	<ul style="list-style-type: none"> • Essay type • Short answer • Objective type • Case study evaluation • Assessment of skills with checklist • OSCE

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Unit	Time (Hrs)	Learning Outcomes	Content	Teaching/Learning Activities	Assessment Methods
		<p>Discuss how the midwife provides care and support for the women during birth to enhance physiological birthing and promote normal birth</p> <p>Assess and provide care of the newborn immediately following birth</p> <p>Discuss the impact of labour and birth as a transitional event in the woman's life</p>	<ul style="list-style-type: none"> • Nutrition during labour • Promote positive child birth experience for women • Birth companion • Role of Doula/ASHA's <p>Second stage</p> <ul style="list-style-type: none"> • Physiology (Mechanism of labour) • Signs of imminent labour • Intrapartum monitoring • Birth position of choice • Vaginal examination • Psychological support • Non-directive coaching • Evidence based management of physiological birth/Conduction of normal child birth • Essential newborn care (ENBC) • Immediate assessment and care of the newborn • Role of Doula/ASHA's <p>Third Stage</p> <ul style="list-style-type: none"> • Physiology – placental separation and expulsion, hemostasis • Physiological management of third stage of labour • Active management of third stage of labour (recommended) • Examination of placenta, membranes and vessels • Assess perineal, vaginal tear/injuries and suture if required • Insertion of postpartum IUCD • Immediate perineal care • Initiation of breastfeeding • Skin to skin contact • Newborn resuscitation <p>Fourth Stage</p> <p><i>Observation, Critical Analysis and Management of mother and newborn</i></p> <ul style="list-style-type: none"> • Maternal assessment, observation fundal height, uterine consistency, urine output, blood loss 	<ul style="list-style-type: none"> • Refer ENBC, NSSK module • Demonstration • Groupwork • Scenario based learning • Simulation • Roleplay • Demonstration • Videos 	

Unit	Time (Hrs)	Learning Outcomes	Content	Teaching/Learning Activities	Assessment Methods
		Ensure initiation of breast feeding and adequate latchin g	<ul style="list-style-type: none"> • Breastfeeding and latchin g • Managing uterine cramp • Alternative/complementary therapies • Role of Doula/ASHA's • Various child birth practices • Safe environment for mother and newborn to promote bonding • Maintaining records and reports 		
V	7(T) 6(L) 40(C)	Describe the physiology, management and care of normal puerperium	Postpartum care/Ongoing care of women <ul style="list-style-type: none"> • Normal puerperium – Physiology, duration • Post-natal assessment and care – facility and home-based care • Perineal hygiene and care • Bladder and bowel function • Minor disorders of puerperium and its management • Physiology of lactation and lactation management • Postnatal counseling and psychological support • Normal postnatal baby blues and recognition of post-natal depression • Transition to parenthood • Care for the woman up to 6 weeks after childbirth • Cultural competence (Taboos related to postnatal diet and practices) • Diet during lactation – review • Post-partum family planning • Follow-up of postnatal mothers 	<ul style="list-style-type: none"> • Lecture • Discussion • Demonstration • Health talk • Simulated practice • Supervised clinical practice • Refer SB module 	<ul style="list-style-type: none"> • Essay type • Short answer • Objective type • Assessment of skills with checklist • OSCE
VI	7(T) 7(L) 40(C)	Discuss the need for and provision of compassionate, family centered midwifery care of the newborn Describe the assessment and care of normal neonate	<ul style="list-style-type: none"> • Drugs used in the postnatal period • Records and reports • Assessment and ongoing care of normal neonates • Family centered care • Respectful newborn care and communication • Normal Neonate – Physiological adaptation • Newborn assessment – Screening for congenital anomalies • Care of newborn up to 6 weeks after 	<ul style="list-style-type: none"> • Lecture • Discussion • Demonstration • Simulated practice session • Supervised clinical practice • Refer safe delivery 	<ul style="list-style-type: none"> • Essay type • Short answer • pp module – newborn

- Objectivetype
- Assessment ofskills
withchecklist
- OSCE



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Unit	Time (Hrs)	Learning Outcomes	Content	Teaching/Learning Activities	Assessment Methods
			<p>the childbirth (Routine care of newborn)</p> <ul style="list-style-type: none"> • Skin to skin contact and the more regulation • Infection prevention • Immunization • Minor disorders of newborn and its management 	<p>management</p> <ul style="list-style-type: none"> • Partial completion of SBA module 	
VII	8(T) 2(L) 40 (C)	<p>Explain various methods of family planning and role of nurse/midwife in providing family planning services</p> <p>Describe youth friendly service and role of nurses/midwives</p> <p>Recognize the role of nurses/midwives in gender based violence</p>	<p>Family welfare services</p> <ul style="list-style-type: none"> • Impact of early/frequent child bearing <ul style="list-style-type: none"> ○ Permanent methods – Male sterilization and female sterilization • Action, effectiveness, advantages, disadvantages, myths, misconception and medical eligibility criteria (MEC) for use of various family planning methods • Emergency contraceptives • Recent trends and research in contraception • Family planning counseling using Balanced Counseling Strategy (BCS) • Legal and rights aspects of FP • Human rights aspects of FP adolescents • Youth friendly services – SRHR services, policies affecting SRHR and attitude of nurses and midwives in provision of services (Review) • Importance of follow up and recommended timing <p>Gender related issues in SRH</p> <ul style="list-style-type: none"> • Gender based violence – Physical, sexual and abuse, Laws affecting GBV and role of nurse/midwife • Special courts for abused people • Gender sensitive health services including family planning 	<ul style="list-style-type: none"> • Lecture • Supervised practice • Field visits • Scenario based learning • Discussion • GoI guidelines – injectable contraceptives, oral contraceptives, IUCD, male and female sterilization • j e c t i v e t y p e • F i e l d v i s i t r e p o r t s 	<ul style="list-style-type: none"> • Essay type • Short answers

• Vignettes

- Comprehensive range of family planning methods
 - Temporary methods – Hormonal, non-hormonal and barrier methods

PRACTICUM

PLACEMENT: VI & VII SEMESTER

VI SEMESTER: MIDWIFERY/OBSTETRICS AND GYNECOLOGY (OBG) NURSING-I

SKILL LAB & CLINICAL: Skill Lab–1 Credit (40 hours); Clinical–3 Credits (240 hours)

PRACTICE COMPETENCIES: On completion of the course, the students will be able to:

1. Counsel women and their families on pre-conception care
2. Demonstrate lab test sex urine pregnancy test
3. Perform antenatal assessment of pregnant women
4. Assess and care for normal antenatal mothers
5. Assist and perform specific investigations for antenatal mothers
6. Counsel mothers and their families on antenatal care and preparation for parenthood
7. Conduct child birth education classes
8. Organize labour room
9. Prepare and provide respectful maternity care for mothers in labour
10. Perform per-vaginal examination for a woman in labour if indicated
11. Conduct normal child birth with essential newborn care
12. Demonstrate skills in resuscitating the newborn
13. Assist women in the transition to motherhood
14. Perform postnatal and newborn assessment
15. Provide care for postnatal mothers and their newborn
16. Counsel mothers on postnatal and newborn care
17. Perform PPIUCD insertion and removal
18. Counsel women on family planning and participate in family welfare services
19. Provide youth friendly health services
20. Identify, assess, care and refer women affected with gender based violence

SKILL LAB: Procedures/Skills for demonstration and return demonstration:

1. Urine pregnancy test
2. Calculation of EDD, Obstetrical score, gestational weeks
3. Antenatal assessment
4. Counseling antenatal mothers
5. Micro birth planning
6. PV examination
7. Monitoring during first stage of labour–Plotting and interpretation of partograph
8. Preparation for delivery–setting up labour room, articles, equipment
9. Mechanism of labour –normal
10. Conduction of normal child birth with essential newborn care
11. Active management of third stage of labour
12. Placental examination
13. Newborn resuscitation
14. Monitoring during fourth stage of labour
15. Postnatal assessment


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16. Newborn assessment
17. Kangaroo mother care
18. Family planning counseling
19. PPIUCD insertion and removal

CLINICAL POSTINGS (6 weeks × 40 hours per week = 240 hours)

Clinical Area	Duration (weeks)	Clinical Learning Outcomes	Procedural Competencies/Clinical Skills	Clinical Requirements	Assessment Methods
Antenatal OPD and Antenatal ward	1 week	Perform antenatal assessment Perform laboratory tests for antenatal women and assist in selected antenatal diagnostic procedures Counsel antenatal women	<ul style="list-style-type: none"> History collection Physical examination Obstetric examination Pregnancy confirmation test Urine testing Blood testing for Hemoglobin, grouping & typing Blood test for malaria KICK chart USG/NST Antenatal counseling Preparation for childbirth Birth preparedness and complication readiness 	<ul style="list-style-type: none"> Antenatal palpation Health talk Case study 	<ul style="list-style-type: none"> OSCE Case presentation
Labour room	3 weeks	Monitor labour using partograph Provide care to women during labour Conduct normal childbirth, provide care to mother and immediate care of newborn	<ul style="list-style-type: none"> Assessment of woman in labour Partograph Pervaginal examination when indicated Care during first stage of labour Pain management techniques Upright and alternative positions in labour Preparation for labour – articles, physical, psychological Conduction of normal childbirth Essential newborn care Newborn resuscitation Active management of third stage of labour Monitoring and care during fourth stage of labour 	<ul style="list-style-type: none"> Partograph recording PV examination Assisting/Conduction of normal childbirth Case study Case presentation Episiotomy and suturing if indicated Newborn resuscitation 	<ul style="list-style-type: none"> Assignment Case study Case presentation OSCE
Post-partum clinic and Postnatal Ward including FP unit	2 weeks	Perform postnatal assessment Provide care to normal postnatal mothers and newborn	<ul style="list-style-type: none"> Postnatal assessment Care of postnatal mothers – normal Care of normal newborn Lactation management 	<ul style="list-style-type: none"> Postnatal assessment Newborn assessment Case study 	<ul style="list-style-type: none"> Assignment Case study Case presentation

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Clinical Area	Duration (weeks)	Clinical Learning Outcomes	Procedural Competencies/Clinical Skills	Clinical Requirements	Assessment Methods
		Provide postnatal counseling Provide family welfare services	• Health teaching on postnatal and newborn care • Family welfare counseling	• Case presentation • PPIUCD insertion & removal	

Note: Partial Completion of SBA module during VI semester

VII SEMESTER

MIDWIFERY/OBSTETRICS AND GYNECOLOGY (OBG) NURSING - II PRACTICUM

SKILL LAB & CLINICAL: Skill Lab – 1 Credit (40 hours); Clinical – 4 Credits (320 hours)

PRACTICE COMPETENCIES: On completion of the course, the students will be able to:

1. Identify, stabilize and refer antenatal women with complications
2. Provide care to antenatal women with complications
3. Provide post-abortion care & counseling
4. Assist in the conduction of abnormal vaginal deliveries and caesarean section.
5. Demonstrate skills in resuscitating the newborn
6. Assist and manage complications during labour
7. Identify postnatal and neonatal complications, stabilize and refer them
8. Provide care for high risk antenatal, intranatal and postnatal women and their families using nursing process approach
9. Provide care for high risk newborn
10. Assist in advanced clinical procedures in midwifery and obstetric nursing
11. Provide care for women during their non-child bearing period.
12. Assess and care for women with gynecological disorders
13. Demonstrate skills in performing and assisting in specific gynecological procedures
14. Counsel and care for couples with infertility

SKILL LAB: Procedures/Skills for demonstration and return demonstration:

1. Antenatal assessment and identification of complications
2. Post-abortion care & counseling
3. Counseling antenatal women for complication readiness
4. Mechanism of labour – abnormal
5. Assisting in the conduction of abnormal vaginal deliveries and caesarean section.
6. Management of complications during pregnancy/labour/postpartum (case studies/simulated scenarios)
7. Administration of Inj. Magnesium sulphate
8. Starting and maintaining an oxytocin drip for PPH
9. Management of PPH – Bimanual compression of uterus
10. Management of PPH – Balloon tamponade
11. Instruments used in obstetrics and gynecology
12. Visual inspection of cervix with acetic acid
13. Cervical biopsy
14. Breast examination
15. Counseling of infertile couples

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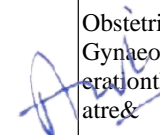
CLINICAL POSTINGS (8 weeks × 40 hours per week = 320 hours)

Clinical Areas	Duration (Weeks)	Learning Outcomes	Procedural Competencies/Clinical Skills	Clinical Requirements	Assessment Methods
Antenatal OPD/infertility clinics/Reproductive medicine and antenatal ward	2 weeks	<p>Perform/assist in selected advanced antenatal diagnostic procedures</p> <p>Provide antenatal care for women with complications of pregnancy</p> <p>Counsel antenatal mothers</p> <p>Provide post abortion care and counselling</p> <p>Provide counselling and support to infertile couples</p>	<ul style="list-style-type: none"> • Kick chart, DFMC • Assist in NST/CTG/USG • Assist in advanced diagnostic procedures • Care of antenatal women with complications in pregnancy • Antenatal counselling • Preparation for childbirth, Birth preparedness and complication readiness • Post abortion care • Post abortion counselling • Counselling infertile couples 	<ul style="list-style-type: none"> • Antenatal palpation • Health talk • Case study 	<ul style="list-style-type: none"> • Simulation • Case presentation • OSCE
Labour room	2 weeks	<p>Conduction of normal childbirth</p> <p>Conduct/assist in abnormal deliveries</p> <p>Monitor labour using partograph</p> <p>Identify and manage complications during labour</p>	<ul style="list-style-type: none"> • Assessment of woman in labour • Partograph • Per vaginal examination if indicated • Obstetric examination • Care during first stage of labour • Pain management techniques • Upright and alternative positions in labour • Preparation for labour – articles, physical, psychological • Conduction of normal childbirth • Essential newborn care • Newborn resuscitation • Active management of third stage of labour • Monitoring and care during fourth stage of labour • Identification, stabilization, referral and assisting in management of prolonged labour, cervical dystocia, CPD, contracted pelvis • Assist in the management of 	<ul style="list-style-type: none"> • Partograph recording • Pain management during labour • Conduction of normal childbirth • Assisting in abnormal deliveries • Managing complication during labour • Case study • Case presentation 	<ul style="list-style-type: none"> • Assignment • Case study • Case presentation • Simulation • OSCE

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Clinical Areas	Duration (Weeks)	Learning Outcomes	Procedural Competencies/Clinical Skills	Clinical Requirements	Assessment Methods
			abnormal deliveries – posterior position, breech deliveries, twin deliveries, vacuum extraction, forceps delivery, shoulder dystocia • Assist in cervical cerclage procedures, D&C, D&E • Identify, assist and manage trauma to the birth canal, retained placenta, post partum hemorrhage, uterine atony		
Postnatal Ward	1 week	Perform postnatal assessment and identify postnatal complications Provide postnatal care Provide family welfare services	• Management of obstetric shock • Postnatal history collection and physical examination • Identify postnatal complications • Care of postnatal mothers – abnormal deliveries, caesarean section • Care of normal newborn • Lactation management • Postnatal counselling • Health teaching on postnatal and newborn care	• Health talk • Postnatal assessment • Newborn assessment • Case studies • Case presentation • PPIUCD insertion and removal	• Role play • Assignment • Case study • Case presentation • Simulation • Vignettes • OSCE
Neonatal Intensive Care Unit	1 week	Perform assessment of newborn and identify complications/congenital anomalies Perform neonatal resuscitation Care of high risk newborn Provide care for newborns in ventilator, incubator etc	• Family welfare counselling • Neonatal assessment – identification of complication, congenital anomalies. • Observation of newborn • Neonatal resuscitation • Phototherapy and management of jaundice in newborn • Assist in Exchange transfusion • Neonatal feeding – spoon and katori, paladai, NG tube • Care of baby in incubator, ventilator, warmer • Infection control in the nursery	• Case study • Case presentation • Assignments • Simulated practice	• Case presentation • Care study • Care plan • Simulation, Vignettes • OSCE
Obstetric/ Gynaecology	2 weeks	Assist/perform special neonatal procedures Assist in gynecological and obstetric surgeries	• Neonatal medications • Starting IV line for newborn, drug calculation • Observe/Assist in caesarean section • Management of retained placenta	• Assisting in obstetric and gynecological surgery • Tray set-up for	• Assignment • Tray set-up for obstetric and gynecological surgeries


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Clinical Areas	Duration (Weeks)	Learning Outcomes	Procedural Competencies/Clinical Skills	Clinical Requirements	Assessment Methods
ward		Care for women with gynecological disorders	<ul style="list-style-type: none"> Gynecological surgeries Hysterectomy Uterine rupture Care of women with gynecological conditions 	<ul style="list-style-type: none"> caesarean section Care plan 	<ul style="list-style-type: none"> Case presentation Simulation Vignettes

Note: Completion of safe delivery App module during VII Semester

COMMUNITY HEALTH NURSING–II

PLACEMENT: VII SEMESTER


THEORY: 5 Credits (100 hours) – includes lab hours also

PRACTICUM: Clinical: 2 Credit (160 hours)

DESCRIPTION: This course is designed to help students gain broad perspective of specialized roles and responsibilities of community health nurses and to practice in various specialized health care settings. It helps students to develop knowledge and competencies required for assessment, diagnosis, treatment, and nursing management of individuals and families within the community in wellness and illness continuum.

COMPETENCIES: On completion of the course, the students will be able to

1. Demonstrate beginning practice competencies/skills relevant to provide comprehensive primary health care/community-based care to clients with common diseases and disorders including emergency and first aid care at home/clinics/centres as per predetermined protocols/drug standing orders approved by MOH & FW
2. Provide maternal, newborn and child care, and reproductive health including adolescent care in the urban and rural health care settings
3. Describe the methods of collection and interpretation of demographic data
4. Explain population control and its impact on the society and describe the approaches towards limiting family size
5. Describe occupational health hazards, occupational diseases and the role of nurses in occupational health programs
6. Identify health problems of older adults and provide primary care, counseling and supportive health services
7. Participate in screening for mental health problems in the community and providing appropriate referral services
8. Discuss the methods of data collection for HMIS, analysis and interpretation of data
9. Discuss about effective management of health information in community diagnosis and intervention
10. Describe the management system of delivery of community health services in rural and urban areas
11. Describe the leadership role in guiding, supervising, and monitoring the health services and the personnel at the PHCs, SCs and community level including financial management and maintenance of records & reports
12. Describe the roles and responsibilities of Mid-Level Health Care Providers (MHCPs) in Health Wellness Centers (HWCs)
13. Identify the roles and responsibilities of health team members and explain their job description
14. Demonstrate initiative in preparing themselves and the community for disaster preparedness and management
15. Demonstrate skills in proper bio-medical waste management as per protocols
16. Explain the roles and functions of various national and international health agencies


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COURSE OUTLINE

T–Theory

	Unit Time (Hrs)	Learning Outcomes	Content	Teaching/Learning Activities	Assessment Methods
I	10(T)	Explain nurses' role in identification, primary management and referral of clients with common disorders/conditions and emergencies including first aid	<p>Management of common conditions and emergencies including first aid</p> <ul style="list-style-type: none"> • Standing orders: Definition, uses <p>Screening, diagnosing/identification, primary care and referral of Gastrointestinal System</p> <ul style="list-style-type: none"> ○ Abdominal pain ○ Nausea and vomiting ○ Diarrhea ○ Constipation ○ Jaundice ○ GI bleeding ○ Abdominal distension ○ Dysphagia and dyspepsia ○ Aphthous ulcers <p>Respiratory System</p> <ul style="list-style-type: none"> ○ Acute upper respiratory infections – Rhinitis, Sinusitis, Pharyngitis, Laryngitis, Tonsillitis ○ Acute lower respiratory infections – Bronchitis, pneumonia and bronchial asthma ○ Hemoptysis, Acute chest pain <p>Heart & Blood</p> <ul style="list-style-type: none"> ○ Common heart diseases – Heart attack/coronary artery disease, heart failure, arrhythmia ○ Blood anemia, blood cancers, bleeding disorders <p>Eye & ENT conditions</p> <ul style="list-style-type: none"> • Eye – local infections, redness of eye, conjunctivitis, sty, trachoma and refractive errors • ENT – Epistaxis, ASOM, sore throat, deafness <p>Urinary System</p> <ul style="list-style-type: none"> • Urinary tract infections – cystitis, pyelonephritis, prostatitis, UTI in children <p>First aid in common emergency conditions – Review</p> <ul style="list-style-type: none"> • High fever, low blood sugar, minor injuries, fractures, fainting, bleeding, shock, stroke, bites, burns, choking, seizures, RTAs, poisoning, drowning and foreign bodies 	<ul style="list-style-type: none"> • Lecture • Discussion • Demonstration • Roleplay • Suggested field visits • Field practice • Assessment of clients with common conditions and provide referral 	<ul style="list-style-type: none"> • Short answer • Essay • Field visit reports • OSCE assessment

Unit	Time (Hrs)	Learning Outcomes	Content	Teaching/Learning Activities	Assessment Methods
II	20(T)	Provide reproductive, maternal, newborn and child care, including adolescent care in the urban and rural health care settings	<p>Reproductive, maternal, newborn, child and adolescent Health (Review from OBG Nursing and application in community setting)</p> <ul style="list-style-type: none"> • Presents situation of reproductive, maternal and child health in India <p>Antenatal care</p> <ul style="list-style-type: none"> • Objectives, antenatal visits and examination, nutrition during pregnancy, counseling • Calcium and iron supplementation in pregnancy • Antenatal care at the health centre level • Birth preparedness • High risk approach – Screening/early identification and primary management of complications – Ante partum hemorrhage, pre-eclampsia, eclampsia, Anemia, Gestational diabetes mellitus, Hypothyroidism, Syphilis • Referral, follow up and maintenance of records and reports <p>Intranatal care</p> <ul style="list-style-type: none"> • Normal labour – process, onset, stages of labour • Monitoring and active management of different stages of labour • Care of women after labour • Early identification, primary management, referral and follow up – preterm labour, fetal distress, prolonged and obstructed labour, vaginal & perineal tears, ruptured uterus • Care of newborn immediately after birth • Maintenance of records and reports • Use of Safe child birth checklist • SBA module – Review • Organization of labour room <p>Postpartum care</p> <ul style="list-style-type: none"> • Objectives, Postnatal visits, care of mother and baby, breast feeding, diet during lactation, and health counseling • Early identification, primary management, referral and follow up of complications, Danger signs-postpartum hemorrhage, shock, puerperal sepsis, breast conditions, post-partum depression • Postpartum visit by health care provider 	<ul style="list-style-type: none"> • Lecture • Discussion • Demonstration • Role play • Suggested field visits and field practice • Assessment of antenatal, postnatal, newborn, infant, preschool child, school child, and adolescent health 	<ul style="list-style-type: none"> • Short answer • Essay • OSCE assessment

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Unit	Time (Hrs)	Learning Outcomes	Content	Teaching / Learning Activities	Assessment Methods
		Promote adolescent health and youth friendly services	<p>Newborn and childcare</p> <ul style="list-style-type: none"> • Review: Essential newborn care • Management of common neonatal problems • Management of common child health problems: Pneumonia, Diarrhoea, Sepsis, screening for congenital anomalies and referral • Review: IMNCI Module • Under five clinics <p>Adolescent Health</p> <ul style="list-style-type: none"> • Common health problems and risk factors in adolescent girls and boys • Common Gynecological conditions – dysmenorrhea, Premenstrual Syndrome (PMS), Vaginal discharge, Mastitis, Breast lump, pelvic pain, pelvic organ prolapse • Teenage pregnancy, awareness about legal age of marriage, nutritional status of adolescents National Menstrual Hygiene scheme • Youth friendly services: <ul style="list-style-type: none"> ○ SRH Service needs ○ Role and attitude of nurses: Privacy, confidentiality, non-judgmental attitude, client autonomy, respectful care and communication • Counseling for parents and teenagers (BCS – balanced counseling strategy) <p>National Programs</p> <ul style="list-style-type: none"> • RMNCH+A Approach – Aims, Health systems strengthening, RMNCH+A strategies, Interventions across life stages, program management, monitoring and evaluation systems • Universal Immunization Program (UIP) as per Government of India guidelines – Review • Rashtriya Bal Swasthya Karyakram (R SBK) – children • Rashtriya Kishor Swasthya Karyakram (R KSK) – adolescents <p>Any other new programs</p>	<ul style="list-style-type: none"> • Screen, manage and refer adolescents • Counsel adolescents 	


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Unit	Time (Hrs)	Learning Outcomes	Content	Teaching/Learning Activities	Assessment Methods
III	4(T)	Discuss the concepts and scope of demography	Demography, Surveillance and Interpretation of Data <ul style="list-style-type: none"> • <i>Demography and vital statistics</i> – demographic cycle, world population trends, vital statistics • Sex ratio and child sex ratio, trends of sex ratio in India, the causes and social implications • <i>Sources of vital statistics</i> – Census, registration of vital events, sample registration system • <i>Morbidity and mortality indicators</i> – Definition, calculation and interpretation • Surveillance, Integrated diseases surveillance project (IDSP), Organization of IDSP, flow of information and mother and child tracking system (MCTS) in India • Collection, analysis, interpretation, use of data • <i>Review: Common sampling techniques</i> – random and non-random techniques • Disaggregation of data 	<ul style="list-style-type: none"> • Lecture • Discussion • Demonstration • Roleplay • Suggested field visits • Field practice 	<ul style="list-style-type: none"> • Short answer • Essay
IV	6(T)	<p>Discuss population explosion and its impact on social and economic development of India</p> <p>Describe the various methods of population control</p>	Population and its Control <ul style="list-style-type: none"> • Population Explosion and its impact on Social, Economic development of individual, society and country. • Population Control – Women Empowerment; Social, Economic and Educational Development • Limiting Family Size – Promotion of small family norm, Temporary Spacing Methods (natural, biological, chemical, mechanical methods etc.), Terminal Methods (Tubectomy, Vasectomy) • Emergency Contraception • Counseling in reproductive, sexual health including problems of adolescents • Medical Termination of pregnancy and MTP Act • National Population Stabilization Fund/JSK (Jan Sankhya Sthirata Kosh) • Family planning 2020 • National Family Welfare Program 	<ul style="list-style-type: none"> • Lecture • Discussion • Demonstration • Roleplay • Suggested field visits • Field practice 	<ul style="list-style-type: none"> • Short answer • Essay • OSCE assessment • Counseling of family planning
V	5(T)	Describe occupational health hazards, occupational diseases and the role of nurses	<ul style="list-style-type: none"> • Role of a nurse in Family Welfare Program Occupational Health <ul style="list-style-type: none"> • Occupational health hazards • Occupational diseases • ESI Act 	<ul style="list-style-type: none"> • Lecture • Discussion • Demonstration • Roleplay 	<ul style="list-style-type: none"> • Short answer • Clinical performance

Unit	Time (Hrs)	Learning Outcomes	Content	Teaching/Learning Activities	Assessment Methods
		occupational health programs	<ul style="list-style-type: none"> •National/State Occupational Health Programs •Role of a nurse in occupational health services – Screening, diagnosing, management and referral of clients with occupational health problems 	<ul style="list-style-type: none"> •Suggested field visits •Field practice 	evaluation
VI	6(T)	Identify health problems of older adults and provide primary care, counseling and supportive health services	Geriatric Health Care <ul style="list-style-type: none"> •Health problems of older adults •Management of common geriatric ailments: counseling, supportive treatment of older adults •Organization of geriatric health services •National program for health care of elderly (NPHCE) •State level programs/Schemes for older adults •Role of a community health nurse in geriatric health services – Screening, diagnosing, management and referral of older adults with health problems 	<ul style="list-style-type: none"> •Lecture •Discussion •Demonstration 	<ul style="list-style-type: none"> •Visit report on elderly home •Essay •Short answer
VII	6(T)	Describe screening for mental health problems in the community, take preventive measures and provide appropriate referrals services	Mental Health Disorders <ul style="list-style-type: none"> •Screening, management, prevention and referral for mental health disorders •Review: <ul style="list-style-type: none"> ○ Depression, anxiety, acute psychosis, Schizophrenia ○ Dementia ○ Suicide ○ Alcohol and substance abuse ○ Drug dependence program ○ National Mental Health Program ○ National Mental Health Policy ○ National Mental Health Act •Role of a community health nurse in screening, initiation of treatment and follow up of mentally ill clients 	<ul style="list-style-type: none"> •Lecture •Discussion •Demonstration •Role play •Health counseling on promotion of mental health •Suggested field visits •Field practice 	<ul style="list-style-type: none"> •Essay •Short answer •Counseling report
VIII	4(T)	Discuss about effective management of health information in community diagnosis and intervention	Health Management Information System (HMIS) <ul style="list-style-type: none"> •Introduction to health management system: data elements, recording and reporting formats, data quality issues •Review: <ul style="list-style-type: none"> ○ Basic Demography and vital statistics ○ Sources of vital statistics ○ Common sampling techniques, frequency distribution 	<ul style="list-style-type: none"> •Lecture •Discussion •Demonstration •Role play •Suggested field visits •Field practice •Group project on community diagnosis-data 	<ul style="list-style-type: none"> •Group project report •Essay •Short answer

Unit	Time (Hrs)	Learning Outcomes	Content	Teaching/Learning Activities	Assessment Methods
			<ul style="list-style-type: none"> Collection, analysis, interpretation of data Analysis of data for community needs assessment and preparation of health action plan 	management	
IX	12(T)	Describe the system of management of delivery of community health services in rural and urban areas	Management of delivery of community health services: <ul style="list-style-type: none"> Planning, budgeting and material management of CHC, PHC, SC/HWC Manpower planning as per IPHS standards Rural: Organization, staffing and material management of rural health services provided by Government at village, SC/HWC, PHC, CHC, hospitals – district, state and central Urban: Organization, staffing, and functions of urban health services provided by Government at slums, dispensaries, special clinics, municipal and corporate hospitals Defense services Institutional services Other systems of medicine and health: Indian system of medicine, AYUSH clinics, Alternative health care system referral systems, Indigenous health services 	<ul style="list-style-type: none"> Lecture Discussion Visits to various health care delivery systems Supervised field practice 	<ul style="list-style-type: none"> Essay Short answer Filed visit reports
X	15(T)	<p>Describe the leadership role in guiding, supervising, and monitoring the health services and the personnel at the PHCs, SCs and community level including financial management</p> <p>Describe the roles and responsibilities of Mid-Level Health Care Providers (MLHCPs) in Health Wellness Centers (HWCs)</p>	Leadership, Supervision and Monitoring <ul style="list-style-type: none"> Understanding work responsibilities/job description of DPHN, Health Visitor, PHN, MPHW (Female), Multipurpose health Worker (Male), AWWs and ASHA Roles and responsibilities of Mid-Level Health Care Providers (MLHCPs) Village Health Sanitation and Nutrition Committees (VHSNC): objectives, composition and roles & responsibilities Health team management Review: Leadership & supervision – concepts, principles & methods Leadership in health: leadership approaches in health care setting, taking control of health of community and organizing health camps, village clinics Training, Supportive supervision and monitoring – concepts, principles and processes e.g. performance of frontline health workers Financial Management and Accounting & Computing at Health Centers (SC)	<ul style="list-style-type: none"> Lecture Discussion Demonstration Roleplay Suggested field visits Field practice 	<ul style="list-style-type: none"> Report on interaction with MPHWs, HVs, ASHA, AWWs Participation in training programs Essay Short answer

Unit	Time (Hrs)	Learning Outcomes	Content	Teaching/Learning Activities	Assessment Methods
			<ul style="list-style-type: none"> Accounting and bookkeeping requirements – accounting principles & policies, book of accounts to be maintained, basic accounting entries, accounting process, payments & expenditure, fixed asset, SOE reporting format, utilization certificate (UC) reporting Preparing a budget Audit <p>Records & Reports:</p> <ul style="list-style-type: none"> Concepts of records and reports – importance, legal implications, purposes, use of records, principles of record writing, filing of records Types of records – community related records, registers, guidelines for maintaining Report writing – purposes, documentation of activities, types of reports Medical Records Department – functions, filing and retention of medical records Electronic Medical Records (EMR) – capabilities and components of EMR, electronic health record (EHR), levels of automation, attributes, benefits and disadvantages of HER 		
XI	6(T)	Demonstrate initiative in preparing themselves and the community for disaster preparedness and management	<p>Nurses' responsibility in record keeping and reporting</p> <p>Disaster Management</p> <ul style="list-style-type: none"> Disaster types and magnitude Disaster preparedness Emergency preparedness Common problems during disasters and methods to overcome Basic disaster supplies kit Disaster response including emergency relief measures and life saving techniques <p>Use disaster management module</p>	<ul style="list-style-type: none"> Lecture Discussion Demonstration Roleplay Suggested field visits, and field practice Mock drills Refer Disaster module (NDMA) National Disaster/INC – Reaching out in emergencies 	
XII	3(T)	Describe the importance of bio-medical waste management, its process and management	<p>Bio-Medical Waste Management</p> <ul style="list-style-type: none"> Waste collection, segregation, transportation and management in the community 	<ul style="list-style-type: none"> Lecture cum Discussion Field visit to waste management site 	Field visit report
XIII	3(T)	Explain the roles and function of	<ul style="list-style-type: none"> Waste management in health center/clinics Bio-medical waste management guidelines – 2016, 2018 (Review) 	Lecture	Essay

Health Agencies

Unit	Time	Learning Outcomes	Content	Teaching/Learning Activities	Assessment Methods
		various national and international health	<ul style="list-style-type: none"> International: WHO, UNFPA, UNDP, World Bank, FAO, UNICEF, European Commission, Red Cross, USAID, UNESCO, ILO, CAR, CIDA, JHPI EGO, any other National: Indian Red Cross, Indian Council for Child Welfare, Family Planning Association of India, Tuberculosis Association of India, Central Social Welfare Board, All India Women's Conference, Blind Association of India, any other Voluntary Health Association of India (VHA) 	<ul style="list-style-type: none"> Discussion 	<ul style="list-style-type: none"> Short answer

COMMUNITY HEALTH NURSING II

Clinical practicum – 2 credits (160

hours) CLINICAL POSTINGS (4 weeks × 40 hours per week)

Clinical Area	Duration (Weeks)	Learning Outcomes	Procedural Competencies/ Clinical Skills	Clinical Requirements	Assessment Methods
Urban Rural	2 weeks 2 Weeks	<p>Screen, diagnose, manage and refer clients with common conditions/emergencies</p> <p>Assess and provide antenatal, intrapartum, postnatal and newborn care</p> <p>Promote adolescent health</p>	<ul style="list-style-type: none"> Screening, diagnosing, management and referral of clients with common conditions/emergencies Assessment (physical & nutritional) of antenatal, intrapartum, postnatal and newborn Conduction of normal delivery at the health center Newborn care Counsel adolescents Family planning counselling Distribution of temporary contraceptives – condoms, OCP's, emergency contraceptives 	<ul style="list-style-type: none"> Screening, diagnosing, Primary management and care based on standard orders/protocols approved by MOH & FW Minor ailments – 2 Emergencies – 1 Dental problems – 1 Eye problems – 1 Ear, nose, and throat problems – 1 High risk pregnant woman – 1 High risk neonate – 1 Assessment of antenatal – 1, intrapartum – 1, postnatal – 1 and newborn – 1 Conduction of normal delivery at health center and documentation – 2 Immediate newborn care and documentation – 1 Adolescent counseling – 1 Family planning counselling – 	<ul style="list-style-type: none"> Clinical performance assessment OSCE during posting Final clinical examination (University) Clinical performance assessment OSCE

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Clinical Area	Duration (Weeks)	Learning Outcomes	Procedural Competencies/ Clinical Skills	Clinical Requirements	Assessment Methods
		<p>Provide family welfare services</p> <p>Screen, diagnose, manage and refer clients with occupational health problem</p> <p>Screen, assess and manage elderly with health problems and refer appropriately</p> <p>Screen, diagnose, manage and refer clients who are mentally unhealthy</p> <p>Participate in community diagnosis – data management</p> <p>Participate in health centre activities</p> <p>Organize and conduct clinics/health camps in the community</p> <p>Prepare for disaster preparedness and management</p> <p>Recognize the importance and observe the biomedical waste management process</p>	<ul style="list-style-type: none"> • Screening, diagnosing, management and referral of clients with occupational health problems • Health assessment to elderly • Mental health screening • Participation in Community diagnosis – data management • Writing health center activity report • Organizing and conducting clinics/camp • Participation in disaster mock drills 	<p>1</p> <ul style="list-style-type: none"> • Family case study – 1 (Rural/Urban) • Screening, diagnosing, management and referral of clients with occupational health problem – 1 • Health assessment (Physical & nutritional) of elderly – 1 • Mental health screening survey – 1 • Group project: Community diagnosis – data management • Write report on health center activities – 1 • Organizing and conducting Antenatal/under-five clinic/Health camp – 1 • Participation in disaster mock drills • Field visit to bio-medical waste management site • Visit to AYUSH clinic 	<ul style="list-style-type: none"> • Family Case study evaluation • Clinical performance evaluation • OSCE • Project evaluation

NURSING RESEARCH AND STATISTICS

PLACEMENT: VII SEMESTER

THEORY: 2 Credits (40 hours)

PRACTICUM: Lab/Skill Lab: 1 Credit (40 hours) Clinical Project: 40 hours

DESCRIPTION: The Course is designed to enable students to develop an understanding of basic concepts of research, research process and statistics. It is further, structured to conduct/ participate in need-based research studies in various settings and utilize the research findings to provide quality nursing care. The hours for practical will be utilized for conducting individual/group research project.

COMPETENCIES: On completion of the course, students will become competent to

1. Identify research priority areas
2. Formulate research questions/problem statement/hypotheses
3. Review related literature on selected research problem and prepare annotated bibliography
4. Prepare sample data collection tool
5. Analyze and interpret the given data
6. Practice computing, descriptive statistics and correlation
7. Draw figures and types of graphs on given select data
8. Develop research proposal
9. Plan and conduct a group/individual research project

COURSE OUTLINE

T – Theory, P – Practicum

Unit	Time (Hrs.)		Learning Outcomes	Content	Teaching/ Learning Activities	Assessment Methods
	T	P				
I	6		Describe the concept of research, terms, need and areas of research in nursing Explain the steps of research process State the purposes and steps of Evidence Based Practice	Research and Research Process • Introduction and need for nursing research • Definition of Research & nursing research • Steps of scientific method • Characteristics of good research • Steps of Research process – overview • Evidence Based Practice – Concept, Meaning, Purposes, Steps of EBPP process and Barriers	• Lecture cum Discussion • Narrate steps of research process followed from examples of published studies • Identify research priorities on a given area/specialty • List examples of Evidence Based Practice	• Short answer • Objective type
II	2	8	Identify and state the research problem and objectives	Research Problem/Question • Identification of problem area • Problem statement • Criteria of a good research problem • Writing objectives and hypotheses	• Lecture cum Discussion • Exercise on writing statement of problem and objectives	• Short answer • Objective type • Formulation of research questions/objectives/hypothesis

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Unit	Time		Learning Outcomes	Content	Teaching/ Learning Activities	Assessment Methods
	(Hrs.)	TP				
III	2	6	Review the related literature	Review of Literature <ul style="list-style-type: none"> • Location • Sources • Online search; CINHAL, COCHRANE etc. • Purposes • Method of review 	<ul style="list-style-type: none"> • Lecture cum Discussion • Exercise on reviewing one research report/article for a selected research problem 	<ul style="list-style-type: none"> • Short answer • Objective type • Assessment of review of literature on given topic presented
IV	4	1	Describe the Research approaches and designs	Research Approaches and Designs <ul style="list-style-type: none"> • Historical, survey and experimental • Qualitative and Quantitative designs 	<ul style="list-style-type: none"> • Prepare annotated Bibliography • Lecture cum Discussion • Identify types of research approaches used from examples of published and unpublished research 	<ul style="list-style-type: none"> • Short answer • Objective type
V	6	6	Explain the Sampling process Describe the methods of data collection	Sampling and data Collection <ul style="list-style-type: none"> • Definition of Population, Sample • Sampling criteria, factors influencing sampling process, types of sampling techniques • Data – why, what, from whom, when and where to collect • Data collection methods and instruments <ul style="list-style-type: none"> ○ Methods of data collection ○ Questioning, interviewing ○ Observations, record analysis and measurement ○ Types of instruments, Validity & Reliability of the Instrument 	<ul style="list-style-type: none"> • Studies with rationale • Lecture cum Discussion • Reading assignment on examples of data collection tools • Preparation of sample data collection tool • Conduct group research project 	<ul style="list-style-type: none"> • Short answer • Objective type • Developing • Practice on
VI	4	6	Analyze, Interpret and summarize the research data	<ul style="list-style-type: none"> • Research ethics • Pilot study • Data collection procedure Analysis of data <ul style="list-style-type: none"> • Compilation, Tabulation, classification, summarization, presentation, interpretation of data 	<ul style="list-style-type: none"> • Lecture cum Discussion • Preparation of sample tables 	
VII	12	8	Explain the use of statistics, scales of measurement	Introduction to Statistics <ul style="list-style-type: none"> • Definition, use of statistics, scales of measurement. 	<ul style="list-style-type: none"> • Lecture cum Discussion 	

questionnaire/Interview
Schedule/Checklist

- Short answer
- Objective type
- Analyze and interpret
given data
- Short answer
- Objective type
- Computation of



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Unit	Time		Learning Outcomes	Content	Teaching/ Learning Activities	Assessment Methods
	(Hrs.)	TP				
			and graphical presentation of data Describe the measures of central tendency and variability and Co-efficient of correlation Correlation	<ul style="list-style-type: none"> Frequency distribution and graphical presentation of data Mean, Median, Mode, Standard deviation Normal Probability and tests of significance Co-efficient of correlation methods of Statistical packages and its application 	<ul style="list-style-type: none"> graphical presentations Practice on computation of measures of central tendency, variability & correlation 	descriptive statistics
VIII	4	5	Communicate and utilize the research findings	Communication and utilization of Research <ul style="list-style-type: none"> Communication of research findings Verbal report Writing research report Writing scientific article/paper Critical review of published research including publication ethics Utilization of research findings 	<ul style="list-style-type: none"> Lecture cum Discussion Read/ Presentation of a sample published/unpublished research report Plan, conduct and Write individual/group research project 	<ul style="list-style-type: none"> Short answer Objectivity type Oral Presentation Development of research proposal Assessment of research Project

• Conducting group research project

MIDWIFERY/OBSTETRIC AND GYNECOLOGY NURSING-II including Safe Delivery App Module

PLACEMENT: VI SEMESTER

THEORY: 3 Credits (60 hours)

PRACTICUM: Skill Lab: 1 Credit (40 Hours) Clinical: 4 Credits (320 Hours)

DESCRIPTION: This course is designed for students to develop knowledge and competencies on the concepts and principles of obstetric and gynecology nursing. It helps them to acquire knowledge and skills in rendering respectful maternity care to high risk woman during antenatal, natal and postnatal periods in hospitals and community settings and help to develop skills in initial management and referral of high risk neonates. It would also help students to gain knowledge, attitude and skills in caring for women with gynecological disorders.

COMPETENCIES: On completion of the course, the students will be able to:

1. Describe the assessment, initial management, referral and respectful maternity care of women with high risk pregnancy.
2. Demonstrate competency in identifying deviation from normal pregnancy.
3. Describe the assessment, initial management, referral and nursing care of women with high risk labour.
4. Assist in the conduction of abnormal vaginal deliveries and caesarean section.
5. Describe the assessment, initial management, referral and nursing care of women with abnormal postnatal conditions.
6. Demonstrate competency in the initial management of complications during the postnatal period.
7. Demonstrate competency in providing care for high risk newborn.
8. Apply nursing process in caring for high risk women and their families.

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10. Demonstrates skills in performing and assisting in specific gynecological procedures.
11. Describes drugs used in obstetrics and gynecology.
12. Counsel and care for couples with infertility.
13. Describe artificial reproductive technology.

COURSE OUTLINE

T–Theory, SL/L–Skill Lab, C–Clinical

	Unit Time	Learning Outcomes	Content	Teaching/ Learning Activities	Assessment Methods
I	(Hrs.) 12(T) 10(L) 80(C)	Describe the assessment, initial management, and referral of women with problems during pregnancy Support women with complicated pregnancy and facilitate a safe and positive birthing outcome	Recognition and Management of problems during Pregnancy <ul style="list-style-type: none"> • Assessment of high-risk pregnancy Problems/Complications of Pregnancy <ul style="list-style-type: none"> • Hyper-emesis gravidarum, • Bleeding in early pregnancy – abortion, ectopic pregnancy, vesicular mole • Unintended or mistimed pregnancy • Post-abortion care & counseling • Bleeding in late pregnancy: placenta previa, abruption placenta, trauma • Medical conditions complicating pregnancy – Anemia, PIH/Pre-eclampsia, Eclampsia, GDM, cardiac disease, pulmonary disease, thyrotoxicosis, STDs, HIV, Rh incompatibility • Infections in pregnancy – urinary tract infection, bacterial, viral, protozoal, fungal, malaria in pregnancy • Surgical conditions complicating pregnancy – appendicitis, acute abdomen • COVID-19 & pregnancy and children • Hydramnios • Multiple pregnancy • Abnormalities of placenta and cord • Intrauterine growth restriction • Intrauterine fetal death • Gynaecological conditions complicating pregnancy • Mental health issues during pregnancy • Adolescent pregnancy • Elderly primi, grand multiparity • Management and care of conditions as per the GoI protocol • Policy for the referral services 	<ul style="list-style-type: none"> • Lecture • Discussion • Demonstration • Video & films • Scan reports • Case discussion • Case presentation • Drug presentation • Health talk • Simulation • Roleplay • Supervised Clinical practice • WHO midwifery toolkit • GoI guideline – screening for hypothyroidism, screening for syphilis, deworming during pregnancy, diagnosis and management of GDM 	<ul style="list-style-type: none"> • Essay • Short answer • Objective type • Assessment of skills with checklist • OSCE

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Unit	Time (Hrs.)	Learning Outcomes	Content	Teaching/ Learning Activities	Assessment Methods
			<ul style="list-style-type: none"> • Drugs used in management of high-risk pregnancies • Maintenance of records and reports 		
II	20(T) 15(L) 80(C)	Identify, provide initial management and refer women with problems during labour within the scope of midwifery practice.	Recognition and management of abnormal labour <ul style="list-style-type: none"> • Preterm labour – Prevention and management of preterm labour; (Use of antenatal corticosteroids in preterm labour) • Premature rupture of membranes • Malposition's and abnormal presentations (posterior position, breech, brow, face, shoulder) • Contracted Pelvis, Cephalopelvic Disproportion (CPD) • Disorders of uterine action – Prolonged labour, Precipitate labour, Dysfunctional labour • Complications of third stage – Retained placenta, Injuries to birth canal, Postpartum hemorrhage (bimanual compression of the uterus, aortic compression, uterine balloon tamponade) • Obstetric emergencies – Foetal distress, Ruptured uterus, Cord prolapse, Shoulder dystocia, Uterine inversion, Vasa previa, Obstetrical shock, Amniotic fluid embolism • Episiotomy and suturing • Obstetric procedures – Forceps delivery, Vacuum delivery, Version • Induction of labour – Medical & surgical • Caesarean section – indications and preparation • Nursing management of women undergoing • Obstetric operations and procedures • Drugs used in management of abnormal labour 	<ul style="list-style-type: none"> • Lecture • Discussion • Demonstration • Case discussion/presentation • Simulation • Roleplay • Drug presentation • Supervised clinical practice • WHO midwifery toolkit • GoI guidelines – use of uterotonics during labour, antenatal corticosteroids • GoI guidance on prevention and management of PPH 	<ul style="list-style-type: none"> • Essay • Short answer • Objective type • Assessment of skills with checklist • OSCE
III	9(T) 5(L) 40(C)	Describe the assessment, initial management, referral and nursing care of women with abnormal postnatal conditions.	<ul style="list-style-type: none"> • Anaesthesia and analgesia in obstetrics Recognition and Management of postnatal problems <ul style="list-style-type: none"> • Physical examination, identification of deviation from normal • Puerperal complications and its management 	<ul style="list-style-type: none"> • Lecture • Demonstration • Case discussion/presentation • Drug presentation • Supervised clinical practice 	<ul style="list-style-type: none"> • Quiz • Simulation • Short answer • OSCE

Unit	Time (Hrs.)	Learning Outcomes	Content	Teaching/ Learning Activities	Assessment Methods
			<ul style="list-style-type: none"> ○ Urinary complications ○ Secondary Postpartum hemorrhage ○ Vulval hematoma ○ Breast engorgement including mastitis/breast abscesses, feeding problem ○ Thrombophlebitis ○ DVT ○ Uterine subinvolution ○ Vesicovaginal fistula (VVF), Rectovaginal fistula (RVF) ○ Postpartum depression/psychosis <ul style="list-style-type: none"> ● Drugs used in abnormal puerperium ● Policy about referral 		
IV	7(T) 5(L) 40(C)	Describe high risk neonates and their nursing management	Assessment and management of High-risk newborn (Review) <ul style="list-style-type: none"> ● Models of newborn care in India – NBCC; SNCUs ● Screening of high-risk newborn ● Protocols, level of neonatal care, infection control ● Prematurity, Post-maturity ● Low birth weight ● Kangaroo Mother Care ● Birth asphyxia/Hypoxic encephalopathy ● Neonatal sepsis ● Hypothermia ● Respiratory distress ● Jaundice ● Neonatal infections ● High fever ● Convulsions ● Neonatal tetanus ● Congenital anomalies ● Baby of HIV positive mothers ● Baby of Rh negative mothers ● Birth injuries ● SIDS (Sudden Infant Death Syndrome) prevention, Compassionate care ● Calculation of fluid requirements, EBM/formula feeds/tube feeding ● Home based newborn care program- 	<ul style="list-style-type: none"> ● Lecture ● Discussion ● Demonstration ● Simulation ● Case discussion/presentation ● Drug presentation ● Supervised Clinical practice ● Integrated Management of Neonatal Childhood Illnesses (IMNCI) 	<ul style="list-style-type: none"> ● Short answer ● Objective type ● Assessment of skills with checklist ● OSCE

Unit	Time (Hrs.)	Learning Outcomes	Content	Teaching/ Learning Activities	Assessment Methods
			community facility integration in newborn care <ul style="list-style-type: none"> Decision making about management and referral Bereavement counseling Drugs used for high risk newborns Maintenance of records and reports 		
V	12(T) 5(L) 80(C)	Describe the assessment and management of women with gynecological disorders.	Assessment and management of women with gynecological disorders <ul style="list-style-type: none"> Gynecological assessment – History and Physical assessment Breast Self-Examination Congenital abnormalities of female reproductive system Etiology, pathophysiology, clinical manifestations, diagnosis, treatment modalities and management of women with <ul style="list-style-type: none"> Menstrual abnormalities Abnormal uterine bleed Pelvic inflammatory disease Infections of the reproductive tract Uterine displacement Endometriosis Uterine and cervical fibroids and polyps Tumors – uterine, cervical, ovarian, vaginal, vulval Cysts – ovarian, vulval Cystocele, urethrocele, rectocele Genitor-urinary fistulas Breast disorders – infections, deformities, cysts, tumors HPV vaccination Disorders of Puberty and menopause Hormonal replacement therapy Assessment and management of couples with infertility <ul style="list-style-type: none"> Infertility – definition, causes Counseling the infertile couple Investigations – male and female Artificial reproductive technology Surrogacy, sperm and ovum donation, cryopreservation 	Lecture <ul style="list-style-type: none"> Discussion Demonstration Case discussion/presentation Drug presentation Videos, films Simulated practice Supervised Clinical practice Visit to infertility clinic and ART centers 	<ul style="list-style-type: none"> Essay Short answer Objective type Assessment of skills with checklist OSCE

Unit	Time (Hrs.)	Learning Outcomes	Content	Teaching/ Learning Activ	Assessment Methods
			<ul style="list-style-type: none"> • Adoption–counseling,procedures • InjuriesandTrauma;Sexualviolence • Drugsusedintreatmentofgy naecologicaldisorders 		

Note:CompletesafedeliveryappduringVII Semester.

PRACTICUM

SKILL LAB & CLINICAL ARE GIVEN UNDER ROBG NURSING–I

LIST OF APPENDICES

1. Internal Assessment: Distribution of marks
2. Internal Assessment guidelines
3. University Theory paper Question pattern and Practical examination

APPENDIX 1

INTERNAL ASSESSMENT: Distribution of marks

I SEMESTER

S.No.	Name of the Course	Continuous Assessment	Sessional Exams – Theory/Practical	Total Internal Marks
	Theory			
1	Communicative English	10	15	25
2	Applied Anatomy & Applied Physiology	10	15	25
3	Applied Sociology & Applied Psychology	10	15	25
4	Nursing Foundation I	10	15	25
	Practical			
5	Nursing Foundation I	10	15	25

II SEMESTER

S.No.	Course	Continuous Assessment	Sessional Exams – Theory/Practical	Total Marks
	Theory			
1	Applied Biochemistry and Applied Nutrition & Dietetics	10	15	25
2	Nursing Foundation II including First Aid I & II	10	15	25 I & II = 25 + 25 = 50/2
3	Health/Nursing Informatics & Technology	10	15	25
	Practical			
4	Nursing Foundation II I & II	10	15	25 I & II = 25 + 25 = 50

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III SEMESTER

S.No.	Course	Continuous Assessment	Sessional Exams – Theory/Practical	Total Marks
	Theory			
1	Applied Microbiology and Infection Control including Safety	10	15	25
2	Pharmacology I and Pathology I	10	15	25
3	Adult Health Nursing I with integrated pathophysiology including BCL	10	15	25
	Practical			
4	Adult Health Nursing I	20	30	50

IV SEMESTER

S.No.	Course	Continuous Assessment	Sessional Exams/ Practical	Total Marks
	Theory			
1	Pharmacology II & Pathology II I & II	10	15	25 I & II = 25 + 25 = 50/2
2	Adult Health Nursing II with integrated pathophysiology including Geriatric	10	15	25
3	Professionalism, Professional values & Ethics including bioethics	10	15	25
	Practical			
4	Adult Health Nursing II	20	30	50

V SEMESTER

S.No.	Course	Continuous Assessment	Sessional Theory/Practical	Total Marks
	Theory			
1	Child Health Nursing I	10	15	25
2	Mental Health Nursing I	10	15	25
3	Community Health Nursing I	10	15	25
4	Educational Technology/Nursing education	10	15	25
5	Introduction to Forensic Nursing and Indian Laws	10	15	25
	Practical			
6	Child Health Nursing I	10	15	25
7	Mental Health Nursing I	10	15	25
8	Community Health Nursing I	20	30	50

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VI SEMESTER

S.No.	Course	Continuous Assessment	Sessional Exams/ Practical	Total Marks
	Theory			
1	Child Health Nursing II I&II	10	15	25 I&II=25+25=50/2
2	Mental Health Nursing II I&II	10	15	25 I&II=25+25=50/2
3	Nursing Management and Leadership	10	15	25
4	Midwifery/Obstetrics and Gynecology I	10	15	25
	Practical			
5	Child Health Nursing II I&II	10	15	25 I&II=25+25=50
6	Mental Health Nursing II I&II	10	15	25 I&II=25+25=50
7	Midwifery/Obstetrics and Gynecology (OBG) Nursing I	10	15	25

VII SEMESTER

S.No.	Course	Continuous assessment	Sessional Exams/ Practical	Total Marks
	Theory			
1	Community Health Nursing II	10	15	25
2	Nursing Research & Statistics	10	15	25
3	Midwifery/Obstetrics and Gynecology (OBG) Nursing II I&II	10	15	25 I&II =25+25=50/2
	Practical			
4	Community Health Nursing II	20	30	50
5	Midwifery/Obstetrics and Gynecology (OBG) Nursing II I&II	10	15	25 I&II =25+25=50

VIII SEMESTER (Internship)

S.No.	Course	Continuous performance evaluation	OSCE	Total Marks
1	Competency assessment – 5 specialties × 20 marks	Each specialty – 10 5 × 10 = 50 marks	Each specialty – 10 5 × 10 = 50 marks	100

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APPENDIX 2
INTERNAL ASSESSMENT GUIDELINES
THEORY

I. CONTINUOUS ASSESSMENT: 10 marks

1. Attendance – **2 marks** (95-100%: 2 marks, 90-94: 1.5 marks, 85-89: 1 mark, 80-84: 0.5 mark, <80: 0)
2. Written assignments (Two) – **10 marks**
3. Seminar/microteaching/individual presentation (Two) – **12 marks**
4. Group project/work/report – **6**

marks Total = 30/3 = 10

If there is a mandatory module in that semester, marks obtained by student out of 10 can be added to 30 totaling 40 marks

Total = 40/4 = 10 marks

II. SESSIONAL EXAMINATIONS: 15 marks

Two sessional exams per course

Exam pattern:

MCQ – 4 × 1 = 4

Essay – 1 × 10 = 10

Short – 2 × 5 = 10

Very Short – 3 × 2 = 6

30 marks × 2 = 60/4 = 15

PRACTICAL

I. CONTINUOUS ASSESSMENT: 10 marks

1. Attendance – **2 marks** (95-100%: 2 marks, 90-94: 1.5 marks, 85-89: 1 mark, 80-84: 0.5 mark, <80: 0)
2. Clinical assignments – **10 marks**
(Clinical presentation – 3, drug presentation & report – 2, case study report – 5)
3. Continuous evaluation of clinical performance – **10 marks**
4. End of posting OSCE – **5 marks**
5. Completion of procedures and clinical requirements – **3**

marks Total = 30/3 = 10

II. SESSIONAL EXAMINATIONS: 15

marks Exam pattern:

OSCE – 10 marks (2-3 hours)

DOP – 20 marks (4-5 hours)

{DOP – Directly observed practical in the clinical setting}

Total = 30/2 = 15

Note: For Adult Health Nursing I, Adult Health Nursing II, Community Health Nursing I & Community Health Nursing II, the marks can be calculated as per weightage. Double the weightage as 20 marks for continuous assessment and 30 for sessional exams.


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COMPETENCY ASSESSMENT: (VIII SEMESTER)

Internal assessment

Clinical performance evaluation – 10×5 specialty = 50

marks OSCE = 10×5 specialty = 50 marks

Total = 5 specialty \times 20 marks = 100

APPENDIX 3

I. UNIVERSITY THEORY QUESTION PAPER PATTERN (For 75 marks)

1. Section A – 37 marks and Section B – 38 marks

- Applied Anatomy & Applied Physiology:** Applied Anatomy – Section A and Applied Physiology – Section B,
- Applied Sociology & Applied Psychology:** Applied Sociology – Section A and Applied Psychology – Section B
- Applied Microbiology & Infection Control including Safety:** Applied Microbiology – Section A and Infection Control including Safety – Section B

Section A (37 marks)

MCQ – $6 \times 1 = 6$

Essay – $1 \times 10 = 10$

Short – $3 \times 5 = 15$

Very Short – $3 \times 2 =$

6 Section B (38

marks) MCQ – 7×1

= 7

Essay – $1 \times 10 = 10$

Short – $3 \times 5 = 15$

Very Short – $3 \times 2 = 6$

2. Section A – 25 marks and Section B – 50 marks

Applied Biochemistry & Nutrition & Dietetics: Applied Biochemistry – Section A and Applied Nutrition & Dietetics – Section B

Section A (25 marks)

MCQ – $4 \times 1 = 4$

Short – $3 \times 5 = 15$

Very Short – $3 \times 2 =$

6 Section B (50

marks) MCQ – 8×1

= 8

Essay/situation type – $1 \times 10 = 10$

Short – $4 \times 5 = 20$

Very Short – $6 \times 2 = 12$

3. Section A – 38 marks, Section B – 25 marks and Section C – 12 marks


Pharmacology, Pathology and Genetics: Pharmacology – Section A, Pathology – Section B and Genetics – Section C

Section A (38 marks)

MCQ – $7 \times 1 = 7$

Essay – $1 \times 10 = 10$

Short – $3 \times 5 = 15$


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Very Short – $3 \times 2 =$

Section B (25

marks)MCQ– 4×1

=4

Short– $3 \times 5 = 15$

Very Short – $3 \times 2 =$

Section C (12

marks)MCQ– 3×1

=3

Short– $1 \times 5 = 5$

VeryShort – $2 \times 2 = 4$

4. SectionA–55marksandSectionB–20marks

ResearchandStatistics:Research–SectionAandStatistics–SectionB

SectionA(55marks)

MCQ– $9 \times 1 = 9$

Essay/situationtype– $2 \times 15 = 30$

Short– $2 \times 5 = 10$

Very Short – $3 \times 2 =$

Section B (20

marks)MCQ– 4×1

=4

Short– $2 \times 5 = 10$

VeryShort – $3 \times 2 = 6$

5. Marks75(Forallotheruniversityexamswith75marks)

MCQ– $12 \times 1 = 12$

Essay/situationtype– $2 \times 15 = 30$

Short– $5 \times 5 = 25$

VeryShort – $4 \times 2 = 8$

6. CollegeExam(EndofSemester)–50marks(50/2=25marks)

MCQ– $8 \times 1 = 8$

Essay/situationtype– $1 \times 10 = 10$

Short– $4 \times 5 = 20$

VeryShort – $6 \times 2 = 12$

II. UNIVERSITY PRACTICAL EXAMINATION – 50

marksOSCE– 15 marks

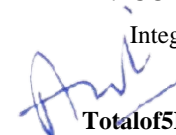
DOP –35marks

III. COMPETENCYASSESSMENT–UniversityExam(VIII SEMESTER)

IntegratedOSCEincludingall5specialties(Stationsbasedonevery specialty)=5specialty $5 \times 20 = 100$ marks

Totalof5Examiners: external–2andinternal–3(Onefromeachspecialty)

Internalexaminersmaybechosenfromcollegefacultywithrequiredqualificationorfromhospitalwithrequiredqualification


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Clinical Logbook for B.Sc. Nursing
Program(ProceduralCompetencies/Skills)

I&IISEMESTER

S.No.	ProceduralCompetencies/Skills	Performsin dependently	Assists/ Observes procedures A/O	DATE		Signature of theTutor/Facul ty
				Skill Lab/Simul ationLab	Clinical Area	
ISEMESTER						
I	CommunicationandDocumentation					
1	MaintainingCommunicationandi nterpersonal relationship withpatientand families					
2	VerbalReport					
3	Recording/Documentationofpatie ntcare(WrittenReport)					
II	MonitoringVitalSigns					
	Temperature					
4	OralAxillary					
5	RectalTymp					
6	anicPulse					
7	RadialApic					
	alRespirati					
8	on					
9	BloodPressure					
10	Hot&ColdApplication					
11	Cold					
III	CompressHot					
12	CompressIceC					
13	ap					
14	Tepidsponge					
15						
IV	HealthAssessment(Basic–Firstyearlevel)					
16	HealthHistory					
17	Physical Assessment – General &systemwise					
18	Documentationoffindings					
V	InfectionControlinClinicalS ettings					

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S.No.	Procedural Competencies/Skills	Performs independently	Assists/ Observes	DATE		Signature of the Tutor/Faculty
					Skill Lab/ Simulation Lab	
19	Hand hygiene (Handwashing & Handrub)					
20	Use of personal and protective equipment					
VI	Comfort					
21	Open					
22	Bed Occupied					
23	Bed					
24	Post-operative					
25	Bed Supine					
26	Position Fowler's					
27	Position Lateral					
28	Position Prone Position					
29	ion					
30	Semi Prone					
31	Position Trendelenburg					
	Position Lithotomy Position					
32	ion					
33	Changing Position of helpless patient					
34	(Moving/Turning/Logrolling)					
35	Cardiac table/Over-bed					
VII	table Back Rest					
36	Bed Cradle					
37	Pain Assessment (Initial & Reassessment)					
38	Safety					
VIII	Siderail					
39	Restraint (Physical)					
40	Fall risk assessment & post fall assessment					
41	Admission & Discharge					
IX	Admission					
42	Discharge					
43	Transfer (within hospital)					



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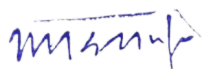


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S.No.	Procedural Competencies/Skills	Performs independently	Assists/ Observes	DATE		Signature of the Tutor/Faculty
					Skill Lab/ Simulation Lab	
		chart Intra Venous Infusion				
		Plan Elimination				
	bed & wheelchair					
44	Transferring patient from & to bed & stretcher					
45	Range of Motion Exercises (ROM)					
X	Patient Education					
46	Individual Patient Teaching					
XI	Hygiene					
47	Sponge bath/Bed					
48	bath Pressure Injury Assessment					
49	t					
50	Skin care and care of pressure points					
51	Oral					
52	hygiene Hair					
53	wash					
54	Pediculosis					
XII	treatment Perineal					
55	Care/Meatal care Urinary					
56	Catheter					
57	care Nursing Process-					
58	Basic level					
	Assessment and formulating nursing diagnosis					
XIII	Planning the nursing					
59	Care Implementation of Care					
60	Evaluation of Care (Reassessment & Modification)					
61						
62	Nutrition & Fluid					
63	Balance 24 Hours Dietary					
64	Recall Planning Well balance					
65	ddiet Making fluid plan					
XIV	Preparation of nasogastric tube					
	Nasogastric tube					
	feeding Maintaining intake & output					



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S.No.	Procedural Competencies/Skills	Performs independently	Assists/ Observes procedures A/O	DATE		Signature of the Tutor/Faculty
				Skill Lab/ Simulation Lab	Clinical Area	
66	Providing					
67	Bedpan Providing					
68	Urinal Enema					
69	Bowel Wash					
XV	Diagnostic Tests-Specimen collection					
70	Urine Specimen for Routine Analysis					
71	Urine Specimen for					
72	Culture Timed urine specimen					
73	collection Feces specimen for					
74	routine Sputum Culture					
	Urine					
75	Testing Ketone					
76	Albumin Reaction					
77	Specific Gravity					
78						
XVI	Oxygenation Needs/Promoting Respiration					
79	Deep Breathing & Coughing Exercises					
80	Steam Inhalation					
81	Oxygen administration using face mask					
82	Oxygen administration using nasal prongs					
XVII	Medication					
83	Administration Oral					
84	Medications Intramuscular					
85	Subcutaneous Rectal					
86	Suppositories					
XVIII	Death and Dying					
87	Deathcare/Last Office					
X	First Aid and Emergencies					
	Bandages & Binders Circular					
88						

S.No.	Procedural Competencies/Skills	Performs independently	Assists/Ob serves pro cedures A/O	DATE		Signature of the Tutor/Facul
				Skill Lab/Simul ation Lab	Clinical Area	
89	Spiral					
90	Reverse Spiral					
91	Recurrent					
92	Spica					
93	Figure of eight					
94	Eye					
95	Ear					
96	Caplin					
97	Jaw					
98	Arm Sling					
99	Abdominal Binder					
100	Basic CPR (first aid module)					

III & IV SEMESTER

S.No.	Specific Procedural Compete	Performs independently	Assists/ Observes Procedures A/O	DATE		Signature of the Tutor/ Faculty
				Skill Lab/Simulation Lab	Clinical Area	
III SEMESTER						
I	MEDICAL					
	Intravenous therapy					
1	IV cannulation					
2	IV maintenance & monitoring					
3	Administration of IV medication					
4	Care of patient with Central Line					
	Preparation, assisting, and after care of patients undergoing diagnostic procedures					
5	Thoracentesis					
6	Abdominal paracentesis					
	Respiratory therapies and monitoring					
7	Administration of oxygen using venturi mask					
8	Nebulization					

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S.No.	Specific Procedural Competencies/Skills	Performs independently	Assists/Observes Procedures A/O	DATE		Signature of the Tutor/ Faculty
				Skill Lab/Simulation Lab	Clinical Area	
9	Chest physiotherapy					
10	Postural drainage					
11	Oropharyngeal suctioning					
12	Care of patient with chest drainage					
	Planning therapeutic diet					
13	High protein diet					
14	Diabetic diet					
15	Performing and monitoring GRBS					
16	Insulin administration					
II	SURGICAL					
17	Pre-Operative care					
18	Immediate Post-operative care					
19	Post-operative exercise					
20	Pain assessment and management					
	Assisting diagnostic procedures and after care of patients undergoing					
21	Colonoscopy					
22	ERCP					
23	Endoscopy L					
24	Liver Biopsy					
25	Nasogastric					
26	aspiration Gastrostomy/Jejunost					
27	omy feeds Ileostomy/Colostomy					
28	care Surgical dressing					
29	Suture removal					
30	Surgical					
31	soak Sitz bath					
32	Care of drain					
III	CARDIOLOGY					
33	Cardiac monitoring					
34	Recording and interpreting					
35	ECG Arterial blood gas analysis					

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S.No.	Specific Procedural Competencies/Skills	Performs independently	Assists/Observes Procedures A/O	DATE		Signature of the Tutor/Faculty
				Skill Lab/Simulation Lab	Clinical Area	
	interpretation					
36	Administration of cardiac drugs					
37	Preparation and after care of patients undergoing cardiac Catheterization					
38	Performing BCLS					
<i>Collection of blood sample for</i>						
39	Blood grouping/cross matching					
40	Blood sugar					
41	Serum electrolytes					
42	Assisting with blood transfusion					
43	Assisting for bone marrow aspiration					
44	Application of antiembolism stockings (TED hose)					
45	Application/maintenance of sequential Compression Device					
IV DERMATOLOGY						
46	Application of topical medication					
47	Intradermal injection- Skin allergy testing					
48	Medicated bath					
V COMMUNICABLE						
49	Intradermal injection-BCG and Tuberculin skin Test or Mantoux test					
50	Barrier nursing & Reverse barrier nursing					
51	Standard precautions- Hand hygiene, use of PPE, needle stick and sharp injury prevention, Cleaning and disinfection, Respiratory hygiene, waste disposal and safe injection practices					
VI MUSCULOSKELETAL						
52	Preparation of patient with Myelogram/CT/MRI					


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S.No.	Specific Procedural Competencies/Skills	Performs independently	Assists/Observes Procedures A/O	DATE		Signature of the Tutor/Faculty
				Skill Lab/Simulation Lab	Clinical Area	
53	Assisting with application & removal of POP/Cast					
54	Preparation, assisting and after care of patient with Skin traction/skeletal traction					
55	Care of orthotics					
56	Muscle strengthening					
57	exercises Crutch walking					
58	Rehabilitation					
VII OR						
59	Position and draping Preparation					
60	of operation					
61	table Setup of trolley with instrument					
62	nt					
63	Assisting in major and minor operation					
64	Disinfection and sterilization of equipment					
65	Scrubbing procedures – Gowning, masking and gloving					
Intraoperative monitoring IV SEMESTER						
I						
1	ENT					
2	History taking and examination of ear, nose & throat					
3	Application of bandage to Ear & Nose					
	Tracheostomy care					
	Preparation of patient, assisting and monitoring of patients undergoing diagnostic procedures					
4	Auditory screening tests					
5	Audiometric tests					
6	Preparing and assisting in special procedures like Anterior/posterior nasal packing, Ear Packing and Syringing					
7	Preparation and after care of patients undergoing ENT surgical procedures					
8	Instillation of ear/nasal					

S.No.	Specific Procedural Competencies/ Skills	Performs independently	Assists/ Observes Procedures A/O	DATE		Signature of the Tutor/ Faculty
				Skill Lab/Simulation Lab	Clinical Area	
	medication					
II	EYE					
9	History taking and examination of eyes and interpretation					
	<i>Assisting</i>					
10	<i>procedures</i> Visual					
11	acuity Fundoscopy/retinos					
12	copy/ Ophthalmoscopy/tonometry					
13	Refraction tests					
14	Pre and postoperative care of patient undergoing eye surgery					
15	Instillation of					
16	eyedrops/medication					
17	Eye irrigation					
III	Application of eye bandage					
18	Assisting with foreign body removal NEPHROLOGY & UROLOGY Assessment of kidney and urinary system • History taking and physical examination					
	• Assisting with Testicular self-examination					
	• Digital rectal exam					
	<i>Preparation and assisting with diagnostic and therapeutic procedures</i>					
19	Cystoscopy, Cystometrogram					
20	Contrast studies – IVP					
21	Peritoneal dialysis					
22	Hemodialysis					
23	Lithotripsy					
24	Renal/Prostate Biopsy					
25	Specific tests –					
26	Semen analysis, gonorrhea test					
27	Urinary Catheterization & care					
28	Bladder irrigation					

S.No.	Specific Procedural Competencies/Skills	Performs independently	Assists/Observes Procedures A/O	DATE		Signature of the Tutor/Faculty
				Skill Lab/Simulation Lab	Clinical Area	
28	Intake and output recording and monitoring					
29	Ambulation and exercise					
IV	BURNS & RECONSTRUCTIVE SURGERY					
30	Assessment of burns wound					
31	First aid of burns					
32	Fluid & electrolyte replacement therapy					
33	Skincare					
34	Care of Burn wounds					
35	Pre-operative and post-operative care of patient with burns					
36	Caring of skin graft and post cosmetic surgery					
37	Rehabilitation					
V	NEUROLOGY					
38	Neurological Examination – ex. Use of Glasgow coma scale					
39	Continuous monitoring					
40	Preparation and assisting for various invasive and non-invasive diagnostic procedures					
41	Care of patient undergoing neurosurgery including rehabilitation					
VI	IMMUNOLOGY					
42	History taking and Physical examination					
43	Immunological status assessment and interpretation of specific test (e.g. HIV)					
44	Care of patient with low immunity					
VII	ONCOLOGY					

S.No.	Specific Procedural Competencies/Skills	Performs independently	Assists/Observes Procedures A/O	DATE		Signature of the Tutor/Faculty
				Skill Lab/Simulation Lab	Clinical Area	
45	History taking & physical examination of cancer patients					
46	Screening for common cancers – TNM classification <i>Preparation, assisting and after care patients undergoing diagnostic procedures</i>					
47	Biopsies/FNAC					
48	Bone-marrow aspiration					
	<i>Preparation of patients and assisting with various modalities of treatment</i>					
49	Chemotherapy					
50	Radiotherapy					
51	Hormonal therapy/Immunotherapy					
52						
53	Gene therapy/any other					
54	Care of patients treated with nuclear medicine					
VIII	Rehabilitation					
55	EMERGENCY					
56	Practicing 'triage'					
57	Primary and secondary survey in emergency					
58	Examination, investigations & their interpretations, in emergency & disaster situations					
59	Emergency care of medical and traumatic injury patients					
60	Documentation, and assisting in legal procedures in emergency unit					
61	Managing crowd					
IX	Counseling the patient and family in dealing with grieving & bereavement					
62	CRITICAL CARE					
63	Assessment of critically ill patients					
64	Assisting with arterial puncture					
	Assisting with ET tube intubation & extubation					

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				Skill Lab/Simulation Lab	Clinical Area	
65	ABG analysis and interpretation					
	— respiratory acidosis, respiratory alkalosis, metabolic acidosis, metabolic alkalosis					
66	Setting up of ventilator modes and settings and care of patient on ventilator					
67	Setting up of trolley with instruments					
68	Monitoring and maintenance of Chest drainage system					
69	Bag and mask ventilation					
70	Assisting with starting and maintenance of Central and peripheral lines invasive					
71	Setting up of infusion pump, and defibrillator					
72	Administration of drugs via infusion, intracardiac, intrathecal, epidural					
73	Monitoring and maintenance of pacemaker					
74	ICU care bundle					
75	Management of the dying patient in the ICU					
X	Geriatric					
76	History taking and Assessment of Geriatric patient					
77	Geriatric counseling					
78	Comprehensive Health assessment (adult) after module completion					
V & VI SEMESTER – CHILD HEALTH NURSING I & III PEDIATRIC MEDICAL & SURGICAL						
<i>Health assessment – Taking history & Physical examination and nutritional assessment of</i>						
1	Neonate					
2	Infant					
3	Toddler					
4	Preschooler					
5	Schooler					

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				Skill Lab/Simulation Lab	Clinical Area	
6	Adolescent Administration of medication/fluids	Calculation, preparation and administration of medication				
7	Oral					
8	I/M					
9	I/V					
10	Intradermal					
11	Subcutaneous					
12	Calculation of fluid requirements					
13	Preparation of different strengths of I/V fluids					
14	Administration of IV fluids					
15	Application of restraints					
	Administration of O ₂ inhalation by different methods					
16	Nasal Catheter/Nasal Prong					
17	Mask					
18	Oxygen hood					
19	Baby bath/sponge bath					
20	Feeding children by Katori & spoon/paladai, cup					
	Collection of specimens for common investigations					
21	Urine					
22	Stool					
23	Blood					
24	Assisting with common diagnostic procedures					
	(Lumbar puncture, bone marrow aspiration) Health education to mothers/parents – Topics					
25	Prevention and management of Malnutrition					
26	Prevention and management of diarrhea (Oral rehydration therapy)					
27	Feeding & Complementary feeding					

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				Skill Lab/Simulation Lab	Clinical Area	
28	Immunization					
29	schedule Play therapy					
30	Conduct individual and group play therapy sessions					
31	Prevention of accidents					
32	Bowel wash					
33	Administration of suppositories					
<i>Care for stomies:</i>						
34	Colostomy					
35	Irrigation Ureterostomy					
36	Gastrostomy					
37	Entero-stomy					
38	Urinary catheterization & drainage					
<i>Feeding Nas</i>						
39	oro-					
40	gastric Gastr					
41	ostomy Jejun					
ostomy						
42	<i>Care of surgical wounds</i>					
43	Dressing Suture					
II	removal					
PEDIATRIC OPD/IMMUNIZATION ROOM						
44	<i>Growth and Developmental assessment of children</i>					
45	Infant Toddler					
46	Preschooler					
47	Schooler					
48	Adolescent					
49	Administration of vaccination					
50	Health/Nutritional					
III	education NICCU/PICU					
51	Assessment of newborn					
52	Care of preterm/LBW newborn					

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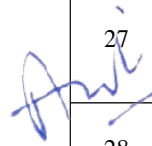
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S.No.	Specific Procedural Competencies/Skills	Performs independently	Assists/Observes Procedures A/O	DATE		Signature of the Tutor/Faculty
				Skill Lab/Simulation Lab	Clinical Area	
53	Kangaroo care					
54	Neonatal resuscitation					
55	Assisting in neonatal diagnostic procedures					
56	Feeding of high risk newborn – EBM (spoon/paladai)					
57	Insertion/removal/feeding – Naso/oro-gastric tube					
58	Administration of medication – oral/parenteral					
59	Neonatal drug calculation					
60	Assisting in exchange transfusion					
61	Organizing different levels of neonatal care					
62	Care of a child on ventilator/CPAP					
63	Endotracheal Suction					
64	Chest Physiotherapy					
65	Administration of fluids with infusion pumps					
66	Total Parenteral Nutrition					
67	Recording & reporting					
68	Cardiopulmonary Resuscitation – PLS					
V & VI SEMESTER – MENTAL HEALTH NURSING I & II PSYCHIATRY OPD						
1	History taking					
2	Mental status examination (MSE)					
3	Psychometric assessment (Observe/practice)					
4	Neurological examination					
5	Observing & assisting in therapies					
	Individual and group psychoeducation					
6	Mental hygiene practice education					
7	Family psycho-education					

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S.No.	Specific Procedural Competencies/Skills	Performs independently	Assists/Ob serves Pro cedures A / O	DATE		Signature of the Tutor/ Faculty
				Skill Lab/Simulation Lab	Clinical Area	
CHILD GUIDANCE CLINIC						
8	History Taking & mental status examination					
9	Psychometric assessment (Observe/practice)					
10	Observing and assisting in v arious therapies					
11	Parental teaching for child with m ental deficiency					
IN-PATIENT WARD						
12	History taking					
13	Mental status examination (MSE)					
14	Neurological examination					
15	Assisting in psychometric a ssessment					
16	Recording therapeutic communication					
17	Administration of medications					
18	Assisting in Electro- convulsive Therapy (ECT)					
19	Participation in all therapies					
20	Preparation of patients for Activities of Daily living (ADL)					
21	Conducting admission and d ischarge counseling					
22	Counseling and teaching patients a nd families					
COMMUNITY PSYCHIATRY & DE ADDICTION CENTRE						
23	Conducting home visit and casework					
24	Identification of individuals with mental health problems					
25	Assisting in organization of Mental Health camp					
26	Conducting awareness meetings for mental health & mental illness					
27	Counseling and Teaching family members, patients and community					
28	Observation of deaddiction care					


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				Skill Lab/Simulation Lab	Clinical Area	
V SEMESTER – COMMUNITY HEALTH NURSING INCLUDING ENVIRONMENTAL SCIENCE & EPIDEMIOLOGY						
1	Interviewing skills (using communication and interpersonal skills)					
2	Conducting community needs assessment/survey					
3	Observation skills					
4	Nutritional assessment skills					
5	Teaching individuals and families on nutrition-food hygiene and safety, healthy lifestyle and health promotion					
6	BCC (Behaviour change communication) skills					
7	Health assessment including nutritional assessment-different age groups <ul style="list-style-type: none">• Children under five• Adolescent• Woman					
8	Investigating an epidemic – Community health survey					
9	Performing lab tests – Hemoglobin, blood sugar, blood smear for malaria, etc.					
10	Screening, diagnosis and primary management of common health problems in the community and referral of high-risk clients (Communicable & NCD)					
11	Documentation skills					
12	Home visit					
13	Participation in national health programs					
14	Participation in school health programs					
V SEMESTER – EDUCATIONAL TECHNOLOGY/NURSING EDUCATION						
1	Writing learning outcomes					
2	Preparation of lesson plan					
3	Practice Teaching/Microteaching					

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				Skill Lab/Simulation Lab	Clinical Area	
4	Preparation of teaching aids/media					
	Preparation of assessment tools					
5	Construction of MCQ tests					
6	Preparation of observation checklist					
VI SEMESTER – NURSING MANAGEMENT & LEADERSHIP						
Hospital and Nursing Service Department						
1	Preparation of organogram (hospital/nursing department)					
2	Calculation of staffing requirements for a nursing unit/ward					
3	Formulation of Job description of nursing officer (staff nurse)					
4	Preparation of Patient assignment plan					
5	Preparation of duty roster for staff/students at different levels					
6	Preparation of logbook/MMF for specific equipment/materials					
7	Participation in Inventory control and daily record keeping					
8	Preparation and maintenance of records & reports such as incident reports/adverse reports/audit reports					
9	Participation in performance appraisal/evaluation of nursing staff					
10	Participate in conducting in-service education for the staff					
College & Hostel						
11	Preparation of organogram of college					
12	Formulation of job description for tutor					
13	Participation in performance appraisal of tutor					
14	Preparation of Master plan, time-table and clinical rotation					

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				Skill Lab/Simulation Lab	Clinical Area	
15	Preparation of student anecdotes					
16	Participation in clinical evaluation of students					
17	Participation in planning and conducting practical examination OSCE – end of posting					
VI&VII SEMESTER – MIDWIFERY/OBSTETRICS AND GYNECOLOGY (OBG) NURSING I&III ANTENATAL CARE						
	Health assessment of antenatal woman					
1	History Taking including obstetrical score, Calculation of EDD, gestational age					
2	Physical examination: head to foot					
3	Obstetrical examination including Leopards maneuvers & auscultation of Fetal heart sound (fetoscope/stethoscope/Doppler)					
	Diagnostic tests					
4	Urine pregnancy test/card test					
5	Estimation of hemoglobin using Sahle's hemoglobinometer					
6	Advice/assist in HIV/HBsAg/VDRL testing					
7	Preparation of peripheral smear for malaria					
8	Urine testing for albumin and sugar					
9	Preparation of mother for USG					
10	Kick chart/DFMC (Daily Fetal and Maternal Chart)					
11	Preparation and recording of CTG/NST					
12	Antenatal counseling for each trimester including birth preparedness and complication readiness					
13	Childbirth preparation classes for couples/family					
14	Administration of Td/TT					
15	Prescription of iron & folic acid and calcium tablets					

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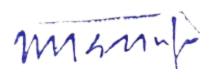
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S.No.	Specific Procedural Competencies/ Skills	ng	Performs independently	Assists/Observe s Procedures		D A Clinical Area E
				A/O		
II	INTRANATAL CARE				Skill Lab/ Simulation Lab	
16	Identification and assessment of woman in labour					
17	Admission of woman in labour					
18	Performing/assisting CTG					
19	Vaginal examination during labour including Clinical pelvimetry					
20	Plotting and interpretation of partograph					
21	Preparation for birthing/delivery – physical and psychological					
22	Setting up of the birthing room/delivery unit					
23	and newborn corner/care area					
24	Pain management during labour – non-pharmacological					
25	Supporting normal births/conducting normal childbirth in upright positions/evidence based					
26						
27	Essential newborn care Basic newborn resuscitation					
28						
29	Management of third stage of labour – Physiologic management/active management (AMTSL)					
30	Examination of placenta					
31	Care during fourth stage of labour					
III	Initiation of breastfeeding and lactation management					
32						
33	Infection prevention during labour and newborn care					
34	POSTNATAL CARE					
35	Postnatal assessment and care Perineal/episiotomy					

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S.No.	Specific Procedural Competencies/Skills	Performs independently	Assists/Observes Procedures A/O	DATE		Signature of the Tutor/Faculty
				Skill Lab/Simulation Lab	Clinical Area	
36	Preparation for discharge					
IV	NEWBORN CARE					
37	Assessment of newborn					
38	Weighing of newborn					
39	Administration of Vitamin K					
40	Neonatal immunization –					
	Administration of BCG, Hepatitis B vaccine					
41	Identification of minor disorders of newborn and their management					
	CARE OF WOMEN WITH ANTENATAL, INTRANATAL & POSTNATAL COMPLICATIONS					
42	High risk assessment – identification of antenatal complications such as pre-eclampsia, anemia, GDM, Antepartum hemorrhage etc.					
43	Post-abortion care & counseling					
44	Glucose challenge test/Glucose Tolerance test					
45	Identification of fetal distress and its management					
46	Administration of MgSO ₄					
47	Administration of antenatal corticosteroids for preterm labour					
48	Assisting with Medical induction of labour					
49	Assist in Surgical induction – stripping and artificial rupture of membranes					
50	Episiotomy (only if required) and repair					
51	Preparation for emergency/elective caesarean section					
52	Assisting in caesarean section					
53	Preparation of mother and assist in vacuum delivery					
54	Identification and assisting in management of malpresentation and malposition during labour					
55	Preparation and assisting in low					

S.No.	Specific Procedural Competencies/Skills	Performs independently	Assists/Observe Procedures A/O	DATE		Signature of the Tutor/Faculty
				Skill Lab/Simulation Lab	Clinical Area	
	forceps operation					
56	Preparation and assisting in emergency obstetric surgeries					
57	Prescription/administration of fluids and electrolytes through intravenous route					
Assisting in procedures						
58	Assisting in Manual removal of the placenta					
59	Assisting in Bimanual compression of uterus / Balloon tamponade for atonic uterus					
60	Assisting in Aortic compression for PPH					
61	Identification and first aid management of PPH & obstetric shock					
62	Assisting in management of obstetric shock					
63	Identification and assisting in management of puerperal sepsis and administration of antibiotics					
64	Management of breast engorgement and infections					
65	Management of thrombophlebitis					
HIGH RISK NEWBORN (Some aspects of high risk newborn care are included in Child Health Nursing)						
66	Identification of high-risk newborn					
67	Care of neonate under radiant warmer					
68	Care of neonate on phototherapy					
69	Referral and transportation of high risk newborn					
70	Parental counselling – sick neonate and neonatal losses					
FAMILY WELFARE						
71	Postpartum Family planning counselling					
72	Postpartum family planning – Insertion and removal of PPIUCD/PAIUCD					

S.No.	Specific Procedural Competencies/Skills	Performs independently	Assists/Observes Procedures A/O	DATE		Signature of the Tutor/Faculty
				Skill Lab/Simulation Lab	Clinical Area	
73	Counselling of the woman for Postpartum sterilization					
74	Preparation and assisting in tubectomy					
OTHER PROCEDURES						
75	Preparation and assisting for D&C/D&E operations					
76	Observation/Assisting in Manual Vacuum Aspiration					
77	Assessment of women with gynaecological disorders					
78	Assisting/performing Papsmear					
79	Performing Visual inspection of cervix with acetic acid					
80	Assisting/observation of cervical punch biopsy/Cystoscopy/Cryosurgery					
81	Assisting in gynecological surgeries					
82	Postoperative care of woman with gynecological surgeries					
83	Counsel on Breast self-examination					
84	Counseling couples with infertility					
85	Completion of safe delivery app with certification					
VII SEMESTER – COMMUNITY HEALTH NURSING II						
1	Screening, diagnosing, management and referral of clients with common conditions/emergencies					
2	Antenatal and postnatal care at home and health centre					
3	Conduction of normal childbirth & newborn care at health centre					
4	Tracking every pregnancy and filling up MCP card					
5	Maintenance of records/register/reports					
6	Adolescent counseling & participation in youth friendly					

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				Skill Lab/Simulation Lab	Clinical Area	
	services					
7	Counseling for safe abortions services					
8	Family planning counseling					
9	Distribution of temporary contraceptives – condoms, OCP's, emergency contraceptives, Inj ectable MPA					
10	Insertion of interval IUCD					
11	Removal of IUCD					
12	Participation in conducting vasectomy/tubectomy camp					
13	Screening, diagnosis, primary management and referral of clients with occupational health problems					
14	Health assessment of elderly					
15	Mental Health screening					
16	Participation in community diagnosis – data management					
17	Writing health centre activity report					
18	Participation in organizing and conducting clinic/health camp					
19	Participation in disaster mock drills					
20	Co-ordinating with ASHAs and other community health workers					
VII SEMESTER – NURSING RESEARCH & STATISTICS						
	<i>Research Process Exercise</i>					
1	Statement of the problem					
2	Formulation of Objectives & Hypotheses					
3	Literature review of research report/article					
4	Annotated bibliography					
5	Preparation of sample research tool					
	<i>Analysis & Interpretation of data – Descriptive statistics</i>					

S.No.	Specific Procedural Compete	Performs independently	Assists/ Observes Procedures A/O	DATE		Signature of the Tutor/ Faculty
				Skill Lab/Simulation Lab	Clinical Area	
6	Organization of data					
7	Tabulation of data					
8	Graphic representation of data					
9	Tabular presentation of data					
10	Research Project (Group/Individual)					
VIII SEMESTER (INTERNSHIP)						

Note: Maximum of 30% of all skills/procedures can be performed by students in skill lab/simulation lab for all clinical nursing Courses except Community Health Nursing and Mental Health Nursing in which the percentage allowed is only 10%

*—When the student is found competent to perform the skill, it will be signed by the faculty/tutor.

Students: Students are expected to perform the listed skills/competencies many times until they reach level 3 competency, after which the preceptor signs against each competency.

Preceptors/faculty: Must ensure that the signature is given for each competency only after they reach level 3.

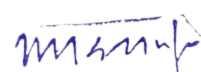
- Level 3 competency denotes that the student is able to perform that competency without supervision
- Level 2 Competency denotes that the student is able to perform each competency with supervision
- Level 1 competency denotes that the student is not able to perform that competency/skill even with supervision

Signature of the Faculty Coordinator

Signature of the HOD/Principal



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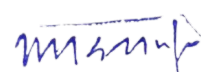
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CLINICAL REQUIREMENTS

S.No.	Clinical Requirement	Date	Signature of the Faculty
I&II SEMESTER			
	NURSING FOUNDATION I&II		
1	History Taking – 21. 2.		
2	Physical Examination – 21. 2.		
3	Fall risk assessment –2		



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S.No.	Clinical Requirement	Date	Signature of the Faculty
	1. 2.		
4	Pressure Sore Assessment – 21. 2.		
5	Nursing Process – 21. 2.		
6	Completion of first aid module		
7	Completion of Health assessment module		
SEMESTER – ADULT HEALTH NURSING I			
	Medical		
1	Care Study – 1		
2	Health education – 1		
3	Clinical presentation / care note – 1		
	Surgical		
4	Care study – 1		
5	Health education – 1		
6	Clinical Presentation / Care note – 1		
	Cardiac		
7	Cardiac assessment – 1		
8	Drug presentation – 1		
	Communicable		
9	Clinical presentation / Care note – 1		
	Musculoskeletal		
10	Clinical presentation / Care note – 1		
	OR		
11	Assist as circulatory nurse – 5i. ii.i ii.i v. v.		
12	Assist as scrub nurse in minor surgeries – 5i. ii.		

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S.No.	Clinical Requirement	Date	Signature of the Faculty
	iii. iv. v.		
13	Positioning & draping – 5i. ii.i ii.i v. v.		
14	Assist as scrub nurse in major surgeries – 5i. ii.i ii.i v. v.		
15	Completion of BCLS module		
SEMESTER-ADULT HEALTH NURSING II			
	ENT		
1	ENT assessment of an adult – 2i. ii.		
2	Observation and activity report of OPD		
3	Clinical presentation –1		
4	Drug Book		
	EYE		
5	Eye assessment i. Adult-1 ii. Geriatric-1		
6	Patient-teaching-1		
7	Clinical Presentation-1		
	NEPHROLOGY & UROLOGY		
8	Assessment of adult – 1 Assessment of Geriatric-1		
9	Drug presentation –1		
10	Care study/Clinical presentation-1		
	BURNS AND RECONSTRUCTIVE SURGERY		

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S.No.	Clinical Requirement	Date	Signature of the Faculty
11	Burn wound assessment –		
12	1 Clinical presentation –		
13	1 Observation report of Burns unit		
14	Observe cosmetic/reconstructive procedures		
	NEUROLOGY		
15	Neuro-assessment – 2i ii.		
16	Unconscious patient – 1		
17	Care study/case presentation –		
18	1 Drug presentation –		
	IMMUNOLOGY		
19	Assessment of immune status		
20	Teaching of isolation to patient		
21	and family caregivers Nutritional management		
22	Care Note – 1		
	ONCOLOGY		
23	Observation report of cancer unit		
24	Assessment of each system cancer patients –		
25	2 Care study/clinical presentation – 1		
26	Pre and post-operative care of patient with various modes of cancer treatments such as chemotherapy, radiation therapy, surgery, BMT, etc. – 3 (at least) i. ii. ii.		
27	Teaching on BSE to family members		
	EMERGENCY		
28	Primary assessment of adult – 1		
29	Immediate care (IV access establishment, assisting in intubation, suction, etc.)		
30	Use of emergency trolley		
	CRITICAL CARE		
31	Assessment of critically ill i. Adult ii. Geriatric		

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S.No.	Clinical Requirement	Date	Signature of the Faculty
32	Care note/Clinical presentation-1		
	GERIATRIC		
33	Geriatric assessment-1		
34	Care note/clinical presentation –		
35	1 Fall risk assessment		
36	Functional status assessment-1		
37	Completion of Fundamental of Prescribing module		
38	Completion of Palliative care module		
V & VI SEMESTER – CHILD HEALTH NURSING I & II			
	Pediatric medical		
1	Nursing care plan-1		
2	Case presentation –1		
3	Health talk-1		
	Surgical		
4	Nursing care plan-1		
5	Case study/presentation-1		
	OPD/Immunization Room		
6	Growth and Developmental study: i. Infant- 1 ii. Toddler- 1 iii. Preschooler-1		
	NICCU/PICU		
7	Newborn assessment-1		
8	Nursing Care Plan-1		
9	Kangaroo mother care-2		
10	Nursing care plan of high risk newborn –1		
11	Completion of ENBC module		
12	Completion of FNBC module		
13	Completion of IMNCI module		
14	Completion of PLS module		
V & VI SEMESTER – MENTAL HEALTH NURSING I & II			
	Psychiatry OPD		
1	History taking and Mental status examination –		
	2i.		

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S.No.	Clinical Requirement	Date	Signature of the Faculty
	ii.		
2	Health education –1		
3	Observation report of OPD		
	Child guidance clinic		
4	Casework –1		
	Inpatient Ward		
5	Casestudy –1		
6	Care plan – 2		
7	Clinical presentation 1		
8	Process recording 2		
9	Maintain drug book		
	Community psychiatry & Deaddiction centre		
10	Casework –1		
11	Observation report on field visits		
12	Visit to deaddiction centre		
V SEMESTER – COMMUNITY HEALTH NURSING – INCLUDING ENVIRONMENTAL SCIENCE & EPIDEMIOLOGY			
1	Community needs assessment/survey (Rural/Urban) –1		
2	Visit to – SC/HWC – PHC – CHC		
3	Observation of nutritional programs Anganwadi		
4	Observation visits		
	i. Water purification site and Water quality tests		
	ii. Milk diary		
	iii. Slaughter-house		
	iv. Market		
	v. Sewage disposal site		
	vi. Rainwater harvesting		
	vii. Slaughter-house		
5	Nutritional assessment –Adult 1		
6	Individual health teaching –Adult 1		

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S.No.	Clinical Requirement	Date	Signature of the Faculty
7	Use of A V aids – flashcards/posters/flannel graphs/flipcharts (Any Two) i. ii. Health assessment of		
8	i. Woman – 1 ii. Infant/under five child – 1 iii. Adolescent – 1 iv. Adult – 1 Growth monitoring of children under five –		
9	1 Documentation		
10	i. Individual records – 1 ii. Family records – 1 Investigation of an epidemic – 1		
11	Screening and primary management of		
12	i. Communicable diseases – 1 ii. NCD – 1 Home visits – 2		
13	Participation in national health programs –		
14	2 Participation in school health program – 1		
15	V SEMESTER – EDUCATIONAL TECHNOLOGY/NURSING EDUCATION		
1	Microteaching – 2 i. Theory – 1 ii. Practical/lab – 1		
2	Field Visit to nursing educational institution – regional/national organization		
V SEMESTER – NURSING MANAGEMENT & LEADERSHIP			
1	Field visit to Hospital – regional/national organization		
& VI SEMESTER – MIDWIFERY/OBSTETRICS AND GYNECOLOGY (OBG) NURSING I & II			
1	Antenatal assessment and care – 20		
2	Postnatal assessment and care – 15		
3	Assessment of labour using partograph – 10		
4	Pervaginal examination – 10		
5	Observing normal child births/deliveries – 10		
6	Assisting in conduction of normal child birth – 10		
7	Conduction of normal deliveries – 10		

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S.No.	Clinical Requirement	Date	Signature of the Faculty
8	Assisting in abnormal/instrumental deliveries –		
9	5 Performing placental examination –		
10	5 Episiotomy and suturing (only if indicated) –		
11	3 Assist/observe Insertion of PPIUCD – 2		
12	Newborn assessment –		
13	10 Newborn resuscitation		
14	– 5 Kangaroo mother care –		
2			
15	Nursing Care Plan/Clinical presentation with Drug Study <i>Antenatal care</i> Normal (care plan) – 1		
16	High risk (case study/Clinical presentation) – 1 <i>Intrapartum care</i>		
17	High risk (Clinical presentation) – 1 <i>Postnatal care</i> Normal (care plan) – 1		
18	High risk (Clinical presentation) – 1 <i>Newborn care</i>		
19	Normal (care plan) – 1 <i>Gynecological</i>		
20	condition Care plan – 1		
21	Health talk – individual/group –		
22	2 Counseling mothers and family members Visit to • Peripheral health facility/Laashya certified labour room		
23	• Infertility centre (Virtual/videos) C		
24	Completion of SBA		
	module Completion of safe delivery		
	app		
	VII SEMESTER – COMMUNITY HEALTH NURSING II		
1	Screening and primary management of i. Minor ailments – 2 ii. Emergencies – 1 iii. Dental problems – 1		
	iv. Eye – 1 v. ENT – 1		

2 Primary management and care based on protocols approved by MO
H&FW (Home/health centre)

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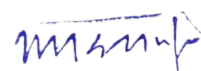
S.No.	Clinical Requirement	Date	Signature of the Faculty
3	Screening and primary management of i. High risk pregnancy ii. High risk neonate		
4	Assessment of i. Antenatal-1 ii. Intrapartum- 1 iii. Postnatal-1 iv. Newborn-1		
5	Conduction of normal child birth and documentation-2		
6	Immediate newborn care and documentation -1		
7	Family planning counseling-1		
8	Group health education (Rural/urban)-1		
9	Adolescent counseling-1		
10	Family case study (Rural/urban)-1		
11	Screening, diagnosis, primary management and referral of clients with occupational health problems-2 i. ii.		
12	Health assessment (physical & nutritional) of elderly-1		
13	Mental health screening survey-1		
14	Group project -Community diagnosis (data management)		
15	Writing report on health centre activity-1		
16	Participation in organizing and conducting under five/antenatal clinic/health camp- 2 i. ii.		
17	Participation in disaster mock drills		
18	Field visits - Biomedical waste management site - AYUSH centre - Industry - Geriatric home		
19	Report on interaction with MPHW/HV/ASHA/AWWs (Any 2) 1. 2.		
VI SEMESTER-NURSING RESEARCH			
1	Research Project – Group/Individual Title:		

Signature of the Faculty coordinator



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Signature of the HOD/Principal



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Master of Science (Nursing)

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Curriculum & Scheme of Examination 2022

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GURUGRAM**

A handwritten signature in blue ink, appearing to read 'Anil'.

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NUR4102	Nursing Education (Practical)	L	T	P	C
Pre-requisites/Exposure				15	8
Co-requisite					

Course Description:

This course is designed to assist students in developing expertise and in - depth knowledge in the field of neurology and neurosurgical Nursing. It will help students to develop advanced skills for nursing intervention in caring for patients with neurological and neurosurgical disorders. It will enable the student to function as neuroscience nurse practitioner/ specialist. It will further enable the student to function as educator, manager and researcher in the field of neurology and neurosurgical Nursing.

Course Outcomes:

At the end of the course the students will be able to perform the following activities (Practical):

CO1- Framing philosophy, aims and objectives.

CO2-Lesson Planning.

CO3-Micro teaching-2.

CO4-Conduct practice teachings using different teaching strategies -10 (like lecture cum discussion, demonstration- lab method, field trips, seminars, project, role play, panel discussion, clinical methods etc)

CO5-Preparation and utilization of instructional Aids using different media.

CO6-Develop course plans, unit plans, rotation plans.

CO7-Conduct a continuing education workshop.

CO8-Annotated bibliography.

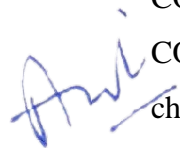
CO9-Critical evaluation of any nursing education program offered by a selected institution.

CO10-Planning and Organizing field visits.

CO11-Educational visits.

CO12-Field visits (INC/SNRC) to get familiar with recognition/registration process.

CO13-Construct, administer and evaluate tools (objective & essay type test, observation checklist, rating scale etc)


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CO14-Observe and practice application of various non-standardized tests (intelligence, Aptitude, personality, Sociometry, physical & mental disabilities tests.)

Course Content

Modules	Blooms level*	Number of hours
Module I: <ul style="list-style-type: none">Framing philosophy, aims and objectives.Annotated bibliography.	L1, L2 and L3	5
Module II Lesson Planning.	L1,L2, L3	5
Module III Micro teaching-2.	L1, L2 and L3	10
Module IV Conduct practice teachings using different teaching strategies -10 (like lecture cum discussion, demonstration- lab method, field trips, seminars, project, role play, panel discussion, clinical methods etc)	L1,L2, L3, L4 and L5	15
Module V Preparation and utilization of instructional Aids using different media.	L1,L2, L3 and L4	5
Module VI Develop course plans, unit plans, rotation plans.	L1,L2, L3, and L5	5
Module VII Conduct a continuing education workshop.	L1,L2, L3, L4	10

	and L5	
Module VIII Critical evaluation of any nursing education program offered by a selected institution.	L3, L4 and L5	10
Module IX Field visits (INC/SNRC) to get familiar with recognition/registration process. Educational visits. Planning and Organizing field visits.	L1,L2, and L3	10
Module X Construct, administer and evaluate tools (objective & essay type test, observation checklist, rating scale etc)	L1,L2, L3,	10
Module XI Observe and practice application of various non-standardized tests (intelligence, Aptitude, personality, Sociometry, physical & mental disabilities tests.)	L1,L2, L3,	10

Text & References:

1. Conley, Virginia C. Curriculum and Instruction in Nursing; Little Brown and Co, London.
2. Heidgerkein LE. Teaching and Learning in Schools of Nursing Delhi; Konark Publishers 1992.
3. Aggarwal J.C, *Principles, Methods & Techniques of Teaching*, Vikas Publishing House
4. Neeraja K.P, *Text Book of Nursing Education*, Jaypee Brothers, New Delhi.
5. Bevis, Em Olivia, *Curriculum Building in Nursing a Process*, C.V Mosby Co., St. Louis. George Kurian Aleyamma,
6. *Principles of Curriculum Development and Evaluation*, Vivekananda Press, 2002.
7. Basavanthappa B.T, *Nursing Education*, Jaypee Brothers, 2005, New Delhi.
8. Bhatia B.D, *Principles and Methods of Teaching*, Doabra House, New Delhi.
9. Billing, Diane M & Halstead, Judith A, *Teaching in Nursing: A Guide for Faculty*, W.B. Saunders.
10. Bloom, Benjamin S Ed, *Taxonomy of Educational Objectives: Cognitive Domain*, David Mckay CO., Inc, 1956, New York.
11. Modley Doris M, *Advancing Nursing Education World Wide*, Springer Publishing Co., 1995, New York.

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* Latest editions of all the suggested books are recommended.

Additional Texts:

1. Fuszard, Barbara, *Innovating Teaching Strategies in Nursing*, Aspen Publishers Inc, 1989, Maryland.
2. Gay L.R., *Educational Evaluation and Measurement Competencies for Analysis and Application*, Ion, Charles E. Merrill Publishers Co., 1985, Columbus.
3. Guilbert. J J., *Educational Handbook for Health Personnel*, World Health Organization, 1982, Geneva.
4. Guinee. Kathleen k, *Teaching and Learning in Nursing*, Macmillan, 1978, New York.
5. Joyce.B, *Models of Teaching*, Prentice Hall Inc, Englewood Cliffs, 1986, New Jersey.
6. Key F.E., *A History of Education in India and Pakistan*, Oxford University Press, 1964, London.

Other readings:

- ✓ Journal of Nursing Education
- ✓ Journal of Continuing Education in Nursing
- ✓ Journal of Nursing Education and Practice

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Scheme of Examination

Practical:

	Internal- 100				EE = 100		
Components	ATT	RM	W/ISE	PT	RM	PT	RP
Weightage (%)	5	25	50	20	25	50	25

ATT-Attendance; RM-Resource material; ; PT- Practice teaching; RP- Rotation

Plan/construction of test; W/ISE-Workshop/In-service education programme; EE- End Semester Examination


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Mapping between COs, PLOs

	P O1	P O2	P O3	P O4	P O5	P O6	P O7	P S O 1	P S O 2	P S O 3	P S O 4
CO1	1	1	-	1	-	1	1	1	1	-	1
CO2	2	1	2	-	1	1	2	2	1	2	-
CO3	1	1	1	2	-	-		1	1	1	2
CO4	2	2	1	-	1	2	2	2	2	1	-
CO5	2	-	-	2	2	1	2	2	-	-	2
CO6	1	1	-	1	1	1	1	1	1	-	1
CO7	1	1	-	1	-	1	1	1	1	-	1
CO8	2	1	2	-	1	1	2	2	1	2	-
CO9	1	1	1	2	-	-		1	1	1	2
CO10	1	-	1	1	1	1	1	-	1	-	1
CO11	-	1	1	2	2	1	1	2	-	1	1
CO12	2	-	-		1	1	1	1	2	-	-
CO13	-	1	2	2	2	2	2	1	-	1	2
CO14	2	2	1	2	2	-	-	-	2	2	1

1-strongly related; 2-moderately related; 3-weakly related



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NUR4201	Advance Nursing Practice	L	T	P	C
Version 1.1	Date of Approval: November 2011	15	12**		21
Pre-requisites/Exposure	NIL				
Co-requisites	NIL				

Course Catalogue: This course is aimed at developing a holistic approach in rendering nursing care to the patients/clients in the hospital as well as in the community respectively by implementing modern trends & methods in nursing profession for the specific protection, promotion, prevention and rehabilitation of the patients/clients.

Course Objectives:

The course is designed to develop an understanding of concepts and constructs of theoretical basis of advance nursing practice and critically analyze different theories of nursing and other disciplines.

Course Outcomes:

On completion of this course students will be able to:

CO1: Describe the History of development of nursing profession, characteristics, criteria of the profession, perspective of nursing profession-national, global

CO2: Explain the Health care delivery system- national, state, district as well as at local level.

CO3: Discuss the Approaches to common genetic disorders

CO4: Describe the Application of epidemiology in health care delivery, Health surveillance and health informatics

CO5: Explain the Bio-Psycho social pathology

CO6: Describe the Philosophy as well as Theories of Nursing along with its implication in health care delivery system.

CO7: Explain Nursing process approach for the individual, family as well as community

CO8: Discuss Psychological aspects and Human relations

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CO9: Describe the Extended and expanded role of the Nurse in promotive, preventive, curative as well as restorative health care delivery system in community and institutions

CO10: Explain the Computer applications for patient care delivery system as well as in Nursing Practice

Modules	Blooms level*	Number of hours
<p>MODULE 1:</p> <p>Nursing as a Profession</p> <ul style="list-style-type: none"> History of development of nursing profession, characteristics, criteria of the profession, perspective of nursing profession-national, global Code of ethics(INC), code of professional conduct(INC), autonomy and accountability, assertiveness, visibility of nurses, legal considerations Role of regulatory bodies Professional organizations and unions-self defense, individual and collective bargaining Educational preparations, continuing education, career opportunities, professional advancement & role and scope of nursing education. Role of research, leadership and management. Quality assurance in nursing (INC). Futuristic nursing. 	L1, and L2	10
<p>MODULE 2:</p> <p>Health care delivery</p> <ul style="list-style-type: none"> Health care environment, economics, constraints, planning process, policies, political process vis a vis nursing profession. Health care delivery system- national, state, district and local level. 	L1,L2, and L3	10

<ul style="list-style-type: none"> Major stakeholders in the health care system-Government, non-govt, Industry and other professionals. Patterns of nursing care delivery in India. Health care delivery concerns, national health and family welfare programs, inter-sectoral coordination, role of nongovernmental agencies. Information, education and communication (IEC). Tele-medicine. 		
MODULE 3: Genetics <ul style="list-style-type: none"> Review of cellular division, mutation and law of inheritance, human genome project ,The Genomic era. Basic concepts of Genes, Chromosomes & DNA. Approaches to common genetic disorders. Genetic testing – basis of genetic diagnosis, Pre symptomatic and predisposition testing, Prenatal diagnosis & screening, Ethical, legal & psychosocial issues in genetic testing. Genetic counselling. Practical application of genetics in nursing. 	L1,L2, L3 and L4	15
MODULE 4: Epidemiology <ul style="list-style-type: none"> Scope, epidemiological approach and methods, Morbidity, mortality, Concepts of causation of diseases and their screening, Application of epidemiology in health care delivery, Health surveillance and health informatics Role of nurse 	L1,L2, and L3	15
MODULE 5:	L1,L2	15

<p>Bio-Psycho social pathology</p> <ul style="list-style-type: none"> • Pathophysiology and Psychodynamics of disease causation. • Life processes, homeostatic mechanism, biological and psycho-social dynamics in causation of disease, life style. • Common problems: Oxygen insufficiency, fluid and electrolyte imbalance, nutritional problems, hemorrhage and shock, altered body temperature, unconsciousness, sleep pattern and its disturbances, pain, sensory deprivation. • Treatment aspects: pharmacological and pre- post operative care aspects, • Cardio pulmonary resuscitation. • End of life Care • Infection prevention (including HIV) and standard safety measures, bio-medical waste management. • Role of Nurse- Evidence based Nursing practice; Best practices • Innovations in Nursing. 	and L3	
<p>MODULE 6:</p> <p>Philosophy and Theories of Nursing</p> <ul style="list-style-type: none"> • Values, Conceptual Models, Approaches. • Nursing theories: Nightingale's, Henderson's, Roger's, Peplau's, Abdella's, Lewine's, Orem's, Johnson's, King's, Neuman's, Roy's, Watson Parsce, etc and their applications, • Health belief models, communication and management, etc • Concept of Self health. • Evidence based practice model. 	L1, L2,L3 and L5	15
<p>MODULE 7:</p> <p>Nursing process approach</p> <ul style="list-style-type: none"> • Health Assessment- illness status of patients/clients (Individuals, family, community), Identification of health illness problems, 	L1,L2, and L3	10

<p>health behaviors, signs and symptoms of clients.</p> <ul style="list-style-type: none"> • Methods of collection, analysis and utilization of data relevant to Nursing Process. Formulation of nursing care plans, health goals, implementation, modification and evaluation of care. 		
<p>MODULE 8:</p> <p>Psychological aspects and Human relations</p> <ul style="list-style-type: none"> • Human behavior, Life processes & growth and development, personality development, defense mechanisms, • Communication, interpersonal relationships, individual and group, group dynamics, and organizational behavior, • Basic human needs, Growth and development, (Conception through preschool, School age through adolescence, Young & middle adult, and Older adult) • Sexuality and sexual health. • Stress and adaptation, crisis and its intervention, Coping with loss, death and grieving, • Principles and techniques of Counseling. 	L1,L2, and L5	15
<p>MODULE 9:</p> <p>Nursing practice</p> <ul style="list-style-type: none"> • Framework, scope and trends. • Alternative modalities of care, alternative systems of health and complimentary therapies. • Extended and expanded role of the Nurse, in promotive, preventive, curative and restorative health care delivery system in community and institutions. • Health promotion and primary health care. • Independent practice issues: - Independent Nurse-midwifery practitioner. • Collaboration issues and models-within and outside Nursing. 	L1,L2, and L3	15

<ul style="list-style-type: none"> • Models of Prevention, • Family Nursing, Home Nursing, • Gender sensitive issues and women empowerment. • Disaster Nursing. • Geriatric considerations in Nursing. • Evidence based Nursing practice- best practices • Trans-cultural Nursing. 		
MODULE 10: Computer applications for patient care delivery system and Nursing Practice <ul style="list-style-type: none"> • Use of computers in teaching, learning, research and Nursing practice. • Windows, MS office: Word, Excel, Power Point, • Internet, literature search, • Statistical packages, • Hospital management information system: software. 	L1,L2, L3 and L4	10

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Main text

1. Potter A. P. & Perry A. G, *Fundamental of Nursing*, C. V. Mosby Co., 2005, St. Louis.
2. Kozier B. et al, *Fundamentals of Nursing Concepts, Process and Practice*, Pearson Education, Inc, 2004.
3. Brunner and Suddarth, *Text Book of Medical Surgical Nursing*, 2002.
4. Zwemer A, *Professional Adjustments and Ethics for Nurse in India*, BI publications, 1995, Bangalore.
5. Rosdhal, *Fundamentals of Nursing*, Lippincott Co., 2003.
6. Taylor Carol, et al, *Fundamentals of Nursing*, Lippincott Co., 2005.
7. Park J.E., *Text Book of Preventive and Social Medicine*, Banarsidas Bhanot, Jabalpur

* Latest editions of all the suggested books are recommended.

Additional Texts:

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1. Basavanthappa B. T, *Nursing Theories*, Jaypee Brothers, 2007, New Delhi.
2. Alligood M. R. & Tomey A. M, *Nursing Theory Utilization and Application*, Mosby, St. Louis.

Other readings:

- ✓ International Journal of Nursing Practice
- ✓ Journal of Advance Nursing
- ✓ International Journal of Research and Analytical Reviews

Web Resources:

- Pub med
- CINAHL(cumulative index to Nursing and allied health literature)
- MEDLINE (Medical Literature Analysis and Retrieval System Online)

Examination Scheme:

Components	ATT	HA	CT	SE	EA	EE
Weightage (%)	5	5	5	5	5	75

ATT-Attendance; HA-Home Assignment; CT-Class Test; SE-Sessional Examination; EA- Extracurricular activity; EE- End Semester Examination

Concept Mapping between COs, PLOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	1	-	1	-	1	1	1	1	-	1
CO2	2	1	2	-	1	1	2	2	1	2	-
CO3	1	1	1	2	-	-		1	1	1	2
CO4	2	2	1	-	1	2	2	2	2	1	-
CO5	2	-	-	2	2	1	2	2	-	-	2
CO6	1	1	-	1	1	1	1	1	1	-	1
CO7	1	1	-	1	-	1	1	1	1	-	1
CO8	2	1	2	-	1	1	2	2	1	2	-
CO9	1	1	1	2	-	-		1	1	1	2
CO10	1	-	1	1	1	1	1	-	1	-	1

CO11	-	1	1	2	2	1	1	2	-	1	1
CO12	2	-	-		1	1	1	1	2	-	-
CO13	-	1	2	2	2	2	2	1	-	1	2
CO14	2	2	1	2	2	-	-	-	2	2	1
CO15	1	1	1	1	1	1	1	-	1	1	1
CO16	1	-	1	1	1	1	1	-	1	-	1
CO17	-	1	1	2	2	1	1	2	-	1	1

1: strongly related, 2: moderately related and 3: weakly related



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NUR4202	Nursing Research and Statistics	L	T	P	C
Version 1.1	Date of Approval: November 2011	15	6		18
Pre-requisites/Exposure	NIL				
Co-requisites	NIL				

Catalog Description

The course is designed to assist the students to acquire an understanding of the research methodology and statistical methods as a basis for identifying research problem, planning and implementing a research plan. It also enables the students to evaluate research studies and utilize research findings to improve quality of Nursing practice, education and management. It will further enable the students to develop an understanding of the statistical methods and apply them in conducting research studies in Nursing.

Course Objectives

The objective of this course is to

1. to acquire an understanding of the research methodology and statistical methods as a basis for identifying research problem, planning and implementing a research plan.
2. enable the students to evaluate research studies and utilize research findings to improve quality of Nursing practice, education and management.
3. enable the students to develop an understanding of the statistical methods and apply them in conducting research studies in Nursing.

Course Outcomes:

At the end of the course the students will be able to:

CO1. Define the terms used in research

CO 2. Describe concepts of scientific inquiry

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- CO 3. Describe research methodology
- CO 4. Critically analyze research studies
- CO 5. Develop acceptable research proposal
- CO 6. Demonstrate initial competency to conduct health related research
- CO 7. Write, present, interpret and utilize health related research
- CO 8. Write scientific paper for publication
- CO 9. Explain basic concepts related to statistics
- CO 10. Identify scope of statistics
- CO 11. Organize and tabulate the data and present it
- CO 12. Use descriptive and inferential statistics to predict the results
- CO 13. Apply & interpret measures of central tendency & measures of variance
- CO 14. Identify concepts related to probability
- CO 15. Use parametric and non- parametric statistical methods.
- CO 16. Draw conclusions of the study and to predict statistical significance of the results
- CO 17. Describe vital and health statistics and their use

Course Content

Modules	Blooms level*	Number of hours
Unit I: Introduction Methods of acquiring knowledge – problem solving and scientific method. Research – Definition, characteristics, purposes, kinds	L1, L2,L3 and L4	10

of research, Historical Evolution of research in Nursing, Basic research terms, Scope of Nursing research: areas, problems in Nursing, health and social research, Concept of evidence based practice, Ethics in research, Overview of Research process.		
Unit II Review of Literature Importance, purposes, sources, criteria for selection of resources and steps in reviewing literature.	L1,L2, L3 and L5	5
Unit III Research Approaches and designs Type: Quantitative and Qualitative, Historical, survey and experimental –Characteristics, types advantages and disadvantages, Qualitative: Phenomenology, grounded theory, ethnography	L2, L3 and L4	12
Unit IV: Research problem: Identification of research problem, Formulation of problem statement and research Objectives:, Definition of terms, Assumptions and delimitations, Identification of variables, Hypothesis – definition, formulation and types.	L1,L2, L3, L4 and L5	10
Unit V: Developing theoretical/conceptual framework <ul style="list-style-type: none"> Theories: Nature, characteristics, Purpose and uses Using, testing and developing conceptual framework, models and 	L1,L2 and L4	5

theories.		
Unit VI –Sampling <ul style="list-style-type: none"> Population and sample Factors influencing sampling Sampling techniques Sample size Probability and sampling error Problems of sampling 	L1,L2, L3, L4 and L5	6
Unit VII Tools and methods of Data collection: <ul style="list-style-type: none"> Concepts of data collection Data sources, methods/techniques quantitative and qualitative. Tools for data collection – types, characteristics and their development Validity and reliability of tools Procedure for data collection	L1,L2, L3, L4 and L5	20
Unit VIII Implementing research plan <ul style="list-style-type: none"> Pilot Study, review research plan (design), planning for data collection, Administration of tool /interventions, collection of data 	L1,L2, L3, L4 and L5	5
Unit IX Analysis and interpretation of data <ul style="list-style-type: none"> Plan for data analysis: quantitative and qualitative 	L1,L2, L3, L4 and L5	10

<ul style="list-style-type: none"> Preparing data for computer analysis and presentation. Statistical analysis Interpretation of data Conclusion and generalizations Summary and discussion 		
Unit X Reporting and utilizing research findings: <ul style="list-style-type: none"> Communication of research results; oral and written Writing research report purposes, methods and style Vancouver, American Psychological Association (APA), Campbell etc. Writing scientific articles for publication: purposes & style 	L1,L2, L3, L4 and L5	10
Unit XI Critical analysis of research reports and articles	L1,L2, L3, L4 and L5	3
Unit XII <ul style="list-style-type: none"> Developing and presenting a research proposal 	L1,L2, L3, L4 and L5	4
STATISTICS		
Unit I – Introduction: <p style="text-align: center;">Concepts, types, significance and scope of statistics, meaning of data,</p> <ul style="list-style-type: none"> Sample, parameter Type and levels of data and their measurement 	L1,L2, L3, L4 and L5	7

<ul style="list-style-type: none"> • Organization and presentation of data – Tabulation of data; • Frequency distribution • Graphical and tabular presentations. 		
Unit II - Measures of central tendency: <ul style="list-style-type: none"> • Mean, Median, Mode 	L1,L2, L3, L4 and L5	4
Unit III Measures of variability; <ul style="list-style-type: none"> • Range, Percentiles, average deviation, quartile deviation, standard deviation 	L1,L2, L3, L4 and L5	4
Unit V Measures of relationship: <ul style="list-style-type: none"> • Correlation – need and meaning • Rank order correlation • Scatter diagram method • Product moment correlation • Simple linear regression analysis and prediction. 	L1,L2, L3, L4 and L5	6
Unit VI Designs and meaning: <ul style="list-style-type: none"> • Experimental designs • Comparison in pairs, randomized block design, Latin squares. 	L1,L2, L3, L4 and L5	5

Unit VII Significance of Statistic and Significance of difference between two Statistics (Testing hypothesis) <ul style="list-style-type: none"> Non parametric test – Chi-square test, Sign, median test, Mann Whitney test. Parametric test – ‘t’ test, ANOVA, MANOVA, ANCOVA 	L1,L2, L3, L4 and L5	8
Unit VIII Use of statistical methods in psychology and education: <ul style="list-style-type: none"> Scaling – Z score, Z Scaling Standard Score and T Score Reliability of test Scores: test-retest method, parallel forms, split half method. 	L1,L2, L3, L4 and L5	5
Unit IX Application of statistics in health: <ul style="list-style-type: none"> Ratios, Rates, Trends Vital health statistics – Birth and death rates. Measures related to fertility, morbidity and mortality 	L1,L2, L3, L4 and L5	4
Unit X Use of Computers for data analysis <ul style="list-style-type: none"> Use of statistical package. 	L1,L2, L3, L4 and L5	4

Text books:

1. Polit, D.F. & Bleck C.T, *Nursing Research Principles & Methods*, Lippincott Williams Wilkins, 2004, New York.

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2. Polit, Bleck & P. Hungler, *Nursing Research Methods, Appraisal & Utilization*, 2001, Lippincott.
 3. Mahajan, B.K, *Methods in Biostatistics*, Jaypee Brothers, 1999, New Delhi.
 4. Rose Hott & Budin. Notter's, *Essentials of Nursing Research*, spinger publisher, 1999, New York.

Reference Books:

5. Patricia Nunhall. *Nursing Research*, James & Bar, 2001, Canada.
6. Carol M.H, *Research Methods for Clinical Therapists Applied Project Design and Analysis*, 1999, Churchill Livingstone.
7. P.K. Indrani, T.K, *Research Methods for Nurses*. Jaypee brothers, 2005.
8. Clifford et al, *Getting Research into Practice*, Churchill Livingstone, 2004, New York.
9. Freshwater D. & Bishop V, *Nursing Research in Context*, Palgrave Macmillan, 2004, New York.
10. Macnee C. L, *Understanding Nursing Research: Reading & Using Research in Practice*, Lippincott Williams, Wilkins, 2004, London.
11. Specials & Carpenter, *Qualitative Research in Nursing Advancing the Humanistic Imperative*, Lippincott Williams. 2007
12. Basavanthappa, B.T, *Nursing Research*, Jaypee Brothers, 2003, New Delhi.

* Latest editions of all the suggested books are recommended

Journals:

1. *Journal of nursing practice and research*.
2. *Indian journal of medical ethics*
3. *International Journal of Nursing Education*
4. *Nursing Journal of India*

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:


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Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	5	8	7	75

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Course Outcomes Assessment

This course contributes towards the learning outcomes, **‘nursing research and statistics**. The outcome will be measured by the performance of students in various class tests/assignments in addition to the End Semester Examination (ESE) that contains significant number of questions on problems related to the **nursing research and statistics**.

Relationship between the course outcomes (COs), programme Outcomes (PO) and learning outcomes (Los)

Mapping between COs, PLOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PS O1	PS O2	PS O3	PS O4
CO1	1	1	-	1	-	1	1	1	1	-	1
CO2	2	1	2	-	1	1	2	2	1	2	-
CO3	1	1	1	2	-	-		1	1	1	2
CO4	2	2	1	-	1	2	2	2	2	1	-
CO5	2	-	-	2	2	1	2	2	-	-	2
CO6	1	1	-	1	1	1	1	1	1	-	1
CO7	1	1	-	1	-	1	1	1	1	-	1
CO8	2	1	2	-	1	1	2	2	1	2	-
CO9	1	1	1	2	-	-		1	1	1	2
CO10	1	-	1	1	1	1	1	-	1	-	1
CO11	-	1	1	2	2	1	1	2	-	1	1

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CO12	2	-	-		1	1	1	1	2	-	-
CO13	-	1	2	2	2	2	2	1	-	1	2
CO14	2	2	1	2	2	-	-	-	2	2	1
CO15	1	1	1	1	1	1	1	-	1	1	1
CO16	1	-	1	1	1	1	1	-	1	-	1
CO17	-	1	1	2	2	1	1	2	-	1	1

1-strongly related; 2-moderately related; 3-weakly related



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MSN4203	Medical Surgical Nursing CS I & II Practical	L	T	P	C
Version 1.1	Date of Approval:				22
Pre-requisites/Exposure	NIL				
Co-requisites	NIL				

Course Catalogue: The course is designed to enable students to develop expertise in the field of medical surgical nursing procedures.

Course Description: It will help students to appreciate the adults as a holistic individual and develop skill to function as a Medical Surgical Nurse specialist.

Course Outcomes:

On completion of this course students will be able to:

CO1: Apply concepts & theories related to health promotion.

CO2: Appreciate the client as a holistic individual.

CO3: Perform physical, psychosocial assessment of Medical – Surgical patients.

CO4: Apply Nursing process in providing care to patients.

CO5: Integrate the concept of family centered nursing care with associated disorder such as genetic, congenital and long-term illness.

CO6: Recognize and manage emergencies with Medical- Surgical patients.

CO7: Describe various recent technologies & treatment modalities in the management of critically ill patients.

CO8: : Recognize the role of Nurse practitioner as a member of the Medical – Surgical health team

CO9: Prepare a design for layout and management of Medical – Surgical Units.

PROGRAMME SPECIFIC OUTCOMES:-

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On completion of M.Sc. Nursing programme the post graduates will be able to:

PSO1 : Assess the health status, identify nursing needs, plan, implement and evaluate nursing care for patients/client that contribute to health of individuals, families and communities.

PSO2: Demonstrate competency in techniques of nursing skills based on concepts and principles from specialized areas of nursing, physical, biological and behavioral sciences. And Participate as member of health care team in the promotive, preventive, curative and restorative health care delivery system of the country.

PSO3: Demonstrate leadership, managerial skills, qualities and decision-making abilities, teaching and communication skills in clinical/ community health settings.

PSO4: Participation in research activities towards continued learning for personal and professional development, practice ethical values and utilize the research findings to improve the quality of care.

Course Content

Modules	Blooms level
Module I Students will be posted in General Medical Ward 120 Hours General Surgical Ward 120 Hours ICUs 120 Hours Oncology 60 Hours Ortho 60 Hours Cardio 60 Hours Emergency Department 60 Hours Neuro 60 Hours	L1,2, 3


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Total 660 Hours (22 Weeks)	
Module II Student Activities: <ul style="list-style-type: none"> • Clinical presentations • History taking • Health Assessment • Nutritional Assessment • Health Education related to disease conditions • Case studies • Project work • Field visits 	L2,3, 4

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

7. Examination Scheme Practical: Internal 100, External 100

Components	NCP	CS/CP	Project	OR	HE	CE	EPE
Weightage (%)	10	30	10	05	05	40	100

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NCP- Nursing Care Plan, CS- Case Study, CP - Case Presentation, OR- Observation Report, HE- Health Education, CE-Clinical Evaluation, EPE- External Practical Examination

Reference Books:

1. Black M.J., Hawks H.J, *Medical Surgical Nursing, Clinical Management for Positive Outcome*, 7th edition, Sauders, Elsevier Publication.
2. Morton, Patricia, et. al. *Critical Care Nursing: A Holistic Approach*, Lippincott Williams and Wilkins; Eighth edition.
3. Urban, A.N., Greenlac K.K, “*Guidelines for Critical Care Nursing*, Mosby.
4. Wood L.S., Frelicher S.E, *Fetal Cardiac Nursing*, Lippincott Williams & Wilkins.
5. Gulanic, Klopp, Galnes, *Fetal Nursing Care Plans Nursing Diagnosis and intervention*.
6. Lewis, Collier & Heitkemper, *Medical Surgical Nursing Assessment and Management of Clinical Problems*.
7. Baughman Diane C, *Hand Book for Surgical Nursing*, 2nd edition, published by Lipincott, NewYork.
8. Philip & Wilma J, *Medical- Surgical Nursing*, 3rd edition, published by B.T Pubn Bangalore.

Course Outcome Measurement:

The outcome will be measured by the performance of the students in various class tests, assignments in addition to the End Semester Exam (ESE) that contains significant number of questions on problems related to meeting needs of the patients.

Relationship between the course outcomes (COs), Programme Outcomes (PO) and Programme Specific Outcomes (PSOs)



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Mapping between COs, POs and PSOs

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PSO 1	PSO 2	PSO 3	PSO 4
CO1	2	1	2	2	2	2	2	1	2	3	1
CO2	2	1	2	2	2	2	2	1	2	3	1
CO3	2	1	2	3	2	2	2	1	2	3	1
CO4	3	1	2	2	2	2	2	1	2	3	1
CO5	2	1	3	2	2	2	2	1	2	2	1
CO6	2	1	3	2	2	2	2	1	2	2	1
CO7	2	1	3	2	2	2	2	1	2	2	1
CO8	3	2	3	2	2	2	2	1	2	3	1
CO9	2	2	2	2	2	2	2	1	2	2	1

1: strongly related, 2: moderately related and 3: weakly related



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PDN4203	Pediatric Nursing CS I & II Practical	L	T	P	C
Version 1.1	Date of Approval:				22
Pre-requisites/Exposure	NIL				
Co-requisites	NIL				

Course Catalogue: The course is designed to enable students to develop expertise in the field of child health nursing procedures.

Course Description: It will help students to appreciate the child as a holistic individual and develop skill to function as a Pediatric Nurse specialist.

Course Outcomes:

On completion of this course students will be able to:

CO1. Elicit the history and perform physical examination of children

CO2. Apply the concepts of growth and development in providing care to the pediatric clients and their families.

CO3. Perform developmental, family and nutritional assessment of pediatric clients

CO4. Apply nursing process in providing nursing care to neonates & children

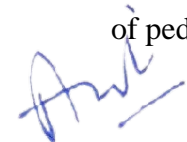
CO5. Integrate the concept of family centered pediatric nursing care with related areas such as genetic disorders, congenital malformations and long term illness.

CO6. Recognize and manage emergencies in neonates


CO7. Implement care using recent technologies and treatment modalities in the management of high risk neonates

CO8. Prepare a design for layout and management of neonatal units

CO9. Incorporate evidence based nursing practice and identify the areas of research in the field of pediatric/neonatal nursing



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PROGRAMME SPECIFIC OUTCOMES:-

On completion of M.Sc. Nursing programme the post graduates will be able to:

PSO1 : Assess the health status, identify nursing needs, plan, implement and evaluate nursing care for patients/client that contribute to health of individuals, families and communities.

PSO2: Demonstrate competency in techniques of nursing skills based on concepts and principles from specialized areas of nursing, physical, biological and behavioral sciences. And Participate as member of health care team in the promotive, preventive, curative and restorative health care delivery system of the country.

PSO3: Demonstrate leadership, managerial skills, qualities and decision-making abilities, teaching and communication skills in clinical/ community health settings.

PSO4: Participation in research activities towards continued learning for personal and professional development, practice ethical values and utilize the research findings to improve the quality of care.

Course Content

Modules	Blooms level
Module I Growth & developmental assessment	L1,2, 3
Module II History taking, Physical examination Family assessment	L2,3, 4
Module III Developmental assessment	L1,2,3
Module IV Nutritional assessment	L1,2, 3
Module V	L3,4, 5


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Assess and manage neonatal conditions	
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**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

7. Examination Scheme Practical: Internal 100, External 100

Components	NCP	CS/CP	Project	OR	HE	CE	EPE
Weightage (%)	10	30	10	05	05	40	100

NCP- Nursing Care Plan, CS- Case Study, CP - Case Presentation, OR- Observation Report, HE- Health Education, CE-Clinical Evaluation, EPE- External Practical Examination

Reference Books:

1. Whaley and Wong, Essentials of Pediatrics Nursing
2. Learners Guide, WHO, AIIMS
3. IMNCI Students' Handbook, WHO
4. Ball and Bindler, *Paediatric Nursing Caring for Children*, Prenticehall.
5. Behrman, Richard K & Vaughan, Nelson,s, *TextBook of Paediatrics*, WB Saunders Co.,
6. Ghai O P, *Essential Paediatrics*
7. Asuma Beevi, Textbook of Pediatric Nursing
8. Parul Datta, Textbook of Pediatric Nursing
9. Panchali Pal, Textbook of Pediatric Nursing


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Course Outcome Measurement:

The outcome will be measured by the performance of the students in various class tests, assignments in addition to the End Semester Exam (ESE) that contains significant number of questions on problems related to meeting needs of the patients.

Relationship between the course outcomes (COs), Programme Outcomes (PO) and Programme Specific Outcomes (PSOs)

Mapping between COs, POs and PSOs

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PSO 1	PSO 2	PSO 3	PSO 4
CO1	2	1	2	2	2	2	2	1	2	3	1
CO2	2	1	2	2	2	2	2	1	2	3	1
CO3	2	1	2	3	2	2	2	1	2	3	1
CO4	3	1	2	2	2	2	2	1	2	3	1
CO5	2	1	3	2	2	2	2	1	2	2	1
CO6	2	1	3	2	2	2	2	1	2	2	1
CO7	2	1	3	2	2	2	2	1	2	2	1
CO8	3	2	3	2	2	2	2	1	2	3	1
CO9	2	2	2	2	2	2	2	1	2	2	1

1: strongly related, 2: moderately related and 3: weakly related



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CHN4203	Community Health Nursing CS I & II Practical	L	T	P	C
Version 1.1	Date of Approval:				22
Pre-requisites/Exposure	NIL				
Co-requisites	NIL				

Course Catalogue: The course is designed to enable students to develop expertise in the field of Community health nursing health nursing procedures.

Course Description: The course is designed to enable students to develop expertise in the field of clinical specialization. It will help students to appreciate the patient, individual as a holistic individual and develop skill to function as a Nurse specialist in their field of clinical specialization

Course Outcomes:

On completion of this course students will be able to:

CO1. Elicit the importance of health services in subcentre, primary health centres and community health centres

CO2. Apply the Government health scheme in providing community health services

CO3. Perform developmental, family and nutritional assessment of Geriatrics

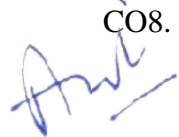
CO4. Apply nursing process in providing nursing care to Antenatal and Post natal Mothers

CO5. Apply the Family planning services among eligible couples

CO6. Recognize the importance of Health Programmes in community

CO7. Apply the nursing Procedures in post natal mothers

CO8. Prepare the vital statistics of community people


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CO9. Incorporate evidence based nursing practice and identify the areas of research in the field of nursing.

PROGRAMME SPECIFIC OUTCOMES:-

On completion of M.Sc. Nursing programme the post graduates will be able to:

PSO1 : Assess the health status, identify nursing needs, plan, implement and evaluate nursing care for patients/client that contribute to health of individuals, families and communities.


PSO2: Demonstrate competency in techniques of nursing skills based on concepts and principles from specialized areas of nursing, physical, biological and behavioral sciences. And Participate as member of health care team in the promotive, preventive, curative and restorative health care delivery system of the country.

PSO3: Demonstrate leadership, managerial skills, qualities and decision-making abilities, teaching and communication skills in clinical/ community health settings.

PSO4: Participation in research activities towards continued learning for personal and professional development, practice ethical values and utilize the research findings to improve the quality of care.

Course Content

Modules	Blooms level
Module I <ul style="list-style-type: none">• Identification of community leaders and resource persons (community mapping)• Community health survey	L1,2, 3


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<ul style="list-style-type: none"> Community health nursing process- individual, family and special groups and community Counseling Identification of community leaders and resource persons (community mapping. 	
Module II <ul style="list-style-type: none"> Health education – campaign, exhibition, folk media, preparation of IEC materials Organising and participating in special clinics/camps and national health and welfare programmes-Organise atleast one health and family welfare mela/fair (all stalls of national health and family welfare activities should be included) 	L2,3, 4
Module III <ul style="list-style-type: none"> Estimation of Vital health statistics –Exercise Drill for disaster preparedness Organise atleast one in-service education to ANM's/LHV/PHN/HW Nutrition – Exercise on nutritional assessment on dietary planning, demonstration and education for various age groups 	L1,2,3
Module IV <ul style="list-style-type: none"> Filling up of Records, reports and registers maintained at SC/PHC/CHC Assist women in self breast examination Conduct antenatal examination Conduct vaginal examination Conduct deliveries 	L1,2, 3
Module V	L3,4, 5

<ul style="list-style-type: none"> • Post natal visits • Perform Episiotomy and suturing • Prepare Pap smear • Conduct Insertion/Removal of IUD • Blood Slide preparation 	
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**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

7. Examination Scheme Practical: Internal 100, External 100

Components	NCP	CS/CP	Project	OR	HE	CE	EPE
Weightage (%)	10	30	10	05	05	40	100

NCP- Nursing Care Plan, CS- Case Study, CP - Case Presentation, OR- Observation Report, HE- Health Education, CE-Clinical Evaluation, EPE- External Practical Examination

Text & References:

Reference Books:

1. Clark, June & Jill Handerson, *Community Health*, Churchill Livingstone, 1993, New York.
2. Freeman B. Ruth, *Public Health Practices*, W. W. Saunders CO., 1990, Philadelphia.
3. Fromer Joan Margot, *Community Health Care and the Nursing Process*, C.VMosby CO., Toronto.
4. Park J. E, *Text Book of Preventive and Social Medicine*, Ms Banarsidas Bhanot CO., 1996, Jabalpur.
5. Rao S. Kasthi, *An Introduction to Community Health Nursing*, B. I. Publishers, Madras.
6. Gulani,K,K. *Community Health Nursing*(2007). Kumar Publishing House.pp 339-420.

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7. Basavanthappa,B,T. Community Health Nursing(2nd edition), Jaypee Brothers Medical Publishers.
 8. Park ,K .Preventive and Social Medicine.(19th edition), Kumar Book Depot.
 9. Kamalam, S. Essentials in Community Health Nursing Practice.(2nd edition), Jaypee Brothers.
 10. Alternative approaches to health care. ICMR. Paper presented at the National Symposium on Alternative Approaches to health care.
 11. Archer,S,E. Community Health Nursing:Patterns and Practice.(2nd edition).Duxbury Press.
 12. Prabhakara,G,N. Textbook of Community Health for Nurses.(2nd edition). Peepee Publishers and distributors.
 13. Stanhope,M &Lanchaster,J.Community Health Nursing:Practice and Process for Promoting Health.(3rd edition).mosby.
 14. Pinger,R,P.An Introduction to Community health.(4th edition).Jones and Bartlett Publishers.
 15. Patney Sunita , (2005), Text Book Of Community Health Nursing, First Edition, Cbs.
 16. Mckenzie James F. Pinger Robert R, Kotecki Jerome E, (2002), An Introduction To Community Health Nursing, Fourth Edition, Jones And Bartlett.
 17. Lundy Saucier Karen, Janes Sharyn, (2002) Community Health Nursing, First Edition, Jones And Bartlett.


*Latest editions of all the suggested books are recommended

Course Outcome Measurement:

The outcome will be measured by the performance of the students in various class tests, assignments in addition to the End Semester Exam (ESE) that contains significant number of questions on problems related to meeting needs of the patients.

Relationship between the course outcomes (COs), Programme Outcomes (PO) and Programme Specific Outcomes (PSOs)

Mapping between COs, POs and PSOs



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	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PSO 1	PSO 2	PSO 3	PSO 4
CO1	2	1	2	2	2	2	2	1	2	3	1
CO2	2	1	2	2	2	2	2	1	2	3	1
CO3	2	1	2	3	2	2	2	1	2	3	1
CO4	3	1	2	2	2	2	2	1	2	3	1
CO5	2	1	3	2	2	2	2	1	2	2	1
CO6	2	1	3	2	2	2	2	1	2	2	1
CO7	2	1	3	2	2	2	2	1	2	2	1
CO8	3	2	3	2	2	2	2	1	2	3	1
CO9	2	2	2	2	2	2	2	1	2	2	1

1: strongly related, 2: moderately related and 3: weakly related



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PSN4203	Psychiatric Nursing CS-I & II Practical	L	T	P	C
Version 1.1	Date of Approval: November 2011		24		22
Pre-requisites/Exposure	NIL				
Co-requisites	NIL				

Course Catalog: This course is designed to assist students in developing expertise and in depth understanding in the field of Psychiatric Nursing. It will help students to develop advanced skills for nursing intervention in various Psychiatric conditions. It will enable the student to function as Psychiatric Nurse practitioner/specialist. It will further enable the student to function as educator, manager, and researcher in the field of Psychiatric Nursing.

Course Objectives:

The objective of this course is to Provide an overview of psychiatric disorders and management of psychiatric patients.

- Demonstrate the role of nurse in psychiatric settings/hospitals.

Course Outcomes:

On completion of this course, the students will be able to:

1. Appreciate the trends and issues in the field of psychiatry and psychiatric nursing.
2. Explain the dynamics of personality development and human behaviour.
3. Describe the concepts of psychobiology in mental disorders and its implications for psychiatric nursing
4. Demonstrate therapeutic communications skills in all interactions
5. Demonstrate the role of psychiatric nurse practitioner in various therapeutic modalities
6. Establish and maintain therapeutic relationship with individual and groups
7. Uses assertive techniques in personal and professional actions
8. Promotes self-esteem of clients, others and self
9. Apply the nursing process approach in caring for patients with mental disorders
10. Describe the psychopharmacological agents, their effects and nurse's role

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11. Recognize the role of psychiatric nurse practitioner and as a member of the psychiatric and mental health team
12. Describe various types of alternative system of medicines used in psychiatric settings
13. Incorporate evidence-based nursing practice and identify the areas of research in the field of psychiatric nursing.

Course Content

Modules	Blooms level
Module 1: History collection and Assessment of mental status examination	L1,2, 3
Module 2 : Management of Psychiatric Patient	L2,3, 4
Module 3: Psychometric and Personality Assessment	L1,2,3
Module 4: Observing various therapies	L1,2, 3
Module 5: Process Recording	L3,4
Module 6: Socio and Psycho drama	L2, 3

*Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

- Kaplan H. Sadock B, Synopsis of Psychiatry, William and Wilkins, 1991, Bathmov.
- Stuart W.G. Sundeen J.S, Principles and Practice of Psychiatry Nursing, Mosby Year book, 1991, London.
- Taylor C.M., Essentials of Psychiatric Nursing, CV Mosby Co., 1982, London.
- Bimla Kapoor CV, A Text book of Psychiatric Nursing, Mosby Co.,1982, Delhi
- Shivas, "Basic Concept of Psychiatric Mental Health Nursing, B.I Publications, 1994

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- Brown R.T. Feldman G.R., Epilepsy- Diagnosis and Management, Little Brown and Co.,1983, Toronto.
- Beck M.C. Rawtins P.R. and et al, Mental Health-Psychiatric Nursing. The C.V. Mosby Co., Ltd.1984, Toronto.
- Coleman C.J, Abnormal Psychology and Modern Life. P.B. Tara and Sons Co. Pvt Ltd. 1982.

Reference Books

- Gelder M.G., Andreasen N.C., New Oxford Text book of Psychiatry, Oxford University Press, 2012.
- Elizabeth M. Varcarolis: Foundations of Psychiatric Mental Health Nursing; 4th Edition, W.B. Saunders, Company, 2002.
- Kaplan & Sadock's: Concise Text book of Clinical psychiatry; 2nd Edition, J.P. Brothers (Indian) Lippincott, Williams & Wilkins, 2002.
- Stuart M. psychiatric mental health nursing
- Sheila. L. Videbeck: Psychiatric mental health nursing; Lippincott, 2001.
- Mary Ann Boyd & Mary Ann Nihart: Psychiatric Nursing Contemporary Practice; Lippincott, 1998

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme Practical: Internal 100, External 100

Components	NCP	CS/CP	Project	OR	HE	CE	EPE
Weightage (%)	10	30	10	05	05	40	100

NCP- Nursing Care Plan, CS- Case Study, CP - Case Presentation, OR- Observation Report, HE- Health Education, CE-Clinical Evaluation, EPE- External Practical Examination

CO, PO and PSO mapping


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	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	3	3	3	2	3	2	-	1	-	-
CO2	1	1	2	3	2	3	1	-	1	-	-
CO3	1	1	2	3	2	3	1	-	1	-	-
CO4	1	1	2	3	1	2	1	-	1	-	-
CO5	1	2	3	3	1	2	1	-	1	-	-
CO6	2	2	2	3	1	2	2	-	1	-	-
CO7	2	1	1	1	2	1	3	-	1	-	-
CO8	1	1	1	3	2	3	2	-	1	-	-
CO9	2	1	2	3	2	3	1	-	1	-	-
CO10	2	3	3	3	1	3	1	-	1	-	-
CO11	1	2	3	3	1	3	1	-	1	-	-
CO12	2	1	1	2	1	2	1	-	1	-	-
CO13	1	1	2	3	1	3	1		1		

1: strongly related, 2: moderately related and 3: weakly related



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OGN4203	Obstetrical and Gynaecological CS I & II Practical	L	T	P	C
Pre-requisites/Exposure					32
Co-requisite					

Course Description:

This course is designed to assist students in developing expertise and in depth understanding in the field of Obstetrics & Gynecological Nursing. It will help students to appreciate the client as a holistic individual and develop skill to function as an independent midwifery practitioner. It will further enable the student to function as an educator, manager and researcher in the field of Obstetrics & Gynecological Nursing.

Course Outcomes:

CO1- Be in a position to describe the physiology and management of the various stages of labour and puerperium.

CO2-Be in a position to manage the mothers during the normal vaginal delivery

CO3-Be in a position to conduct normal vaginal delivery and also be able to resuscitate the newborn babies immediately after birth.

CO4-Be in a position to identify the at risk mothers and manage them accordingly.

CO5-Be in a position to identify the various alternative and complimentary therapies in obstetrics & gynaecological nursing

CO6-Be in a position to incorporate evidence based nursing practice and identify the areas of nursing research.

Course Content

Modules	Blooms level*	Number of hours
Module I : Students will be posted in following areas: Antenatal Wards & OPDs 120 Hours Labour Room 150 Hours Postnatal Ward 60 Hours	L1, L2 and L3	5

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Family Planning Clinics 60 Hours PHC/Rural maternity settings 120 Hours Gynae 60 Hours Maternity OT 60 Hours NICU 30 Hours Total 660Hours - 22 Weeks		
Module II : Procedures Observed <ul style="list-style-type: none"> Diagnostic investigations : amniocentesis, chorionic villi sampling Infertility management: artificial reproduction : artificial insemination, invitro fertilization, and related procedures 		
Module II : Procedures Assisted <ul style="list-style-type: none"> Medical termination of pregnancy 		8
Module III : Procedures Performed Antenatal assessment-20 • Postnatal assessment-20 • Assessment during labour : use of partograph - 20 • Per vaginal examination-20 • Conduct of normal delivery-20 • Episiotomy and suturing-10 • Setting up of delivery areas • Insertion of intra uterine devices(copper T) Others • Identification of high risk women and referral • Health education: to women and their families • Motivation of couples for planned parenthood		10

Text & References:

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Reference Books:

1. Buckley Kathleen and Kulb Nancy W, *High Risk Maternity Nursing Manual*, Williams & Wilkin, 1993, Philadelphia.
2. Bennet V Ruth & Brown K Linda, *Myles Text Book for Midwives*, ELBS, Churchill Livingstone.
3. Calander, R & Miller A, *Obstetrics Illustrated*, 4th edition, Churchill & Livingstone, 1993, New York.
4. Dawn C.S, *Text Book of Obstetrics and Neonatology*, Dawn Books, Calcutta.
5. Dawn C.S, *Text Book of Gynecology and Contraception*, Dawn Books, Calcutta.
6. Dutta D.C, *Text Book of Obstetrics*, 4th edition, New Central Agency (p), 2001, Calcutta.
7. Dutta D.C, *Text Book of Gynaecology*, 4th edition, New Central Agency (p), 2001, Calcutta.
8. Daftary Shrish, *Holland and Brews Manual of Obstetrics*, 16th edition, B Churchill Livingstone (P) Ltd, New Delhi.
9. Dickason Elizabeth Jean et al, *Maternal Infant Nursing Care*, 2nd edition, Mosby, 1998, St. Louis.
10. Goodner Brenda, *Concepts of Obstetrics Nursing*, 1st edition, Skidmore, Roth Publishing, INC, 1994, Texas.
11. Gorie Trula Myers et al, *Foundations of Maternal Newborn Nursing*, 2nd edition, WB Saunders Co., 1998, Philadelphia.
12. Ladewing Patricia Wieland et al, *Essentials of Maternal Newborn Nursing*, 2nd edition, Adisdisol Wesley Nursing, 1990, New York.
13. Rashmi Patil, *Instruments, Operations, Drugs in Obstetrics and Gynaecology*, Vora Medical Publications, Mumbai.
14. Philips Celeste R, *Family Centered Maternity Newborn Care*, 3rd edition, Mosby New Year Book, 1996, St Louis.

Examination Scheme Practical:

Components	NCP	CS/CP	Pr	OR	HE	CE	EPE
Weightage (%)	10	30	10	05	05	40	100

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NCP- Nursing Care Plan, CS- Case Study, CP - Case Presentation, Pr- Project, OR- Observation Report, HE- Health Education, CE-Clinical Evaluation, EPE- External Practical Examination

Relationship between the course outcomes (COs), programme Outcomes (PO) and learning outcomes (Los)


Mapping between COs, POs

	P O1	P O2	P O3	P O4	P O5	P O6	P O7	P S O 1	P S O 2	P S O 3	P S O 4
CO1	1	1	-	1	-	1	1	1	1	-	1
CO2	2	1	2	-	1	1	2	2	1	2	-
CO3	1	1	1	2	-	-		1	1	1	2
CO4	1	1	-	1	-	1	1	1	1	-	1
CO5	2	1	2	-	1	1	2	2	1	2	-
CO6	1	1	1	2	-	-		1	1	1	2

1-strongly related; 2-moderately related; 3-weakly related



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PSN4203	Psychiatric Nursing	L	T	P	C
Version 1.1	Date of Approval: November 2011	16	36		16
Pre-requisites/Exposure	NIL				
Co-requisites	NIL				

Catalog Catalogue:

This course is designed to assist students in developing expertise and in depth understanding in the field of Psychiatric Nursing. It will help students to develop advanced skills for nursing intervention in various Psychiatric conditions. It will enable the student to function as Psychiatric Nurse practitioner/specialist. It will further enable the student to function as educator, manager, and researcher in the field of Psychiatric Nursing

Course Objectives: On completion of the two year M.Sc. Nursing (Psychiatry) programme, the Post Graduate Nurse will be able to provide comprehensive nursing care to patients with psychiatric problems in preventive, curative and rehabilitation aspects.

Course Outcomes

On completion of this course, the students will be able to

CO1: Utilize/apply the concepts, theories and principles of psychiatric nursing science

CO2.Demonstrate advance competence in practice of psychiatric nursing

&Practice as a psychiatric nurse specialist.

CO3.Demonstrate leadership qualities and function effectively as psychiatric nurse educator and manager.

CO4.Demonstrate skill in conducting nursing research, interpreting and utilizing the findings from health related research.

CO5.Demonstrate the ability to plan and effect change in psychiatric nursing practice and in the health care delivery system.


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CO6. Establish collaborative relationship with members of other disciplines and Demonstrate interest in continued learning for personal and professional advancement

CO7 Elaborate the Substance-Related Disorders

CO8 Explain the Schizophrenia and Other Psychotic Disorders (Check ICD10)

CO9 Describe the mood disorder

CO10 Describe the Anxiety disorder

CO11 Discuss Somatoform and Sleep Disorders

CO12 Discuss the Dissociative Disorders and Management

CO13 Elaborate the Sexual and Gender Identity Disorders

CO14 Enumerate the Eating Disorders

CO15 Describe the Adjustment and Impulse Control Disorders

CO16 Explain the Medical Conditions due to Psychological Factors

CO17 Explain the Personality Disorders

CO18 Discuss the The Aging Individual

CO19 Describe the person living with HIV Disease

CO20 Explain the Problems Related to Abuse or Neglect

CO21 Elaborate the Community Mental Health Nursing

CO22 Discuss the Ethical and Legal Issues in Psychiatric/Mental Health Nursing

CO23 Describe the Psychosocial rehabilitation

CO24 Discuss the Counseling

CO25 Explain the Administration and management of Psychiatric units including emergency unit

Modules	Blooms level*	Number of hours
MODULE 1: Principles and practice of Psychiatric Nursing Review	L1, L2 and L3	6
MODULE 2: Crisis Intervention • Crisis, Definition	L2, L3 and L4	16

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<ul style="list-style-type: none"> • Phases in the Development of a Crisis • Types of Crisis Dispositional, Anticipated Life Transitions Traumatic Stress, • Maturation / Development , Reflecting • Psychopathology • Psychiatric Emergencies and their management • Grief and grief reaction • Crisis Intervention; Phases • Post traumatic stress disorder (PTSD) • Role of the Nurse 		
MODULE 3: Anger / Aggression Management <ul style="list-style-type: none"> • Anger and Aggression, Types, Predisposing Factors • Management • Role of the Nurse 	L2, L3 and L4	20
MODULE 4: The Suicidal Client <ul style="list-style-type: none"> • Epidemiological Factors • Risk Factors Predisposing Factors <ul style="list-style-type: none"> • Theories of Suicide-Psychological, Sociological, Biological Nursing Management	L1, L2, and L4	10
MODULE 5: Disorders of Infancy, Childhood, and Adolescence <ul style="list-style-type: none"> • Mentally Challenged • Autistic Disorders • Attention-Deficit/Hyperactivity Disorder • Conduct Disorders, behavioural disorders • Oppositional Defiant Disorder • Tourette's Disorders 	L1,L2, and L4	10

<ul style="list-style-type: none"> • Separation Anxiety Disorder 		
Psychopharmacological Intervention and Nursing Management		

MODULE 6: Delirium, Dementia, and Amnestic Disorders <ul style="list-style-type: none"> • Delirium • Dementia • Amnesia 	L1,L2, L4	12
Psychopharmacological Intervention and Nursing Management		
MODULE 7: Substance-Related Disorders <ul style="list-style-type: none"> • Substance-Use Disorders • Substance-Induced Disorders • Classes Of Psychoactive Substances • Predisposing Factors • The Dynamics of Substance-Related Disorders • The Impaired Nurse • Codependency 	L1,L2, L3 and L4	10
Treatment Modalities For Substance-Related Disorders and Nursing Management		

MODULE 8: Schizophrenia and Other Psychotic Disorders (Check ICD10) <ul style="list-style-type: none"> • Nature of the Disorder • Predisposing Factors • Schizophrenia -Types <ul style="list-style-type: none"> • Disorganized Schizophrenia • Catatonic Schizophrenia • Paranoid Schizophrenia • Undifferentiated Schizophrenia 	L1,L2, L3 and L4	06
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<ul style="list-style-type: none"> • Residual Schizophrenia • Other Psychotic disorders <ul style="list-style-type: none"> • Schizoaffective Disorder • Brief Psychotic Disorder • Schizophrenic form Disorder • Psychotic Disorder Due to a General Medical Condition • Substance-Induced Psychotic Disorder <p>Treatment and Nursing Management</p>		
<p>MODULE 9: Mood Disorders</p> <ul style="list-style-type: none"> • Historical Perspective • Epidemiology • The Grief Response • Maladaptive Responses to Loss • Types Of Mood Disorders • Depressive disorders • Bipolar disorders <p>Treatment and Nursing Management</p>	L1,L2, L3 and L4	06
<p>MODULE 10: Anxiety Disorders</p> <ul style="list-style-type: none"> • Historical Aspects • Epidemiological Statistics • How much is too much? • Types <ul style="list-style-type: none"> • Panic Disorder • Generalized Anxiety Disorder • Phobias • Obsessive-Compulsive Disorder • Posttraumatic Stress Disorder • Anxiety Disorder Due to a General Medical Condition • Substance-Induced Anxiety Disorder • Treatment Modalities 	L1,L2, L3 and L4	08

Psychopharmacology & Nursing Management		
MODULE 11: Somatoform and Sleep Disorders <ul style="list-style-type: none"> Somatoform Disorders Historical Aspects <ul style="list-style-type: none"> Epidemiological Statistics Pain Disorder Hypochondriasis Conversion Disorder Body Dysmorphic Disorder Sleep Disorder Treatment Modalities and Nursing Management	L1,L2, L3 and L4	06
MODULE 12: Dissociative Disorders and Management <ul style="list-style-type: none"> Historical Aspects Epidemiological Statistics Application of the Nursing Management Treatment Modalities and Nursing Management	L1,L2, L3 and L4	06
MODULE 13: Sexual and Gender Identity Disorders <ul style="list-style-type: none"> Development of Human Sexuality Sexual Disorders Variation in Sexual Orientation Nursing Management	L1,L2, L3 and L4	06
MODULE 14: Eating Disorders <ul style="list-style-type: none"> Epidemiological Factors Predisposing Factors: Anorexia Nervosa and Bulimia Nervosa obesity Psychopharmacology Treatment & Nursing Management	L1,L2, L3 and L4	06
MODULE 15: Adjustment and Impulse Control Disorders <ul style="list-style-type: none"> Historical and Epidemiological Factors 	L1,L2,	06

<ul style="list-style-type: none"> • Adjustment Disorders • Impulse Control Disorders <p>Treatment & Nursing Management</p>	L3 and L4	
<p>MODULE 16: Medical Conditions due to Psychological Factors</p> <ul style="list-style-type: none"> • Asthma • Cancer • Coronary Heart Disease • Peptic Ulcer • Essential Hypertension • Migraine Headache • Rheumatoid Arthritis • Ulcerative Colitis <p>Treatment & Nursing Management</p>	L1,L2, L3 and L4	06
<p>MODULE 17: Personality Disorders</p> <ul style="list-style-type: none"> • Historical perspectives • Types Of Personality Disorders <ul style="list-style-type: none"> • Paranoid Personality Disorder • Schizoid Personality Disorder • Antisocial Personality Disorder • Borderline Personality Disorder • Histrionic Personality Disorder • Narcissitic Personality Disorder • Avoidance Personality Disorder • Dependent Personality Disorder • Obsessive-Compulsive Personality Disorder • Passive-Aggressive Personality Disorders • Identification, diagnostic, symptoms • Psychopharmacology <p>Treatment & Nursing Management</p>	L1,L2, L3 and L4	06

MODULE 18: The Aging Individual <ul style="list-style-type: none"> • Epidemiological Statistics • Biological Theories • Biological Aspects of Aging • Psychological Aspects of Aging • Memory Functioning • Socio-cultural aspects of aging • Sexual aspects of aging • Special Concerns of the Elderly Population • Psychiatric problems among elderly population Treatment & Nursing Management	L1,L2, L3 and L4	06
MODULE 19: The person living with HIV Disease <ul style="list-style-type: none"> • Psychological problems of individual HIV/AIDS • Counseling Treatment & Nursing Management	L1,L2, L3 and L4	06
MODULE 20: Problems Related to Abuse or Neglect <ul style="list-style-type: none"> • Vulnerable groups, Women, Children, elderly, Psychiatric patients, under privileged, challenged • Predisposing Factors Treatment & Nursing management- Counseling	L1,L2, L3 and L4	06
MODULE 21: Community Mental Health Nursing <ul style="list-style-type: none"> • National Mental Health Program- Community mental health program • The Changing Focus of care • The Public Health Model • The Role of the Nurse • Case Management 	L1,L2, L3 and L4	06

<ul style="list-style-type: none"> • The community as Client <ul style="list-style-type: none"> • Primary Prevention • Populations at Risk • Secondary prevention • Tertiary Prevention <p>Community based rehabilitation</p>		
MODULE 22: Ethical and Legal Issues in Psychiatric/Mental Health Nursing <ul style="list-style-type: none"> • Ethical Considerations • Legal Consideration • Nurse Practice Acts • Types of Law • Classification within Statutory and Common Law • Legal Issues in Psychiatric/Mental Health Nursing <p>Nursing Liability</p>	L1,L2, L3 and L4	06
Module 23 : Psychosocial rehabilitation <ul style="list-style-type: none"> • Principles of rehabilitation • Disability assessment • Day care centers • Half way homes • Reintegration into the community • Training and support to care givers • Sheltered workshops <p>Correctional homes</p>	L1,L2, L3 and L4	05
MODULE 24: Counselling <ul style="list-style-type: none"> • Liaison Psychiatric Nursing • Terminal illnesses-Counseling • Post partum psychosis-treatment, care and counseling 	L1,L2, L3 and	05

<ul style="list-style-type: none"> • Death dying- Counseling • Treatment, care and counseling – <ul style="list-style-type: none"> • Unwed mothers HIV and AIDS	L4	
MODULE 25: Administration and management of Psychiatric units including emergency unit <ul style="list-style-type: none"> • Design & layout • Staffing, • Equipment, supplies, • Norms, policies and protocols • Quality assurance • Practice standards for Psychiatric Nursing Documentation	L1,L2, L3 and L4	05

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

1. **Text Books a) Main text:** Kaplan H. Saddock B, Synopsis of Psychiatry, William sand Wilkins, 1991, Bathmov.
2. Bimlakapoor CV, A Text book of Psychiatric Nursing, Mosby Co., 1982, Delhi.
3. Shivas, "Basic Concept of Psychiatric Mental Health Nursing, B.I Publications, 1994.
4. Brown R. T. Feldman G. R., Epilepsy -Diagnosis and Management, Little Brown And Co., 1983, Toronto.
5. Beck M. C. Rawtins P. R. and et al, Mental Health – Psychiatric Nursing. The C.V. Mosby Co., Ltd. 1984, Toronto.
6. Coleman C. J, Abnormal Psychology and Modern Life. P. B. Tara and Sons Co. Pvt Ltd. 1982.



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- **b) Additional Texts:** Gelder M.G., Andreasen N.C. New Oxford Textbook of Psychiatry, Oxford University Press, 2012.

c) Other readings: Journals of Psychiatry

Journals of Psychiatric Nursing

Journals of Psychiatric Social Work

Journals of Clinical Psychology

7. Reference Books :

1. Stuart W. G. Sundeen J. S, Principles and Practice of Psychiatric Nursing, Mosby Year book, 1991, London.

2. Taylor C.M., Essentials of Psychiatric Nursing, CV Mosby Co., 1982, London

1. Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

1. Assessment Scheme(more columns may be added for assessment):

Components	ATT	HA	CT	SE	EA	EE
Weightage (%)	5	5	5	5	5	75

ATT-Attendance; HA-Home Assignment; CT-Class Test; SE-Sessional Examination;

EA- Extracurricular activity; EE- End Semester Examination

CO, PO and PSO mapping

	P O 1	P O 2	P O 3	P O 4	P O 5	P O 6	P O 7	P O 8	PS O 1	PS O 2	PS O 3	PS O 4
CO1	1	3	1	2	1	-	3	1	1	--	--	1
CO2	1	3	1	1	1	-	3	1	1	--	--	1
CO3	1	3	1	3	1	-	3	1	1	--	--	1
CO4	1	1	1	2	2	2	3	1	1	-	1	-
CO5	1	2	3	3	1	2	3	1	1	-	2	1

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CO6	1	2	3	3	1	2	3	1	1	-	2	1
CO7	1	3	1	2	1	-	3	1	1	--	--	1
CO8	1	3	1	1	1	-	3	1	1	--	--	1
CO9	1	3	1	3	1	-	3	1	1	--	--	1
CO10	1	1	1	2	2	2	3	1	1	-	1	-
CO11	1	2	3	3	1	2	3	1	1	-	2	1
CO12	1	2	3	3	1	2	3	1	1	-	2	1
CO13	1	3	1	2	1	-	3	1	1	--	--	1
CO14	1	3	1	1	1	-	3	1	1	--	--	1
CO15	1	3	1	3	1	-	3	1	1	--	--	1
CO16	1	1	1	2	2	2	3	1	1	-	1	-
CO17	1	2	3	3	1	2	3	1	1	-	2	1
CO18	1	2	3	3	1	2	3	1	1	-	2	1
CO19	1	3	1	2	1	-	3	1	1	--	--	1
CO20	1	3	1	1	1	-	3	1	1	--	--	1
CO21	1	3	1	3	1	-	3	1	1	--	--	1
CO22	1	1	1	2	2	2	3	1	1	-	1	-
CO23	1	2	3	3	1	2	3	1	1	-	2	1
CO24	1	2	3	3	1	2	3	1	1	-	2	1
CO25	1	3	1	2	1	-	3	1	1	--	--	1

1: strongly related, 2: moderately related and 3: weakly related



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CHN4402	<u>Community Health Nursing Practical</u>	L	T	P	C
Version 1.1	Date of Approval:		28**		32
Pre-requisites/Exposure	NIL				
Co-requisites	NIL				

Course Catalogue: The course is designed to enable students to develop expertise in the field of Community health nursing procedures.

Course Outcomes: The course is designed to assist students in developing expertise and in depth understanding in the field of Community Health Nursing. It would help students to appreciate holistic life style of individuals, families & groups and develop skills to function as Community Health Nurse specialist/practitioner. It would further enable student to function as an educator, manager, care giver and researcher in the field of Community Health Nursing. Each student is required to participate in following activities during the community posting in urban as well as rural area

On completion of this course students will be able to:

CO1. Apply the nursing process in the care of geriatric patients in old age home and community

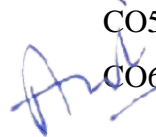
CO2. Demonstrate advanced skills/competence in nursing management of children with Communicable problems

CO3. Recognize and manage emergencies in deaddiction centres and mental health centres

CO4. Utilize the recent technology and various treatment modalities in the management of high risk children

CO5. Prepare a design for layout and describe standards for National health services

CO6. Identify areas of research in the field of community health nursing


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Course Content

Modules	Blooms level
Module 1 <ul style="list-style-type: none">• MCH office and DPHNO• CHC/ First Referral unit (FRU)• Child guidance clinic• Institute/ unit for mentally challenged• District TB centre• AIDS control society	L1,2,
Module 2 <ul style="list-style-type: none">• Filariasis clinic• RCH clinic	L1. 2


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<ul style="list-style-type: none"> • STD clinic • Leprosy clinic • Community based rehabilitation unit • Cancer centers • Palliative care 	
Module 3: <ul style="list-style-type: none"> • Home of old age • Mental health units • De-addiction centres • School health services • Industry • Selected industrial health centers • ESI unit • Municipality/ corporation office 	L1,2,
Module 4 <ul style="list-style-type: none"> • Laparoscopic sterilization • Vasectomy • All clinics related to RCH • Monitoring of national health and family welfare programmes 	L1,2, 3
Module 5 <ul style="list-style-type: none"> • Conduct various clinics • School health assessment. • Health survey. • Health assessment 	L3,4

<ul style="list-style-type: none"> • Drug Administration as per the protocols • Treatment of minor ailments Investigating outbreak of epidemic	
Module 6 <ul style="list-style-type: none"> • Screening for leprosy, TB and non-communicable disease • Presumptive and radical treatment for Malaria. • Counseling • Report writing • Referrals • Writing a project proposal • Material management- requisition for indent, condemnation, inventory maintenance, • Training and Supervision of various categories of personnel • Liaison with NGO's 	L3,4

*Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

7. Examination Scheme Practical: Internal 100, External 100

Components	NCP	CS/CP	Project	OR	HE	CE	EPE
Weightage (%)	10	30	10	05	05	40	100

NCP- Nursing Care Plan, CS- Case Study, CP - Case Presentation, OR- Observation Report, HE- Health Education, CE-Clinical Evaluation, EPE- External Practical Examination

Text & References:

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Reference Books:

1. Clark, June & Jill Handerson, *Community Health*, Churchill Livingstone, 1993, New York.
2. Freeman B. Ruth, *Public Health Practices*, W. W. Saunders CO., 1990, Philadelphia.
3. Fromer Joan Margot, *Community Health Care and the Nursing Process*, C.VMosby CO., Toronto.
4. Park J. E, *Text Book of Preventive and Social Medicine*, Ms Banarsidas Bhanot CO., 1996, Jabalpur.
5. Rao S. Kasthi, *An Introduction to Community Health Nursing*, B. I. Publishers, Madras.
6. Gulani,K,K. *Community Health Nursing*(2007). Kumar Publishing House.pp 339-420.
7. Basavanthappa,B,T. *Community Health Nursing*(2nd edition), Jaypee Brothers Medical Publishers.
8. Park ,K .*Preventive and Social Medicine*.(19th edition), Kumar Book Depot.
9. Kamalam, S. *Essentials in Community Health Nursing Practice*.(2nd edition), Jaypee Brothers.
10. Alternative approaches to health care. ICMR. Paper presented at the National Symposium on Alternative Approaches to health care.
11. Archer,S,E. *Community Health Nursing:Patterns and Practice*.(2nd edition).Duxbusy Press.
12. Prabhakara,G,N. *Textbook of Community Health for Nurses*.(2nd edition). Peepee Publishers and distributors.
13. Stanhope,M &Lanchaster,J.*Community Health Nursing:Practice and Process for Promoting Health*.(3rd edition).mosby.
14. Pinger,R,P.*An Introduction to Community health*.(4th edition).Jones and Bartlett Publishers.
15. Patney Sunita , (2005), *Text Book Of Community Health Nursing*, First Edition, Cbs.
16. Mckenzie James F. Pinger Robert R, Kotecki Jerome E, (2002), *An Introduction To Community Health Nursing*, Fourth Edition, Jones And Bartlett.
17. Lundy Saucier Karen, Janes Sharyn, (2002) *Community Health Nursing*, First Edition, Jones And Bartlett.

*Latest editions of all the suggested books are recommended

Course Outcome Measurement:

The outcome will be measured by the performance of the students in various class tests, assignments in addition to the End Semester Exam (ESE) that contains significant number of questions on problems related to meeting needs of the patients.

Relationship between the course outcomes (COs), Programme Outcomes (PO) and Programme Specific Outcomes (PSOs)

Mapping between COs, POs and PSOs

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PSO 1	PSO 2	PSO 3	PSO 4
CO1	2	1	2	2	2	2	2	1	2	3	1
CO2	2	1	2	2	2	2	2	1	2	3	1
CO3	2	1	2	3	2	2	2	1	2	3	1
CO4	3	1	2	2	2	2	2	1	2	3	1
CO5	2	1	3	2	2	2	2	1	2	2	1
CO6	2	1	3	2	2	2	2	1	2	2	1
CO7	2	1	3	2	2	2	2	1	2	2	1
CO8	3	2	3	2	2	2	2	1	2	3	1
CO9	2	2	2	2	2	2	2	1	2	2	1

1: strongly related, 2: moderately related and 3: weakly related

PSN4402	Psychiatric Nursing CS-III & IV Practical	L	T	P	C
Version 1.1	Date of Approval:		28**		32
Pre-requisites/Exposure	NIL				
Co-requisites	NIL				

Catalog Catalogue:

This course is designed to assist students in developing expertise and in depth understanding in the field of Psychiatric Nursing. It will help students to develop advanced skills for nursing intervention in various Psychiatric conditions. It will enable the student to function as Psychiatric Nurse practitioner/specialist. It will further enable the student to function as educator, manager, and researcher in the field of Psychiatric Nursing

Course Objectives: On completion of the two year M.Sc. Nursing (Psychiatry) programme, the Post Graduate Nurse will be able to provide comprehensive nursing care to patients with psychiatric problems in preventive, curative and rehabilitation aspects.

Course Outcomes

At the end of the course the students will be able to:

1. Apply the nursing process in the care of patients with mental disorders in hospital and community
2. Demonstrate advanced skills/competence in nursing management of patients with mental disorders
3. Identify and care for special groups like children, adolescents, women, elderly, abused and neglected, people living with HIV/AIDS.
4. Identify and manage psychiatric emergencies.


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-
5. Provide nursing care to critically ill patients with mental disorders
 6. Utilize the recent technology and various treatment modalities in the management of patients with mental disorders
 7. Demonstrate skills in carrying out crisis intervention.
 8. Appreciate the legal and ethical issues pertaining to psychiatric nursing.
 9. Identify areas of research in the field of psychiatric nursing.
 10. Prepare a design for layout and describe standards for management of Psychiatric units/emergency units/hospitals
 11. Teach psychiatric nursing to undergraduate students & in-service nurses.

Course Content

Modules	Blooms level
Module 1: History collection and Assessment of mental status examination	L1,2, 3
Module 2 : Management of Psychiatric Patient	L2,3, 4
Module 3: Psychometric and Personality Assessment	L1,2,3
Module 4: Observing various therapies	L1,2, 3
Module 5: Process Recording	L3,4
Module 6: Socio and Psycho drama	L2, 3


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*Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

- Kaplan H. Sadock B, Synopsis of Psychiatry, William and Wilkins, 1991, Bathmov.
- Stuart W.G. Sundeen J.S, Principles and Practice of Psychiatry Nursing, Mosby Year book, 1991, London.
- Taylor C.M., Essentials of Psychiatric Nursing, CV Mosby Co., 1982, London.
- Bimla Kapoor CV, A Text book of Psychiatric Nursing, Mosby Co.,1982, Delhi
- Shivas, "Basic Concept of Psychiatric Mental Health Nursing, B.I Publications, 1994
- Brown R.T. Feldman G.R., Epilepsy- Diagnosis and Management, Little Brown and Co.,1983, Toronto.
- Beck M.C. Rawtins P.R. and et al, Mental Health-Psychiatric Nursing. The C.V. Mosby Co., Ltd.1984, Toronto.
- Coleman C.J, Abnormal Psychology and Modern Life. P.B. Tara and Sons Co. Pvt Ltd. 1982.

Reference Books

- Gelder M.G., Andreasen N.C., New Oxford Text book of Psychiatry, Oxford University Press, 2012.
- Elizabeth M. Varcarolis: Foundations of Psychiatric Mental Health Nursing; 4th Edition, W.B. Saunders, Company, 2002.
- Kaplan & Sadock's: Concise Text book of Clinical psychiatry; 2nd Edition, J.P. Brothers (Indian) Lippincott, Williams & Wilkins, 2002.
- Stuart M. psychiatric mental health nursing
- Sheila. L. Videbeck: Psychiatric mental health nursing; Lippincott, 2001.
- Mary Ann Boyd & Mary Ann Nihart: Psychiatric Nursing Contemporary Practice; Lippincott, 1998

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination


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Examination Scheme Practical: Internal 100, External 100

Components	NCP	CS/CP	Project	OR	HE	CE	EPE
Weightage (%)	10	30	10	05	05	40	100

NCP- Nursing Care Plan, CS- Case Study, CP - Case Presentation, OR- Observation Report, HE- Health Education, CE-Clinical Evaluation, EPE- External Practical Examination

CO PO MAPPING

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	3	3	3	2	3	2	-	1	-	-
CO2	1	1	2	3	2	3	1	-	1	-	-
CO3	1	1	2	3	1	2	1	-	1	-	-
CO4	1	2	3	3	1	2	1	-	1	-	-
CO5	2	2	2	3	1	2	2	-	1	-	-
CO6	2	1	1	1	2	1	3	-	1	-	-
CO7	1	1	2	3	1	2	1	-	1	-	-
CO8	1	1	2	3	1	2	1	-	1	-	-


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CO9	1	1	2	3	1	2	1	-	1	-	-
CO10	1	1	2	3	1	2	1		1		
CO11	1	1	2	3	1	2	1		1		

1: strongly related, 2: moderately related and 3: weakly related

PDN4402	<u>Child Health (Pediatric) Nursing Practical</u>	L	T	P	C
Version 1.1	Date of Approval:		28**		32
Pre-requisites/Exposure	NIL				
Co-requisites	NIL				

Course Catalogue: The course is designed to enable students to develop expertise in the field of child health nursing procedures.

Course Description: It will help students to appreciate the child as a holistic individual and develop skill to function as a Pediatric Nurse specialist.


Course Outcomes:

On completion of this course students will be able to:

CO1. Apply the nursing process in the care of ill infants to pre adolescents in hospital and community

CO2. Demonstrate advanced skills/competence in nursing management of children with medical and surgical problems

CO3. Recognize and manage emergencies in children and Provide nursing care to critically ill children


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CO4. Utilize the recent technology and various treatment modalities in the management of high risk children

CO5. Prepare a design for layout and describe standards for management of pediatric units/hospitals

CO6. Identify areas of research in the field of pediatric nursing

Course Content

Modules	Blooms level
Module I Procedures Observed: <ul style="list-style-type: none">Echo cardiogramUltrasound headROP screening (Retinopathy of prematurity)	L1,2, 3
Module II Procedures Assisted <ul style="list-style-type: none">Advanced neonatal life supportLumbar PunctureArterial Blood GasECG RecordingUmbilical catheterization – arterial and venousArterial B P monitoringBlood transfusion- exchange transfusion full and partialIV cannulation & therapyArterial catheterizationChest tube insertionEndotracheal intubationVentilationInsertion of long lineAssist in surgery	L2,3, 4

Module III Procedures Performed: <ul style="list-style-type: none"> • Airway Management <ul style="list-style-type: none"> • Application of Oro Pharyngeal Airway • Oxygen therapy • CPAP (Continuous Positive Airway Pressure) • Care of Tracheostomy • Endotracheal Intubation • Neonatal Resuscitation • Monitoring of Neonates – clinically & with monitors, CRT (Capillary Refill Time), assessment of jaundice, ECGGastric Lavage • Setting of Ventilators • Phototherapy • Assessment of Neonates: Identification & assessment of risk factors, APGAR Score, gestation age, Anthropometric assessment, Weighing the baby, Newborn examination, detection of life threatening congenital abnormalities, • Admission & discharge of neonates • Feeding - management of breast feeding, artificial feeding, expression of breast milk, OG (Orogastric) tube insertion, gavage feeding, TPN, Breast feeding counseling • Thermoregulation- Axillary temperature, Kangaroo Mother Care (KMC), Use of Radiant warmer, incubators, management of thermoregulation & control • Administration of Drugs: I/M, IV injection, IV Cannulation & fixation infusion pump, Calculation of dosages, Neonatal formulation of drugs, use of tuberculin/ insulin syringes, Monitoring fluid therapy, Blood Administration. 	L1,2,3

<ul style="list-style-type: none"> Procedures for prevention of infections: Hand washing, disinfections & sterilization, surveillance, fumigation Collection of specimens Setting, Use & maintenance of basic equipment: Ventilator, O2 analyzer, monitoring equipment, Photo therapy unit, Flux meter, Infusion pump, Radiant warmer, incubator, Centrifuge machine, Bilimeter, Refractometer, laminar flow 	
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**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

7. Examination Scheme Practical: Internal 100, External 100

Components	NCP	CS/CP	Project	OR	HE	CE	EPE
Weightage (%)	10	30	10	05	05	40	100

NCP- Nursing Care Plan, CS- Case Study, CP - Case Presentation, OR- Observation Report, HE- Health Education, CE-Clinical Evaluation, EPE- External Practical Examination

Reference Books:

10. Whaley and Wong, Essentials of Pediatrics Nursing
11. Learners Guide, WHO, AIIMS
12. IMNCI Students' Handbook, WHO
13. Ball and Bindler, *Paediatric Nursing Caring for Children*, Prenticehall.
14. Behrman, Richard K & Vaughan, Nelson,s, *TextBook of Paediatrics*, WB Saunders Co.,
15. Ghai O P, *Essential Paediatrics*
16. Asuma Beevi, Textbook of Pediatric Nursing

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17. Parul Datta, Textbook of Pediatric Nursing

18. Panchali Pal, Textbook of Pediatric Nursing

Course Outcome Measurement:

The outcome will be measured by the performance of the students in various class tests, assignments in addition to the End Semester Exam (ESE) that contains significant number of questions on problems related to meeting needs of the patients.

Relationship between the course outcomes (COs), Programme Outcomes (PO) and Programme Specific Outcomes (PSOs)

Mapping between COs, POs and PSOs

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PSO 1	PSO 2	PSO 3	PSO 4
CO1	2	1	2	2	2	2	2	1	2	3	1
CO2	2	1	2	2	2	2	2	1	2	3	1
CO3	2	1	2	3	2	2	2	1	2	3	1
CO4	3	1	2	2	2	2	2	1	2	3	1
CO5	2	1	3	2	2	2	2	1	2	2	1
CO6	2	1	3	2	2	2	2	1	2	2	1

1: strongly related, 2: moderately related and 3: weakly related



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NUTRITION AND DIETETICS

Course Code: NUR2106

Credit Unit-04

Course Description: This course is designed to provide the students with a wide knowledge of dietetics in Indian setting, that the practices of teaching optimum and realistic dietary planning can become an integral part of Nursing Practices.

OBJECTIVES

At the end of the course, the student will:

1. Explain the principles and practices of nutrition and dietetics.
2. Plan therapeutic diets in different settings.
3. Identify nutritional needs of different age groups and plan diet accordingly.
4. Prepare meals using different methods utilizing cookery rules.
5. Prepare recommended meals according to the disease conditions of the patients.

Course Contents

Module I

- Introduction to nutrition and dietetics.
- Balanced diet, factors on which it depends.
- Factors to be considered in planning.
- Guides available for planning.
- Food hygiene, preparation and preservation.
- Review of nutrients – micro & macro.

Module II

- Introduction to diet therapy.
- Routine hospital diets.
- Therapeutic diet under each Module i.e. Cardiovascular diseases, gastrointestinal diseases, renal disorders, endocrine and metabolic disorders, allergy, infections and fevers, pre and post operative stages, deficiency diseases and malnutrition, overweight and underweight.

Module III

- Infant and child nutrition.
- Feeding of normal infants: factors to be considered in planning nutritional requirements.
- Feeding of premature infants: factors to be considered in planning nutritional requirements.
- Supplementary feeding of infants: Advantage and method of introduction.
- Weaning, effects on mother and child.
- Psychology of infant and child feeding.
- Feeding the sick child. Diet in diseases of infancy and childhood.
- Deficiency status – Malnutrition and under nutrition.
- Feeding pre-school child: Nutritional needs, factors to be considered in planning diets. Problems in feeding.
- School lunch programme: Advantage, need in India.

Module IV

- Community nutrition: need for Community nutrition programme.
- Nutritional needs for special groups: Infant, child, adolescent, pregnant woman, lactating mother and old people.
- Substitutes for non-vegetarian foods.
- Selection of cheap and nutritious foods. Nutrition education needs and methods.
- Methods of assessing nutritional status of individual / group / Community.
- Current nutritional problems and national programmes.

PRACTICUM

I. *Methods of cooking and cookery rules.*

1. Simple preparation of beverages, soups, cereals and pulses, eggs, vegetables, meat.
2. Menu plans.

II. *Preparation of supplementary food for infants.*

1. Foods for toddlers.
2. Low cost nutritious dishes for vulnerable groups.
3. Dietary case study of patient on special diet planning of low cost dietary instructions for home adaptations.
4. Planning of therapeutic diets.

Examination Scheme:

Components	ATT	HA	CT	SE	EA	EE
Weightage(%)	5	5	5	5	5	75

**ATT-Attendance; HA-Home Assignment; CT-Class Test; SE-Sessional Examination;
EA- Extracurricular activity; EE- End Semester Examination**

Text & References:

Text

1. Swaminathan M., *Hand Book of Food and Nutrition*, Bangalore printing and publishing Co., 1970, Bangalore.
2. Anderson, *Nutrition in Nursing*, Lippincott Co., 1972, Philadelphia.
3. Joshi V.D., *Hand Book of Nutrition and Dietetics*, Vora Medical Publications, Bombay

References

1. Antia, E. P., *Clinical Dietetics and Nutrition*, Oxford University Press, 1995, New Delhi.
2. Corrine H Robinson, *Normal and Therapeutic Nutrition*, Oxford and IBH Publications.
3. Sue Rodwell Williams, *Nutrition and Diet Therapy*, C.V Mosby and Co., 1977.
4. Patwardhan V. N., *Nutrition in India*, 1961.
5. Hervietta Flick, *Introduction to Nutrition*, Mac Millon Publishing Co., 1970.
6. Lenna F. Copper, *Nutrition in Heath and Disease*, J.B Lippincott Co., Philadelphia.

* Latest editions of all the suggested books are recommended.

MEDICAL SURGICAL NURSING

Course Code: NUR2108

Credit Unit-08

Course Description: The purpose of this course is to widen the students' knowledge and develop proficiency in caring for patients with medical surgical problems. This course includes review of relevant Anatomy and Physiology, Pathophysiology in Medical-Surgical disorders and Nursing management of these conditions.

OBJECTIVES

At the end of the course, the student will:

1. Explain relevant Anatomy and Physiology of various systems of the body.
2. Explain Pathophysiology of various disorders.
3. Explain the actions, side effects and Nursing implications in administering drugs for various disorders.
4. Discuss the recent advancement in the treatment and care of patients with medical surgical conditions.
5. Develop skill in giving comprehensive Nursing care to patients following the steps of Nursing process.
6. Assist the patients and their families in identifying and meeting their own health needs.
7. Appreciate the role of the nurse in the medical surgical health term.

Course Contents

Module I

- Introduction to Medical Surgical Nursing.
- Review of concepts of comprehensive Nursing care in medical surgical conditions.
- Nurse, patient and his/ her family.
- Functions of Nurse in the Outpatient Department.
- Intensive care Module.

Module II

- Nursing management of patient with specific problems:
 - Fluid and electrolyte imbalance.
 - Dyspnea and cough, Respiratory obstruction
 - Fever
 - Shock
 - Unconsciousness
 - Pain
 - Acute illness
 - Chronic illness
 - Terminal illness
 - Age related illness
 - Patient undergoing surgery
 - Incontinence.

Module III

- Nursing management of patient with Neurological and Neurosurgical conditions.

- Review of Anatomy and Physiology of the Nervous System.
- Pathophysiology, diagnostic procedures and management of-
 - Cerebra-vascular accident.
 - Cranial spinal and peripheral Neuropathies.
 - Headache and intractable pain.
 - Epilepsy.
 - Infectious and inflammatory diseases and trauma of the Nervous System.
 - Common disorders of the system.
 - Recent advances in diagnostic and treatment modalities.
 - Drugs used in these disorders.
 - Tumors of brain & Spinal cord, congenital malformations, degenerative diseases.

Module IV

- Nursing management of patient with Cardiovascular problems.
- Review of relevant Anatomy and Physiology of Cardiovascular system.
- Pathophysiology, diagnostic procedures and management of:
 - Ischemic Heart diseases
 - Cardiac arrhythmias
 - Congestive heart failure
 - Rheumatic and other valvular heart diseases
 - Endocarditis, cardiomyopathies, congenital heart diseases, hypertension, heart block
 - Cardiac emergencies: Cardiac Arrest, acute pulmonary oedema, cardiac tamponade, cardiogenic shock, aneurysms and peripherovascular disorders, recent advancement in cardiology.

Module V

- Nursing management of patient with respiratory problems.
- Review of Anatomy and Physiology of respiratory system Pathophysiology, diagnostic procedures and management of upper respiratory tract infections:
 - Bronchitis
 - Asthma
 - Emphysema, Empyema, Atelectasis, COPD
 - Bronchiectasis
 - Pneumonia
 - Pulmonary tuberculosis
 - Lung abscess
 - Pleural effusion
 - Tumours and cysts
 - Chest injuries
 - Respiratory arrest and insufficiency
 - Pulmonary embolism
 - Drugs used in the management of these patients
 - Special respiratory therapies.

Module VI

- Nursing management of patient with Genito-urinary problems.
- Review of Anatomy and Physiology of the Genito-urinary System
 - Nephritis
 - Renal calculus
 - Acute renal failure
 - Chronic renal failure
 - End stage renal disease.
- Special procedures, dialysis, renal transplant.
- Drugs used in management of these patients.
- Congenital disorders, urinary infections.
- Benign prostate hypertrophy.

Module VII

- Nursing management of patients with problems of the digestive systems.
- Review of Anatomy and Physiology of gastrointestinal system and accessory organs.
- Pathophysiology, diagnostic procedures and management of :
 - G.I. Bleeding
 - Peptic ulcer
 - Infections
 - Acute abdomen
 - Colitis, diarrhea, dysentery & mal-absorption syndrome.
 - Cholecystitis
 - Hepatitis, hepatic coma and cirrhosis of liver
 - Portal hypertension
 - Pancreatitis
 - Tumors, Hernias, Fistulas, Fissures, Hemorrhoids.
- Drug used in the management of these patients.

Module VIII

- Nursing management of patients with endocrine problems.
- Review of Anatomy, Physiology and Pathophysiology of patient with:
 - Thyroid disorders
 - Diabetes mellitus
 - Diabetes insipidus
 - Adrenal tumour
 - Pituitary disorders
 - Diagnostic procedures.
- Nursing management of patient with above problems.
- Drug used in Endocrine problems.

Module IX

- Nursing management of patient with musculoskeletal problems.
- Review of anatomy, Physiology and Pathophysiology:
 - Arthritis Osteomyelitis, Bursitis
 - Fractures, dislocation and trauma

- Prolapsed disc
- Osteomalacia and osteoporosis
- Tumor
- Amputation.
- Diagnostic procedures
- Nursing management of patient with above problems.
- Prosthesis and Rehabilitation.
- Transplant & replacement surgeries.

Module X

- Nursing management of patient with disorders of female reproductive tract.
- Disorder of menstruation.
- Infections of the genital tract.
- Benign and malignant tumors of the genital tract.
- R.V.F., V.V.F.
- Climacteric changes and associated problems.

Module XI

- Nursing management of patient with Oncological disorders.
- Types of Neoplasms and related Pathophysiology.
- Diagnostic procedures.
- Modalities of treatment and nurse's role.
- Special therapies – Chemotherapy and Radiotherapy
- Preventive measures, other therapies.

Module XII

- Nursing management of patient with burns.
- Nursing management of patient with reconstructive surgeries.

Module XIII

- Nursing management of patient with common communicable diseases & STD'S.
- Nursing management of patient with immunological disorders including HIV/AIDS.

Module XIV

- Nursing management of patient with diseases of eye, ear, nose, throat & skin.

Module XV

- Nursing management of patient with blood disorders
- Review of Anatomy & Physiology of Blood & Blood products.
- Pathophysiology, diagnostic procedures and management of blood disorders:
 - Anemia
 - Leukemia
 - Bleeding disorders
 - Hemophilia
 - Purpura etc.
- Blood transfusion, safety checks, procedure and requirements. Management of adverse transfusion reaction, records for blood transfusion.

- Management and counseling of blood donors, phlebotomy procedure, and post donation management.
- Blood bank functioning and hospital transfusion committee
- Bio-safety and waste management in relation to blood transfusion.

Module XVI

- Nursing in emergencies.
- Cardiac emergencies.
- Trauma.
- Poisoning.
- Crisis management: Thyroid crisis, Hypertensive crisis and Adrenal crisis.

Examination Scheme:

Components	ATT	HA	CT	SE	P/S	EE
Weightage (%)	5	5	5	5	5	75

**ATT-Attendance; HA-Home Assignment; CT-Class Test; SE-Sessional Examination;
P/S-Presentation/Seminar; EE- End Semester Examination**

Text & References:

Text

1. Chintamani, Lewis's Medical Surgical Nursing, Assessment and Management of Clinical Problems, Adapted for South Asian Curriculum; 2011, New Delhi, Elsevier,
2. Joyce M. Black & Jane Hokanson Hawks, Medical Surgical Nursing, 7th Edition, Year 2004, Saunders (imprint of device)

References

1. Phippe, Manohar, Said et al. Medical Surgical Nursing – Health and Illness perspectives, 7th Edition, Year 2003 Mosby (Elsevier).
2. Beare-Myers-Adults Health Nursing 3rd Edition, Year 1998 Mosby.
3. Saundra M Nettina- The Lippincott Manual of Nursing Practice, 6th Edition, Year- 1991, Lippincott.
4. Brunner & Doris Smith Suddarth, Text Book of Medical Surgical Nursing, J.B. Lippincott Company.
5. Ansari, Javed. A textbook of Medical Surgical Nursing II, Year 2013, S.Vikas and Company India (Pee Vee)
6. Jean Luckman-Saunders, Manual of Nursing Care Year 1997, W.B. Saunders Company.
7. Donna D. Jgmataromis & M Linda workman Medical Surgical Nursing, Year- 2002. L.B. Saunders Company.

MEDICAL SURGICAL NURSING (PRACTICAL)

Course Code: NUR2110

Credit Unit-11

This Course is based on Course Code NUR2108


Guidelines

1. Students should be rotated in the selected medical & surgical areas, like Cardio Thoracic, Neurology, Urology, Orthopedics, Gynecology, Oncology, and Burns and Reconstructive surgical Modules.
2. The students should be given patient assignment. They have practices patient centered comprehensive Nursing.
3. Each student is requested to give planned health teachings, conduct clinical teaching, case presentation and drug study.

Examination Scheme:

Components	P/S	NCS	NCP	HE	CE	SPE	EPE
Weightage (%)	20	15	30	5	20	10	100

P/S-Presentation/Seminar; NCS-Nursing Case Study; NCP- Nursing Care plan; HE- Health Education; CE-Clinical Evaluation; SPE-Sessional Practical Examination; EE- External Practical Examination


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MATERNAL NURSING

Course Code: NUR2208

Credit Unit-05

Course Description: This course is designed to widen the student's knowledge of obstetrics during pregnancy, labour and puerperium. It also helps to acquire knowledge and develop skill in rendering optimum Nursing care to a child bearing mother in a hospital or Community and help in the management of common gynecological problems.

OBJECTIVES

At end of the course, the student will:

1. Describe the Physiology of pregnancy, labour and puerperium.
2. Manage normal pregnancy, labour and puerperium.
3. Explain the Physiology of lactation and advice on management of breast feeding.
4. Be skilled in providing pre and post operative Nursing care in obstetric conditions.
5. Identify and manage high risk pregnancy including appropriate referrals.
6. Propagate the concept and motivate acceptance of family planning methods.
7. Teach, guide and supervise auxiliary midwifery personnel.

Course Contents

Module I

- Introduction and historical review.
- Planned Parenthood.
- Maternal morbidity and mortality rates.
- Legislations related to maternity benefits, MTP acts, incentives for family planning etc.

Module II

- Review of the Anatomy and Physiology of female reproductive system.
- Female pelvis (normal and contracted).
- Review of Foetal development.

Module III

- Physiology and management of pregnancy, labour and puerperium.
- Signs and symptoms and diagnosis of pregnancy.
- Antenatal care.
- Pregnant woman with HIV/ AIDS.
- Management of common Gynecological problems.

Module IV

- The new born baby.
- Care of the baby at birth including resuscitation.
- Essential newborn care:
 - Feeding
 - Jaundice and infection
 - Small & large for date babies.
 - Intensive care of the new born
 - Trauma and hemorrhage.

Module V

- Management of abnormal pregnancy, labour and puerperium.
- Abortion, ectopic pregnancy and vesicular mole.
- Pregnancy induced hypertension, gestational diabetes, anaemia, heart disease.

- Urinary infection, Antepartum haemorrhage.
- Abnormal labour (malposition & malpresentation):
 - Uterine inertia
 - Disorders of puerperium
 - Management of engorged breast, cracked nipples, breast abscess and mastitis
 - Puerperal sepsis
 - Post partum haemorrhage
 - Inversion and prolapsed of uterus, obstetrical emergencies
 - Obstetrical operation i.e. forceps, vacuum, episiotomy, caesarean section.

Module VI

- Drugs in obstetrics.
- Effects of drugs during pregnancy, labour and puerperium on mother & body.

Module VII

- National Welfare Programmes for Women.
- National Family Welfare Programme.
- Infertile Family.
- Problems associated with unwanted pregnancy.
- Unwed mothers.

Examination Scheme:

Components	ATT	HA	CT	SE	P/S	EE
Weightage (%)	5	5	5	5	5	75

**ATT-Attendance; HA-Home Assignment; CT-Class Test; SE-Sessional Examination;
P/S-Presentation/Seminar; EE- End Semester Examination**

Text & References:

Text

1. Dawn C.S, *Text Book of Gynaecology & Contraception*, Dawn books, 1994, CIT Road, Calcutta.
2. Dutta D. C., *Text Book of Gynaecology*, New central book agency Ltd., Calcutta.
3. Myles Margaret, *Text Book of Midwives*, Educational low priced books scheme, British Government

Reference Books

1. Dawn C.S, *Text Book of Obstetrics*, New central book agency Ltd., Calcutta.
 2. Hawkins & Borune, Shaw's, *Text Book of Gynaecology*, B.I. Chrchill Livingstone Pvt. Ltd.
- *Latest editions of all the suggested books are recommended.

PAEDIATRIC NURSING

Course Code: NUR2209

Credit Unit-05

Course Description: This course is aimed at developing an understanding of the modern approach to child care, the common health problems of children and neonates in health and sickness.

OBJECTIVES

At the end of the course, the student will:

1. Explain the modern concept of child care and the principles of Paediatric Nursing.
2. Describe the normal growth and development of children at different ages.
3. Manage sick as well as healthy neonates and children.
4. Identify various aspects of preventive Paediatric Nursing and apply them in providing Nursing care to children in hospital and Community.

Course Contents

Module I

- Introduction.
- Modern concept of child care.
- Internationally accepted rights of the child.
- National policy and legislations in relation to child health and welfare.
- National programmes related to child health and welfare.
- Changing trends in hospital care, preventive, promotive and curative aspects of child health.
- Child morbidity and mortality rates.
- Differences between an adult and child.
- Hospital environment for a sick child.
- The role of a Paediatric Nurse in caring for a hospitalized child.
- Principles of Pre and Post operative care of infants and children.
- Paediatric Nursing procedures.

Module II

- The healthy child.
- Growth and development from birth to adolescence.
- The needs of normal children through the stages of development and parental guidance.
- Nutritional needs of children & infants breast- feeding, supplementary/ artificial feeding and weaning.
- Accidents, causes and prevention.
- Value of play selection of play material.
- Preventive immunization.

Module III

- Nursing care of a neonate.
- Nursing care of a normal newborn.
- Neonatal resuscitation.
- Nursing management of a low birth weight body.
- Nursing management of common neonatal disorders.
- Organization of neonatal Module. Preventive of infections in the nursery.

Module IV

- Nursing management in common childhood diseases.
- Nutritional deficiency disorders.
- Reparatory disorders and infections.

- Gastrointestinal infections, infections and congenital disorders.
- Cardio vascular problem-congenital defects and rheumatic fever.
- Genito-urinary disorder – Nephritic syndrome, Wilms’ tumor, infection and congenital disorders.
- Neurological infections and disorders- convulsions, epilepsy, meningitis, hydrocephalus, spinabifida.
- Hematological disorders – Anemias, Thalassemia, ITP, Leukemia, hemophilia.
- Endocrine disorders – Juvenile Diabetes Mellitus.
- Orthopedic disorders – club feet, hip dislocation and fracture.
- Disorders of skin eye and ears.
- Common Communicable Diseases in children, their identification, Nursing management in hospital and home and prevention.
- Paediatric emergencies – poisoning, foreign bodies, haemorrhage, burns and drowning.

Module V

- Management of behavioral disorders in children.
- Management of challenged children:
 - Mentally challenged
 - Physically challenged
 - Socially challenged.

Examination Scheme:

Components	ATT	HA	CT	SE	P/S	EE
Weightage (%)	5	5	5	5	5	75

ATT-Attendance; HA-Home Assignment; CT-Class Test; SE-Sessional Examination;
P/S-Presentation/Seminar; EE- End Semester Examination

Text & References:

Text

1. Marlow R., *Child Health for Nurses*, 6th edition, W.B. Saunders Company, New Delhi, 2002
2. Parthasarathy A., *Text Book of Paediatrics*, 3rd edition, Jaypee Brothers, New Delhi, 2006.
3. Lippincott, *Lippincott manual of nursing practice*, 6th edition, , Lippincott publishers, Philadelphia. 1996

References

1. Behrman, Richard K & Vaughan, Nelson,s, *TextBook of Paediatrics*, WB Saunders Co.,
2. Barbara EW, *Guidelines in the Care of the Low Birth Weight*, Orient Longman
3. Aravind. R., *Applied Neonatology*, 1st edition, Jaypee brothers medical publication, New Delhi, 2006.
4. Guha.K, *Neonatology-Principles and practice*, 3rd edition, Jaypee publication, New Delhi, 2005.
5. Singh Meharban, *Care of the Newborn*, 6th edition, Sagar publications, New Delhi, 2004.
6. Ghai .O.P, *Essential Pediatric*, 6th edition, CBS Publishers, Bangalore, 2006
7. Gupta .S, *Essential Text Book of Paediatrics*, Jaypee Brothers Publishers Pvt. Ltd., 7th edition, 1995.
8. J.M. Chellapa, *Paediatric Nursing*, Gajanana Book Publishers and Distributors, Delhi, 1995.

* Latest editions of all the suggested books are recommended.

MATERNAL NURSING (PRACTICAL)

Course Code: NUR2211

Credit Unit-10

This Course is based on Course Code NUR2208

Guidelines

1. The student will:
 - a. Be posted in antenatal Clinic, MCH clinic, antenatal ward, labour room, postnatal ward, maternity OT, MTP room.
 - b. Visit welfare agencies for woman and write observation report.
 - c. Follow Nursing process in providing care to 3-6 patients.
 - d. Write at least two Nursing care studies and do a presentation.
 - e. Give at least one planned health teaching to a group of mothers.
2. Practices following Nursing procedures -
 - a. Antenatal & Post natal examination, per vaginal exam.
 - b. Conduct normal delivery, stitching of episiotomy, (for male candidate minimum conduct of 5 deliveries)
 - c. Motivation of family for adopting family planning methods.
 - d. Motivate family for Planned Parenthood.
 - e. Assist in various diagnostic and therapeutic procedures including IUD insertion and removal.

Examination Scheme:

Components	ANC	NCP (PNC)	P/S	HE	NCS	CE	SPE	EPE
Weightage (%)	10	10	10	10	10	40	10	100

ANC-Antenatal case; NCP- Nursing Care plan; PNC-Post natal case; P/S- Presentation//Seminar; HE-Health Education; NCS- Nursing Case Study; CE- Clinical Evaluation; SPE- Sessional Practical Examination; EPE-External Practical Exam

PAEDIATRIC NURSING (PRACTICAL)

Course Code: NUR2212

Credit Unit-10

This Course is based on Course Code NUR2209

Guidelines

The student will:

1. Be posted in Pediatric Medical and Surgical wards, OPD in hospital, health centre and neonatal unit.
2. Visit a centre for handicapped children and child welfare centre and write observation report.
3. Write an observational study of normal children of various age groups in home/ nursery school/ crèche.
4. Follow Nursing process in providing care to 3-6 children.
5. Write at least two Nursing care studies and do a presentation.
6. Give two planned health teachings, one in hospital and one in OPD / health centre.
7. Practice the following Nursing procedures:
 - Taking pediatric history
 - Physical assessment of children
 - Baby bath
 - Feeding
 - Restraining.
8. Calculation of dosage of drugs and administration of medications and injections.
9. Collection of specimens.
10. Enema, bowel wash, colostomy irrigation.
11. Steam and oxygen inhalation.
12. Preparation to assist with diagnostic tests and operations.
13. Examination / Assessment of a newborn.
14. Neonatal resuscitation.
15. Care of a baby in incubator and on ventilator.
16. Photo Therapy.
17. Assist in exchange transfusion and other therapeutic procedures.

Examination Scheme:

Components	NCP	HE	NCS/P	GDA	CE	SPE	EPE
Weightage (%)	10	10	20	10	30	20	100

NCP-Nursing Care Plan; HE- Health Education; NCS/P-Nursing Case Study/Presentation; GDA-Growth & Development Assessment; SPE-Sessional Practical Examination; CE- Clinical Evaluation; EPE- End Semester Practical Examination

COMMUNITY HEALTH NURSING (PRACTICAL)

Course Code: NUR2308

Credit Unit-10

This Course is based on Course Code NUR2306

Guidelines

1. Each student will prepare a Community profile.
2. The student will be allotted families for gaining experience in identifying family health needs, health counseling and guidance and family budgeting for optimum health.
3. The student will participate in the activities of primary health centre.
4. Sub-centre, MCH centre.
5. Visits will be made to selected health and welfare agencies, water purification plant and sewage disposal plant, infectious disease hospital, child welfare centre, old aged homes, orphanages and handicapped hospitals.
6. Conduct health educational programmes for individual/ groups/ Community.

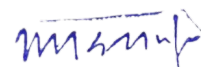
Examination Scheme:

Components	CHP	CP	FCS	OR	HE	EPE
Weightage (%)	20	10	30	10	30	100

CHP- Community Health project; CP-Community Profile; FCS-Family Case Study; OR- Observation Report; HE-Health Education; EPE-External Practical Exam



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INTRODUCTION TO NURSING RESEARCH AND STATISTICS

Course Code: NUR2407

Credit Unit-04

Course Description: The course is designed to assist the students to develop an understanding of basic concepts of Research and Statistics, use the findings of Nursing Research in nursing practices, apply the knowledge in conducting project(S) and solve problems related to nursing using scientific method.

OBJECTIVES

At the end of the course, the students will:

1. Define the terms and concepts of Nursing Research.
2. Identify needs and scope of Nursing Research
3. Identify and define a Research problem
4. Locate and list sources of literature for a specific study
5. Describe different Research approaches, methods of data collection and sampling techniques with a special reference to survey method.
6. Develop tool for data collection.
7. Enumerate steps of data analysis and present data summary in tabular form.
8. Use descriptive and co-relational statistics in data analysis.
9. Conduct a group Research project.

Course Contents

A. INTRODUCTION TO RESEARCH METHODOLOGY

Module I

- Steps of scientific methods.
- Definition of Research.
- Need for Nursing Research.
- Characteristics of good research. Research process.

Module II

- Statement of Research problem.
- Statement of purpose and objectives.
- Definition of Research terms.
- Review of literature.

Module III

- Research approaches: historical, survey and experimental.

Module IV

- Sampling techniques and methods of data collection.
- Sampling.
- Instrument-questionnaire, Interview.
- Observation schedule, records, measurements.
- Reliability and validity of instruments.

Module V

- Analysis of Data, Tabulation:
 - Classification and summarization
 - Presentation

- Interpretation of data.

Module VI

- Communication of research findings.
- Writing report:
 - Organizing materials for writing
 - Format of the report
 - Use of computers.

B. INTRODUCTION TO STATISTICS

Module VII

- Descriptive Statistics.
- Frequency Distribution – Types of measure - frequencies, class interval, graphic methods of describing frequency.
- Measures of Central Tendency – Mode, Median, Mean.
- Measures of variability: Range, Standard deviation
- Introduction to normal probability.

Module VIII

- Correlation.
- Computation by rank difference methods.
- Uses of correlation co-efficient.

Module IX

- Biostatistics: Crude rates and standardized rates, ratio and estimation of the trends.

Module X

- Introduction to computers in Nursing.
- Introduction to Computer and disk – operating system
- Introduction to word processing
- Introduction to data base
- Window application: Word, Excel, Power point, Multimedia.
- Use of statistical packages.
- Introduction to internet & use of electronic mail.
- Computer aided teaching & testing.

Examination Scheme:

Components	ATT	HA	CT	SE	EE
Weightage (%)	5	10	5	5	75

ATT-Attendance; HA-Home Assignment; CT-Class Test; SE-Sessional Examination;
EE- End Semester Examination

Text & References:

Text

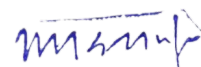
1. Polit. D. F. and Hungler, B. P, *Essentials of Nursing Research*, J. B. Lippincott Co., Philadelphia.
2. Basavanthappa B.T, *Nursing Research*, Jaypee Brothers, 2003, New Delhi

References

1. Treece, E. W. and Treece J. W, *Elements of Research in Nursing*, C.V. Mosby Co., St. Louis.
 2. Garrett H.E, *Statistic in Psychology & Education*, Vakils, Feffer and Samons, Bombay.
 3. Mahajan B.K, *Methods in Biostatistics*, Jaypee medical publication, 1999, New Delhi.
- * Latest editions of all the suggested books are recommended.



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PSYCHIATRIC NURSING (PRACTICAL)

Course Code: NUR2408

Credit Unit-10

This Course is based on Course Code NUR2405

Guidelines

The student will be provided opportunity to:

1. Observe, Record and Report the behavior of their selected patients.
2. Record the process of interaction.
3. Assess the Nursing needs of their selected patients, plan and implement the Nursing intervention.
4. Counsel the attendant and family members of patient.
5. Participate in the activities of Psychiatric team.
6. Write observation report after a field visit to the following places:
 - Child guidance clinic.
 - School / Special Schools (For mentally subnormal)
 - Mental Hospital,
 - Community Mental Health Centers.
 - De-addiction and Rehabilitation Centers.

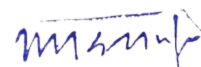
Examination Scheme:

Components	PR	NCP	NCS	MSE	HE	CE	EPE
Weightage (%)	20	20	20	10	10	20	100

PR-Process Recording; NCP-Nursing Care Plan; NCS-Nursing Case Study; MSE- Mental status Examination; HE- Health Education; CE-Clinical Evaluation; EPE-End Term Practical Examination.



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DISSERTATION (NURSING RESEARCH)

Course Code: NUR2437

Credit Unit-10

Objectives: During the training the students are expected to learn about research problem, research methodology, research plan, implementation and statistical methods. The knowledge will be utilized for improving the quality of nursing practice and education.

Research Project

Students will conduct research project in selected areas of nursing and submit a report. The studies may include exploring existing health practices, improved practices of nursing procedures, health records, patient records and survey of nursing literature.


Guidelines:

- During the clinical training a student will write a research project work related to the profession of nursing, based on his/her interest.
- Project work would be under the supervision of internal faculty (assigned for guiding the project) appointed by the Principal/Director of college of nursing.
- The research project would be completed and submitted before the completion of fourth semester of the course.
- Before the submission of project the student will be required to make a presentation before the research committee through power point presentation.
- The assessment of performance of student will be totally internal and the research committee will assess the student on the basis of his/her performance.
- There would be mid-term review of the progress of the project before three members of the research committee appointed by the Principal/Director of college of nursing.
- The research project work should cover the following area.
 - Review of literature on the selected topic and reporting
 - Formulation of problem statement, objectives.
 - Research methodology
 - Analysis and interpretation
 - Summary & Conclusion.

Examination Scheme

Components	PP	TP	DAP	GE	Pr R/V (EE)
Weightage (%)	10	10	15	15	50

PP -Proposal Presentation; TP- Tool Presentation; DAP- Data Analysis Presentation; GE- Guides' Evaluation; Pr R/V (EE)-Project Report/Viva (External Examination)


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PHARMACEUTICAL ANALYSIS

Course Code : BP102T

Credit Units: 04

Course Objective : This course deals with the fundamentals of analytical chemistry and principles of electrochemical analysis of drugs. Upon completion of the course student shall be able to understand the principles of volumetric and electro chemical analysis, carryout various volumetric and electrochemical titrations & develop analytical skills.

Course Contents :

Module-I

(a) Pharmaceutical analysis- Definition and scope

i) Different techniques of analysis

ii) Methods of expressing concentration

iii) Primary and secondary standards.

iv) Preparation and standardization of various molar and normal solutions-

Oxalic acid, sodium hydroxide, hydrochloric acid, sodium thiosulphate, sulphuric acid, potassium permanganate and ceric ammonium sulphate

(b) Errors: Sources of errors, types of errors, methods of minimizing errors, accuracy, precision and significant figures

(c) Pharmacopoeia, Sources of impurities in medicinal agents, limit tests.

Module-II

Acid base titration: Theories of acid base indicators, classification of acid base titrations and theory involved in titrations of strong, weak, and very weak acids and bases, neutralization curves

Non aqueous titration: Solvents, acidimetry and alkalimetry titration and estimation of Sodium benzoate and Ephedrine HCl

Module-III

Precipitation titrations: Mohr's method, Volhard's, Modified Volhard's, Fajans method, estimation of sodium chloride.

Complexometric titration: Classification, metal ion indicators, masking and demasking reagents, estimation of Magnesium sulphate, and calcium gluconate.

Gravimetry: Principle and steps involved in gravimetric analysis. Purity of the precipitate: coprecipitation and post precipitation, Estimation of barium sulphate.

Basic Principles, methods and application of diazotisation titration.

Module-IV

Redox titrations

(a) Concepts of oxidation and reduction

(b) Types of redox titrations (Principles and applications)

Cerimetry, Iodimetry, Iodometry, Bromatometry, Dichrometry, Titration with potassium iodate

Module-V

Electrochemical methods of analysis

Conductometry: Introduction, Conductivity cell, Conductometric titrations, applications.

Potentiometry - Electrochemical cell, construction and working of reference (Standard hydrogen, silver chloride electrode and calomel electrode) and indicator electrodes (metal electrodes and glass electrode), methods to determine end point of potentiometric titration and applications.

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Polarography: Principle, Ilkovic equation, construction and working of dropping mercury electrode and rotating platinum electrode, applications

Examination Scheme :

Components	CT	HA	S/V/Q	ATTD	EE
Weightage(%)	15	3	3	4	75

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, ATTD: Attendance EE: End Semester Examination

Recommended Books: (Latest Editions)

- A.H. Beckett & J.B. Stenlake's, Practical Pharmaceutical Chemistry Vol I & II, Stahlone Press of University of London
- A.I. Vogel, Text Book of Quantitative Inorganic analysis
- P. Gundu Rao, Inorganic Pharmaceutical Chemistry
- Bentley and Driver's Textbook of Pharmaceutical Chemistry
- John H. Kennedy, Analytical chemistry principles
- Indian Pharmacopoeia.



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COMMUNICATION SKILLS

Course Code : BP105T

Credit Units: 02

Course Objectives:

This course will prepare the young pharmacy student to interact effectively with doctors, nurses, dentists, physiotherapists and other health workers. At the end of this course the student will get the soft skills set to work cohesively with the team as a team player and will add value to the pharmaceutical business.

Course Contents:

Module-I

Communication Skills: Introduction, Definition, The Importance of Communication, The Communication Process – Source, Message, Encoding, Channel, Decoding, Receiver, Feedback, Context

Barriers to communication: Physiological Barriers, Physical Barriers, Cultural Barriers, Language Barriers, Gender Barriers, Interpersonal Barriers, Psychological Barriers, Emotional barriers

Perspectives in Communication: Introduction, Visual Perception, Language, Other factors affecting our perspective - Past Experiences, Prejudices, Feelings, Environment

Module-II

Elements of Communication: Introduction, Face to Face Communication - Tone of Voice, Body Language (Non-verbal communication), Verbal Communication, Physical Communication

Communication Styles: Introduction, The Communication Styles Matrix with example for each -Direct Communication Style, Spirited Communication Style, Systematic Communication Style, Considerate Communication Style

Module-III

Basic Listening Skills: Introduction, Self-Awareness, Active Listening, Becoming an Active Listener, Listening in Difficult Situations

Effective Written Communication: Introduction, When and When Not to Use Written Communication - Complexity of the Topic, Amount of Discussion Required, Shades of Meaning, Formal Communication

Writing Effectively: Subject Lines, Put the Main Point First, Know Your Audience, Organization of the Message

Module-IV

Interview Skills: Purpose of an interview, Do's and Dont's of an interview

Giving Presentations: Dealing with Fears, Planning your Presentation, Structuring Your Presentation, Delivering Your Presentation, Techniques of Delivery

Module-V

Group Discussion: Introduction, Communication skills in group discussion, Do's and Dont's of group discussion

Examination Scheme:

Components	CT	HA	S/V/Q	ATTD	EE
Weightage(%)	10	2	1	2	35

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, ATTD: Attendance

EE: End Semester Examination

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Recommended Books: (Latest Edition)

- Basic communication skills for Technology, Andreja. J. Ruther Ford, 2nd Edition, Pearson Education, 2011
- Communication skills, Sanjay Kumar, Pushpalata, 1stEdition, Oxford Press, 2011
- Organizational Behaviour, Stephen .P. Robbins, 1stEdition, Pearson, 2013
- Brilliant- Communication skills, Gill Hasson, 1stEdition, Pearson Life, 2011
- The Ace of Soft Skills: Attitude, Communication and Etiquette for success, Gopala Swamy Ramesh, 5thEdition, Pearson, 2013
- Developing your influencing skills, Deborah Dalley, Lois Burton, Margaret, Green hall, 1st Edition Universe of Learning LTD, 2010
- Communication skills for professionals, Konar nira, 2ndEdition, New arrivals – PHI, 2011
- Personality development and soft skills, Barun K Mitra, 1stEdition, Oxford Press, 2011
- Soft skill for everyone, Butter Field, 1st Edition, Cengage Learning india pvt.ltd, 2011
- Soft skills and professional communication, Francis Peters SJ, 1stEdition, Mc Graw Hill Education, 2011
- Effective communication, John Adair, 4thEdition, Pan Mac Millan,2009
- Bringing out the best in people, Aubrey Daniels, 2ndEdition, Mc Graw Hill, 1999



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HUMAN ANATOMY AND PHYSIOLOGY PRACTICAL-I

Course Code : BP107P

Credit Units: 02

Course Objective:

Practical physiology is complimentary to the theoretical discussions in physiology. Practicals allow the verification of physiological processes discussed in theory classes through experiments on living tissue, intact animals or normal human beings. This is helpful for developing an insight on the subject.

Course Contents:

List of experiments :

1. Study of compound microscope.
2. Microscopic study of epithelial and connective tissue
3. Microscopic study of muscular and nervous tissue
4. Identification of axial bones
5. Identification of appendicular bones
6. Introduction to hemocytometry.
7. Enumeration of white blood cell (WBC) count
8. Enumeration of total red blood corpuscles (RBC) count
9. Determination of bleeding time
10. Determination of clotting time
11. Estimation of hemoglobin content
12. Determination of blood group.
13. Determination of erythrocyte sedimentation rate (ESR).
14. Determination of heart rate and pulse rate.
15. Recording of blood pressure.

Examination Scheme :

IA				EE	
A	PR	LR	V	PR	V
02	05	03	05	25	10

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PHARMACEUTICAL ANALYSIS PRACTICAL

Course Code : BP108P

Credit Units: 02

List of experiments:

Limit Test of the following

- (1) Chloride
- (2) Sulphate
- (3) Iron
- (4) Arsenic

II Preparation and standardization of

- (1) Sodium hydroxide
- (2) Sulphuric acid
- (3) Sodium thiosulfate
- (4) Potassium permanganate
- (5) Ceric ammonium sulphate

III Assay of the following compounds along with Standardization of Titrant

- (1) Ammonium chloride by acid base titration
- (2) Ferrous sulphate by Cerimetry
- (3) Copper sulphate by Iodometry
- (4) Calcium gluconate by complexometry
- (5) Hydrogen peroxide by Permanganometry
- (6) Sodium benzoate by non-aqueous titration
- (7) Sodium Chloride by precipitation titration

IV Determination of Normality by electro-analytical methods

- (1) Conductometric titration of strong acid against strong base
- (2) Conductometric titration of strong acid and weak acid against strong base
- (3) Potentiometric titration of strong acid against strong base

Examination Scheme :

IA				EE	
A	PR	LR	V	PR	V
02	05	03	05	25	10

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PHARMACEUTICS PRACTICAL

Course Code : BP109P

Credit Units: 02

List of experiments :

1. Syrups

- a) Syrup IP'66
- b) Compound syrup of Ferrous Phosphate BPC'68

3 Hours / week

2. Elixirs

- a) Piperazine citrate elixir
- b) Paracetamol pediatric elixir

3. Linctus

- a) Terpin Hydrate Linctus IP'66

4. Solutions

- b) Iodine Throat Paint (Mandles Paint)
- a) Strong solution of ammonium acetate
- b) Cresol with soap solution
- c) Lugol's solution

5. Suspensions

- a) Calamine lotion
- b) Magnesium Hydroxide mixture
- c) Aluminium Hydroxide gel

6. Emulsions

- a) Turpentine Liniment
- b) Liquid paraffin emulsion

7. Powders and Granules

- a) ORS powder (WHO)
- b) Effervescent granules
- c) Dusting powder
- d) Divided powders

8. Suppositories

- a) Glycero gelatin suppository
- b) Cocoa butter suppository
- c) Zinc Oxide suppository

8. Semisolids

- a) Sulphur ointment
- b) Non staining-iodine ointment with methyl salicylate
- c) Carbopal gel

9. Gargles and Mouthwashes

- a) Iodine gargle
- b) Chlorhexidine mouthwash

Examination Scheme :

IA				EE	
A	PR	LR	V	PR	V
02	05	03	05	25	10

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PHARMACEUTICAL INORGANIC CHEMISTRY PRACTICAL

Course Code : BP110P

Credit Units: 02

List of experiments:

I Limit tests for following ions

Limit test for Chlorides and Sulphates
Modified limit test for Chlorides and Sulphates
Limit test for Iron
Limit test for Heavy metals
Limit test for Lead
Limit test for Arsenic

II Identification test

Magnesium hydroxide
Ferrous sulphate
Sodium bicarbonate
Calcium gluconate
Copper sulphate

III Test for purity

Swelling power of Bentonite
Neutralizing capacity of aluminum hydroxide gel
Determination of potassium iodate and iodine in potassium Iodide

IV Preparation of inorganic pharmaceuticals

Boric acid
Potash alum
Ferrous sulphate

Examination Scheme :

IA				EE	
A	PR	LR	V	PR	V
02	05	03	05	25	10

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COMMUNICATION SKILLS PRACTICAL

Course Code : BP111P

Credit Units: 01

The following learning modules are to be conducted using words worth® English language lab software

Basic communication covering the following topics

Meeting People
Asking Questions
Making Friends
What did you do?
Do's and Dont's

Pronunciations covering the following topics

Pronunciation (Consonant Sounds)
Pronunciation and Nouns
Pronunciation (Vowel Sounds)

Advanced Learning

Listening Comprehension / Direct and Indirect Speech
Figures of Speech
Effective Communication
Writing Skills
Effective Writing
Interview Handling Skills
E-Mail etiquette
Presentation Skills

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
02	03	02	03	5	10

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REMEDIAL BIOLOGY PRACTICAL

Course Code: BP112RBP

Credit Units: 01

List of Experiments :

1. Introduction to experiments in biology
 - a) Study of Microscope
 - b) Section cutting techniques
 - c) Mounting and staining
 - d) Permanent slide preparation
2. Study of cell and its inclusions
3. Study of Stem, Root, Leaf, seed, fruit, flower and their modifications
4. Detailed study of frog by using computer models
5. Microscopic study and identification of tissues pertinent to Stem, Root Leaf, seed, fruit and flower
6. Identification of bones
7. Determination of blood group
8. Determination of blood pressure
9. Determination of tidal volume

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
02	03	02	03	5	10

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COMPUTER APPLICATIONS IN PHARMACY

Course Code : BP205T

Credit Units: 03

Course Objectives: This subject deals with the introduction Database, Database Management system, computer application in clinical studies and use of databases.

Course Contents:

Module-I

Number System: Binary number system, Decimal number system, Octal number system, Hexadecimal number systems, conversion decimal to binary, binary to decimal, octal to binary etc, binary addition, binary subtraction – One's complement, Two's complement method, binary multiplication, binary division

Concept of Information Systems and Software : Information gathering, requirement and feasibility analysis, data flow diagrams, process specifications, input/output design, process life cycle, planning and managing the project

Module-II

Web technologies: Introduction to HTML, XML, CSS and Programming languages, introduction to web servers and Server Products Introduction to databases, MYSQL, MS ACCESS, Pharmacy Drug database

Module-III: Application of computers in Pharmacy - Drug information storage and retrieval, Pharmacokinetics, Mathematical model in Drug design, Hospital and Clinical Pharmacy, Electronic Prescribing and discharge (EP) systems, barcode medicine identification and automated dispensing of drugs, mobile technology and adherence monitoring Diagnostic System, Lab-diagnostic System, Patient Monitoring System, Pharma Information System

Module-IV

Bioinformatics: Introduction, Objective of Bioinformatics, Bioinformatics Databases, Concept of Bioinformatics, Impact of Bioinformatics in Vaccine Discovery

Module-V

Computers as data analysis in Preclinical development: Chromatographic data analysis(CDS), Laboratory Information management System (LIMS) and Text Information Management System (TIMS)

Examination Scheme:

Components	CT	HA	S/V/Q	ATTD	EE
Weightage(%)	15	3	3	4	50

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, ATTD: Attendance

EE: End Semester Examination

Recommended books (Latest edition):

- Computer Application in Pharmacy – William E.Fassett –Lea and Febiger, 600 South Washington Square, USA, (215) 922-1330.
- Computer Application in Pharmaceutical Research and Development –Sean Ekins – Wiley-Interscience, A John Wiley and Sons, INC., Publication, USA
- Bioinformatics (Concept, Skills and Applications) – S.C.Rastogi-CBS Publishers and Distributors, 4596/1- A, 11 Darya Gani, New Delhi – 110 002(INDIA)
- Microsoft office Access - 2003, Application Development Using VBA, SQL Server,
- DAP and Infopath – Cary N.Prague – Wiley Dreamtech India (P) Ltd., 4435/7, Ansari Road, Daryagani, New Delhi – 110002

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ENVIRONMENTAL SCIENCES

Course Code : BP206T

Credit Units: 03

Course Objectives: Environmental Sciences is the scientific study of the environmental system and the status of its inherent or induced changes on organisms. It includes not only the study of physical and biological characters of the environment but also the social and cultural factors and the impact of man on environment.

Course Contents:

Module-I: The Multidisciplinary nature of environmental studies Natural Resources Renewable and non-renewable resources:

Natural resources and associated problems a) Forest resources; b) Water resources; c) Mineral resources; d) Food resources; e) Energy resources; f) Land resources: Role of an individual in conservation of natural resources.

Module-II

Ecosystems Concept of an ecosystem. Structure and function of an ecosystem. Introduction, types, characteristic features, structure and function of the ecosystems: Forest ecosystem; Grassland ecosystem; Desert ecosystem; Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

Module-III

Environmental Pollution: Air pollution; Water pollution; Soil pollution

Examination Scheme:

Components	CT	HA	S/V/Q	ATTD	EE
Weightage(%)	15	3	3	4	50

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, ATTD: Attendance

EE: End Semester Examination

Recommended Books (Latest edition):

- Y.K. Sing, Environmental Science, New Age International Pvt, Publishers, Bangalore
- Agarwal, K.C. 2001 Environmental Biology, Nidi Publ. Ltd. Bikaner.
- Bharucha Erach, The Biodiversity of India, Mapin Publishing Pvt. Ltd., Ahmedabad – 380 013, India,
- Brunner R.C., 1989, Hazardous Waste Incineration, McGraw Hill Inc. 480p
- Clark R.S., Marine Pollution, Clanderson Press Oxford
- Cunningham, W.P. Cooper, T.H. Gorhani, E & Hepworth, M.T. 2001,
- Environmental Encyclopedia, Jaico Publ. House, Mumbai, 1196p
- De A.K., Environmental Chemistry, Wiley Eastern Ltd.
- Down of Earth, Centre for Science and Environment



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HUMAN ANATOMY AND PHYSIOLOGY PRACTICAL-II

Course Code: BP207P

Credit Units: 02

Practical physiology is complimentary to the theoretical discussions in physiology. Practicals allow the verification of physiological processes discussed in theory classes through experiments on living tissue, intact animals or normal human beings. This is helpful for developing an insight on the subject.

List of Experiments

1. To study the integumentary and special senses using specimen, models, etc.,
2. To study the nervous system using specimen, models, etc.,
3. To study the endocrine system using specimen, models, etc
4. To demonstrate the general neurological examination
5. To demonstrate the function of olfactory nerve
6. To examine the different types of taste.
7. To demonstrate the visual acuity
8. To demonstrate the reflex activity
9. Recording of body temperature
10. To demonstrate positive and negative feedback mechanism.
11. Determination of tidal volume and vital capacity.
12. Study of digestive, respiratory, cardiovascular systems, urinary and reproductive systems with the help of models, charts and specimens.
13. Recording of basal mass index .
14. Study of family planning devices and pregnancy diagnosis test.
15. Demonstration of total blood count by cell analyser
16. Permanent slides of vital organs and gonads.

Examination Scheme :

IA				EE	
A	PR	LR	V	PR	V
02	05	03	05	25	10

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PHARMACEUTICAL ORGANIC CHEMISTRY PRACTICAL-I

Course Code : BP208P

Credit Units: 02

List of experiments

A. Systematic qualitative analysis of unknown organic compounds like

1. Preliminary test: Color, odour, aliphatic/aromatic compounds, saturation and unsaturation, etc.
2. Detection of elements like Nitrogen, Sulphur and Halogen by Lassaigne's test
3. Solubility test
4. Functional group test like Phenols, Amides/ Urea, Carbohydrates, Amines, Carboxylic acids, Aldehydes and Ketones, Alcohols, Esters, Aromatic and Halogenated Hydrocarbons, Nitro compounds and Anilides.
5. Melting point/Boiling point of organic compounds
6. Identification of the unknown compound from the literature using melting point/ boiling point.
7. Preparation of the derivatives and confirmation of the unknown compound by melting point/ boiling point.
8. Minimum 5 unknown organic compounds to be analysed systematically.

B. Preparation of suitable solid derivatives from organic compounds

C. Construction of molecular models

Examination Scheme :

IA				EE	
A	PR	LR	V	PR	V
02	05	03	05	25	10

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BIOCHEMISTRY PRACTICAL

Course Code : BP209P

Credit Units: 02

List of experiments

1. Qualitative analysis of carbohydrates (Glucose, Fructose, Lactose, Maltose, Sucrose and starch)
2. Identification tests for Proteins (albumin and Casein)
3. Quantitative analysis of reducing sugars (DNSA method) and Proteins (Biuret method)
4. Qualitative analysis of urine for abnormal constituents
5. Determination of blood creatinine
6. Determination of blood sugar
7. Determination of serum total cholesterol
8. Preparation of buffer solution and measurement of pH
9. Study of enzymatic hydrolysis of starch
10. Determination of Salivary amylase activity
11. Study the effect of Temperature on Salivary amylase activity.
12. Study the effect of substrate concentration on salivary amylase activity.

Examination Scheme :

IA				EE	
A	PR	LR	V	PR	V
02	05	03	05	25	10

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COMPUTER APPLICATIONS IN PHARMACY PRACTICAL

Course Code : BP210P

Credit Units: 01

List of experiments

1. Design a questionnaire using a word processing package to gather information about a particular disease.
2. Create a HTML web page to show personal information.
- 3 Retrieve the information of a drug and its adverse effects using online tools
- 4 Creating mailing labels Using Label Wizard , generating label in MS WORD
- 5 Create a database in MS Access to store the patient information with the required fields Using access
6. Design a form in MS Access to view, add, delete and modify the patient record in the database
7. Generating report and printing the report from patient database
8. Creating invoice table using – MS Access
9. Drug information storage and retrieval using MS Access
10. Creating and working with queries in MS Access
11. Exporting Tables, Queries, Forms and Reports to web pages
12. Exporting Tables, Queries, Forms and Reports to XML pages

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
02	03	02	03	5	10

Note: A-Attendance, IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.



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PHARMACEUTICAL MICROBIOLOGY

Course Code : BP303T

Credit Units: 04

Course Objectives: Study of all categories of microorganisms especially for the production of alcohol antibiotics, vaccines, vitamins enzymes etc..

Course Content:

Module-I

Introduction, history of microbiology, its branches, scope and its importance. Introduction to Prokaryotes and Eukaryotes. Study of ultra-structure and morphological classification of bacteria, nutritional requirements, raw materials used for culture media and physical parameters for growth, growth curve, isolation and preservation methods for pure cultures, cultivation of anaerobes, quantitative measurement of bacterial growth (total & viable count). Study of different types of phase contrast microscopy, dark field microscopy and electron microscopy.

Module-II

Identification of bacteria using staining techniques (simple, Gram's & Acid fast staining) and biochemical tests (IMViC). Study of principle, procedure, merits, demerits and applications of physical, chemical gaseous, radiation and mechanical method of sterilization. Evaluation of the efficiency of sterilization methods. Equipments employed in large scale sterilization. Sterility indicators.

Module-III

Study of morphology, classification, reproduction/replication and cultivation of Fungi and Viruses. Classification and mode of action of disinfectants Factors influencing disinfection, antiseptics and their evaluation. For bacteriostatic and bactericidal actions Evaluation of bactericidal & Bacteriostatic. Sterility testing of products (solids, liquids, ophthalmic and other sterile products) according to IP, BP and USP.

Module-IV

Designing of aseptic area, laminar flow equipments; study of different sources of contamination in an aseptic area and methods of prevention, clean area classification. Principles and methods of different microbiological assay. Methods for standardization of antibiotics, vitamins and amino acids. Assessment of a new antibiotic.

Module-V

Types of spoilage, factors affecting the microbial spoilage of pharmaceutical products, sources and types of microbial contaminants, assessment of microbial contamination and spoilage. Preservation of pharmaceutical products using antimicrobial agents, evaluation of microbial stability of formulations. Growth of animal cells in culture, general procedure for cell culture, Primary, established and transformed cell cultures. Application of cell cultures in pharmaceutical industry and research.

Examination Scheme :

Components	CT	HA	S/V/Q	ATTD	EE
Weightage(%)	15	3	3	4	75

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, ATTD: Attendance EE: End Semester Examination


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Recommended Books (Latest edition)

- W.B. Hugo and A.D. Russel: Pharmaceutical Microbiology, Blackwell Scientific publications, Oxford London.
- Prescott and Dunn., Industrial Microbiology, 4th edition, CBS Publishers & Distributors, Delhi.
- Pelczar, Chan Kreig, Microbiology, Tata McGraw Hill edn.
- Malcolm Harris, Balliere Tindall and Cox: Pharmaceutical Microbiology.
- Rose: Industrial Microbiology.
- Probisher, Hinsdill et al: Fundamentals of Microbiology, 9th ed. Japan
- Cooper and Gunn's: Tutorial Pharmacy, CBS Publisher and Distribution. Peppler: Microbial Technology. I.P., B.P., U.S.P.- latest editions.
- Ananthnarayan : Text Book of Microbiology, Orient-Longman, Chennai Edward: Fundamentals of Microbiology.
- N.K.Jain: Pharmaceutical Microbiology, Vallabh Prakashan, Delhi
- Bergeys manual of systematic bacteriology, Williams and Wilkins- A Waverly company



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PHARMACEUTICAL ENGINEERING

Course Code : BP304T

Credit Units: 04

Course Objectives: This course is designed to impart a fundamental knowledge on the art and science of various Module operations used in pharmaceutical industry.

Course Content:

Module-I

Flow of fluids: Types of manometers, Reynolds number and its significance, Bernoulli's theorem and its applications, Energy losses, Orifice meter, Venturimeter, Pitot tube and Rotometer.

Size Reduction: Objectives, Mechanisms & Laws governing size reduction, factors affecting size reduction, principles, construction, working, uses, merits and demerits of Hammer mill, ball mill, fluid energy mill, Edge runner mill & end runner mill.

Size Separation: Objectives, applications & mechanism of size separation, official standards of powders, sieves, size separation Principles, construction, working, uses, merits and demerits of Sieve shaker, cyclone separator, Air separator, Bag filter & elutriation tank.

Module-II

Heat Transfer: Objectives, applications & Heat transfer mechanisms. Fourier's law, Heat transfer by conduction, convection & radiation. Heat interchangers & heat exchangers.

Evaporation: Objectives, applications and factors influencing evaporation, differences between evaporation and other heat process. principles, construction, working, uses, merits and demerits of Steam jacketed kettle, horizontal tube evaporator, climbing film evaporator, forced circulation evaporator, multiple effect evaporator & Economy of multiple effect evaporator.

Distillation: Basic Principles and methodology of simple distillation, flash distillation, fractional distillation, distillation under reduced pressure, steam distillation & molecular distillation

Module-III

Drying: Objectives, applications & mechanism of drying process, measurements & applications of Equilibrium Moisture content, rate of drying curve. principles, construction, working, uses, merits and demerits of Tray dryer, drum dryer spray dryer, fluidized bed dryer, vacuum dryer, freeze dryer.

Mixing: Objectives, applications & factors affecting mixing, Difference between solid and liquid mixing, mechanism of solid mixing, liquids mixing and semisolids mixing. Principles, Construction, Working, uses, Merits and Demerits of Double cone blender, twin shell blender, ribbon blender, Sigma blade mixer, planetary mixers, Propellers, Turbines, Paddles & Silverson Emulsifier,

Module-IV

Filtration: Objectives, applications, Theories & Factors influencing filtration, filter aids, filter medias. Principle, Construction, Working, Uses, Merits and demerits of plate & frame filter, filter leaf, rotary drum filter, Meta filter & Cartridge filter, membrane filters and Seidtz filter.

Centrifugation: Objectives, principle & applications of Centrifugation, principles, construction, working, uses, merits and demerits of Perforated basket centrifuge, Non-perforated basket centrifuge, semi continuous centrifuge & super centrifuge.

Module-V

Materials of pharmaceutical plant construction, Corrosion and its prevention: Factors affecting during materials selected for Pharmaceutical plant construction, Theories of corrosion, types of corrosion

and there prevention. Ferrous and nonferrous metals, inorganic and organic non metals, basic of material handling systems.

Examination Scheme :

Components	CT	HA	S/V/Q	ATTD	EE
Weightage(%)	15	3	3	4	75

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, ATTD: Attendance EE: End Semester Examination

Recommended Books: (Latest Editions)

- Introduction to chemical engineering – Walter L Badger & Julius Banchero, Latest edition.
- Solid phase extraction, Principles, techniques and applications by Nigel J.K. Simpson Latest edition.
- Module operation of chemical engineering – McCabe Smith, Latest edition.
- Pharmaceutical engineering principles and practices – C.V.S Subrahmanyam et al., Latest edition.
- Remington practice of pharmacy- Martin, Latest edition.
- Theory and practice of industrial pharmacy by Lachmann., Latest edition.
- Physical pharmaceutics- C.V.S Subrahmanyam et al., Latest edition.
- Cooper and Gunn's Tutorial pharmacy, S.J. Carter, Latest edition.



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PHARMACEUTICAL ORGANIC CHEMISTRY PRACTICAL-II

Course Code : BP305P

Credit Units: 02

List of experiments

I Experiments involving laboratory techniques

Recrystallization

Steam distillation

II Determination of following oil values (including standardization of reagents)

Acid value

Saponification value

Iodine value

III Preparation of compounds

Benzanilide/Phenyl benzoate/Acetanilide from Aniline/ Phenol /Aniline by acylation reaction.

2,4,6-Tribromo aniline/Para bromo acetanilide from Aniline/ Acetanilide by halogenation (Bromination) reaction.

5-Nitro salicylic acid/Meta di nitro benzene from Salicylic acid / Nitro benzene by nitration reaction.

Benzoic acid from Benzyl chloride by oxidation reaction.

Benzoic acid/ Salicylic acid from alkyl benzoate/ alkyl salicylate by hydrolysis reaction.

1-Phenyl azo-2-naphthol from Aniline by diazotization and coupling reactions.

Benzil from Benzoin by oxidation reaction.

Dibenzal acetone from Benzaldehyde by Claisen Schmidt reaction

Cinnamic acid from Benzaldehyde by Perkin reaction

P-Iodo benzoic acid from *P*-amino benzoic acid

Examination Scheme :

IA				EE	
A	PR	LR	V	PR	V
02	05	03	05	25	10

Note: A-Attendance, IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.


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PHYSICAL PHARMACEUTICS PRACTICAL-I

Course Code : BP306P

Credit Units: 02

List of Experiments

1. Determination the solubility of drug at room temperature
2. Determination of pKa value by Half Neutralization/ Henderson Hasselbalch equation.
3. Determination of Partition co- efficient of benzoic acid in benzene and water
4. Determination of Partition co- efficient of Iodine in CCl₄ and water
5. Determination of % composition of NaCl in a solution using phenol-water system by CST method
6. Determination of surface tension of given liquids by drop count and drop weight method
7. Determination of HLB number of a surfactant by saponification method
8. Determination of Freundlich and Langmuir constants using activated char coal
9. Determination of critical micellar concentration of surfactants
10. Determination of stability constant and donor acceptor ratio of PABA-Caffeine complex by solubility method
11. Determination of stability constant and donor acceptor ratio of Cupric-Glycine complex by pH titration method

Examination Scheme :

IA				EE	
A	PR	LR	V	PR	V
02	05	03	05	25	10

Note: A-Attendance, IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.



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PHARMACEUTICAL MICROBIOLOGY PRACTICAL

Course Code : BP307P

Credit Units: 02

List of experiments

1. Introduction and study of different equipments and processing, e.g., B.O.D. incubator, laminar flow, aseptic hood, autoclave, hot air sterilizer, deep freezer, refrigerator, microscopes used in experimental microbiology.
2. Sterilization of glassware, preparation and sterilization of media.
3. Sub culturing of bacteria and fungus. Nutrient stabs and slants preparations.
4. Staining methods- Simple, Grams staining and acid fast staining (Demonstration with practical).
5. Isolation of pure culture of micro-organisms by multiple streak plate technique and other techniques.
6. Microbiological assay of antibiotics by cup plate method and other methods
7. Motility determination by Hanging drop method.
8. Sterility testing of pharmaceuticals.
9. Bacteriological analysis of water
10. Biochemical test.

Examination Scheme :

IA				EE	
A	PR	LR	V	PR	V
02	05	03	05	25	10

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PHARMACEUTICAL ENGINEERING PRACTICAL

Course Code : BP308P

Credit Units: 02

List of Experiments

- I. Determination of radiation constant of brass, iron, unpainted and painted glass.
- II. Steam distillation – To calculate the efficiency of steam distillation.
- III. To determine the overall heat transfer coefficient by heat exchanger.
- IV. Construction of drying curves (for calcium carbonate and starch).
- V. Determination of moisture content and loss on drying.
- VI. Determination of humidity of air – i) From wet and dry bulb temperatures –use of Dew point method.
- VII. Description of Construction working and application of Pharmaceutical Machinery such as rotary tablet machine, fluidized bed coater, fluid energy mill, de humidifier.
- VIII. Size analysis by sieving – To evaluate size distribution of tablet granulations – Construction of various size frequency curves including arithmetic and logarithmic probability plots.
- IX. Size reduction: To verify the laws of size reduction using ball mill and determining Kicks, Rittinger's, Bond's coefficients, power requirement and critical speed of Ball Mill.
- X. Demonstration of colloid mill, planetary mixer, fluidized bed dryer, freeze dryer and such other major equipment.
- XI. Factors affecting Rate of Filtration and Evaporation (Surface area, Concentration and Thickness/ viscosity
- XII. To study the effect of time on the Rate of Crystallization.
- XIII. To calculate the uniformity Index for given sample by using Double Cone Blender.

Examination Scheme :

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02	05	03	05	25	10

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MEDICINAL CHEMISTRY PRACTICAL-I

Course Code : BP406P

Credit Units: 02

List of experiments

I Preparation of drugs/ intermediates

- 1,3-pyrazole
- 1,3-oxazole
- Benzimidazole
- Benzotriazole
- 2,3- diphenyl quinoxaline
- Benzocaine
- Phenytoin
- Phenothiazine
- Barbiturate

II Assay of drugs

- Chlorpromazine
- Phenobarbitone
- Atropine
- Ibuprofen
- Aspirin
- Furosemide

III Determination of Partition coefficient for any two drugs

Examination Scheme :

IA				EE	
A	PR	LR	V	PR	V
02	05	03	05	25	10

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PHYSICAL PHARMACEUTICS PRACTICAL-II

Course Code : BP407P

Credit Units: 02

List of experiments

1. Determination of particle size, particle size distribution using sieving method
2. Determination of particle size, particle size distribution using Microscopic method
3. Determination of bulk density, true density and porosity
4. Determine the angle of repose and influence of lubricant on angle of repose
5. Determination of viscosity of liquid using Ostwald's viscometer
6. Determination sedimentation volume with effect of different suspending agent
7. Determination sedimentation volume with effect of different concentration of single suspending agent
8. Determination of viscosity of semisolid by using Brookfield viscometer
9. Determination of reaction rate constant first order.
10. Determination of reaction rate constant second order
11. Accelerated stability studies

Examination Scheme :

IA				EE	
A	PR	LR	V	PR	V
02	05	03	05	25	10

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PHARMACOLOGY PRACTICAL-I

Course Code : BP408P

Credit Units: 02

List of experiments

1. Introduction to experimental pharmacology.
2. Commonly used instruments in experimental pharmacology.
3. Study of common laboratory animals.
4. Maintenance of laboratory animals as per CPCSEA guidelines.
5. Common laboratory techniques. Blood withdrawal, serum and plasma separation, anesthetics and euthanasia used for animal studies.
6. Study of different routes of drugs administration in mice/rats.
7. Study of effect of hepatic microsomal enzyme inducers on the phenobarbitone sleeping time in mice.
8. Effect of drugs on ciliary motility of frog oesophagus
9. Effect of drugs on rabbit eye.
10. Effects of skeletal muscle relaxants using rota-rod apparatus.
11. Effect of drugs on locomotor activity using actophotometer.
12. Anticonvulsant effect of drugs by MES and PTZ method.
13. Study of stereotype and anti-catatonic activity of drugs on rats/mice.
14. Study of anxiolytic activity of drugs using rats/mice.
15. Study of local anesthetics by different methods

Note: All laboratory techniques and animal experiments are demonstrated by simulated experiments by softwares and videos

Examination Scheme :

IA				EE	
A	PR	LR	V	PR	V
02	05	03	05	25	10

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PHARMACOGNOSY AND PHYTOCHEMISTRY PRACTICAL-I

Course Code : BP409P

Credit Units: 02

List of experiments

1. Analysis of crude drugs by chemical tests: (i) Tragacanth (ii) Acacia (iii) Agar (iv) Gelatin (v) starch (vi) Honey (vii) Castor oil
2. Determination of stomatal number and index
3. Determination of vein islet number, vein islet termination and palisade ratio.
4. Determination of size of starch grains, calcium oxalate crystals by eye piece micrometer
5. Determination of Fiber length and width
6. Determination of number of starch grains by Lycopodium spore method
7. Determination of Ash value
8. Determination of Extractive values of crude drugs
9. Determination of moisture content of crude drugs
10. Determination of swelling index and foaming

Examination Scheme :

IA				EE	
A	PR	LR	V	PR	V
02	05	03	05	25	10

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INDUSTRIAL PHARMACY-I

Course Code : BP502T

Credit Units: 04

Course Objectives: Course enables the student to understand and appreciate the influence of pharmaceutical additives and various pharmaceutical dosage forms on the performance of the drug product.

Course content:

Module-I

Preformulation Studies: Introduction to preformulation, goals and objectives, study of physicochemical characteristics of drug substances.

a. Physical properties: Physical form (crystal & amorphous), particle size, shape, flow properties, solubility profile (pKa, pH, partition coefficient), polymorphism

b. Chemical Properties: Hydrolysis, oxidation, reduction, racemisation, polymerization BCS classification of drugs & its significant. Application of preformulation considerations in the development of solid, liquid oral and parenteral dosage forms and its impact on stability of dosage forms.

Module-II

Tablets:

a. Introduction, ideal characteristics of tablets, classification of tablets. Excipients, Formulation of tablets, granulation methods, compression and processing problems. Equipments and tablet tooling.

b. Tablet coating: Types of coating, coating materials, formulation of coating composition, methods of coating, equipment employed and defects in coating.

c. Quality control tests: In process and finished product tests

Liquid orals: Formulation and manufacturing consideration of syrups and elixirs suspensions and emulsions; Filling and packaging; evaluation of liquid orals official in pharmacopoeia

Module-III

Capsules:

a. **Hard gelatin capsules:** Introduction, Production of hard gelatin capsule shells. Size of capsules, Filling, finishing and special techniques of formulation of hard gelatin capsules, manufacturing defects. In process and final product quality control tests for capsules.

b. **Soft gelatin capsules:** Nature of shell and capsule content, size of capsules, importance of base adsorption and minim/gram factors, production, in process and final product quality control tests. Packing, storage and stability testing of soft gelatin capsules and their applications.

Pellets: Introduction, formulation requirements, pelletization process, equipments for manufacture of pellets

Module-IV

Parenteral Products:

a. Definition, types, advantages and limitations. Preformulation factors and essential requirements, vehicles, additives, importance of isotonicity

b. Production procedure, production facilities and controls, aseptic processing

c. Formulation of injections, sterile powders, large volume parenterals and lyophilized products.

d. Containers and closures selection, filling and sealing of ampoules, vials and infusion fluids. Quality control tests of parenteral products.

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Ophthalmic Preparations: Introduction, formulation considerations; formulation of eye drops, eye ointments and eye lotions; methods of preparation; labeling, containers; evaluation of ophthalmic preparations

Module-V

Cosmetics: Formulation and preparation of the following cosmetic preparations: lipsticks, shampoos, cold cream and vanishing cream, tooth pastes, hair dyes and sunscreens.

Pharmaceutical Aerosols: Definition, propellants, containers, valves, types of aerosol systems; formulation and manufacture of aerosols; Evaluation of aerosols; Quality control and stability studies.

Packaging Materials Science: Materials used for packaging of pharmaceutical products, factors influencing choice of containers, legal and official requirements for containers, stability aspects of packaging materials, quality control tests.

Examination Scheme :

Components	CT	HA	S/V/Q	ATTD	EE
Weightage(%)	15	3	3	4	75

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, ATTD: Attendance EE: End Semester Examination

Recommended Books: (Latest Editions)

- Pharmaceutical dosage forms - Tablets, volume 1 -3 by H.A. Liberman, Leon Lachman & J.B.Schwartz
- Pharmaceutical dosage form - Parenteral medication vol- 1&2 by Liberman & Lachman
- Pharmaceutical dosage form disperse system VOL-1 by Liberman & Lachman
- Modern Pharmaceutics by Gilbert S. Banker & C.T. Rhodes, 3rd Edition
- Remington: The Science and Practice of Pharmacy, 20th edition Pharmaceutical Science (RPS)
- Theory and Practice of Industrial Pharmacy by Liberman & Lachman
- Pharmaceutics- The science of dosage form design by M.E.Aulton, Churchill livingstone, Latest edition
- Introduction to Pharmaceutical Dosage Forms by H. C.Ansel, Lea &Febiger, Philadelphia, 5th edition, 2005
- Drug stability - Principles and practice by Cartensen & C.J. Rhodes, 3rd Edition, Marcel Dekker Series, Vol 107.



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PHARMACEUTICAL JURISPRUDENCE

Course Code : BP505T

Credit Units: 04

Course Objectives: This course is designed to impart basic knowledge on important legislations related to the profession of pharmacy in India.

Course Content:

Module-I

Drugs and Cosmetics Act, 1940 and its rules 1945:

Objectives, Definitions, Legal definitions of schedules to the Act and Rules

Import of drugs – Classes of drugs and cosmetics prohibited from import, Import under license or permit. Offences and penalties.

Manufacture of drugs – Prohibition of manufacture and sale of certain drugs,

Conditions for grant of license and conditions of license for manufacture of drugs,

Manufacture of drugs for test, examination and analysis, manufacture of new drug, loan license and repacking license.

Module-II

Drugs and Cosmetics Act, 1940 and its rules 1945.

Detailed study of Schedule G, H, M, N, P, T, U, V, X, Y, Part XII B, Sch F & DMR (OA)

Sale of Drugs – Wholesale, Retail sale and Restricted license. Offences and penalties

Labeling & Packing of drugs- General labeling requirements and specimen labels for drugs and cosmetics, List of permitted colors. Offences and penalties.

Administration of the Act and Rules – Drugs Technical Advisory Board, Central drugs

Laboratory, Drugs Consultative Committee, Government drug analysts, Licensing authorities, controlling authorities, Drugs Inspectors

Module-III

Pharmacy Act –1948: Objectives, Definitions, Pharmacy Council of India; its constitution and functions, Education Regulations, State and Joint state pharmacy councils; constitution and functions, Registration of Pharmacists, Offences and Penalties

Medicinal and Toilet Preparation Act –1955: Objectives, Definitions, Licensing,

Manufacture In bond and Outside bond, Export of alcoholic preparations,

Manufacture of Ayurvedic, Homeopathic, Patent & Proprietary Preparations.

Offences and Penalties.

Narcotic Drugs and Psychotropic substances Act-1985 and Rules: Objectives, Definitions, Authorities and Officers, Constitution and Functions of narcotic & Psychotropic Consultative Committee, National Fund for Controlling the Drug Abuse, Prohibition, Control and Regulation, opium poppy cultivation and production of poppy straw, manufacture, sale and export of opium, Offences and Penalties

Module -IV

Study of Salient Features of Drugs and Magic Remedies Act and its rules: Objectives, Definitions, Prohibition of certain advertisements, Classes of Exempted advertisements, Offences and Penalties

Prevention of Cruelty to animals Act-1960: Objectives, Definitions, Institutional Animal Ethics Committee, CPCSEA guidelines for Breeding and Stocking of Animals, Performance of Experiments, Transfer and acquisition of animals for experiment, Records, Power to suspend or revoke registration, Offences and Penalties

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National Pharmaceutical Pricing Authority: Drugs Price Control Order (DPCO)- 2013. Objectives, Definitions, Sale prices of bulk drugs, Retail price of formulations, Retail price and ceiling price of scheduled formulations, National List of Essential Medicines (NLEM)

Module-V

Pharmaceutical Legislations – A brief review, Introduction, Study of drugs enquiry committee, Health survey and development committee, Hathi committee and Mudaliar committee

Code of Pharmaceutical ethics Definition, Pharmacist in relation to his job, trade, medical profession and his profession, Pharmacist's oath

Medical Termination of Pregnancy Act

Right to Information Act

Introduction to Intellectual Property Rights (IPR)

Examination Scheme :

Components	CT	HA	S/V/Q	ATTD	EE
Weightage(%)	15	3	3	4	75

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, ATTD: Attendance EE: End Semester Examination

Recommended books: (Latest Edition)

- Forensic Pharmacy by B. Suresh
- Text book of Forensic Pharmacy by B.M. Mithal
- Hand book of drug law-by M.L. Mehra
- A text book of Forensic Pharmacy by N.K. Jain
- Drugs and Cosmetics Act/Rules by Govt. of India publications.
- Medicinal and Toilet preparations act 1955 by Govt. of India publications.
- Narcotic drugs and psychotropic substances act by Govt. of India publications
- Drugs and Magic Remedies act by Govt. of India publication
- Bare Acts of the said laws published by Government. Reference books (Theory)



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INDUSTRIAL PHARMACY PRACTICAL-I

Course Code : BP506P

Credit Units: 02

List of experiments

1. Preformulation studies on paracetamol/asparin/or any other drug
2. Preparation and evaluation of Paracetamol tablets
3. Preparation and evaluation of Aspirin tablets
4. Coating of tablets- film coating of tables/granules
5. Preparation and evaluation of Tetracycline capsules
6. Preparation of Calcium Gluconate injection
7. Preparation of Ascorbic Acid injection
8. Qulaity control test of (as per IP) marketed tablets and capsules
9. Preparation of Eye drops/ and Eye ointments
10. Preparation of Creams (cold / vanishing cream)
11. Evaluation of Glass containers (as per IP)

Examination Scheme :

IA				EE	
A	PR	LR	V	PR	V
02	05	03	05	25	10

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PHARMACOLOGY PRACTICAL-II

Course Code : BP507P

Credit Units: 02

List of experiments

1. Introduction to *in-vitro* pharmacology and physiological salt solutions.
2. Effect of drugs on isolated frog heart.
3. Effect of drugs on blood pressure and heart rate of dog.
4. Study of diuretic activity of drugs using rats/mice.
5. DRC of acetylcholine using frog rectus abdominis muscle.
6. Effect of physostigmine and atropine on DRC of acetylcholine using frog rectus abdominis muscle and rat ileum respectively.
7. Bioassay of histamine using guinea pig ileum by matching method.
8. Bioassay of oxytocin using rat uterine horn by interpolation method.
9. Bioassay of serotonin using rat fundus strip by three point bioassay.
10. Bioassay of acetylcholine using rat ileum/colon by four point bioassay.
11. Determination of PA₂ value of prazosin using rat anococcygeus muscle (by Schilds plot method).
12. Determination of PD₂ value using guinea pig ileum.
13. Effect of spasmogens and spasmolytics using rabbit jejunum.
14. Anti-inflammatory activity of drugs using carrageenan induced paw-edema model.
15. Analgesic activity of drug using central and peripheral methods

Note: All laboratory techniques and animal experiments are demonstrated by simulated experiments by softwares and videos

Examination Scheme :

IA				EE	
A	PR	LR	V	PR	V
02	05	03	05	25	10

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PHARMACOGNOSY AND PHYTOCHEMISTRY PRACTICAL-II

Course Code : BP508P

Credit Units: 02

List of Experiments

1. Morphology, histology and powder characteristics & extraction & detection of: Cinchona, Cinnamon, Senna, Clove, Ephedra, Fennel and Coriander
2. Exercise involving isolation & detection of active principles
 - a. Caffeine - from tea dust.
 - b. Diosgenin from Dioscorea
 - c. Atropine from Belladonna
 - d. Sennosides from Senna
3. Separation of sugars by Paper chromatography
4. TLC of herbal extract
5. Distillation of volatile oils and detection of phytoconstituents by TLC
6. Analysis of crude drugs by chemical tests: (i) Asafoetida (ii) Benzoin (iii) Colophony (iv) Aloes (v) Myrrh

Examination Scheme :

IA				EE	
A	PR	LR	V	PR	V
02	05	03	05	25	10

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HERBAL DRUG TECHNOLOGY

Course Code : BP603T

Credit Units: 04

Course Objectives: This subject gives the student the knowledge of basic understanding of herbal drug industry, the quality of raw material, guidelines for quality of herbal drugs, herbal cosmetics, natural sweeteners, nutraceutical etc. The subject also emphasizes on Good Manufacturing Practices (GMP), patenting and regulatory issues of herbal drugs

Course Content:

Module-I

Herbs as raw materials: Definition of herb, herbal medicine, herbal medicinal product, herbal drug preparation. Source of Herbs. Selection, identification and authentication of herbal materials. Processing of herbal raw material

Biodynamic Agriculture: Good agricultural practices in cultivation of medicinal plants including Organic farming. Pest and Pest management in medicinal plants: Biopesticides/Bioinsecticides.

Indian Systems of Medicine

- a) Basic principles involved in Ayurveda, Siddha, Unani and Homeopathy
- b) Preparation and standardization of Ayurvedic formulations viz Aristas and Asawas, Ghutika, Churna, Lehya and Bhasma.

Module-II

Nutraceuticals: General aspects, Market, growth, scope and types of products available in the market. Health benefits and role of Nutraceuticals in ailments like Diabetes, CVS diseases, Cancer, Irritable bowel syndrome and various Gastro intestinal diseases. Study of following herbs as health food: Alfaalfa, Chicory, Ginger, Fenugreek, Garlic, Honey, Amla, Ginseng, Ashwagandha, Spirulina

Herbal-Drug and Herb-Food Interactions: General introduction to interaction and classification. Study of following drugs and their possible side effects and interactions: Hypercium, kava-kava, Ginkobiloba, Ginseng, Garlic, Pepper & Ephedra.

Module-III

Herbal Cosmetics

Sources and description of raw materials of herbal origin used via, fixed oils, waxes, gums colours, perfumes, protective agents, bleaching agents, antioxidants in products such as skin care, hair care and oral hygiene products.

Herbal excipients:

Herbal Excipients – Significance of substances of natural origin as excipients – colorants, sweeteners, binders, diluents, viscosity builders, disintegrants, flavors & perfumes.

Herbal formulations :

Conventional herbal formulations like syrups, mixtures and tablets and Novel dosage forms like phytosomes

Module-IV

Evaluation of Drugs WHO & ICH guidelines for the assessment of herbal drugs Stability testing of herbal drugs.

Patenting and Regulatory requirements of natural products:

- a) Definition of the terms: Patent, IPR, Farmers right, Breeder's right, Bioprospecting and Biopiracy
- b) Patenting aspects of Traditional Knowledge and Natural Products. Case study of Curcuma & Neem.

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Regulatory Issues - Regulations in India (ASU DTAB, ASU DCC), Regulation of manufacture of ASU drugs - Schedule Z of Drugs & Cosmetics Act for ASU drugs.

Module-V

General Introduction to Herbal Industry: Herbal drugs industry: Present scope and future prospects. A brief account of plant based industries and institutions involved in work on medicinal and aromatic plants in India.

Schedule T – Good Manufacturing Practice of Indian systems of medicine

Components of GMP (Schedule – T) and its objectives

Infrastructural requirements, working space, storage area, machinery and equipments, standard operating procedures, health and hygiene, documentation and records.

Examination Scheme :

Components	CT	HA	S/V/Q	ATTD	EE
Weightage(%)	15	3	3	4	75

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, ATTD: Attendance EE: End Semester Examination

Recommended Books: (Latest Editions)

- Textbook of Pharmacognosy by Trease & Evans.
- Textbook of Pharmacognosy by Tyler, Brady & Robber.
- Pharmacognosy by Kokate, Purohit and Gokhale
- Essential of Pharmacognosy by Dr.S.H.Ansari
- Pharmacognosy & Phytochemistry by V.D.Rangari
- Pharmacopoeal standards for Ayurvedic Formulation (Council of Research in
- Indian Medicine & Homeopathy)
- Mukherjee, P.W. Quality Control of Herbal Drugs: An Approach to Evaluation of
- Botanicals. Business Horizons Publishers, New Delhi, India, 2002



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PHARMACEUTICAL QUALITY ASSURANCE

Course Code : BP606T

Credit Units: 04

Course Objectives: This course deals with the various aspects of quality control and quality assurance aspects of pharmaceutical industries. It deals with the important aspects like cGMP, QC tests, documentation, quality certifications and regulatory affairs.

Course Content:

Module-I

Quality Assurance and Quality Management concepts: Definition and concept of Quality control, Quality assurance and GMP

Total Quality Management (TQM): Definition, elements, philosophies

ICH Guidelines: purpose, participants, process of harmonization, Brief overview of QSEM, with special emphasis on Q-series guidelines, ICH stability testing guidelines

Quality by design (QbD): Definition, overview, elements of QbD program, tools

ISO 9000 & ISO14000: Overview, Benefits, Elements, steps for registration

NABL accreditation : Principles and procedures

Module-II

Organization and personnel: Personnel responsibilities, training, hygiene and personal records.

Premises: Design, construction and plant layout, maintenance, sanitation, environmental control, utilities and maintenance of sterile areas, control of contamination.

Equipments and raw materials: Equipment selection, purchase specifications, maintenance, purchase specifications and maintenance of stores for raw materials.

Module-III

Quality Control: Quality control test for containers, rubber closures and secondary packing materials.

Good Laboratory Practices: General Provisions, Organization and Personnel, Facilities, Equipment, Testing Facilities Operation, Test and Control Articles, Protocol for Conduct of a Nonclinical Laboratory Study, Records and Reports, Disqualification of Testing Facilities

Module-IV

Complaints: Complaints and evaluation of complaints, Handling of return good, recalling and waste disposal.

Document maintenance in pharmaceutical industry: Batch Formula Record, Master Formula Record, SOP, Quality audit, Quality Review and Quality documentation, Reports and documents, distribution records.

Module-V

Calibration and Validation: Introduction, definition and general principles of calibration, qualification and validation, importance and scope of validation, types of validation, validation master plan. Calibration of pH meter, Qualification of UV-Visible spectrophotometer, General principles of Analytical method Validation.

Warehousing: Good warehousing practice, materials management


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Examination Scheme :

Components	CT	HA	S/V/Q	ATTD	EE
Weightage(%)	15	3	3	4	75

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, ATTD: Attendance EE: End Semester Examination

Recommended Books: (Latest Edition)

- Quality Assurance Guide by organization of Pharmaceutical Products of India.
- Good Laboratory Practice Regulations, 2nd Edition, Sandy Weinberg Vol. 69.
- Quality Assurance of Pharmaceuticals- A compendium of Guide lines and Related materials Vol IWHO Publications.
- A guide to Total Quality Management- Kushik Maitra and Sedhan K Ghosh
- How to Practice GMP's – P P Sharma.
- ISO 9000 and Total Quality Management – Sadhan K Ghosh
- The International Pharmacopoeia – Vol I, II, III, IV- General Methods of Analysis and Quality specification for Pharmaceutical Substances, Excipients and Dosage forms
- Good laboratory Practices – Marcel Deckker Series
- ICH guidelines, ISO 9000 and 14000 guidelines



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MEDICINAL CHEMISTRY PRACTICAL-III

Course Code : BP607P

Credit Units: 02

List of experiments

I Preparation of drugs and intermediates

- 1 Sulphanilamide
- 2 7-Hydroxy, 4-methyl coumarin
- 3 Chlorobutanol
- 4 Triphenyl imidazole
- 5 Tolbutamide
- 6 Hexamine

II Assay of drugs

- 1 Isonicotinic acid hydrazide
- 2 Chloroquine
- 3 Metronidazole
- 4 Dapsone
- 5 Chlorpheniramine maleate
- 6 Benzyl penicillin

III Preparation of medicinally important compounds or intermediates by Microwave irradiation technique

IV Drawing structures and reactions using chem draw®

V Determination of physicochemical properties such as logP, clogP, MR, Molecular weight, Hydrogen bond donors and acceptors for class of drugs course content using drug design software Drug likeliness screening (Lipinskies RO5)

Examination Scheme :

IA				EE	
A	PR	LR	V	PR	V
02	05	03	05	25	10

Note: A-Attendance, IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.



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PHARMACOLOGY PRACTICAL-III

Course Code : BP608P

Credit Units: 02

List of experiments

1. Dose calculation in pharmacological experiments
2. Antiallergic activity by mast cell stabilization assay
3. Study of anti-ulcer activity of a drug using pylorus ligand (SHAY) rat model and NSAIDS induced ulcer model.
4. Study of effect of drugs on gastrointestinal motility
5. Effect of agonist and antagonists on guinea pig ileum
6. Estimation of serum biochemical parameters by using semi- autoanalyser
7. Effect of saline purgative on frog intestine
8. Insulin hypoglycemic effect in rabbit
9. Test for pyrogens (rabbit method)
10. Determination of acute oral toxicity (LD50) of a drug from a given data
11. Determination of acute skin irritation / corrosion of a test substance
12. Determination of acute eye irritation / corrosion of a test substance
13. Calculation of pharmacokinetic parameters from a given data
14. Biostatistics methods in experimental pharmacology(student's t test, ANOVA)
15. Biostatistics methods in experimental pharmacology (Chi square test, Wilcoxon Signed Rank test)

**Experiments are demonstrated by simulated experiments/videos*

Examination Scheme :

IA				EE	
A	PR	LR	V	PR	V
02	05	03	05	25	10

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HERBAL DRUG TECHNOLOGY PRACTICAL

Course Code : BP609P

Credit Units: 02

List of experiments

1. To perform preliminary phytochemical screening of crude drugs.
2. Determination of the alcohol content of Asava and Arista
3. Evaluation of excipients of natural origin
4. Incorporation of prepared and standardized extract in cosmetic formulations like creams, lotions and shampoos and their evaluation.
5. Incorporation of prepared and standardized extract in formulations like syrups, mixtures and tablets and their evaluation as per Pharmacopoeial requirements.
6. Monograph analysis of herbal drugs from recent Pharmacopoeias
7. Determination of Aldehyde content
8. Determination of Phenol content
9. Determination of total alkaloids

Examination Scheme :

IA				EE	
A	PR	LR	V	PR	V
02	05	03	05	25	10

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INDUSTRIAL PHARMACY-II

Course Code : BP702T

Credit Units: 04

Course Objectives: This course is designed to impart fundamental knowledge on pharmaceutical product development and translation from laboratory to market

Course Content:

Module-I

Pilot plant scale up techniques: General considerations - including significance of personnel requirements, space requirements, raw materials, Pilot plant scale up considerations for solids, liquid orals, semi solids and relevant documentation, SUPAC guidelines, Introduction to platform technology

Module-II

Technology development and transfer: WHO guidelines for Technology Transfer(TT): Terminology, Technology transfer protocol, Quality risk management, Transfer from R & D to production (Process, packaging and cleaning), Granularity of TT Process (API, excipients, finished products, packaging materials) Documentation, Premises and equipments, qualification and validation, quality control, analytical method transfer, Approved regulatory bodies and agencies, Commercialization - practical aspects and problems (case studies), TT agencies in India - APCTD, NRDC, TIFAC, BCIL, TBSE / SIDBI; TT related documentation - confidentiality agreement, licensing, MoUs, legal issues

Module-III

Regulatory affairs: Introduction, Historical overview of Regulatory Affairs, Regulatory authorities, Role of Regulatory affairs department, Responsibility of Regulatory Affairs Professionals

Regulatory requirements for drug approval: Drug Development Teams, Non-Clinical Drug Development, Pharmacology, Drug Metabolism and Toxicology, General considerations of Investigational New Drug (IND) Application, Investigator's Brochure (IB) and New Drug Application (NDA), Clinical research / BE studies, Clinical Research Protocols, Biostatistics in Pharmaceutical Product Development, Data Presentation for FDA Submissions, Management of Clinical Studies.

Module-IV

Quality Management Systems: Quality management & Certifications: Concept of Quality, Total Quality Management, Quality by Design (QbD), Six Sigma concept, Out of Specifications (OOS), Change control, Introduction to ISO 9000 series of quality systems standards, ISO 14000, NABL, GLP

Module-V

Indian Regulatory Requirements: Central Drug Standard Control Organization (CDSCO) and State Licensing Authority: Organization, Responsibilities, Certificate of Pharmaceutical Product (COPP), Regulatory requirements and approval procedures for New Drugs.

Examination Scheme :

Components	CT	HA	S/V/Q	ATTD	EE
Weightage(%)	15	3	3	4	75

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, ATTD: Attendance EE: End Semester Examination


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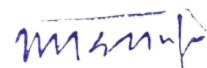

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Recommended Books: (Latest Editions)

- Regulatory Affairs from Wikipedia, the free encyclopedia modified on 7th April available at http://en.wikipedia.org/wiki/Regulatory_Affairs.
- International Regulatory Affairs Updates, 2005. available at <http://www.iraup.com/about.php>
- Douglas J Pisano and David S. Mantus. Text book of FDA Regulatory Affairs A Guide for Prescription Drugs, Medical Devices, and Biologics' Second Edition.
- Regulatory Affairs brought by learning plus, inc. available at <http://www.cgmp.com/ra.htm>.



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PHARMACY PRACTICE

Course Code : BP703T

Credit Units: 04

Course Objectives: In the changing scenario of pharmacy practice in India, for successful practice of Hospital Pharmacy, the students are required to learn various skills like drug distribution, drug information, and therapeutic drug monitoring for improved patient care. In commModuley pharmacy, students will be learning various skills such as dispensing of drugs, responding to minor ailments by providing suitable safe medication, patient counselling for improved patient care in the commModuley set up.

Course Contents:

Module-I

a) Hospital and it's organization: Definition, Classification of hospital- Primary, Secondary and Tertiary hospitals, Classification based on clinical and non- clinical basis, Organization Structure of a Hospital, and Medical staffs involved in the hospital and their functions.

b) Hospital pharmacy and its organization: Definition, functions of hospital pharmacy, Organization structure, Location, Layout and staff requirements, and Responsibilities and functions of hospital pharmacists.

c) Adverse drug reaction: Classifications - Excessive pharmacological effects, secondary pharmacological effects, idiosyncrasy, allergic drug reactions, genetically determined toxicity, toxicity following sudden withdrawal of drugs, Drug interaction- beneficial interactions, adverse interactions, and pharmacokinetic drug interactions, Methods for detecting drug interactions, spontaneous case reports and record linkage studies, and Adverse drug reaction reporting and management.

d) CommModuley Pharmacy: Organization and structure of retail and wholesale drug store, types and design, Legal requirements for establishment and maintenance of a drug store, Dispensing of proprietary products, maintenance of records of retail and wholesale drug store.

Module-II

a) Drug distribution system in a hospital: Dispensing of drugs to inpatients, types of drug distribution systems, charging policy and labelling, Dispensing of drugs to ambulatory patients, and Dispensing of controlled drugs.

b) Hospital formulary: Definition, contents of hospital formulary, Differentiation of hospital formulary and Drug list, preparation and revision, and addition and deletion of drug from hospital formulary.

c) Therapeutic drug monitoring: Need for Therapeutic Drug Monitoring, Factors to be considered during the Therapeutic Drug Monitoring, and Indian scenario for Therapeutic Drug Monitoring.

d) Medication adherence: Causes of medication non-adherence, pharmacist role in the medication adherence, and monitoring of patient medication adherence.

e) Patient medication history interview: Need for the patient medication history interview, medication interview forms.

f) CommModuley pharmacy management: Financial, materials, staff, and infrastructure requirements.

Module-III

a) Pharmacy and therapeutic committee: Organization, functions, Policies of the pharmacy and therapeutic committee in including drugs into formulary, inpatient and outpatient prescription, automatic stop order, and emergency drug list preparation.

b) Drug information services: Drug and Poison information centre, Sources of drug information, Computerised services, and storage and retrieval of information.

c) Patient counseling: Definition of patient counseling; steps involved in patient counseling, and Special

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cases that require the pharmacist

d) Education and training program in the hospital: Role of pharmacist in the education and training program, Internal and external training program, Services to the nursing homes/clinics, Code of ethics for commModuley pharmacy, and Role of pharmacist in the interdepartmental communication and commModuley health education.

e) Prescribed medication order and communication skills: Prescribed medication order- interpretation and legal requirements, and Communication skills- communication with prescribers and patients.

Module-IV

a) Budget preparation and implementation: Budget preparation and implementation

b) Clinical Pharmacy: Introduction to Clinical Pharmacy, Concept of clinical pharmacy, functions and responsibilities of clinical pharmacist, Drug therapy monitoring - medication chart review, clinical review, pharmacist intervention, Ward round participation, Medication history and Pharmaceutical care. Dosing pattern and drug therapy based on Pharmacokinetic & disease pattern.

c) Over the counter (OTC) sales: Introduction and sale of over the counter, and Rational use of common over the counter medications.

Module-V

a) Drug store management and inventory control: Organisation of drug store, types of materials stocked and storage conditions, Purchase and inventory control: principles, purchase procedure, purchase order, procurement and stocking, Economic order quantity, Reorder quantity level, and Methods used for the analysis of the drug expenditure

b) Investigational use of drugs: Description, principles involved, classification, control, identification, role of hospital pharmacist, advisory committee.

c) Interpretation of Clinical Laboratory Tests: Blood chemistry, hematology, and urinalysis

Examination Scheme :

Components	CT	HA	S/V/Q	ATTD	EE
Weightage(%)	15	3	3	4	75

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, ATTD: Attendance EE: End Semester Examination

Recommended Books (Latest Edition):

- Merchant S.H. and Dr. J.S.Quadry. *A textbook of hospital pharmacy*, 4th ed. Ahmadabad: B.S. Shah Prakakshan; 2001.
- Parthasarathi G, Karin Nyfort-Hansen, Milap C Nahata. *A textbook of Clinical Pharmacy Practice-essential concepts and skills*, 1st ed. Chennai: Orient Longman Private Limited; 2004.
- William E. Hassan. *Hospital pharmacy*, 5th ed. Philadelphia: Lea & Febiger; 1986.
- Tipnis Bajaj. *Hospital Pharmacy*, 1st ed. Maharashtra: Career Publications; 2008.
- Scott LT. *Basic skills in interpreting laboratory data*, 4th ed. American Society of Health System Pharmacists Inc; 2009.
- Parmar N.S. *Health Education and CommModuley Pharmacy*, 18th ed. India: CBS Publishers & Distributers; 2008.



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NOVEL DRUG DELIVERY SYSTEMS

Course Code : BP704T

Credit Units: 04

Course Objectives: This subject is designed to impart basic knowledge on the area of novel drug delivery systems.

Course Content:

Module-I

Controlled drug delivery systems: Introduction, terminology/definitions and rationale, advantages, disadvantages, selection of drug candidates. Approaches to design controlled release formulations based on diffusion, dissolution and ion exchange principles. Physicochemical and biological properties of drugs relevant to controlled release formulations

Polymers: Introduction, classification, properties, advantages and application of polymers in formulation of controlled release drug delivery systems.

Module-II

Microencapsulation: Definition, advantages and disadvantages, microspheres /microcapsules, microparticles, methods of microencapsulation, applications

Mucosal Drug Delivery system: Introduction, Principles of bioadhesion / mucoadhesion, concepts, advantages and disadvantages, transmucosal permeability and formulation considerations of buccal delivery systems

Implantable Drug Delivery Systems: Introduction, advantages and disadvantages, concept of implants and osmotic pump

Module-III

Transdermal Drug Delivery Systems: Introduction, Permeation through skin, factors affecting permeation, permeation enhancers, basic components of TDDS, formulation approaches

Gastroretentive drug delivery systems: Introduction, advantages, disadvantages, approaches for GRDDS – Floating, high density systems, inflatable and gastroadhesive systems and their applications

Nasopulmonary drug delivery system: Introduction to Nasal and Pulmonary routes of drug delivery, Formulation of Inhalers (dry powder and metered dose), nasal sprays, nebulizers

Module-IV

Targeted drug Delivery: Concepts and approaches advantages and disadvantages, introduction to liposomes, niosomes, nanoparticles, monoclonal antibodies and their applications

Module-V

Ocular Drug Delivery Systems: Introduction, intra ocular barriers and methods to overcome – Preliminary study, ocular formulations and ocuserts

Intrauterine Drug Delivery Systems: Introduction, advantages and disadvantages, development of intra uterine devices (IUDs) and applications

Examination Scheme :

Components	CT	HA	S/V/Q	ATTD	EE
Weightage(%)	15	3	3	4	75

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, ATTD: Attendance EE: End Semester Examination

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Recommended Books: (Latest Editions)

- Y W. Chien, Novel Drug Delivery Systems, 2nd edition, revised and expanded, Marcel Dekker, Inc., New York, 1992.
- Robinson, J. R., Lee V. H. L, Controlled Drug Delivery Systems, Marcel Dekker, Inc., New York, 1992.
- Encyclopedia of Controlled Delivery. Edith Mathiowitz, Published by Wiley
- Interscience Publication, John Wiley and Sons, Inc, New York. Chichester/Weinheim
- N.K. Jain, Controlled and Novel Drug Delivery, CBS Publishers & Distributors, New Delhi, First edition 1997 (reprint in 2001).
- S.P. Vyas and R.K. Khar, Controlled Drug Delivery -concepts and advances, Vallabh Prakashan, New Delhi, First edition 2002.



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INSTRUMENTAL METHODS OF ANALYSIS PRACTICAL

Course Code : BP705P

Credit Units: 02

List of experiments

- 1 Determination of absorption maxima and effect of solvents on absorption maxima of organic compounds
- 2 Estimation of dextrose by colorimetry
- 3 Estimation of sulfanilamide by colorimetry
- 4 Simultaneous estimation of ibuprofen and paracetamol by UV spectroscopy
- 5 Assay of paracetamol by UV- Spectrophotometry
- 6 Estimation of quinine sulfate by fluorimetry
- 7 Study of quenching of fluorescence
- 8 Determination of sodium by flame photometry
- 9 Determination of potassium by flame photometry
- 10 Determination of chlorides and sulphates by nephelo turbidometry
- 11 Separation of amino acids by paper chromatography
- 12 Separation of sugars by thin layer chromatography
- 13 Separation of plant pigments by column chromatography
- 14 Demonstration experiment on HPLC
- 15 Demonstration experiment on Gas Chromatography

Examination Scheme :

IA				EE	
A	PR	LR	V	PR	V
02	05	03	05	25	10

Note: A-Attendance, IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.



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PRACTICE SCHOOL

Course Code: BP706PS

Credit Units: 06

Objectives: Every candidate shall undergo practice school for a period of 150 hours evenly distributed throughout the semester. The student shall opt any one of the domains for practice school declared by the program committee from time to time. At the end of the practice school, every student shall submit a printed report (in triplicate) on the practice school he/she attended (not more than 25 pages). Along with the exams of Semester VII, the report submitted by the student, knowledge and skills acquired by the student through practice school shall be evaluated by the subject experts at college level and grade point shall be awarded.

Examination Scheme:

Total: 150 marks

Internal Marks : 25

Continuous Mode :

Assignment	Periodic report
10	15

External Marks : 125

Objective(s) of the work done	15 Marks
Learning Outcomes	30 Marks
Presentation of Work	30 Marks
Communication skills	20 Marks
Question and answer skills	30 Marks

Total = 125 Marks



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BIOSTATISTICS AND RESEARCH METHODOLOGY

Course Code : BP801T

Credit Units: 04

Course Objectives: To understand the applications of Biostatistics in Pharmacy. This subject deals with descriptive statistics, Graphics, Correlation, Regression, logistic regression Probability theory, Sampling technique, Parametric tests, Non Parametric tests, ANOVA, Introduction to Design of Experiments, Phases of Clinical trials and Observational and Experimental studies, SPSS, R and MINITAB statistical software's, analyzing the statistical data using Excel.

Course Content:

Module-I

Introduction: Statistics, Biostatistics, Frequency distribution

Measures of central tendency: Mean, Median, Mode- Pharmaceutical examples

Measures of dispersion: Dispersion, Range, standard deviation, Pharmaceutical problems

Correlation: Definition, Karl Pearson's coefficient of correlation, Multiple correlation - Pharmaceuticals examples

Module-II

Regression: Curve fitting by the method of least squares, fitting the lines $y = a + bx$ and $x = a + by$, Multiple regression, standard error of regression- Pharmaceutical Examples

Probability: Definition of probability, Binomial distribution, Normal distribution, Poisson's distribution, properties - problems

Sample, Population, large sample, small sample, Null hypothesis, alternative hypothesis, sampling, essence of sampling, types of sampling, Error-I type, Error-II type, Standard error of mean (SEM) - Pharmaceutical examples

Parametric test: t-test (Sample, Pooled or Unpaired and Paired) , ANOVA, (One way and Two way), Least Significance difference

Module-III

Non Parametric tests: Wilcoxon Rank Sum Test, Mann-Whitney U test, Kruskal-Wallis test, Friedman Test

Introduction to Research: Need for research, Need for design of Experiments, Experimental Design Technique, plagiarism

Graphs: Histogram, Pie Chart, Cubic Graph, response surface plot, Counter Plot graph

Designing the methodology: Sample size determination and Power of a study, Report writing and presentation of data, Protocol, Cohorts studies, Observational studies, Experimental studies, Designing clinical trial, various phases.

Module-IV

Blocking and confounding system for Two-level factorials

Regression modeling: Hypothesis testing in Simple and Multiple regression models

Introduction to Practical components of Industrial and Clinical Trials Problems: Statistical Analysis Using Excel, SPSS, MINITAB®, DESIGN OF EXPERIMENTS, R - Online Statistical Software's to Industrial and Clinical trial approach

Module-V

Design and Analysis of experiments:

Factorial Design: Definition, 2², 2³ design. Advantage of factorial design

Response Surface methodology: Central composite design, Historical design, Optimization Techniques

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Examination Scheme :

Components	CT	HA	S/V/Q	ATTD	EE
Weightage(%)	15	3	3	4	75

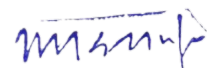
CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, ATTD: Attendance EE: End Semester Examination

Recommended Books (Latest edition):

- Pharmaceutical statistics- Practical and clinical applications, Sanford Bolton, publisher Marcel Dekker Inc. New York.
- Fundamental of Statistics – Himalaya Publishing House- S.C.Guptha
- Design and Analysis of Experiments –PHI Learning Private Limited, R. Pannerselvam,
- Design and Analysis of Experiments – Wiley Students Edition, Douglas and C. Montgomery



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SOCIAL AND PREVENTIVE PHARMACY

Course Code : BP802T

Credit Units: 04

Course Objectives: The purpose of this course is to introduce to students a number of health issues and their challenges. This course also introduced a number of national health programmes. The roles of the pharmacist in these contexts are also discussed.

Course Content:

Module-I:

Concept of health and disease: Definition, concepts and evaluation of public health. Understanding the concept of prevention and control of disease, social causes of diseases and social problems of the sick.

Social and health education: Food in relation to nutrition and health, Balanced diet, Nutritional deficiencies, Vitamin deficiencies, Malnutrition and its prevention.

Sociology and health: Socio cultural factors related to health and disease, Impact of urbanization on health and disease, Poverty and health

Hygiene and health: personal hygiene and health care; avoidable habits

Module-II:

Preventive medicine: General principles of prevention and control of diseases such as cholera, SARS, Ebola virus, influenza, acute respiratory infections, malaria, chicken guinea, dengue, lymphatic filariasis, pneumonia, hypertension, diabetes mellitus, cancer, drug addiction-drug substance abuse

Module-III:

National health programs, its objectives, functioning and outcome of the following: HIV AND AIDS control programme, TB, Integrated disease surveillance program (IDSP), National leprosy control programme, National mental health program, National programme for prevention and control of deafness, Universal immunization programme, National programme for control of blindness, Pulse polio programme.

Module-IV:

National health intervention programme for mother and child, National family welfare programme, National tobacco control programme, National Malaria Prevention Program, National programme for the health care for the elderly, Social health programme; role of WHO in Indian national program

Module-V:

CommModuley services in rural, urban and school health: Functions of PHC, Improvement in rural sanitation, national urban health mission, Health promotion and education in school.

Examination Scheme :

Components	CT	HA	S/V/Q	ATTD	EE
Weightage(%)	15	3	3	4	75

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, ATTD: Attendance EE: End Semester Examination


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Recommended Books (Latest edition):

- Short Textbook of Preventive and Social Medicine, Prabhakara GN, 2nd Edition, 2010, ISBN: 9789380704104, JAYPEE Publications
- Textbook of Preventive and Social Medicine (Mahajan and Gupta), Edited by Roy
- Rabindra Nath, Saha Indranil, 4th Edition, 2013, ISBN: 9789350901878, JAYPEE Publications
- Review of Preventive and Social Medicine (Including Biostatistics), Jain Vivek, 6th Edition, 2014, ISBN: 9789351522331, JAYPEE Publications
- Essentials of Community Medicine—A Practical Approach, Hiremath Lalita D,
- Hiremath Dhananjaya A, 2nd Edition, 2012, ISBN: 9789350250440, JAYPEE Publications
- Park Textbook of Preventive and Social Medicine, K Park, 21st Edition, 2011,
- ISBN-14: 9788190128285, BANARSIDAS BHANOT PUBLISHERS.
- Community Pharmacy Practice, Ramesh Adepu, BSP publishers, Hyderabad



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QUALITY CONTROL AND STANDARDIZATION OF HERBALS

Course Code : BP806ET

Credit Units: 04

Course Objectives: In this subject the student learns about the various methods and guidelines for evaluation and standardization of herbs and herbal drugs. The subject also provides an opportunity for the student to learn cGMP, GAP and GLP in traditional system of medicines.

Course Contents:

Module-I

Basic tests for drugs – Pharmaceutical substances, Medicinal plants materials and dosage
Forms WHO guidelines for quality control of herbal drugs.
Evaluation of commercial crude drugs intended for use

Module-II

Quality assurance in herbal drug industry of cGMP, GAP, GMP and GLP in traditional system of medicine.
WHO Guidelines on current good manufacturing Practices (cGMP) for Herbal Medicines
WHO Guidelines on GACP for Medicinal Plants.

Module-III

EU and ICH guidelines for quality control of herbal drugs.
Research Guidelines for Evaluating the Safety and Efficacy of Herbal Medicines

Module-IV

Stability testing of herbal medicines. Application of various chromatographic techniques in standardization of herbal products.
Preparation of documents for new drug application and export registration
GMP requirements and Drugs & Cosmetics Act provisions.

Module-V

Regulatory requirements for herbal medicines.
WHO guidelines on safety monitoring of herbal medicines in pharmacovigilance systems
Comparison of various Herbal Pharmacopoeias.
Role of chemical and biological markers in standardization of herbal products

Examination Scheme :

Components	CT	HA	S/V/Q	ATTD	EE
Weightage(%)	15	3	3	4	75

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, ATTD: Attendance EE: End Semester Examination

Recommended Books: (Latest Editions)

- Pharmacognosy by Trease and Evans
- Pharmacognosy by Kokate, Purohit and Gokhale
- Rangari, V.D., Text book of Pharmacognosy and Phytochemistry Vol. I, Carrier Pub., 2006.
- Aggrawal, S.S., Herbal Drug Technology. Universities Press, 2002.
- EMEA. Guidelines on Quality of Herbal Medicinal Products/Traditional Medicinal Products,
- Mukherjee, P.W. Quality Control of Herbal Drugs: An Approach to Evaluation of Botanicals. Business Horizons Publishers, New Delhi, India, 2002.
- Shinde M.V., Dhalwal K., Potdar K., Mahadik K. Application of quality control principles to herbal drugs. International Journal of Phytomedicine 1(2009); p. 4-8.
- WHO. Quality Control Methods for Medicinal Plant Materials, World Health Organization, Geneva, 1998. WHO. Guidelines for the Appropriate Use of Herbal Medicines. WHO Regional Publications, Western Pacific Series No 3, WHO Regional office for the Western Pacific, Manila, 1998.
- WHO. The International Pharmacopeia, Vol. 2: Quality Specifications, 3rd edn. World Health Organization, Geneva, 1981.
- WHO. Quality Control Methods for Medicinal Plant Materials. World Health Organization, Geneva, 1999.
- WHO. WHO Global Atlas of Traditional, Complementary and Alternative Medicine. 2 vol. set. Vol. 1 contains text and Vol. 2, maps. World Health Organization, Geneva, 2005.
- WHO. Guidelines on Good Agricultural and Collection Practices (GACP) for Medicinal Plants. World Health Organization, Geneva, 2004.



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COMPUTER AIDED DRUG DESIGN

Course Code : BP807ET

Credit Units: 04

Course Objectives: This subject is designed to provide detailed knowledge of rational drug design process and various techniques used in rational drug design process.

Course Content:

Module-I

Introduction to Drug Discovery and Development

Stages of drug discovery and development

Lead discovery and Analog Based Drug Design

Rational approaches to lead discovery based on traditional medicine,

Random screening, Non-random screening, serendipitous drug discovery, lead discovery based on drug metabolism, lead discovery based on clinical observation.

Analog Based Drug Design: Bioisosterism, Classification, Bioisosteric replacement. Any three case studies

Module-II

Quantitative Structure Activity Relationship (QSAR): SAR versus QSAR, History and development of QSAR, Types of physicochemical parameters, experimental and theoretical approaches for the determination of physicochemical parameters such as Partition coefficient, Hammett's substituent constant and Tafts steric constant. Hansch analysis, Free Wilson analysis, 3D-QSAR approaches like COMFA and COMSIA.

Module-III

Molecular Modeling and virtual screening techniques

Virtual Screening techniques: Drug likeness screening, Concept of pharmacophore mapping and pharmacophore based Screening,

Molecular docking: Rigid docking, flexible docking, manual docking, Docking based screening. *De novo* drug design.

Module-IV

Informatics & Methods in drug design: Introduction to Bioinformatics, chemoinformatics. ADME databases, chemical, biochemical and pharmaceutical databases.

Module-V

Molecular Modeling: Introduction to molecular mechanics and quantum mechanics. Energy Minimization methods and Conformational Analysis, global conformational minima determination.

Examination Scheme :

Components	CT	HA	S/V/Q	ATTD	EE
Weightage(%)	15	3	3	4	75

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, ATTD: Attendance EE: End Semester Examination


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Recommended Books (Latest Editions)

- Robert GCK, ed., "Drug Action at the Molecular Level" University Park Press Baltimore.
- Martin YC. "Quantitative Drug Design" Dekker, New York.
- Delgado JN, Remers WA eds "Wilson & Gisvolds's Text Book of Organic Medicinal & Pharmaceutical Chemistry" Lippincott, New York.
- Foye WO "Principles of Medicinal chemistry 'Lea & Febiger.
- Koro I kovas A, Burckhalter JH. "Essentials of Medicinal Chemistry" Wiley Interscience.
- Wolf ME, ed "The Basis of Medicinal Chemistry, Burger's Medicinal Chemistry" JohnWiley& Sons, New York.
- Patrick Graham, L., An Introduction to Medicinal Chemistry, Oxford University Press.
- Smith HJ, Williams H, eds, "Introduction to the principles of Drug Design" Wright Boston.
- Silverman R.B. "The organic Chemistry of Drug Design and Drug Action" Academic Press New York.



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COSMETIC SCIENCE

Course Code : BP809ET

Credit Units: 04

Course Contents :

Module-I

Classification of cosmetic and cosmeceutical products

Definition of cosmetics as per Indian and EU regulations, Evolution of cosmeceuticals from cosmetics, cosmetics as quasi and OTC drugs

Cosmetic excipients: Surfactants, rheologymodifiers, humectants, emollients, preservatives. Classification and application

Skin: Basic structure and function of skin.

Hair: Basic structure of hair. Hair growth cycle.

Oral Cavity: Common problem associated with teeth and gums.

Module-II

Principles of formulation and building blocks of skin care products: Face wash, Moisturizing cream, Cold Cream, Vanishing cream and their advantages and disadvantages. Application of these products in formulation of cosmeceuticals.

Antiperspirants & deodorants- Actives & mechanism of action.

Principles of formulation and building blocks of Hair care products: Conditioning shampoo, Hair conditioner, anti-dandruff shampoo. Hair oils. Chemistry and formulation of Para-phenylene diamine based hair dye. Principles of formulation and building blocks of oral care products: Toothpaste for bleeding gums, sensitive teeth. Teeth whitening, Mouthwash.

Module-III

Sun protection, Classification of Sunscreens and SPF.

Role of herbs in cosmetics:

Skin Care: Aloe and turmeric

Hair care: Henna and amla.

Oral care: Neem and clove

Analytical cosmetics: BIS specification and analytical methods for shampoo, skincream and toothpaste.

Module-IV

Principles of Cosmetic Evaluation: Principles of sebumeter, corneometer. Measurement of TEWL, Skin Color, Hair tensile strength, Hair combing properties. Soaps, and syndet bars. Evolution and skin benefits.

Module-V

Oily and dry skin, causes leading to dry skin, skin moisturisation. Basic understanding of the terms Comedogenic, dermatitis. Cosmetic problems associated with Hair and scalp: Dandruff, Hair fall causes. Cosmetic problems associated with skin: blemishes, wrinkles, acne, prickly heat and body odor. Antiperspirants and Deodorants- Actives and mechanism of action

Examination Scheme :

Components	CT	HA	S/V/Q	ATTD	EE
Weightage(%)	15	3	3	4	75

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, ATTD: Attendance EE: End Semester Examination

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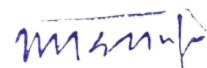
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References

- Harry's Cosmeticology, Wilkinson, Moore, Seventh Edition, George Godwin.
- Cosmetics – Formulations, Manufacturing and Quality Control, P.P. Sharma, 4th Edition, Vandana Publications Pvt. Ltd., Delhi.
- Text book of cosmeticology by Sanju Nanda & Roop K. Khar, Tata Publishers.



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EXPERIMENTAL PHARMACOLOGY

Course Code : BP810ET

Credit Units: 04

Course Objectives:

This subject is designed to impart the basic knowledge of preclinical studies in experimental animals including design, conduct and interpretations of results.

Course Contents:

Module-I

Laboratory Animals:

Study of CPCSEA and OECD guidelines for maintenance, breeding and conduct of experiments on laboratory animals, Common lab animals: Description and applications of different species and strains of animals. Popular transgenic and mutant animals. Techniques for collection of blood and common routes of drug administration in laboratory animals, Techniques of blood collection and euthanasia.

Module-II

Preclinical screening models

a. Introduction: Dose selection, calculation and conversions, preparation of drug solution/suspensions, grouping of animals and importance of sham negative and positive control groups. Rationale for selection of animal species and sex for the study.

b. **Study of screening animal models for:** Diuretics, nootropics, anti-Parkinson's, antiasthmatics,

Preclinical screening models: for CNS activity- analgesic, antipyretic, anti-inflammatory, general anaesthetics, sedative and hypnotics, antipsychotic, antidepressant, antiepileptic, antiparkinsonism, alzheimer's disease

Module-III

Preclinical Screening Models: for ANS activity, sympathomimetics, sympatholytics, parasympathomimetics, parasympatholytics, skeletal muscle relaxants, drugs acting on eye, local anaesthetics

Module-IV


Preclinical screening models: for CVS activity- antihypertensives, diuretics, antiarrhythmic, antidyslipidemic, anti aggregatory, coagulants, and anticoagulants. Preclinical screening models for other important drugs like antiulcer, antidiabetic, anticancer and antiasthmatics.

Research methodology and Bio-statistics: Selection of research topic, review of literature, research hypothesis and study design Pre-clinical data analysis and interpretation using Students 't' test and One-way ANOVA. Graphical representation of data

Examination Scheme :

Components	CT	HA	S/V/Q	ATTD	EE
Weightage(%)	15	3	3	4	75

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, ATTD: Attendance EE: End Semester Examination


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Recommended Books (latest edition):

- Fundamentals of experimental Pharmacology-by M.N. Ghosh
- Hand book of Experimental Pharmacology-S.K. Kulakarni
- CPCSEA guidelines for laboratory animal facility.
- Drug discovery and Evaluation by Vogel H.G.
- Drug Screening Methods by Suresh Kumar Gupta and S. K. Gupta
- Introduction to biostatistics and research methods by PSS Sundar Rao and J Richard



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ADVANCED INSTRUMENTATION TECHNIQUES

Course Code : BP811ET

Credit Units : 04

Course Objectives: This subject deals with the application of instrumental methods in qualitative and quantitative analysis of drugs. This subject is designed to impart advanced knowledge on the principles and instrumentation of spectroscopic and chromatographic hyphenated techniques. This also emphasizes on theoretical and practical knowledge on modern analytical instruments that are used for drug testing.

Course Content:

Module-I

Nuclear Magnetic Resonance spectroscopy: Principles of H-NMR and C-NMR, chemical shift, factors affecting chemical shift, coupling constant, Spin - spin coupling, relaxation, instrumentation and applications

Mass Spectrometry- Principles, Fragmentation, Ionization techniques – Electron impact, chemical ionization, MALDI, FAB, Analyzers-Time of flight and Quadrupole, instrumentation, applications

Module-II

Thermal Methods of Analysis: Principles, instrumentation and applications of Thermogravimetric Analysis (TGA), Differential Thermal Analysis (DTA), Differential Scanning Calorimetry (DSC)

X-Ray Diffraction Methods: Origin of X-rays, basic aspects of crystals, X-ray Crystallography, rotating crystal technique, single crystal diffraction, powder diffraction, structural elucidation and applications.

Module-III

Calibration and validation-as per ICH and USFDA guidelines

Calibration of following Instruments: Electronic balance, UV-Visible spectrophotometer, IR spectrophotometer, Fluorimeter, Flame Photometer, HPLC and GC

Module-IV

Radio immune assay: Importance, various components, Principle, different methods, Limitation and Applications of Radio immuno assay

Extraction techniques: General principle and procedure involved in the solid phase extraction and liquid-liquid extraction

Module-V

Hyphenated techniques-LC-MS/MS, GC-MS/MS, HPTLC-MS.

Examination Scheme :

Components	CT	HA	S/V/Q	ATTD	EE
Weightage(%)	15	3	3	4	75

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, ATTD: Attendance EE: End Semester Examination


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Recommended Books (Latest Editions)

- Instrumental Methods of Chemical Analysis by B.K Sharma
- Organic spectroscopy by Y.R Sharma
- Text book of Pharmaceutical Analysis by Kenneth A. Connors
- Vogel's Text book of Quantitative Chemical Analysis by A.I. Vogel
- Practical Pharmaceutical Chemistry by A.H. Beckett and J.B. Stenlake
- Organic Chemistry by I. L. Finar
- Organic spectroscopy by William Kemp
- Quantitative Analysis of Drugs by D. C. Garrett
- Quantitative Analysis of Drugs in Pharmaceutical Formulations by P. D. Sethi
- Spectrophotometric identification of Organic Compounds by Silverstein



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PROJECT WORK

Course Code: BP813PW

Credit Units: 06

Objectives:

The aim of the project work is to provide student with an opportunity to further intellectual and personal development in chosen field by undertaking a significant practical unit of activity, having an educational value at a level commensurate with the award of the degree. The project work can be defined as a scholarly inquiry into a problem or issues, involving a systematic approach to gathering and analysis of information / data, leading to production of a structured report.

The area of the project shall directly relate any one of the elective subject opted by the student in semester VIII. The project shall be carried out in group not exceeding 5 in number. The project report shall be submitted in triplicate (typed & bound copy not less than 25 pages).

THE COMPONENTS OF A PROJECT REPORT

The outcome of Project Work is the Project Report. A project report should have the following components:

1) Cover Page: This should contain the title of the project proposal, to whom it is submitted, for which degree, the name of the author, name of the supervisor, year of submission of the project work, name of the University.

2) Acknowledgement: Various organizations and individuals who might have provided assistance /co-operation during the process of carrying out the study.

3) Table of Content: Page-wise listing of the main contents in the report, i.e., different Chapters and its main Sections along with their page numbers.

4) Body of the Report: The body of the report should have these four logical divisions

- Introduction:* This will cover the background, rationale/ need / justification, brief review of literature, objectives, methodology (the area of the study, sample, type of study, tools for data collection, and method of analysis), Limitations of the Study, and Chapter Planning.
- Conceptual Framework / National and International Scenario:* (relating to the topic of the Project).
- Presentation of Data, Analysis and Findings:* (using the tools and techniques mentioned in the methodology).
- Conclusion and Recommendations:* In this section, the concluding observations based on the main findings and suggestions are to be provided.

5) Bibliography or References: This section will include the list of books and articles which have been used in the project work, and in writing a project report.

6) Annexures: Questionnaires (if any), relevant reports, etc.

(The main text of the Project should normally be in the range of 5000 words. However, there may be annexure in addition to the main text)

THE STEPS OF PROJECT WORK

STEP I : Selection of the topic for the project by taking following points into consideration:

- Suitability of the topic.
- Relevance of the topic
- Time available at the disposal.
- Feasibility of data collection within the given time limit.
- Challenges involved in the data collection (time & cost involved in the data collection, possibility of getting responses, etc.)

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STEP II : Finalisation of the Topic and preparation of Project Proposal in consultation with the Supervisor.

STEP III : Collection of information and data relating to the topic and analysis of the same.

STEP IV : Writing the report dividing it into suitable chapters, viz.,

Chapter 1: Introduction,

Chapter 2: Conceptual Framework / National & International Scenario,

Chapter 3: Analysis & Findings

Chapter 4: Conclusion and Recommendations.

STEP V : The following documents are to be attached with the Final Project Report.

1) Approval letter from the supervisor (Annexure-IA)

2) Student's declaration (Annexure-IB)

3) Certificate from the Competent Authority of the Organisation / Institution, if the student undertakes the Project Work in any Organisation / Institution.

Annexures, References / Bibliography

Guidelines for Evaluation:

- Each of the students has to undertake a Project individually under the supervision of a teacher and to submit the same following the guidelines stated below.
- Language of Project Report and Viva-Voce Examination may be English. The Project Report must be typed and hard bound.
- Failure to submit the Project Report or failure to appear at the Viva-voce Examination will be treated as "Absent" in the Examination. He /she has to submit the Project Report and appear at the Viva-Voce Examination in the subsequent years (within the time period as per University Rules).
- No marks will be allotted on the Project Report unless a candidate appears at the Viva-Voce Examination. Similarly, no marks will be allotted on Viva-Voce Examination unless a candidate submits his/her Project Report.
- Evaluation of the Project Work to be done jointly by one internal expert and one external expert with equal weightage, i.e., average marks of the internal and external experts will be allotted to the candidate.
- A candidate has to qualify in the Project Work separately, obtaining minimum marks of 80 (Dissertation Book and Presentation taken together).

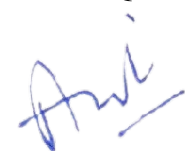
Examination Scheme: Total-150 marks

Evaluation of Dissertation Book:

Objective(s) of the work done	15 Marks
Methodology adopted	20 Marks
Results and Discussions	20 Marks
Conclusions and Outcomes	20 Marks
Total-75 Marks	

Evaluation of Presentation:

Presentation of work	25 Marks
Communication skills	20 Marks
Question and answer skills	30 Marks
Total-75 Marks	



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Curriculum & Scheme of Examination

2022

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HEMATOLOGY-I

Course Code: MLT2108

Credit Units: 03

Course Objectives:

- To impart the knowledge about the blood and blood formation in bone marrow.
- To provide the knowledge about handling of haematological apparatus.
- To impart the knowledge of routine haematology tests.
- To develop the understanding of advanced haematological techniques.

Course Contents:

Module-I

Hematology: Introduction and importance of hematology.

Blood: Definition, composition, functions of blood.

Blood cells: Shape, size, structure and functions of blood cells.

Haemopoiesis: Erythropoiesis, leucopoiesis and thrombopoiesis.

Module-II

Instruments and apparatus used in hematology laboratory: Neubauer chamber, pipettes, colorimeter, cell counter.

Hemoglobin: Formation, Degradation, types and functions.

Haemoglobinometry: Methods, principle, procedure, application and error analysis.

Anticoagulants and preservatives: Mode of action, composition, merits and demerits of EDTA, citrate, oxalate, heparin and sodium fluoride.

Blood collection: Capillary, venous and arterial method, order of blood draw, preservation of blood sample; Changes during blood storage.

Module-III

Blood cells count: Red blood cell, white blood cells, platelets, eosinophil and reticulocyte count.

ESR: Mechanism, methods, factors influencing and clinical significance.

PCV: Methods, principle, factors influencing and clinical significance.

Buffy coat: Preparation of buffy coat and its application.

Peripheral blood smear: Methods of preparation, importance and error analysis.

Staining: Methods, principle, composition and staining procedure and error analysis

Module-IV

Hemocytometer: Principle, procedure, application, precautions and clinical significance.

Red cell indices: Different parameters, calculations, color index and maturation index and clinical significance.

Automated cell counter: Principle, application and procedures.

Examination Scheme

Components	CA	A	ME	EE
Weightage(%)	15	5	10	70

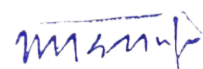
Recommended books:

- Shrish M. Kawthalkar, Essential Hematology, 2nd Edition 2013, Jaypee Publication.
- Bain, Decie & Lewis Practical Hematology, 11th Edition 2016, Churchill Livingstone.
- J Ochei and A Kolhatkar, Medical Laboratory Science- Theory and Practice, 1st Edition 2000, Tata Mcgraw Hill Publishing Co. Ltd.
- Praful B. Godkar, Darshan P. Godkar, Text book of Medical Laboratory Technology, 3rd Edition 2014, Bhalani Publishing House.

- Harse Mohan, Text Book of Pathology 7th Edition 2015, Jaypee & Brothers Medical Publishers LTD.
- Richard A. McPherson, Henry's Clinical Diagnosis and Management by Laboratory Methods, 22 Edition 2014 Elsevier.
- E M Keohane, L Smith, J Walenga, Rodak's Hematology: Clinical Principle and Application, 5th Edition 2015, Elsevier.
- John P. Greer ,Daniel A. Arber , Bertil E. Glader , Alan F. List , Robert T. Means, Frixos Paraskevas, George M. Rodgers , John Foerster, Wintrobe's Clinical Hematology 13th Edition 2013, Wolters Kluwer.
- Bernadette F. Rodak, George A. Fritsma, Kathryn Doig, Hematology: Clinical Principles and Applications, 4th Edition 2012. Saunders & Elseviers.



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GENERAL MICROBIOLOGY

Course Code: MLT2109

Credit Units: 03

Course Objective:

- To provide the understanding of relationship between microorganisms and human health.
- To impart the knowledge about microbial pathogenicity, aseptic methods, cultivation and identification techniques in microbiology.

Course Contents:

Module-I

Microbiology: Introduction, importance and scopes, contribution of Antony Van Leeuwenhoek, Edward Jenner, Louis Pasteur, Robert Koch and Joseph Lister; golden era of microbiology; safety measures in microbiology.

Microorganisms: Classification and taxonomy; Classification and morphological characteristics of bacteria, viruses, fungi, protozoa and helminthes.

Module-II

Microscopy: Principle, parts, working, care and maintenance of compound, dark ground, fluorescent, phase contrast and electron microscope.

Normal micro flora: Importance of normal flora in human body

Microbial Pathogenicity: Virulence factors - antigenicity, toxicity, bacterial enzymes, **Infection:** Classification, sources, mode of transmission and portal of entry.

Module-III

Basic terminology: Antibacterial, bactericidal, bacteriostatic and germicide agents.

Sterilization: Definition and classification; Parts, working, care and handling of autoclave, hot air oven and laminar air flow; Sterilization indicators and calibration of equipments.

Disinfection: Definition, types, mode of action, properties and use of disinfectants and antiseptics, efficiency testing of disinfectants.

Module-IV

Culture media: Composition of culture media and broth, basal media, enriched media, enrichment media, selective media, differential media, transport media, anaerobic media.

Inoculation: Pouring, spreading, streaking, stroke, stab, slant and anaerobic culture methods; Colony characteristics.

Examination Scheme

Components	CA	A	ME	EE
Weightage (%)	15	5	10	70

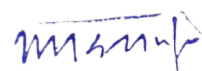
Recommended books:

- C P Baveja, Text book of Microbiology, 4th Edition 2010, Arya Publication.
- Arti Kapil, Ananthanarayan and Paniker's Textbook of Microbiology, 9th Edition 2013, Orient Black Swan.
- Mark Gladwin, Trattler William, C. Scott, Mahan, Clinical Microbiology Made Ridiculously Simple. 6th Edition 2013, Medmaster.
- D.R.Arora / Brij Bala Arora, Textbook of Microbiology, 5th Edition 2016, CBS Publishers & Distributors.
- Eds J. G. Collee, J. P. Duguid, A. G. Fraser & B. P. Marmio, Mackie and McCartney: Practical medical microbiology, 14th Edition 2007, Church New Delhi (India): Elsevierill Livingston.
- R C Dubay & D.K.Maheshwari, Practical Microbiology, Revised edition 2014, S Chand & Company Ltd.

- Dr. C.P. Baveja, Dr. V. Baveja, Textbook of Microbiology for MLT, 2nd Edition, Arya Publication.
- Joanne Willey, Linda Sherwood, Christopher J. Woolverton, Prescott's Microbiology, 9th Edition 2014, McGraw-Hill Education.
- Gary W Procop & Elmer W. Koneman Koneman's Color Atlas and Textbook of Diagnostic Microbiology, 7th Edition 2016, Wolters Kluwer Health.
- F. H. Kayser, K. A. Bienz, J. Eckert, Medical Microbiology, 10th German Edition 2005, Thieme Stuttgart, New York.
- Michael Ford, Medical Microbiology, 2nd Edition 2014, Oxford university press.



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ANATOMY AND PHYSIOLOGY LAB-I

Course Code: MLT2110

Credit Units: 01

Course objectives:

- To provide the basic understanding of human organ systems.
- To impart the basic knowledge about the microscopic structure of different tissues and muscles.

List of experiments:


- Demonstration of human anatomy with the help of chart.
- Demonstration of different tissues with the help of permanent mounted slides.
- Demonstration of human digestive system with the help of model or chart.
- Demonstration of structural differences between skeletal, smooth and cardiac muscles using permanent mounts.
- Demonstration of various parts of circulatory system using models or chart.
- Demonstration of human bones and joints.
- Estimation of blood pressure with the help of BP apparatus
- Demonstration of pulse rate.
- Demonstration of heart rate.
- Demonstration of body temperature.

Examination Scheme

Components	Internal Assessment	Attendance	Record	EE
Weightage (%)	20	5	5	70

Recommended books:

- B. D. Chaurasia, BD Chaurasia's Human Anatomy Regional and Applied Dissection and Clinical: Lower Limb Abdomen and Pelvis, Vol I, II and III, 7th Edition 2016, CBS Publishers & Distributors.
- K Simbulingam & P Simbulingam, Essential Medical Physiology, 6th Edition 2012, Jaypee Brothers Medical publishers (P) Ltd.
- N Murgesh, Basic Anatomy and Physiology, 6th Edition 2011, Satya Publishers.
- Anne Waugh, Kathleen and J W Wilson, Ross and Wilson Anatomy and Physiology, 12th Edition 2014, Churchill Living Stone.
- H. G. Q. Rowett, Basic Anatomy and Physiology, 3rd Edition 1996, Murray Publishers Ltd.
- Gerard J. Tortora, Bryan H. Derrickson, Principle of anatomy and physiology, 14th Edition 2014, Wiley Publication.
- R S Winwood, Sears Anatomy & Physiology, 6th Edition, 1985, CRC Press.
- Elaine N. Marie, Essentials of Human Anatomy and Physiology, 11th Edition 2015, Pearsons Benjamin Cummings.


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HEMATOLOGY LAB-I

Course Code: MLT2111

Credit Units: 01

Course objectives:

- To impart the basic knowledge of principles, techniques and clinical importance of routine and selected laboratory procedures.
- To familiarize with basic knowledge of instruments commonly utilized in the clinical hematology laboratory.

List of experiments:

1. Preparation of anticoagulants vials.
2. Collection of Blood by various methods.
3. Estimation of hemoglobin.
4. To perform RBC count.
5. To perform WBC count.
6. To perform Platelets count.
7. To perform ESR and PCV.
8. Preparation of Romanosky stain.
9. Preparation and staining of peripheral blood smear.
10. Examination of blood cells morphology.

Examination Scheme

Components	Internal Assessment	Attendance	Record	EE
Weightage (%)	20	5	5	70

Recommended books:

- J. Ochei and A. Kolhatkar, Medical Laboratory Science- Theory and Practice, 1st Edition 2000, Tata Mcgraw Hill Publishing Co. Ltd.
- Praful B. Godkar, Darshan P. Godkar, Text book of Medical Laboratory Technology, 3rd Edition 2014, Bhalani Publishing House.
- Bain, Decie & Lewis Practical Hematology, 11th Edition 2016, Churchill Livingstone.
- Mannual of Basic Technique for Health Laboratory, 2nd Edition 2003, WHO Geneva.
- Sood, Textbook of Medical Laboratory Technology, 1st Edition 2006, Jaypee Brothers Publishers, 2006.



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CLINICAL TRAINING-I

Course Code: MLT2112

Credit Units: 2

Course Objective: The purpose of a Clinical training is to provide hands on practical experience in relevant sections of diagnostic labs as per the need of healthcare system. Students will participate in samples collection, documentation, transportation, receiving, processing and dispatch of reports. Students will help in the performance of clinical protocols, quality maintenance and laboratory research. In some cases, students may be deputed in community services or assist in organizing camps like blood testing or blood donation camp.

Students will be sent to diagnostic laboratory or hospital once a week outside campus or may be within the campus if facility available.

Plan for clinical training:

1. Hematology Lab
2. Microbiology Lab

Note: Students must submit training report during examination and the same would be evaluated through Viva voice and presentation.

Examination Scheme

Components	Viva	A	ME	EE
Weightage (%)	10	5	15	70



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HEMATOLOGY-II

Course Code: MLT2208

Credit Units: 03

Course Objectives:

- To impart the knowledge about disorders of blood cells.
- To familiarize students about pathogenesis and laboratory diagnosis of various anemia.

Course Contents:

Module-I

Blood cell disorders: Morphological disorders of Blood cells; Physiological variation of erythrocytes, leucocytes and thrombocytes.

Bone Marrow: Introduction, collection, processing, indications and significance.

Module-II

Anemia: Introduction, causes, sign and symptoms, classification and laboratory diagnosis of anemia; Pathogenesis and laboratory diagnosis of iron deficiency anemia, pernicious anemia, megaloblastic anemia, aplastic anemia, sideroblastic anemia; anemia due to chronic renal failure and liver disease.

Module-III

Hemolytic Anemia: Pathogenesis and laboratory diagnosis of hereditary spherocytosis, hereditary elliptocytosis, thalassemia and sickle cell anaemia; other types of anemia- Glucose -6-phosphate dehydrogenase deficiency, pyruvate kinase deficiency, paroxysmal nocturnal haemoglobinuria, warm antibody type, cold antibody type, incompatible blood transfusion, hemolytic disease of new born.

Module-IV

Leukemia: Introduction, causes, sign & symptoms, classification and laboratory diagnosis; myeloid and lymphoid leukemia.

Examination Scheme

Components	CA	A	ME	EE
Weightage(%)	15	5	10	70

Recommended books:

- Shrish M. Kawthalkar, Essential Hematology, 2nd Edition 2013, Jaypee Publication.
- Bain, Decie & Lewis Practical Hematology, 11th Edition 2016, Churchill Livingstone.
- J Ochei and A Kolhatkar, Medical Laboratory Science- Theory and Practice, 1st Edition 2000, Tata Mcgraw Hill Publishing Co Ltd.
- Praful B. Godkar, Darshan P. Gidkar, Text book of Medical Laboratory Technology, 3rd Edition 2014, Bhalani Publishing House.
- Harse Mohan, Text Book of Pathology 7th Edition 2015, Jaypee & Brothers Medical Publishers LTD.
- Richard A. McPherson, Henry's Clinical Diagnosis and Management by Laboratory Methods, 22 Edition 2014 Elsevier.
- E M Keohane, L Smith, J Walenga, Rodak's Hematology: Clinical Principle and Application, 5th Edition 2015, Elsevier.
- John P. Greer, Daniel A. Arber, Bertil E. Glader, Alan F. List, Robert T. Means, Frixos Paraskevas, George M. Rodgers, John Foerster, Wintrobe's Clinical Hematology 13th Edition 2013, Wolters Kluwer.
- Bernadette F. Rodak, George A. Fritsma, Kathryn Doig, Hematology: Clinical Principles and Applications, 4th Edition 2012. Saunders& Elseviers.

CLINICAL BACTERIOLOGY

Course Code: MLT2209

Credit Units: 03

Course Objective:

- To impart the knowledge of morphology, culture characteristics, pathogenicity, lab diagnosis and prophylaxis of major bacterial pathogens.
- To provide the understanding of special laboratory techniques.

Course Contents:

Module-I

Bacteriology: Introduction, bacterial reproduction, bacterial growth curve and factors effecting bacterial growth; Bacterial genetics- plasmid, mutation, transformation, transduction and conjugation.

Module-II

Gram negative bacteria: Morphology, pathogenicity, lab diagnosis and prophylaxis of: Neisseria gonorrhoeae, Neisseria meningitides, Escherichia coli, Shigella, Klebsiella, Proteus, Yersinia, Salmonella, Vibrio, Aeromonas, Pseudomonas, Campylobacter, Bacteroides, Fusobacterium, Brucella, Haemophilus, Bordetella and Helicobacter pylori.

Module-III

Gram positive bacteria: Morphology, pathogenicity, lab diagnosis and prophylaxis of: Staphylococci, Streptococci, Pneumococcus, Enterococcus, Bacillus, Corynebacterium, Clostridia, Mycobacterium, Actinomycetes and Listeria.

Miscellaneous bacteria: Morphology, pathogenicity, lab diagnosis and prophylaxis of: Spirochetes, Rickettsiae, Chlamydia and Mycoplasma.

Module-IV

Staining: Gram stain, AFB stain, Albert's stain and special stains for spore, capsule and flagella.

Biochemical test: Catalase, coagulase, oxidase, indole, MR, VP, citrate, urease and triple sugar iron agar.

Special laboratory techniques: Antimicrobial susceptibility testing; Bacteriological examination of water, milk and air.

Examination Scheme

Components	CA	A	ME	EE
Weightage(%)	15	5	10	70

Recommended books:

- C P Baveja, Text book of Microbiology, 4th Edition 2010, Arya Publication.
- Arti Kapil, Ananthanarayan and Paniker's Textbook of Microbiology, 9th Edition 2013, Orient BlackSwan.
- Mark Gladwin, Trattler William, C. Scott, Mahan, Clinical Microbiology Made Ridiculously Simple. 6th Edition 2013, Medmaster.
- D.R.Arora / Brij Bala Arora, Textbook of Microbiology, 5th Edition 2016, CBS Publishers & Distributors.
- Eds J. G. Collee, J. P. Duguid, A. G. Fraser & B. P. Marmio, Mackie and McCartney: Practical medical microbiology, 14th Edition 2007, Church New Delhi (India): Elsevierill Livingston.
- R C Dubay & D.K.Maheshwari, Practical Microbiology, Revised edition 2014, S Chand & Company LTD.
- Dr. C.P. Baveja, Dr. V. Baveja, Textbook of Microbiology for MLT, 2nd Edition, Arya Publication.

- Joanne Willey, Linda Sherwood, Christopher J. Woolverton, Prescott's Microbiology, 9th Edition 2014, McGraw-Hill Education.
- Gary W Procop & Elmer W. Koneman Koneman's Color Atlas and Textbook of Diagnostic Microbiology, 7th Edition 2016, Wolters Kluwer Health.
- F. H. Kayser, K. A. Bienz, J. Eckert, Medical Microbiology, 10th German Edition 2005, Thieme Stuttgart, New York.
- Michael Ford, Medical Microbiology, 2nd Edition 2014, Oxford university press.
- Neal Chamberlain, Medical Microbiology: The Big Picture, 1st Edition 2008, Mc Graw Hill Medical.



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HAEMATOLOGY LAB-II

Course Code: MLT2211

Credit Units: 01

Course Objectives:

- To impart the basic knowledge of principles, techniques and clinical importance of routine and selected laboratory procedures.
- To familiarize with basic knowledge of instruments commonly utilized in the clinical hematology laboratory.

List of experiments:

1. Demonstration of abnormal blood cells.
2. Demonstration of microcytic and hypochromic anemia.
3. Demonstration of macrocytic and normochromic anemia.
4. Demonstration of hemolytic anemia.
5. Demonstration of hemorrhagic anemia.
6. Demonstration myeloid leukemia.
7. Demonstration of lymphoid leukemia.
8. To perform osmotic fragility test.
9. To perform sickling test.
10. Demonstration of normal and abnormal bone marrow cells in permanent slides.

Examination Scheme


Components	Internal Assessment	Attendance	Record	EE
Weightage (%)	20	5	5	70

Recommended books:

- J. Ochei and A. Kolhatkar, Medical Laboratory Science- Theory and Practice, 1st Edition 2000, Tata McGraw Hill Publishing Co. Ltd.
- Praful B. Godkar, Darshan P. Godkar, Text book of Medical Laboratory Technology, 3rd Edition 2014, Bhalani Publishing House.
- Bain, Decie & Lewis Practical Hematology, 11th Edition 2016, Churchill Livingstone.
- Mannual of Basic Technique for Health Laboratory, 2nd Edition 2003, WHO Geneva.
- Sood, Textbook of Medical Laboratory Technology, 1st Edition 2006, Jaypee Brothers Publishers, 2006.



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CLINICAL TRAINING-II

Course Code: MLT2212

Credit Units: 2

Course objective: The purpose of a Clinical training is to provide hands on practical experience in relevant sections of diagnostic labs as per the need of healthcare system. Students will participate in samples collection, documentation, transportation, receiving, processing and dispatch of reports. Students will help in the performance of clinical protocols, quality maintenance and laboratory research. In some cases, students may be deputed in community services or assist in organizing camps like blood testing or blood donation camp.

Students will be sent to diagnostic laboratory or hospital once a week outside campus or may be within the campus if facility available.

Plan for clinical training:

1. Bacteriology Lab
2. Hematology Lab

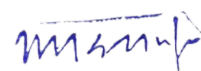
Note: Students must submit training report during examination and the same would be evaluated through Viva voice and presentation.

Examination Scheme

Components	Viva	A	ME	EE
Weightage (%)	10	5	15	70



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NUTRITION

Course Code: MLT2205

Credit Units: 03

Course Objective: At the end of the course student would have gained the knowledge of the following: Balanced diet, protein, carbohydrates, vitamins, minerals, carotenoids and eye nutrition, Ocular aging and adverse effects of ocular nutritional supplements.

Course Contents:

Module I:

Introduction to Nutrition and Food Science, Food Groups and Food Pyramid; Balanced diet for different age groups and recommended dietary Allowances

Module II:

Assessment of Nutritional Status; Energy – Units, Metabolisms, Energy expenditure, and Energy imbalance; Digestion, absorption and transport of Food

Module III:

Proteins and eye; Lipids and eye; Carbohydrates and eye; Vitamins and eye; Minerals and trace elements and eye; Carotenoids and eye; Oxidative stress and the eye

Module IV:

Vitamin A, C and E deficiency; Nutrition and ocular aging; Contraindications, Adverse reactions and ocular nutritional supplements

Examination Scheme:

Components	A	HA	CT	P	EE
Weightage (%)	5	5	10	10	70


(CT-Class Test; HA - Home Assignment; P-Practical; A- Attendance; EE-End Semester Examination)

Recommended books:

- M Swaminathan, Hand book of Food and Nutrition, fifth edition, Bangalore printing & publishing Co. Ltd, Bangalore, 2004.
- C Gopalan, BV Rama Sastri, SC Balasubramanian, Nutritive Value of Indian Foods, National Institute of Nutrition, ICMR, Hyderabad, 2004.
- Frank Eperjesi & Stephen Beatty, Nutrition and The Eye, A Practical Approach, Elsevier Butterworth – Heinemann, USA, 2006.



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MEDICAL TERMINOLOGY

Course Code: MLT2206

Credit Units: 03

Course Objectives: To use medical terms and abbreviations correctly related to medicine and health.

Course Contents:

Module-I

Introduction to Medical terminology: Origin of terms; Body structure & organization; Anatomical planes; Diseases & disorder terms; Diagnostic tests & equipments; Surgical procedural terms; Area of study & specialists; Signs, symptoms & related terms; Medical abbreviations.

Module-II

Medical Records & their utility: Definition and characteristics of 'Good' medical record; Required characteristics of entries in medical records and responsibility for medical record quality; Medical record forms and their content; Incomplete record control; Utility & functions of medical records in health care delivery system; Organizations & management of medical records department; Role of medical technologists in medical record keeping; Reports & returns in medical record system.

Module-III

Medico-Legal Aspects of Medical Records: Basic knowledge of legal aspects of Medical Records including Factories Act - Workmen compensation act, consumer protection act; Procedures of medical auditing & its importance in brief.

Examination Scheme:

Components	CD	CT1	SA	A	EE
Weightage (%)	5	10	10	5	70

Recommended books:

- Quick Medical Terminology: A self teaching guide. Shirley Soltesz Steiner, Natalie Pate Capps 5th Edition.
- Medical Terminology: A Living Language (5th Edition)," by Bonnie F. Fremgen and Suzanne S. Frucht.
- Basic Medical Terminology Concepts (2nd Edition) by Marilyn White Wilson.



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IMMUNOLOGY & SEROLOGY

Course Code: MLT2307

Credit Units: 03

Course Objectives:

- To impart the basic knowledge of human immune system.
- To familiarize with various methods of antigen-antibody reactions.

Course Contents:

Module-I:

Immunity: Definition, types - Innate, acquired, local and herd immunity, opsonization and phagocytosis, relationship between innate and acquired immunity, vaccine and immunization.

Antigen: Antigen properties, structure and types; Adjuvant.

Antibody: Immunoglobulin – structure, classes, properties and function; Monoclonal and polyclonal antibody.

Module-II:

Immune Response: Humoral and cellular immune response; Major histocompatibility complex.

Cell and Organs of Immune System: Primary lymphoid organ, secondary lymphoid organ, T-lymphocytes, B-lymphocytes, cytokines.

Complement system: General properties and pathways.

Module-III:

Hypersensitivity: Definition and classification- Type-I, Type-II, Type-III and Type-IV.

Immunodeficiency Disorders: Definition and classification, humoral immunodeficiency, cellular immunodeficiency, disorders of phagocytosis and complement system.

Module-IV:

Antigen Antibody Reaction: General properties and types of antigen antibody reaction, precipitation reaction, agglutination reaction, complement fixation test, neutralization test, radio immuno assay, enzyme-linked immune-sorbent assay and immunofluorescence assay.

Examination Scheme

Components	CA	A	ME	EE
Weightage (%)	15	5	10	70

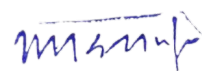
Recommended books:

- Dale Male, Jonathan Brostoff, David B Roth and Ivan Roitt Kuby Immunology, 7th Edition 2012, Mosby (Elsevier).
- C P Baveja, Text book of Microbiology, 4th Edition 2010, Arya Publication.
- Arti Kapil, Ananthanarayan and Paniker's Textbook of Microbiology, 9th Edition 2013, Orient BlackSwan.
- D.R.Arora / Brij Bala Arora, Textbook of Microbiology, 5th Edition 2016, CBS Publishers & Distributors.
- B S Nagoba and D V Bedpathsk, Immunology, 1st Edition 2008, BI Publications.
- J Ochei and A Kolhatkar, Medical Laboratory Science- Theory and Practice, 1st Edition 2000, Tata Mcgraw Hill Publishing Co Ltd.
- Praful B. Godkar, Darshan P. Godkar, Text book of Medical Laboratory Technology, 3rd Edition 2014, Bhalani Publishing House.
- Peter Lydyard, Alex Whelan, Michael Fanger, Instant Notes in Immunology 3rd Edition 2011, BIOS Scientific Publisher.

- William E. Paul, Fundamental Immunology 7th Edition 2013, Woulters Kluwar / Lippincott Williams & Wilkins.
- T Doan, R Mervold, S Visseli, C Waltenbough, Immunology 2nd Edition 2013, Woulters Kluwar / Lippincott Williams & Wilkins.



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HAEMATOLOGY-III

Course Code: MLT2308

Credit Units: 03

Course Objectives:

- To familiarize students about mechanism of haemostasis and related disorders.
- To impart the knowledge of investigation required in coagulation study.
- To impart the understanding of pathogenesis, lab diagnosis and prevention of multiple myeloma and lymphoma.

Course Contents:

Module-I

Hemostasis: Introduction and mechanism of hemostasis, role of platelets in hemostasis, clotting factors and coagulation cascade- intrinsic, extrinsic and common pathway; Fibrinolytic system.

Module-II

Hemostatic disorders: Hemophilia, von Willebrand's syndrome, disseminated intravascular coagulation and other coagulation factor deficiencies, vitamin K deficiency, anticoagulant therapy, liver diseases, platelets disorders.

Module-III

Laboratory diagnosis: Principle, procedure, reference values and significance of – Bleeding Time, Clotting Time, Prothrombin Time, Activated Partial Prothrombin Time, Thrombin Time, Hess Test, Clot Retraction Time, Fibrinogen Degradation Product and assays for coagulation factors.

Coagulometer: Principle, working and applications.

Module-IV

Lymphoma and Multiple Myeloma: Introduction, Classification and pathogenesis, laboratory diagnosis, prevention and control.

LE cell: LE cell phenomena, various methods for diagnosis and clinical significance.

Examination Scheme

Components	CA	A	ME	EE
Weightage (%)	15	5	10	70

Recommended books:

- Shrish M. Kawthalkar, Essential Hematology, 2nd Edition 2013, Jaypee Publication.
- Bain, Decie & Lewis Practical Hematology, 11th Edition 2016, Churchill Livingstone.
- J Ochei and A Kolhatkar, Medical Laboratory Science- Theory and Practice, 1st Edition 2000, Tata McGraw Hill Publishing Co Ltd.
- Praful B. Godkar, Darshan P. Godkar, Text book of Medical Laboratory Technology, 3rd Edition 2014, Bhalani Publishing House.
- Harse Mohan, Text Book of Pathology 7th Edition 2015, Jaypee & Brothers Medical Publishers LTD.
- Richard A. McPherson, Henry's Clinical Diagnosis and Management by Laboratory Methods, 22 Edition 2014 Elsevier.
- E M Keohane, L Smith, J Walenga, Rodak's Hematology: Clinical Principle and Application, 5th Edition 2015, Elsevier.
- John P. Greer, Daniel A. Arber, Bertil E. Glader, Alan F. List, Robert T. Means, Frixos Paraskevas, George M. Rodgers, John Foerster, Wintrobe's Clinical Hematology 13th Edition 2013, Wolters Kluwer.
- Bernadette F. Rodak, George A. Fritsma, Kathryn Doig, Hematology: Clinical Principles and Applications, 4th Edition 2012. Saunders & Elseviers.

CLINICAL PARASITOLOGY

Course Code: MLT2309

Credit Units: 03

Course Objectives:

- To impart knowledge about detrimental effects of parasites on human health.
- To develop understanding of life cycle, transmission, pathogenicity, and control strategies of clinically important parasites.
- To familiarize with techniques of sample collection and processing to diagnose parasitic infection.

Course Contents:

Module-I

Introduction of Parasitology: Introduction to clinical parasitology, general characteristics, morphology and classification of parasites, classification of hosts and vectors, relationship between parasites and host, mode of transmission of parasitic infections.

Module-II

Protozoology: Morphology, life cycle, pathogenicity, prevention and lab diagnosis of Entamoeba, Dientamoeba, Iodamoeba, Trichomonas, Trypanosomes, Leishmania, Giardia, Plasmodium, Isospora, Balantidium and Toxoplasma.

Module-III

Helminthology: Morphology, life cycle, pathogenicity, prevention and lab diagnosis of-

i) Platyhelminthes: Diphylobothrium, Taenia, Echinococcus, Hymenolepis, Schistosoma, Fasciola, Fasciolopsis, Clonorchis, Peragonimus.

ii) Nematelminthes: Ascaris, Ancylostoma, Necator, Strongyloides, Trichinella, Enterobius, Trichurias, Wucheria, Brugia, Loa loa, Onchocerca, Dracunculus.

Module-IV

Diagnostic Methods: Collection, transportation, processing of different clinical specimens for parasitological examination, concentration techniques, rapid diagnostic techniques and permanent smears preparation techniques.

Examination Scheme

Components	CA	A	ME	EE
Weightage (%)	15	5	10	70

Recommended books:

- Arora & Arora, Text book of Medical parasitology, 4th Edition 2015, CBS Publishers.
- Saugata Ghosh, Paniker's text book of medical parasitology, 7th Edition 2013, Jaypee Brothers Medical Publishers.
- KD Chatterjee, Protozoology and Helminthology, 13th Edition 2009, CBS Publishers & Distributors pvt.
- Subhash Chandra Parija, Textbook of Medical Parasitology: Protozoology & Helminthology, 4th Edition 2013, All India Publishers & Distributors.
- T V Rajan, Textbook of Medical Parasitology, 1st Edition 2008, B I Publications.
- World Health Organization, Basic laboratory methods in medical parasitology, World Health Organization 1991. WHO Geneva.
- Manual of Basic Technique for Health Laboratory, 2nd Edition 2003, WHO Geneva.
- Lynne S. Garcia, Diagnostic Medical Parasitology, 6th Edition 2016, ASM Press.
- David T. John, William A. Petri Jr., Markell and Voge's Medical Parasitology, 9th Edition 2006, Saunders Elseviers.

HAEMATOLOGY LAB-III

Course Code: MLT2311

Credit Units: 01

Course Objectives:

- To impart the basic knowledge of principles, techniques and clinical importance of routine and selected laboratory procedures.
- To familiarize with basic knowledge of instruments commonly utilized in the clinical hematology laboratory.

List of Experiments:

1. To perform bleeding time.
2. To perform clotting time.
3. To perform prothrombin time.
4. To perform activated partial prothrombin time.
5. To perform thrombin time.
6. To perform Hess's test.
7. To perform clot retraction time.
8. To study LE cell phenomena.
9. To perform osmotic fragility test.
10. To perform reticulocyte counts.

Examination Scheme:


Components	Internal Assessment	Attendance	Record	EE
Weightage (%)	20	5	5	70

Recommended books:

- J. Ochei and A. Kolhatkar, Medical Laboratory Science- Theory and Practice, 1st Edition 2000, Tata Mcgraw Hill Publishing Co. Ltd.
- Praful B. Godkar, Darshan P. Godkar, Text book of Medical Laboratory Technology, 3rd Edition 2014, Bhalani Publishing House.
- Bain, Decie & Lewis Practical Hematology, 11th Edition 2016, Churchill Livingstone.
- Mannual of Basic Technique for Health Laboratory, 2nd Edition 2003, WHO Geneva.
- Sood, Textbook of Medical Laboratory Technology, 1st Edition 2006, Jaypee Brothers Publishers, 2006.



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CLINICAL BIOCHEMISTRY LAB

Course Code: MLT2312

Credit Units: 01

Course Objectives:

- To impart the basic knowledge of principles, techniques and clinical importance of routine and selected laboratory procedures.
- To familiarize with basic knowledge of instruments commonly utilized in the clinical biochemistry laboratory.

List of Experiments:

1. To perform blood glucose.
2. To perform blood urea.
3. To perform total bilirubin.
4. To perform total plasma protein.
5. To perform serum creatinine.
6. Estimation of serum calcium ion.
7. Estimation of serum uric acid.
8. To perform blood urea nitrogen.
9. Estimation of serum phosphate.
10. Estimation of serum phosphorus.

Examination Scheme:


Components	Internal Assessment	Attendance	Record	EE
Weightage (%)	20	5	5	70

Recommended books:

- J. Ochei and A. Kolhatkar, Medical Laboratory Science- Theory and Practice, 1st Edition 2000, Tata McGraw Hill Publishing Co Ltd.
- Praful B. Godkar, Darshan P. Godkar, Text book of Medical Laboratory Technology, 3rd Edition 2014, Bhalani Publishing House.
- Manual of Basic Technique for Health Laboratory, 2nd Edition 2003, WHO Geneva.
- Ranjna Chawla, Practical Clinical Biochemistry: Methods and Interpretations, 4th Edition 2014, Jaypee & Brothers Medical Publishers (P) Ltd.
- Shivaraja Shankara YM, ,ShankaraGanesh MK, Laboratory Manual for Practical Biochemistry, 2nd Edition 2013, Jaypee & Brothers Medical Publishers (P) Ltd.
- David T Punmmer, An Introduction to Practical Biochemistry, 3rd Edition 2004, Tata McGraw Hill.
- Sood, Textbook of Medical Laboratory Technology, 1st Edition 2006, Jaypee Brothers Publishers, 2006.



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CLINICAL TRAINING-III

Course Code: MLT2313

Credit Units: 2

Course Objective: The purpose of a Clinical training is to provide hands on practical experience in relevant sections of diagnostic labs as per the need of healthcare system. Students will participate in samples collection, documentation, transportation, receiving, processing and dispatch of reports. Students will help in the performance of clinical protocols, quality maintenance and laboratory research. In some cases, students may be deputed in community services or assist in organizing camps like blood testing or blood donation camp.

Students will be sent to diagnostic laboratory or hospital once a week outside campus or may be within the campus if facility available.

Plan for clinical training:

1. Serology Lab
2. Parasitology Lab
3. Biochemistry Lab
4. Hematology Lab

Note: Students must submit training report during examination and the same would be evaluated through Viva voice and presentation.

Examination Scheme

Components	Viva	A	ME	EE
Weightage (%)	10	5	15	70

HOSPITAL ADMINISTRATION

Course Code: MLT2305

Credit Units: 03

Course Objective: To develop understanding about the norms and standards for accreditation of the healthcare organization and adopt continuous evaluation to improve the quality of health care settings.

Course Contents:

Module-I

Hospital Organization: History & development of hospitals, types & sizes of hospitals, role & functions of hospital administrator and hospital information system.

Module-II

Financial Aspects: Cost & its classification; Theory of supply & demand; Break even analysis.

Module-III

Hospital Material Management: Types of stores in hospitals; Material cycle; Location & Layout of store premises.

Module-IV

Legal Aspects: Statutory obligations; Medical negligence; Prevention against litigation.

Module-V

Clinical services: OPD, IPD, OT, ICU and emergency services.

Support services: Laboratory, Radiology, Blood bank and CSSD.

Utility services: MRD, engineering and pharmacy etc.

Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70

Recommended Books:

- Yashpal Sharma, R. K. Sharma and L A Gomas. Hospital administration principles and practice, 1st edition 2013, Jaypee brothers publication.



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LAB MANAGEMENT & SAFETY PROCESS

Course Code: MLT2306

Credit Units: 03

Course Objective: The students will aware about the ethics of a clinical laboratory and learn about good laboratory practice, safety measures and quality management in a clinical laboratory.

Course Contents:

Module-I

Quality control: Introduction to quality control, total quality management framework, quality laboratory processes, quality assurance, quality assessment, quality control, quality planning and quality improvement, costs of conformance and non conformance, appraisal costs, prevention costs, internal quality control, basic steps, sources of error and their correction methods, CAPA - corrective action & preventive action and sources of variation in laboratory results.

Module-II

External quality control: Quality control charts, Levy- Jennings and Cusum charts, external quality control, quality control programme, intrinsic and extrinsic and random errors, current trends in laboratory accreditation, ISO certificate, West guard rules and demonstration of various methods of quality control.

Module-III

Laboratory ethics: Ethical Principles and standards for a clinical laboratory professional – Duty to the patient, colleagues, other professionals and the society.

Laboratory accreditation: Good Laboratory Practice (GLP) Regulations and Accreditation – Introduction, aims and advantages of GLP and accreditation.

Module-IV

Laboratory safety measures: Awareness / Safety in a clinical laboratory, general safety precautions; HIV – pre and post-exposure guidelines; Hepatitis B & C – pre and Post-exposure guidelines; Drug resistant tuberculosis; Patient management for clinical samples collection, transportation and preservation of sample; Sample, purpose and methods of accountability.

Examination Scheme

Components	P	A	ME	EE
Weightage (%)	15	5	10	70

Recommended books:

- Textbook of Medical Lab Technology ,Sood, Jaypee Brothers Publications
- Fundamentals of urine and body fluid analysis (3rd ed.) - Brunzel, N. A



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CLINICAL PATHOLOGY & CYTOLOGY

Course Code: MLT2405

Credit Units: 03

Course Objectives:

- To develop the knowledge about physical, chemical and microscopic examination of various clinical sample.
- To provide the understanding of collection, processing and clinical aspects of various body fluids.
- To develop the knowledge about various stains used in cytology.

Course Contents:

Module-I

Urine Analysis: Introduction, collection, handling, transportation, preservation and storage of urine; Physical, chemical and microscopic examinations with clinical significance; other specific tests and 24 hrs urine analysis.

Module-II

Stool analysis: Introduction, collection, preservation, transportation and clinical aspects of stool sample; Physical, chemical and microscopic examination with clinical significance.

Semen analysis: Introduction, composition and clinical aspects of semen, collection, preservation and transportation of semen sample; Physical, chemical and microscopic examinations with clinical significance.

Module-III

CSF analysis: Introduction, collection, transportation, processing and clinical indications of CSF analysis.

Synovial fluid analysis: Introduction, collection, transportation, processing and clinical indications of synovial fluid analysis.

Serous fluids analysis: Introduction, collection, transportation, processing and clinical indications of pleural, pericardial and peritoneal fluids analysis.

Module-IV

Cytology: Introduction to cytology and exfoliative cytology and clinical importance; Collection, preservation, transportation and processing of cytological specimens (Sputum, Bronchial brush, Esophageal and gastric brush, oral scraping, Breast aspiration and Nipple discharge, Cervical and vaginal specimens).

Cytological stains: Introduction, composition and preparation of cytological stains; Staining procedure - Giemsa stain, Papanicolaou stain, PAS stain, Haematoxylin and eosin stain, Masson's trichrome stain and Ziehl-Neelsen stain.

Examination Scheme

Components	CA	A	ME	EE
Weightage (%)	15	5	10	70

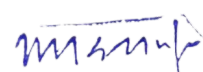
Recommended books:

- Medical Laboratory Science: Theory and practice by J. Ochei, Arundhati kolhatkar, 1st Edition 2000, Mcgraw Hill Education.
- P K Godkar, Text book of Medical Laboratory technology, 3rd Edition 2014, Bhalani Publication.

- Sabitri Sanyal & Arpana Bhattacharya, Clinical Pathology: A Practical Manual, 4th Edition 2008, Elsevier.
- Susan King Strasinger, Marjorie Schaub Di Lorenzo, Urinalysis and Body Fluids, 6th Edition 2014, F A Davids Company.
- Karen Munson Ringsrud, Jean Jorgenson Linné, Urinalysis and Body Fluids: A Colortext and Atlas, 1st Edition 1995, Mosby.
- Richard A. McPherson, John Bernard Henry, Matthew R. Pincus, Henry's Clinical Diagnosis and Management by Laboratory Methods, 22nd Edition 2014, Elsevier/Saunders.
- Lillian A. Mundt, Kristy Shanahan, Graff's Textbook of Routine Urinalysis and Body Fluids, 2nd Edition 2016, Philadelphia : Wolters Kluwer/Lippincott Williams & Wilkins Health.
- Leopold G. Koss, Myron R. Melamed, Koss' Diagnostic Cytology and Its Histopathologic Bases, Volume 1, 5th Edition 2006, Lippincott Williams & Wilkins.
- Edmund S. Cibas, Barbara S. Ducatman, Cytology: Diagnostic Principles and Clinical Correlates. 4th Edition 2014, Saunders and Elseviers.
- Gabrijela Kocjan, Fine Needle Aspiration Cytology: Diagnostic Principles and Dilemmas, 1st Edition 2005, Springer.



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CLINICAL VIROLOGY AND MYCOLOGY

Course Code: MLT2406

Credit Units: 03

Course Objectives:

- To impart knowledge of diagnosis of viral diseases.
- To impart knowledge of diagnosis of fungal disease.
- To provide understanding of molecular method of diseases diagnosis.

Course Contents:

Module-I

Virology: General properties of viruses; Collection, transportation and storage of clinical samples; Cultivation of viruses; Molecular methods for virus diagnosis.

Module-II

Clinically important virus: Human immunodeficiency viruses, viral hepatitis, rabies virus, herpes viruses, influenza viruses, rubella, mumps, measles, rota virus, poliomyelitis, japanese encephalitis, dengue, chikungunya, human onocogenic viruses and kysanur forest disease.

Module-III

Mycology: General properties, morphology, classification and cultivation of fungi; Types of mycoses; Lab diagnosis of fungal infections.

Module-IV

Common fungal infections: Dermatophytes, candidiasis, mycetoma, rhinosporidium, sporotrichosis, histoplasmosis, blastomycosis, coccidioidosis, paracoccidioidosis, cryptococcosis, aspergillosis, pencillosis, zygomycosis and pneumocystis.

Examination Scheme

Components	CA	A	ME	EE
Weightage (%)	15	5	10	70

Recommended books:

- C P Baveja, Text book of Microbiology, 4th Edition 2010, Arya Publication.
- Arti Kapil, Ananthanarayan and Paniker's Textbook of Microbiology, 9th Edition 2013, Orient BlackSwan.
- Mark Gladwin, Trattler William, C. Scott, Mahan Clinical Microbiology Made Ridiculously Simple. 6th Edition 2013, Medmaster
- D.R.Arora / Brij Bala Arora, Textbook of Microbiology, 5th Edition 2016, CBS Publishers & Distributors.
- Eds J. G. Collee, J. P. Duguid, A. G. Fraser & B. P. Marmio, Mackie and McCartney: Practical medical microbiology, 14th Edition 2007, Church New Delhi (India): Elsevierill Livingston.
- R C Dubay & D.K.Maheshwari, Practical Microbiology, Revised edition 2014, S Chand & Company LTD.
- Dr. C.P. Baveja, Dr. V. Baveja, Textbook of Microbiology for MLT, 2nd Edition, Arya Publication.
- Joanne Willey, Linda Sherwood, Christopher J. Woolverton, Presscot's Microbiology, 9th Edition 2014, McGraw-Hill Education.
- Gary W Procop & Elmer W. Koneman Koneman's Color Atlas and Textbook of Diagnostic Microbiology, 7th Edition 2016, Wolters Kluwer Health.
- F. H. Kayser, K. A. Bienz, J. Eckert, Medical Microbiology, 10th German Edition 2005, Thieme Stuttgart, New York.
- Michael Ford, Medical Microbiology, 2nd Edition 2014, Oxford university press.
- Neal Chamberlain, Medical Microbiology: The Big Picture, 1st Edition 2008, Mc Grew Hill Medical.

DIAGNOSTIC BIOCHEMISTRY LAB-I

Course Code: MLT2408

Credit Units: 01

Course Objectives:

- To impart the basic knowledge of principles, techniques and clinical importance of routine and selected laboratory procedures.
- To familiarize with basic knowledge of instruments commonly utilized in the clinical biochemistry laboratory.

List of experiments:

1. To perform serum albumin and A: G ratio.
2. To perform serum ALP.
3. To perform SGPT.
4. To perform SGOT.
5. To perform serum amylase
6. To perform serum lipase.
7. To perform triiodothyronine hormone.
8. To perform tetraiodothyronine hormone.
9. To perform OGTT.
10. To perform HbA_{1c}.

Examination Scheme

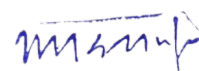
Components	Internal Assessment	Attendance	Record	EE
Weightage(%)	20	5	5	70

Recommended books:

- J. Ochei and A. Kolhatkar, Medical Laboratory Science- Theory and Practice, 1st Edition 2000, Tata Mcgraw Hill Publishing Co. Ltd.
- Praful B. Godkar, Darshan P. Godkar, Text book of Medical Laboratory Technology, 3rd Edition 2014, Bhalani Publishing House.
- Mannual of Basic Technique for Health Laboratory, 2nd Edition 2003, WHO Geneva.
- Ranjna Chawla, Practical Clinical Biochemistry: Methods and Interpretations, 4th Edition 2014, Jaypee & Brothers Medical Publishers (P) Ltd.
- Shivaraja Shankara YM, Shankara, Ganesh MK, Laboratory Manual for Practical Biochemistry, 2nd Edition 2013, Jaypee & Brothers Medical Publishers (P) Ltd.
- David T Punmmer, An Introduction to Practical Biochemistry, 3rd Edition 2004, Tata McGrew Hill.
- Sood, Textbook of Medical Laboratory Technology, 1st Edition 2006, Jaypee Brothers Publishers, 2006.



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CLINICAL TRAINING-IV

Course Code: MLT2409

Credit Units: 2

Course Objectives: The purpose of a Clinical training is to provide hands on practical experience in relevant sections of diagnostic labs as per the need of healthcare system. Students will participate in samples collection, documentation, transportation, receiving, processing and dispatch of reports. Students will help in the performance of clinical protocols, quality maintenance and laboratory research. In some cases, students may be deputed in community services or assist in organizing camps like blood testing or blood donation camp.

Students will be sent to diagnostic laboratory or hospital once a week outside campus or may be within the campus if facility available.

Plan for clinical training:

1. Pathology Lab
2. Virology and Mycology Lab
3. Biochemistry Lab


Note: Students must submit training report during examination and the same would be evaluated through Viva voice and presentation.

Examination Scheme

Components	Viva	A	ME	EE
Weightage (%)	10	5	15	70



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BASICS IN COMPUTER & PC PACKAGE

Course Code: MLT2410

Credit Units: 03

Course Objective:

This course aims at preparing the students to handle personal computers, learn basics of the current hardware, software and windows operating systems being used.

Course Contents:

Module-I

Computer Basics: History of computers, Definition of computers, Input Devices, storage devices, types of memory, and units of measurement, range of computers, generations of computers and characteristics of computers.

Module-II

System: Hardware, Software, system definition, fundamentals of networking, internet, performing searches and working with search engines, types of software and its applications.

Module-III

Office Application Suite: Word Processor, spread sheet, presentations, other utility tools Fundamentals of Linux /windows operating system, functions, interfaces and basic commands.

Module-IV

Special Applications: Use of database software for clinic records; Use of specialized software for optometric use.

List of practical:

- Various browsers, Search engines, E-mail
- Text document with multiple formatting option using specific office package
- Spread sheet using a specified office package
- Presentation on a specified topic using a specified office package.

Examination Scheme

Components	A	HA	(CT)	V	P
Weightage (%)	20	20	20	20	20

(CT-Class Test; V-Viva; HA - Home Assignment; P-Practical; A- Attendance)



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HISTOPATHOLOGY

Course Code: MLT2507

Credit Units : 04

Course Objectives:

- To impart the knowledge of fixatives and tissue processing for histopathological examination.
- To impart the knowledge of microtomy and staining technique in histopathology laboratory.

Course Contents:

Module-I

Grossing: Introduction, histological specimens, labeling and reporting.

Fixation: Definition, classification, properties, composition, advantages and disadvantages of fixatives; Post chroming.

Decalcification: Importance, decalcifying agent, composition, advantages and disadvantages.

Module-II:

Tissue processing: Definition, importance, steps, dehydrating agents and dehydration process, clearing agents and clearing process.

Embedding: Embedding media, water soluble embedding media;

Module-III:

Microtome: Definition, types, care and use of microtome; Microtome knife, honing and stropping; Technique for sectioning, paraffin embedded tissue, frozen section; Errors in sectioning and remedies.

Mounting: Mounting media, advantages and disadvantages.

Module-IV:

Staining: Hematoxylin and eosin staining; Specific stain for collagen, reticulin, elastin, fat, amyloid, glycogen, mucin, iron and neuron.

Examination Scheme

Components	CA	A	ME	EE
Weightage (%)	15	5	10	70

Recommended books:

- J Ochei and A Kolhatkar, Medical Laboratory Science- Theory and Practice, 1st Edition 2000, Tata Mcgraw Hill Publishing Co Ltd.
- Praful B. Godkar, Darshan P. Godkar, Text book of Medical Laboratory Technology, 3rd Edition 2014, Bhalani Publishing House.
- C F A Culling, Handbook of Histopathological and Histochemical Techniques, 3rd Edition 1974, Butterworth-Heinemann.
- Bancroft J. D and Gamble M, Theory & Practice of Histological Techniques, 6th Edition 2008, Churchill livingstone.
- H. Mohan, Text Book of Pathology 7th Edition 2015, Jaypee & Brothers Medical Publishers LTD.
- Leopold G. Koss, Myron R. Melamed, Koss' Diagnostic Cytology and Its Histopathologic Bases, Volume 1, 5th Edition 2006, Lippincott Williams & Wilkins.
- Edmund S. Cibas, Barbara S. Ducatman, Cytology: Diagnostic Principles and Clinical Correlates. 4th Edition 2014, Saunders and Elseviers.
- Gabrijela Kocjan, Fine Needle Aspiration Cytology: Diagnostic Principles and Dilemmas, 1st Edition 2005, Springer.
- John A. Kiernan, Histological and Histochemical Methods: Theory and Practice, 4th Edition 2008, Scion Publishing Ltd.

IMMUNOHEMATOLOGY AND BLOOD TRANSFUSION

Course Code: MLT2508

Credit Units: 03

Course objectives:

- To impart the basic knowledge of blood group antigens and antibodies.
- To provide the concepts of donor screening and blood transfusion reactions.

Course Contents:

Module-I

Blood group system: Introduction and history of blood group systems, ABO blood group system and Rh system, blood group antigens and antibody, Sub groups, Bombay group, Red cell membrane structure,

Module-II

Phlebotomy and blood storage: blood bags and preservatives, donor selection criteria, blood collection procedure, component separation, cryoprecipitate, screening and storage of blood.

Pre-transfusion testing: blood grouping and typing, compatibility testing, coomb's test, D^u test and HLA type.

Module-III

Blood transfusion: Indication, types, apheresis, transfusion reactions, erythroblastosis fetalis, investigation of transfusion reaction.

Artificial blood: Clinical trials, blood substitutes and uses.

Module-IV

Blood banking: Organization, operation and administration of blood bank and blood donation camp; quality control in blood banking.

Advances in transfusion medicine: Cord blood bank, Automation, blood collection machine.

Examination Scheme

Components	CA	A	ME	EE
Weightage(%)	15	5	10	70

Recommended books:

- J Ochei and A Kolhatkar, Medical Laboratory Science- Theory and Practice, 1st Edition 2000, Tata Mcgraw Hill Publishing Co Ltd.
- Praful B. Godkar, Darshan P. Godkar, Text book of Medical Laboratory Technology, 3rd Edition 2014, Bhalani Publishing House.
- R N Makroo, Principle & Practice of transfusion medicine, 1st Edition 2014, Jain Books.
- Christopher D Hillyer, Beth, James, Transfusion Medicine & hemostasis: Clinical & Laboratory aspect, 2nd Edition 2013, Elsevier Healths.
- Richard A. McPherson, Henry's Clinical Diagnosis and Management by Laboratory Methods, 22nd Edition 2014, Elsevier.

BIOSTATISTICS AND QUALITY ASSURANCE

Course Code: MLT2509

Credit Units: 03

Course Objectives:

- To enable the student to understand the applications of statistics in diagnostic research.
- To impart the knowledge of hypotheses to estimate the possible risk factors of a disease.
- To enable to address public health and clinical problems in statistics forms.

Course Contents:

Module-I

Basic Biostatistics: Introduction, basic concept and clinical importance of biostatistics; Data classification, source of data, variables; Central tendency – mean, median, mode; Mode of dispersion – standard deviation, variance; Standard error, coefficient of variation and their importance; Normal distribution and t- test and its application.

Module-II

Sampling: Introduction: various methods, errors and distribution of sampling.

Hypothesis: Introduction, basic concept and importance of null hypothesis and alternate hypothesis.

Quality assurance system: Introduction and its application; Internal quality assurance and external quality assurance.

Module-III

Quality control: Introduction, basic concept and importance of quality control; Internal quality control and external quality control; Preparation quality control charts; Introduction, basic concept and application of Westguard rules; Biostatistics and its relation with laboratory quality control; Basic terminology- accuracy, precision, error, bias, sensitivity, specificity.

Module-IV

Automation: Introduction, basic principle and importance of automation; Phases of automation – pre-analytical, analytical and post analytical.

Examination Scheme

Components	CA	A	ME	EE
Weightage (%)	15	5	10	70

Recommended books:

- P. S. S. Sundar Rao, J. Richard, An Introduction to Biostatistics: A Manual for Students in ,Health Sciences3rd Edition 2004, Prentice Hall India Pvt. Limited.
- N Gurumani, An Introduction to Biostatistics, 2nd Edition 2011, MJP Publishers.
- Thomas Glover, Kevin Mitchell, An Introduction to Biostatistics, 3rd Edition 2015, Waveland Press, Elseviers.
- Shubhangi Tambweker, Handbook of Quality Assurance in Laboratry Medicine, 1st Edition 2009, BI Publications.
- Greg Cooper, Basic Lesson in Laboratory Quality Control, QC Work Book, 2008, Bio-Rad Laboratories, Quality Systems Division.
- Huldah Bancroft, Introduction to Biostatistics, 1st Edition 1957, Hoeber-Harper.
- Wayne W. Daniel, Biostatistics: A foundation for analysis in the health sciences, 10th Edition 2012, John Wiley & Sons Inc.
- Richard A. McPherson, ,John Bernard HenryMatthew R. Pincus, Henry's Clinical Diagnosis and Management by Laboratory Methods, 22nd Edition 2011, Saunders.

DIAGNOSTIC BIOCHEMISTRY-II

Course Code: MLT2510

Credit Units: 04

Course Objectives:

- To enhance the knowledge about the bio molecules and their role in human health.
- To impart the knowledge of analysis of biochemical parameters in metabolic disorders.
- To impart the knowledge of principles of biochemical tests and their clinical significance.

Course Contents:

Module-I

Renal function test: Glomerular Filtration Tests, tests for renal blood flow, tests of tubular function, other miscellaneous tests to assess renal function.

Lipoproteins: Formation of HDL, LDL, VLDL, circulation of lipoproteins, role in atherosclerosis, hyper and hypolipoproteinemia.

Module-II

Gastric function test: Patient preparation, principle and procedure of gastric analysis, fasting gastric juice analysis, post meal gastric analysis, post stimulation gastric analysis, clinical significance.

Intestinal malabsorption analysis: Principle, procedure of xylose absorption test, clinical significance of xylose absorption test.

Module-III

Acid base balance test: Buffer systems, acidosis and its pathophysiology, alkalosis and its pathophysiology, arterial blood gas test, metabolic panel, pulmonary function test.

Blood electrolytes: Sodium, potassium, magnesium, chloride and calcium.

Module-IV

Tumour markers: Biochemical changes in cancer, etiology of cancer, tumor markers, apoptosis and its role in carcinogens.

Toxicology: Drug abuse, lead, mercury, salicylates, aspirin, alcohol, illegal drugs, barbiturates.

Examination Scheme

Components	CA	A	ME	EE
Weightage (%)	15	5	10	70


Recommended books:

- U Satyanarayan and U Chakrapani, Text book of Biochemistry, 4th Edition 2013, Elsevier.
- M N Chatterjea and Rana Shinde, Text book of Medical Biochemistry, 8th Edition 2012, Jaypee & Brothers Medical Publishers (P) LTD.
- S Ramakrishana, Text Book of Medical Biochemistry, 3rd Illustrated Edition 2004, Orient Longman.
- D M Vasudevan, Sreekumari S, Kannan Vaidyanathan, Textbook of Biochemistry for Medical Students, 8th Edition 2016, Jaypee & Brothers Medical Publishers (P) LTD.
- S Chitiprol, Biochemistry: Instant Notes for Medical students, 1st Edition 2006, Jaypee & Brothers Medical Publishers.
- P K Godkar, Text Book of Medical Laboratory Technology, 3rd Edition 2014, Bhalani Publication.
- Ranjna Chawla, Practical Clinical Biochemistry: Methods and Interpretations, 4th Edition 2014, Jaypee & Brothers Medical Publishers (P) LTD.
- David T Punmmer, An introduction to practical biochemistry, 3rd Edition 2004, Tata McGraw Hill.

- Shivaraja Shankara YM, Shankara, Laboratory Manual for Practical Biochemistry, 2nd Edition 2013, Jaypee & Brothers Medical Publishers (P) LTD.
- Carl A Buttis, David E. Bruns, Teitz fundamental of clinical chemistry and molecular diagnosis, 7th Edition 2015, Elsevier.
- Albert L Lehninger, Michel M Cox, David L Nensson, Lehninger Principle of Biochemistry, 6th Edition 2013, W H Freeman & Co.
- Robert Kincaid Murray, David Bender, Kathleen M. Botham, Peter J. Kennelly, Harpers Illustrated Biochemistry, 30th Edition 2015, McGraw Hill Professional.
- Michael Lieberman, Allan D. Marks, Colleen M. Smith, Dawn B. Marks, Marks' Essential Medical Biochemistry, 2nd Edition 2007, Lippincott Williams & Wilkins.
- Donald Voet, Judith G. Voet, Charlotte W. Pratt, Fundamentals Of Biochemistry: Life At The Molecular Level, 5th Edition 2016, John Wiley and Sons.



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DIAGNOSTIC BIOCHEMISTRY LAB-II

Course Code: MLT2511

Credit Units: 01

Course Objectives:

- To impart the basic knowledge of principles, techniques and clinical importance of routine and selected laboratory procedures.
- To familiarize with basic knowledge of instruments commonly utilized in the clinical biochemistry laboratory.

List of Experiments:

1. To perform serum total cholesterol.
2. To perform serum triglyceride.
3. To perform serum HDL, LDL and VLDL.
4. Determination of Acid Phosphatase.
5. To perform urea clearance test.
6. To perform creatinine clearance test.
7. Estimation of Lactate dehydrogenase .
8. Estimation of serum sodium.
9. Estimation of serum potassium.
10. To perform serum chloride.

Examination Scheme:


Components	Internal Assessment	Attendance	Record	EE
Weightage (%)	20	5	5	70

Recommended books:

- J. Ochei and A. Kolhatkar, Medical Laboratory Science- Theory and Practice, 1st Edition 2000, Tata Mcgraw Hill Publishing Co. Ltd.
- Praful B. Godkar, Darshan P. Godkar, Text book of Medical Laboratory Technology, 3rd Edition 2014, Bhalani Publishing House.
- Mannual of Basic Technique for Health Laboratory, 2nd Edition 2003, WHO Geneva.
- Ranjna Chawla, Practical Clinical Biochemistry: Methods and Interpretations, 4th Edition 2014, Jaypee & Brothers Medical Publishers (P) Ltd.
- David T Punmmer, An Introduction to Practical Biochemistry, 3rd Edition 2004, Tata McGrew Hill.
- Sood, Textbook of Medical Laboratory Technology, 1st Edition 2006, Jaypee Brothers Publishers, 2006.
- Shivaraja Shankara YM, Shankara, Ganesh MK, Laboratory Manual for Practical Biochemistry, 2nd Edition 2013, Jaypee & Brothers Medical Publishers (P) Ltd.



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CLINICAL TRAINING-V

Course Code: MLT2512

Credit Units: 2

Course Objective: The purpose of a Clinical training is to provide hands on practical experience in relevant sections of diagnostic labs as per the need of healthcare system. Students will participate in samples collection, documentation, transportation, receiving, processing and dispatch of reports. Students will help in the performance of clinical protocols, quality maintenance and laboratory research. In some cases, students may be deputed in community services or assist in organizing camps like blood testing or blood donation camp.

Students will be sent to diagnostic laboratory or hospital once a week outside campus or may be within the campus if facility available.

Plan for clinical training:

1. Histopathology Lab
2. Immunohematology and Blood Transfusion Lab
3. Biochemistry Lab


Note: Students must submit training report during examination and the same would be evaluated through Viva voice and presentation.

Examination Scheme

Components	Viva	A	ME	EE
Weightage (%)	10	5	15	70



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PREVENTIVE & SOCIAL MEDICINE

Course Code: MLT2505

Credit Units: 03

Course objective:

- To sensitize the students with the awareness of communicable and non – communicable diseases.
- To make the students capable of investigating and managing possible outbreaks or epidemics.

Course Contents:

Module-I

Health and Disease: Determinants of health, multi – factorial causation of disease host, agent, environment relationship primary, secondary and tertiary levels of prevention with examples related to few diseases of national importance; Natural history of disease; Mode of transmission of disease; Air – borne, vector and vehicle transmission; Methods of control with examples for control of each mode.

Disinfection: Introduction, disinfection of the infective materials received in the Laboratory by using the appropriate disinfection methods at the health centre level.

Module-II

Health services: Brief description of organization of health services at the centre and state levels; Primary health care – Definition, components and principles of primary health care, health for all indicators; Primary health centre – The functions, staffing pattern and the role of laboratory technicians in primary health centre, laboratory tests for use in health centre(see annexure for description).

Health Programmes: Family welfare programme; National programme for water supply and sanitation; Nutritional programmes; Immunization and universal immunization programme; National programmes of health and disease eradication /control; Disease eradication programme: leprosy & guinea worm; Disease control programmes – tuberculosis, malaria, filaria, S.T.D, goitre, cholera and other diarrhoeal diseases and national programme for prevention of blindness including trachoma.

Module-III

Demography & Population control: Introduction; The factors influencing population growth, death rate, birth rate and methods of contraception.

Environmental sanitation: Methods of water purification and disinfection, collection of water samples, their transport and bacteriological analysis; Methods of excreta disposal.

Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70

Recommended books:

- Park's Textbook of Preventive and Social Medicine, by K. Park, 24th edition, Banarsidas Bhanot Publishers.

PROJECT

Course code: MLT2532

Credit Units: 03

Course objective:

The aim of the project is to provide the students with an opportunity to further their intellectual and personal development in the chosen field by undertaking a significant practical unit of activity. The project can be defined as a scholarly inquiry into a problem or issues, involving a systematic approach to gathering and analysis of information / data, leading to production of a structured report.

Chapter Scheme and distribution of marks:

Chapter 1: Introduction – 10 marks

Chapter 2: Conceptual Framework/ National/International Scenario – 25 marks

Chapter 3: Presentation, Analysis & Findings -- 25 marks

Chapter 4: Conclusion & Recommendations -- 10 marks

Chapter 5: Bibliography -- 05 marks

Examination scheme:

Project Report	Power Point Presentation & Viva
75 marks	25 marks

Components of a Project Report

The outcome of Project Work is the Project Report. A project report should have the following components:

- 1) **Cover Page:** This should contain the title of the project proposal, to whom it is submitted, for which degree, the name of the author, name of the supervisor, year of submission of the project work, name of the University.
- 2) **Acknowledgement:** Various organizations and individuals who might have provided assistance /co-operation during the process of carrying out the study.
- 3) **Table of Content:** Page-wise listing of the main contents in the report, i.e., different Chapters and its main Sections along with their page numbers.
- 4) **Abstract:** The body of the report should have summary of the project.
 - a) **Introduction:** This will cover the background, rationale/ need / justification, brief review of literature, objectives, methodology (the area of the study, sample, type of study, tools for data collection, inclusion & exclusion criteria and method of analysis), Limitations of the Study, and Planning.
 - b) **Conceptual Framework / National and International Scenario:** (relating to the topic of the Project).
 - c) **Presentation of Data, Analysis and Findings.**
 - d) **Conclusion and Recommendations:** In this section, the concluding observations based on the main findings and suggestions are to be provided.
- 5) **Bibliography or References:** This section will include the list of books and articles which have been used in the project work, and in writing a project report.
- 6) **Annexure:** Questionnaires (if any), relevant reports, etc.
(The main text of the Project should normally be in the range of 5000 words. However, there may be annexure in addition to the main text)

The Steps of a Project Report

Step I: Selection of the topic for the project by taking following points into consideration:

- Suitability of the topic.
- Relevance of the topic
- Time available at the disposal.
- Feasibility of data collection within the given time limit.
- Challenges involved in the data collection (time & cost involved in the data collection, possibility of getting responses, etc.)

Step II: Finalisation of the Topic and preparation of Project Proposal in consultation with the Supervisor.

Step III: Collection of information and data relating to the topic and analysis of the same.

Step IV: Writing the report dividing it into suitable chapters, viz.,

Chapter 1: Introduction,

Chapter 2: Methodology,

Chapter 3: Analysis & Findings

Chapter 4: Conclusion and Recommendations.

Step V: The following documents are to be attached with the Final Project Report.

1) Approval letter from the supervisor (Annexure-IA)

2) Student's declaration (Annexure-IB)

3) Certificate from the Competent Authority of the Organisation / Institution, if the student undertakes the Project Work in any Organisation / Institution.

Guidelines for Evaluation:

- Each of the students has to undertake a Project individually under the supervision of a teacher and to submit the same following the guidelines stated below.
- Language of Project Report and Viva-Voce Examination may be English. The Project Report must be typed and hard bound.
- Failure to submit the Project Report or failure to appear at the Viva-voce Examination will be treated as "Absent" in the Examination. He /she has to submit the Project Report and appear at the Viva-Voce Examination in the subsequent years (within the time period as per University Rules).
- No marks will be allotted on the Project Report unless a candidate appears at the Viva-Voce Examination. Similarly, no marks will be allotted on Viva-Voce Examination unless a candidate submits his/her Project Report.
- Evaluation of the Project Work to be done jointly by one internal expert and one external expert with equal weightage, i.e., average marks of the internal and external experts will be allotted to the candidate.

INTERNSHIP

Course Code: MLT2637

Credit Units: 15

Course Objectives:

The basic objective of internship is to provide first hand practical exposure of the medical laboratory and to acquaint students with the culture of medical lab. The internship training will also provide an opportunity to the students to apply their theoretical understanding while working on the concerned project in the laboratory. Thus, this internship programme is an attempt to bridge the gap between theory and practice. This will also enhance the student's intellectual ability and attributes related to data handling, decision making, report writing, oral presentation and imbibing an interdisciplinary approach.

General guidelines:

Every student of under graduate courses will be required to undergo a practical training in a medical laboratory organization approved by the Institute for four months, after the end of the 5th semester examinations. The candidates shall be required to undergo training in the various areas like clinical pathology, clinical hematology, clinical microbiology, clinical biochemistry and blood banking labs of the concerned organization. The organization may assign a specific project to the student, which will be completed by him/her during the period of training. The work done by the student during the training period shall be submitted in the form of a report as per the guidelines provided by the department.

Chapter scheme for the internship project report:

Chapter I: Introduction	- 20 marks
Chapter II: Conceptual Framework/National/International Scenario	- 5 marks
Chapter III: Presentation, Analysis and Findings	- 35 marks
Chapter IV: Conclusion and Recommendations	- 15 marks

The report has to be written in font style – Times New Roman, font size – 12, line spacing on both sides of the paper – 1.5 and should be spiral bound. The report should comprise of a maximum of 70 pages and has to be submitted in two copies.

The components of internship project report:

The outcome of internship training is the project report. A project report should have the following components:

- 1) **Cover Page:** This should contain the title of the project proposal, to whom it is submitted, for which degree, the name of the student, name of the supervisor, year of submission of the project work and name of the University.
- 2) **Acknowledgement:** Various laboratory organizations and individuals who might have provided assistance /co-operation during the process of carrying out the study.
- 3) **Table of Content:** Page-wise listing of the main contents in the report, i.e., different Chapters and its main Sections along with their page numbers.
- 4) **Body of the Report:** The body of the report should have these four logical divisions
 - a. **Introduction:** This will cover the background, rationale/ need / justification, brief review of literature, objectives, methodology (the area of the study, sample, type of study, tools for data collection, and method of analysis), limitations of the study, and chapter planning.
 - b. **Conceptual framework / national and international scenario:** (relating to the topic of the project).
 - c. **Presentation of data, analysis and findings:** (using the tools and techniques mentioned in the methodology).
 - d. **Conclusion and Recommendations:** In this section, the concluding observations based on the main findings and suggestions are to be provided.
- 5) **Bibliography or References:** This section will include the list of books and articles which have been used in the project work, and in writing a project report.

6) Annexure: Questionnaires (if any), relevant reports, etc.

Guidelines for evaluation:

1. Each of the students has to undertake a project individually under the supervision of a teacher and to submit the same following the guidelines stated below.
2. Language of project report and viva-voce examination should be in English. The project report must be typed and hard (spiral) bound.
3. Failure to submit the project report or failure to appear at the viva-voce examination will be treated as "Absent" in the examination. He /she have to submit the project report and appear at the viva-voce examination in the subsequent years (within the time period as per university rules).
4. No marks will be allotted on the project report unless a candidate appears at the viva-voice examination. Similarly, no marks will be allotted on viva-voce examination unless a candidate submits his/her project report.
5. Evaluation of the project work to be done jointly by one internal expert and one external expert with equal weightage, i.e., average marks of the internal and external experts will be allotted to the candidate.
6. A candidate has to qualify in the project work separately, obtaining minimum marks of 40 (project report and viva-voce taken together).

Evaluation Scheme:

Internship Project Report	Power Point Presentation & Viva
75 marks	25 marks



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Bachelor of Science - Molecular Medicine & Stem Cell Technologies

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Programme Structure

Curriculum & Scheme of Examination

2022

AMITY UNIVERSITY HARYANA

GURUGRAM

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BIOTECHNIQUES & INSTRUMENTATION

Course Code: SCT2105

Credit Units: 02

Course Objective:

Students will learn about safe laboratory practices, bio-analytical instruments, principles of their proper functioning, and analysis methods applied to biological data obtained in experimental techniques.

Course Contents:

Module I

Sampling and sample preparation: Sample fixing for various analytical applications and sample processing. Principles of microscopy, Light, dark field, fluorescence microscope, confocal microscope, transmission and Scanning electron microscopy, microtomy and analysis and measurement of image. Fluorescence activated cell sorter (FACS) basic principles and applications.

Module II

Electrophoresis of DNA, RNA and proteins. Capillary electrophoresis, Two-dimensional electrophoresis, Southern blotting, Northern blotting, Immunoprecipitation, Western blotting. Sequencing, Next Generation Sequencing, RNA-Seq. etc.

Module III:

Centrifugation techniques: Introduction, Basic principle of sedimentation, centrifuges and their uses, Density gradient and analytical centrifugation.

Spectroscopy techniques: UV and visible spectroscopy, infrared and atomic absorption spectroscopy, fluorescence spectroscopy, mass spectrometry, MALDITOF, nuclear magnetic resonance and electron spin resonance spectroscopy.

Module IV:

Chromatography: Theoretical basis of chromatographic separations. Column, Thin layer, Paper, Normal phase and reverse phase chromatography, Ion-exchange, Affinity and Gas Chromatography, High performance liquid chromatography (HPLC) and GLC.

Module V

Principles of X-ray diffraction and X-ray Crystallography. Theory and application of UV-VIS, IR, NMR, Fluorescence, Atomic absorption spectroscopy; X-ray diffraction. Introduction to mass spectroscopy
Radioisotopic techniques: Introduction to radioisotopes, detection, measurement and uses of radioisotopes, counting efficiency and autoradiography, biotechnological applications

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

Text:

- Principles of Physical Biochemistry, K.E. Van Holde, Prentice Hall.
- Essentials of Biophysics, P. Narayanan, New Age International Publishers

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References:

- Advanced Instrumentation, Data Interpretation, and Control of Biotechnological Processes, J.F. Van Impe, Kluwer Academic
- Crystal Structure Analysis, J.P. Glusker and K.N. Trueblood, Oxford University Press
- Crystallography made Crystal Clear, G. Rhodes, Academic Press
- Modern Spectroscopy, J.M. Hollas, John Wiley and Son Ltd.
- NMR Spectroscopy: Basic Principles, Concepts and Applications in Chemistry, H. Gunther, John Wi



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CELL & MOLECULAR BIOLOGY LAB

Course Code: SCT2107

Credit Units: 01

Course Contents:

Module I

Microscopy: Light microscopy, Bright field, Phase contrast.

BSL I, BSLII, BSLIII laboratory facility development: design and regulatory requirements.

Module II

Cell culture: aseptic suspension and adherent cell culture techniques. Cell number enumeration and cell passage methods, and methods for characterization of cells in culture and cell proliferation.

Module III

Cell mounting techniques, and study of permanent slides of different types of cancer. Induction and characterization of apoptosis and necrosis. Cell mitosis and meiosis and karyotyping techniques.

Module IV

Bacterial culture techniques, bacterial transformation and transduction techniques, single cell clone isolation.

Module V

Study of physical and chemical mutagens on growth of *E. coli*, PTC test.

Examination Scheme:

IA			EE			
Class Test (Practical Based)	Mid Term Viva	Attendance	Major Experiment	Minor Experiment/Spo tting	Practic al Record	Viva
15	10	05	35	15	10	10



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BIOCHEMISTRY LAB

Course Code: SCT2108

Credit Units: 01

Course Contents

Module I

Preparation of solutions: Percentage solutions, Molar solutions, Normal solutions, Standardization of pH meter, preparation of buffers, emulsions. Spectroscopy: determination of absorption maxima (λ_{max}) of a given solution. Colorimetric determination of pK and sugars (Molischs test, iodine test, Saliwanoff test, Fehlings test, Benedicts test, Bials test). Titration of weak acid-weak base.

Module II

Biochemical estimation: Cholestrol, free fatty acids, iodine number. Quantitative estimation of carbohydrates. Distinguish reducing and non-reducing sugars. Quantitative estimation of proteins. Estimation of nucleic acids

Module III

Biochemical estimation of proteins (Ninhydrin test, Biuret test, Xanthoprotein test). Isoelectric precipitation. Separation of sugars, fatty acids and amino acids by paper chromatography. Extraction of lipids from plant material Thin layer chromatography. Gel electrophoresis

Module IV

Biochemical estimation of DNA and RNA. Quantitative estimation of DNA and RNA by UV spectrophotometer. Determination of melting temperature of DNA from thermal denaturation characteristics.

Examination Scheme:

IA			EE			
Class Test (Practical Based)	Mid Term Viva	Attendance	Major Experiment	Minor Experiment/Spo tting	Practic al Record	Viva
15	10	05	35	15	10	10

Reference books

- Wilson and Walker "Principles and Techniques of Practical Biochemistry" 4 Edn., Cambridge Knew pros 1997.
- Plummer DT "An Introduction to Practical Biochemistry" III Edn., Tata



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BIOTECHNIQUES & INSTRUMENTATION LAB

Course Code: SCT2109

Credit Units: 01

Course Contents:

Module I

Cell disruption techniques and cell fractionation.

Module II

Centrifugation: low speed and high speed. Density gradient centrifugation.

Module III

Spectrophotometer methods and analysis.

Module IV

Chromatography: Paper Chromatography and Thin Layer Chromatography

Module V

Electrophoresis: DNA, protein and RNA quantitation, SDS-PAGE and Agarose gel electrophoresis.

Examination Scheme:

IA			EE			
Class Test (Practical Based)	Mid Term Viva	Attendance	Major Experiment	Minor Experiment/Spo tting	Practic al Record	Viva
15	10	05	35	15	10	10



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RESEARCH PRESENTATION

Course Code: SCT2110

Credit Units: 01

Course Objective:

Students will learn how to do literature search on a particular topic, how to construct, organize and deliver a scientific presentation.

Examination Scheme:

Literature Search/Project Report	50
Presentation	50
Total	100



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TERM PAPER

Course Code: SCT2131

Credit Units: 01

METHODOLOGY

A term (or research) paper is primarily a record of intelligent reading in several sources on a particular subject.

The students will choose the topic at the beginning of the session in consultation with the faculty assigned. The progress of the paper will be monitored regularly by the faculty. At the end of the semester the detailed paper on the topic will be submitted to the faculty assigned. The evaluation will be done by Board of examiners comprising of the faculties.

GUIDELINES FOR TERM PAPER

The procedure for writing a term paper may consists of the following steps:

1. Choosing a subject
2. Finding sources of materials
3. Collecting the notes
4. Outlining the paper
5. Writing the first draft
6. Editing & preparing the final paper

1. Choosing a Subject

The subject chosen should not be too general.

2. Finding Sources of materials

- a) The material sources should be not more than 10 years old unless the nature of the paper is such that it involves examining older writings from a historical point of view.
- b) Begin by making a list of subject-headings under which you might expect the subject to be listed.
- c) The sources could be books and magazines articles, news stories, periodicals, scientific journals etc.

3. Collecting the notes

Skim through sources, locating the useful material, then make good notes of it, including quotes and information for footnotes.

- a) Get facts, not just opinions. Compare the facts with author's conclusion.
- b) In research studies, notice the methods and procedures, results & conclusions.
- c) Check cross references.

4. Outlining the paper

- a) Review notes to find main subdivisions of the subject.
- b) Sort the collected material again under each main division to find sub-sections for outline so that it begins to look more coherent and takes on a definite structure. If it does not, try going back and sorting again for main divisions, to see if another general pattern is possible.

5. Writing the first draft

Write the paper around the outline, being sure that you indicate in the first part of the paper what its purpose is. You may follow the following:

- a) statement of purpose
- b) main body of the paper
- c) statement of summary and conclusion

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Avoid short, bumpy sentences and long straggling sentences with more than one main ideas.

6. Editing & Preparing the final Paper

- a) Before writing a term paper, you should ensure you have a question which you attempt to answer in your paper. This question should be kept in mind throughout the paper. Include only information/ details/ analyses of relevance to the question at hand. Sometimes, the relevance of a particular section may be clear to you but not to your readers. To avoid this, ensure you briefly explain the relevance of every section.
- b) Read the paper to ensure that the language is not awkward, and that it "flows" properly.
- c) Check for proper spelling, phrasing and sentence construction.
- d) Check for proper form on footnotes, quotes, and punctuation.
- e) Check to see that quotations serve one of the following purposes:
 - (i) Show evidence of what an author has said.
 - (ii) Avoid misrepresentation through restatement.
 - (iii) Save unnecessary writing when ideas have been well expressed by the original author.
- f) Check for proper form on tables and graphs. Be certain that any table or graph is self-explanatory.

Term papers should be composed of the following sections:

- 1) Title page
- 2) Table of contents
- 3) Introduction
- 4) Review
- 5) Discussion & Conclusion
- 6) References
- 7) Appendix

Generally, the introduction, discussion, conclusion and bibliography part should account for a third of the paper and the review part should be two thirds of the paper.

Discussion

The discussion section either follows the results or may alternatively be integrated in the results section. The section should consist of a discussion of the results of the study focusing on the question posed in the research paper.

Conclusion

The conclusion is often thought of as the easiest part of the paper but should by no means be disregarded. There are a number of key components which should not be omitted. These include:

- a) summary of question posed
- b) summary of findings
- c) summary of main limitations of the study at hand
- d) details of possibilities for related future research

References

From the very beginning of a research project, you should be careful to note all details of articles gathered.

The bibliography should contain ALL references included in the paper. References not included in the text in any form should NOT be included in the bibliography.

The key to a good bibliography is consistency. Choose a particular convention and stick to this.

Bibliographical conventions

Monographs

Crystal, D. (2001), *Language and the internet*. Cambridge: Cambridge University Press.

Edited Volumes

Gass, S./Neu, J. (eds.) (1996), *Speech acts across cultures. Challenges to communication in a second language*. Berlin/ NY: Mouton de Gruyter.

[(eds.) is used when there is more than one editor; and (ed.) where there is only one editor. In German the abbreviation used is (Hrsg.) for Herausgeber].

Edited Articles

Schmidt, R./Shimura, A./Wang, Z./Jeong, H. (1996), *Suggestions to buy: Television commercials from the U.S., Japan, China, and Korea*. In: Gass, S./Neu, J. (eds.) (1996), *Speech acts across cultures. Challenges to communication in a second language*. Berlin/ NY: Mouton de Gruyter: 285-316.

Journal Articles

McQuarrie, E.F./Mick, D.G. (1992), *On resonance: A critical pluralistic inquiry into advertising rhetoric*. *Journal of consumer research* 19, 180-197.

Electronic Book

Chandler, D. (1994), *Semiotics for beginners* [HTML document]. Retrieved [5.10.'01] from the World Wide Web, <http://www.aber.ac.uk/media/Documents/S4B/>.

Electronic Journal Articles

Watts, S. (2000) *Teaching talk: Should students learn 'real German'?* [HTML document]. *German as a Foreign Language Journal* [online] 1. Retrieved [12.09.'00] from the World Wide Web, <http://www.gfl-journal.com/>.

Other Websites

Verterhus, S.A. (n.y.), *Anglicisms in German car advertising. The problem of gender assignment* [HTML document]. Retrieved [13.10.'01] from the World Wide Web, <http://olaf.hiof.no/~sverrev/eng.html>.

Unpublished Papers

Takahashi, S./DuFon, M.A. (1989), *Cross-linguistic influence in indirectness: The case of English directives performed by native Japanese speakers*. Unpublished paper, Department of English as a Second Language, University of Hawai'i at Manoa, Honolulu.

Unpublished Theses/ Dissertations

Möhl, S. (1996), *Alltagssituationen im interkulturellen Vergleich: Realisierung von Kritik und Ablehnung im Deutschen und Englischen*. Unpublished MA thesis, University of Hamburg.

Walsh, R. (1995), *Language development and the year abroad: A study of oral grammatical accuracy amongst adult learners of German as a foreign language*. Unpublished PhD dissertation, University College Dublin.

Appendix

The appendix should be used for data collected (e.g. questionnaires, transcripts,...) and for tables and graphs not included in the main text due to their subsidiary nature or to space constraints in the main text.

Assessment Scheme:

Continuous Evaluation:

40%

(Based on abstract writing, interim draft, general approach, research orientation, readings undertaken etc.)

Final Evaluation:

60%

(Based on the organization of the paper, objectives/ problem profile/ issue outlining, comprehensiveness of the research, flow of the idea/ ideas, relevance of material used/ presented, outcomes vs. objectives, presentation/ viva etc.)



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IMMUNOLOGY-I

Course Code: SCT2202

Credit Units: 02

Course Objective:

The will learn about the innate and adaptive immune responses; antigens, major histocompatibility complexes and their role in generation of immune response and transplant rejection; generation and regulation of immune system, and cell-mediated cytotoxicity.

Course Contents:

Module I:

Types of immunity: innate, acquired, active and passive; clonal nature of immune response; lymphoid organs; Nature and Biology of antigens and superantigens; types, structure and function of antibodies.

Module II:

Major histocompatibility complexes (MHC) and their role in immune response generation and transplant immunology; B cell receptor (BCR) and T cell receptor (TCR); antibody diversity and mechanisms of antibody diversity generation; complement system.

Module III:

Cells of the immune system: Hematopoiesis and differentiation; lymphocyte trafficking, B-and T-Lymphocytes; innate lymphoid cells; macrophages, dendritic cells, natural killer, lymphokines and lymphokine activated killer cells, eosinophils, neutrophils and mast cells

Module IV:

Regulation of immune response: Antigen processing and presentation, activation of B and T lymphocytes, cytokines and their role in immune regulation, T cell regulation and MHC restriction, immunological tolerance

Module V:

Cell mediated toxicity: Mechanism of T cell and NK cell mediated lysis and macrophage mediated cytotoxicity.

Immunological methods and Techniques: Immuno-diffusion, immuno-electrophoresis, Cross reactivity, Precipitation and Agglutination reaction; ELISA, RIA, fluorescence activated cell sorter.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

Text:

- Basic Immunology, A.K. Abbas and A.H. Lichtman, Saunders W.B. Company
- Basic Immunology, A.K. Abbas and A.H. Lichtman, Saunders W.B. Company

References:

- Fundamentals of Immunology, W. Paul, Lippincott Williams and Wilkins
- Immunology, W.L. Anderson, Fence Creek Publishing (Blackwell).
- Immunology: A Short Course, E. Benjamin, R. Coico and G. Sunshine, Wiley-Leiss Inc.
- Immunology, Roitt, Mosby – Yearbook Inc.
- Kuby Immunology, R.A. Goldsby, T.J. Kindt, and B.A. Osborne, Free

BIOSTATISTICS

Course Code: SCT2205

Credit Units: 03

Course Objective:

Students will learn about the statistical methods and application of statistical methods applied to biological data obtained in experimental techniques.

Course Contents:

Module I

Preliminary concepts of Statistics and Biostatistics; Measures of Central Tendency: Mean, Median, Mode
Measures of Dispersion: Range, Standard deviation, Variance

Module II:

Probability: Random Experiments, Trial and Event, Sample Space, Mutually Exclusive or Disjoint Events, Mutually Exhaustive Events, Equally Probable Events, Complementary Event, Classical definition of Probability, Statistical definition of Probability, Axiomatic definition of Probability, Addition theorem, Multiplication theorem, Conditional Probability, Bayes' Theorem. Expectation.

Module III:

Types of Probability Distributions: Introduction to Normal Distribution, Bernoulli Distribution, Uniform Distribution, Binomial Distribution, Poisson distribution, Exponential Distribution

Module IV:

Correlation & Regression: Bivariate distribution Correlation, Types of Correlation, Simple Correlation Coefficient for ungrouped data, Properties and Interpretation of Correlation Coefficient, Coefficient of determination, Scatter diagram, Standard Error, Probable error of Correlation Coefficient. Rank correlation, Some examples. Regression lines and Regression Coefficients, Properties of Regression Coefficients, Some examples. Method of least square: Fitting of straight line

Module V:

Hypothesis Testing: Parameter, Statistic, Null hypothesis, Alternative hypothesis, Critical region, Type I Error, Type II Error, Level of significance, P-value and its applications. One sample t-test, Paired t-test, Degrees of freedom for t-test, F test for equality of Population variances, Degrees of freedom for F-test. Normal test for sample mean and population mean, Normal test for two sample means. Chi-square Test: Test of goodness of fit, Test of Independence of attributes, Degrees of freedom for Chi-square test, Coefficient of contingency, Yates' correction for continuity. Analysis of Variance: One way and Two-way (only Examples)

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70


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Text & References:

Text:

- Introduction to Biostatistics, Ronald N. Fothergill and Eun Sun Lee, Publisher: Elsevier.
- Statistical Methodology, S.P. Gupta, Publisher: S. Chand & Co.
- Fundamentals of Statistics, S.C. Gupta. Publisher: S.Chand & Co.

References:

- Biostatistics: A manual of Statistical Methodology for use in Health, Nutrition and Anthropology, K. Visweswara Rao. Publisher: Jaypee Brothers
- Biostatistics: A foundation for analysis in the Health Sciences, W.W. Daniel, Publisher: John Wiley and Sons
- Fundamentals of Mathematical Statistics, S.C. Gupta and V.K. Kapoor, Publisher: S.Chand & Co.
- Statistical Analysis, Kaushal, T.L. Publisher: Kalyani Publishers
- Statistical Methods, Potri, D. Kalyani Publishers.
- Mathematical Statistics, H.C. Saxena, and V.K. Kapoor: S. Chand & Company
- Biostatistics, P.N. Arora and P.K. Malhan, Publisher: Himalaya Publishing House.



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MOLECULAR BIOLOGY LAB

Course Code: SCT2207

Credit Units: 01

Course Contents:

1. Genomic DNA isolation from plant and animal cells.
2. RNA isolation.
3. Whole cell protein isolation and analysis on SDS-PAGE.
4. DNA, RNA and protein quantification by spectrophotometric analysis.
5. Restriction mapping and analysis on native-PAGE.
6. Studies of gene regulation.
7. Induction of gene.
8. PCR, RT-PCR, Real time PCR.

Examination Scheme:

IA			EE			
Class Test (Practical Based)	Mid Term Viva	Attendance	Major Experiment	Minor Experiment/Sp otting	Practical Record	Viva
15	10	05	35	15	10	10



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MICROBIOLOGY & VIROLOGY LAB

Course Code: SCT2208

Credit Units: 01

Course Contents:

1. Preparation of solid and liquid media.
2. Isolation and maintenance of organisms by plating, streaking and serial dilution.
3. Preparation of slant cultures.
4. Growth curve measurement of bacterial population by turbidometry.
5. Measurement of bacterial population by dilution method. Techniques for isolation of pure cultures.
6. Isolation of heterotrophs and autotrophs, isolation and enumeration of microbial population in soil and water.
7. Effect of temperature, pH, carbon and nitrogen sources on growth of bacteria.
8. Microscopic examination of bacteria by gram staining.

Examination Scheme:

IA			EE			
Class Test (Practical Based)	Mid Term Viva	Attendance	Major Experiment	Minor Experiment/Spot ting	Practical Record	Viva
15	10	05	35	15	10	10



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IMMUNOLOGY-I LAB

Course Code: SCT2209

Credit Units: 01

Course Contents:

1. Blood film preparation and identification of cells.
2. Immuno-diffusion.
3. Hemagglutination, agglutination inhibition.
4. Rocket immune-electrophoresis.
5. Western blotting, ELISA.
6. Epitope prediction using Immuno-informatics tool.
7. Isolation of peripheral blood mononuclear cells (PBMC).
8. Cell phenotype analysis.

Examination Scheme:

IA			EE			
Class Test (Practical Based)	Mid Term Viva	Attendance	Major Experiment	Minor Experiment/Spo tting	Practic al Record	Viva
15	10	05	35	15	10	10

Note: Minor variation could be there depending on the examiner



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BIOINFORMATICS-II LAB

Course Code: SCT2210

Credit Units: 01

Course Contents:

Module I

Database creation using DDL and DML. Defining the primary and secondary keys. Implementation of selection, projection and joins (internal and external) with MySQL

Module II

Introduction to Linux Shell Programming, Running BioJava Scripts

Module III

Running BioPerl and BioPython Scripts

Module IV

Programming in R basic scripts

Module V

R/Bioconductor programming for DEGs, Visualization and annotation.

Examination Scheme:

IA			EE			
Class Test (Practical Based)	Mid Term Viva	Attendance	Major Experiment	Minor Experiment/Spotti ng	Practical Record	Viva
15	10	05	35	15	10	10

Note: Minor variation could be there depending on the examiner


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SCIENTIFIC COMMUNICATION SKILL DEVELOPMENT (SEMINAR / WORKSHOP)


Course Code: SCT2211

Credit Units: 01

Students will learn about methods, tools and resources for literature search on a particular topic, and how to build, organize and deliver a scientific presentation.

Examination Scheme:

Literature Search/Project Report	50
Presentation	50
Total	100


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IMMUNOLOGY-II

Course Code: SCT2303

Credit Units: 02

Course Objective:

Role of antibody engineering in biomedical applications and the importance of immune-genetics in disease processes, tissue transplantation and immune regulation are some of the areas of attributes of this course which can help the students to understand the biotechnology related to human kind.

Course Contents:

Module I: Antigen, antibody definitions, properties and utility

Antigens and Antibodies: Factors responsible for immunogenicity, Epitopes, Adjuvants, superantigens, Antigen Presentation and processing, Structure and function of antibody, Antibody classes, Passive antibody therapy, Monoclonal antibody, Antibody engineering, Generation of antibody diversity

Module II: Autoimmunity, Hypersensitivity and Immunodeficiency

Tolerance and Autoimmunity, Types and mechanism of autoimmune diseases, Hypersensitive reactions, Transplantation types, Immunological basis of graft rejection. Primary and secondary immunodeficiency, AIDS

Module III: Tumor immunology, Immunity to infectious agents

Immune response to viral infections, Tumor immunity and Tumor antigens, Immunodiagnostics (diagnosis of infectious diseases)

Module IV: vaccines

General consideration, idotype network hypothesis, Synthetic vaccines: Active and passive immunization, Vaccine types (Live but attenuated, Killed, Subunit, Recombinant, DNA and Peptide).

Module V: Hybridoma technology and its applications

Fusion of myeloma cells with lymphocytes

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

Text:

- Basic Immunology, A.K. Abbas and A.H. Lichtman, Saunders W.B. Company
- Basic Immunology, A.K. Abbas and A.H. Lichtman, Saunders W.B. Company

References:

- Fundamentals of Immunology, W. Paul, Lippincott Williams and Wilkins
- Immunology, W.L. Anderson, Fence Creek Publishing (Blackwell).
- Immunology: A Short Course, E. Benjamin, R. Coico and G. Sunshine, Wiley-Leiss Inc.
- Immunology, Roitt, Mosby – Yearbook Inc.
- Kuby Immunology, R.A. Goldsby, T.J. Kindt, and B.A. Osborne, Free

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RECOMBINANT DNA TECHNOLOGY

Course Code: SCT2304

Credit Units: 02

Course Objective:

A complete understanding of molecular techniques like DNA sequencing, restriction mapping, PCR for the cloning and expression of genes can be obtained through the course.

Course Contents:

Module I

Purification of DNA from bacterial, plant and animal cells, manipulation of purified DNA. Introduction of DNA into living cells, transformation, transduction, electroporation, micro-injection.

Module II

Introduction to gene cloning and its uses, tools and techniques: plasmids, cosmids, transposons and other vectors, DNA, RNA, cDNA, viral and non-viral vectors.

Module III

Clinical applications of recombinant technology; Erythropoietin; Insulin analogs and its role in diabetes; Recombinant human growth hormone; Streptokinase and urokinase in thrombosis; Recombinant coagulation factors, Monoclonal antibodies and their role in cancer; Role of recombinant interferons; Immunostimulants; Immuno-suppressors in organ transplants; Role of cytokine therapy in cancers.

Module IV

Analysis of DNA by Southern blotting, Analysis of RNA by Northern blotting, Analysis of proteins by Western blot techniques, Dot blots and slot blots, RFLP, AFLP.

PCR: Basic principles and its modification application and uses.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

Text:

- Gene cloning and DNA analysis by T.A. Brown

References:

- Recombinant DNA, J.D. Watson et al, W.H. Freeman and Company
- Principles of Gene Manipulation: An Introduction to Genetic Engineering, R.W. Old and S. B Primrose, Blackwell Science Inc
- Molecular Biotechnology: Principles and Applications of Recombinant DNA, B.R. Grick and J.J. Pasternak, ASM Press
- Molecular Biology of gene by Watson, Baker, Bell, Gann, Levine, Losick
- DNA Science by Micklos Freyer
- Principles of Gene manipulation and Genomics by Primrose and Twyman

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IMMUNOLOGY-II LAB

Course Code: SCT2307

Credit Units: 01

Course Contents:

Module I

Identification of blood group. Blood film preparation and identification of cells.

Module II

Isolation of serum. Purification of IgG through affinity chromatography

Module III

Immunohistochemistry. Lymphoid organs and their microscopic organization.

Module IV

WIDAL Test

Module V

Radial Immuno-diffusion Test. Ouchterlony Double diffusion Test. DOT, Sandwich ELISA.

Examination Scheme:

IA			EE			
Class Test (Practical Based)	Mid Term Viva	Attendance	Major Experiment	Minor Experiment/Spo tting	Practical Record	Viva
15	10	05	35	15	10	10



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RECOMBINANT DNA TECHNOLOGY LAB

Course Code: SCT2308

Credit Units: 01

Course Objective:

The laboratory experiments in Recombinant DNA Technology would certainly help to comprehend the theoretical aspects of the subject.

Course Contents:

Module I

Study of cloning (GFP cloning)

Module II

Design and execution of PCR, RT-PCR, quantitative RT-PCR

Module III

Study of Southern hybridisation

Module IV

Study of RAPD

Module V


Site directed mutagenesis

Examination Scheme:

IA			EE			
Class Test (Practical Based)	Mid Term Viva	Attendance	Major Experiment	Minor Experiment/Spo tting	Practical Record	Viva
15	10	05	35	15	10	10



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GENOMICS & PROTEOMIC ALGORITHMS LAB

Course Code: SCT2309

Credit Units: 01

Course Contents:

Module I

Three dimensional Structures – In silico study – large molecular complexes RNA polymerase II, ribosome, unstructured proteins

Module II

Microarray and Microarray data analysis, DNA sequencing methods, next generation sequencing.

Module III

Comparison of two given genomes

Module IV

Inference of protein function from structure

Module V

Gene finding tools and Genome annotation.

Examination Scheme:

IA			EE			
Class Test (Practical Based)	Mid Term Viva	Attendance	Major Experiment	Minor Experiment/Spotting	Practical Record	Viva
15	10	05	35	15	10	10



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NANO-BIOTECHNOLOGY & NANO-MEDICINE LAB

Course Code: SCT2310

Credit Units: 01

Course Objective:

This course offers understanding of generation of nano particles, their characterization and applications.

Course Contents:

1. Demonstration about occupational health and safety (OHS) and workplace health and safety (WHS) in nanotechnology.
2. Preparation of aqua regia, its handling and role in washing glass-ware for metal nanoparticles synthesis.
3. Optimization of temperature for metal nanoparticle preparations using biological materials.
4. Synthesis of silver nanoparticles and analysis of their surface Plasmon resonance (SPR) properties.
5. Neem extract mediated silver nanoparticle synthesis and analysis of their optical properties.
6. Dye degradation using silver nanoparticles synthesized in experiments 4 and 5.
7. Preparation of metal oxide nanoparticles and their characterization.
8. Interactions of silver nanoparticles with red blood cells.
9. Interaction of silver nanoparticles with bacterium and their antimicrobial properties.
10. Preparation of nanoparticles containing polymeric films.

Examination Scheme:

IA			EE			
Class Test (Practical Based)	Mid Term Viva	Attendance	Major Experiment	Minor Experiment/Spo tting	Practic al Record	Viva
15	10	05	35	15	10	10



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SCIENTIFIC COMMUNICATION SKILL DEVELOPMENT (SEMINAR/ WORKSHOP)

Course Code: SCT2311

Credit Units: 01

Students will learn how to do literature search on a particular topic, how to construct, organize and deliver a scientific presentation.

Examination Scheme:

Literature Search/Project Report	50
Presentation	50
Total	100



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PLANT BIOTECHNOLOGY AND ITS APPLICATIONS IN MOLECULAR MEDICINE

Course Code: SCT2405

Credit Units: 02

Course Objective:

The application of Plant Biotechnology covers major areas related to commercial applications. Regeneration of plants through *in vitro* techniques offers a practical strategy for micro propagation. Importance will also be given to areas like *in vitro* fertilization, animal cell and tissue culture, hormone vaccine and important enzyme production through animal biotechnology.

Course Contents:

Module I

Historical perspective of plant tissue culture.
Tissue culture lab and organization
Sterilisation techniques
Types of nutrient media and media composition
Plant regeneration pathways
Role of phytohormones
Cell culture techniques- cell, tissue, organ cultures, callus culture, suspension culture
Culture techniques Callus culture, cell culture and protoplast cultures.

Module II

Organogenesis and somatic embryogenesis.
Applications of plant tissue and cell culture.
Micropropagation, pathogen free plants. production haploids,
Somaclonal variation.preservation of germplasm.

Module III

Genetic engineering in plants, - transformation vectors
Gene transfer techniques-vector mediated and vector less gene transfer.
Transgenic plants transgene integration and expression

Module IV

Transgenic crop with new traits-herbicide tolerance, insect and disease resistance,
Therapeutic proteins and compounds
Oral vaccines
Production of secondary metabolites via tissue culture
Bioethics of plant genetic engineering.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

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Text & References:

- An Introduction to Plant Tissue Culture, M.K. Razdan, Oxford and IBH Publishing
- Experiments in Plant Tissue Culture, J.H. Dodds and L.K. Roberts, Cambridge University Press
- Plant Biotechnology and Transgenic Plants, K.M.O. Caldey, W.H. Barz and H.L. Wills, Marcel Dekker
- Plant Biotechnology, J. Hammond, P. McGarvey and V. Yusibov, Springer Verlag.
- Plant Cell & Tissue Culture for the Production of Food Ingredients, T-J Fu, G. Singh and W.R. Curtis, Kluwer Academic/Plenum Press
- Plant Tissue Culture: Theory & Practice, S.S. Bhojwani and M.K. Razdan, Elsevier Health Sciences



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MOLECULAR IMMUNOLOGY LAB

Course Code: SCT2406

Credit Units: 01

Course Objective:

Students will learn methods for isolation, culture and maintenance of immune cells, for example T cell lines, human primary T cells and antigen presenting cells. Students will also learn nuances of antigen-specific immune response generation, antigen processing and presentation, cell phenotype analysis, cell proliferation, cell death and cytotoxicity assays.

Course Contents:

1. Culture of immortalized immune cell lines, for example Jurkat, T2-A2 etc.
2. Isolation of CD4 and CD8+ T cells from human peripheral blood.
3. Cell phenotype analysis, calculation of CD4:CD8 ratio in normal healthy individual blood.
4. Isolation and characterization of antigen presenting cells.
5. Activation of T cells by non-specific stimulus as well as by engaging their T cell receptor (TCR).
6. Cell proliferation assay.
8. Generation, and phenotypic and functional characterization of antigen-specific T cell response.
9. B cell culture and hybridoma technology.

Examination Scheme:

IA			EE			
Class Test (Practical Based)	Mid Term Viva	Attendance	Major Experiment	Minor Experiment/Spotting	Practical Record	Viva
15	10	05	35	15	10	10



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MOLECULAR MODELING & DRUG DEVELOPMENT LAB

Course Code: SCT2407

Credit Units: 01

Course Objective:

The above course will enable the student to handle in silico drug designing , docking , modeling and simulation using various software such as Schrodinger Biologics Suite, Spdbviewer, Modeller, Desmond and few other online resources. The students gains insights into the life cycle of drug development.

Course Contents:

1. Protein Structural Visualization
2. Homology Modeling
3. Drug Docking
4. Pharmacophore Designing
5. QSAR studies
6. Basics of molecular simulation studies

Examination Scheme:

IA			EE			
Class Test (Practical Based)	Mid Term Viva	Attendance	Major Experiment	Minor Experiment/Spotting	Practical Record	Viva
15	10	05	35	15	10	10



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SCIENTIFIC COMMUNICATION SKILL DEVELOPMENT (SEMINAR/ WORKSHOP)

Course Code: SCT2408

Credit Units: 01

Course Objective:

Students will learn how to do literature search on a particular topic, how to construct, organize and deliver a scientific presentation.

Examination Scheme:

Literature Search/Project Report	50
Presentation	50
Total	100

WORKSHOP / CERTIFICATION

Objectives

A workshop is primarily an activity based academic event that is organized to provide the students a one to one and hands on experience on any aspect of their learning. The communication in a workshop has to be necessarily two way. The trainer has to make sure that the aspect covered are practically practiced by the participants. The student will choose the option of workshop from amongst their concentration electives. The evaluation will be done by Board of examiners comprising of the faculties.

Major Themes for Workshop

The workshop may be conducted on any of the following major themes:

Accounting
Finance
Human Resources
Marketing
Economics
Operations
Supply Chain Management

These themes are merely indicative and other recent and relevant topics of study may be included.

Guidelines for Workshop

The procedure for earning credits from workshop consists of the following steps:

Relevant study material and references will be provided by the trainer in advance.

The participants are expected to explore the topic in advance and take active part in the discussions held

Attending and Participating in all activities of the workshop

Group Activities have to be undertaken by students as guided by the trainer.

Evaluation of workshop activities would be done through test and quiz at the end of the workshop.

Submitting a write up of at least 500 words about the learning outcome from the workshop.

Methodology

The methodology followed at the workshop could be based on any one or more of the following methods:

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Case Study
 Business Game
 Simulation
 Group Activity
 Role Play
 Business Planning
 Quiz

Evaluation Scheme:

Attendance	Active Participation	Multiple Choice Questions/ Quiz	Solving the case/ Assignment/ Write up	Total
5	35	30	30	100



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ETHICS OF BIOMEDICAL RESEARCH, INTELLECTUAL PROPERTY (IP), IP RIGHTS (IPR)

Course Code: SCT2503

Credit Units: 03

Course Objective

The aim of this course is to develop the understanding of relevance, business Impact and protection of Intellectual Property along with the types of Intellectual Property Rights: Patents, Trademarks, Copyrights, Industrial Designs, Geographical Indications and International Conventions, Biosafety and Bioethics

Course Contents

Module I: Basic Principles and Acquisition of Intellectual Property Rights

Basic Principles of Patent Law, Patent Application procedure, Drafting of a Patent Specification, Understanding Copyright Law, Basic Principles of Trade Mark and Design Rights, International Background of Intellectual Property

Module II: Ownership and Enforcement of Intellectual Property Rights

Patents-Objectives, Rights, Assignments, Defences in case of Infringement. Copyright-Objectives, Rights, Transfer of Copyright, work of employment Infringement, Defences for infringement. Trademarks-Objectives, Rights, Protection of goodwill, Infringement, Passing off, Defences. Designs-Objectives, Rights, Assignments, Infringements, Defences of Design Infringement, Enforcement of Intellectual Property Rights - Civil Remedies, Criminal Remedies, Border Security measures, Practical Aspects of Licensing - Benefits, Determinative factors, important clauses, licensing clauses.

Module III: Biotechnology and Intellectual Property Rights

Objective, Evolution, Basic Structure of Gene Techniques, Applications, Commercial Potential of Biotech Inventions, Rationale for Intellectual Property Protection. Patenting Biotechnology Inventions-Objective, Concept of Novelty, Concept of inventive step, Microorganisms, Moral Issues in Patenting Biotechnological inventions. Plant Varieties Protection-Objectives, Justification, International Position, Plant Varieties Protection in India Protection of Geographical Indications Objectives, Justification, International Position, Multilateral Treaties, National Level, Indian Position.

Module IV

Biosafety and Bioethics Management-Key to environmentally responsible use of biotechnology. Cartagena Protocol on Biosafety, Ethical implications of Biotechnological products and techniques. Biosafety: History, evolution and concept of biosafety; need and application of biosafety in laboratories and industries; biosafety guidelines and regulations, international and national norms of biosafety; Implementation of biosafety guidelines; Classification and Description of Biosafety levels. Good laboratory practice (GLP) and Good manufacturing practice (GMP), Use of GMO's and their release, GM products, issues in use of GMO's, risk for animal/human/agriculture and environment owing to GMOs. Bioethics: Introduction and need of bioethics, its relation with other branches, types of risk associated with genetically modified microorganisms, Ethical Issues involving GMOs; ethics related to human cloning, human genome project, prenatal diagnosis, agriculture and animal rights, data privacy of citizens health; ethical issues in India and abroad through case studies.


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Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:***Text***

- Intellectual Property Rights by Birgitte Anderson, Edward Elgar Publishing
- Intellectual Property Rights and the Life Science Industries by Graham Dutfield, Ashgate Publishing

References

- WIPO Intellectual Property Handbook
- Intellectual Property by William Rodelph Cornish, David Clewelyn
- Globalising Intellectual Property Rights by Duncan Matthews
- Journals and Current magazines



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STEM CELLS AND REGENERATIVE MEDICINE LAB

Course Code: SCT2505

Credit Units: 01

Course Contents:

Module-I:

Stem cell isolation and characterization.

Module-II:

Generation of iPSC lines and characterization of their pluripotency profile and genome stability (Stem Cell Karyotype analysis).

Module-III:

Differentiation of iPSC into somatic cell lineages and characterization of stem cell-derived somatic cell populations.

Module-IV:

Functional characterization of stem cell-derived somatic cell populations.

Module-V:

Recent advances in stem cell therapeutics and stem cell-based drug discovery.

Examination Scheme:

IA			EE			
Class Test (Practical Based)	Mid Term Viva	Attendance	Major Experiment	Minor Experiment/Spo tting	Practic al Record	Viva
15	10	05	35	15	10	10


Text & References:

Text:

- Stem Cell Biology, Daniel Marshak, Richard L. Gardener and David Gottlieb, Cold Spring Harbour Laboratory Press
- Stem cell biology and gene therapy, Booth C., Cell Biology International, Academic Press
- Stem Cell and Gene-Based Therapy: Frontiers in Regenerative Medicine, *Alexander Battler, Jonathan Leo*, Springer.

References:

- Stem Cell Biology and Gene Therapy. Quesenberry PJ, Stein GS, eds. (£65.00.) Wiley, 1998.
- Progress in gene therapy, Volume 2, Pioneering stem cell/gene therapy trials, Roger Bertolotti, Keiya Ozawa and H. Kirk Hammond, VSP international science publishers
- Stem Cells Handbook: Stewart Sell, Humana Press; Totowa NJ, USA; Oct. 2003,
- Human Embryonic Stem Cells: The Practical Handbook by Stephen Sullivan and Chad A Cowan.


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SUMMER INTERNSHIP EVALUATION

Course Code: SCT2535

Credit Units: 06

GUIDELINES FOR PROJECT FILE

Research experience is as close to a professional problem-solving activity as anything in the curriculum. It provides exposure to research methodology and an opportunity to work closely with a faculty guide. It usually requires the use of advanced concepts, a variety of experimental techniques, and state-of-the-art instrumentation.

Research is genuine exploration of the unknown that leads to new knowledge which often warrants publication. But whether or not the results of a research project are publishable, the project should be communicated in the form of a research report written by the student.

Sufficient time should be allowed for satisfactory completion of reports, taking into account that initial drafts should be critiqued by the faculty guide and corrected by the student at each stage.

The File is the principal means by which the work carried out will be assessed and therefore great care should be taken in its preparation.

Methodology

The students will be sent to various industries and institutes where they will undergo short term training. After the completion of the training the students will be required to submit project report which shall then be evaluated by two internal examiners. The students will then have to appear for a Viva Voce examination to be conducted by an external evaluator at the end of the semester.

In general, the File should be comprehensive and include

- A short account of the activities that were undertaken as part of the project;
- A statement about the extent to which the project has achieved its stated goals.
- A statement about the outcomes of the evaluation and dissemination processes engaged in as part of the project;
- Any activities planned but not yet completed as part of the project, or as a future initiative directly resulting from the project;
- Any problems that have arisen that may be useful to document for future reference.

Report Layout

The report should contain the following components:

➤ Title or Cover Page

The title page should contain the following information: Project Title; Student's Name; Course; Year; Supervisor's Name.

➤ Acknowledgements (optional)

Acknowledgment to any advisory or financial assistance received in the course of work may be given.

➤ Abstract

A good "Abstract" should be straight to the point; not too descriptive but fully informative. First paragraph should state what was accomplished with regard to the objectives. The abstract does not have to be an entire summary of the project, but rather a concise summary of the scope and results of the project

➤ Table of Contents

Titles and subtitles are to correspond exactly with those in the text.


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➤ **Introduction**

Here a brief introduction to the problem that is central to the project and an outline of the structure of the rest of the report should be provided. The introduction should aim to catch the imagination of the reader, so excessive details should be avoided.

➤ **Materials and Methods**

This section should aim at experimental designs, materials used. Methodology should be mentioned in details including modifications if any.

➤ **Results and Discussion**

Present results, discuss and compare these with those from other workers, etc. In writing these section, emphasis should be given on what has been performed and achieved in the course of the work, rather than discuss in detail what is readily available in text books. Avoid abrupt changes in contents from section to section and maintain a lucid flow throughout the thesis. An opening and closing paragraph in every chapter could be included to aid in smooth flow.

Note that in writing the various sections, all figures and tables should as far as possible be next to the associated text, in the same orientation as the main text, numbered, and given appropriate titles or captions. All major equations should also be numbered and unless it is really necessary never write in “point” form.

➤ **Conclusion**

A conclusion should be the final section in which the outcome of the work is mentioned briefly.

➤ **Future prospects**

➤ **Appendices**

The Appendix contains material which is of interest to the reader but not an integral part of the thesis and any problem that have arisen that may be useful to document for future reference.

➤ **References / Bibliography**

This should include papers and books referred to in the body of the report. These should be ordered alphabetically on the author's surname. The titles of journals preferably should not be abbreviated; if they are, abbreviations must comply with an internationally recognised system.

Examples

For research article

Voravuthikunchai SP, Lortheeranuwat A, Ninrprom T, Popaya W, Pongpaichit S, Supawita T. (2002) Antibacterial activity of Thai medicinal plants against enterohaemorrhagic *Escherichia coli* O157: H7. *Clin Microbiol Infec*, **8** (suppl 1): 116–117.

For book

Kowalski, M. (1976) Transduction of effectiveness in *Rhizobium meliloti*. SYMBIOTIC NITROGEN FIXATION PLANTS (editor P.S. Nutman IBP), **7**: 63-67

ASSESSMENT OF THE PROJECT FILE

Essentially, marking will be based on the following criteria: the quality of the report, the technical merit of the project and the project execution.

Technical merit attempts to assess the quality and depth of the intellectual efforts put into the project

Project execution is concerned with assessing how much work has been put in.
The File should fulfill the following *assessment objectives*:

Range of Research Methods used to obtain information

Execution of Research

Data Analysis

Analyse Quantitative/ Qualitative information
Control Quality

Draw Conclusions

Examination Scheme:

Project Report	50
Viva Voce	50
Total	100



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TERM PAPER

Course Code: SCT2531

Credit Units: 01

METHODOLOGY

A term (or research) paper is primarily a record of intelligent reading in several sources on a particular subject.

The students will choose the topic at the beginning of the session in consultation with the faculty assigned. The progress of the paper will be monitored regularly by the faculty. At the end of the semester the detailed paper on the topic will be submitted to the faculty assigned. The evaluation will be done by Board of examiners comprising of the faculties.

GUIDELINES FOR TERM PAPER

The procedure for writing a term paper may consists of the following steps:

- Choosing a subject
- Finding sources of materials
- Collecting the notes
- Outlining the paper
- Writing the first draft
- Editing & preparing the final paper

1. Choosing a Subject

The subject chosen should not be too general.

2. Finding Sources of materials

- d) The material sources should be not more than 10 years old unless the nature of the paper is such that it involves examining older writings from a historical point of view.
- e) Begin by making a list of subject-headings under which you might expect the subject to be listed.
- f) The sources could be books and magazines articles, news stories, periodicals, scientific journals etc.

3. Collecting the notes

Skim through sources, locating the useful material, then make good notes of it, including quotes and information for footnotes.

- d) Get facts, not just opinions. Compare the facts with author's conclusion.
- e) In research studies, notice the methods and procedures, results & conclusions.
- f) Check cross references.

4. Outlining the paper

- c) Review notes to find main sub-divisions of the subject.
- d) Sort the collected material again under each main division to find sub-sections for outline so that it begins to look more coherent and takes on a definite structure. If it does not, try going back and sorting again for main divisions, to see if another general pattern is possible.

5. Writing the first draft

Write the paper around the outline, being sure that you indicate in the first part of the paper what its purpose is. You may follow the following:

- a) statement of purpose
- b) main body of the paper

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- c) statement of summary and conclusion

Avoid short, bumpy sentences and long straggling sentences with more than one main ideas.

6. Editing & Preparing the final Paper

- g) Before writing a term paper, you should ensure you have a question which you attempt to answer in your paper. This question should be kept in mind throughout the paper. Include only information/ details/ analyses of relevance to the question at hand. Sometimes, the relevance of a particular section may be clear to you but not to your readers. To avoid this, ensure you briefly explain the relevance of every section.
- h) Read the paper to ensure that the language is not awkward, and that it "flows" properly.
- i) Check for proper spelling, phrasing and sentence construction.
- j) Check for proper form on footnotes, quotes, and punctuation.
- k) Check to see that quotations serve one of the following purposes:
- (iv) Show evidence of what an author has said.
 - (v) Avoid misrepresentation through restatement.
 - (vi) Save unnecessary writing when ideas have been well expressed by the original author.
- l) Check for proper form on tables and graphs. Be certain that any table or graph is self-explanatory.

Term papers should be composed of the following sections:

- 8) Title page
- 9) Table of contents
- 10) Introduction
- 11) Review
- 12) Discussion & Conclusion
- 13) References
- 14) Appendix

Generally, the introduction, discussion, conclusion and bibliography part should account for a third of the paper and the review part should be two thirds of the paper.

Discussion

The discussion section either follows the results or may alternatively be integrated in the results section. The section should consist of a discussion of the results of the study focusing on the question posed in the research paper.

Conclusion

The conclusion is often thought of as the easiest part of the paper but should by no means be disregarded. There are a number of key components which should not be omitted. These include:

- e) summary of question posed
- f) summary of findings
- g) summary of main limitations of the study at hand
- h) details of possibilities for related future research

References

From the very beginning of a research project, you should be careful to note all details of articles gathered.

The bibliography should contain ALL references included in the paper. References not included in the text in any form should NOT be included in the bibliography.

The key to a good bibliography is consistency. Choose a particular convention and stick to this.

Bibliographical conventions

Monographs

Crystal, D. (2001), Language and the internet. Cambridge: Cambridge University Press.

Edited Volumes

Gass, S./Neu, J. (eds.) (1996), Speech acts across cultures. Challenges to communication in a second language. Berlin/ NY: Mouton de Gruyter.

[(eds.) is used when there is more than one editor; and (ed.) where there is only one editor. In German the abbreviation used is (Hrsg.) for Herausgeber].

Edited Articles

Schmidt, R./Shimura, A./Wang, Z./Jeong, H. (1996), Suggestions to buy: Television commercials from the U.S., Japan, China, and Korea. In: Gass, S./Neu, J. (eds.) (1996), Speech acts across cultures. Challenges to communication in a second language. Berlin/ NY: Mouton de Gruyter: 285-316.

Journal Articles

McQuarrie, E.F./Mick, D.G. (1992), On resonance: A critical pluralistic inquiry into advertising rhetoric. Journal of consumer research 19, 180-197.

Electronic Book

Chandler, D. (1994), Semiotics for beginners [HTML document]. Retrieved [5.10.'01] from the World Wide Web, <http://www.aber.ac.uk/media/Documents/S4B/>.

Electronic Journal Articles

Watts, S. (2000) Teaching talk: Should students learn 'real German'? [HTML document]. German as a Foreign Language Journal [online] 1. Retrieved [12.09.'00] from the World Wide Web, <http://www.gfl-journal.com/>.

Other Websites

Verterhus, S.A. (n.y.), Anglicisms in German car advertising. The problem of gender assignment [HTML document]. Retrieved [13.10.'01] from the World Wide Web, <http://olaf.hiof.no/~sverrev/eng.html>.

Unpublished Papers

Takahashi, S./DuFon, M.A. (1989), Cross-linguistic influence in indirectness: The case of English directives performed by native Japanese speakers. Unpublished paper, Department of English as a Second Language, University of Hawai'i at Manoa, Honolulu.

Unpublished Theses/ Dissertations

Möhl, S. (1996), Alltagssituationen im interkulturellen Vergleich: Realisierung von Kritik und Ablehnung im Deutschen und Englischen. Unpublished MA thesis, University of Hamburg.

Walsh, R. (1995), Language development and the year abroad: A study of oral grammatical accuracy amongst adult learners of German as a foreign language. Unpublished PhD dissertation, University College Dublin.

Appendix

The appendix should be used for data collected (e.g. questionnaires, transcripts,...) and for tables and graphs not included in the main text due to their subsidiary nature or to space constraints in the main text.

Assessment Scheme:

Continuous Evaluation:

(Based on abstract writing, interim draft, general approach, research orientation, readings undertaken etc.)

40%

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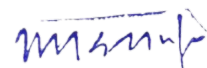
Final Evaluation:

60%

(Based on the organization of the paper, objectives/
problem profile/ issue outlining, comprehensiveness of the
research, flow of the idea/ ideas, relevance of material used/
presented, outcomes vs. objectives, presentation/ viva etc.)



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SCIENTIFIC COMMUNICATION SKILL DEVELOPMENT (SEMINAR/ WORKSHOP)

Course Code: SCT2506

Credit Units: 01

Course Objective:

Students will learn how to do literature search on a particular topic, how to construct, organize and deliver a scientific presentation.

Examination Scheme:

Literature Search/Project Report	50
Presentation	50
Total	100



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MEDICAL WRITING

Course Code: SCT2507

Credit Units: 01

Course Objective

To develop understanding of information and library science research issues in the domain of bioinformatics through review of journal articles, invited talks, and critical group discussions of methods. The main objectives for this course are to develop: familiarity with information and library science-oriented problems in the biomedical sciences, an understanding of research methods in the biomedical domain, critical thinking and evaluation skills and presentation and summarization skills.

Course Contents

Module I

Introduction: Science, Scientific Field and Biological research. Role of a researcher in different stages of a project, Routes to research funding (academic and commercial)

Module II

Research – Definition – Importance and Meaning of research – Characteristics of research – Types of Research – Steps in research – Identification, Selection and formulation of research problem – Research questions – Research design – Formulation of Hypothesis – Review of Literature.

Module III: Sampling techniques

Sampling theory – types of sampling – Steps in sampling – Sampling and Non-sampling error – Sample size – Advantages and limitations of sampling. Collection of Data: Primary Data – Meaning – Data Collection methods – Secondary data – Meaning - Relevance's, Limitations and cautions. Statistics in Research.

Module IV

Type of Articles (review, letters etc). Scientific paper format (Abstract, Introduction, Materials and Methods, Results, Discussion). Writing, evaluating, presenting and publishing the results of scientific research in the academic press (journals, conferences etc). Choosing the appropriate journal (Sources, Information, Instructions to authors, peer review system, journal evaluation)

Module V

Case studies of areas of current research. Formulating a research plan and its presentation

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

Text:

- Statistical Methods By S.P. Gupta

References:

- Research Methodology Methods and Techniques by C.R. Kothari
- Statistics(Theory and Practice) by B.N. Gupta
- Research Methodology Methods and statistical Techniques by Santosh Gupta
- Scientific journals and magazines

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PROJECT/ DISSERTATION

Course Code: SCT2637

Credit Units: 12

Course Objective:

The students are expected to utilize their scheduled periods by undertaking the project that would be completed during the semester

Every student shall undertake a major Project. The major Project shall be undertaken in some biotechnology industry or laboratory of repute. Each student shall be assigned to a faculty who shall continuously monitor the progress of the Project in the concerned laboratory or industry. The faculty, in consultation with the concerned scientist of the industry/laboratory, shall decide the topic of the project. At the conclusion of the project the student shall submit a seminar and a dissertation. The dissertation shall be evaluated by the internal faculty/examiner. The student then shall have to appear for the viva voce examination.

GUIDELINES FOR PROJECT FILE

Research experience is as close to a professional problem-solving activity as anything in the curriculum. It provides exposure to research methodology and an opportunity to work closely with a faculty guide. It usually requires the use of advanced concepts, a variety of experimental techniques, and state-of-the-art instrumentation.

Research is genuine exploration of the unknown that leads to new knowledge which often warrants publication. But whether or not the results of a research project are publishable, the project should be communicated in the form of a research report written by the student.

Sufficient time should be allowed for satisfactory completion of reports, taking into account that initial drafts should be critiqued by the faculty guide and corrected by the student at each stage.

The File is the principal means by which the work carried out will be assessed and therefore great care should be taken in its preparation.

In general, the File should be comprehensive and include

- A short account of the activities that were undertaken as part of the project;
- A statement about the extent to which the project has achieved its stated goals.
- A statement about the outcomes of the evaluation and dissemination processes engaged in as part of the project;
- Any activities planned but not yet completed as part of the project, or as a future initiative directly resulting from the project;
- Any problems that have arisen that may be useful to document for future reference.

Report Layout

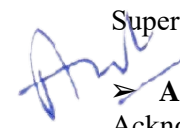
The report should contain the following components:

➤ Title or Cover Page

The title page should contain the following information: Project Title; Student's Name; Course; Year; Supervisor's Name.

➤ Acknowledgements (optional)

Acknowledgment to any advisory or financial assistance received in the course of work may be given.


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➤ **Abstract**

A good "Abstract" should be straight to the point; not too descriptive but fully informative. First paragraph should state what was accomplished with regard to the objectives. The abstract does not have to be an entire summary of the project, but rather a concise summary of the scope and results of the project

➤ **Table of Contents**

Titles and subtitles are to correspond exactly with those in the text.

➤ **Introduction**

Here a brief introduction to the problem that is central to the project and an outline of the structure of the rest of the report should be provided. The introduction should aim to catch the imagination of the reader, so excessive details should be avoided.

➤ **Materials and Methods**

This section should aim at experimental designs, materials used. Methodology should be mentioned in details including modifications if any.

➤ **Results and Discussion**

Present results, discuss and compare these with those from other workers, etc. In writing these section, emphasis should be given on what has been performed and achieved in the course of the work, rather than discuss in detail what is readily available in text books. Avoid abrupt changes in contents from section to section and maintain a lucid flow throughout the thesis. An opening and closing paragraph in every chapter could be included to aid in smooth flow.

➤ Note that in writing the various sections, all figures and tables should as far as possible be next to the associated text, in the same orientation as the main text, numbered, and given appropriate titles or captions. All major equations should also be numbered and unless it is really necessary never write in "point" form.

➤ **Conclusion**

A conclusion should be the final section in which the outcome of the work is mentioned briefly.

➤ **Future prospects**

➤ **Appendices**

The Appendix contains material which is of interest to the reader but not an integral part of the thesis and any problem that have arisen that may be useful to document for future reference.

➤ **References / Bibliography**

This should include papers and books referred to in the body of the report. These should be ordered alphabetically on the author's surname. The titles of journals preferably should not be abbreviated; if they are, abbreviations must comply with an internationally recognised system.

Examples

For research article

Voravuthikunchai SP, Lortheeranuwat A, Ninrprom T, Popaya W, Pongpaichit S, Supawita T. (2002) Antibacterial activity of Thai medicinal plants against enterohaemorrhagic *Escherichia coli* O157: H7. *Clin Microbiol Infect*, 8 (suppl 1): 116–117.

For book

Kowalski, M.(1976) Transduction of effectiveness in *Rhizobium meliloti*. SYMBIOTIC NITROGEN FIXATION PLANTS (editor P.S. Nutman IBP), 7: 63-67

ASSESSMENT OF THE PROJECT FILE

Essentially, marking will be based on the following criteria: the quality of the report, the technical merit of the project and the project execution.

Technical merit attempts to assess the quality and depth of the intellectual efforts put into the project.

Project execution is concerned with assessing how much work has been put in.

The File should fulfill the following *assessment objectives*:

Range of Research Methods used to obtain information

Execution of Research

Data Analysis

Analyse Quantitative/ Qualitative information

Control Quality

Draw Conclusions

Examination Scheme:

Dissertation: 50

Viva Voce: 50

Total: 100



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ANALYSIS OF BUSINESS OF SCIENCE AND ALTERNATIVE CAREERS IN MOLECULAR MEDICINE & REGENERATIVE MEDICINE

Course Code: SCT2601

Credit Units: 01

Course Objective:


Students will be provided study material on business aspects of science/biotechnology. Material may include papers, articles, webinars etc.

Examination Scheme:

Assignment/Project/Viva: 100



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INDUSTRY TRENDS AND CAMPUS RECRUITMENT EVENTS AND CAREER COUNSELING

Course Code: SCT2602

Credit Units: 01

Course Objective:

Students will be provided study material on Molecular Medicine and Stem Cell Technology Industry trends. Material may include papers, articles, webinars etc..

Examination Scheme:

Assignment/project: 100



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Bachelor of Science - Dietetics & Applied Nutrition

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Curriculum & Scheme of Examination

2022

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Food Science – I Lab

Course Code: DAN2103

Credit Units: 02

Note: One recipe in each food group indicating best method of cooking

Food group Grouping of foods, discussion on nutritive value,

Sensory Evaluation

1. Cereals:

a) Microscopic study of different starches.

b) Methods of combining starch and boiling water.

C) Study of effects of moist heat on starch.

d) Preparation of white sauces and soups.

e) Gluten formation.

2. Pulses -

Effect of hard water, soft water, alkali, papaya on texture and cooking time of grams and dhals.

3. Vegetables -


Effect of shredding, dicing, acids, alkali, covering, steaming and pressure cooking on the different pigments and acceptability of vegetables.

4. Fruits -

Study of different methods of preventing enzymatic browning of fruits. Pectin content of fruits.

Examination Scheme:

IA				EE		
A	PR	LR	V	PR	WT	V
5	10	10	5	15	15	20


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Nutritional Biochemistry– Lab

Course Code: DAN2104

Credit Units: 02


1. Qualitative tests for sugars-glucose, fructose, lactose, maltose and galactose.
2. Qualitative estimation of reducing sugars.
3. Qualitative tests for proteins.
4. Qualitative tests for minerals.
5. Quantitative estimation of Calcium.
6. Quantitative estimation of Phosphorous.
7. Quantitative estimation of Vitamin-C.
8. Deamination Experiments
9. Estimation of total nitrogen in foods (Micro or Macro Kjeldahl methods)
10. Lipid extraction
11. Determination of Iodine value.
12. Estimation of Iron.

Examination Scheme:

IA				EE		
A	PR	LR	V	PR	WT	V
5	10	10	5	15	15	20



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Food Microbiology

Course Code: DAN2202

Credit Units: 04

Module I

Introduction and History of Microbiology - The theory of spontaneous generation, gene theory of disease, Louis pasteur's experiment. Different terminology of Heterotrophic nutrition, autotrophic nutrition, saprophytic, holozoic, host, culture, parasite.

Bacteria - Morphology, reproduction, growth curve, nomenclature, genera of bacteria important in food microbiology. Observation of motility of bacteria in bottle milk.

Mold - Morphology, reproduction, physiology and nutrition, genera of mold important in foods.

Demonstration of mold growth in bread.

Module II

Yeast - Morphology, reproduction, classification, physiology and nutrition, process of hybridization, importance of yeast in food. Observation of yeast cells

Virus - Occurrence, morphology, reproduction, human viral disease caused by virus.

Algae - Occurrence, morphology, reproduction, importance of algae.

General principles underlying spoilage- fitness and unfitness of food for consumption, causes for spoilage, factors affecting kinds and number of micro organism in food, factors affecting the growth of micro organism in food.

Module III

Contamination and kinds of micro organisms causing spoilage of Cereal products- grains, flour, baked products and cake.

Fruits and vegetables and their products- fruit juice, pickles.

Fleshy foods- meats, poultry and fish. Observation of milk spoilage.

Module IV

Contamination and kinds of micro organisms causing spoilage of

Eggs and milk and milk products- cream, milk frozen desserts and butter.

Fats and oils, bottled beverages, spices and condiments.

Food poisoning, food infection and food borne diseases.

Micro organism in air, air borne diseases.

Module V

Micro-organisms in Water - sources, bacteriological examinations, total count, test of E.Coli, purification of water, water borne diseases.

Micro organisms in sewage and sewage disposal.

Destruction of bacteria- sterilization, physical agents, light, desiccators, electricity, heat and chemical agents. Visit to micro lab to learn most probable number.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

REFERENCE:

1. Frazier WC, Food Microbiology Mc Green Hill Book, 1985
2. Sullia SB and S Shantharam- " General Microbiology" Oxford and IBH Publishing Ltd., 1998.
3. Michael J. Pelczar, E.C.S.Cahn & Noel. R.Kruef- Microbiology.Tata McGraw- Hill Edition-1993.
4. Nicklin J. Graeme- Cook K, Page& Killington R- " Notes in Microbiology Bros Scientific Publishers- Preprinted 2001, 2002.
5. Eugene Rosenlorg & Irun R. Cohea- Microbial Biology- Holt- Saunders International Editions 1983.
6. James M.Jay ' Modern Food Microbiology International Thomson Publishing- Fifth Edn-1996.
7. Paul A.Ketchem- "Microbiology Concepts and applications Wiley International Edition-1942.
8. West BB wood-L Harger VT- Food Service in Institutions, John Wiley, 2003
9. Karls L Qauntity ,Food Sanitation, John Wiley, 1973

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Food Science II-Lab

Course Code: DAN2203

Credit Units: 02

1. **Eggs** -
Coagulation of egg protein - factors, Egg white foam, effects of beating, sugar, acid and temperature
2. **Milk** cookery
Coagulation of milk protein, panneer, cooking of vegetables in milk.
3. **Fats and Oils** -
Comparison of smoking temperature of some fats and oils.
4. **Sugar** and Jaggery -
Different stages of crystallisation of sugar.
5. Experience in Baking (Group work) Cakes and biscuits.
6. Experience in preservation of foods (Group work) salting, pickling, preservation with sugar, jams, jellies, marmalades, squash, sauces and ketchup.
7. **Food adulteration** - Identification of common adulterants - Demonstration.

Examination Scheme:

IA				EE		
A	PR	LR	V	PR	WT	V
5	10	10	5	15	15	20


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Food Microbiology- Lab

Course Code: DAN2204

Credit Units: 02

1. Demonstration of the different parts of the Microscope, the use and care of Microorganism
2. Preparation of Bacterial smear, Simple staining
3. Preparation of Common Laboratory media for cultivation of Bacteria, Yeast & Mold
4. Microbiological Identification of Important Mould & Yeast - Rhizopus, Mucor, Aspergillus, Penicillium, Saccharomyces, Alternaria
5. Demonstration Of Micro biological analysis of water and Milk

Examination Scheme:

A				EE		
A	PR	LR	V	PR	WT	V
5	10	10	5	15	15	20



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Quantity Food Service

Course Code: DAN2301

Credit Units: 04

Module - I

Floor planning and layout – characteristics of typical food service facilities. Floor plan physical planning, space allocation for the various areas and flow of traffic through receiving, storage, preparation, service and dish washing areas. Working heights and dimensions of work centers, lighting, ventilation and pest – rodent control.

Module - II

Materials - Basic materials used in the manufacture of equipment, finishes and insulation. Strength and limitation of materials.

Module - III

Equipment - Equipment required for quantity food service-major and minor equipment with reference to food storage, preparation, service and cleaning. Factors influencing their selection and purchase. Arrangement of equipment in work centers, use, care and maintenance of equipment. Transition from traditional to modern equipment.

Module - IV

Meal Planning - Menu-principles involved in planning menu, types of menu.

Fuel: Cooking fuels-selection, advantages, limitations, safety measures and fuel saving techniques.

Module - V

Quantity food preparation – Selection, purchasing and storage of foods, standardization of recipe, portion control, utilization of left over foods.

Marketing of foods –Importance and need for advertisement.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

REFERENCES:

- 1.Sethi and Mahan s.-Catering Management and integrated approach ,Johnwiley & Sons,New York .
- 2.Lillicarp DR – Food and Beverage Service ,Edward Arnold Pub.Malbourne .
- 3.Longnee K and Bieker CC – sanitary techniques in food service, Johnwiley & Sons,New York
- 4.Tersel MC and Harger – Profession food preparation , Johnwiley & Sons,New York
- 5.Kotschevar LH and Terrell ME “Food Service Planning Layout and Equipment “, 2nd Edn.,John Wiley and sons ,New York ,1977.
- 6.Glow ,G.”Catering Equipment and Systems Design “ , Applied Science Publishers Ltd.,1977.
- 7.Unkelsbay,Nand Unkilesbay,k.”Energy management in Food service : Ellis Harwood Ltd.,England 1982.
- 8.West ,BB, Wood ,L.,Hargu VF and Shugart GS “Food service in Institutions”, Johnwiley & Sons,New York .
- 9.Kinton ,R and Ceserani ,V.”The Theroy of catering “, Arnold – Heinemam ,1985
10. Fundamentals of menu planning .Vanmost and Rein Hold Company , New york.
- 11.Marian C.Spears ,Food Service Organisation – Managerial and system approach ,prentice hall.inc.Osio,III rd edition ,1995


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Human Physiology-Lab

Course Code: DAN2303

Credit Units: 01

1. Estimation of Hemoglobin
2. Determination of Blood Group
3. Collect biochemical reports of the patients and study the same and prepare field survey report
 - a. Communicable diseases
 - b. Non-Communicable diseases
4. Determination of Blood Clotting time
5. Cardiopulmonary Resuscitation
6. Blood Pressure determination

Examination Scheme:

A				EE		
A	PR	LR	V	PR	WT	V
5	10	10	5	15	15	20


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Research Paper Writing

Course Code: DAN2331

Credit Units: 02

The students will be asked to do meta- analysis in brief(Article writing)

A **meta-analysis** refers to methods focused on contrasting and combining results from different studies, in the hope of identifying patterns among study results, sources of disagreement among those results, or other interesting relationships that may come to light in the context of multiple studies. In its simplest form, this is normally by identification of a common measure of effect size, of which a weighted average might be the output of a meta-analysis. The weighting might be related to sample sizes within the individual studies. More generally there are other differences between the studies that need to be allowed for, but the general aim of a meta-analysis is to more powerfully estimate the true effect size as opposed to a less precise effect size derived in a single study under a given single set of assumptions and conditions.

Examination Scheme:

A				EE		
A	PR	LR	V	PR	WT	V
5	10	10	5	15	15	20



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Project

Course Code: DAN2332

Credit Units: 03

Every student shall be allotted a project supervisor. The project supervisor shall be from the Department of Dietetics & Applied Nutrition.

The allotment of the project supervisor will be done during the semester. The topic of project will be finalized by the project supervisor. It is the responsibility of the project supervisor that the student is making the required progress in work.

The project must be completed and submitted in the form of a report by the end of the semester.

1. Individual Project
2. Any one diseases (Infection & fever, allergy, deficiency diseases, obesity)
3. Minimum five clinical cases
4. To present a report furnishing the following data
 - a) Hospital - lay out and organization
 - b) Medical profile
 - a. general details
 - b. family history, associated complications, drugs
 - c. anthropometry and clinical status
 - d. biochemical status
 - e. biophysical status
 - f. progress chart
 - c) Diet therapy

Examination Scheme:

A				EE		
A	PR	LR	V	PR	WT	V
5	10	10	5	15	15	20


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Workshop

Course Code: DAN2333

Credit Units: 01

It aims to provide a detailed insight on the simple practical aspects of the chosen topic by organising lectures followed by the group assignments .focus group discussion,Quiz ,debates and various modes of interactions .The registered participants will get participation certificate and one credit point.

Objectives

Potential trainers / participants will be able

Plan any low cost Nutritious recipe/Food product development

To plan general intervention strategies(action in order to improve eating habits)

Gather information on sensory evaluation or satisfaction level of the visitors/audience

Implementation:


This would be approximately 2 hours long after the completion of lectures. The student will ask the visitors to complete a form with details of their planned recipe including cost, nutritive value etc and its sensory evaluation. This information is necessary as it is important to have a complete idea of the acceptability to make their product better. They would be asked to fill the satisfaction scales/Feedback.This activity would be discussed in further depth during the workshop.

Examination Scheme:

A				EE		
A	PR	LR	V	PR	WT	V
5	10	10	5	15	15	20



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Food Processing

Course Code: DAN2304

Credit Units: 03

Module I

Cereals and Pulses

Milling of wheat - extraction of flour, refined wheat flour and pasta products

Milling of rice – parboiled rice, rice based instant food

Processing of corn, barley and millets – pearling, flaking and puffing, corn starch products, Malting

Pulses – Red gram, Bengal gram, black gram, green gram, soy based products, Decortication and dhal milling, elimination of toxic factors, fermentation and germination

Module II

Milk and Milk products

Collection, Standardization, pasteurization, homogenization, UHT processing, manufacture of paneer, khoa, curd, yogurt, cream, butter, cheese, ghee, flavoured milk, ice creams, dehydrated milk products

Module III

Fruits and vegetables

Harvesting, physiological and bio chemical changes during ripening, handling and storage, general methods of processing - extraction and pulping, raw material and product specifications and standards.

Module IV

Meat, poultry, fish and egg:

Ageing and tenderizing, curing, smoking and freezing of meat, fresh storage of meat. Meat based products: sausages, salaami, bacon. Fish processing and storage, pickling.

Egg: storage, frozen egg, dehydrated egg powder.

Others

Module V

a. nuts and oil seeds – pressing, solvent extraction, purification – degumming, refining, bleaching, deodourizing. Hydrogenation – margarines, shortenings

b. Spices – processing and extraction of essential oils and colours, storage and preservation

c. Tea, coffee and coco – Processing and storage

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

REFERENCES:

1. Desrosier N W and Desrosier J N (1987) 'The Technology of Food Preservation', 4th Edition, CBS, New Delhi,
2. Fellows P J (2000) 'Food Processing Technology: Principles and Practice' 2nd edition CRC Woodhead Publishing Ltd., Cambridge.
3. Khetarpaul Neelam (2005) 'Food Processing and Preservation', Daya Publications, New Delhi.
4. Salunke D K and Kadam S S (1995) 'Hand book of Food Science and Technology: production, composition, storage and processing' Marcel Dekker INC, New York.
5. Sivasankar B (2002) 'Food Processing & Preservation' Prentice Hall, India.

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ADVANCED DIETETICS

Course code: DAN 2451

Credit: 03

MODULE I

Objectives of diet therapy - Role of a dietitian. Principles of diet preparation and counseling.

Normal diet in the hospitals –regular diet, liquid, semi liquid, light, soft diet, and bland diet.

Different types of Feeding - Basic concepts of oral feeding, tube feeding, IV feeding, gastrostomy feeding.

MODULE II

Therapeutic diets for the following disorders:

- Under weight - definition, etiology, treatment
- Obesity - definition, etiology, treatment.
- Diseases of the gastro intestinal tract-Peptic ulcer and duodenal ulcer, Dumping syndrome, constipation
- Acute and chronic diarrhea -rehydration therapy.

MODULE III

Diseases of the liver and gall bladder (risk factors and diet therapy)

- jaundice
- hepatitis
- cirrhosis
- fatty liver and diet therapy

Diseases of the cardio vascular system (risk factors and diet therapy)

- atherosclerosis
- arteriosclerosis
- hypertension
- congestive heart failure

MODULE IV

Diabetes mellitus – causes, symptoms, bio-chemical changes, insulin, hypo-glycemic drugs, changes in the metabolism of carbohydrate, fat and protein, food exchange list, dietary management

Diseases of the kidney and urinary tract

- Acute and chronic nephritis
- Nephrotic syndrome
- Renal failure
- Urinary calculi
- Uremia

Causes and dietary treatment of kidney diseases and dialysis.

Nutrition and cancer - Dietary guidelines for management.

MODULE V

Diet in Allergy - Definition, classification, common food allergy, test of allergy, diet therapy. Pre operative and post operative diets.

Diet in febrile conditions - Short duration e.g. Typhoid, Long duration e.g. Tuberculosis. Dietetic management of gout and phenyl ketonuria.

Diet in relation to deficiency diseases-Protein calorie deficiency, vitamin A deficiency and anemia.

Examination Scheme

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

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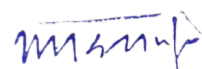
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Reference Books:

1. Krause and Mahan – Food ,Nutrition and Diet therapy, 6th Edition W.B. Saunders company, London
2. Normal and therapeutic nutrition –17th Edition, Robinson et. al ., Mac Millan Pub.Co., New York
3. ICMR(1989) Nutrient Requirements and recommended dietary allowances for Indians.
4. Antia FP (1987) Clinical Dietetics and Nutrition, Oxford University Press, New Delhi
5. Srilakshmi (2002) Dietetics, IVth Edition. New Age International (P) Limited, Publishers, New Delhi
6. Shubhangini. A. Joshi (2002) Nutrition and dietetics, Tata Mc Graw- Hill publishing company limited, New Delhi.
7. B. Srilakshmi (2002) Nutrition science, New age international (P) limited, New Delhi
8. Carolyn E. Townsend and Ruth A. Roth (2002) Nutrition and Diet Therapy, Delmar publisher
9. Sue rod Williams, Nutrition and diet Therapy, Times Mirror Mosby College publishing, Boston, 1989.
10. The Indian journal of nutrition and dietetics, Avinashilingam Deemed University, Coimbatore



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FOOD SERVICE MANAGEMENT LAB

Course Code: DAN2404

Credit:01

Practical experience is correlated with theory course and will be provided at Amity School of Medical, Gurgaon.

Contents:

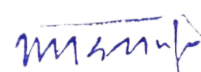
- Standardisation of recipes
- Napkin folds
- Fruit and vegetable carving
- Table setting
- Quantity preparation and sale
- Visit to hospital food service
- Visit to Hotel food service
- Visit to Industrial canteen

Examination Scheme:

IA				EE		
A	PR	LR	V	PR	WT	V
5	10	10	5	15	15	20



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PAPER WRITING

Course Code: DAN2431

Credits:02

Every student shall be allotted a research supervisor. The research supervisor shall be from the Department of Dietetics & Applied Nutrition.

The allotment of the research supervisor will be done during the semester. The topic of research will be finalized by the research supervisor. It is the responsibility of the research supervisor that the student is making the required progress in work.


The research work must be completed and submitted in the form of a report by the end of the semester.

The format of the research report is given below:

1. Research Objective
2. Literature Review
3. Research Methodology
4. Results and Analysis
5. Conclusions
6. References
7. Appendices – to include questionnaire, if any



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PROJECT

Course Code: DAN2432

Credits:03

Every student shall be allotted a project supervisor. The project supervisor shall be from the Department of Dietetics & Applied Nutrition.

The allotment of the project supervisor will be done during the semester. The topic of project will be finalized by the project supervisor. It is the responsibility of the project supervisor that the student is making the required progress in work.

The project must be completed and submitted in the form of a report by the end of the semester.

1. Individual Project
2. Any one diseases (gastro intestinal disorders, renal diseases, liver diseases, cardio vascular disorders and diabetes mellitus, Cancer, Neurological Disorders,)
3. Minimum five clinical cases
4. To present a report furnishing the following data
 - a) Hospital - lay out and organization
 - b) Medical profile
 - a. general details
 - b. family history, associated complications, drugs
 - c. anthropometry and clinical status
 - d. biochemical status
 - e. biophysical status
 - f. progress chart
 - c) Diet therapy

Viva Voice



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WORKSHOP

Course code: DAN2433

Credit : 01


- To understand the basic concept of data collection on Nutrition based studies.i.e Nutritional Assessment including anthropometrical measurements, food diaries & 24 dietary recall method etc
- To present and facilitate with support of more experienced trainers as per the contents
- To practice facilitation and Counseling techniques and know about basic Communication with regard to Diet consultation

Implementation:

This would be approximately 2 hours long after the completion of lectures. The student will be asked to complete a form with details of their health goals, and previous and current health history. This information is necessary as it is important to have a complete health picture before making nutritional recommendations. They would be asked to fill the 24 dietary recall/Food Frequency/3 day food Dairy. This information is discussed in further depth during the workshop. Relevant Physical Parameters/ measurements would also be recorded. These include blood pressure, Height, Weight & BMI etc. The final part would comprise of discussing the recommended dietary and lifestyle changes that will help the students to achieve their health goal(s). Supplementation with specific nutrients may be recommended if necessary.



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NUTRITION FOR HEALTH & FITNESS

Course code: DAN2501

Course credits: 05

MODULE-I

Definition components of specific fitness and health status. Energy input & output , diet & Exercise .Nutrition exercise ,physical fitness & health inter-relationship.

MODULE-II

Review of different energy systems for endurance and power activity shifts in carbohydrate and fat metabolism. Mobilization of fat stores during exercise.

MODULE- III

Nutrition in sports: sports specific requirements. Diet manipulation, pre-game & Post game meal . Life style and dietary management of stress.

MODULE-IV

Significance of Physical fitness, nutrition and prevention of weight control, obesity, CV disorder and diabetes.

MODULE- V


Alternative systems for health and fitness like Yoga, meditation.

Examination Scheme

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70



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BAKERY

Course code: DAN2502

Credit: 04

MODULE I

Baking - Definition, Principles of baking, classification of baked foods. Types of equipments in baking industry, cleaning and sanitizing methods of baking equipments, baking temperature of different products, operation techniques of different baking equipments.

MODULE II

Ingredients and Their Role in Baking - Flour, Yeast, sugar, egg, butter, salt, baking powder, colouring, flavouring agents. List of standard colouring and flavouring agents.

MODULE III

Preparation of baked foods - Quick breads, cakes and its varieties, different types of biscuits, cookies and pastries.

MODULE IV

Decoration of baked foods - Icing- Types of Icing used in different bakery product. Role of other ingredients used in icing.

MODULE V


Baking unit/ plant layout & design of a baking unit sanitation and hygiene. Types of packaging materials used for bakery products, method of packaging.

Reference Books:

1. Potter, N. Food Science, The AVI Publishing Co., Inc., West Port, Connecticut, 1975.
2. Baker's Handbook on practical Baking .Wheat Associates, USA, New Delhi.
3. Dubey, SC, Basic Baking Science and Craft, Jwalmukhi Job Press, Bangalore, 1979

Examination Scheme

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70


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BAKERY LAB

Course Code: DAN 2504

Credit: 02


1. Breads
2. Cakes
3. Biscuits and cookies
4. Pastries
5. Icing

Examination Scheme:

IA				EE		
A	PR	LR	V	PR	WT	V
5	10	10	5	15	15	20



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FOOD QUALITY CONTROL LAB

Course Code: DAN2505

Credits:02

Course Content:

MODULE I

Organizing, preparing and serving food for three different meals for 50 members or more (list attached)

Setting up the restaurant - laying of table cloth changing, setting up the silver and other table arrangements.

Folding of serviettes correct use of waiter's cloth. Preparation for customers.

MODULE II

Serving and clearing practice, French and English service.

Service of beverages tea, coffee, juices and alcoholic beverages.

Laying for breakfast.

MODULE III

Tray service

Order taking, making out checks bills presentation of bills

Up keep and cleaning of cutlery, crockery, other equipment.

Examination Scheme:

IA				EE		
A	PR	LR	V	PR	WT	V
5	10	10	5	15	15	20


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CLINICAL & THERAPEUTIC NUTRITION

Course code: DAN2602

Credits: 04

MODULE I

Carbohydrates : Review of digestion, absorption and metabolism of carbohydrates, aerobic and anaerobic glycolysis, storage and utilisation of carbohydrates as energy source for physical activity.

MODULE II

Lipids : Review of digestion absorption and metabolism of fats and fatty acids, energy yield from dietary fats, storage, mobilisation of fat stores during exercises, production of Ketone bodies, Ketogenic diets.

MODULE III

Energy Metabolism : BMR, energy requirements for physical activity, relative body weight and influence of physical exercise on changes in body fat and body composition, utilization of energy by muscle tissue, shifts in lipid and carbohydrate, utilisation, in relation to exercise type, intensity and duration.

MODULE IV

Water and electrolyte balance : Water & electrolyte lossess and their replenishment; effect of dehydration.

MODULE V

Nutrient and Drug Interactions: Effect of drug therapy on absorption and utilisation onutrients.

MODULE VI

Diseases of the gastro - intestinal tract : Effect on digestion, absorption and nutritional status. **Implications for diet therapy**

- Diarrhoea, Constipation
- Gastritis and Ulcers.
- Colitis.
- Malabsorption syndromes.

MODULE VII

Liver Gallbladder & Pancreas: Etiology, symptoms, Metabolic and Nutritional Implications

- Hepatitis, Cirrhoses, Hepatic Coma
- Pancreatic
- Cholecystitis, Cholelithiasis

8. Renal System: Etiology, Symptoms, Metabolic and Nutritional Implications


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- Nephrotic Syndrome
- Renal Failure
- Renal Calculi

9. Disorders of Metabolism:

- Diabetes Mellitus
- Inborn Errors of Metabolism
- Gout

10. Cardiovascular system: - Etiology, Symptoms, Role of Specific nutrients, Clinical finding related to nutritional care. Hypertension, Atherosclerosis.

Examination Scheme

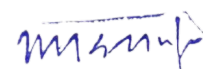
Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

REFERENCES:

1. Antia F.P. "Clinical Dietetics" Nutrition 3rd 2000. Oxford University Press. New Delhi/Bombay.
2. Passmore, R. Eastwood M.A. "Human Nutrition & Dietetics" 8th Ed. 1986. ELBS Publ.
3. Robusseau C.H. & Wyley E.S. "Basic Nutrition & Diet Therapy" 6th Ed. 1989 Macmillan Pub New York.
4. Anderson L. & Others "Nutrition in Health & Disease" 1982 17,th ed J.B. Lippincott Cp. Philadelphia. Vocational Training Course - Clinical Nutrition



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FOOD PRESERVATION LAB

Corse code: DAN2603

Credits: 01


1. Methods of Food Preservation using salt and sugar.
2. Drying and Dehydration
3. Food Adulteration tests for some common foods.
4. Preservation and bottling of fruit and vegetable products.
5. Preservation by using chemicals
6. Sensory analysis of preserved and processed foods.

Examination Scheme:

IA				EE		
A	PR	LR	V	PR	WT	V
5	10	10	5	15	15	20



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CLINICAL & THERAPEUTIC NUTRITION LAB

Course Code: DAN2604

Credits: 01

Prepare the diet plans for the following diseases

MODULE I

Diseases of the gastrointestinal tract: Diarrhoea, Constipation, Gastritis and Ulcers, Colitis, Malabsorption syndromes.

Liver Gallbladder & Pancreas: Hepatitis, Cirrhosis, Hepatic Coma, Pancreatic, Cholecystitis, Cholelithiasis.

MODULE II

Renal System:

- Nephritis
- Nephrotic Syndrome
- Renal Failure
- Renal Calculi

Disorders of Metabolism:

- Diabetes Mellitus
- Inborn Errors of Metabolism
- Gout

MODULE III

Cardiovascular system: Hypertension and Atherosclerosis

Examination Scheme:

IA				EE		
A	PR	LR	V	PR	WT	V
5	10	10	5	15	15	20



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Bachelor of Audiology & Speech Language Pathology

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Curriculum & Scheme of Examination

2022

AMITY UNIVERSITY HARYANA

GURUGRAM

A handwritten signature in blue ink, appearing to read 'Anil'.

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ANATOMY AND PHYSIOLOGY OF SPEECH AND HEARING

Course Code: ASL2107

Credit Units: 05

Course Objectives: After completing this course, the student will be able to understand the

- anatomy of the auditory system
- anatomy of the speech mechanism
- physiology of hearing mechanism
- functioning of speech and swallowing mechanism

Course Contents:

Module-I: Introduction

- a) General anatomical terms
- b) Anatomical positions and planes of reference
- c) Cells, tissues and muscles
- d) Muscle connection and joints
- e) Tissue - vascular and neural

Module-II: Embryology

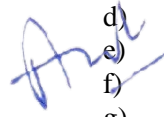
- a) Basic terminologies related to embryology
- b) Development of external ear
- c) Development of middle ear
- d) Development of Inner ear and the auditory system
- e) Five examples of embryonic anomalies affecting speech-language & hearing
- f) Development of respiratory structures
- g) Development of larynx
- h) Development of facial region and palate
- i) Development of tongue and teeth

Module-III: Anatomy and physiology of speech production systems and swallowing

- a) Mechanisms of breathing with emphasis on speech breathing
- b) Supportive frame work of larynx
- c) Anatomy of larynx
- d) Anatomy of oesophagus
- e) Brief mechanisms of swallowing
- f) Mechanisms of phonation
- g) Anatomy of articulators and associated structures
- h) Contribution of articulatory structures to speech production
- i) Anatomy of resonatory mechanisms
- j) Contribution of resonatory mechanisms to speech production

Module-IV: Anatomy and physiology of external and middle ear

- a) Anatomy of the external ear
- b) Physiology of external ear including localization
- c) Head shadow effect, inter-aural intensity and time differences
- d) Brief anatomy of temporal bone
- e) Anatomy of tympanic membrane and associate structures
- f) Anatomy of middle ear and ossicles
- g) Anatomy of Eustachian tube and middle ear muscles


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- h) Physiology of Eustachian tube
- i) Middle ear transformer action
- j) Physiology of middle ear muscles

Module-V: Anatomy and physiology of labyrinth

- a) Anatomy of bony and membranous labyrinth
- b) Macro anatomy of cochlea
- c) Micro anatomy of cochlea
- d) Innervations and blood supply to cochlea
- e) Overview of theories of hearing
- f) Physiology of cochlea
- g) Electrical potentials of the cochlea
- h) Physiology of hearing through bone conduction
- i) Overview to physiology of balancing mechanisms
- j) Overview to anatomy of central auditory pathway
- k) Overview to central auditory mechanism

Examination Scheme:

Components	CRW	PTB	CT	A	EE
Weightage (%)	5	5	15	5	70

CRW- Clinical record writing, PTB- Proficiency in using test batteries, CT- Class test, A- Attendance, EE- End semester examination

Recommended Reading

- Seikel, J. A., King, D. W., & Drumright, D. G. (2010). Anatomy & Physiology for Speech, Language, and Hearing (4th edition). Delmar, Cengage Learning, Division of Thomson Learning. NY.
- Zemlin, W. R. (2010). Speech and Hearing Science: Anatomy and Physiology: International Edition (4 edition.). Boston: Pearson.
- Chaurasia, B.D (2004). Human Anatomy, vol 3. Head Neck and Brain 4 th Eds, CBS Publishers and Distributors, New Delhi. ISBN 81-239-1157-2.
- Kelley, M., Wu, D., & Fay, R. R. (Eds.). (2005). Development of the Inner Ear (2005 edition.). New York: Springer.



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CLINICAL PSYCHOLOGY

Course Code: ASL2108

Credit Units: 05

Course Objectives: After completing this course, the student will be able to understand the

- scope of clinical psychology and its significance for speech and hearing
- concept of normality, abnormality and classification of abnormal behavior
- cognitive, motor, emotional and social development
- theories of learning and therapy techniques based on learning principles
- neuropsychological assessment and rehabilitation
- application of neuropsychology in the field of speech and hearing
- basics of counselling

Course Contents:

Module-I: Introduction to psychology

- a) Introduction to psychology: definition, history and schools of psychology
- b) Scope of psychology
- c) Meaning and definition of clinical psychology
- d) Historical development, modern clinical psychology
- e) Significance of clinical psychology in health sciences
- f) Role of clinical psychology in speech and hearing
- g) Concept of normality
- h) Concept of abnormality
- i) Models of mental disorders: biological, psychological social models

Module-II: Assessment procedures in clinical psychology

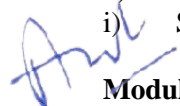
- a) Methods in clinical psychology: case history, clinical interviewing, clinical observation, definition and types of psychological testing
- b) Assessment of cognitive functions
- c) Adaptive functions,
- d) Personality
- e) Behavioural assessment
- f) Classification of abnormal behavior
- g) History, need & rationale of classification
- h) Current classificatory system: DSM, ICD

Module-III: Developmental psychology

- a) Child and developmental psychology: meaning, definition and scope
- b) Meaning of growth, development & maturation
- c) Principles of child development
- d) Motor development: general principals of motor development
- e) Stages in motor development: early motor development, motor development during later childhood and adolescence, decline with age
- f) Cognitive development: growth from early childhood to adolescence
- g) Piaget's theory of cognitive development
- h) Emotional development
- i) Social development

Module-IV: Principles of learning and behaviour modification

- a) Learning: meaning, definition and characteristics


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- b) Theories of learning: introduction
- c) Pavlov's classical conditioning: experiments and principles
- d) Skinner's operant conditioning: experiments and principles
- e) Therapeutic techniques based on learning principles
- f) Skill behavior techniques
- g) Problem behavior techniques

Module-V: Neuropsychology and its relevance to study of speech

- a) Neuropsychology: introduction and definition
- b) Neuropsychological assessment
- c) Neuropsychological rehabilitation
- d) Application of neuropsychology in the field of speech and hearing
- e) Counselling: introduction and definition
- f) Types of counselling: directive and non- directive
- g) Characteristics of a good counsellor

Examination Scheme:

Components	CRW	PTB	CT	A	EE
Weightage (%)	5	5	15	5	70

CRW- Clinical record writing, PTB- Proficiency in using test batteries, CT- Class test, A- Attendance, EE- End semester examination

Recommended Reading

- Morgon C.T., King R.A., Robinson N.M. Introduction to Psychology. Tata McGraw Hill Publishing Co.
- Anastasi, A. (1999). Psychological testing, London: Freeman
- Baura, M (2004). Human Development and Psychology, Rehabilitation Council of India, New Delhi. ISBN: 81-7391-868-6
- Coleman J.C. Abnormal Psychology and Modern Life, Taraporevala Sons & Co.
- Gregory, R.J. (2000). Neuropsychological and geriatric assessment in Psychological Testing: History, Principles, and Applications (3rd ed.). New York: Allyn & Bacon.
- Hurlock, E.B. (1981). Child development. (VI Ed.). Mc Graw Hill International Book Co.
- Kline, P. (1993). The Handbook of Psychological Testing. Routledge
- Lezak, M., Loring, D.W., and Hannay, H.J. (2004). Neuropsychological Assessment. Fourth Edition. New York: Oxford University Press
- Siegal M.G. (Ed). (1987). Psychological Testing from Early Childhood Through Adolescence. International Universities Press.



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LINGUISTICS AND PHONETICS

Course Code: ASL2109

Credit Units: 05

Course Objectives: After completing this course, the student will be able to understand

- different branches and aspects of linguistics
- characteristics and functions of language
- different branches of phonetics, applied linguistics, and phonology
- morphology, syntax, semantics, pragmatics
- acquisition of language and factors affecting it
- bi/multilingualism and related issues

Course Contents:

Module-I: Linguistics

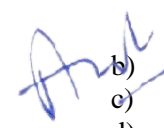
- Introduction to linguistics and different branches of linguistics: applied linguistics, sociolinguistics, psycholinguistics, metalinguistics, neurolinguistics and clinical linguistics
- Language characteristics and functions, difference between animal communication systems and human language
- Morphology – concepts of morph, allomorph, morpheme, bound free and compound forms, roots etc.
- Processes of word formation, content and function words
- Endocentric and exocentric constructions, form classes, grammatical categories
- Inflection and derivation, paradigmatic and syntagmatic relationship
- Principles and practices of morphemic analysis
- Langue versus parole
- Competence vs. performance

Module-II: Phonetics and Phonology

- Introduction to phonetics
- Articulatory, acoustic, auditory and experimental phonetics – an introduction
- Articulatory classification of sounds – segmental and supra-segmental
- Classification description and recognition of vowels and consonants
- Pathological aspects of speech sound production
- Transcription systems with special emphasis on IPA. Transcription of samples of normal and disordered speech
- Introduction to phonology, classification of speech sounds on the basis of distinctive features and phonotactics
- Application of distinctive feature theory to speech pathology and speech therapy, phonotactics, phonotactic patterns of English and Indian languages
- Phonemic analysis – Principles and practices; their practical implications for speech pathologists
- Common phonological processes - assimilation, dissimilation, metathesis, haplology, epenthesis, spoonerism, vowel harmony, nasalization, neutralization

Module-III: Morphology, syntax, semantics and applied linguistics

- Morphology – concepts of morph, allomorph, morpheme, roots, compound forms - endocentric and exocentric constructions, free and bound morphemes, inflection and derivation, principles and practices of morphemic analysis
- Syntax – different methods of syntactic analysis
- IC analysis, phrase structure, grammar, transformational generative grammar
- Introduction to the major types of transformations


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- e) Sentence types, notions about competence versus performance
- f) Deep structure versus surface structure
- g) Acceptability versus grammaticality language versus parole etc.
- h) A brief introduction to semantics – semantic feature theory, pragmatics
- i) Processes of word formation, content and function words, form classes, grammatical categories
- j) Syntax – concepts of phrases and clauses, sentence and its types
- k) Different methods of syntactic analysis – Immediate constituent analysis, Phrase structure, grammar, transformational generative grammar– deep structure versus surface structure, acceptability versus grammaticality; Introduction to the major types of transformations
- l) Usefulness of morphemic and syntactic analysis in planning speech and language therapy
- m) A brief introduction to semantics, semantic relations, semantic feature theory
- n) A brief introduction to pragmatics and discourse.

Module-IV: Language acquisition

- a) Issues in first language acquisition
- b) Pre-linguistic stages, linguistic stages
- c) Acquisition of phonology, morphology, syntax, semantics, and pragmatics
- d) Language and cognition
- e) A brief introduction to theories and models of language acquisition
- f) Biological maturation theory, linguistic theory, behavioral theory, information processing theory, social interaction theory
- g) An integrated approach to theories communicative competence and its development
- h) Applied linguistics with special reference to communication disorders
- i) Usefulness of morphemic and syntactic analysis in planning speech and language therapy

Module-V: Bi/multilingualism

- a) Introduction to the language families of the world and India
- b) Issues related to second language acquisition & factors influencing it
- c) Inter-language theory, language transfer and linguistic interference
- d) Differences between first and second language acquisition/learning
- e) Bilingualism/Multilingualism
- f) Metaphonology
- g) Writing systems – types of writing
- h) History of writing systems
- i) Indian writing systems

Examination Scheme:

Components	CRW	PTB	CT	A	EE
Weightage (%)	5	5	15	5	70

CRW- Clinical record writing, PTB- Proficiency in using test batteries, CT- Class test, A- Attendance, EE- End semester examination

Recommended Reading

- Ball & Martin (1995). Phonetics for speech pathology. Delhi: AITBS Publishes, India.
- Ball, Rahilly & Trench (1996). The phonetic transcription of disordered speech. San Diego: Singular Publishing Group Inc.
- Clark and Yallop (1999). An introduction to phonetics and phonology. Oxford: Blackwell Publishes Inc.
- Karanth, P (2003). Cross-Linguistic study of Acquired Reading Disorders. Sage Publications, New Delhi. ISBN : 0-306-48319-X
- Ladefoged, P. (1982). A course in phonetics. New York: Harcourt Brace Jovanovich Inc.
- Shriberg & Kent (1982). Clinical phonetics. New York: John Wiley & Sons.

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ELECTRONICS AND ACOUSTICS

Course Code: ASL2110

Credit Units: 05

Course Objectives: After completing this course, the student will be able to understand the

- concept and types of power supply for biomedical instruments
- basic aspects of digital signal processing
- theoretical basis of acoustics required for audiologists
- functioning of computers and computing systems

Course Contents:

Module-I: Electronic components and power supply

- Resistors, capacitors, inductors
- Transformers and potentiometers,
- Semiconductor diodes and transistors
- Light emitting devices, seven segment displays, Liquid crystal displays
- Principles of operations and working of Field Effect Transistors, Uni-junction transistors and thyristors
- Introduction to linear and digital integrated circuits
- Block diagram of a DC power supply
- Linear regulated power supplies, line regulation and load regulation, specifications of a DC power supply unit, Switched Mode Power Supply
- AC power supply, stabilizers, Uninterrupted Power Supply, and inverters
- Basic electronic concepts such as Polarity, Grounding

Module-II: Introduction to acoustics

- Vibrations and their characteristics
- Sound - generation and propagation
- Characteristics of sound
- Amplitude, frequency and phase of pure tones
- Amplitude, frequency and phase of complex tones (FFT and spectrum, relationship between time waveform, FFT and impulse response)
- Reflection and absorption, acoustic impedance, reverberation
- Impedance and admittance
- Electro-mechano-acoustic transformers

Module-III: Acoustical treatment, transducers and basics of computers

- Introduction to audiometric rooms
- Absorption coefficient, Sabine's formula
- Materials for construction of audiometric rooms
- Lighting, grounding and other miscellaneous issues related to audiometric rooms
- Evaluation of efficiency of sound proofing in the audiometric rooms
- Amplifiers
- Microphones, loudspeakers - types and function
- Fundamentals of digital electronics, binary number system, Hex code, bit, byte, logic gates, counters, flip-flops etc.
- Introduction to computers
- Operating systems, hard ware, software, memory devices and other peripherals, care and preventive maintenance of computers

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Module-IV: Digital signal processing

- Digital signal processing –introduction and need
- Analog to digital converters, sampling and quantization
- Fundamentals of digital filtering
- Infinite impulse response and finite impulse response filters
- Time domain methods of speech processing
- Frequency domain methods of speech processing
- Linear predictive analysis of speech signals
- Digital coding of speech signals
- Automatic speech recognition
- Speech synthesis

Module-V: Instrumentation in speech and hearing

- Introduction to electronic instrumentation in speech and hearing
- Electrodes, filters and preamplifiers
- Principle of operations, block diagram, calibration, maintenance and troubleshooting of audiometers, immittance meters, oto-acoustic emissions, hearing aids, evoked potential system, speech and voice analyses systems, artificial larynx, electroglottograph

Examination Scheme:

Components	CRW	PTB	CT	A	EE
Weightage (%)	5	5	15	5	70

CRW- Clinical record writing, PTB- Proficiency in using test batteries, CT- Class test, A- Attendance, EE- End semester examination

Recommended Reading

- Haughton, P., & Haughton, P. M. (2002). Acoustics for Audiologists (1st edition.). San Diego, Calif: Emerald Group Publishing Limited.
- Moser, P. (2015). Electronics and Instrumentation for Audiologists. Psychology Press.
- Moser, P. J. (2013). Electronics and Instrumentation for Audiologists. Psychology Press.
- Rout, N and Rajendran, S. (2014). Hearing aid trouble shooting and Maintenance, Published by National Institute for Empowerment of Persons with Multiple Disabilities, Chennai. Freely downloadable from <http://niepmd.tn.nic.in/publication.php>. ISBN 978-81-928032-1-0.
- Speaks, C. E. (1999). Introduction To Sound: Acoustics for the Hearing and Speech Sciences (3 edition.). San Diego: Cengage Learning.
- Villchur, E. (1999). Acoustics for Audiologists (1 edition.). San Diego, Calif: Delmar Cengage Learning.



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RESEARCH METHODS AND STATISTICS

Course Code: ASL2111

Credit Units: 05

Course Objectives: After completing this course, the student will be able to understand the

- basic concept of research in the field of audiology and speech-language pathology
- design and execution of research
- ethical guidelines for conducting research

Course Contents:

Part-A: Research Methods

Module-I: Introduction to research methods

- a) Meaning and purpose of research: meaning
- b) Need for research in audiology and speech-language pathology
- c) Funds/grants for research
- d) Steps in research: identification, selection
- e) Formulation of research questions: aims, objectives, statement of problem, hypothesis
- f) Types of variables; types of sampling procedures (random and non-random);
- g) Types/ methods of data collection and their advantages and disadvantages
- h) Reliability and validity (internal and external validity)

Module-II: Research design in audiology and speech-language pathology

- a) Types of research: survey, ex-post facto research, normative research, standard-group comparison
- b) Experimental and quasi experimental research: group design & single subject design
- c) Internal and external validity of research
- d) Between groups vs. repeated measures design
- e) Documentation of research: scientific report writing, different formats or styles (APA, AMA and MLA),
- f) Ethics of research


Part-B: Statistics

Module-III: Introduction to statistics and data collection

- a) Application of statistics in the field of Audiology and speech-language pathology.
- b) Scales of measurement: nominal, ordinal, interval, ratio
- c) Classification of data: class intervals, continuous and discrete measurement
- d) Normal distribution: general properties of normal distribution, theory of probability, area under normal probability curve
- e) Variants from the normal distribution: skewness and kurtosis
- f) Measure of central tendency: mean, median, mode
- g) Measures of variability: range, deviation (average and standard deviation), variance

Module-IV: Statistics and research designs

- a) Choosing statistics for different research designs
- b) Correlational techniques: Pearson's Product Moment Correlation Coefficient; Spearman's Rank order correlation coefficient
- c) Statistical inference: concept of standard error and its use; the significance of statistical measures; testing the significance of difference between two means z-test, t-test; analysis of variance, post hoc tests,


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- d) Non-parametric tests: Chi-square test, Wilcoxon test, Mann-Whitney U test,
- e) Reliability and validity of test scores: reliability and validity, Item analysis
- f) Analysis of qualitative data
- g) Software for statistical analysis

Module-V: Epidemiology

- a) Basic epidemiologic concepts and principles
- b) Epidemiologic data sources and measurements
- c) Epidemiologic methods – questionnaire survey, screening, personal survey, testing
- d) Media - their advantages and disadvantages
- e) Incidence and prevalence of hearing, speech, language disorders as per different census (NSSO, WHO)

Examination Scheme:

Components	CRW	PTB	CT	A	EE
Weightage (%)	5	5	15	5	70

CRW- Clinical record writing, PTB- Proficiency in using test batteries, CT- Class test, A- Attendance, EE- End semester examination

Recommended Reading

- Dane F. C. (2011). Sampling and Measurement. In Evaluating research: Methodology for people who need to read research. New Delhi: SAGE publication.
- Field, A. (n.d.). Discovering Statistics Using IBM SPSS (4th ed.). SAGE Publications.
- Hegde M. N. (2010). A course book on Scientific and professional writing for speech language pathology (4th Edition), Singapore: Delmar publication.
- Hegde, M. N. (2003). Clinical research in communicative disorders: Principles and strategies. (3rd Edition), Austin: Pro-ed
- Hesse-Biber, S. N. & Leavy, P. (2011). The Ethics of social research. In The Practice of qualitative research. (2nd Edition), New Delhi: SAGE publication.
- Jekel, F. J., Katz, L.D., & Elmore, G.J (2001). Basic Epidemiologic Concepts and Principles in epidemiology, Biostatistics, and Preventive Medicine (2nd Edition). Pennsylvanian: Saunders
- Meline, T. (2010). A research primer for communication sciences and disorders. Singapore: Pearson publication.



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SPEECH-LANGUAGE PATHOLOGY

Course Code: ASL2208

Credit Units: 05

Course Objectives: After completing this course, the student will be able to understand the

- different speech and language disorders
- basic concepts and tools required for diagnosing speech and language disorders
- basics of assessment procedures for speech and language disorders
- basic principles and intervention procedures for speech and language disorders
- clinical requirements to practice,
- different laws, social-cultural and ethical issues
- identification and prevention of speech and language disorders
- basic principles of providing counselling and guidance to clients and caregivers

Course Contents:

Module-I: Basic concepts and methods of diagnostics

- Introduction to Speech Language Disorders
- Definition and descriptions of delay, deviancy and disorders; impairment, disability and handicap
- Incidence and prevalence of speech and language disorders
- Causes of speech and language disorders
- Basic principles in assessment, evaluation and appraisal
- Tools for diagnosis- case history, interview, self-reports, questionnaire & observations
- Diagnostic models – SLPM, Wepman, Bloom and Lahey
- Types of diagnoses – Clinical diagnosis, direct diagnosis, differential diagnosis, diagnosis by treatment, diagnosis by exclusion, team diagnosis, instrumental diagnosis, provocative diagnosis, tentative diagnosis advantage/disadvantages
- Characteristics of a diagnostic clinician
- Organization and basic requirements for clinical set up and team approach
- DSM, ICD classification and ICF

Module-II: Basic concepts and methods of therapeutics

- Basic concepts and terminologies in speech therapeutics
- General principles of speech and language therapy
- Speech therapy set-up
- Individual and group therapy
- Procedures and types of for speech-language therapy
- Approaches to speech and language therapy – formal, informal and eclectic approaches
- Planning for speech and language therapy – goals, steps, procedures and activities
- Importance of reinforcement principles and strategies in speech and language therapy, types and schedules of rewards and punishment
- Individual and group therapy
- AAC and other nonverbal methods of therapy

Module-III: Overview of basic assessment and management of speech disorders

- Causes of speech disorders
- Overview of assessment procedures for voice disorders; articulation and phonological disorders; and fluency disorders
- Overview of management procedures for voice disorders; articulation and phonological disorders; and fluency disorders
- Early identification and prevention of speech disorders


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- e) Basic concepts in assessment and management of swallowing disorders

Module-IV: Overview of basic assessment and management of language disorders

- Types, characteristics and classification of language disorders
- Causes of language disorders
- Overview of assessment procedures for child language disorders; adult language disorders; and neurogenic language disorders
- Overview of management procedures for child language disorders; adult language disorders; and neurogenic language disorders
- Early identification and prevention of language disorders
- Issues related to bi- /multilingualism

Module-V: Other issues in practice as a speech - language pathologist

- Professional code of conduct – social, cultural and other ethical issues
- Scope of practice –different set ups and prerequisites
- Documentation of diagnostic, therapeutic and referral reports
- Counselling, guidance, facilitation of parent participation and transfer of skills
- Evaluation of therapy outcome and follow up
- Evidence based practice
- Community based rehabilitation
- Role of itinerant speech therapist, Anganwadis, resource teachers etc.
- PWD act, National Trust, Consumer protection Act, noise pollution Act and other public laws, RCI, ISHA and other organizations controlling the field
- Facilities and concessions available for speech and hearing disabled

Examination Scheme:

Components	CRW	PTB	CT	A	EE
Weightage (%)	5	5	15	5	70

CRW- Clinical record writing, PTB- Proficiency in using test batteries, CT- Class test, A- Attendance, EE- End semester examination

Recommended Reading

- Owens, Jr, Kimberly, A. Metz, F.E. (2014). 5th Ed. Introduction to Communication Disorders: A life span based Perspective. Pearson Communication Science and Disorders Series.
- Hegde, M. N., & Davis, D. (2005). Clinical methods and practicum in speech-language pathology (4th ed.). Australia; Clifton Park, NY: Thomson Delmar Learning.
- Shipley, K. G., & Roseberry-McKibbin, C. (2006). Interviewing and counselling in communicative disorders : Principles and procedures (3rd ed.). Austin, Tex: Pro-Ed.
- Brookshire, R. H. (2003). Introduction to neurogenic communication disorders (6th ed.). St. Louis, Mo: Mosby.
- Hulit, L.M., Marle, R., Kathleen, R. H., & Fowey (2010). Born to Talk. Pearson Communication Science and Disorders Series 5th Ed.
- Roth, F. P., & Worthington, C. K. (2005). Treatment resource manual for speech language pathology (3rd ed.). Australia; Clifton Park, NY: Thomson Delmar Learning.
- Shipley, K. G., & McAfee, J. G. (2004). Assessment in speech-language pathology: A resource manual (3rd ed.). Australia; Clifton Park, NY: Delmar Learning.
- Ysseldyke, J. E., & Algozzine, R. (2006). Teaching students with communication disorders : A practical guide for every teacher. Thousand Oaks, Calif.: Corwin Press

AUDIOLOGY

Course Code: ASL2209

Credit Units: 05

Course Objectives: After completing this course, the student will be able to

- understand and carryout experiments to measure differential sensitivity loudness and pitch
- take case history, administer the tuning fork tests and interpret the results
- administer pure tone audiometry including masking on clinical population and appreciate the theoretical back ground of it
- carryout different tests involved in speech audiometry appreciate the theoretical back ground
- carryout subjective calibration and daily listening checks of the audiometer
- get adequate theoretical information necessary to understand concepts involved in objective calibration

Course Contents:

Module-I: Differential sensitivity

- a) Concept of differential sensitivity, just noticeable difference
- b) Weber's fraction
- c) Intensity discrimination
- d) Frequency discrimination
- e) Duration discrimination and temporal resolution
- f) Applications of jnd's
- g) Magnitude estimation and production
- h) Loudness – equal loudness level contours and its application
- i) Loudness scales - sone, phone, Steven's power law
- j) Pitch- scales of pitch

Module-II: Case history and tuning fork tests

- a) Need for case history
- b) Basics of history taking
- c) Essential factors to be included in case history for adults
- d) Essential factors to be included in case history for children
- e) Interpretation of case history
- f) Audiological evaluation – rationale and purpose
- g) Principles, procedure, interpretation, advantages and disadvantages of Rinne and Schwabach tuning fork test
- h) Principles, procedure, interpretation, advantages and disadvantages of Weber and Bing tuning fork test
- i) Audiometric version of Weber and Bing test

Module-III: Pure tone audiometry

- a) Classification of audiometers, Parts of an audiometer, characteristics and specifications of transducers used (earphones, bone vibrators, loud speakers)
- b) Audiogram- concept and symbols used
- c) Clinical method of threshold estimation
- d) Factors affecting air conduction threshold
- e) Bone conduction thresholds- measurements, factors effecting
- f) Permissible noise levels in the audiometric room


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Module-IV: Speech audiometry

- Importance and purpose
- Different types of stimuli used in speech audiometry
- Concept of phonetically and phonemically balanced
- Speech detection thresholds – procedure and application
- Speech reception thresholds – procedures and application
- Word recognition scores – procedure and applications
- PIPB function – procedure and applications
- Factors affecting speech audiometry
- BC speech audiometry – procedure and its application
- Test materials available in various languages

Module-V: Clinical masking and instrumental calibration

- Definition and different terminologies
- Purpose and rationale of clinical masking
- Different types of stimulus employed in clinical masking
- Interaural attenuation and factors affecting interaural attenuation
- When to mask and how much to mask – importance of adequate noise levels
- Different procedures for masking
- Masking for speech audiometry
- Calibration definition and purpose
- Daily listening checks and subjective calibration
- Objective calibration of air conduction transducers
- Objective calibration of bone conduction transducers
- Frequency calibration

Examination Scheme:

Components	CRW	PTB	CT	A	EE
Weightage (%)	5	5	15	5	70

CRW- Clinical record writing, PTB- Proficiency in using test batteries, CT- Class test, A- Attendance, EE- End semester examination

Recommended Reading

- Durrant, J. D., & Feth, L. L. (2012). Hearing Sciences: A Foundational Approach (1 edition.). Boston: Pearson.
- Emanuel, D. C., & Letowski, T. (2008). Hearing Science (1 edition.). Philadelphia: Lippincott Williams and Wilkins.
- Gelfand, S. A. (2009). Hearing: An Introduction to Psychological and Physiological Acoustics (5 edition.). London: CRC Press.
- Kaplan, H., Gladstone, V. S., & Lloyd, L. L. (1993). Audiometric Interpretation: A Manual of Basic Audiometry (2 edition.). Boston: Pearson.
- Katz, J. (2014). Handbook of Clinical Audiology (7th International edition edition.). Lippincott Williams and Wilkins.
- Martin, F. N., & Clark, J. G. (2014). Introduction to Audiology. Boston: Pearson.
- Silman, S., & Silverman, C. A. (1997). Auditory Diagnosis: Principles and Applications (Reissue edition.). San Diego: Singular Publishing Group


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PRACTICALS IN SPEECH-LANGUAGE PATHOLOGY

Course Code: ASL2210

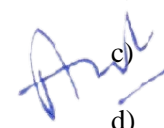
Credit Units: 07

Practicals

- a) Demonstrate normal aspects of speech and analyse perceptually variations in voice, articulation and fluency in different recorded speech samples of typical individuals at different age groups (children, adults and older adults) and sex.
- b) Demonstrate normal aspects of language and analyse perceptually variations in language in different recorded samples of typical individuals at different age groups (children, adults and older adults) and sex.
- c) Demonstrate stress, rhythm and intonation and variations in rate of speech and analyse perceptually variations in prosody in different recorded samples of typical individuals at different age groups (children, adults and older adults) and sex.
- d) Use IPA to transcribe spoken words.
- e) Record a standard passage, count number of syllables and words, identify syllable structure, syntactic structures in the passage.
- f) Oral mechanism examination on 5 normal children and 5 normal adults.
- g) Prepare a chart and show the developmental stages of speech and language behavior.
- h) Administer standardized tests for assessment of delayed speech and language development such as REEL, SECS, LAT, 3DLAT, ALD each on any 2 children.
- i) Study the available normative data (Indian/Western) of speech such as respiratory, phonatory, resonatory and articulatory parameters.
- j) Measure the following in 5 normal subjects: (a) Habitual frequency (b) Frequency range (c) Intensity (d) Intensity range (e) Phonation duration (f) rate of speech (g) Alternate Motion Rates and Sequential Motion Rates (h) s/z ratio.
- k) Study the available normative data (Indian/Western) of language such as phonology, semantics, syntax, morphology and pragmatic measures.
- l) Perceptual analysis of speech and language parameters in normal (2 children and 2 adults and persons with speech disorders (3 adults + 3 children).
- m) Prepare a model diagnostic report of a patient with speech and language disorder.
- n) Prepare a diagnostic and therapy kit.
- o) Make a list of speech language stimulation techniques and other therapy techniques for various speech disorders.
- p) Familiarize with the sources for referral and parent counseling procedures.
- q) Prepare a report on the available audiovisual material and printed material/pamphlets relating to speech-language pathology, public education of communication and hearing disorders, etc.
- r) Prepare a report on the available clinical facilities and clinical activities of the institute.

Clinical Practicum

- a) Observe the evaluation process and counselling of at least 5 different speech and language disorders in children.
- b) Observe the evaluation process and counselling of at least 5 different speech and language disorders in adults.
- c) Take case history of a minimum of 10 individuals (5 normal & 5 clients with complaints of speech-language problems).
- d) Observation of diagnostic procedures.


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- e) Observe various therapeutic methods carried out with children and adults with speech and language disorders.

Examination scheme:

Components	CRW	C/P/A	CT	A	Viva
Weightage (%)	15	15	15	5	50

CRW- Clinical record writing, C/P/A- Case discussion/presentation/analysis, CT- Class test, A- Attendance, Viva- Internal/External



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PRACTICALS IN AUDIOLOGY

Course Code: ASL2211

Credit Units: 07

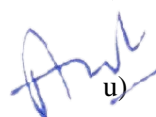
Practicals

Calculate/derive the answers for following

- Calculate the relative intensities with different reference intensities.
- Calculate decibels when sound intensities are doubled, increased by 4 times
- Add decibels when two sounds with different intensities are produced simultaneously
- Collect pictures of audiometers that existed between 1920 and 1990.

Perform the following experiments

- Calculate reference equivalent sound pressure levels (RETSPL) for head phones and bone vibrator for any two frequencies using 30 participants.
- Measure most comfortable level on 10 participants with normal hearing sensitivity.
- Measure uncomfortable levels on 10 participants with normal hearing sensitivity.
- Calculate the sensation levels of MCL and UCLs in above 10 participants.
- Measure difference limen of intensity, frequency and duration on 10 normal hearing adults and plot it in graphical form and interpret the results.
- Measure equal loudness level contours at minimum level, 40 dB SPL, 70 dB SPL (1 kHz) in 5 normal hearing adults.
- Measure sone and mel in 5 normal hearing adults using scaling techniques.
- Take case history on 5 adults and 5 children with hearing problem and correlate the information from case history to results of pure tone audiometry.
- Administer different tuning fork tests on 5 simulated conductive and 5 sensori neural hearing loss individuals.
- Carry out pure tone and speech audiometry on 10 normal hearing individuals.
- Carry out clinical masking on 10 normal hearing individuals with simulated conductive hearing loss and carry out clinical masking on 5 individuals with conductive hearing loss and 5 individuals with sensori-neural hearing loss.
- Carryout daily listening checks and subjective calibrations 20 times and observe objective calibration once
- Perform otoscopy and draw the tympanic membrane of 10 healthy normal individuals
- Measure difference limen of intensity, frequency and duration on 10 normal hearing adults and plot it in graphical form and interpret the results
- Measure equal loudness level contours at minimum level, 40 dB SPL, 70 dB SPL (1 kHz) in 5 normal hearing adults
- Measure sone and mel in 5 normal hearing adults using scaling techniques
- Take case history on 5 adults and 5 children with hearing problem and correlate the information from case history to results of pure tone audiometry
- Administer different tuning fork tests on 5 simulated conductive and 5 sensori neural hearing loss individuals
- Carry out pure tone and speech audiometry on 10 normal hearing individuals.
- Carry out clinical masking on 10 normal hearing individuals with simulated conductive hearing loss and carry out clinical masking on 5 individuals with conductive hearing loss and 5 individuals with sensori-neural hearing loss
- Carryout daily listening checks and subjective calibration 20 times and observe objective calibration once


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Clinical Practicum

- Observe case history being taken on 5 adults and 5 children with hearing problem and correlate the information from case history to results of pure tone audiometry.
- Administer different tuning fork tests on 5 conductive and 5 sensori neural hearing loss individuals.
- Observe the pure tone audiometry being carried out on 30 clients.
- Plot the audiogram, calculate the pure tone average and write the provisional diagnosis of observed clients.
- Perform otoscopy (under supervision) on at least 1 client with following conditions: Tympanic membrane perforation, SOM, CSOM

Examination scheme:

Components	CRW	C/P/A	CT	A	Viva
Weightage (%)	15	15	15	5	50

CRW- Clinical record writing, C/P/A- Case discussion/presentation/analysis, CT- Class test, A- Attendance, Viva- Internal/External



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VOICE AND ITS DISORDERS

Course Code: ASL2307

Credit Units: 05

Course Objectives: After completing this course, the student will be able to

- describe characteristics of normal voice and identify voice disorders
- explain etiology related to voice problems, and its pathophysiology
- assess voice disorders
- provide counselling and therapy to individuals with voice disorders

Course Contents:

Module-I: Basic concepts in voice and its production

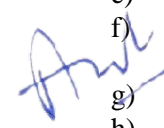
- a) Definition and functions of voice – biological and non-biological
- b) Parameters of voice
- c) Structures and function of respiratory system for the purpose of phonation
- d) Laryngeal anatomy – Structural support of larynx, muscles, vocal fold microstructure, blood supply, and innervations
- e) Vocal tract resonance and voice quality
- f) Development of voice: Birth to senescence; structural and voice related changes
- g) Aerodynamic myo-elastic theory of voice production
- h) Voice mechanics – Physiologic, acoustic and aerodynamic correlates of voice
- i) Pitch and loudness changing mechanism, voice registers and voice quality
- j) Description of normal and abnormal voice: Parametric, pathologic/perceptual, social

Module-II: Characteristics and pathophysiology of voice disorders

- a) Pathologies of the laryngeal mechanism: classification of voice disorders, incidence, and prevalence
- b) Etiology of voice disorders: voice misuse and abuse, medical related etiologies, primary disorder etiologies and personality related etiologies
- c) Pathologies of vocal fold cover (infective and trauma related secondary conditions) and muscular dysfunction
- d) Non-organic voice disorders: functional disorders, psychosomatic- functional aphonia and physiological- voice abuse, puberphonia)
- e) Congenital voice disorders
- f) Neurological voice disorders
- g) Voice problems in systemic illnesses and endocrine disorders
- h) Voice problems in transgenders
- i) Voice problems in the elderly
- j) Voice problems in professional voice users: teachers and singers

Module-III: Assessment of voice

- a) Referral sources, medical examination and team approach
- b) Protocol for voice assessment: components and philosophies (ICF, ICD)
- c) Clinical voice laboratory: principles of instrumental measurements – electrical error, electrical safety, hygiene safety; recording of data; storage; patented softwares, free wares
- d) Perceptual evaluation of voice: GRBAS, CAPE -V
- e) Visualization procedures- indirect laryngoscopy, video laryngoscopy & stroboscopy
- f) Acoustic analysis of voice: F0 related measures, intensity related measures, quality related measures, phonetogram, DSI
- g) Electroglottography and inverse filtering procedures
- h) Aerodynamic analysis of voice: static & dynamic measures


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- i) Self-evaluation of voice : PROM, VHI, V-DOP
- j) Reporting of voice findings, normative comparisons, differential diagnosis

Module-IV: Management of voice

- a) Voice therapy orientation: basic principles, goal setting and approaches
- b) Vocal hygiene and preventive counselling
- c) Symptomatic voice therapy – voice facilitation techniques
- d) Psychological approaches to voice therapy – psychoanalysis, rational emotive therapy and cognitive behavior therapy
- e) Physiological approach – breathing and postural techniques
- f) Holistic voice therapy approaches -1: accent therapy, confidential voice therapy,
- g) Holistic voice therapy approaches - 2: vocal function exercises, resonant voice therapy, Lee Silverman voice therapy
- h) Medical and surgical procedures in the treatment of benign vocal fold lesions: pharmaceutical effects on voice, phono surgery : re-innervation techniques, laryngeal framework surgeries, micro laryngeal excision
- i) Professional voice care

Module-V: Intervention strategies for voice disorders

- a) Vocal trauma related disorders
- b) Functional voice disorders – inappropriate vocal components
- c) Functional aphonia
- d) Puberphonia/mutational falsetto
- e) Muscle tension dysphonia
- f) Sulcus vocalis
- g) Vocal fold palsy
- h) Spasmodic dysphonia
- i) GERD/LPR
- j) Benign vocal fold lesions requiring surgical intervention
- k) Post-operative care for benign vocal fold lesions disorders
- l) Documenting voice therapy outcomes

Practicals

- a) Record phonation and speaking samples (counting numbers) from five children, adult men, adult women, geriatric men and geriatric women. Note recording parameters and differences in material.
- b) Make inferences on age and sex differences across the samples obtained in the previous experiment using perceptual voice profiling. Make a note of differences in pitch, loudness, quality and voice control. Explain how voice reflects ones personality and other social needs.
- c) Perform an acoustic voice analysis on phonation sample and generate a voice report based on acoustic findings. Compare findings between men & women.
- d) Perform MPT and s/z ratio. Infer differences across age and sex.
- e) Perform spirometry or any other appropriate aerodynamic procedure. Infer differences across age and sex.
- f) Perform acoustic analysis on five abnormal voice samples.
- g) Observe and document findings from five laryngeal examinations (pre-recorded or live) such as VLS, stroboscopy or any other relevant.
- h) Administer a PROM on five individuals.
- i) Prepare a vocal hygiene checklist.
- j) Demonstrate therapy techniques such as vocal function exercise, resonant voice therapy, digital

manipulation, push pull, relaxation exercises.

Examination Scheme:

Components	CRW	PTB	CT	A	EE
Weightage (%)	5	5	15	5	70

CRW- Clinical record writing, PTB- Proficiency in using test batteries, CT- Class test, A- Attendance, EE- End semester examination

Recommended Reading

- Stemple, J. C., Glaze, L. E., & Gerdeman, B, K. (2014). Clinical voice pathology: Theory & Management (5th Ed.). San Diego: Plural publishers.
- Aronson, A.E. & Bless, D. M. (2009). Clinical Voice Disorders.(4th Ed.). New York: Thieme, Inc.
- Boone, D. R., McFarlane, S. C, Von Berg, S. L. & Zraick, R, I. (2013): The Voice and Voice Therapy. (9th Ed.). Englewood Cliffs, Prentice-Hall, Inc. New Jersey.
- Professional Voice: Assessment and Management. Proceedings of the national workshop on “Professional Voice: Assessment and management”, 9-10 Dec 2010. All India Institute of Speech & Hearing, Mysore. 2010.
- Andrews, M. L. (2006). Manual of Voice treatment: Pediatrics to geriatrics (3rd Ed.). Thomson Delmar Learning.
- Colton, R. H, Casper, J. K. & Leonard, R. (2006). Understanding voice problems. Baltimore: Williams & Wilkins.
- Sapienza, C. M., & Ruddy, B H. (2013). Voice Disorders.(2nd Ed.). San Diego: Plural Publisher.
- Voice: Assessment and Management. Proceedings of the national workshop on “Voice: Assessment and management”, 14-15 Feb 2008. All India Institute of Speech & Hearing, Mysore. 2008.



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SPEECH SOUND DISORDERS

Course Code: ASL2308

Credit Units: 05

Course Objectives: After completing this course, the student will be able to

- describe normal speech sound development and characterization of individuals with speech sound disorders.
- perform phonological analysis and assessment of speech sound disorders.
- plan intervention for individuals with speech sound disorders.

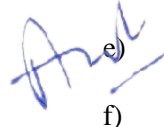
Course Contents:

Module-I: Speech sound acquisition and development

- a) Fundamentals of articulatory phonetics - phonetic description of vowels & consonants.
- b) Phonology & phonological theories – generative phonology, natural phonology.
- c) Phonology & phonological theories – non-linear phonology, optimality theory.
- d) Methods to study speech sound acquisition – diary studies, cross sectional studies and longitudinal studies.
- e) Speech sound acquisition
 - i. birth to one year (development of infant speech perception, early speech production).
 - ii. one to two years (consonant inventories, influence of phonological knowledge on vocabulary acquisition).
 - iii. two to five years (growth of phonetic, phonemic, phonotactic inventory – consonants, clusters, phonological patterns).
 - iv. above five years (speech sound mastery and development of literacy – phonological awareness).
 - v. Factors influencing speech sound acquisition
- f) Acoustics of speech sounds
- g) Speech intelligibility, factors affecting speech intelligibility, assessment of speech intelligibility
- h) Co articulation: types and effects
- i) Phonological development in bilingual children.
- j) Phonological development in Indian languages.

Module-II: Assessment of speech sound disorders - I

- a) Current concepts in terminology and classification of speech sound disorders
 - i. Organically-based speech sound disorders, childhood apraxia of speech.
 - ii. Speech sound disorders of unknown origin, classification by symptomatology.
- b) Factors related to speech sound disorders
 - i. structure and function of speech & hearing and oro-sensory mechanisms.
 - ii. cognitive – linguistic, psychosocial and social factors.
 - iii. metalinguistic factors related to speech sound disorders.
- c) Introduction to assessment procedures: aims of assessment, screening and comprehensive assessment.
- d) Speech sound sampling procedures - issues related to single word and connected speech samples; imitation and spontaneous speech samples, contextual testing, recording of speech samples.
- e) Review of tests in English and other Indian languages - Single word articulation tests, deep articulation of articulation, and computerized tests of phonology.
- f) Influence of language and dialectal variations in assessment.


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- g) Transcription of speech sample - transcription methods –IPA and extension of IPA; broad and narrow transcription.

Module-III: Assessment of speech sound disorders - II

- a) Introduction to independent and relational analysis.
- b) Independent analyses – phonetic inventory, phonemic inventory and phonotactic inventory (utility of independent analysis for analysis of speech of young children and children with severe speech sound disorders).
- c) Relational analyses – SODA, pattern analysis, (distinctive features, phonological process analysis).
- d) Phonological processes analyses - language specific issues, identification and classification of errors.
- e) Assessment of oral peripheral mechanism.
- f) Speech sound discrimination assessment, phonological contrast testing.
- g) Stimulability testing.
- h) Determining the need for intervention – speech intelligibility and speech severity assessment.
- i) Factors influencing target selection – stimulability, frequency of occurrence, developmental appropriateness, contextual testing, and phonological process analysis.
- j) Case study – Documenting the assessment findings and determining the need for intervention.

Module-IV: Management – I

- a) Basic considerations in therapy – target selection, basic framework for therapy, goal-attack strategies, organizing therapy sessions, individual vs. group therapy.
- b) Treatment continuum – establishment, generalization and maintenance; measuring clinical change.
- c) Facilitation of generalization.
- d) Maintenance and termination from therapy.
- e) Motor-based treatment approaches – Principles of motor learning.
- f) Discrimination/ear training and sound contrast training.
- g) Establishing production of target sound – imitation, phonetic placement, successive approximation, context utilization.
- h) Traditional approach, contextual/sensory-motor approaches.
- i) General guidelines for motor-based treatment approaches.
- j) Use of technology in articulation correction.

Module-V: Management – II

- a) Core vocabulary approach.
- b) Introduction to linguistically-based treatment approaches- Distinctive feature therapy.
- c) Minimal pair contrasts therapy.
- d) Metaphon therapy, Cycles approach.
- e) Broad-based language approaches.
- f) General guidelines for linguistically-based approaches.
- g) Phonological awareness and phonological disorders.
- h) Phonological awareness intervention for preschool children.
- i) Adapting intervention approaches to individuals from culturally and linguistically diverse backgrounds.
- j) Role of family in intervention for speech sound disorders.

Practicals

- a) List the vowels and consonants in your primary language and provide phonetic and acoustic descriptions for the speech sounds.
- b) Identify the vowels and consonants of your language on the IPA chart and practice the IPA symbols by transcribing 25 words.

- c) Make a list of minimal pairs (pairs of words which differ by only one phoneme) in English.
- d) Make a list of minimal pairs in any language other than English.
- e) Identify the stages of speech sound acquisition by observations from videos of children from birth to 5 years of age.
- f) Record the speech of a two year old typically developing child, transcribe and analyze the speech sample.
- g) Record the speech of one typically developing child from 3-5 years of age (include single word and connected speech samples), transcribe the sample, and perform phonological assessment.
- h) Analyze transcribed speech samples of typically developing children – practice independent and relational analysis.
- i) Practice instructions for phonetic placement of selected sounds.
- j) Develop a home plan with activities for any one section of phonological awareness in English and in one Indian language.

Examination Scheme:

Components	CRW	PTB	CT	A	EE
Weightage (%)	5	5	15	5	70

CRW- Clinical record writing, PTB- Proficiency in using test batteries, CT- Class test, A- Attendance, EE- End semester examination

Recommended Reading

- Bernthal, J.E., Bankson, N.W., & Flipsen, P. (2013). Articulation and phonological disorders.(7th Ed.). Boston, MA: Pearson.
- Dodd, B. (2013). Differential diagnosis and treatment of children with speech disorder.(2nd Ed). NJ: Wiley.
- Rout, N (Ed)., Gayathri, P., Keshree, N and Chowdhury, K (2015). Phonics and Phonological Processing to Develop Literacy and Articulation; A Novel Protocol. A publication by NIEPMED, Chennai. Freely downloadable from
- <http://niepmd.tn.nic.in/publication.php>. ISBN 978-81-928032-9-5
- Vasanta, D. (2014). Clinical applications of phonetics and phonology. ISHA Monograph.Vol 14, No. 1.Indian Speech & Hearing Association.
- Velleman, S. L (2003). Resource guide for Childhood Apraxia of Speech.Delmar/Thomson Learning.
- Williams, A., McLeod, S., & McCauley, R. (2010). Interventions for speech sound disorders in children. Baltimore: Brookes.



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DIAGNOSTIC AUDIOLOGY: BEHAVIOURAL TESTS

Course Code: ASL2309

Credit Units: 05

Course Objectives: After completing this course, the student will be able to

- choose individualized test battery for assessing cochlear pathology, retro cochlear pathology, functional hearing loss, CAPD, vestibular dysfunctions, tinnitus and hyperacusis
- independently run the tests and interpret the results to identify the above conditions and also use the information for differential diagnosis
- make adjustments in the test parameters to improve sensitivity and specificity of tests.
- make appropriate diagnosis based on the test results and suggest referrals.

Course Contents:

Module-I: Introduction to diagnostic audiology

- a) Characteristics of a diagnostic test, difference between screening and diagnostic test, functions of a diagnostic test in Audiology
- b) Need for test battery approach in auditory diagnosis and integration of results of audiological tests, cross-check principle
- c) Concept of sensitivity, specificity, true positive, true negative, false positive, false negative, hit rate
- d) Definition of behavioural and physiological tests and their characteristics in diagnostic audiology
- e) Theories and physiological bases of recruitment
- f) Theories and physiological bases of adaptation
- g) Clinical indications for cochlear pathology, retro-cochlear pathology, central auditory processing disorders, functional hearing loss, vestibular disorders

Module-II: Tests to identify cochlear and retro cochlear pathology

- a) ABLB, MLB and SISI tests
- b) Behavioural tests of adaptation
- c) Bekesy audiometry
- d) Brief tone audiometry
- e) PIPB function
- f) Glycerol test
- g) Test to identify dead regions of cochlea

Module-III: Tests to diagnose functional hearing loss

- a) Behavioural and clinical indicators of functional hearing loss
- b) Pure tone tests including tone in noise test, Stenger test, BADGE, puretone DAF
- c) Speech tests including Lombard test, Stenger test, lip-reading test, Doerfler-Stewart test, Low level PB word test, Yes-No test, DAF test
- d) Identification of functional hearing loss in children: Swinging story test, Pulse tone methods

Module-IV: Assessment of central auditory processing

- a) Definition, different behavioral processes
- b) Behavioral and clinical indicators of central auditory processing disorders
- c) Bottle neck and subtlety principles and their implications in
- d) Tests to detect central auditory processing disorders
- e) Monaural low redundancy tests - filtered speech tests, time compressed speech test, speech-in-noise test, SSI with ICM, other monaural low redundancy tests.
- f) Dichotic speech tests – Dichotic digit test, Staggered spondaic word test, Dichotic CV test, SSI with CCM, Competing sentence test, other dichotic speech tests.


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- g) Binaural interaction tests – RASP, BFT, MLD, other binaural interaction tests
- h) Tests of Temporal processing – pitch pattern test, duration pattern tests, other temporal ordering tests, gap detection test, TMTF
- i) Variables influencing the assessment of central auditory processing: Procedural and subject variables
- j) Test findings of important tests in subjects with central auditory disorders: brainstem lesion, cortical, CAPD in children.

Module-V: Assessment of persons with vestibular disorder, tinnitus, hyperacusis

- a) Introduction to structure and function of vestibular system
- b) Vestibular ocular reflex and vestibulo spinal reflex
- c) Overview on other systems involved in balance
- d) Signs and Symptoms of vestibular disorders
- e) Team in the assessment and management of vestibular disorders
- f) Behavioral tests to assess vestibular functioning: Fukuda stepping test, tandem gait test, finger nose pointing, Romberg test, Sharpened Romberg test, Dix-Hallpike test, Log-roll test
- g) Overview of tinnitus and hyperacusis and tests for assessment
- h) Pitch matching, loudness matching, residual inhibition, Feldman masking curves
- i) Johnson Hyperacusis Dynamic Range Quotient

Practicals

- a) Administer ABLB, MLB and prepare ladder gram (ABLB to be administered by blocking one ear with impression material)
- b) Administer classical SISI on 3 individuals and note down the scores
- c) Administer tone decay tests (classical and its modifications) and note down the results (at least 3 individuals)
- d) Administer Bekesy audiometry
- e) Administer Brief tone audiometry
- f) Plot PIPB function using standardized lists in any 5 individuals
- g) Administer the tests of functional hearing loss (both tone based and speech based) by asking subject to malingering and having a yardstick of loudness.
- g) Administer CAPD test battery to assess different processes on 3 individuals and note down the scores
- h) Administer Fukuda stepping test, Tandem gait test, Finger nose pointing, Romberg test, Sharpened Romberg test, Dix-Hallpike test, Log-roll test on 5 of the individuals each and note down the observations.
- i) Estimate the pitch and loudness of tinnitus in 2 persons with tinnitus (under supervision). Assess the residual inhibition in them.
- j) Plot Feldman masking curves for a hypothetical case
- k) Administer Johnson Hyperacusis Dynamic Range Quotient on any 2 of the individuals and note down the scores.

Examination Scheme:

Components	CRW	PTB	CT	A	EE
Weightage (%)	5	5	15	5	70

CRW- Clinical record writing, PTB- Proficiency in using test batteries, CT- Class test, A- Attendance, EE- End semester examination

Recommended Reading

- Gelfand, S. A. (2009). Essentials of Audiology. Thieme.
- Hall, J. W., & Mueller, H. G. (1996). Audiologists' Desk Reference: Diagnostic audiology principles, procedures, and protocols. Cengage Learning.
- Jerger, J. (1993). Clinical Audiology: The Jerger Perspective. Singular Publishing Group.
- Katz, J., Medwetsky, L., Burkard, R. F., & Hood, L. J. (Eds.). (2007). Handbook of Clinical Audiology (6th revised North American edition). Philadelphia: Lippincott Williams and Wilkins.
- Martin, F. N., & Clark, J. G. (2014). Introduction to Audiology (12 edition). Boston: Pearson.
- Roeser, R. J., Valente, M., & Hosford-Dunn, H. (2007). Audiology: Diagnosis. Thieme.
- Stach, B. A. (2010). Clinical audiology: an introduction (2nd ed). Clifton Park, NY: Delmar Cengage Learning.



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AMPLIFICATION DEVICES

Course Code: ASL2310

Credit Units: 05

Course Objectives: After completing this course, students will be able to

- assess the candidacy for hearing aids and counsel accordingly
- evaluate the listening needs and select the appropriate hearing aid
- independently program digital hearing aids as per the listening needs of the client
- independently assess the benefit from the hearing aid using subjective and objective methods
- make all types of ear molds
- counsel the parents/care givers at all stages

Course Contents:

Module-I: Types of hearing aids

- a) Historical development of hearing aids: development of concept of amplification, development of different types of amplification devices
- b) Review of basic elements of hearing aids: Microphone, Amplifier, Receiver/vibrator, Cords, Batteries.
- c) Classification and Types of hearing aids
 - Body level, ear level, in the ear, ITC, invisible in the canal, CIC
 - Binaural, pseudo binaural, monaural
 - Programmable, trimmer digital and digital hearing aids
 - Directional hearing aids, modular hearing aids
 - RIC hearing aids
 - Implantable hearing aids
 - Master hearing aids
 - CROS hearing aids
- d) Group amplification – hard wired, induction loop, FM, infrared
- e) Assistive listening devices – types and selection (Telephones, Television, typing technology)

Module-II: Technological aspects in hearing aids

- a) Routing of signals, head shadow/baffle/diffraction effects
- b) Output limiting and issues related to them: peak clipping, compression
- c) Concept and use of compression in hearing aids: BILL, TILL, PILL, Wide Dynamic Range Compression, Syllabic Compression, Dual Compression
- d) Signal processing in hearing aids – BILL, TILL, PILL
- e) Signal enhancing technology
- f) Noise reduction algorithms
- g) Extended low frequency amplification, frequency lowering technology (transposition, compression)
- h) Recent advances in hearing aids

Module-III: Electro-acoustic measurements for hearing aids

- a) Purpose and Parameters to be considered: OSPL90, SSPL90, HFA SSPL90, Gain, Full on Gain, HFA Full on Gain, Reference test Gain, Basic Frequency Response, Total Harmonic distortion, Intermodulation Distortion, input Output functions, instrumentation, procedure, variables affecting EAM
- b) Electro-acoustic measurements, BIS, IEC and ANSI standards
- c) Environmental tests.
- d) Care, maintenance and troubleshooting of hearing aids
- e) Counselling and orienting the hearing aid user (Client and significant others)

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Module-IV: Selection of hearing aids

- Pre-selection factors; Prescriptive and comparative procedures; Functional gain and insertion gain methods; Use of impedance, OAEs and AEPs audiometry; Hearing aids for conductive hearing loss; Hearing aids for children; Hearing aids for elderly; Selection of non-linear programmable and digital hearing aids
- Hearing aid programming
- Methods for assessing hearing aid benefit
- Real ear insertion measurements for verification of hearing aid benefit: REIG, REUR, REAR, REOR, RESR, REIG, REAG, RECD
- Acoustic feedback in hearing aids

Module-V: Mechano-acoustic couplers (Ear molds)

- Different types of molds
- Procedure for hard molds and soft mold
- UV curing methods
- Special modifications in the ear molds: Vents (diagonal and parallel), deep canal molds, short canal, horns, Libby horn, reverse horn, acoustic modifier
- Effects of mechano-acoustic couplers on the hearing aid output

Practicals

- Listen to the output of different types and classes of hearing aids (monaural, binaural, analog, digital hearing aids), in different settings
- Troubleshoot hearing aids: Check the continuity of the receiver cord using multi meter, measure the voltage of different sized batteries using multi meter, Check voltage of batteries different types and sizes
- Carry out electroacoustic measurements for the body level and ear level hearing aids
- Program the hearing aid for different configuration and degrees of hearing loss (at least 5 different audiograms) using different prescriptive formulae
- Program the hearing aid for different listening situations (at least 3 different situations)
- Vary the compression settings in a digital hearing aid and note down the differences in the output
- Perform real ear insertion measurements using different hearing aids (body level and ear level, hearing aids of different gains)
- Compare speech perception through conventional BTE and RIC hearing aids using a rating scale
- Observe assistive listening devices such as telephone amplifier, vibro-tactile alarms, note down the candidacy and their utility.
- Administer a questionnaire to assess hearing aid benefit on 2 persons using hearing aids.
- Carry out a role play activity of counselling a hearing aid user
- Ear Molds
 - Take impression for the ear mold using different techniques, different methods and using different materials
 - Make hard mold for any 2 ears
 - Make soft mold for any 2 ears
 - Make vent in hard molds you made

Examination Scheme:

Components	CRW	PTB	CT	A	EE
Weightage (%)	5	5	15	5	70

CRW- Clinical record writing, PTB- Proficiency in using test batteries, CT- Class test, A- Attendance, EE- End semester examination

Recommended Reading

- Dillon. (2012). Hearing Aids (2 edition). Thieme Medical and Scientific Publisher.
- Hall, J. W., & Mueller, H. G. (1998). Audiologists' Desk Reference: Audiologic management, rehabilitation, and terminology. Singular Publishing Group.
- Kates, J. M. (2008). Digital Hearing Aids (1 edition). San Diego: Plural Publishing Inc.
- Metz, M. J. (2014). Sandlin's Textbook of Hearing Aid Amplification: Technical and Clinical Considerations. Plural Publishing.
- Mueller, H. G., Hawkins, D. B., & Northern, J. L. (1992). Probe Microphone Measurements: Hearing Aid Selection and Assessment. Singular Publishing Group.
- Mueller, H. G., Ricketts, T. A., & Bentler, R. A. (2007). Modern Hearing Aids: Pre-fitting Testing and Selection Considerations: 1 (1 edition). San Diego, CA: Plural Publishing Inc.
- Sandlin, R. E. (Ed.). (1989). Handbook of Hearing Aid Amplification: Clinical Considerations and Fitting Practices v. 2. Boston: Singular Publishing Group.
- Sandlin, R. E. (Ed.). (1993). Understanding Digitally Programmable Hearing AIDS. Boston: Allyn & Bacon.
- Tate, M. (2013). Principles of Hearing Aid Audiology. Springer.
- Taylor, B., & Mueller, H. G. (2011). Fitting and Dispensing Hearing Aids (1 edition). San Diego: Plural Publishing Inc.
- Valente, M. (2002). Hearing Aids: Standards, Options, and Limitations. Thieme.



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CLINICALS IN SPEECH LANGUAGE PATHOLOGY-I

Course Code: ASL2311

Credit Units: 07

General considerations:

- Exposure is primarily aimed to be linked to the theory courses covered in the semester.
- After completion of clinical postings in Speech –language diagnostics, the student will know (concepts), know how (ability to apply), show (demonstrate in a clinical diary/log book based on clinical reports/recordings, etc), and do (perform on patients/ client contacts) the following:

Know:

1. Procedures to obtain a speech language sample for speech & language assessment from children of different age groups such as, pre schoolers, kindergarten, primary school and older age groups.
2. Methods to examine the structures of the oral cavity/organs of speech.
3. The tools to assess language abilities in children (with hearing impairment, specific language impairment & mixed receptive language disorder).
4. Development of speech sounds in vernacular and linguistic nuances of the language.

Know-how:

1. To evaluate speech and language components using informal assessment methods.
2. To administer at least two standard tests for childhood language disorders.
3. To administer at least two standard tests of articulation/ speech sounds.
4. To assess speech intelligibility.

Show:

1. Analysis of language components – Form, content & use – minimum of 2 samples.
2. Analysis of speech sounds at different linguistic levels including phonological processes – minimum of 2 samples.
3. Transcription of speech language samples – minimum of 2 samples.
4. Analyse differences in dialects of the local language.

Do:

1. Case history - minimum of 5 individuals with speech & language disorders.
2. Oral peripheral examination - minimum of 5 individuals.
3. Language evaluation report – minimum of 5.
4. Speech sound evaluation report – minimum of 5.

Evaluation:

- Internal evaluation shall be based on attendance, clinical diary, log book and learning conference.
- External evaluation: Spot test, OSCE, Record, Viva-voce, case work

Examination scheme:

Components	CRW	C/P/A	CT	A	Viva
Weightage (%)	15	15	15	5	50

CRW- Clinical record writing, C/P/A- Case discussion/presentation/analysis, CT- Class test, A- Attendance, Viva- Internal/External


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CLINICALS IN AUDIOLOGY-I

Course Code: ASL2312

Credit Units: 07

General considerations:

- Exposure is primarily aimed to be linked to the theory courses covered in the semester, however, not just limited to these areas.
- After completion of clinical postings in auditory diagnostics and auditory rehabilitation, the student will Know (concept), know how (ability to apply), show (demonstrate in a clinical diary/log book), and do (perform on patients/ client contacts) the following:

Know:

1. Methods to calibrate audiometer.
2. Materials commonly employed in speech audiometry.
3. Calculation pure tone average, % of hearing loss, minimum and maximum masking levels.
4. Different types of hearing loss and its common causes

Know-how:

1. To obtain detailed case history from clients or parents/guardians.
2. To carryout commonly used tuning fork tests.
3. To administer pure tone audiometry including appropriate masking techniques on adults using at least techniques
4. To administer tests to find out speech reception threshold, speech identification scores, most comfortable and uncomfortable levels on adults.

Show:

1. Plotting of audiograms with different degree and type with appropriate symbols – 2 audiograms per degree and type
2. Detailed case history taken and its analysis
3. Calculation degree, type and percentage of hearing loss on 5 sample conditions

Do:

1. Case history on at least 5 adults and 3 children with hearing disorders
2. Tuning fork test on at least 2 individuals with conductive and 2 individuals with sensori-neural hearing loss
3. Pure tone audiometry with appropriate masking on 5 individuals with conductive, 5 individuals SN hearing loss and 3 individuals with unilateral/asymmetric hearing loss – 5

Evaluation:

- Internal evaluation shall be based on attendance, clinical diary, log book and learning conference.
- External evaluation: Spot test, OSCE, Record, Viva-voce, case work

Examination scheme:

Components	CRW	C/P/A	CT	A	Viva
Weightage (%)	15	15	15	5	50

CRW- Clinical record writing, C/P/A- Case discussion/presentation/analysis, CT- Class test, A- Attendance, Viva- Internal/External

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MOTOR SPEECH DISORDERS IN CHILDREN

Course Code: ASL2402

Credit Units: 05

Course Objectives: After completing this course, the student will be able to

- describe the characteristics of motor speech disorders in children such as cerebral palsy, childhood apraxia of speech and other childhood dysarthrias
- assess the speech and non-speech aspects associated with the above conditions
- plan and execute therapy strategies for children with motor speech disorders

Course Contents:

Module-I: Neuro-developmental processes in speech production and motor speech disorders

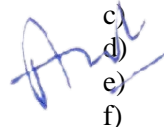
- a) Review of neuro-anatomy (cerebral cortex, sub-cortical structures, brainstem, cerebellum, spinal cord & cranial nerves, pyramidal and extra-pyramidal systems)
- b) Sensory-motor integration (spatial temporal planning, motor planning and feedback)
- c) Anatomic development of speech production systems
- d) Development of neural pathways of speech motor control (brain maturation, reflexes, sensory and motor)
- e) Dysarthria in children – cerebral palsy – disorders of tone (spastic, flaccid): definition, etiology, characteristics and associated problems
- f) Dysarthria in children – cerebral palsy – disorders of movement (hyperkinetic, hypokinetic) and disorder of balance (ataxia): definition, etiology, characteristics and associated problems
- g) Dysarthria in children – lower motor neuron and other syndromes with motor speech disorders
- h) Childhood apraxia of speech and nonverbal oral apraxia: definition, characteristics and classification

Module-II: Assessment of motor speech disorders in children

- a) Case history and developmental neurological evaluation – primitive postural and oro-pharyngeal reflexes, cranial nerve examination
- b) Assessment of oral sensory and motor capacity – Oral peripheral mechanism examination, neuro-muscular status
- c) Assessment of speech sub-systems – quantitative and qualitative
- d) Assessment of speech intelligibility and comprehensibility
- e) Assessment of associated problem
- f) Speech assessment with specific reference to childhood apraxia of speech – Phonetic and phonemic inventory, phonotactics and syllable sequencing, variability of errors, speech intelligibility, fluency and prosody
- g) Test materials – checklist for childhood apraxia of speech, screening test for developmental apraxia of speech
- h) Protocols for non-verbal and verbal praxis specific to Indian languages
- i) Differential diagnosis- dysarthria and other developmental disorders
- j) Differential diagnosis - childhood apraxia of speech and other developmental disorders

Module-III: Management of childhood dysarthria

- a) Team approach in rehabilitation of motor speech disorders in children
- b) Neuro-developmental therapy
- c) Non speech oral-motor exercises: its application for children with dysarthria
- d) Management of drooling
- e) Behavioral management of respiratory, phonatory, resonatory and articulatory subsystems
- f) Prosthetic appliances in treatment of childhood dysarthria


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- g) AAC in management of motor speech disorders- role of devices, AAC team, candidacy and pre-requisites, symbol selection, techniques, assessment for AAC, effective use of AAC
- h) Case studies: Planning intervention for children with dysarthria

Module-IV: Management of childhood apraxia of speech

- a) Principles of motor learning
- b) Integral stimulation – dynamic temporal cueing
- c) Multisensory and tactile cueing techniques (motor kinesthetic speech training, sensory motor approach, PROMPTS, Touch cue method & speech facilitation)
- d) Gestural cueing techniques (signed target phoneme therapy, adapted cueing techniques, cued speech, visual phonics, & Jordon's gestures)
- e) Miscellaneous techniques (melodic intonation therapy, multiple phonemic approach, & instrumental feedback)
- f) Cognitive/conceptual/ linguistic /phonological remedial approaches - phonotactics
- g) Other approaches: Vowel and diphthong remediation techniques (Northampton (Yale) vowel chart and Alcorn symbols), Nancy Kauffman's speech praxis treatment kit
- h) Use of AAC in childhood apraxia of speech
- i) Evidence-based practice in intervention for childhood apraxia of speech
- j) Case studies: Planning intervention for childhood apraxia of speech

Module-V: Feeding and swallowing disorders in children

- a) Embryology- periods and structures of development
- b) Anatomical structures of swallowing- upper aero digestive system, anatomic difference between adults and children
- c) Physiology of swallowing- swallow phases, neural control of swallowing, reflexes related to swallowing, suckling and sucking, airway and swallowing
- d) Terms involved in dysphagia and development of feeding skills
- e) Causes of dysphagia in children
- f) Signs and symptoms of dysphagia in children
- g) Assessment – inferences from neural developmental assessment, cranial nerve examination, assessment scales, nutritive and non-nutritive assessment, instrumental assessment (VFS, cervical auscultation), gastrointestinal evaluation
- h) Management: positioning, oral- motor treatment, team approach, non oral feeding, transitional feeding, modifications in feeding
- i) Role of speech-language pathologist in neonatal intensive care with reference to feeding and swallowing

Practicals

- a) With the help of models, charts and software, identify the motor control centers in the brain.
- b) Perform oro-motor examination in five children and adults and compare
- c) Identify oro-motor reflexes (rooting, suckling, & phase bite) in 5 infants.
- d) Demonstrate normal posture and breathing patterns required for varied speech tasks. Alter the postures and breathing patterns and notice changes in speech patterns.
- e) Assess DDK rate in five typically developing children.
- f) Rate intelligibility of speech in five typically developing children. Discuss factors that influenced speech intelligibility and their ratings.
- g) Observe and record (a) physical status, (b) oral sensory motor abilities and vegetative skills, (c) respiration, (d) phonation, (e) resonance, (f) articulation and (g) language abilities in five typically developing children. Compare these with observations made from children with motor speech disorders.

- h) Perform oro-motor exercises – isotonic and isometric. Discuss strategies to modify exercises for children.
- i) Identify from video the AAC system such as low technology vs high technology systems and different symbol system, that is, Bliss symbols, IICP symbols and different signing systems – Makaton.
- j) Observe feeding and swallowing skills in different age groups of children: 2 newborns; 2 infants, 2 toddlers, and 2 older children. Identify the differences in feeding methods, food consistencies, texture, quantity, feeding habits, feeding appliances used by these children.

Examination Scheme:

Components	CRW	PTB	CT	A	EE
Weightage (%)	5	5	15	5	70

CRW- Clinical record writing, PTB- Proficiency in using test batteries, CT- Class test, A- Attendance, EE- End semester examination

Recommended Reading

- Arvedson, J.C., and Brodsky, L. (2002) (2nd Ed.). Pediatric swallowing and feeding. San Diego, Singular publishing.
- Caruso, F. J. and Strand, E. A. (1999). Clinical Management of Motor Speech Disorders in Children. New York: Thieme.
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- Love, R.J. (2000) (2nd Ed). Childhood Motor Speech Disorders. Allyn & Bacon.
- Love, R.J. and Webb, W.G. (1993). (2nd ed.) Neurology for the Speech-Language Pathologist. Reed Publishing (USA)
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- Velleman, S. L (2003). Resource guide for Childhood Apraxia of Speech. Delmar/Thomson Learning



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DIAGNOSTIC AUDIOLOGY: PHYSIOLOGICAL TESTS

Course Code: ASL2407

Credit Units: 05

Course Objectives: After completing this course, the students will be able to

- justify the need for using the different physiological tests in the audiological assessment
- independently run the tests and interpret the results to detect the middle ear, cochlear and retro cochlear pathologies and also differentially diagnose
- design tailor-made test protocols in immittance, AEPs and OAEs as per the clinical need
- make appropriate diagnosis based on the test results and suggest referrals.

Course Contents:

Module-I: Immittance Evaluation

- a) Clinical significance of physiological tests in audiology
- b) Immittance evaluation: Principle of immittance evaluation: Concept of impedance and admittance, their components,
- c) Tympanometry: definition, measurement procedure, response parameters, their measurement and normative, classification of tympanogram, clinical significance of tympanometry
- d) Eustachian tube functioning tests of tympanometry: basics of pressure equalization function of ET, Valsalva, Toynbee, William's pressure swallow, inflation-deflation test.
- e) Overview on multicomponent and multi-frequency tympanometry
- f) Overview on wide band reflectance and wide band tympanometry
- g) Reflexometry: definition, acoustic reflex pathway, measurement procedure, clinical applications of acoustic reflexes, special tests

Module-II: Auditory evoked potentials (AEPs): Auditory brainstem response (ABR)

- a) Introduction and classification of AEPs
- b) Instrumentation
- c) Principles of AEP recording techniques:
- d) Auditory brainstem response generators
- e) Protocol and procedure of recording auditory brainstem response
- f) Factors affecting auditory brainstem responses
- g) Clinical applications of ABR
- h) ABR in the paediatric population
- i) Role of ABR in infant hearing screening

Module-III: Overview of other AEPs

- a) ECochG
- b) Auditory Middle Latency Responses (AMLR) and their clinical applications
- c) Auditory Long Latency Responses (Obligatory responses) and their clinical applications
- d) Other long latency potentials such as P300, MMN, P600, N400, T-complex, CNV) and their clinical applications
- e) ASSR: Instrumentation, recording and clinical applications
- f) Brainstem responses to speech and other complex signals

Module-IV: Otoacoustic emissions

- Introduction to otoacoustic emissions
- Origin and classification of OAEs
- Instrumentation
- Procedure of OAE measurement: SOAE, TEOAEs, and DPOAEs


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- Interpretation of results: SOAE, TEOAEs, and DPOAEs
- Clinical applications of OAEs: SOAE, TEOAEs, and DPOAEs
- Contralateral suppression of OAEs and its clinical implications

Module-V: Physiological tests for assessment of vestibular system

- Electronystagmography: procedure, interpretation, clinical applications
- Videonystagmography, videoocculograph
- Vestibular Evoked Myogenic Potentials
- Overview of Rotatory chair test, video Head Impulse Test,
- Overview of Dynamic Posturography

Practicals

- Measure admittance in the calibration cavities of various volumes and note down the observations
- Calculate Equivalent ear canal volume by measuring static admittance in an uncompensated tympanogram (10 ears)
- Do tympanogram in the manual mode and measure peak pressure, peak admittance and ear canal volume manually using cursor (10 ears).
- Measure gradient of the tympanogram (10 ears)
- Administer Valsalva and Toynbee and William's pressure swallow test(5 ears)
- Record acoustic reflex thresholds in the ipsi and contra modes, (10 ears)
- Plot Jerger box pattern for various hypothetical conditions that affect acoustic reflexes and interpret the pattern and the corresponding condition.
- Carry out Acoustic reflex decay test and quantify the decay manually using cursor (5 individuals).
- Trace threshold of ABR (in 5 dB nHL steps near the threshold) for clicks and tone bursts of different frequencies (2 persons) and draw latency intensity function.
- Record ABR using single versus dual channels and, note down the differences
- Record ABR at different repetition rates in 10/sec step beginning with 10.1/11.1 per second. Latency-repetition rate function needs to be drawn.
- Record with each of three transducers (HP, insert phones and bone vibrator) and polarities and draw a comparative table of the same. Students should also record with different transducers without changing in the protocol in the instrument and calculate the correction factor required.
- Record ASSR for stimuli of different frequencies and estimate the thresholds
- Record TEOAEs and note down the amplitude, SNR, noise floor and reproducibility at octave and mid-octave frequencies. Note down the stimulus stability and the overall SNR (10 ears).
- Record DPOAEs and note down the amplitude, SNR, noise floor and reproducibility at octave and mid-octave frequencies (10 ears)

Examination Scheme:

Components	CRW	PTB	CT	A	EE
Weightage (%)	5	5	15	5	70

CRW- Clinical record writing, PTB- Proficiency in using test batteries, CT- Class test, A- Attendance, EE- End semester examination

Recommended Reading

- Hall, J. W., & Mueller, H. G. (1996). Audiologists' Desk Reference: Diagnostic audiology principles, procedures, and protocols. Cengage Learning.
- Hood, L. J. (1998). Clinical Applications of the Auditory Brainstem Response. Singular Publishing Group.
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 - Musiek, F. E., Baran, J. A., & Pinheiro, M. L. (1993). Neuroaudiology: Case Studies (1 edition). San Diego, Calif: Singular.
 - Robinette, M. S., & Glatke, T. J. (Eds.). (2007). Otoacoustic Emissions: Clinical Applications (3rd edition). New York: Thieme.



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IMPLANTABLE HEARING DEVICES

Course Code: ASL2408

Credit Units: 05

Course Objectives: After completing this course, the students will be able to

- assess candidacy for bone anchored hearing devices, middle ear implants, cochlear implants, and ABI
- select the appropriate device depending on the audiological and non-audiological findings
- handle post-implantation audiological management
- assess the benefit derived from implantation, and
- counsel the parents/care givers during different stages of implantation

Course Contents:

Module-I: Implantable hearing devices – basics

- a) Need for implantable hearing devices
- b) History of implantable hearing devices (bone anchored hearing devices, middle ear implants, cochlear implants, auditory brainstem implants and midbrain implants)
- c) Candidacy for implantable hearing devices
- d) Team involved in implantable hearing devices
- e) Pre-implant counseling, Informed consent

Module-II: Bone anchored hearing devices and middle ear implants

- a) Types, components
- b) Surgical approaches, risks, complications
- c) Audiological evaluations for candidacy, contraindications
- d) Assessment of benefits

Module-III: Cochlear implant and brain stem implants – basics

- a) Terminology, types, components and features
- b) Bilateral, bimodal and hybrid cochlear implants
- c) Factors related to selection of the device, funding sources
- d) Surgical approaches, risks, complications
- e) Audiological and non-audiological candidacy criteria, contraindications

Module-IV: Cochlear implants and brainstem implants

- a) Signal coding strategies, classification, types
- b) Intraoperative monitoring by audiologists
- c) Objective measures: ESRT, ECAP, prom stim, EABR, aided cortical potentials
- d) Post implant Mapping: schedule, pre-requisites, switch-on, mapping parameters, impedance, compliance, role of objective and subjective measures in mapping,
- e) post mapping audiological evaluation
- f) Assessment of benefits
- g) Optimization of hearing aid on contralateral ear

Module-V: Implantable hearing devices - Counselling and troubleshooting; Rehabilitation

- a) Post implant Counselling on care and maintenance and trouble shooting of the device
- b) Overview of post implant rehabilitation including AVT
- c) Factors affecting outcome of implantable devices in adults and children


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Practicals

- Watch videos of BAHA, middle ear implant, cochlear implant
- Create hypothetical cases (at least 5 different cases) who are candidates for cochlear implantation. Make protocol for recording an EABR
- List down the technological differences across different models of cochlear implants from different companies, their cost
- Observation of mapping
- Watching of videos on AVT
- Watch video on cochlear implant surgery

Examination Scheme:

Components	CRW	PTB	CT	A	EE
Weightage (%)	5	5	15	5	70

CRW- Clinical record writing, PTB- Proficiency in using test batteries, CT- Class test, A- Attendance, EE- End semester examination

Recommended Reading

- Clark, G., Cowan, R. S. C., & Dowell, R. C. (1997). Cochlear Implantation for Infants and Children: Advances. Singular Publishing Group.
- Cooper, H., & Craddock, L. (2006). Cochlear Implants: A Practical Guide. Wiley.
- Dutt, S. N. (2002). The Birmingham Bone Anchored Hearing Aid Programme: Some Audiological and Quality of Life Outcomes. Den Haag: Print Partners Ipskamp.
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- Gifford, R. H. (2013). Cochlear Implant Patient Assessment: Evaluation of Candidacy, Performance, and Outcomes. Plural Publishing.
- Hagr, A. (2007). BAHA: Bone-Anchored Hearing Aid. International Journal of Health Sciences, 1(2), 265–276.
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- Kompis, M., & Caversaccio, M.-D. (2011). Implantable Bone Conduction Hearing Aids. Karger Medical and Scientific Publishers.
- Mankekar, G. (2014). Implantable Hearing Devices other than Cochlear Implants. Springer India.
- Møller A.R. (2006). Cochlear and Brainstem Implants (Vol. 64).
- Niparko, J. K. (2009). Cochlear Implants: Principles & Practices. Lippincott Williams & Wilkins.
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- Thoutenhoofd, E. (2005). Paediatric cochlear implantation: evaluating outcomes. Whurr.
- Valente, M. (2002). Strategies for selecting and verifying hearing aid fittings. 2nd Edn. Thieme.



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CLINICALS IN SPEECH-LANGUAGE PATHOLOGY-II

Course Code: ASL2409

Credit Units: 07

General considerations:

- Exposure is primarily aimed to be linked to the theory courses covered in the semester.
- After completion of clinical postings in Speech –language diagnostics, the student will know (concepts), know how (ability to apply), show (demonstrate in a clinical diary/log book based on clinical reports/recordings, etc), and do (perform on patients/ client contacts) the following:

Know:

1. Speech & language stimulation techniques.
2. Different samples /procedures required to analyse voice production mechanism. (acoustic/ aerodynamic methods / visual examination of larynx/ self evaluation)
3. Different samples /procedures required to analyse speech production mechanism in children with motor speech disorders.

Know-how:

1. To administer at least two more (in addition to earlier semester) standard tests for childhood language disorders.
2. To administer at least two more (in addition to earlier semester) standard tests of articulation/ speech sounds.
3. To set goals for therapy (including AAC) based on assessment/test results for children with language and speech sound disorders.
4. To record a voice sample for acoustic and perceptual analysis.
5. To assess parameters of voice and breathing for speech.
6. Assessment protocol for children with motor speech disorders including reflex profile and swallow skills.
7. Counselling for children with speech-language disorders.

Show:

1. Acoustic analysis of voice – minimum of 2 individuals with voice disorders.
2. Simple aerodynamic analysis - minimum of 2 individuals with voice disorders.
3. Self evaluation of voice – minimum of 2 individuals with voice disorders.
4. Informal assessment of swallowing – minimum of 2 children.
5. Assessment of reflexes and pre linguistic skills - minimum of 2 children.
6. Pre –therapy assessment and lesson plan for children with language and speech sound disorders - minimum of 2 children each.

Do:

1. Case history - minimum of 2 individuals with voice disorders.
2. Case history - minimum of 2 children with motor speech disorders
3. Oral peripheral examination- minimum of 5 children
4. Apply speech language stimulation/therapy techniques on 5 children with language disorders (with hearing impairment, specific language impairment & mixed receptive language disorder)/speech sound disorders – minimum of 5 sessions of therapy for each child.
5. Exit interview and counselling - minimum of 2 individuals with speech language disorders.


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Evaluation:

- Internal evaluation shall be based on attendance, clinical diary, log book and learning conference.
- External evaluation: Spot test, OSCE, Record, Viva-voce, case work

Examination scheme:

Components	CRW	C/P/A	CT	A	Viva
Weightage (%)	15	15	15	5	50

CRW- Clinical record writing, C/P/A- Case discussion/presentation/analysis, CT- Class test, A- Attendance, Viva- Internal/External



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CLINICALS IN AUDIOLOGY-II

Course Code: ASL2410

Credit Units: 07

General considerations:

- Exposure is primarily aimed to be linked to the theory courses covered in the semester, however, not just limited to these areas.
- After completion of clinical postings in auditory diagnostics and auditory rehabilitation, the student will Know (concept), know how (ability to apply), show (demonstrate in a clinical diary/log book), and do (perform on patients/ client contacts) the following:

Know:

- Indications to administer special tests
- Procedures to assess the listening needs
- National and international standards regarding electroacoustic characteristics of hearing aids

Know-how:

- To administer at least 1 test for adaptation, recruitment and functional hearing loss.
- Counsel hearing aid user regarding the use and maintenance hearing aids
- To troubleshoot common problems with the hearing aids
- To select test battery for detection of central auditory processing disorders.
- Select different types of ear moulds depending on type of hearing aid, client, degree, type and configuration of hearing loss

Show:

- Electroacoustic measurement as per BIS standard on at least 2 hearing aids
- How to process 2 hard and 2 soft moulds
- How to preselect hearing aid depending on listening needs and audiological findings on at least 5 clinical situations (case files)
- How select test battery depending on case history and basic audiological information – 3 situations

Do:

- Tone decay test – 2 individuals with sensori-neural hearing loss
- Strenger test – 2 individuals with unilateral/asymmetrical hearing loss
- Dichotic CV/digit, Gap detection test – 2 individuals with learning difficulty or problem in hearing in noise
- Hearing aid fitment for at least 5 individuals with mild to moderate and 3 individuals with moderate to profound
- Hearing aid selection with real ear measurement system on 3 individuals with hearing impairment

Evaluation:

- Internal evaluation shall be based on attendance, clinical diary, log book and learning conference.
- External evaluation: Spot test, OSCE, Record, Viva-voce, case work

Examination scheme:

Components	CRW	C/P/A	CT	A	Viva
Weightage (%)	15	15	15	5	50

CRW- Clinical record writing, C/P/A- Case discussion/presentation/analysis, CT- Class test, A- Attendance, Viva- Internal/External

FLUENCY AND ITS DISORDERS

Course Code: ASL2501

Credit Units: 05

Course Objectives: After completion of the course, the student will be able to

- understand the characteristics of fluency and its disorders
- evaluate and diagnose fluency disorders
- learn about the techniques for the management of fluency disorders

Course Contents:

Module-I: Fluency

- a) Scope and definition of fluency
- b) Factors influencing fluency
- c) Definition and characteristics of features of suprasegmentals in speech: rate of speech, intonation, rhythm, stress and pause
- d) Suprasegmental features in typical speech
- e) Suprasegmental features in the speech of persons with fluency disorders
- f) Developmental aspects of suprasegmentals of speech
- g) Normal non-fluency

Module-II: Stuttering and other fluency disorders

- a) Stuttering: Definition and causes for stuttering
- b) Characteristics of stuttering: core and peripheral characteristics, primary and secondary stuttering, effect of adaptation and situation
- c) Development of stuttering
- d) Normal non fluency: characteristics and differential diagnosis
- e) Theories of stuttering: organic, functional, neurogenic, diagnosogenic and learning
- f) Cluttering: Definition, causes and characteristics
- g) Neurogenic stuttering: Definition, causes and characteristics

Module-III: Assessment and differential diagnosis

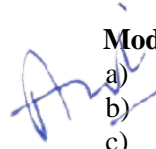
- a) Assessment of fluency disorders: stuttering, cluttering, neurogenic stuttering and normal non fluency:
- b) Subjective methods: protocols and tests
- c) Objective methods
- d) Qualitative and quantitative assessment
- e) Differential diagnosis of fluency disorders

Module-IV: Management of stuttering

- a) Approaches to management
- b) Changing scenario in management of stuttering
- c) Different techniques and strategies used in management with their rationale
- d) Relapse and recovery from stuttering
- e) Issues of speech naturalness in stuttering

Module-V: Management of fluency-related entities

- a) Management of cluttering: rationale, techniques and strategies
- b) Management of neurogenic stuttering: rationale, techniques and strategies
- c) Management of normal non-fluency: rationale, techniques and strategies


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- d) Relapse and recovery in cluttering and neurogenic stuttering. Changes in normal non-fluency
- e) Prevention and early identification of stuttering, and cluttering

Practicals

- a) Assess the rate of speech in 5 normal adults.
- b) Record and analyse the supra segmental features in typically developing children between 2 and 5 years.
- c) Record audio visual sample of 5 typically developing children and 5 adults for fluency analysis.
- d) Listen/see samples of normal non fluency and stuttering in children and document the differences.
- e) Identify the types of dysfluencies in the recorded samples of adults with stuttering.
- f) Instruct and demonstrate the following techniques: Airflow, prolongation, easy onset shadowing techniques.
- g) Record 5 speech samples with various delays in auditory feedback and analyse the differences.
- h) Administer SPI on 5 typically developing children.
- i) Administer SSI on 5 adults with normal fluency.
- j) Administer self-rating scale on 10 adults with normal fluency.

Examination Scheme:

Components	CRW	PTB	CT	A	EE
Weightage (%)	5	5	15	5	70

CRW- Clinical record writing, PTB- Proficiency in using test batteries, CT- Class test, A- Attendance, EE- End semester examination

Recommended Reading

- Assessment and management of fluency disorders. Proceedings of the national workshop on “Assessment and management of fluency disorders”, 25-26 Oct 2007. All India Institute of Speech & Hearing, Mysore. 2007.
- Bloodstein, O., & Ratner, N. B. (2008). A Handbook on Stuttering (6th Ed.). Clifton Park, NY, Thomson Demer Learning.
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STRUCTURAL ANOMALIES AND SPEECH DISORDERS

Course Code: ASL2507

Credit Units: 05

Course Objectives: After completing the course, the student will be able to

- understand the characteristics of disorders with structural anomalies including speech
- evaluate and diagnose the speech characteristics seen in these disorders
- learn about the techniques for the management of speech disorders in these conditions

Course Contents:

Module-I: Speech characteristics of persons with cleft lip and palate

- a) Types, characteristics and classification of cleft lip and palate
- b) Causes of cleft lip and palate: genetic, syndrome and others
- c) Velopharyngeal inadequacy: types, causes and classification
- d) Associated problems in persons with cleft lip and palate: speech, language, feeding, dental and occlusion, hearing, psychological

Module-II: Assessment and management of cleft lip and palate speech

- a) Team of professionals in the management of persons with cleft lip and palate: their roles in diagnosis and management.
- b) Assessment of persons with cleft lip and palate for speech language functions:
- c) Subjective assessment of speech characteristics and speech intelligibility: proforma, tests, scales and others.
- d) Objective assessment of phonatory, resonatory and articulatory features
- e) Diagnosis and differential diagnosis of speech related functions
- f) Subjective assessment of language and communication functions
- g) Reporting test results using Universal Parameters
- h) Management of persons with cleft lip and palate
- i) Surgical and prosthetic management
- j) Techniques and strategies to correct speech sound disorders
- k) Techniques and strategies to improve feeding
- l) Counselling and guidance

Module-III: Structural anomalies of tongue and mandible - Characteristics, assessment and management

- a) Types, classification and characteristics of structural anomalies of tongue and mandible
- b) Causes for structural anomalies of tongue and mandible
- c) Team of professionals in the management of persons with structural anomalies of tongue and mandible and their roles.
- d) Associated problems in persons with structural anomalies of tongue and mandible:
 - Speech
 - Feeding
 - Dental and occlusion
 - Psychological and others
- e) Management of persons with structural anomalies of tongue and mandible
 - Surgical and prosthetic management
 - Techniques and strategies to improve speech intelligibility
 - Techniques and strategies to improve feeding
 - Counselling and guidance for persons with glossectomy and mandibulectomy


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Module-IV: Characteristics & assessment of laryngectomy

- Causes, symptoms and classifications of laryngeal cancers
- Team of professionals in the management of persons with laryngeal cancer
- Surgery for laryngeal cancers: types and outcome
- Associated problems in laryngectomy individuals
- Assessment of speech and communication skills of laryngectomy individuals: Pre and post-operative considerations

Module-V: Management of speech and communication in laryngectomies

- Esophageal speech: candidacy, types of air intake procedures, speech characteristics and its modification through techniques and strategies, complications and contraindications.
- Tracheo-esophageal speech: candidacy, types of TEP, fitting of prosthesis, speech characteristics and its modification through techniques and strategies, complications and contraindications.
- Artificial larynx: types, factors for selection, output characteristics, techniques for efficient use of artificial larynx, complications and contraindications.
- Other remedial procedures: Pharyngeal speech, buccal speech, ASAI speech, gastric speech.

Practicals

- Identify the different types of cleft lip and palate by looking at illustrations and images
- Listen to 10 speech samples of children with cleft lip and palate and rate their nasality/ speech (articulation and cleft type errors) based on universal reporting parameters.
- Identify the type of closure of velopharyngeal port for 5 normal individuals and 5 individuals with cleft lip and palate using videos of nasoendoscopy/ videofluoroscopy.
- Perform oral peripheral mechanism examination on 10 individuals and document the structure and functions of the articulators.
- Analyse the different types of occlusion in 10 individuals.
- Identify the type of glossectomy by looking at pictures/illustrations.
- Identify the different types of prosthesis in the management of head and neck cancer.
- Analyse the speech profile of 5 individuals with laryngectomy.
- Identify parts of an artificial larynx and explore its use.
- Prepare a checklist / pamphlet illustrating care of the stoma and T- tubes in vernacular.

Examination Scheme:

Components	CRW	PTB	CT	A	EE
Weightage (%)	5	5	15	5	70

CRW- Clinical record writing, PTB- Proficiency in using test batteries, CT- Class test, A- Attendance, EE- End semester examination

Recommended Reading

- Berkowitz. S. (2001). Cleft Lip and Palate: Perspectives in Management. Vol II. San Diego, London, Singular Publishing Group Inc.
- Falzone. P., Jones. M. A., & Karnell. M. P. (2010). Cleft Palate Speech. IV Ed., Mosby Inc.
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- Peterson-Falzone, S. J., Cardomone, J. T., & Karnell, M. P. (2006). The Clinician Guide to Treating Cleft Palate Speech. Mosby, Elsevier.
- Salmon . J & Shriley (1999). Alaryngeal speech rehabilitation for clinicians and by clinicians. ProEd
- Yvonne, E (Ed) (1983). Laryngectomy: Diagnosis to rehabilitation. London: Croom Helm Ltd



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PEDIATRIC AUDIOLOGY

Course Code: ASL2508

Credit Units: 05

Course Objectives: After completing this course, the student will be able to

- describe auditory development
- list etiologies and relate them to different types of auditory disorders that may arise
- explain different hearing screening/identification procedures and their application
- elaborate on different aspects of paediatric behavioral and physiological / electrophysiological evaluation

Course Contents:

Module-I: Auditory development

- a) Review of Embryology of the ear
- b) Development of auditory system from periphery to cortex
- c) Neuroplasticity
- d) Prenatal hearing
- e) Normal auditory development from 0-2 years
- f) Infant speech perception
- g) Incidence and prevalence of auditory disorders in children

Module-II: Auditory disorders

- a) Congenital and acquired hearing loss in children
- b) Permanent minimal and mild bilateral hearing loss
- c) Impact on auditory skills, speech-language, educational and socio-emotional abilities
- d) Moderate to profound sensorineural hearing loss
- e) Unilateral hearing loss
- f) Auditory Neuropathy Spectrum Disorders
- g) Central auditory processing disorders
- h) Pseudohypacusis
- i) Auditory disorders in special population and multiple handicap

Module-III: Early identification of hearing loss

- a) Principles of early hearing detection and intervention programs
- b) Principles and history of hearing screening
- c) Joint Committee on Infant Hearing position statement (2000, 2007,2013)
- d) High risk register/ checklists for screening
- e) Sensitivity and specificity of screening tests
- f) Hearing screening in infants and toddlers: Indian and Global context
- g) Hearing screening in preschool children: Indian and Global context
- h) Hearing screening in school-age children (including screening for CAPD): Indian and Global context

Module-IV: Paediatric assessment I

- a) Behavioral observation audiometry
- b) Conditioned orientation reflex audiometry
- c) Visual reinforcement audiometry, TROCA, play audiometry
- d) Pure tone audiometry in children: Test stimuli, response requirement and reinforcement
- e) Speech audiometry (SRT, SDT); Speech recognition and speech perception tests developed in India)


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- f) Bone conduction speech audiometry
- g) Immittance evaluation in paediatric population
- h) Central auditory processing disorders assessment

Module-V: Paediatric assessment II

- a) Recording and interpretation of OAE in paediatric population
- b) Factors affecting OAE in paediatric population
- c) Recording and interpretation of click evoked and tone burst evoked ABR in paediatric population
- d) Factors affecting ABR in paediatric population
- e) Recording ASSR in paediatric population
- f) Recording AMLR, ALLR in paediatric population
- g) Assessment of hearing loss in special population
- h) Diagnostic test battery for different age groups
- i) Diagnosis and differential diagnosis


Practicals

- a) Observe a child with normal hearing (0-2 years) in natural settings. Write a report on his/her responses to sound.
- b) Observe a child with hearing impairment (0-2 years) in natural settings. Write a report on his/her responses to sound with and without his amplification device
- c) Administer HRR on at least 3 newborns and interpret responses
- d) Based on the case history, reflect on the possible etiology, type and degree of hearing loss the child may have.
- e) Compare ABR wave forms in children of varying ages from birth to 24 months.
- f) Observe live or video of BOA/VRA of a child with normal hearing and hearing loss and write a report on the instrumentation, instructions, stimuli used, procedure and interpretation.
- g) Observe OAE in a child with normal hearing and a child with hearing loss. Write a report on the instrumentation, protocol used and interpretation
- h) Observe ABR in a child with normal hearing and a child with hearing loss. Write down a report on the instrumentation, protocol used and interpretation
- i) Observe immittance evaluation in a child with normal hearing and a child with hearing loss. Write a report on the instrumentation, protocol used and interpretation
- j) Using role play demonstrate how the results of audiological assessment are explained to caregiver in children with the following conditions
 - Child referred in screening and has high risk factors in his history
 - Child with chronic middle ear disease
 - Child with CAPD
 - Child with severe bilateral hearing impairment

Examination Scheme:

Components	CRW	PTB	CT	A	EE
Weightage (%)	5	5	15	5	70

CRW- Clinical record writing, PTB- Proficiency in using test batteries, CT- Class test, A- Attendance, EE- End semester examination


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Recommended Reading

- Finitzo, T., Sininger, Y., Brookhouser, P., & Village, E. G. (2007). Year 2007 position statement: Principles and guidelines for early hearing detection and intervention programs. Paediatrics, 120(4), 898–921. <http://doi.org/10.1542/peds.2007-2333>
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- Northern, J.L. and Downs, M.P. (2014). Hearing in Children. 6th Ed. San Diego: Plural Publishing.
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AURAL REHABILITATION IN CHILDREN

Course Code: ASL2509

Credit Units: 05

Course Objectives: After completing this course the student will be able to

- describe the different communication options available for young children with hearing impairment
- explain the impact of hearing impairment on auditory development and spoken language communication
- describe factors that effect of acoustic accessibility and strategies to manage them at home and in classroom
- design activities for auditory learning at different levels
- enumerate how the needs of individuals with hearing impairment using sign language and spoken language as form of communication in India are being met

Course Contents:

Module-I: Auditory development, spoken communication and acoustic accessibility

- a) Sensitivity period for auditory development
- b) Impact of hearing impairment on auditory development, spoken language acquisition, parent child communication
- c) Factors affecting auditory development
- d) Hearing loss implications for speech perception: acoustics of speech
- e) Optimizing hearing potential through hearing aids
- f) Optimizing hearing potential through cochlear implants
- g) Barriers to acoustic accessibility: distance, signal to noise ratio, reverberation
- h) Managing the listening environment for infants, toddlers schools
- i) Signal to noise ratio enhancing technologies personal FM, loop systems, desktop group systems, blue tooth connectivity

Module-II: Communication options

- a) Detecting and confirming hearing loss
- b) Parent support counselling, individual family service plan
- c) Choosing communication options
- d) Auditory oral approach
- e) Auditory verbal therapy
- f) Manual/sign language: Indian and Global context
- g) Cued speech and total communication
- h) Listening devices hearing aid/cochlear implant
- i) Early intervention programs



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Module-III: Optimal listening and learning environments infancy and early childhood

- a) Involvement of family
- b) Factors impacting family involvement, supporting families through information and education
- c) Creating optimum listening and learning environment
- d) Intervention: Assessment, auditory learning, listening and language facilitation techniques in infancy and early childhood
- e) Issues with children with mild hearing loss, unilateral hearing loss,
- f) Children with hearing loss, ANSD or APD: Children are intervened late
- g) Children with hearing loss and other special needs
- h) Listening and spoken language in school age: benefits of inclusion
- i) Intervention at school age: Functional hearing assessment, communication assessment and intervention to integrate with academic targets

Module-IV: Auditory - speech reading training and literacy

- a) Candidacy for auditory training and speech reading
- b) Auditory training/learning four design principles skill, stimuli, activity, and difficulty level
- c) Early training Objectives
- d) Analytic and Synthetic training Objectives
- e) Formal and informal training
- f) Auditory training for infants and very young children
- g) Outcomes of training
- h) Speech and language and literacy characteristics
- i) Speech language and literacy evaluation assessment
- j) Speech language therapy

Module-V: Indian perspectives

- a) Prevalence of hearing impairment in children
- b) Education of the deaf in India historical perspectives
- c) Available resources for education of the hearing impaired
- d) Early intervention programs and centers
- e) Schools for the hearing impaired; day schools, residential schools
- f) Beyond school: college and vocational training
- g) Training manpower resources for service delivery
- h) Indian sign language
- i) Training sign language interpreters
- j) Cued speech in India
- k) Assessment and therapy tools developed for individuals with hearing impairment in India.

Practicals

- a) Watch documentaries such as “Sound and Fury” (2001). Write a reflection of why parents made communication choices for their children
- b) Follow on links to the above film that shows the status of the children with hearing impairment after a few years.
- c) Learn at least 50 signs across different categories of Indian sign language. Make a video of you signing 10 sentences. Have a class mate interpret them.
- d) Interview a parent of a child with hearing impairment on how they adapted their child to wear the hearing aids and /or implant. What were the first responses to sound they observed and how language and speech develop?
- e) Complete a functional auditory evaluation on one child with hearing loss. Do a speech and language evaluation and also write a report on the child strengths and weakness.

- f) Design and demonstrate auditory learning activities at the four levels awareness, discrimination, identification and comprehension. Ensure that the activities encompass different skill level and difficulty levels.
- g) Develop a short audio/film/pamphlet for parents in your local language on one of the following: teaching parent to trouble shooting the hearing aid/cochlear implant, establishing consistent use of listening device, activities to facilitate language across different age groups
- h) Visit a school for the deaf. Document your observation about the acoustic environment in the class, strategies used by the teacher to promote listening and spoken language

Examination Scheme:

Components	CRW	PTB	CT	A	EE
Weightage (%)	5	5	15	5	70

CRW- Clinical record writing, PTB- Proficiency in using test batteries, CT- Class test, A- Attendance, EE- End semester examination

Recommended Reading

- Fitzpatrick, E.M., and Doucet S.P. (2013) (Eds). Paediatric Audiologic Rehabilitation. Thieme, New York
- Hosford-Dumm, H., Roser, R., & Valente, M. (2007). Audiology Practice Management (2nd edition edition). New York: Thieme.
- Mardell, J., & Flexer, C. (2013). Paediatric Audiology: Diagnosis, Technology, and Management (2nd ed.). New York, NY: Thieme.
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- Status of Disability in India Hearing Impairment (2012) Rehabilitation Council of India, New Delhi



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CLINICALS IN SPEECH LANGUAGE PATHOLOGY-III

Course Code: ASL2510

Credit Units: 07

General considerations:

- Exposure is primarily aimed to be linked to the theory courses covered in the semester.
- After completion of clinical postings in Speech –language diagnostics, the student will know (concepts), know how (ability to apply), show (demonstrate in a clinical diary/log book based on clinical reports/recordings, etc.), and do (perform on patients/ client contacts) the following:

Know:

1. Procedures to assess speech fluency and its parameters using standardized tests for children and adults.
2. Differential diagnosis of motor speech disorders in children.
3. Procedures to assess individuals with cleft lip and palate, and other oro-facial structural abnormalities.
4. Procedures to assess laryngectomy and provide management options.

Know-how:

1. To administer at least two more (in addition to earlier semesters) standard tests for childhood language disorders.
2. To record a speech sample for analysis of fluency skills (including blocks & its frequency, rate of speech, prosody, etc.).
3. To assess posture and breathing for speech in children with motor speech disorders.
4. To consult with inter-disciplinary medical/rehabilitation team and counsel the individual/family regarding management options and prognosis.

Show:

1. Rating of cleft, speech intelligibility and nasality – minimum of 2 individuals with cleft lip and palate.
2. Language assessment - minimum of 2 individuals with cleft lip and palate.
3. Transcription of speech sample and assessment of percentage dis/dysfluency– minimum of 2 individuals with stuttering.
4. Assessment of rate of speech on various speech tasks – at least on 2 children & adults.

Do:

1. Voice assessment report - minimum of 2 individuals with voice disorders.
2. Fluency assessment report - minimum of 2 individuals with fluency disorders.
3. Oral peripheral examination on minimum of 2 individuals with cleft lip and palate.
4. Apply speech language stimulation/therapy techniques on 5 children with language disorders/speech sound disorders/ motor speech disorders – minimum 5 sessions of therapy for each child.

Evaluation:

- Internal evaluation shall be based on attendance, clinical diary, log book and learning conference.
- External evaluation: Spot test, OSCE, Record, Viva-voce, case work.


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Examination Scheme:

Components	CRW	PTB	CT	A	EE
Weightage (%)	5	5	15	5	70

CRW- Clinical record writing, PTB- Proficiency in using test batteries, CT- Class test, A- Attendance, EE- End semester examination



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CLINICALS IN AUDIOLOGY-III

Course Code: ASL2511

Credit Units: 07

General considerations:

- Exposure is primarily aimed to be linked to the theory courses covered in the semester, however, not just limited to these areas.
- After completion of clinical postings in auditory diagnostics and auditory rehabilitation, the student will Know (concept), know how (ability to apply), show (demonstrate in a clinical diary/log book), and do (perform on patients/ client contacts) the following:

Know:

- Different protocols in tympanometry and reflexometry.
- Different protocols used in auditory brainstem responses
- Protocols for screening and diagnostic otoacoustic emissions
- Tests to assess vestibular system
- Different indications for selecting implantable hearing devices
- Various speech stimulation and auditory training techniques

Know-how:

- To administer auditory brainstem responses for the purpose of threshold estimation and site of lesion testing
- To administer high frequency tympanometry and calculate resonance frequency
- To administer high risk register
- To modify the given environment to suit the needs of hearing impairment

Show:

- Analysis of ABR waveforms – threshold estimation 5 and site of lesion 5
- Analysis of immittance audiometry and relating to other tests – 5 individuals with conductive and 5 individuals with sensori-neural hearing loss
- How to formulate select appropriate auditory training technique based on audiological evaluation

Do:

- Threshold estimation on 5 infants (< 2 years)
- TEOAE and DPOAE on 5 infants (<2 years)
- BOA on 5 infants (<2 years)
- VRA on 2 infants (6 month – 3 year)
- Conditioned play audiometry – 3 children (3-6 years)
- Hearing aid fitment on 1 infant (< 3 years) 2 children (3-6 years)
- Listening age of 3 children with hearing impairment
- Appropriate auditory training on 5 children with hearing loss

Evaluation:

- Internal evaluation shall be based on attendance, clinical diary, log book and learning conference.
- External evaluation: Spot test, OSCE, Record, Viva-voce, case work


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Examination Scheme:

Components	CRW	PTB	CT	A	EE
Weightage (%)	5	5	15	5	70

CRW- Clinical record writing, PTB- Proficiency in using test batteries, CT- Class test, A- Attendance, EE- End semester examination



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MOTOR SPEECH DISORDERS IN ADULTS

Course Code: ASL2606

Credit Units: 05

Course Objectives: After completing the course, the student will be able to

- understand the characteristics of acquired motor speech disorders in adults
- evaluate and diagnose speech characteristics in acquired motor speech disorders
- learn about the techniques for the management of speech and related errors in acquired motor speech disorders

Course Contents:

Module-I: Causes & Characteristics of dysarthria

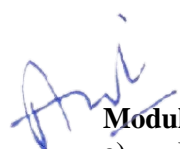
- a) Definition, etiology and classification of acquired dysarthria
- b) General, speech and feeding related characteristics of acquired dysarthria with and without genetic underpinnings:
- c) Vascular lesions: dysarthria following stroke/CVA, cranial and peripheral nerve palsies
- d) Infectious condition of the nervous system: dysarthria following meningitis, encephalitis, polyneuritis, poliomyelitis, neurosyphilis.
- e) Traumatic lesions: Dysarthria following TBI.
- f) Toxic conditions of the nervous system: Dysarthria following exogenic and endogenic toxic conditions of the nervous system.
- g) Anoxia of the nervous system: Dysarthria following anoxic conditions
- h) Metabolic disorders affecting nervous system: Dysarthria following metabolic conditions that affect the nervous system, Wilson's disease etc.
- i) Idiopathic causes: Dysarthria following idiopathic causes
- j) Neoplastic lesions of nervous system: Dysarthria following neoplastic lesions in the nervous system
- k) Demyelinating and degenerative conditions: Huntington's Chorea, Parkinson's, Multiple Sclerosis, Motor Neuron Diseases

Module-II: Assessment and diagnosis of dysarthria

- a) Subjective assessment of dysarthria:
 - Assessment of respiratory, phonatory, resonatory, articulatory errors
 - Assessment of prosodic features
 - Assessment of speech intelligibility
 - Scales, protocols and tests used for subjective assessment of dysarthria
- b) Instrumental analysis of speech in dysarthria: Acoustic, kinematic and physiological
- c) Advantages and disadvantages of subjective and instrumental procedures in the assessment of dysarthria in adults
 - Differential diagnosis of acquired motor speech disorders in adults:
 - Dysarthria and verbal apraxia
 - Dysarthria and functional articulation disorders
 - Dysarthria and aphasia
 - Apraxia of speech and aphasia
 - Dysarthria from other allied disorders such as agnosia, alexia, agraphia etc.
 - Apraxia from other allied disorders such as agnosia, alexia, agraphia etc.
 - Assessment of feeding, swallowing and related issues in persons with dysarthria

Module-III: Management of dysarthria

- a) Management of acquired dysarthria


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- b) General principles in the management of dysarthria
- c) Influence of medical, prosthetic and surgical procedures on the speech in persons with acquired dysarthria.
- d) Facilitative approach: vegetative, sensorimotor and reflex based.
- e) Systems approach: correction of respiratory, phonatory, resonatory, articulatory and prosodic errors.
- f) Strategies to improve speech intelligibility and speech enhancement techniques
- g) Strategies to improve feeding, swallowing behavior in persons with acquired dysarthria

Module-IV: Assessment and management of apraxia in adults

- a) Definition, etiology and classification of acquired apraxia
- b) Characteristics of nonverbal apraxia's in adults
- c) Characteristics of verbal apraxia's in adults
- d) Subjective assessment strategies: standard tests and scales, protocols and behavioral profiles
- e) Instrumental analysis of the speech of apraxia in adults: Acoustic, Kinematic and Physiological
- f) Management Approaches for verbal & nonverbal apraxia: principles and strategies

Module-V: Management related issues in motor speech disorders

- a) Team involved in the management of persons with acquired dysarthria and apraxia
- b) Issues related to maintenance and generalization of speech in dysarthria and apraxia
- c) Counselling and guidance for persons with acquired dysarthria and apraxia
- d) Augmentative and alternative strategies for persons with acquired dysarthria and apraxia

Practicals

- a) Identify the cranial nerves and mention its origin and insertion from a picture/ model. Demonstrate methods to assess the cranial nerves.
- b) Assess the respiratory system using speech and non-speech tasks in 10 healthy adults.
- c) Assess the phonatory system using subjective and acoustic analysis in 10 healthy adults.
- d) Looking at a video identify the clinical signs and symptoms of different neurological conditions resulting in Dysarthria.
- e) Record the speech sample of 5 normal adults and compare with the audio sample of individuals with Dysarthria.
- f) Administer Duffy's intelligibility rating scale on 5 healthy adults.
- g) Administer Frenchay's Dysarthria Assessment on 5 healthy adults.
- h) Demonstrate activities to improve the functions of speech subsystem.
- i) Identify the signs of UMN and LMN based on a video.
- j) Prepare a low tech AAC for functional communication for an individual with apraxia.

Examination Scheme:

Components	CRW	PTB	CT	A	EE
Weightage (%)	5	5	15	5	70

CRW- Clinical record writing, PTB- Proficiency in using test batteries, CT- Class test, A- Attendance, EE- End semester examination

Recommended Reading

- Brookshire, R. H. (2007). Introduction to Neurogenic Communication Disorders. University of Virginia, Mosby.

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- Ferrand, C. T., & Bloom, R. L. (1997). Introduction to Organic and Neurogenic Disorders of Communication: Current Scope of Practice. US, Allyn & Bacon.
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- Murdoch, B. E. (2010). Acquired Speech and Language Disorders: A Neuroanatomical and Functional Neurological Approach (2nd Ed.). New Delhi, India: John Wiley & Sons.
- Papathanasiou, I. (2000) (Eds.). Acquired Neurogenic Communication Disorders – A Clinical Perspective, Chapters 5, 6 & 7. London, Whurr Publishers.
- Yorkston, K. M., Beukelman, D. R., Strand, E. A., & Hakel, M. (2010). Management of Motor Speech Disorders in Children and Adults (3rd Ed.). Austin, Texas; Pro-Ed Inc.



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AUDIOLOGY IN PRACTICE

Course Code: ASL2609

Credit Units: 05

Course Objectives: After completing the course, the student will be able to

- list and describe the highlights of legislations relating to hearing impairment and other disabilities
- incorporate ethical practices in professional service delivery.
- provide information on welfare measures, policies of government when needed
- describe different strategies to create awareness of hearing impairment and programs to address them
- explain the different clinical practice settings in audiology with reference to their requirement, protocols and role and responsibility of audiologist
- describe methods to measure the impact of noise on humans and strategies to address excessive noise exposure in industries and the community.
- describe terminology, technology and methods used in tele practice, and their application in audiological service delivery

Course Contents:

Module-I: Scope, legislation and ethics in audiology

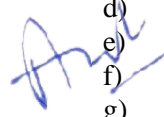
- a) Scope of practice in audiology (National – ISHA & International body - AAA)
- b) Professional ethics (ISHA)
- c) Legislations and conventions relating to disability: need and historical aspects
- d) Classification of hearing impairment and disability certification,
- e) Rehabilitation Council of India Act (1992) and its amendments
- f) Person with Disability Act (1995)
- g) National Trust Act (1999)
- h) Right to Education (2012)
- i) Biwako Millennium framework (2003) and Salamanca Statement 1994
- j) UNCRPD
- k) Concept of barrier free access and universal design relating to individuals with hearing impairment

Module-II: Hearing health and strategies for prevention of hearing impairment

- a) Epidemiology of hearing disorders
- b) ICD and ICF
- c) Levels of prevention: Primary, secondary and tertiary
- d) National programs and efforts national institutes
- e) Welfare measures by Government,
- f) Camps (planning, purpose, organizing and providing remedial measures)
- g) Public education and information (media, radio broadcasts, street plays)
- h) Hearing health and prevention programs (hearing help line, dangerous decibels, online hearing tests etc.)

Module-III: Audiological practice in different settings

- a) Audiological Private practice
- b) ENT clinics
- c) Paediatric / neonatology clinic/departments
- d) Neurology departments
- e) Factories and Industry
- f) Hearing aid dispensing centre/hearing aid industry
- g) Rehabilitation centres such as DRC/CRCs


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- h) Schools for the hearing impaired
- i) Cochlear implant clinics
- j) Multiple handicap habilitation centre and others

Module-IV: Noise and hearing conservation in industry and community

- a) Introduction to noise, types
- b) Sources of noise in the industry and community
- c) Effects of noise in the auditory system (outer, middle and inner ear)
- d) Temporary threshold shift, permanent threshold shift, factors increasing the risk of NIHL
- e) Non auditory effects of noise (physiological, psychological, stress, sleep, job productivity and accidents)
- f) Legislations related to noise, permissible noise exposure levels, workers compensation, OSHA standards, Indian legislations related to noise
- g) Instrumentation, measurement and procedure for measuring noise in industry
- h) Instrumentation, measurement and procedure for measuring noise in community
- i) Hearing conservation program (HCP), steps, record keeping,
- j) Ear protective devices

Module-V: Scope and practice of tele audiology

- a) Introduction to tele-health: definition, history of tele-health
- b) Terminologies-tele-health, tele medicine, tele practice
- c) Connectivity: internet, satellite, mobile data
- d) Methods of tele-practice-store and forward and real time
- e) Ethics and Regulations for tele-audiology
- f) Requirements/Technology for tele- audiology: Web based platforms, Video conferencing, infrastructure
- g) Manpower at remote end and audiologist end, training assistants for tele-audiology
- h) Audiological screening using tele-technology : new born hearing screening, school screening, community screening, counselling
- i) Diagnostic audiological services using tele-technology : video otoscopy, pure tone audiometry, speech audiometry, oto acoustic emission, tympanometry, auditory brainstem response. Intervention / aural rehabilitation using tele-technology :hearing aid counselling and troubleshooting, tinnitus, counselling, aural rehabilitation services, AVT, and counselling

Practicals

- a) Undertake the activities such as ‘Dangerous decibel’ program (www.dangerousdecibels.org)
- b) Noise measurement and attenuation measurement of ear protection devices.
- c) Sound level meter measurement in different areas (generator room, audio rooms)
- d) Speech in noise assessment for 10 subjects
- e) Visit an audiologist in different practice settings and provide a report
- f) Administer ICF protocols for patients with different disorders
- g) Explore websites of national institutes, hearing aid companied, NGOs in disability field and describe the accessibility features and information provided
- h) Remote control a PC based audiology equipment connected to internet using any authorized desktop sharing software
- i) Develop one pamphlet/poster/ in local language that would address some aspect of audiology practice
- j) Perform Accessibility ability of your institute/center and prepare a report

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Examination Scheme:

Components	CRW	PTB	CT	A	EE
Weightage (%)	5	5	15	5	70

CRW- Clinical record writing, PTB- Proficiency in using test batteries, CT- Class test, A- Attendance, EE- End semester examination

Recommended Reading

- Audiology Telepractice; Editor in Chief, Catherine V. Palmer, Ph.D.; Guest Editor, Greg D. Givens, Ph.D. Seminars in Hearing, volume 26, number 1, 2005.
- Bergland, B., Lindwall, T., Schwela, D.H., eds (1999). Guidelines on Community noise <http://www.who.int/docstore/peh/noise/guidelines2.html> WHO 1999
- BIS specifications relating to Noise Measurements.- IS:7194-1973 Specification for assessment of noise exposure during work for hearing conservation purposes.
- Census of India information on disability
- Dobie, R. A (2001). Medical legal evaluation of hearing loss, 2nd Ed.
- Hearing health and strategies for prevention of hearing impairment WHO (2001). International classification of Functioning, Disability and Health. Geneva: WHO
- <http://www.asha.org/Practice-Portal/Professional-Issues/Audiology-Assistants/Teleaudiology-Clinical-Assistants/>
- <http://www.asha.org/uploadedFiles/ModRegTelepractice.pdf>
- IS:10399-1982 Methods for measurement of noise emitted by Stationary vehicles
- IS:6229-1980 Method for measurement of real-ear
- IS:9167-1979 Specification for ear protectors. 95
- IS:9876-1981 Guide to the measurement of airborne acoustical noise and evaluation of its effects on man- IS:7970-1981 Specification for sound level meters.
- IS:9989-1981 Assessment of noise with respect to community response.
- John Ribera. Tele-Audiology in the United States. In Clinical Technologies: Concepts, Methodologies, Tools and Applications (pp. 693-702), 2011. Hershey, PA: Medical Information Science Reference. doi:10.4018/978-1-60960-561-2.ch305
- Lipscomb, D. M. (1994). Hearing conservation – In industry, schools and the military.
- Mandke, K and Oza R.K (2014). Private practice in speech pathology and audiology, 2014 ISHA
- Philippe Valentin Giffard. Tele-Audiology. Tort, 2012. ISBN 6139256615, 9786139256617
- Rawool, V. W. (2012). Hearing conservation in occupational, recreational, educational and home setting. Thieme: New York
- RCI, PWD and National Trust, and Right to education act
- Richard Wootton, John Craig, Victor Patterson, editors. Introduction to telemedicine. Second edition. London: The Royal Society of Medicine Press Ltd. 2006. p. 206 ISBN: 1 85315 677 9.
- Salamanca statement and framework for action
- Scope of practice by RCI
- Swanepoel de W, Hall JW 3rd A systematic review of tele health applications in audiology. Telemed J E Health. 2010 Mar;16(2):181-200. doi: 10.1089/tmj.2009.0111.
- UNCRPD



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CLINICALS IN SPEECH-LANGUAGE PATHOLOGY-IV

Course Code: ASL2610

Credit Units: 07

General considerations:

- Exposure is primarily aimed to be linked to the theory courses covered in the semester.
- After completion of clinical postings in Speech-language diagnostics, the student will know (concepts), know how (ability to apply), show (demonstrate in a clinical diary/log book based on clinical reports/recordings, etc.), and do (perform on patients/ client contacts) the following:

Know:

1. Procedures to assess motor speech disorders in adults.
2. Differential diagnosis of motor speech disorders in adults.
3. Procedures to assess individuals with adult language disorders, and other related abnormalities.

Know-how:

1. To administer at least two standard tests for adult language disorders.
2. To administer at least two standard tests/protocols for motor speech disorders in adults.
3. To record a sample for analysis of language and speech skills in adults with neuro-communication disorders.
4. To assess posture, breathing, speech and swallowing in adults with motor speech disorders.
5. To consult with inter-disciplinary medical/rehabilitation team and counsel the individual/family regarding management options and prognosis.

Show:

1. Language assessment - minimum of 2 individuals after stroke.
2. Associated problems in individuals after stroke and its evaluation.
3. Dysphagia assessment – minimum of 2 children & adults.
4. Goals and activities for therapy (including AAC) based on assessment/test results for adults with neuro-communication disorders.

Do:

1. Voice therapy - Minimum of 2 individuals with voice disorders.
2. Fluency therapy - Minimum of 2 individuals with fluency disorders.
3. Bed side evaluation of individuals with neuro-communication disorders – Minimum of 2 individuals.
4. Apply speech language stimulation/therapy techniques on 5 children with language disorders/speech sound disorders/ motor speech disorders – minimum 5 sessions of therapy for each child.

Evaluation:

- Internal evaluation shall be based on attendance, clinical diary, log book and learning conference.
- External evaluation: Spot test, OSCE, Record, Viva-voce, case work

Examination scheme:

Components	CRW	C/P/A	CT	A	Viva
Weightage (%)	15	15	15	5	50

CRW- Clinical record writing, C/P/A- Case discussion/presentation/analysis, CT- Class test, A- Attendance, Viva- Internal/External

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CLINICALS IN AUDIOLOGY-IV

Course Code: ASL2611

Credit Units: 07

General considerations:

- Exposure is primarily aimed to be linked to the theory courses covered in the semester, however, not just limited to these areas.
- After completion of clinical postings in auditory diagnostics and auditory rehabilitation, the student will Know (concept), know how (ability to apply), show (demonstrate in a clinical diary/log book), and do (perform on patients/ client contacts) the following:

Know:

1. National and international standards related to noise exposure.
2. Recommend appropriate treatment options such as speech reading, AVT, combined approaches etc.

Know-how:

1. To carryout noise survey in Industry and community
2. To carryout mapping of cochlear implant in infants and children using both objective and subjective procedures
3. To trouble shoot cochlear implant

Show:

1. Analysis of objective responses like compound action potential, stapedial reflexes on at least 3 samples
2. Comprehensive hearing conservation program for at least 1 situation

Do:

1. AVT on at least 1 child with hearing impairment
2. Trouble shooting and fine tuning of hearing aids on at least 5 geriatric clients
3. At least one activity for different stages involved in auditory training

Evaluation:

- Internal evaluation shall be based on attendance, clinical diary, log book and learning conference.
- External evaluation: Spot test, OSCE, Record, Viva-voce, case work

Examination scheme:

Components	CRW	C/P/A	CT	A	Viva
Weightage (%)	15	15	15	5	50

CRW- Clinical record writing, C/P/A- Case discussion/presentation/analysis, CT- Class test, A- Attendance, Viva- Internal/External



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CLINICALS IN SPEECH-LANGUAGE PATHOLOGY AND AUDIOLOGY-I

Course Code: ASL2701

Credit Units: 24

CLINICALS IN SPEECH LANGUAGE PATHOLOGY

General: Clinical internship aims to provide clinical exposure and experience in different set ups. The students would not only carry out greater quantum of work, but also work varied clinical populations and in different contexts. Internship will provide greater opportunity for the students to liaise with professionals from allied fields. The intern is expected to demonstrate competence and independence in carrying out the following, among others:

- 1) Diagnosis and management of speech, language, and swallowing disorders across life span.
- 2) Report evaluation findings, counsel and make appropriate referrals.
- 3) Plan and execute intervention and rehabilitation programs for persons with speech language, communication, and swallowing disorders
- 4) Develop and maintain records related to persons with speech-language, communication, and swallowing disorders

CLINICALS IN AUDIOLOGY

General: Clinical internship aims to provide clinical exposure and experience in different set ups. The students would not only carry out greater quantum of work, but also work varied clinical populations and in different contexts. Internship will provide greater opportunity for the students to liaise with professionals from allied fields. The intern is expected to demonstrate competence and independence in carrying out the following, among others:

- 1) Diagnosis and management of hearing disorders across life span.
- 2) Report evaluation findings, counsel and make appropriate referrals.
- 3) Plan and execute intervention and rehabilitation programs for persons with hearing disorders
- 4) Develop and maintain records related to persons with hearing disorders
- 5) Engage in community related services such as camps, awareness programs specifically, and community based rehabilitation activities, in general.

Examination Scheme: Based on performance in clinical practicum.

Components	DR	LP/TP	AT	CL
Weightage (%)	30	30	20	20

DR-Daily Report, LP/TP-Lesson Plan/Therapy Plan, AT-Attendance, CL-Case Load



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CLINICALS IN SPEECH-LANGUAGE PATHOLOGY AND AUDIOLOGY-II

Course Code: ASL2801

Credit Units: 24

CLINICALS IN SPEECH LANGUAGE PATHOLOGY

General: Clinical internship aims to provide clinical exposure and experience in different set ups. The students would not only carry out greater quantum of work, but also work varied clinical populations and in different contexts. Internship will provide greater opportunity for the students to liaise with professionals from allied fields. The intern is expected to demonstrate competence and independence in carrying out the following, among others:

- 1) Engage in community related services such as camps, awareness programs specifically, and community based rehabilitation activities, in general.
- 2) Make appropriate referrals and liaise with professionals from related fields.
- 3) Gain experience in different set ups and be able to establish speech centres in different set-ups
- 4) Demonstrate that the objectives of the B.ASLP program have been achieved.
- 5) Advise on the welfare measures available for their clinical clientele and their families.
- 6) Advise and fit appropriate aids and devices for their clinical population.

CLINICALS IN AUDIOLOGY

- 1) Make appropriate referrals and liaise with professionals from related fields.
- 2) Gain experience in different set ups and be able to establish hearing centres in different set-ups
- 3) Demonstrate that the objectives of the B.ASLP program have been achieved.
- 4) Advise on the welfare measures available for their clinical clientele and their families.
- 5) Advise and fit appropriate aids and devices for their clinical population.

Examination Scheme: Based on performance in clinical practicum.

Components	DR	LP/TP	AT	CL
Weightage (%)	30	30	20	20

DR-Daily Report, LP/TP-Lesson Plan/Therapy Plan, AT-Attendance, CL-Case Load



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PHYSICAL OPTICS

Course Code: OPT2104

Credit Units: 03

Course Objectives: The objective of this course is to equip the students with a thorough knowledge of properties of light. At the end of this course, students will be able to predict the distribution of light under various conditions.

Course Contents:

Module-I: Nature of light

Light as electromagnetic oscillation – wave equation, Sources of light; Electromagnetic Spectrum, Polarized light; Intensity of polarized light; Malus' Law; polarizers and analyzers.

Module-II: Birefringence; ordinary and extraordinary rays.

Relationship between amplitude and intensity, Coherence; interference; constructive interference, destructive interference; fringes; fringe width, Double slits, multiple slits, gratings, Diffraction; diffraction by a circular aperture;

Module-III: Resolution of an instrument

Raleigh's criterion, Scattering; Raleigh's scattering; Tyndall effect, Fluorescence and Phosphorescence

Module-IV: Basics of Lasers

Coherence; population inversion; spontaneous emission; Einstein's theory of lasers.

Module-V: Radiometry

radiometric units; photopic and scotopic luminous efficiency and efficacy curves; photometric units, Inverse square law of photometry; Lambert's law, other units of light measurement; retinal illumination; Trolands

Practicals:

Determination of wavelengths of light from Mercury vapour lamp, Measurement of the resolving power of telescopes;; Demonstration of fluorescence and phosphorescence using crystals and paints.

Examination Scheme:

Components	CT	HA	P	A	EE
Weightage (%)	10	5	10	5	70

(CT-Class Test; HA - Home Assignment-,P-Practical; A- Attendance; EE-End Semester Examination)

Text & References:

- Text Book:Subrahmanyam N, Brij Lal, A text book of Optics, S. Chand Co Ltd, New Delhi, India, 2003.

Reference Books:

- Pedrotti L. S, Pedrotti Sr. F. L, Optics and Vision, Prentice Hall, New Jersey, USA, 1998.
- Keating NM. P, Geometric, Physical and Visual Optics, Butterworth- Heinemann, Massachusetts, USA, 2002.


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GEOMETRICAL OPTICS-I

Course Code: OPT2105

Credit Units: 03

Course Objectives: The objective of this course is to equip the students with a thorough knowledge of mirrors and lenses. At the end of this course, students will be able to predict the basic properties of the images formed on the retina by the optics of the eye.

Course Contents:

Module-I: Nature of light

Light as electromagnetic oscillation; ideas of sinusoidal oscillations; amplitude and phase; speed of light in vacuum and other media; refractive index; Wavefronts – spherical, elliptical and plane; Curvature and vergence; rays; convergence and divergence in terms of rays and vergence; vergence at a distance; Refractive index; its dependence on wavelength

Module-II: Mirrors

Fermat's and Huygen's Principle – Derivation of laws of reflection and refraction (Snell's law) from these principles; Plane mirrors – height of the mirror; rotation of the mirror; Reflection by a spherical mirror – paraxial approximation; sign convention; derivation of vergence equation; Imaging by concave mirror & convex mirror; Reflectivity; transmittivity; Snell's Law; refraction at a plane surface; Glass slab; displacement without deviation; displacement without dispersion.

Module-III: Refraction

Thick prisms; angle of prism; deviation produced by a prism; refractive index of the prism; angular dispersion; dispersive power; Abbe's number, definition of crown and flint glasses; materials of high refractive index; Thin prism – definition; definition of Prism diopter; deviation produced by a thin prism; its dependence on refractive index; Refraction by a spherical surface; sign convention; introduction to spherical aberration using image formed by a spherical surface of a distance object; sag formula; Paraxial approximation; derivation of vergence equation; Imaging by a positive powered surface; Imaging by a negative powered surface.

Module-IV: Effectivity

Vergence at a distance formula; effectivity of a refracting surface; Definition of a lens as a combination of two surfaces; different types of lens shapes; Image formation by a lens by application of vergence at a distance formula; definitions of front and back vertex powers; equivalent power; first and second principal planes/points; primary and secondary focal planes/points; primary and secondary focal lengths; Newton's formula; linear magnification; angular magnification; Nodal Planes.

Module-V: Lenses

Thin lens as a special case of thick lens; review of sign convention; Imaging by a thin convex lens; image properties (real/virtual; erect/inverted; magnified/minified) for various object positions; Imaging by a thin concave lens; image properties (real/virtual; erect/inverted; magnified/minified) for various object positions; Prentice's Rule; System of two thin lenses; review of front and back vertex powers and equivalent power, review of six cardinal points; System of more than two thin lenses; calculation of equivalent power using magnification formula

Practical:

Thick Prism – determination of prism angle and dispersive power; calculation of the refractive index; Thin Prism – measurement of deviation; calculation of the prism diopter; Image formation by spherical mirrors; Convex lens - power determination using lens gauge, power determination using distant object

method; power determination using the vergence formula; Concave lens – in combination with a convex lens – power determination; Construction of a tabletop telescope – all three types of telescopes; Construction of a tabletop microscope.

Examination Scheme:

Components	CT	HA	P	A	EE
Weightage (%)	10	5	10	5	70

(CT-Class Test ; HA - Home Assignment-,P-Practical; A- Attendance; EE-End Semester Examination)
Text & References:

Text book:

- Milton Katz, Introduction to Geometrical Optics : World Scientific Publishing Co. Pre. Ltd.
- Subrahmanyam, Brijlal and Avadhanulu ,A Textbook of Optics Pub: S. Chand
- Tunnacliffe A. H, Hirst J. G, Optics, The association of British Dispensing Opticians, London, U.K., 1990.
- Pedrotti L. S, Pedrotti Sr. F. L, Optics and Vision, Prentice Hall, New Jersey, USA, 1998.

Reference Books:

- Loshin D. S. The Geometric Optics Workbook, Butterworth-Heinemann, Boston, USA, 1991.
- Schwartz S. H. Geometrical and Visual Optics: A Clinical Introduction, McGraw-Hill, New York, USA, 2002.



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OPTOMETRIC PROCEDURES-I

Course Code: OPT2106

Credit Units: 01

Course Objectives: At the end of the course the students will be equipped with the introduction to certain concepts that would lay the foundation of the program

Course Content:

Module-I: Introduction to Optometry

Introduction to structure of eye.

Torch examination

Module-II: Scope of optometry

History of Optometry

Visit to Hospital / clinics

Introduction to various eye examination procedures

Module-III:

Visual Acuity

Refractive errors

Spectacle lenses and types

Module-IV:

History Taking;

Basic Eye Examination

Examination Scheme:

Components	A	P	HA	V	EE
Weightage (%)	5	20	25	20	30

(CT-Class Test ; V-Viva; P-Practical; A- Attendance; EE-End Semester Examination, HA= assignments)

Reference Book:

- Primary Care Optometry: Theodore Grosvenor, Theodore P. Grosvenor; Elsevier Health Sciences
- BHVI: Module I.
- Teachers reference notes



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BASICS IN COMPUTER & PC PACKAGE

Course Code: OPT2107

Credit Units: 02

Course objective: This course aims at preparing the students to handle personal computers, Learn Basics of the current hardware and software being used .the student should be able to complete his optometry and other professional assignment like project work ,thesis presentation etc. he should be well versed in using e-mail, and internet .

Course Contents:

Module-I: Computer Basics

History of computers, Definition of computers, Input Devices, storage devices, types of memory, and units of measurement, range of computers, generations of computers. Characteristics of computers.

Module-II: System

Hardware, Software,, system definition, fundamentals of networking, internet, performing searches and working with search engines ,types of software and its applications

Module-III: Office Application Suite

Word Processor, spread sheet, presentations, other utility tools Fundamentals of Linux /windows operating system, functions, interfaces, basic commands.

Module-IV: Special Applications

Use of database software for clinic records

Use of specialised software for optometric use

Practical:

Various browsers, Search engines, E-mail

Text document with multiple formatting option using specific office package

Spread sheet using a specified office package

Presentation on a specified topic using a specified office package

Examination Scheme:

Components	A	HA	(CT)	VIVA	PRACTICAL
Weightage (%)	20	20	20	20	20

(CT-Class Test; V-Viva; HA - Home Assignment; P-Practical; A- Attendance; EE-End Semester Examination)



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GEOMETRICAL OPTICS-II

Course Code: OPT2204

Credit Units: 04

Course Objectives: The objective of this course is to equip the students with a thorough knowledge of mirrors and lenses used in spectacle lenses. At the end of this course, students will be able to predict the basic properties of the images formed on the retina by the optics of the eye.

Course Contents:

Module-I: Cylindrical Lenses

Image formation; relation between cylinder axis and line image orientation; Imaging due to two cylinders in contact with axes parallel; Two cylinders in contact with axes perpendicular; line images and their orientations to the cylinders' powers; interval of Sturm; circle of least confusion (CLC); spherical equivalent; position of CLC; Spherical lens and a cylindrical lens in contact; spherical equivalent; interval of Sturm and CLC; Spherocylindrical lens notations – plus/minus cylinder form, cross cylinder/meridian form; transformations between them; depth of focus; depth of field;

Module-II: Aberrations

Chromatic Aberrations; methods of removing chromatic aberrations; Abbe number; Monochromatic Aberrations – deviation from paraxial approximation; difference between ray aberrations and wavefront aberrations; Third order aberrations – spherical aberrations; coma; astigmatism; distortion and curvature of fields; Ways of minimizing spherical aberrations – pupil size, bending of lens, shape factor; Lens tilt – astigmatism; Higher order aberrations; introduction to Zernike Polynomials

Module-III: Telescopes & Microscopes

Telescopes – Keplerian, Galilean and Newtonian; position of cardinal points, entrance and exit pupils; magnifications; advantages and disadvantages; Microscopes – magnification; tube length.

Module-IV: Gullstrand's Schematic Eye (GSE)

Calculation of the power of the cornea, the lens and the eye; axial length; calculation of the position of the cardinal points; magnification; Purkinje images and their reflectances; Entrance and exit pupils for a 3mm pupil; ocular aberrations – spherical aberrations and coma; chromatic aberrations; Introduction to refractive errors - myopia and hyperopia; corneal curvature; axial length; far point; blur size calculations; corrections; astigmatism; blur size; circle of least confusion; correction; Object closer than at infinity; introduction to accommodation; far point; near point; presbyopia; spectacle and contact Lens corrections - comparison of magnification.

Practical- Demonstration:

Imaging by a cylindrical lens – relationship between cylinder axis and image orientation; Imaging by two cylinders in contact – determination of the position of CLC; verification of CLC using a spherical lens with power equal to the spherical equivalent; orientations and position of the line images and their relation to the cylinders' powers and orientations; Imaging by a spherocylindrical lens – sphere and cylinder in contact – determination of the position of CLC; verification of CLC using a spherical lens with power equal to the spherical equivalent; orientations and position of the line images and their relation to the cylinder's power and orientation



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Examination Scheme:

Components	A	HA	CT	P	EE
Weightage	5	5	10	10	70

(CT-Class Test; HA - Home Assignment; P-Practical; A- Attendance; EE-End Semester Examination)

Text & References:**Text book:**

- Tunnacliffe A. H, Hirst J. G, Optics, The association of British Dispensing Opticians, London, U.K., 1990.
- Pedrotti L. S, Pedrotti Sr. F. L, Optics and Vision, Prentice Hall, New Jersey, USA, 1998.
- Recommendation as per faculty

Reference Books:

- Loshin D. S. The Geometric Optics Workbook, Butterworth-Heinemann, Boston, USA, 1991.
- Schwartz S. H. Geometrical and Visual Optics: A Clinical Introduction, McGraw-Hill, New York, USA, 2002.



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OPTOMETRIC PROCEDURES-II

Course Code: OPT2205

Credit Units: 02

Course Objectives: At the end of the course the students will be equipped with the basics knowledge about certain concepts, which would lay the foundation for their courses in the next semester

Course Content:

Module-I: Objective refraction

Principles of Retinoscopy, instrumentation brief and purpose; Retinoscopy demonstration and practical on model eyes.

Module-II: Examination of the anterior segment

Pupillary reflex test; Anterior segment examination with torch light – Slit lamp examination – demo, Tonometry.

Module-III: Examination of the posterior segment

Fundus demonstration by ophthalmoscopy, direct & indirect

Module-IV: Adjunct tests

Near point of convergence; cover test; Motilities; Visual field testing; Colour vision; IPD; Stereopsis; Contrast visual acuity

Examination Scheme:

Components	A	CT	PL	V	P	EE
Weightage	5	15	20	20	10	30

(CT-Class Test; A- Attendance; PL- Practical Lab Record; V- Viva; P- Performance; EE-End Semester Examination)

Text & References:

Text book:

- Grosvenor, Primary Care Optometry , Butterworth-Heinemann,

Reference Books:

- Benjamin Borish ,Clinical Refraction ,Butterworth Heinemann



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CLINICS-I

Course Code: OPT2206

Credit Units: 01

Course Objective: This course aims to give student the basic knowledge of the theory and practical behind the basic clinical procedures. After completion, of course the student should have standard eye examination. Learn to write formal records and understand the preliminary eye testing

Course Content:

The practical will involve rotation in campus clinics, observation in eye hospitals and screening camps.

Unit of Competency:

Methods of ocular Examination-I

The ability to communicate effectively with a diverse group of patients with arrange of optometric conditions and needs.

The ability to use techniques in ocular examination and to understand the implication of findings in terms of subsequent examination techniques

History taking of an Ophthalmic care

Visual acuity testing – Distance, Near

Basic of eye examination

History Taking

Visual Acuity Estimation

Torch light Examination

Pupil Examination

Near point of accommodation

Near point of convergence

Extra ocular Motility and cover/ uncover test

Tear function test

Slit lamp examination – Demo

Retinoscopy procedure on model eyes

IPD

90 % attendance is compulsory in clinics .In case of any miss out the student will have to complete the clinical hours to be allowed for the end term exam

Examination Scheme:

Components	Attd.	Record File	Multiple Choice Questions/ Quiz	Viva	Practical	Total
Weightage	5	15	15	15	50	100

Text & References

Reference book:

- Grosvenor, Primary Care Optometry , Butterworth-Heinemann,
- A K Khurana: Comprehensive Ophthalmology, 4th edition, New age international (p) Ltd. Publishers, New Delhi, 2007
- D B. Elliott :Clinical Procedures in Primary Eye Care,3rd edition, Butterworth-Heinemann, 2007


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NUTRITION

Course Code: OPT2207

Credit Units: 03

Course Objective: At the end of the course student would have gained the knowledge of the following: Balanced diet. Protein, carbohydrates, vitamins, Minerals, carotenoids and eye, Nutrition and Ocular aging and adverse effects of ocular nutritional supplements.

Course Contents:

Module-I:

Introduction to Nutrition and Food Science, Food Groups and Food Pyramid; Balanced diet for different age groups, recommended dietary Allowances

Module-II:

Assessment of Nutritional Status; Energy – Units, Metabolisms, Energy expenditure, and Energy imbalance; Digestion, absorption and transport of Food

Module-III:

Proteins and eye; Lipids and eye; Carbohydrates and eye; Vitamins and eye; Minerals and trace elements and eye; Carotenoids and eye; Oxidative stress and the eye

Module-IV:

Vitamin A, C and E deficiency; Nutrition and ocular aging; Contraindications, Adverse reactions and ocular nutritional supplements
Ocular complications to nutritional deficiencies

Examination Scheme:

Components	A	HA	CT	P	EE
Weightage	5	5	10	10	70

(CT-Class Test; HA - Home Assignment; P-Practical; A- Attendance; EE-End Semester Examination)

Text & References:

Text books:

- M Swaminathan: Hand book of Food and Nutrition, fifth edition, Bangalore printing & publishing Co.Ltd, Bangalore,2004
- C Gopalan, BV Rama Sastri, SC Balasubramanian: Nutritive Value of Indian Foods , National Institute of Nutrition, ICMR, Hyderabad,2004

Reference book:

- Frank Eperjesi & Stephen Beatty: Nutrition and the Eye A practical Approach, Elsevier Butterworth – Heinemann, USA, 2006



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PROJECT

Course code: OPT2232

Credit Units: 03

Course Objectives:

The aim of the project is to provide the students with an opportunity to further their intellectual and personal development in the chosen field by undertaking a significant practical unit of activity.

The basics of Research methodology need to be understood

The project can be defined as a scholarly inquiry into a problem or issues, involving a systematic approach to gathering and analysis of information / data, leading to production of a structured report.

Course Contents:

Module-I:

Introduction to research methods, Variables in research, Reliability and validity in research, Conducting a literature review, Formulation of research problems and writing research questions, Hypothesis, Null and Research Hypothesis, Type I and Type II errors in hypothesis testing

Module-II:

Experimental and non experimental research designs, Sampling methods, Data collection methods- Observation method, Interview method, Questionnaires and schedules Construction

Module-III

Ethical Issues in Research, Principles and Concepts in research ethics – confidentiality and privacy, informed consent

Module-IV:

Writing Research proposals, Development of conceptual framework in research

Module-V:

Basics of statistics in Research

Standard deviation, variance, T test, Regression, correlation

Examination Scheme:

Components	CP	V	A	ME	CT
Weightage	5	10	5	30	50

(CP – Class Performance; V-Viva; A- Attendance; ME- Mid-Term Exam, CT-Class Test)


Text & References:

Text books:

- Research Methodology: A Step By Step Guide For Beginners : Ranjit Kumar
- Research Methodology: Methods and Techniques : By C. R. Kothari



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OCULAR MICROBIOLOGY

Course Code: OPT2301

Credit Units: 02

Course Objectives: The objectives of the course are:

- to prepare the students to gain essential knowledge about the characteristics of bacteria, viruses, fungi and parasites;
- to acquire knowledge of the principles of sterilisation and disinfection in hospital and ophthalmic practice;
- to understand the pathogenesis of the diseases caused by the organisms in the human body with particular reference to the eye infections and
- To understand basic principles of diagnostic ocular Microbiology.

Course Contents:

Module-I:

Introduction to Microbiology; Types of Microorganisms; Physiology of Microorganisms – Nutrition, Enzymes, Metabolism and energy, Microbial Growth

Module-II:

Sterilization and disinfection in the laboratory; Control of Microbial Growth; Microbes versus Humans- The development of Infection, the disease process, pathogenicity and virulence

Module-III:

Ocular Bacteriology - Gram positive, (Staphylococcus aureus, Staphylococcus epidermidis, Streptococcus, propionibacterium, actinomyces, Nocardia) Bacteria including acid fast bacilli (Mycobacterium tuberculosis, Mycobacterium leprae); Ocular Bacteriology - Gram negative Bacteria (pseudomonas, haemophilus, Brucella, Neisseria, Moraxella); Spirochetes (Treponema, Leptospiraceae)

Module-IV:

Virology: Classification of Viruses in Ocular Disease, Rubella, Adenovirus, Oncogenic Viruses (HPV, HBV, EBV, Retroviruses), HIV.; Fungi : Yeasts, Filamentous, Dimorphic; Intracellular parasites - Chlamydia, Protozoa (Toxoplasmosis, Acanthamoeba); Helminths (Toxocariasis, Filariasis, Onchocerciasis, Trematodes)

Practical:

Students will visit the microbiology lab identify various microorganism; Practical demo of various culture media preparations and growth of microorganism on culture medias; Culture sensitivity test

Examination Scheme:

Components	A	HA	CT	P	EE
Weightage	5	5	10	10	70

(CT-Class Test; HA- Home Assignment; P-Practical/ record file ; A- Attendance; EE-End Semester Examination)


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Text & References:**Text books:**

- BURTON G.R.W: Microbiology for the Health Sciences, third edition, J.P. Lippincott Co., St. Louis, 1988.
- M J Pelczar (Jr), ECS Chan, NR Krieg : Microbiology ,fifth edition, TATA McGRAW-HILL Publisher, New Delhi,1993

Reference Books:

- KJ Ryan, CG Ray: Sherris Medical Microbiology- An Introduction to infectious Diseases, fourth edition, McGRAWHILL Publisher, New Delhi, 1994
- MACKIE & McCartney Practical Medical Microbiology
- SYDNEY M. FINEGOLD & ELLEN JO BARON: Diagnostic Microbiology (DM)
- As per faculty recommendation



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APPLIED OPTICS-I (Optometric Optics)

Course Code: OPT2302

Credit Units: 03

Course Objectives: Skills/knowledge to be acquired at the end of this course:

Measurement of lens power, lens centration using conventional techniques

Transposition of various types of lenses

Knowledge to identify different forms of lenses (equi-convex, planoconvex, periscopic, etc.)

Knowledge to select the tool power for grinding process.

Measurement of surface powers using lens measure.

Method of laying off the lens for glazing process.

Ophthalmic prism knowledge – effects, units, base-apex notation, compounding and resolving prisms.

Knowledge of prism and decentration in ophthalmic lenses

Knowledge of different types of materials used to make lenses and its characteristics

Knowledge lens designs – single vision, bifocals, progressive lens

Knowledge on tinted and protective lenses

Knowledge on special lenses like isekonic, spectacle magnifiers.

Knowledge on spectacle frames – manufacture, materials

Course Contents:

Module-I: Revision of Basics

Introduction – Light, Mirror, Reflection, Refraction and Absorption; Prisms – Definition, properties, Refraction through prisms, Thickness difference, Base-apex notation, uses, nomenclature and units, Sign Conventions, Fresnel's prisms, rotary prisms

Module-II:

Lenses – Definition, units, terminology used to describe, form of lenses; Vertex distance and vertex power, Effectivity calculations; Lens shape, size and types i.e. spherical, cylindrical and Sphero-cylindrical; Transpositions – Simple, Toric and Spherical equivalent; Prismatic effect, centration, decentration and Prentice rule, Prismatic effect of Plano-cylinder and Sphero-cylinder lenses

Module-III:

Spherometer & Sag formula, Edge thickness calculations; Magnification in high plus lenses, Minification in high minus lenses; Tilt induced power in spectacles; Aberration in Ophthalmic Lenses

Module-IV:

The characteristics of Ophthalmic lens material properties (Refractive index, Specific gravity, UV Cutoff, Impact resistance-Drop ball test, Abbe value, Center thickness) :Power Specification (Measurement of Lens power) including Lensometry:Types of Ophthalmic Lenses

Module-V:

Spectacle Frame Nomenclature, Lens surfacing: Identification of Optical center of the given Lens: Marking Datum line for spherical and cylindrical lenses: Glazing of spectacle lenses (Fitting)

Practicals: Based on theory lectures

Unit of competency: Lens Identification and Centration.

The ability to interpret different types of lenses, Facial and frame measurements.

The ability to measure the lens power by different methods

Elements of competence:

- A) Lens Identification: Biconvex, biconcave, Meniscus, Plano Convex and plano concave.
- B) Geneva lens measure for surface power calculation
- C) Lensometry and Hand neutralization
- D) Identification of optical centre and datum line marks for spherical lens
- E) Prism Power measurement with Lensometer
- F) Lens Material Identification
- G) Identification of different types of bifocal
- H) IPD measurement (Monocular and binocular)

Examination Scheme:

Components	A	HA	CT	P	EE
Weightage	5	5	10	10	70

CT-Class Test; HA-Home Assignment; P-Practical; A- Attendance; EE-End Semester Examination)

Text & References:

- Text Books: Jalie M: The principles of Ophthalmic Lenses, The Association of Dispensing Opticians, London, 1972

Reference Books:

- David Wilson: Practical Optical Dispensing, OTEN- DE, NSW TAFE Commission, 1999
- C V Brooks, IM Borish: System for Ophthalmic Dispensing, Second edition, Butterworth-Heinemann, USA, 1996



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VISUAL OPTICS-I

Course Code: OPT2303

Credit Units: 04

Course Objectives:

To understand the fundamentals of optical components of the eye

Upon completion of the course, the student should be able:

1. To understand the fundamentals of optical components of the eye
2. To gain theoretical knowledge and practical skill on visual acuity measurement, colour vision and history taking

Course Contents:

Module-I: Review of Geometric Optics

Vergence and power, Object space and image space, Sign convention, Cardinal points, Magnification, Aberrations

Module-II: Optics of Ocular Structures

Cornea and aqueous, crystalline lens, Vitreous, Schematic and Reduced Eye

Module-III: Measurement of the optical constants of the eye

Curvature of cornea, Curvature of the lens, Measurement of Axial length, Axes of the eye

Module-IV: Basic Optometric Procedures

History taking in various cases, Visual Acuity, Color Vision, Maddox rod, filters,

Module-V: Refractive anomalies and their causes

Etiology of refractive anomalies, populating distributions of anomalies, Optical component measurements, Growth of the eye in relation to refractive errors

Practicals:

History taking

Visual acuity measurement

Measurement of corneal curvature

Study of Purkinje Images

Effects of lenses

Colour Vision Measurement,

Pinhole

Examination Scheme:

Components	A	HA	CT	P	EE
Weightage	5	5	10	10	70

CT-Class Test; HA - Home Assignment; A- Attendance; P-Practicals, EE-End Semester Examination

Text & References:

Text Books:

- A H Tunnacliffe: Visual optics, The Association of British Optician, 1987
- AG Bennett & RB Rabbets: Clinical Visual optics, 3rd edition, Butterworth Heinemann, 1998

Reference Books:

- WJ Benjamin: Borish's clinical refraction, 2nd edition, Butterworth Heinemann, Missouri, USA, 2006
- Primary Care Optometry- Theodore Grosvenor, 4th edition, Butterworth

CLINICAL OPTOMETRIC PROCEDURES

Course Code: OPT2306

Credit Units: 03

Course Objectives: At the end of the course the students will be skilled in knowing the purpose, set-up and devices required for the test, indications and contraindications of the test, step-by-step procedures, documentation of the findings, and interpretation of the findings of the various clinical optometry procedures.

Course Contents: Revision of skills and enhanced knowledge on skills as discussed in previous courses OP 1 and OP 2

Module-I: Case History

Case History Script

Module-II: Entrance Tests

Visual acuity and its estimation

Colour vision

cover test, Extraocular motility

Hirschberg test,

Near point of accommodation, Near point of convergence

Stereopsis

WFDT

Pupils Examination

Visual field test-Confrontation, Amsler' grid

IPD

Module-III: Ocular Health Assessment

External examination of the eye, Lid Eversion

Tear function test-Schirmer's, TBUT, tear meniscus level, NITBUT (keratometer),

Anterior segment examination with torch light – Slit lamp examination – demo

Photostress test

Corneal Sensitivity

Module-IV: Functional Test

Contrast acuity

Examination Scheme:

Components	A	HA	CT	P	EE
Weightage	5	5	10	10	70

CT-Class Test; HA - Home Assignment, P-Practical; A- Attendance; EE-End Semester Examination)

Text & References:

Text books:

- T Grosvenor: Primary Care Optometry, 5th edition, Butterworth – Heinemann, USA, 2007.

Reference Books:

- A K Khurana: Comprehensive Ophthalmology, 4th edition, New age international (p) Ltd. Publishers, New Delhi, 2007
- D B. Elliott :Clinical Procedures in Primary Eye Care,3rd edition, Butterworth-Heinemann, 2007

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- Jack J. Kanski Clinical Ophthalmology: A Systematic Approach, 6th edition, Butterworth-Heinemann, 2007
- J.B Eskridge, J F. Amos, J D. Bartlett: Clinical Procedures in Optometry, Lippincott Williams and Wilkins, 1991
- N B. Carlson , D I Kurtz: Clinical Procedures for Ocular Examination, 3rd edition, McGraw-Hill Medical, 2003



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CLINICS-II

Course Code: OPT2307

Credit Units: 01

Course Objective: This course aims to give student the basic knowledge of the theory and practical behind the basic clinical procedures. After completion, of course the student should have standard eye examination. Learn to write formal records and understand the preliminary eye testing

Unit of Competency:

Methods of ocular Examination Part 2

The ability to communicate effectively with a diverse group of patients with arrange of optometric conditions and needs.

The ability to use techniques in ocular examination and to understand the implication of findings in terms of subsequent examination techniques

Elements of competence:

Module-I: Basic Eye examination and finding the refractive error.

History taking,

Visual acuity estimation

Retinoscopy on model eye.

Retinoscopy on human eye and neutralization.

Module-II: Anterior segment examination

External examination of the eye, Lid Eversion

Schirmer's, TBUT, tear meniscus level, NITBUT (keratometer)

Pupillary reflex test

Slit lamp techniques.

Anterior segment examination with torch light

Slit lamp examination on live eye – demo

Corneal Sensitivity, HVID, Keratometry

Module-III: Visual field examination.

Visual field testing

Confrontation test, Amsler' grid

Module-IV: Miscellaneous test

Photostress test,

Colour vision

Direct Ophthalmoscopy

Examination Scheme:

Components	Attd.	Record File	Written Test	Viva	Practical	Total
Weightage	5	15	30	30	20	100



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MEDICAL LAWS AND ETHICS

Course Code: OPT2310

Credit Units: 02

Course Objective: The course not only aims at training students to gain knowledge in the fields related to Legal and ethical considerations are firmly believed to be an integral part of medical practice in planning patient care. Advances in medical sciences, growing sophistication of the modern society's legal framework, increasing awareness of human rights and changing moral principles of the community at large, now result in frequent occurrences of healthcare professionals being caught in dilemmas over aspects arising from daily practice.

Medical ethics has developed into a well based discipline which acts as a "bridge" between theoretical bioethics and the bedside. The goal is "to improve the quality of patient care by identifying, analyzing, and attempting to resolve the ethical problems that arise in practice". Doctors are bound by, not just moral obligations, but also by laws and official regulations that form the legal framework to regulate medical practice. Hence, it is now a universal consensus that legal and ethical considerations are inherent and inseparable parts of good medical practice across the whole spectrum.

Course Contents:

Few of the important and relevant topics that need to focus on are as follows:

1. Medical ethics - Definition - Goal - Scope b
2. Introduction to Code of conduct
3. Basic principles of medical ethics –Confidentiality
4. Malpractice and negligence - Rational and irrational drug therapy
5. Autonomy and informed consent - Right of patients
6. Care of the terminally ill- Euthanasia
7. Organ transplantation
8. Medico legal aspects of medical records –Medico legal case and type- Records and document related to MLC - ownership of medical records - Confidentiality Privilege communication - Release of medical information - Unauthorized disclosure - retention of medical records - other various aspects.
9. Professional Indemnity insurance policy
10. Development of standardized protocol to avoid near miss or sentinel events
11. Obtaining an informed consent.

Examination Scheme:

Components	A	ASG	CT1	CT2	EE
Weightage	5	15	15	15	50

(CT-Class Test; ASG-Assignment; A- Attendance; EE-End Semester Examination)

Text book/ Reference Book

As recommended by the faculty



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TERM PAPER

Course Code: OPT2331

Credit Units: 02

Course Objective:

The objective of this course is to judge the understanding as well as application of the knowledge gained by the students. The aim of the term paper is to provide the students with an opportunity to further enhance their knowledge in a sector of their choice by undertaking a significant practical unit of examining and analyzing various aspects of Clinical Optometry at a level commensurate with the learning outcomes of the various courses taken up them in the ongoing semester.

A term paper is primarily a record of intelligent reading in several sources on a particular subject. The students will choose the topic at the beginning of the session in consultation with the faculty assigned. At least one middle level or senior level person of a company from the chosen sector may be interviewed face to face.

Guidelines:

1. The term paper will be related to the contemporary Optometry topic and it will be given by the department.
2. The presentation of the term paper is scheduled to be held before the commencement of Semester examinations.
3. The paper will carry 100 marks that will be marked on the basis of understanding and organization of content based on the literature review. The Bibliography shall form an important part of the paper.

Examination Scheme:

Components	Organization & relevance of content	Literature Review	Bibliography	Total
Weightage	40	40	20	100



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PROJECT

Course Code: OPT2332

Credit Units: 02

Course Objectives:

The objective of this module is to help the students understand the basic principles of research and methods applied to draw inferences from the research findings.

Course Contents:

Module-I and II: Research Methodology

1. Introduction to research methods
2. Identifying research problem
3. Ethical issues in research
4. Research design
5. Types of Data
6. Research tools and Data collection methods
7. Sampling methods
8. Developing a research proposal

Module-III and IV: Biostatistics

1. Basics of Biostatistics
 - 1.1 Introduction of Biostatistics
 - 1.2 Measures of Morality
 - 1.3 Sampling
 - 1.4 Statistical significance
 - 1.5 Correlation
 - 1.6 Sample size determination.
 - 1.7 Statistics –Collection of Data - presentation including classification and diagrammatic representation –frequency distribution. Measures of central tendency; measures of dispersion.
 - 1.8 Theoretical distributions.
 - 1.8.1 Binomial
 - 1.8.2 Normal
 - 1.8.3 Sampling –necessity of methods and techniques.
 - 1.8.4 Chi. Square test (2 x 2)
2. Hospital Statistics
3. Use of computerized software for statistics

Examination Scheme:

Components	A	ASG	CT1	CT2	EE
Weightage	5	15	15	15	50

(CT-Class Test; ASG-Assignment; A- Attendance; EE-End Semester Examination)

Text book/ Reference Book

- Mausner & Bahn: Epidemiology-An Introductory text, 2nd Ed., W. B. Saunders Co.
- Richard F. Morton & J. Richard Hebd: A study guide to Epidemiology and Biostatistics, 2nd Ed., University Park Press, Baltimore.
- Sylvia W Smoller, J Smoller, Biostatistics & Epidemiology A Primer for health and Biomedical professionals, 4th edition, Springs, 2015


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WORKSHOP

Course Code: OPT2333

Credit Units: 01

Course Objective:

A workshop is primarily an activity based academic event that is organized to provide the students a one to one and hands on experience on any aspect of their learning. The communication in a workshop has to be necessarily two ways. The trainer has to make sure that the aspects covered are practically practiced by the participants. The student will choose the option of workshop from amongst their concentration electives. The evaluation will be done by Board of examiners comprising of the faculties.

Major Themes for Workshop:

The workshop may be conducted on any of the major themes

The department may choose any recent and relevant topic of study.

Guidelines for Workshop:

The procedure for earning credits from workshop consists of the following steps:

Relevant study material and references will be provided by the department in advance.

The participants are expected to explore the topic in advance and take active part in the discussions held

Attending and Participating in all activities of the workshop

Group Activities have to be undertaken by students as guided by the department.

Evaluation of workshop activities would be done through test and quiz at the end of the workshop.

Submitting a write up of atleast 500 words about the learning outcome from the workshop.

Methodology:

The methodology followed at the workshop could be based on any one or more of the following methods:

Case Study

Hands on training

Simulation

Group Activity

Role Play

Quiz

Evaluation Scheme:

Attendance	Active Participation	Multiple Choice Questions/ Quiz	Solving the case/ Assignment/ Write up	Total
10	30	30	30	100



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APPLIED OPTICS-II (Dispensing optics)

Course Code: OPT2401

Credit Units: 04

Course Objectives: Skills/knowledge to be acquired at the end of this course:

Measurement of lens power, lens centration using conventional techniques

Ophthalmic prism knowledge – effects, units, base-apex notation, compounding and resolving prisms.

Method of laying off the lens for glazing process.

Knowledge of prism and decentration in ophthalmic lenses

Knowledge of different types of materials used to make lenses and its characteristics

Knowledge lens designs – Bifocals and Progressive lens

Knowledge on tinted and protective lenses

Knowledge on special lenses like isekonic, spectacle magnifiers.

Knowledge on spectacle frames – manufacture, materials

Course Contents:

Module-I

The characteristics of lens material properties (Refractive index, specific gravity, UV cut off, impact resistance – include drop ball test, abbe value, Center thickness); Measurement of lens power; Quality control. Lens enhancements (Scratch resistant coatings – spin/dip, Anti-reflection coating, UV coating, Hydrophobic coating, anti-static coating)

Module-II

Lens types single vision; Lens types bifocal / multifocal; Lens notation; Lens power and thick lenses; Effectivity and high power lenses; Aberrations and lens design; Lens thickness.

Module-III

Ophthalmic prism; Absorptive lenses and lens coatings; Frames types and materials; Frame standard alignment and repairs done; Prescribing ophthalmic lenses; Facial Measurements; Frame Adjustment; Spectacle Delivery - on eye verification

Module-IV

Progressive lenses history and development; Prescribing PALs; Customized PAL designs; Dispensing PALs; Delivery of PALs; Troubleshooting PALs

Module-V

Pediatric Dispensing; Low Vision Aids; Lens enhancements (Scratch resistant coatings – spin/dip, Anti-reflection coating, UV coating, Hydrophobic coating, anti-static coating)

Practical to be conducted along with theory lectures

Lab visit will be undertaken to demonstrate different lab procedures.

Glazing and edging Hands on; A collection of different lens types and frames types should be done by students; Lens verification; Project report : lens and spectacle frames available in Indian market


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Examination Scheme:

Components	A	HA	CT	P	EE
Weightage	5	5	10	10	70

(CT-Class Test; HA - Home Assignment; P-Practical; A- Attendance; EE-End Semester Examination)

Text & References:**Text Books:**

- Jalie M: The principles of Ophthalmic Lenses, The Association of Dispensing Opticians, London, 1972

Reference Books:

- David Wilson: Practical Optical Dispensing, OTEN- DE, NSW TAFE Commission, 1999
- C V Brooks, IM Borish: System for Ophthalmic Dispensing, Second edition, Butterworth-Heinemann, USA, 1996



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VISUAL OPTICS-II

Course Code: OPT2402

Credit Units: 03

Course Objectives: To acquire a comprehensive theoretical understanding to the Optometric diagnostic procedures and the refractive conditions of the eye.

Course Outcome: Upon completion of the course, the student should be able:

1. To understand the fundamentals of optical components of the eye
2. To gain theoretical knowledge and practical skill on visual acuity measurement, objective and subjective clinical refraction

Course Contents:

Module-I: Refractive conditions

Myopia
Hyperopia
Astigmatism
Anisometropia and Anisekonion
Presbyopia
Aphakia and Pseudophakia
Correction and Management of Amblyopia

Module-II: Accommodation

Far and near point of accommodation
Range and amplitude of accommodation,
Anomalies of accommodation
Relationship between accommodation and convergence; A/c ratio

Module-III: Objective Refraction

Retinoscopy – principles and methods
Retinoscopy – speed of reflex and optimum condition
Retinoscopy – dynamic/static
Review of objective refractive methods

Module-IV: Subjective Refraction

Subjective refractive methods
Cross cylinder method for astigmatism, Astigmatic Fan test
Duochrome, Transposition of lenses
Spherical equivalent
Prescribing prisms
Binocular balancing & refraction

Module-V: Effective power of spectacles; vertex distance effects

Ocular refraction versus spectacle refraction
Ocular accommodation versus spectacle accommodation
Spectacle magnification and relative spectacle magnification
Retinal image blur; depth of focus and depth of field

Tutorials: Case discussion on difficult situations on Retinoscopy

Practicals

I- History taking

II - Visual acuity measurement

III - Objective Refraction

Students are to neutralize 10 cases (2 low myope, 2 low hyperope, 2 high myope, 2 Aphake, 2 astigmats with or without spherical errors). An initial practice session would be given and the students are to exhibit their competency in neutralizing to the nearest power. In case of gross errors the lab would be repeated. The students are to submit the report of their cases duly signed by their supervisor

IV - Subjective refraction

Students should perform fogging technique, Duochrome, cyclodamia, JCC, Binocular balancing and binocular refraction to determine the end point of refraction.

V - Measurement of accommodation

Students need to measure the far point, near point, range and amplitude of accommodation using various methods for 10 cases. Also needs to measure the negative and positive relative accommodation compare the values between the normals.

VI - Measurement of convergence

Students need to measure the near point of convergence, AC/A ratio for 10 patients

Examination Scheme:

Components	A	HA	CT	P	EE
Weightage	5	5	10	10	70

(CT-Class Test; HA - Home Assignment; A- Attendance; P-Practicals, EE-End Semester Examination)

Text & References:

Text Books:

- Abrams D: Duke elders Practice of Refraction, Edition 9, 1998
- Primary Care Optometry- Theodore Grosvenor, 4th edition, Butterworth

Reference Books:

- WJ Benjamin: Borish's clinical refraction, 2nd edition, Butterworth Heinemann, Missouri, USA, 2006



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OCULAR DISEASES-II

Course Code: OPT2403

Credit Units: 04

Course Objective: At the end of the course the students will be knowledgeable in the following aspects of ocular diseases: knowledge on the etiology, epidemiology, symptoms, signs, course sequelae of ocular disease, diagnostic approach, and Management of the ocular diseases.

Course Contents:

Module-I: Retina and Vitreous:

Applied Anatomy; Congenital and Developmental Disorders (Optic Disc: Coloboma, Drusen, Hypoplasia, Medullated nerve fibers; Persistent Hyaloid Artery) ; Inflammatory disorders (Retinitis: Acute purulent , Bacterial, Virus, mycotic); Retinal Vasculitis (Eales's); Retinal Artery Occlusion (Central retinal Artery occlusion); Retinal Vein occlusion (Ischaemic, Non Ischaemic , Branch retinal vein occlusion); Retinal degenerations : Retinitis Pigmentosa, Lattice degenerations; Macular disorders: Solar retinopathy, central serous retinopathy, cystoid macular oedema, Age related macular degeneration; Retinal Detachment: Rhegmatogenous, Tractional, Exudative); Retinoblastoma; LASERS in Ophthalmology; Fluorescein angiography; OCT

Module-II: Ocular Injuries:

Terminology: Closed globe injury (contusion, lamellar laceration) Open globe injury (rupture, laceration, penetrating injury, perforating injury); Mechanical injuries (Extraocular foreign body, blunt trauma, perforating injury, sympathetic ophthalmitis); Non Mechanical Injuries (Chemical injuries, Thermal, Electrical, Radiational); Clinical approach towards ocular injury patients

Module-III: Uveal Tract & Sclera

Applied Anatomy; Classification of uveitis; Etiology; Pathology ; Anterior Uveitis; Posterior Uveitis; Purulent Uveitis; Endophthalmitis; Panophthalmitis; Pars Planitis; Tumors of uveal tract(Melanoma); Episcleritis and scleritis; Clinical examination of Uveitis and Scleritis

Module-IV: Clinical Neuro-ophthalmology

Anatomy of visual pathway; Lesions of the visual pathway; Pupillary reflexes and abnormalities; Amaurotic light reflex, Efferent pathway defect, Wernicke's hemianopic pupil, Marcus gunn pupil. Argyll Robertson pupil, Adie's tonic pupil); Optic neuritis, Anterior Ischemic optic neuropathy, Pappilloedema, optic atrophy; Cortical blindness; Malingering; Nystagmus; Clinical examination

Module-V: Glaucoma

Applied anatomy and physiology of anterior segment; Clinical Examination; Definitions and classification of glaucoma; Pathogenesis of glaucomatous ocular damage; Congenital glaucomas; Primary open angle glaucoma; Ocular hypertension; Normal Tension Glaucoma; Primary angle closure glaucoma (Primary angle closure suspect, Intermittent glaucoma, acute congestive, chronic angle closure); Secondary Glaucomas; Management : common medications, laser intervention and surgical techniques; Glaucoma investigations and procedures; Confrontation Amsler grid; Tonometry-Appplanation Schiotz; Visual fields-; GTX, HRT; Provocative test; OCT

Practicals:

Students will visit OPD clinic and record pathologies seen during the posting [under supervision of faculty]; Record file of ocular pathologies to be prepared [Faculty to decide]; Atleast two Case presentations of pathologies seen during clinical posting

Examination Scheme:

Components	A	HA	CT	P	EE
Weightage	5	5	10	10	70

CT-Class Test; HA- Home Assignment; P-Practical; A- Attendance; EE-End Semester Examination)

Text & References:**Text books:**

- A K Khurana: Comprehensive Ophthalmology, 4th edition, New age international (p) Ltd. Publishers, New Delhi, 2007

Reference Books:

- Stephen J. Miller : Parsons Diseases of the Eye, 18th edition, Churchill Livingstone, 1990
- Jack J. Kanski Clinical Ophthalmology: A Systematic Approach, 6th edition, Butterworth-Heinemann, 2007



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CLINICS-III

Course Code: OPT2406

Credit Units: 03

Course Contents:

Module-I:

Unit of competency: Refraction

An understanding of methods of assessing vision, Refraction in all Patients

The ability to relate facial anatomy to the fitting of optical appliances.

Elements of competence:

1. Recording VA
2. Practice of Streak Retinoscopy and dynamic retinoscopy.
3. Subjective refraction –
4. Initial sphere check.: fogging
5. Cylinder axis and power refinement: clockdial, fan, JCC,
6. Second sphere check, Duochrome or bichrome test,
7. Binocular balance :prism balance, TIB,
8. cyclodeimia,
9. Slit refraction.
10. Presbyopic add determination
11. Writing prescription
12. Overview of the use of cycloplegic drugs.

Module-II

Unit of competency: Applied Optics:

The ability to dispensing appropriate appliances

The ability to interpret and dispense a prescription using appropriate lenses and facial frame measurements.

Elements of competence:

1. Frame types and nomenclature of frames. Know about special frame features and handling the frames.
2. Relationship between frame ,lenses and face
3. IPD measurement (with Scale and IPD ruler , Pupilometer)
4. Recommends and dispenses special optical appliances where appropriate(e.g. VDU users, Sports, safety, pediatric frames, recumbent, reversible, flips, trigeminal spectacles etc.)
5. Identification of tints & Coating on lens surface and its application ,associated advantage and disadvantages.
6. Taking and recording children's facial and frame measurement
7. Awareness of the dermatological effects of the materials to be able to advise patient accordingly.
8. Identifies possible errors in prescription and follows the appropriate course of action.
9. Identification of incomplete, inaccurate and ambiguous prescription.
10. when to modify and when to refer a new prescription

Module-III

Unit of competency: Progressive addition lens

Brief overview of PAL'S and clinical decision making.

An understanding of refractive prescribing and management decisions

Elements of competence:

1. Know Basic construction of progressive addition lens.
2. Frame selection for Progressive

3. Familiarity of different types of progressive lens design and clinical relevance .advantages and disadvantages of different types of lens.
4. Choosing the right type of progressive lens
5. Progressive lens fitting measurement
6. Progressive lens verification.
7. Progressive dispensing
8. Trouble shooting of progressive.
- 9.Familiarity of different brands of PAL's.

Module-IV:

Unit of competency: Comprehensive eye care:

The ability to identify and manage ocular abnormalities

The ability to identify sight threatening eye diseases

Recognizes common ocular abnormalities referred when appropriate

Recognizes adverse ocular reactions to medication

Assess symptoms and signs of neurological significance

Elements of competences:

- 1.Understands the risk factors for developing common ocular conditions including: Glaucoma, cataract, diabetic retinopathy and ARMD .
2. Recognizes, using appropriate technique/s, all of the following: Cataract, Glaucoma or glaucoma suspects ,Anterior eye disorders e.g. blepharitis, dry eye, meibomian gland dysfunction, lid lesions AMD and macular abnormalities and Manages appropriately.
3. Manages patients presenting with cataract.
4. Evaluates glaucoma risk factors, to detect glaucoma and refer accordingly.
5. Recognize the patients presenting with macular degeneration .
6. Recognizes, evaluates and manages diabetic eye disease and refers accordingly.
- 7.Evaluates and manages patients presenting with symptoms of retinal detachment.
8. Recognizes ocular manifestations of systemic disease
9. Assesses symptoms and signs of neurological significance
10. Recognizes adverse ocular reactions to medication.

Module-V

Unit of competency: Ocular diseases 1.

The ability to identify and manage ocular abnormalities

The ability to identify sight threatening eye diseases

Recognizes common ocular abnormalities referred when appropriate

Recognizes adverse ocular reactions to medication

Elements of competences:

1. Interprets and investigates the presenting symptoms and sign of the patient.
2. Identifies external pathology and offers appropriate advice to patients not requiring referral.
 - External eye and ocular surfaces : Lids, lashes, lumps/bumps and red eye
 - Gives the correct advice /treatment and review period
 - Aware of pharmaceutical agents available (legal status, indications, contraindications and side effects and uses appropriate sources of medicines information)
 - Explains clearly to the patient and checks their understanding
3. Recognizes common ocular abnormalities
4. Understanding of symptoms associated with internal eye disease.
5. Manage patient presenting with Red eyes.

Examination Scheme:

Components	Attd.	Record File	Multiple Choice Questions/ Quiz	Viva	Practical	Total
Weightage	5	15	15	15	50	100

Text book/ Reference Book

- Grosvenor, Primary Care Optometry, Butterworth-Heinemann,
- A K Khurana: Comprehensive Ophthalmology, 4th edition, New age international (p) Ltd. Publishers, New Delhi, 2007
- D B. Elliott :Clinical Procedures in Primary Eye Care,3rd edition, Butterworth-Heinemann, 2007
- BHVI modules



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OPHTHALMIC ELECTRODIAGNOSTIC PROCEDURES

Course Code: OPT2408

Credit Units: 03

Course Objective: The objective of the course is to familiarize the student with the Electrophysiology Laboratory which performs several clinical tests, including the electroretinogram (ERG), electro-oculogram (EOG), visual evoked response (VER), color vision testing (CVT) and dark adaptometry (DA)

Course Contents:

Module-I: Electrophysiological investigations

Electro-oculogram (EOG) Measurement of retinal function with standardised eye movements.

Electroretinogram (ERG)

Macular or Focal Electroretinogram

Pattern Electroretinogram (PERG)

Flash Visually Evoked Cortical Potential (Flash VEP)

Pattern Appearance Visually Evoked Cortical Potential

Other non-standard procedures for recording VEP and ERG e. g., measurement of interocular beat frequencies, flicker and sweep VEPs, multi-focal ERG, fast oscillation.

Electromyogram (EMG)

Electro-nystagmography. For measurement of nystagmus and eye movements.

Module-II: Indications for Patient Referral

Tests Available

Patterns of Referral

Indications for Specific Tests

Standardised Electroretinogram, Electro-Oculogram and Visually, Evoked Potential

Evaluation Scheme:

Attendance	Record file	Multiple Choice Questions/ Quiz	Viva	Practical skills /performance	Total
5	15	15	15	50	100

Textbook:

- Ophthalmic Electrodiagnosis (Major Problems in Ophthalmology) N.R. Galloway



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PERIMETRY

Course Code: OPT2409

Credit Units: 03

Course Objective: The aim of this course is to acquire skills in the visual field examination of the eye. This course deals almost exclusively with manual and automated perimetry. Emphasis is on technical aspects of administering the automated test with skill; as well as on skillful interpretation of the result based on an understanding of the text.

Course Contents:

Module-I:

The field of vision
Normal field of vision
Retinal nerve fiber paths and the field of vision
Characteristics of visual field loss in glaucoma

Module-II:

Perimetric Parameters
Manual vs. Automated Perimetry
Advantages of Automated Perimetry
Static vs. Dynamic Perimetry
Target size and luminance
Testing Algorithms

Module-III:

Monitoring Fixation
Monocular vs. Binocular testing
Alternative perimetric targets
Interpretation of SAP
Patient and Test details
Displays of sensitivities across the visual field

Module-IV:


Summary measures of visual field performance
Establishing reliability of results
Identifying Glaucomatous VF Loss on SAP
Common perimetric errors

Evaluation Scheme:

Attendance	Record file	Multiple Choice Questions/ Quiz	Viva	Practical skills /performance	Total
5	15	15	15	50	100

Reference Book

- Automated static perimetry : Douglas R. Anderson


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TERM PAPER

Course Code: OPT2431

Credit Units: 02

Course Objective:

The objective of this course is to judge the understanding as well as application of the knowledge gained by the students. The aim of the term paper is to provide the students with an opportunity to further enhance their knowledge in a sector of their choice by undertaking a significant practical unit of examining and analyzing various aspects of Clinical Optometry at a level commensurate with the learning outcomes of the various courses taken up them in the ongoing semester.

A term paper is primarily a record of intelligent reading in several sources on a particular subject. The students will choose the topic at the beginning of the session in consultation with the faculty assigned. At least one middle level or senior level person of a company from the chosen sector may be interviewed face to face.

Guidelines:

1. The term paper will be related to the contemporary Optometry topic and it will be given by the department.
2. The presentation of the term paper is scheduled to be held before the commencement of Semester examinations.
3. The paper will carry 100 marks that will be marked on the basis of understanding and organization of content based on the literature review. The Bibliography shall form an important part of the paper.

Evaluation Scheme:

Organisation and relevance of content	Literature Review	Bibliography	Total
40	40	20	100



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PROJECT

Course code: OPT2432

Credit Units: 03

Course Objectives:

The objective of this module is to help the students understand the basic principles of research and methods applied to draw inferences from the research findings.

Course Contents:

Module-I and II: Research Methodology

1. Introduction to research methods
2. Identifying research problem
3. Ethical issues in research
4. Research design
5. Types of Data
6. Research tools and Data collection methods
7. Sampling methods
8. Developing a research proposal

Module-III and IV: Biostatistics

1. Basics of Biostatistics
 - 1.1 Introduction of Biostatistics
 - 1.2 Measures of Morality
 - 1.3 Sampling
 - 1.4 Statistical significance
 - 1.5 Correlation
 - 1.6 Sample size determination.
 - 1.7 Statistics –Collection of Data - presentation including classification and diagrammatic representation –frequency distribution. Measures of central tendency; measures of dispersion.
 - 1.8 Theoretical distributions.
 - 1.8.1 Binomial
 - 1.8.2 Normal
 - 1.8.3 Sampling –necessity of methods and techniques.
 - 1.8.4 Chi. Square test (2 x 2)
2. Hospital Statistics
3. Use of computerized software for statistics

Evaluation Scheme:

Attendance	Assignment	CT1	CT 2	End-Term Evaluation	Total
5	15	15	15	50	100

Text book/ Reference Book

- Mausner & Bahn: Epidemiology-An Introductory text, 2nd Ed., W. B. Saunders Co.
- Richard F. Morton & J. Richard Hebd: A study guide to Epidemiology and Biostatistics, 2nd Ed., University Park Press, Baltimore.
- Sylvia W Smoller, J Smoller, Biostatistics & Epidemiology A Primer for health and Biomedical professionals, 4th edition, Springs, 2015

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WORKSHOP

Course Code: OPT2433

Credit Units: 01

Course Objective:

A workshop is primarily an activity based academic event that is organized to provide the students a one to one and hands on experience on any aspect of their learning. The communication in a workshop has to be necessarily two ways. The department has to make sure that the aspects covered are practically practiced by the participants. The student will choose the option of workshop from amongst their concentration electives. The evaluation will be done by Board of examiners comprising of the faculties.

Major Themes for Workshop:

The workshop may be conducted on any of the various major themes: These themes are merely indicative and the department may choose any recent and relevant topic of study.

Guidelines for Workshop:

The procedure for earning credits from workshop consists of the following steps:

Relevant study material and references will be provided by the department in advance.

The participants are expected to explore the topic in advance and take active part in the discussions held

Attending and Participating in all activities of the workshop

Group Activities have to be undertaken by students as guided by the department .

Evaluation of workshop activities would be done through test and quiz at the end of the workshop.

Submitting a write up of atleast 500 words about the learning outcome from the workshop.

Methodology:

The methodology followed at the workshop could be based on any one or more of the following methods:

Case Study

Hands on training

Simulation

Group Activity

Role Play

Quiz

Evaluation Scheme:

Attendance	Active Participation	Multiple Choice Questions/ Quiz	Solving the case/ Assignment/ Write up	Total
10	30	30	30	100



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CONTACT LENS-I

Course Code: OPT2501

Credit Units -03

Course Objectives: Upon completion of the course, the student should be able to:

- Understand the basics of contact lenses
- List the important properties of contact lenses
- Finalise the CL design for various kinds patients
- Recognize various types of fitting
- Explain all the procedures to patient
- Identify and manage the adverse effects of contact lens

Course Contents:

Module-I

Anatomy and physiology of anterior segment, History of contact lenses, Optics of contact lenses, comparison spectacles, Contact lens designs, Corneal oxygenation in contact lens wear

Module-II

Contact lens fabrication, Manufacturing of Rigid and soft Contact Lenses –Various methods
Pre fitting examination-steps, significance, recording of results, Instruments used for examination, Special investigation in pre-fitting examinations., Keratometry and corneal topography, Slit lamp examination, Discussion with patient, choice of lens type

Module-III

Examining the Prospective Contact Lens Patient, Selecting Lens Type, Wear Mode and Replacement Rate, Fitting Spherical GP Contact Lenses, Fitting Spherical Soft Contact Lenses, Correcting Astigmatism with Contact Lenses

Module-IV


Calculation and finalizing of contact lens parameters, Ordering contact lenses – writing a prescription to the laboratory, Checking and verifying contact lenses from laboratory, Modifications possible with rigid lenses

Practical:

History Taking role plays, Pre fitting evaluation, RGP CL insertion & Removal, Fitting assessment
Over refraction, Follow up examination, Patient instructions, Contact Lenses Do's and don'ts, Instructions for care and maintenance

Practical:

History Taking role plays; Pre fitting evaluation; RGP CL insertion & Removal; Fitting assessment; Over refraction; Follow up examination; Patient instructions; Contact Lenses Do's and don'ts ; Instructions for care and maintenance.


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Examination Scheme:

Components	A	HA	CT	P	EE
Weightage	5	5	10	10	70

(CT-Class Test; HA- Home Assignment; P-Practical; A- Attendance; EE-End Semester Examination)

Text & Reference:**Text books:**

- IACLE modules A1 - 6,B2-9,C 1-4
- CLAO Volumes 1, 2, 3
- Text book of Contact Lenses 5th edition by Sinha Rajesh ,jaypee publication 2017
- Contact lens Primer :Jaypee Bros : Monica Chaudhry
- Anthony J. Phillips : Contact Lenses, 5th edition, Butterworth-Heinemann, 2006
- Elisabeth A. W. Millis: Medical Contact Lens Practice, Butterworth-Heinemann, 2004
- E S. Bennett ,V A Henry :Clinical manual of Contact Lenses, 3rd edition, Lippincott Williams and Wilkins, 2008



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LOW VISION CARE

Course Code: OPT2502

Credit Units: 03

Course Objectives: At the end of the course, the student will be knowledgeable in the following:

- Definition and epidemiology of Low Vision
- Clinical examination of Low vision subjects
- Optical, Non-Optical, Electronic, and Assistive devices.
- Training for Low Vision subjects with Low vision devices
- Referrals and follow-up

Course Contents:

Module-I

Definitions & classification of Low vision; Epidemiology of low vision [magnitude]

Module-II

Pre-clinical evaluation of low vision patients, functional needs assessment; Types of low vision aids – optical aids, non-optical aids & electronic devices ,Assistive technologies devices; Optics of low vision aids

Module-III

Clinical evaluation – assessment of visual acuity, visual field, selection of low vision aids, instruction & training; Paediatric Low Vision care

Module-IV

Low vision aids – dispensing & prescribing aspects; Visual rehabilitation & counselling prognostic & psychological factors; psycho-social impact of low vision; Legal aspects of Low vision in India; Eye Disorders & Low vision; Case Analysis

Practical:

Attending in low vision care clinic and history taking; Determining the type of telescope and its magnification (Direct comparison method & calculated method); Determining the change in field of view with different magnification and different eye to lens distances with telescopes and magnifiers; Inducing visual impairment and prescribing magnification; Determining reading speed with different types of low vision aids with same magnification; Evaluation of low vision patient; Prescribing optical devices [How to use]; Prescribing of non-optical devices [how to use them]; Visit to blind school and rehabilitation centers; Establishing a low vision in clinic; Report on disability networks in India; Visit to clinics and prepare report on low vision patients

VISUAL REHABILITATION:

Module-I: Rehabilitation

History of Rehabilitation Optometry; Definition and Principles of Rehabilitation; Psychology in Optometric Rehabilitation; Pain and Suffering; Adaptation and Compensatory Adjustment; Human Motivation; Psychological Disturbance and Psychotherapy; Symptomatology of Visual Disorders

Module-II: Introduction to Optometry rehabilitation Practice

A Basis for Practice; Roles in Daily Life and Professional Practice

Module-III: Clinical Presentation and Case


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Examination Scheme:

Components	A	HA	CT	P	EE
Weightage	5	5	10	10	70

(CT-Class Test; HA- Home Assignment; P-Practical; A- Attendance; EE-End Semester Examination)

Text & References:**Text books:**

- Christine Dickinson: Low Vision: Principles and Practice Low vision care, 4th edition, Butterworth-Heinemann, 1998
- Low vision : jaypee Bros : Monica Chaudhry
- E Vaithilingam: practice of Low vision – A guide book, Medical Research Foundation, 2000

Reference Books:

- Richard L. Brilliant: Essentials of Low Vision Practice, Butterworth-Heinemann, 1999
- Helen Farral: optometric Management of Visual Handicap, Blackwell Scientific publications, 1991
- A J Jackson, J S Wolffsohn: Low Vision Manual, Butterworth Heinemann, 2007



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BINOCULAR VISION-I

Course Code: OPT2504

Credit Units: 03

Course Objectives: On successful completion of this module, a student will be expected to be able to:-

- Demonstrate an in-depth knowledge of the gross anatomy and physiology relating to the extraocular muscles.
- Provide a detailed explanation of, and differentiate between the aetiology, investigation and management of binocular vision anomalies.
- Adapt skills and interpret clinical results following investigation of binocular vision anomalies appropriately and safely.

Course Contents:

Module-I

Binocular Vision and Space perception; Relative subjective visual direction; Retino motor value; Grades of BSV; SMP and Cyclopean Eye; correspondence, Fusion, Diplopia, Retinal rivalry; Horopter; Physiological Diplopia and Suppression; Stereopsis, Panum's area, BSV

Module-II

Revision: Anatomy of Extra Ocular Muscles; Physiology of Ocular movements; Center of rotation, Axes of Fick; Action of individual muscles

Module-III

Laws of ocular motility; Donder's and Listing's law; Sherrington's law; Hering's law; Uniocular& Binocular movements - fixation, saccadic & pursuits; Version & Vergence; Fixation & field of fixation

Module-IV

Near Vision Complex; Accommodation: Definition and mechanism (process), Methods of measurement, Stimulus and innervation, Types of accommodation, Anomalies of accommodation – aetiology and management; Convergence: Definition and mechanism, Methods of measurement, Types and components of convergence - Tonic, accommodative, fusional, proximal, Anomalies of Convergence – aetiology and management.

Module-V

Sensory adaptations: Confusion, Suppression, Investigations, Management, Blind spot syndrome; Abnormal Retinal Correspondence, Investigation and management; Eccentric Fixation, Investigation and management; Amblyopia: Classification and management

Practicals:

Binocular vision assessment, Stereopsis evaluation, Measurement of NPC and NPA, Measurement of AC/A Ratio, Measurement of convergence, Convergence insufficiency and management of cases, ARC-case discussion, Eccentric fixation –Diagnosis and discussion, Amblyopia management –case presentation

Examination Scheme:

Components	A	HA	CT	P	EE
Weightage	5	5	10	10	70

(CT-Class Test; HA- Home Assignment; P-Practical; A- Attendance; EE-End Semester Examination)

Texts & References:

Text Books:

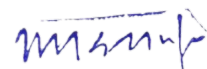
- Pradeep Sharma: Strabismus simplified, New Delhi, First edition, 1999, Modern publishers.
- Mitchell Scheiman; Bruce Wick: Clinical Management of Binocular Vision Heterophoric, Accommodative, and Eye Movement Disorders, 2008, Lippincot Williams & Wilkins publishers

References:

- Fiona J. Rowe: Clinical Orthoptics, second edition, 2004, Blackwell Science Ltd
- Gunter K. Von Noorden: BURIAN- VON NOORDEN'S Binocular vision and ocular motility theory and management of strabismus, Missouri, Second edition, 1980, C. V. Mosby Company
- Mitchell Scheiman; Bruce Wick: Clinical Management of Binocular Vision Heterophoric, Accommodative, and Eye Movement Disorders, 2008, Lippincot Williams & Wilkins publishers



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DISEASE OF EYE AND CLINICAL MEDICINE

Course Code: OPT2505

Credit Units: 02

Course Objectives: At the end of the course, students should get acquainted with the following:

Common Systemic conditions: Definition, diagnostic approach, complications and management options

Ocular findings of the systemic conditions

First Aid knowledge

Course Contents:

Module-I

Hypertension – Definition, classification, Epidemiology, clinical examination, complications, and management. Hypertensive retinopathy; Diabetes Mellitus – Classification, pathophysiology, clinical presentations, diagnosis, and management, Complications, Diabetic Retinopathy; Thyroid Disease Physiology, testing for thyroid disease, Hyperthyroidism, Hypothyroidism, Thyroiditis, Thyroid tumors, Grave's Ophthalmopathy; Acquired Heart Disease : Ischemic Heart Disease, Congestive heart failure, Disorders of cardiac rhythm, Ophthalmic considerations

Module-II

Cancer; Connective Tissue Disease; Rheumatic arthritis; Systemic lupus erythematosus; Sjogren syndrome Behcet's syndrome; Tuberculosis – Aetiology, pathology, clinical features, pulmonary tuberculosis, diagnosis, complications, treatment tuberculosis and the eye.

Module-III

Herpes virus (HERPES AND EYE); Hepatitis (Hepatitis A, B, C); Acquired Immunodeficiency Syndrome

Module-IV

Anaemia (Diagnosis, clinical evaluation, consequences, Sickle cell disease, treatment, Ophthalmologic considerations); Common Tropical Medical Ailments; Nutritional and Metabolic disorders: Myasthenia Gravis, Marfan's Syndrome

Practical: Visit to Hospital Medicine O.P.D / Ward, Neurology

Examination Scheme:

Components	A	HA	CT	P	EE
Weightage	5	5	10	10	70

(CT-Class Test; HA- Home Assignment; P-Practical; A- Attendance; EE-End Semester Examination)

Text & References:

- C Haslett, E R Chilvers, N A boon, N R Coledge, J A A Hunter: Davidson's Principles and Practice of Medicine, Ed. John Macleod, 19th Ed., ELBS/Churchill Livingstone. (PPM), 2002
- Basic and clinical Science course: Update on General Medicine, American Academy of Ophthalmology, Section 1, 1999
- As recommended by Faculty



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CLINICS-IV

Course Code: OPT2507

Credit Units: 03

Module-I

Unit Of competency: Contact lens -1.

The ability to select and fit the most appropriate lens for the planned use

The ability to Identify and manage after care

Elements of competence:

1. Recognize Contact lens types and material.
2. Pre fitting evaluation
3. Demonstrates an understanding of the range of rigid lens material and designs available
4. Appropriate choice of rigid lens parameter.
5. Fitting philosophies of rigid lens and fitting assessment.
6. Demonstrates an understanding of the type of astigmatism which require correction.
7. RGP lens adaptation
8. RGP lens wear and care including use of RGP lens care product.
9. Demonstrates an understanding of the range of soft lens materials and design available.
10. appropriate choices of soft lens , Fitting philosophies and fitting assessment.
11. Write appropriate order form for RGP and soft lenses
12. Instruct patient the technique of RGP, soft lens insertion, removal and other relevant handling instructions.

Module-II

Unit Of competency: Assessment of Binocular vision

The ability to assess the patient with anomalies of binocular vision

The ability to assess binocular status using objective and subjective means

Elements of competence:

1. Understand the different objective test available to assess deviation. E.g. cover & motility test
2. Different subjective test available to assess subjective deviation. E.g. fixation disparity
3. Identification of phoria and tropia
4. Measurement of fusional vergence range dist and near
5. Measurement of accommodative facility
6. Measurement of stereopsis
7. AC/A ratio (heterophoria and gradient method)
8. Synoptophore:
Measurement of SMP, FUSION And stereopsis
Angle of anomaly
ARC

Module-III:

Unit of competency: Low vision and rehabilitation:

The ability to assess a patient with low vision

The ability to advice, refer and provide after care to low vision patients

The ability to refer low vision Patients to other agencies where appropriate

Elements of competence:

1. Distance and near vision chart used for low vision
2. Assessment of visual function, including the use of Log MAR and other specialist charts, effects of illumination, contrast and glare.
3. Assessment of visual field of patient with reduced vision.

4. VA criteria for visual impairment, Low vision and visually handicap
5. Indication of binocular low vision aids
6. Knowledge of Optical and non optical devices
7. Identification of patients visual needs
8. Sign and symptoms of ocular and systemic pathologies.
9. Assessment of magnification for distance and near vision
10. Selection of Optical aids for distance and near.
11. Advises on the use of, and dispenses simple low vision aids :
Identifies which patients would benefit from low vision aids and advice ,
Understands the principles of magnification,
Field of view and working distance in relation to different aids Provides advice on the advantages and disadvantages of different types of simple low vision aids ,
Understands the mechanisms of prescribing magnification including acuity reserve ,
Gives correct instruction to a patient in the use of various aids, to include: Which specs to use with aid,
Lighting required, Appropriate working distance
12. Training in use of aids
13. Low vision rehabilitation

Module-IV:

Unit of competency: Community Visit.

The ability to screen refractive error and knowledge of eye health disorders in community

The ability to impart information in a manner which is appropriate to the recipients.

Elements of competence:

1. School screening
2. Industrial Eye screening
3. Community eye services.

Evaluation Scheme:

Attendance	Record file	Written test	Viva	Practical	Total
5	15	30	30	20	100

Text book/ Reference Book

- Grosvenor, Primary Care Optometry , Butterworth-Heinemann,
- A K Khurana: Comprehensive Ophthalmology, 4th edition, New age international (p) Ltd. Publishers, New Delhi, 2007
- D B. Elliott :Clinical Procedures in Primary Eye Care, 3rd edition, Butterworth-Heinemann, 2007
- BHVI modules



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SUMMER INTERSHIP EVALUATION-I

Course Code: OPT2535

Credit Units: 02

Objective:

The basic objective of a Summer Internship is to refine the practical exposure. This summer training will provide an opportunity to the students to apply their theoretical understanding while working on the concerned project in the hospital / corporates. Thus this summer internship programme is an attempt to bridge the gap between theory and practice. This will also enhance the students' intellectual ability and attributes related to data handling, decision making, report writing, oral presentation and imbibing an interdisciplinary approach.

General Guidelines:

Every student of Boptom shall be required to undergo a practical training in a organization approved by the Institute for minimum of four weeks, normally in the Summer Vacation, after the end of the fourth semester examinations. The candidates shall be required to undergo training in the various areas of the organization concerned. The organization may assign a specific tasks to the candidate, which will be completed by him/her during the period of training. The work done by the candidate during the training period shall be submitted in form of a training report.

The last date for the receipt of training report AND CASE SHEETS in the department shall be one month after the date of completion of training, i.e. at the beginning of the fifth semester.

Evaluation Scheme:

Attendance	Overall Performance: grading by centre	Viva	Attendance	LOG book Report	Total
5	30	30	10	30	100



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OCULAR PROSTHESIS

Course Code: OPT2508

Credit Units: 03

Course Objective:

This course aims at making the students equipped with the basics of Prosthesis and the various conditions where they are applied.

Course Contents:

- Basics on Prosthesis,
- Types of Prosthesis
- Indications,
- Techniques employed,
- Complications,
- Advancements and Results

Evaluation Scheme:

Attendance	Record file	Multiple Choice Questions/ Quiz	Viva	Practical skills /performance	Total
5	15	15	15	50	100

Reference Book

- J.H. Prince, Ocular Prosthesis, Livingstone, 1946



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REFRACTIVE SURGERY

Course Code: OPT2509

Credit Units: 03

Course Objectives:

- Provide patients with unbiased, up-to-date advice concerning refractive surgery techniques
- Recognise the most appropriate tests for investigating suitable candidates pre-operatively and assessing visual performance post-operatively
- Recognise post-operative complications
- Appreciate the most appropriate management strategy for a given refractive surgery patient, communicating effectively with the patient and their surgeon
- Interpret and critically review research pertaining to refractive surgery.

Course Contents:

Module-I: Background – History of Refractive Surgery, Radial Keratotomy, Excimer Laser Photorefractive Keratectomy, Automated Lamellar Keratoplasty, Laser In Situ Keratoplasty, newer advances

Module-II: Refractive surgery Measurement – Peripheral Keratometry, Photokeratoscopy, Videokeratoscopy, Evaluation of Videokeratoscopy, Applications of Videokeratoscopy, Corneal topography reports, Corneal tomography reports.

Module-III: Principles of Microkeratomes- Types of Microkeratomes, Achieving the Optimal Flap, Risks & Complications, Flap Creation Using Femtosecond Laser, Advantages & Disadvantages of Femtosecond Laser Customized Ablation Procedures - Why Use Customized Ablation?, Technology Used for Customised Ablation, Customized Ablation Methods, Guidelines

Module-IV: Complications of Refractive Procedures- Microkeratome related complication, Laser Ablation related complications, Postoperative Complications, Management.

Module-V: Introduction to Phakic IOLs-and Types of Corneal Rings- Preoperative Evaluation & Inclusion Criteria, Surgical Procedures, Overview of Refractive Lens Exchange (RLE), Deciding to perform RLE, Retinal Risks of RLE, Avoiding Retinal Detachment, Informing Patient of Risks, Postoperative Issues, Problems of Phakic IOLs

Evaluation Scheme:

Attendance	Record file	Multiple Choice Questions/ Quiz	Viva	Practical skills /performance	Total
5	15	15	15	50	100

Text & References:

Text books:

- Ioannis G. Pallikaris and Dimitrios S. Siganos (1998), LASIK, SLACK incorporated, NJ
- T Grosvenor: Primary Care Optometry, 4th edition, Butterworth – heinneman, USA, 2002
- Agarwal: Dr. Agarwal's Step by Step Lasik Surgery; Jaypee Brothers, medical Publishers, India (2005)

Reference Books:

- Hanratty, M. (2005) Lasik: a handbook for optometrists. Oxford: Butterworth-Heinemann

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- MacRae, S., Krueger, R., Applegate, R.A. (2004) Wavefront Customized Visual Correction - the quest for super vision-II. London: Slack Inc.
- Naroo, S.(2003) Refractive Surgery: Clinical Decision making in ophthalmic practice. Oxford: Butterworth Heinemann.
- Probst, L.E. (2001) LASIK - a color atlas and surgical synopsis. London: Slack inc.
- Sullivan, L.(2007) Step by step LASIK surgery (2nd Edition). London: Taylor and Francis



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TERM PAPER

Course Code: OPT2531

Credit Units: 02

Course Objective:

The objective of this course is to judge the understanding as well as application of the knowledge gained by the students. The aim of the term paper is to provide the students with an opportunity to further enhance their knowledge in a sector of their choice by undertaking a significant practical unit of examining and analyzing various aspects of Clinical Optometry at a level commensurate with the learning outcomes of the various courses taken up them in the ongoing semester.

A term paper is primarily a record of intelligent reading in several sources on a particular subject. The students will choose the topic at the beginning of the session in consultation with the faculty assigned. At least one middle level or senior level person of a company from the chosen sector may be interviewed face to face.

Guidelines:

1. The term paper will be related to the contemporary Optometry topic and it will be given by the department.
2. The presentation of the term paper is scheduled to be held before the commencement of Semester examinations.
3. The paper will carry 100 marks that will be marked on the basis of understanding and organization of content based on the literature review. The Bibliography shall form an important part of the paper.

Evaluation Scheme:

Organisation and relevance of content	Literature Review	Bibliography	Total
40	40	20	100



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PROJECT

Course code: OPT2532

Credit Units: 03

Objectives:

The aim of the project is to provide the students with an opportunity to further their intellectual and personal development in the chosen field by undertaking a significant practical unit of activity. The project can be defined as a scholarly inquiry into a problem or issues, involving a systematic approach to gathering and analysis of information / data, leading to production of a structured report.

Chapter Scheme and distribution of marks:

Chapter 1: Introduction – 10 marks

Chapter 2: Conceptual Framework/ National/International Scenario – 25 marks

Chapter 3: Presentation, Analysis & Findings -- 25 marks

Chapter 4: Conclusion & Recommendations -- 10 marks

Chapter 5: Bibliography -- 05 marks

Project Report	Power Point Presentation & Viva
75 marks	25 marks

Components of a Project Report

The outcome of Project Work is the Project Report. A project report should have the following components:

- 1) Cover Page: This should contain the title of the project proposal, to whom it is submitted, for which degree, the name of the author, name of the supervisor, year of submission of the project work, name of the University.
 - 2) Acknowledgement: Various organizations and individuals who might have provided assistance /co-operation during the process of carrying out the study.
 - 3) Table of Content: Page-wise listing of the main contents in the report, i.e., different Chapters and its main Sections along with their page numbers.
 - 4) Abstract: The body of the report should have summary of the project.
 - a) Introduction: This will cover the background, rationale/ need / justification, brief review of literature, objectives, methodology (the area of the study, sample, type of study, tools for data collection, inclusion & exclusion criteria and method of analysis), Limitations of the Study, and Planning.
 - b) Conceptual Framework / National and International Scenario: (relating to the topic of the Project).
 - c) Presentation of Data, Analysis and Findings
 - d) Conclusion and Recommendations: In this section, the concluding observations based on the main findings and suggestions are to be provided.
 - 5) Bibliography or References: This section will include the list of books and articles which have been used in the project work, and in writing a project report.
 - 6) Annexure: Questionnaires (if any), relevant reports, etc.
- (The main text of the Project should normally be in the range of 5000 words. However, there may be annexure in addition to the main text)

The Steps of a Project Report

Step I: Selection of the topic for the project by taking following points into consideration:

Suitability of the topic.

Relevance of the topic

Time available at the disposal.

Feasibility of data collection within the given time limit.

Challenges involved in the data collection (time & cost involved in the data collection, possibility of getting responses, etc.)

Step II: Finalisation of the Topic and preparation of Project Proposal in consultation with the Supervisor.

Step III: Collection of information and data relating to the topic and analysis of the same.

Step IV: Writing the report dividing it into suitable chapters, viz.,

Chapter 1: Introduction,

Chapter 2: Methodology,

Chapter 3: Analysis & Findings

Chapter 4: Conclusion and Recommendations.

Step V: The following documents are to be attached with the Final Project Report.

1) Approval letter from the supervisor

2) Student's declaration

3) Certificate from the Competent Authority of the Organisation / Institution, if the student undertakes the Project Work in any Organisation / Institution.

Guidelines for Evaluation:

Each of the students has to undertake a Project individually under the supervision of a teacher and to submit the same following the guidelines stated below.

Language of Project Report and Viva-Voce Examination may be English. The Project Report must be typed and hard bound.

Failure to submit the Project Report or failure to appear at the Viva-voce Examination will be treated as "Absent" in the Examination. He /she has to submit the Project Report and appear at the Viva-Voce Examination in the subsequent years (within the time period as per University Rules).

No marks will be allotted on the Project Report unless a candidate appears at the Viva-Voce Examination. Similarly, no marks will be allotted on Viva-Voce Examination unless a candidate submits his/her Project Report.

Evaluation of the Project Work to be done jointly by one internal expert and one external expert with equal weightage, i.e., average marks of the internal and external experts will be allotted to the candidate.



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WORKSHOP

Course Code: OPT2533

Credit Units: 01

Course Objective:

A workshop is primarily an activity based academic event that is organized to provide the students a one to one and hands on experience on any aspect of their learning. The communication in a workshop has to be necessarily two ways. The department has to make sure that the aspects covered are practically practiced by the participants. The student will choose the option of workshop from amongst their concentration electives. The evaluation will be done by Board of examiners comprising of the faculties.

Major Themes for Workshop:

The workshop may be conducted on any of the major themes: These themes are merely indicative and the department may choose any recent and relevant topic of study.

Guidelines for Workshop:

The procedure for earning credits from workshop consists of the following steps:

Relevant study material and references will be provided by the department in advance.

The participants are expected to explore the topic in advance and take active part in the discussions held

Attending and Participating in all activities of the workshop

Group Activities have to be undertaken by students as guided by the department .

Evaluation of workshop activities would be done through test and quiz at the end of the workshop.

Submitting a write up of atleast 500 words about the learning outcome from the workshop.

Methodology:

The methodology followed at the workshop could be based on any one or more of the following methods:

Case Presentation

Hands on training

Simulation

Group Activity

Role Play

Quiz

Evaluation Scheme:

Attendance	Active Participation	Multiple Choice Questions/ Quiz	Solving the case/ Assignment/ Write up	Total
10	30	30	30	100



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CONTACT LENS-II

Course Code: OPT2601

Credit Units: 04

Course Objectives: Upon completion of the course, the student should be able to:

- Review the basics of contact lenses
- List the important properties of contact lenses
- Finalise the CL design for various kinds patients
- Recognize various types of fitting
- Explain all the procedures to patient
- Identify and manage the adverse effects of contact lens

Course Contents:

Module-I: Prefitting examination

Review of Basics; Patient Selection; Pre screening for contact lens wear; Slit Lamp examination; Assessment of Cornea; Assessment of Tear film

Module-II: Contact lens fitting

Soft contact lens fitting; Soft Toric Contact Lens fitting; Rigid Contact lens fitting; Managing the Presbyope

Module-III: Extended wear contact lens

Cornea and Oxygen; Extended Wear and Silicone Hydrogel Lenses

Module-IV: Contact lens care

Contact lens After Care; Contact lens Care System

Module-V: Speciality contact lens

Therapeutic and Prosthetic contact lenses; Overview of Special considerations for fitting contact lenses; Business Aspects of Contact lens practice; Setting up a Contact lens clinics

Assignment: The student should consult all the manufacturers of RGP lenses and soft lenses and list down various products (Lenses, care products and accessories) available with them. Detailed parameters along with manufacturer recommendation should be noted. Also students will be encouraged to read books and journals and submit a report to the faculty. The topics of the same can be decided by the faculty.

Practical

Pre fitting evaluation; SCL insertion & Removal; Fitting assessment; Over refraction; Follow-up Examination; Toric contact lens fitting and assessment; Cosmetic contact lens fitting and assessment; Do's and don'ts for contact lenses; Care and maintenance; Special instructions for silicone hydrogels; Demonstration for bifocal ,multifocal lenses, scleral lenses, Orthokeratology; Patient communication workshop / role plays; Visit to contact lens manufacturing unit, Case Presentations (components of Practical exam); Video preparations (components of Practical exam)

Examination Scheme:

Components	A	HA	CT	P	EE
Weightage	5	5	10	10	70

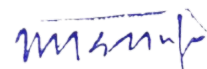
(CT-Class Test; HA- Home Assignment; P-Practical; A- Attendance; EE-End Semester Examination)

Text & References:

- IACLE modules 1 – 10
- Essential Contact Lens practice : Jane Veys, John Meyler , Ian Davies
- CLAO Volumes 1, 2, 3
- Anthony J. Phillips : Contact Lenses, 5th edition, Butterworth-Heinemann, 2006
- Elisabeth A. W. Millis: Medical Contact Lens Practice, Butterworth-Heinemann, 2004
- E S. Bennett ,V A Henry :Clinical manual of Contact Lenses, 3rd edition, Lippincott Williams and Wilkins, 2008
- Contact lens Primer : Monica Chaudhry : Jaypee Brothers



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BINOCULAR VISION-II

Course Code: OPT2602

Credit Units: 04

Course Objective: The objective of this course is to inculcate the student with the knowledge of different types of strabismus its etiology signs and symptoms, necessary investigations and also management. The student on completion of the course should be able to independently investigate and diagnose case of strabismus with comments in respect to retinal correspondence and binocular single vision. The student should be able to perform all the investigations to check retinal correspondence, state of Binocular Single Vision, angle of deviation and special investigations for paralytic strabismus.

Course Contents:

Module-I:

Strabismus - Definition, Classification and etiology; Development of squint or ocular deviation; Adaptation to development of ocular deviation; Orthoptic instruments and their uses; Methods of examination

Module-II:

Anomalous Retinal Correspondence (ARC); Suppression; Amblyopia and eccentric fixation; Definition & Classification; Investigations; Management

Module-III:

Latent Strabismus (Heterophoria); Esotropia; Accommodative esotropia; Partially accommodative esotropia; Non accommodative esotropia; Microtropia; Recurrent esotropia; Secondary esotropia; Management of esotropia; esotropia associated with vertical deviation; Exotropia; Classification and etiology; Primary exodeviation; Dissociated exodeviation; Secondary exodeviation; Cyclo - Vertical Deviation; Comitant hyper deviation; Dissociated vertical deviation; Dissociated horizontal deviation; Elevation in adduction; Depression in adduction; Cyclodeviation

Module-IV:

A and V pattern; Paralytic Strabismus; Genetics and occurrence of squint and binocular vision problems; Special Forms of Strabismus; Retraction syndrome (Duane syndrome); Brown syndrome; Adherence syndrome; Strabismus fixus; Strabismus in high myopes; Fibrosis of extra ocular muscles; Graves' Endocrine ophthalmopathy; Acute orbital myositis; Cyclic heterotropia; Acquired motor fusion deficiency; Fracture of orbital floor; Fracture of medial orbital floor; Ocular Myasthenia gravis; Chronic progressive external ophthalmoplegia (Ocular myopathy of Von Graefe)

Module-V:

Nystagmus; Principle of non surgical treatment; Optical treatment; Pharmacological treatment; Orthoptics; Chemodenervation of extra ocular muscles – Botulinum Toxin; Principle of surgical treatment; Vision Training Programme (VTP)

Practicals:

History taking –Role play; Cover test; ocular motility demonstration and hands on various orthoptic instruments and procedures; Case discussion different types of strabismus; Visit to clinic and record cases



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Examination Scheme:

Components	A	HA	CT	P	EE
Weightage	5	5	10	10	70

(CT-Class Test; HA- Home Assignment; P-Practical; A- Attendance; EE-End Semester Examination)

Text & References:

- Pradeep Sharma: Strabismus simplified, New Delhi, First edition, 1999, Modern publishers.
- Fiona J. Rowe: Clinical Orthoptics, second edition, 2004, Blackwell Science Ltd
- Gunter K. Von Noorden: BURIAN- VON NOORDEN'S Binocular vision and ocular motility theory and management of strabismus, Missouri, Second edition, 1980, C. V. Mosby Company
- Mitchell Scheiman; Bruce Wick: Clinical Management of Binocular Vision Heterophoric, Accommodative, and Eye Movement Disorders, 2008, Lippincot Williams & Wilkins publishers



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CLINIC-V

Course Code: OPT2605

Credit Units: 03

Course Contents:

Module-I

Unit of competency: Contact lens II

The ability to select and fit the most appropriate lens for the planned use

The ability to Identify and manage after care

The ability to understand the techniques used in fitting complex contact lenses and advises patients requiring complex visual corrections.

Module-II

Unit of competency: Pediatric and geriatric optometry:

Pediatric:

Assess ocular health and systemic health conditions.

Identify risk factor of systemic diseases based on ocular findings.

Assess VA, ocular motility, pupil, Objective and subjective refraction.

Pediatric prescribing decision and their purpose. E.g. early onset myopia

investigation and management of children presenting with anomalies of binocular vision.

Geriatric:

Evaluate the functional status of the eye, vision system and account special demands and needs.

Assess ocular health and systemic health conditions.

Detect and diagnose ocular abnormalities and disease

Counsel and educate the patients regarding their visual, ocular and related systemic health care status including recommendations for treatment, management and future care.

Module-III:

Unit of competency: Squint Evaluation:

The ability to assess binocular status using objective and subjective tests

The ability to investigate and manage a patient presenting with heterophoria or heterotropia.

The ability to manage a patient presenting with an incomitant deviations

Demonstration of following Orthoptic instruments/methods and their uses –

Orthoptic Investigative & Therapeutic Procedure.

Cover and uncover test: Differentiate from phoria and tropia.

Measurement of angle of deviation: Subjectively (Synoptophore) and objectively (PBCT/ Modified Krinsky)

Module-IV: Vision Therapy:

The ability to understand different eye exercise procedure

Restoration of vision and maintain ocular alignments by means of different eye exercise

Module-V: Comprehensive eye examination


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Evaluation Scheme:

Attendance	Record file	Written test	Viva	Practical	Total
5	15	30	30	20	100

Text book/ Reference Book

- Grosvenor, Primary Care Optometry , Butterworth-Heinemann,
- A K Khurana: Comprehensive Ophthalmology, 4th edition, New age international (p) Ltd. Publishers, New Delhi, 2007
- D B. Elliott :Clinical Procedures in Primary Eye Care,3rd edition, Butterworth-Heinemann, 2007
- BHVI modules



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VISUAL REHABILITATION

Course Code: OPT2606

Credit Units: 03

Course Objective:

Its aim is develop skills for those who want to work in a professional setting assisting adult populations who are blind/visually impaired and integrate compensatory skills and assistive technology that will enable them to live safe, productive, and independent lives.

Competencies acquired

Specific areas of instruction learned by Vision Rehabilitation Therapists will include:

Communication Systems (Braille, handwriting, recording skills, use of electronic reading systems, use of assistive technology and computer access technology, etc.).

Personal Management (grooming, hygiene, clothing organization, medical measurement, socialization skills, etc.)

Home Management (organization and labeling, repair and home maintenance, budgeting and record keeping, etc.)

Activities of Daily Living (cooking, cleaning, shopping, safety, money organization and management, etc.)

Leisure and Recreation (hobbies, woodworking, crafts, sports, etc.)

Psychosocial Aspects of Blindness and Vision Loss

Medical Management (assessment and instruction and training of adaptive medical equipment)

Basic Orientation and Mobility Skills (sighted guide, safety techniques, etc.)

Evaluation Scheme:

Attendance	Record file	Multiple Choice Questions/ Quiz	Viva	Practical skills /performance	Total
5	15	25	15	40	100

Text & References:

As per the clinical supervisor



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VISION THERAPY AND LEARNING DISABILITIES

Course Code: OPT2607

Credit Units: 03

Course Objective: Its aim is develop skills for those who want to work as a professional Vision therapist
--The course on learning disabilities, vision therapy is specifically directed toward resolving visual problems which interfere with reading, learning and educational instruction.

Competencies acquired

Overview of Normal Child Development
The Relationship between Vision and Learning General Issues
Visual Efficiency Problems
Management of Visual Information Processing Problems
Vision Therapy Procedures for Developmental Visual Information Processing Problems
Interdisciplinary Management of Learning Problems Case Studies
The Role of the Optometrist in the Management of Learning Related Vision Problems
Optometric Assessment Case History
Optometric Assessment Visual Efficiency Problems
Optometric Assessment Visual Information Processing Problems
Various techniques used in management of anomalies

Evaluation Scheme:

Attendance	Record file	Multiple Choice Questions/ Quiz	Viva	Practical skills /performance	Total
5	15	25	15	40	100

Text & References:

- Optometric Management of Learning-related Vision Problems: Mitchell Scheiman, Michael W. Rouse
- Understanding and Managing Vision Deficits: A Guide for Occupational Therapists Mitchell Scheiman



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EYE BANKING

Course Code: OPT2608

Credit Units: 03

Course Objective:

To familiarise the students with various methods of eye banking and the various procedures involved in tissue preservation, transport and storage.

Course Contents:

Module-I: Quality Assurance and Control

EB Medical Standards
EB Standardized Procedures
Sterilization
Refrigeration and Temperature Recording
Instrument Inspection, Cleaning, and Handling
Quality Assurance Monitoring
Record Keeping and Documentation
Professional Standards
Adverse Reaction Reports
Consent Informed Consent Procedures and Documentation
Donor History, Screening, and Evaluation
Determination of Suitability
Donation
Transplant
Legislation and Regulatory Requirements

Module-II: Tissue Related Procedures

Preservation of Tissue
Procedures and Methods
Preservation Media
Transport and Storage of Tissue
Packaging and Labeling
Documentation Requirements
Distribution of Tissue
Storage
Examination and Evaluation of Tissue
Slit Lamp Biomicroscopy
Specular Microscopy
Other
Surgical Procedures
Penetrating Keratoplasty
Lamellar Keratoplasty
Epikeratoplasty
Patch Graft

Module-III: Technical Procedures

Whole Eye Enucleations
Preparation
Equipment and Instrumentation


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Procedure
Corneal Excisions
Preparation
Equipment and Instrumentation
Procedure

Evaluation Scheme:

Attendance	Record file	Multiple Choice Questions/ Quiz	Viva	Practical skills /performance	Total
5	15	25	15	40	100

Text & References:

- Essentials of Eye Banking : by A. Panda
- Eye Banking : T. Bredehorn, Gernot Duncker, W. John Armitage
- Postgraduate Ophthalmology, Volume 1 Zia Chaudhuri, Murugesan Vanathi
- As per the clinical supervisor



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PROJECT

Course code: OPT2632

Credit Units: 03

Objectives:

The aim of the project is to provide the students with an opportunity to further their intellectual and personal development in the chosen field by undertaking a significant practical unit of activity. The project can be defined as a scholarly inquiry into a problem or issues, involving a systematic approach to gathering and analysis of information / data, leading to production of a structured report.

Chapter Scheme and distribution of marks:

Chapter 1: Introduction – 10 marks

Chapter 2: Conceptual Framework/ National/International Scenario – 25 marks

Chapter 3: Presentation, Analysis & Findings -- 25 marks

Chapter 4: Conclusion & Recommendations -- 10 marks

Chapter 5: Bibliography -- 05 marks

Project Report	Power Point Presentation & Viva
75 marks	25 marks

Components of a Project Report

The outcome of Project Work is the Project Report. A project report should have the following components:

- 1) Cover Page: This should contain the title of the project proposal, to whom it is submitted, for which degree, the name of the author, name of the supervisor, year of submission of the project work, name of the University.
 - 2) Acknowledgement: Various organizations and individuals who might have provided assistance /co-operation during the process of carrying out the study.
 - 3) Table of Content: Page-wise listing of the main contents in the report, i.e., different Chapters and its main Sections along with their page numbers.
 - 4) Abstract: The body of the report should have summary of the project.
 - a) Introduction: This will cover the background, rationale/ need / justification, brief review of literature, objectives, methodology (the area of the study, sample, type of study, tools for data collection, inclusion & exclusion criteria and method of analysis), Limitations of the Study, and Planning.
 - b) Conceptual Framework / National and International Scenario: (relating to the topic of the Project).
 - c) Presentation of Data, Analysis and Findings
 - d) Conclusion and Recommendations: In this section, the concluding observations based on the main findings and suggestions are to be provided.
 - 5) Bibliography or References: This section will include the list of books and articles which have been used in the project work, and in writing a project report.
 - 6) Annexure: Questionnaires (if any), relevant reports, etc.
- (The main text of the Project should normally be in the range of 5000 words. However, there may be annexure in addition to the main text)

The Steps of a Project Report

Step I: Selection of the topic for the project by taking following points into consideration:

Suitability of the topic.

Relevance of the topic

Time available at the disposal.

Feasibility of data collection within the given time limit.

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Challenges involved in the data collection (time & cost involved in the data collection, possibility of getting responses, etc.)

Step II: Finalisation of the Topic and preparation of Project Proposal in consultation with the Supervisor.

Step III: Collection of information and data relating to the topic and analysis of the same.

Step IV: Writing the report dividing it into suitable chapters, viz.,

Chapter 1: Introduction,

Chapter 2: Methodology,

Chapter 3: Analysis & Findings

Chapter 4: Conclusion and Recommendations.

Step V: The following documents are to be attached with the Final Project Report.

1) Approval letter from the supervisor (Annexure-IA)

2) Student's declaration (Annexure-IB)

3) Certificate from the Competent Authority of the Organisation / Institution, if the student undertakes the Project Work in any Organisation / Institution.

Guidelines for Evaluation:

Each of the students has to undertake a Project individually under the supervision of a teacher and to submit the same following the guidelines stated below.

Language of Project Report and Viva-Voce Examination may be English. The Project Report must be typed and hard bound.

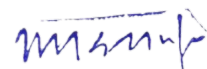
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No marks will be allotted on the Project Report unless a candidate appears at the Viva-Voce Examination. Similarly, no marks will be allotted on Viva-Voce Examination unless a candidate submits his/her Project Report.

Evaluation of the Project Work to be done jointly by one internal expert and one external expert with equal weightage, i.e., average marks of the internal and external experts will be allotted to the candidate.



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(CLINIC-VI A – INTERNSHIP) RETINA, GLAUCOMA, LOW VISION

Course Code: OPT2701

Credit Units: 03

Course Objectives:

At the end of the course, the student will be knowledgeable in the following:

- Examination diagnose and manage various conditions of retina
- Examine, Diagnose and manage various conditions of glaucoma
- Examine manage patients with low vision
- Prescribe and train patient for use of low vision devices

Course Contents:

Module-I: Retina and Vitreous: student should be learning following

- Assess pupil reactions
- Interpret and investigate the presenting symptoms of the patient.
- Examine fundus using direct and indirect techniques
- Identify external pathology and offer appropriate advice to patients not needing referral,
- Understand of risk factors for common ocular conditions.
- Recognise common ocular abnormalities and to refer when appropriate.
- Develop a management plan for the investigation of the patient
- Manage a patient presenting with reduced vision.
- Manage a patient presenting with macular degeneration
- Recognize, evaluate and manage diabetic eye disease and refer accordingly.
- Evaluate and manage a patient presenting with symptoms suggestive of retinal detachment.
- An understanding of the treatment of a range of common retinal diseases.
- Recognise ocular manifestations of systemic disease.
- Assess symptoms and signs of neurological significance.
- Manage patients presenting with sight- threatening eye disease.
- Recognise adverse ocular reactions to medication.
- Help ophthalmologist in performing Retinal LASERS
- Perform and analyse Fluorescein angiography
- Perform and interpret test results of OCT

Module-II: Glaucoma

The ability to perform an examination of the eye and related structures use instruments in ocular examination and to understand the implications of the findings in terms of subsequent examination techniques. Use a contact tonometer to measure intraocular pressure and analyse and interpret the results of Tonometry- Applanation Schiotz

Amsler grid

Assess visual fields of patients with reduced visual acuity.

Interpret and investigate the presenting symptoms of the patient.

Understanding of risk factors for Glaucoma

Investigate visual fields and to analyse and interpret the results.

Visual fields- confrontations, automated, tangent screen, bernels perimeter

Manage a patient presenting with a red eye.

Manage a patient presenting with reduced vision.

Evaluate glaucoma risk factors, to detect glaucoma and refer accordingly.

Understanding of the role of optometrists in shared care

Recognise adverse ocular reactions to medication.

Management : common medications, laser intervention and surgical techniques

Glaucoma investigations and procedures

GTX,HRT,

Provocative test

OCT

Module-III: Low Vision

Clinical examination of Low vision subjects

Optical, Non-Optical, Electronic, and Assistive devices.

Training for Low Vision subjects with Low vision devices

Deciding management plan for Referrals and follow-up

Visual rehabilitation

Examination Scheme

Component	Attendance	Performance	Log book	Practical skills	Viva	Total
Max marks	05	25	20	30	20	100

Text books:

- A K Khurana: Comprehensive Ophthalmology, 4th edition, new age international (p) Ltd. Publishers, New Delhi, 2007
- Christine Dickinson: Low Vision: Principles and Practice Low vision care, 4th edition, Butterworth-Heinemann, 1998

Reference Books:

- Stephen J. Miller : Parsons Diseases of the Eye, 18th edition, Churchill Livingstone, 1990
- Jack J. Kanski Clinical Ophthalmology: A Systematic Approach, 6th edition, Butterworth - Heinemann, 2007
- Richard L. Brilliant: Essentials of Low Vision Practice, Butterworth-Heinemann, 1999



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(CLINIC-VI B) PEDIATRIC & BINOCULAR VISION

Course Code: OPT2702

Credit Units: 03

Course Objective:

To inculcate in a student the

Ability to take an appropriate binocular vision history

Ability to assess eye alignment and eye movements.

Ability to assess sensory fusion and stereopsis.

Ability to assess oculomotor function.

Ability to assess accommodation.

Also to make the student able

To develop an appropriate timetable for eye and vision examinations for pediatric patients

To select appropriate examination procedures for all pediatric patients

To examine the eye health and visual status of pediatric patients effectively

To minimize or avoid the adverse effects of eye and vision problems in children through early identification, education, treatment, and prevention

To inform and educate patients, parents/caregivers, and other health care providers about the importance and frequency of pediatric eye and vision examinations

Evaluation:

Evaluation will be based on the following competencies:

Assesses binocular status using objective and subjective means.

Understands the management of patients with an anomaly of binocular vision.

Investigates and manages adult patients presenting with heterophoria

Manages adult patients with heterotropia.

Manages children at risk of developing an anomaly of binocular vision.

Manages children presenting with an anomaly of binocular vision.

Manages patients presenting with an incommittant deviation.

Examination Scheme:

Component	Attendance	Performance	Log book	Practical skills	Viva	Total
Max marks	05	25	20	30	20	100



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(CLINIC-VI C) CORNEA & CONTACT LENS

Course Code: OPT2703

Credit Units: 03

Course Objectives: At the end of the course the student will be able to:

- Examine the anterior segment of the eye with the help of advanced diagnostic instrument.
- Access the ocular health and clinical decision making of types of contact lens is appropriate
- Instruct a patient in the techniques of soft & RGP lens insertion, removal and other relevant handling instructions and Instruct a patient on the principles of lens wear and care including lens care products.

Course Contents:

Module-I: Examination of anterior segment:

Anatomy & physiology of the anterior segment
Corneal topography: Measurement and significance
Keratometry: interpretation of keratometry result.
Slit lamp bio microscopy procedure
Tear function test
Corneal staining
Corneal sensation test
Specular microscopy: interpretation of test result

Module-II: RGP lens

Pre-fitting evaluation
Nomenclature and lens design
RGP contact lens fitting
Correction of astigmatism with rigid lens
Market availability of different types of RGP contact lens and lens material

Module-III: Soft contact lens

Nomenclature, design, Material properties and manufacturing techniques.
Soft contact lens fitting
Disposable, extended wear and frequent replacement soft contact lens
Correction of astigmatism with soft contact lens
Silicon hydrogel lens
Market availability of different types of soft CL and

Module-IV: Speciality contact lens

Presbyopic lenses
Rose k Lenses
Scleral lenses
Lenses for irregular cornea
Orthokeratology
Myopia control lenses .
Contact lens fitting in high myopia and hyperopia.

Module-V: Care & Maintenance

Preservation and disinfection
Contact lens cleaning and disinfection


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Post fitting care of RGP and soft lenses
Write appropriate order form for RGP and soft lenses
CL practice management

Examination Scheme:

Components	Attd.	Case Presentation	Log book	Viva /CT	EE Practical
Weightage (%)	5	10	15	30	40

Text book:

- IACLE modules
- Essential Contact Lens practice : Jane Veys, John Meyler , Ian Davies
- Contact lens Primer : Monica Chaudhry : Jaypee Brothers
- CLAO Volumes 1, 2, 3
- Anthony J. Phillips : Contact Lenses, 5th edition, Butterworth-Heinemann, 2006
- Elisabeth A. W. Millis: Medical Contact Lens Practice, Butterworth-Heinemann, 2004
- E S. Bennett ,V A Henry :Clinical manual of Contact Lenses, 3rd edition, Lippincott Williams and Wilkins, 2008



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(CLINIC-VI D) PRIMARY EYE CARE

Course Code: OPT2704

Credit Units: 03

Objectives:

- It is expected that upon completion the student will be able to carry out the standard clinical procedures safely and efficient
- Upon completion of the course the student must be able to achieve these skills

Module-I: Take down a comprehensive history –

Must be able to take a structured, accurate history of symptoms from patients with a range of ophthalmic problems and needs

Must be able to produce comprehensive, legible and organized record keeping

Module-II: Do a complete and proper refraction

Visual acuity estimation

Must be able to measure and assess visual function of patients of any age with appropriate tests and techniques like

Lensometry

Retinoscopy

Refraction procedures

Must be able to use subjective and objective techniques to identify and quantify ametropia

Module-III: Do a torch light examination.

Hirschberg test

Module-IV: Do a binocular vision assessment

Ocular motility, cover test

Must be able to assess eye alignment and eye movements

Near point of accommodation, Near point of convergence

Do a detailed binocular vision assessment if required in particular cases

Module-V: Use a slit lamp to do a complete anterior segment examination and posterior segment as required

Must be able to examine for abnormalities in eye and adnexa especially eyelid, conjunctiva, cornea, anterior chamber, lens and fundus using appropriate instruments and techniques

Must be able to interpret signs and symptoms of ocular abnormality

Must be able to perform applanation tonometry and non contact tonometry

Must be able to take the decision to dilate the eye as per need

Must be able take the decision to use appropriate ocular drugs diagnostically and to aid refraction and fundus examination in consultation with the ophthalmologist.

Module-VI: Must be able to give a preliminary diagnosis

During management the student must be able to advice on the most suitable form of optical correction

Examination Scheme:

Components	A	Case Discussion	Log book	Viva /CT	EE Practical
Weightage (%)	5	10	10	25	50

SUMMER INTERNSHIP EVALUATION-II

Course Code: OPT2735

Credit Units: 06

Course Objectives:

The basic objective of a Summer Internship is to refine the practical exposure. This summer training will provide an opportunity to the students to apply their theoretical understanding while working on the concerned project in the hospital / corporate. Thus this summer internship programme is an attempt to bridge the gap between theory and practice. This will also enhance the students' intellectual ability and attributes related to data handling, decision making, report writing, oral presentation and imbibing an interdisciplinary approach.

General Guidelines:

Every student of Boptom shall be required to undergo a practical training in a organization approved by the Institute for minimum of four weeks, normally in the Summer Vacation, after the end of the fourth semester examinations. The candidates shall be required to undergo training in the various areas of the organization concerned. The organization may assign a specific tasks to the candidate, which will be completed by him/her during the period of training. The work done by the candidate during the training period shall be submitted in form of a training report.

The last date for the receipt of training report AND CASE SHEETS in the department shall be one month after the date of completion of training, i.e. at the beginning of the next semester.

Evaluation Scheme:

Attendance	Overall Performance: grading by centre	Viva	Attendance	LOG book Report	Total
5	30	30	10	30	100



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RESEARCH PROJECT (MID TERM EVALUATION)

Objectives: Midterm review of the final year project will be done this semester. The student is required to submit the following during this semester end

Chapter Scheme and distribution of marks:

Chapter 1: Introduction

Chapter 2: Literature review

Chapter 3 : methodology

Chapter 4 : data and its analysis

Pre conclusion and results

Project Report	Viva
75 marks	25 marks

Components of a Project Report

The outcome of Project Work is the Project Report. A project report should have the following components:

- 1) Cover Page: This should contain the title of the project proposal, to whom it is submitted, for which degree, the name of the author, name of the supervisor, year of submission of the project work, name of the University.
- 2) Acknowledgement: Various organizations and individuals who might have provided assistance /co-operation during the process of carrying out the study.
- 3) Table of Content: Page-wise listing of the main contents in the report, i.e., different Chapters and its main Sections along with their page numbers.
- 4) Abstract: The body of the report should have summary of the project.
 - a) Introduction: This will cover the background, rationale/ need / justification, brief review of literature, objectives, methodology (the area of the study, sample, type of study, tools for data collection, inclusion & exclusion criteria and method of analysis), Limitations of the Study, and Planning.
 - b) Conceptual Framework / National and International Scenario: (relating to the topic of the Project).
 - c) Presentation of Data, Analysis and Findings
 - d) Conclusion and Recommendations: In this section, the concluding observations based on the main findings and suggestions are to be provided.
- 5) Bibliography or References: This section will include the list of books and articles which have been used in the project work, and in writing a project report.
- 6) Annexure: Questionnaires (if any), relevant reports, etc.
(The main text of the Project should normally be in the range of 5000 words. However, there may be annexure in addition to the main text)

The Steps of a Project Report

Step I: Selection of the topic for the project by taking following points into consideration:

Suitability of the topic.

Relevance of the topic

Time available at the disposal.

Feasibility of data collection within the given time limit.

Challenges involved in the data collection (time & cost involved in the data collection, possibility of getting responses, etc.)

Step II: Finalisation of the Topic and preparation of Project Proposal in consultation with the Supervisor.

Step III: Collection of information and data relating to the topic and analysis of the same.

Step IV: Writing the report dividing it into suitable chapters, viz.,

Chapter 1: Introduction,
Chapter 2: Methodology,
Chapter 3: Analysis & Findings
Chapter 4: Conclusion and Recommendations.

Step V: The following documents are to be attached with the Final Project Report.

- 1) Approval letter from the supervisor (Annexure-IA)
- 2) Student's declaration (Annexure-IB)
- 3) Certificate from the Competent Authority of the Organisation / Institution, if the student undertakes the Project Work in any Organisation / Institution.

Guidelines for Evaluation:

Each of the students has to undertake a Project individually under the supervision of a teacher and to submit the same following the guidelines stated below.

Language of Project Report and Viva-Voce Examination may be English. The Project Report must be typed and hard bound.

Failure to submit the Project Report or failure to appear at the Viva-voce Examination will be treated as "Absent" in the Examination. He /she has to submit the Project Report and appear at the Viva-Voce Examination in the subsequent years (within the time period as per University Rules).

No marks will be allotted on the Project Report unless a candidate appears at the Viva-Voce Examination. Similarly, no marks will be allotted on Viva-Voce Examination unless a candidate submits his/her Project Report.

Evaluation of the Project Work to be done jointly by one internal expert and one external expert with equal weightage, i.e., average marks of the internal and external experts will be allotted to the candidate.



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INTERNSHIP-II

(CLINIC-VII) COMPREHENSIVE EYE CARE & REFRACTION

Course Code: OPT2801

Credit Units: 05

Objectives: It is expected that upon completion the student will be able to carry out the standard clinical procedures especially refraction efficiently and safely.

Course Contents:

Upon completion of the course the student must be able to

Module-I: Take down a comprehensive history –

Must be able to communicate effectively with the patient, taking into account his/her physical, emotional, intellectual and cultural background – building a rapport

Must be able to take a structured, efficient, accurate history and symptoms from patients with a range of ophthalmic problems and needs

Must be able to produce comprehensive, legible and organised record keeping with appropriate detail and grading

Must be able to interpret and respond appropriately to patient records and other relevant information

Module-II: Do a complete and proper refraction

Visual acuity estimation.

Must be able to measure visual function of patients of any age with appropriate tests and techniques

Must be able to assess visual function in patients with visual impairment

Lensometry

Retinoscopy

Refraction procedures

Must be able to use subjective and objective techniques to identify and quantify ametropia

Module-III: Do a torch light examination.

Hirschberg test

Module-IV: Do a binocular vision assessment

Ocular motility, cover test

Must be able to assess eye alignment and eye movements

Near point of accommodation, Near point of convergence

Module-V: Do a detailed binocular vision assessment if required in particular cases as per the format given in binocular vision syllabus

Module-VI: Do a pupil evaluation with torch light

Module-VII: Use a slit lamp to do a complete anterior segment examination and posterior segment as required

Must be able to examine for abnormalities in eye and adnexa especially eyelid, conjunctiva, cornea, anterior chamber, lens and fundus using appropriate instruments and techniques

Must be able to interpret signs and symptoms of ocular abnormality

Must be able to perform applanation tonometry and non contact tonometry

8. Must be able to take the decision to dilate the eye as per need

Must be able take the decision to use appropriate ocular drugs diagnostically and to aid refraction and fundus examination.

Must be able to give a preliminary diagnosis

During management the student must be able to advice on, order and be able to dispense the most suitable form of optical correction taking into account durability, comfort, cosmetic appearance, age and lifestyle.

Evaluation Scheme:

Attendance	Record file Log book	Case discussion- I	Case discussion- II	EE Practical	Total
10	20	20	20	30	100

The final evaluation is based on the Clinical skill evaluation practical exam the candidate will be asked to examine a patient with all details. This examination will primarily measures skills, it contains an assessment, management and communication skills, as well as some interpretation of clinical findings.

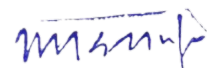
The study centre will form an integral part of the evaluation and will be based on the regular performance and participation in grand rounds .discussions and presentations.

Text book/ Reference Book

- Grosvenor, Primary Care Optometry , Butterworth-Heinemann,
- A K Khurana: Comprehensive Ophthalmology, 4th edition, New age international (p) Ltd. Publishers, New Delhi, 2007
- D B. Elliott :Clinical Procedures in Primary Eye Care,3rd edition, Butterworth-Heinemann, 2007
- BHVI modules



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(CLINIC-VII) OPTOMETRIC PROCEDURES & INSTRUMENTS

Course Code: OPT2802

Credit Units: 05

Course Objective:

This course deals with complete theory and practical experience in all basic tests, instrumentation and procedures necessary to evaluate the ocular health status of a patient. The topics include complete optometric procedures and instruments taught in the previous semesters like case history, gross external examination of the eye and adnexa, pupil and muscle functions, anterior and posterior segment examination, tonometry, visual acuity, and visual fields assessment and so on .

The objective of this course is to apply all theoretical knowledge into examination and optometric management of the patient with ocular problems.

The student should learn to operate all instruments and be able to carry out all ophthalmic procedures.

Evaluation Scheme:

The final evaluation is based on the Clinical skill evaluation practical exam the candidate will be asked to examine a patient with all details. This examination will primarily measures skills, it contains an assessment, management and communication skills, as well as some interpretation of clinical findings. It will be assessing the competence of individual optometrists in the practice of optometry


Evaluation Scheme:

Attendance	Record file Log book	Practical	Written test	Viva	Total
10	20	30	30	20	100

The study centre will form an integral part of the evaluation and will be based on the regular performance and participation in grand rounds .discussions and presentations.



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PROJECT-DISSERTATION

Course Code: OPT2837

Credit Units: 12

The project evaluation will include assessment at the end of third year (synopsis submission). Midterm review (at the end of 7th semester)

Weightage will be as follows

Synopsis submission = 20% (end of sixth semester)

Mid-Term review = 30 % (end of seventh semester)

Final submission and presentation = 50%

Chapter Scheme and distribution of marks: (submission at end semester)

Chapter 1: Introduction – 10 marks

Chapter 2: Conceptual Framework and literature review – 25 marks

Chapter 3: Presentation, Analysis & Findings -- 25 marks

Chapter 4: Conclusion & Recommendations -- 10 marks

Chapter 5: Bibliography -- 05 marks

Project Report	Power Point Presentation & Viva
75 marks	25 marks

Components of a Project Report

The outcome of Project Work is the Project Report. A project report should have the following components:

1) Cover Page: This should contain the title of the project proposal, to whom it is submitted, for which degree, the name of the author, name of the supervisor, year of submission of the project work, name of the University.

2) Acknowledgement: Various organizations and individuals who might have provided assistance /co-operation during the process of carrying out the study.

3) Table of Content: Page-wise listing of the main contents in the report, i.e., different Chapters and its main Sections along with their page numbers.

4) Abstract: The body of the report should have summary of the project.

a) Introduction: This will cover the background, rationale/ need / justification, brief review of literature, objectives, methodology (the area of the study, sample, type of study, tools for data collection, inclusion & exclusion criteria and method of analysis), Limitations of the Study, and Planning.

b) Conceptual Framework / National and International Scenario: (relating to the topic of the Project).

c) Presentation of Data, Analysis and Findings

d) Conclusion and Recommendations: In this section, the concluding observations based on the main findings and suggestions are to be provided.

5) Bibliography or References: This section will include the list of books and articles which have been used in the project work, and in writing a project report.

6) Annexure: Questionnaires (if any), relevant reports, etc.

(The main text of the Project should normally be in the range of 5000 words. However, there may be annexure in addition to the main text)

The Steps of a Project Report

Step I: Selection of the topic for the project by taking following points into consideration:

Suitability of the topic.

Relevance of the topic

Time available at the disposal.

Feasibility of data collection within the given time limit.

Challenges involved in the data collection (time & cost involved in the data collection, possibility of getting responses, etc.)

Step II: Finalisation of the Topic and preparation of Project Proposal in consultation with the Supervisor.

Step III: Collection of information and data relating to the topic and analysis of the same.

Step IV: Writing the report dividing it into suitable chapters, viz.,

Chapter 1: Introduction,

Chapter 2: Methodology,

Chapter 3: Analysis & Findings

Chapter 4: Conclusion and Recommendations.

Step V: The following documents are to be attached with the Final Project Report.

1) Approval letter from the supervisor (Annexure-IA)

2) Student's declaration (Annexure-IB)

3) Certificate from the Competent Authority of the Organisation / Institution, if the student undertakes the Project Work in any Organisation / Institution.

Guidelines for Evaluation:

Each of the students has to undertake a Project individually under the supervision of a teacher and to submit the same following the guidelines stated below.

Language of Project Report and Viva-Voce Examination may be English. The Project Report must be typed and hard bound.

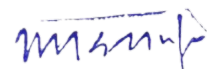
Failure to submit the Project Report or failure to appear at the Viva-voce Examination will be treated as "Absent" in the Examination. He /she has to submit the Project Report and appear at the Viva-Voce Examination in the subsequent years (within the time period as per University Rules).

No marks will be allotted on the Project Report unless a candidate appears at the Viva-Voce Examination. Similarly, no marks will be allotted on Viva-Voce Examination unless a candidate submits his/her Project Report.

Evaluation of the Project Work to be done jointly by one internal expert and one external expert with equal weightage, i.e., average marks of the internal and external experts will be allotted to the candidate.



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INTEGRATIVE SEMINAR DURING THE INTERNSHIP

It serves to teach optometry students how the material in the curriculum relates to their role as optometrist. This will be achieved through a synthesis of lecture, clinical observation, case-based learning and small-group discussion. Once a week, the entire class will attend a one-hour lecture with topics reflective of the ongoing course material being presented in other courses. For two additional hours per week, small seminar group observation and discussion will take place. The seminar meetings will reinforce the lecture concepts through clinical observation and case discussions relating to those observations. Lecture and small-group discussions will include the participation of both basic and clinical science faculty in order to promote integration of the curricular material and to show how the care provided is related to what is currently being learned. This will enable the future clinician to make informed clinical decisions, encourage critical thinking and promote lifelong independent learning.

INTEGRATIVE SEMINAR

Is designed to facilitate the student's transition into clinical internship by using an integrative approach. The course builds upon past Integrative Seminars, providing the student with an environment leading to the development of informed clinical decision making, critical thinking and lifelong independent learning. The student gains a foundation for optometric practice by learning to employ scientific knowledge, utilization of informational resources, doctor-patient interactive skills and clinic participation to form the basis of an individualized patient evaluation, assessment and plan. This will be achieved through a synthesis of group teaching, case-based learning, small-group discussion and clinical experience. Group discussions will include the participation of both basic and clinical science faculty to foster integration of curricular material. As a means of entry into clinical practice, the highest standards of professional conduct and responsibility will be emphasized throughout the course.

The interns are required to complete one quarter of senior seminar.

The seminar meets over four hours each week to provide a small group-learning environment focused on clinical case presentations derived from the participants' clinical experience.

This grand-rounds format will provide a basis for integration and critical analysis of current clinical research with the goal of increasing the participants' understanding, use and communication of evidence-based clinical information.



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DIETETICS & NUTRITION

Programme Structure

Course Code	Course Title	Lectures (L) Hours Per Week	Tutorial (T) Hours Per Week	Practical (P) Hours Per Week	Total Credits (15)
DAN2151	Principles of Nutrition	3	-	-	3
DAN2251	Family Meal Management	3	-	-	3
DAN2351	Basic Dietetics	2	-	2	3
DAN2451	Advanced Dietetics	2	-	2	3
DAN2551	Community Nutrition	3	-	-	3
DAN2651	Food Chemistry	3	-	-	3
	TOTAL				18



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DIETETICS & NUTRITION

Syllabus - Semester First

PRINCIPLES OF NUTRITION

Course Code: DAN2151

Credit Units: 03

Course Objective

This Course is designed to enable students

1. Understand the vital link between nutrition and health
2. Gain knowledge on functions, metabolism and effects of deficiency of nutrients

Course Contents:

Module -I

Nutrition - General introduction, Classification of nutrients, Functions of food, social function of food, psychological functions of food.

Energy - Definition of Kilocalories, Joule, energy value of foods, determination, physiological fuel values, SDA of foods, determination of energy requirements of body, basal metabolic rate determination, factors influencing BMR, Recommended Dietary Allowances for energy.

Carbohydrates - Classification, functions, source, digestion, absorption and utilization, dietary fiber and health.

Module -II

Protein - Classification, functions, sources and requirements, digestion, absorption and Utilization, Protein quality - Definition of biological value, NPU, digestibility coefficient, PER definition and measurement. Deficiency due to shortage of protein and energy – PCM, kwashiorkor. Reference protein, essential amino acids and mutual supplementation of dietary protein.

Fats and Lipids - Classification, functions, sources, requirement, digestion, absorption and utilization, importance of essential fatty acids, their requirements and deficiency.

Module -III

Vitamins – Fat soluble vitamins –A, D, E and K- functions, source, requirements, deficiency disorders. Water soluble vitamins –The B-complex vitamins – Thiamine, Riboflavin, Niacin, Folic acid, Biotin, Pantothenic acid and Vitamin C - functions, source, requirements and deficiency disorders.

Module -IV

Minerals - General functions in the body, classification- macro and micro minerals.

Micro minerals – Iron, Fluorine, Zinc, copper, Iodine -functions, absorption, utilization, requirements, deficiency and toxicity. Macro minerals – Calcium & phosphorus - functions, absorption, utilization, requirements, deficiency and toxicity.

Module -V

Water Balance – Functions of water, water distribution, maintenance of water and electrolyte balance, regulation of acid-base balance in the body.

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Examination Scheme:

Components	ATT	P	HA	CT	EE
Weightage (%)	5	5	5	15	70

(ATT-Attendance; P-Project; HA-Home Assignment; CT-Class Test; EE-End Semester Examination)

Text and References:

- Essential of food & Nutrition –Vol. 1 M. Swaminathan, Bappco, Bangalore.
- Human Nutrition and Dietetics –Davidson S. Passmore
- Normal and Therapeutic Nutrition- Corinne .H.Robinson & Marilyn Lawler
- Contemporary Nutrition - Gordon M. Wardlaw, Paul Insel et, al., (2000) Mosby, Chicago.
- Nutrition- concepts and controversies- Eleanor Whitney –Eighth Edition (2000)
- Basic principles of Nutrition- Seema Yadav, First edition (1997)
- Essentials of Nutrition and Diet therapy -Sue Rodwell Williams, fifth edition, Times Mirror Mosby College Publishing, 1990.
- Understanding Nutrition -Whitney P.N. and Roes S.R., West Publication Co, 1996



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Syllabus - Semester Second

FAMILY MEAL MANAGEMENT

Course Code: DAN2251

Credit Units: 03

Course Objectives: To enable the students

1. Understand the nutritional demands in various stages of life cycle.
2. Acquire skills in planning adequate meals in different stages of life cycle.

Course Contents:

Module I

Basic Principles of Meal Planning - Basic meal pattern and its need to suit different income levels age and physiological stages. Recommended allowance-RDA for Indians, basis for requirement, energy allowance for different growth pattern of children, energy allowance for various activities.

Module II

Nutritional Needs during Pregnancy - Normal growth and weight change. Nutritional requirements, complications during various stages of pregnancy – hyper emesis gravidarum, preeclampsia and eclampsia and their management at family level.

Nutrition during Lactation - Function of breast, physiology of lactation, hormonal control and relaxation, Milk output and factors affecting it, frequency of nursing- supply and demand, nutritional components of colostrum and mature milk. Nutritional requirements of lactating women.

Module III

Nutrition during Infancy - Growth and development, factors influencing growth, Advantages of breast feeding, difference between breast feeding and bottle feeding, factors to be considered in bottle feeding. Different types of milk formulae.

Weaning Foods - Weaning foods and commercially prepared baby foods. Uses of growth chart to monitor growth & development. Nutritional requirements of infants' upto one year. Weaning foods developed by different organizations. Problems of feeding in normal and premature infants.

Module IV

Nutritional needs of pre-school children (1-5 year) - Nutritional and food requirements of preschool children. Factors to be considered while planning meals for pre-school children. Eating problems of children and their management, preparation of supplementary foods using available low cost foods.

Nutrition for School children - Nutritional requirement, meal planning for school children, dental caries and packed lunch.

Module-V

Nutrition during Adolescence - Physical Growth- changes and factors affecting height and weight, increments during menarche, Nutritional requirement. Nutritional problems in adolescence- Iron deficiency anemia, obesity, anorexia nervosa and bulimia nervosa.

Nutritional needs of adults (men and women) – Nutrition and work efficiency. Menopausal and post menopausal women, hormonal changes, nutritional requirement of the adult in relation to occupation.

Nutrition During Old Age - Physiological changes in ageing- psycho-social and economic factors affecting eating behavior. Nutritional problems of aged and their management.

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Examination Scheme:

Components	ATT	P	HA	CT	EE
Weightage (%)	5	5	5	15	70

(ATT-Attendance; P-Project; HA-Home Assignment; CT-Class Test; EE-End Semester Examination)

Text and References :

- Nutrition Trends in India -Vinodhini Reddy, Prahlad Rao, Govmth Sastry and Kashinath, NIN, Hyderabad, 1993.
- Modern Nutrition in Health and Diseases- Shills, E.M. Olson, A.J. and Shike, Lea and Febiger
- Dietetics -B. Srilakshmi, New Age International Pvt. Ltd, 2003.
- NutritionScience-B.Srilakshmi,NewAgeInternationalPvt.Ltd., 2003.
- Food,nutrition and diet therapy -Krause, Eleventh edition
- Human Nutrition and Dietetics- Davidson S Passmore R, Brock JP, ELBS and Churchill, Livingstone.
- Fundamentals of foods and Nutrition - Mudambi SR and Rajagopal M Y, Wiley Eastern Ltd.
- ICMR- Nutritive value of Indian Foods, 1989.
- Nutrition throughout the life cycle, Bonnie S.Worthinton, Roberts, Sue Rod well Williams., TheMcGraw- Hill company,1996.
- Nutrition in the life span- Virginia Beal, John Wiley & sons New York.



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Syllabus - Semester Third

BASIC DIETETICS

Course Code: DAN2351

Credit Units: 03

Course Objectives:

- To understand the modifications in nutrients and dietary requirements for various diseases.
- To acquire the ability to plan and prepare diets for various diseases.

Course Contents:

Module I

1. Role of Dietician-hospital and community
2. Basic concepts in Diet Therapy
3. Therapeutic Adaptation of the normal diet
4. Routine Hospital Diets- Regular diet, light diet, soft diet, full liquid diet and tube feeding.
5. Modifications of Diet -Febrile conditions, infections & surgical conditions.

Module II

6. Diets of gastro intestinal disorders, renal diseases, liver diseases, obesity, cardio vascular disorders and diabetes mellitus.
7. Geriatrics - Role of diet.
8. Feeding infants & children - problems in feeding children in the hospital.
9. Feeding the patient - psychology of feeding the patient, assessment of patients needs.
10. Nutrition & Diet Clinics - Patients check up and dietary counseling, education of the patient and follow up.

Examination Scheme:

Components	ATT	P	HA	CT	EE
Weightage (%)	5	5	5	15	70

(ATT-Attendance; P-Project; HA-Home Assignment; CT-Class Test; EE-End Semester Examination)



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Syllabus - Semester Fourth

ADVANCED DIETETICS

Course Code: DAN2451

Credit Units: 03

Course Objectives: To enable students

1. Gain knowledge about principles of diet therapy and different therapeutic diets.
2. Develop aptitude for taking up dietetics as a profession.

Course Contents:

Module-I

Objectives of diet therapy - Role of a dietitian. Principles of diet preparation and counselling.

Normal diet in the hospitals –regular diet, liquid ,semi liquid, light , soft diet, and bland diet.

Different types of Feeding - Basic concepts of oral feeding, tube feeding, IV feeding, gastrostomy feeding.

Module-II

Therapeutic diets for the following disorders:

- a. Under weight - definition, etiology, treatment
- b. Obesity - definition, etiology, treatment.
- c. Diseases of the gastro intestinal tract-Peptic ulcer and duodenal ulcer, Dumping syndrome, constipation
- d. Acute and chronic diarrhea -rehydration therapy.

Module-III

Diseases of the liver and gall bladder (risk factors and diet therapy)

- a) jaundice b) hepatitis c) cirrhosis d) fatty liver and diet therapy

Diseases of the cardio vascular system (risk factors and diet therapy)

- a) atherosclerosis b) arteriosclerosis c) hypertension d) congestive heart failure

Module-IV

Diabetes mellitus – causes, symptoms, bio-chemical changes, insulin, hypo- glycemic drugs, changes in the metabolism of carbohydrate, fat and protein, food exchange list, dietary management

Diseases of the kidney and urinary tract

- a. Acute and chronic nephritis
- b. Nephrotic syndrome
- c. Renal failure
- d. Urinary calculi
- e. Uremia

Causes and dietary treatment of kidney diseases and dialysis.

Nutrition and cancer - Dietary guidelines for management.

Module-V

Diet in Allergy - Definition, classification, common food allergy, test of allergy, diet therapy. Pre operative and post operative diets.

Diet in febrile conditions - Short duration e.g. Typhoid, Long duration e.g. Tuberculosis. Dietetic management of gout and phenyl ketonuria.

Diet in relation to deficiency diseases-Protein calorie deficiency, vitamin A deficiency and anemia.

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Examination Scheme:

Components	ATT	P	HA	CT	EE
Weightage (%)	5	5	5	15	70

(ATT-Attendance; P-Project; HA-Home Assignment; CT-Class Test; EE-End Semester Examination)

Text and References:

- Krause and Mahan – Food ,Nutrition and Diet therapy, 6th Edition W.B. Saunders company, London
- Normal and therapeutic nutrition –17th Edition, Robinson et. al ., Mac Millan Pub.Co., New York
- ICMR(1989) Nutrient Requirements and recommended dietary allowances for Indians.
- Antia FP (1987) Clinical Dietetics and Nutrition, Oxford University Press, New Delhi
- Srilakshmi (2002) Dietetics, IVth Edition. New Age International (P) Limited, Publishers, New Delhi
- Shubhangini. A. Joshi (2002) Nutrition and dietetics, Tata Mc Graw- Hill publishing company limited, New Delhi.
- B. Srilakshmi (2002) Nutrition science, New age international (P) limited, New Delhi
- Carolyn E.Town send and Ruth A. Roth (2002) Nutrition and Diet Therapy, Delmar publisher
- Sue rod Williams, Nutrition and diet Therapy, Times Mirror Mosby College publishing, Boston, 1989.
- The Indian journal of nutrition and dietetics, Avinashilingam Deemed University, Coimbatore



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Syllabus - Semester Fifth

COMMUNITY NUTRITION

Course Code: DAN2551

Credit Units: 03

Course Objectives: To enable the students

1. Know about the application of basics of nutrition in the community
2. Gain knowledge of community nutrition programmes of national and international organization

Course Contents :

Module-I

Definition - Community, family, village and block

Meaning of Optimum Nutrition, Malnutrition- Under nutrition and over nutrition..

Characteristics of community- Demography, Vital statistics, IMR, MMR, morbidity. Causes of **malnutrition**-Factors contributing to malnutrition in the community - food habits, customs and practices, availability of food, Socio-economic factors, Housing and hygienic conditions, population explosion.

Module-II

Assessment of the nutritional status of the community -direct and indirect methods - Anthropometry, Clinical and Biochemical, Diet Surveys.

Nutritional problems of women and men- Anemia, Vitamin A deficiency, B-complex deficiency.

Nutritional problems of infants and children- PEM-Marasmus and Kwashiorkor, Vitamin A deficiency, B-complex deficiency diseases, anemia-incidence, prevalence, epidemiology and prevention , other problems- Goitre, fluorosis and Lathyrism- prevalence, causes and symptoms and programmes to control.

Module-III

Nutrition intervention programmes - ICDS: Objectives and services, Noon meal programme, TINP, SNP, Vitamin A prophylaxis.

National Organization- Role of ICMR, NIN, NNMB & ICAR

International organization- WHO, FAO , UNICEF, DANIDA & World Bank.

Module-IV

Home Science- Meaning and Objectives. Role of Home-Scientists in rural development-with reference to ongoing programmers like Family Welfare Programme, Adult Education for community-different methods, advantages and disadvantages. Nutrition education- merits and demerits of different methods, Concept of nutrition garden.

Module-V

Communication- Principles, methods and classification. Advantages and limitations of different methods.

Audio-visual aids- Types, advantages and limitations.

Health care- delivery, challenges & strategies. Set up of PHC, school health services and employees state insurance.


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Examination Scheme:

Components	ATT	P	HA	CT	EE
Weightage (%)	5	5	5	15	70

(ATT-Attendance; P-Project; HA-Home Assignment; CT-Class Test; EE-End Semester Examination)

Text and References:

- Jelliffe DN, Assessment of Nutritional Status of the community.
- Ritchie JA, Teaching Nutrition FAO, 1979.
- Rajalakshmi R, Applied Nutrition, Oxford and JBH Publishers, 1981.
- Devadas RF, Nutrition in Tamil Nadu, Sanfam Publishers, Madras, 1972.
- Mc.Laren S, Nutrition and the community, John Wiley & Sons, 1982.
- Reddy AA, Extension Education, Srilakshmi Press, Bapla, 1971.
- Dahama OP and Bhatnagar OP Education and Communication for development.Oxford IBH Publishing Co.,1980.
- Savile AH, Extension in rural communities, Oxford University Press,1965.
- Nutrition Science, Srilakshmi (2001).
- Nutritional problem in India-PK Shukla,Prentice Hall, India.
- Foundations of community Health Education, Mc Graw Hill,London.



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Syllabus - Semester Sixth

FOOD CHEMISTRY

Course Code: DAN2651

Credit Units: 03

Course Contents:

Module-I

Study of various cooking methods - Boiling, steaming, stewing, frying, baking, roasting, broiling, cooking under pressure. Stages of sugar cookery, crystallization and factors affecting crystallization.

Module-II

Cereals - Structure, composition of rice, wheat, effects of cooking on parboiled and raw rice, principles of starch cookery, gelatinization, flours-types, formation of dough and batter

Pulses and Legumes – Varieties of pulses & legumes, composition, nutritive value, cooking quality of pulses, germination and its effect.

Module III

Vegetables - Classification, composition, nutritive value, selection and preparation for cooking

Fruits - Classification, composition, nutritive value, changes during ripening, methods and effects of cooking, enzymatic browning

Module IV

Milk - Composition, nutritive value, kinds of milk, pasteurization and homogenization of milk, changes in milk during heat processing, preparation of cheese and milk powder.

Module V

Egg - Structure, composition, selection, nutritive value, uses of egg in cookery

Fleshy foods - meat structure, composition, nutritive value, selection of meat, post mortem changes in meat, aging, methods of cooking meat

a) Poultry – types, composition, nutritive value, selection

b) Fish - Structure, composition, nutritive value selection of fish

Module VI

Fats and Oils - Types of oils, function of fats and oils, shortening effects of oil, smoking point of oil

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

Texts & References:

- Food Science, Chemistry and Experimental Foods by M. Swaminathan.
- Food Science by Norman.N.Potter.
- Experimental Study of Foods by Griswold R.M.
- Food Science by Helen Charley.
- Foundation of Food Preparation by A.G. Peckam.
- Modern Cookery for teaching and trade, volume I&II, Thangam Philip. Orient Longmans Ltd.
- Food Fundamentals by MacWilliams, John Willy and son's, New York.
- Food Facts & Principles by Shakunthala manay & Shadakhraswamy.
- Food Science by Srilakshmi, second edition, 2002.

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Master of Science - Clinical Research

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Programme Structure

Curriculum & Scheme of Examination

2022

AMITY UNIVERSITY HARYANA

GURUGRAM

A handwritten signature in blue ink, appearing to read 'Anil'.

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STATISTICS FOR CLINICAL RESEARCH

Course Code: CLR4103

Credit Units: 04

Course Objective:

To enrich the understanding of biostatistician procedure in clinical research which sponsor, CRO and Hospital use in clinical trials. To know the importance of biostatistics in clinical trials.

Course Contents:

Module 1:

Introduction and basic concepts ,Overview of the drug development process, bias, randomization, blinding, choice of control group. Organization and display of data, Types of data, graphical diagrammatic representation of data. Role of biostatisticians in clinical research, ANOVA –Survival analysis, measurement scales and variables, sampling, degree and meaning of correlation, and its types , karl Pearson and spearman correlation coefficient ,difference b/w correlation and regression.

Module 2:

Measures of Central tendency ,Mean, median, mode, measure of dispersion ,Standard Deviation, Standard Error, Variance, range, Coefficient of Variation. Skegness & Kurtosis.

Module3: Correlation and Regression

Correlation:, types of data required, assumptions, correlation coefficient, significance of correlation, meaningfulness of correlation coefficient. **Regression:-**, Simple linear regression.

Module 4:

Probability and probability distributions, Definitions, probability distribution curves. Continuous probability distribution-Normal distribution, properties and applications.Discrete probability distribution-Binomial & Poisson distribution, properties and applications. Test of significance-F –test, t-test & chi-square test. Statistical input during protocol design, Demonstration of sample size calculation: comparing two means, Sample size computation

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

Text:

- Biostatistics: A foundation for analysis in the Health Sciences, W.W Daniel. Publisher: John Wiley and Sons.
- Biostatistics, P.N Arora and P.K Malhan. Publisher: Himalaya Publishing House.

References:

- Introduction to Biostatistics, Ronald N. Forthfer and Eun Sun Lee .Publisher: Elsevier.
- Biostatistics: A foundation for analysis in the Health Sciences, W.W Daniel. Publisher: John Wiley and Sons.
- Statistical Methodology, S.P Gupta. Publisher: S.Chand& Co.
- Biostatistics: A manual of Statistical Methodology for use in Health, Nutrition and Anthropology, K. VisweswaraRao. Publisher: Jaypee Brothers.

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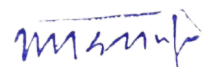
- Fundamentals of Mathematical Statistics, S.C Gupta and V.K Kapoor. Publisher: S. Chand & Co.
- Statistical Analysis, Kaushal, T.L. Publisher: Kalyani Publishers.
- Statistical Methods, Potri, D. Kalyani Publishers.
- Mathematical Statistics by H.C. Saxena and V.K. Kapoor. Publisher: S. Chand & Co

PRACTICAL

- Collection of data & statistical calculations
- Preparation of charts/graphs
- Problems based on measure of central tendency.
- Problems based on measure of dispersion.
- Problems based on test of significance-t-test, F-test, chi-square test.
- Problems based on correlation & regression.
- Problems based on Probability



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BASICS OF PHARMACY, DRUG DISCOVERY AND DEVELOPMENT

Course Code: CLR4104

Credit Units: 05

Course Objective:

To enrich the understanding of pharmacology, drug discovery procedure in clinical research which sponsor, CRO and Hospital use for patient protection. To know the importance of drug discovery in clinical trials.

Course Contents:

Module-1:

History of Pharmacy, Indian Pharmaceutical industry, Drugs-sources, nomenclature, classification, Pharmacopoeias, Formulary, Codex. Branches of Pharmacy: Pharmacognosy, Pharmaceutical chemistry, Quality Assurance, Pharmaceutics, Pharmacology, Pharmacy Management and Pharmacy Practice. Pharmaceutical Manufacturing-Quality Assurance and Quality Control.

Module-2:

Drug Regulatory Environment-Pharmaceutical Legislation in India, Drug regulatory authorities, International Conference on Harmonization, Good Practices and Quality Management, Drug Master File.

Module-3:

Drug Discovery & Development. History of drug development, Drug Discovery Pipeline, Drug Discovery Process. Approaches to Drug Discovery: Synthetic/medicinal chemistry, combinatorial synthesis, Natural Product, In Silicon approach or CADD, QSAR, Discovery Genomics.

Module-4:

Personalized medicines, High throughput screening. Manufacturing and packaging Manufacturing-Multitasking machines Packaging-cGMP, USP requirements on containers and closures, Quality Control, Inhalation drug products, drug products for injection, drug products for ophthalmic, liquid based oral and topical drug products, post approval packaging changes.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

- Drug Discovery and Development , 2nd Edition by Raymond G Hill
- Drugs: From Discovery to Approval by Rick Ng



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PRE-CLINICAL STUDIES AND SAFETY

Course Code: CLR4201

Credit Units: 05

Course Objective:

To enrich the understanding of pre-clinical drug discovery procedure in clinical research.
To know the importance of Preclinical studies and various procedure used in clinical trials.

Course Contents:

Module-I:

Experimental animals used, Equipments used in ATC, Sterilization techniques, media for animal cell culture. Cell culture and cell lines, concepts in mammalian and non-mammalian culture, applications of cell culture, Assessment of preclinical data, assessment of cost benefit and risk ratio.

Module-II:

History of toxicity, relationship between dose and toxicity, types of toxicity, factors influencing toxicity, toxins, toxicity studies, special toxicity studies, in vitro models, in situ methods, in vivo models.

Module III:

Good Laboratory Practices, ICMR-GLP guidelines, FDA-GLP guidelines, Organization and personnel, facilities, equipment, testing facilities operation, test and control studies, protocol for and conduct of a non-clinical laboratory study, records and reports, disqualification of testing facilities, OECD-GLP guidelines, quality assurance program, facilities, test systems, test and reference items, Standard Operating Procedures, Performance of the study, reporting of study results, storage and retention of records and materials.

Module-IV:

Drug action, mechanism of drug action, dose-response relationship, therapeutic index, undesirable effects, disease modeling—hypertension, asthma, acidity, arthritis, cancer, addiction, autoimmune diseases, pain, epilepsy, inflammation.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

Text:

- Basic Principles of Clinical Research and Methodology by S.K.Gupta
- Drug Discovery and Development by Raymond G Hill


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IPR & DATA EXCLUSIVITY, BIOETHICS IN CLINICAL RESEARCH

Course Code: CLR4202

Credit Units: 05

Course Objective:

To enrich the understanding of IPR and bioethics procedure in clinical research which sponsor, CRO and Hospital use for patient protection .To know the importance of ethics and IPR law used in clinical trials.

Course Contents:

Module-1:

Intellectual property rights, Laws of IPR, patents, The World Trade Organization and the TRIPS agreement, copy rights, the rationale for IP protection, the evidence about the impact of IP, Technology Transfer, Contracts and Agreements ,CIOMS , Insurance for research injuries, contractual agreement.

Module-2:

The Data Protection Act & data mining, data and disclosure, data exclusivity, data exclusivity as a governmental function, commercial and economical rationale for test data, confidentiality, current state of data protection.

Module-3:

Introduction to bioethics, ethical issues in preclinical (animal) studies, & clinical studies-Ethical principles, Institutional Review Board, Special issues in research. Ethical Guidelines-ICMR, Institutional Ethics Committees, Institutional Review Board, Ethics-SOPs Ethical issues based on methodology of clinical Research. The ethics of clinical research in developing countries.

Module-4:

Basic philosophies of animal ethics: (3 'R's), Animal Ethics Committee, executive, meetings, confidentiality and indemnity, period of approval, joint animal ethics committee, process to establish an AEC, guidelines for ethical conduct in the care and use of animals. Social responsibility for clinical researcher.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

- Basic Principles of Clinical Research and Methodology by S.K.Gupta


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REGULATORY AFFAIRS

Course Code: CLR4204

Credit Units: 05

Course Objective:

To enrich the understanding of Regulatory Affairs procedure in clinical research for global business purposes. To know the procedure of regulatory submission from CRO, Sponsor.

Course Contents:

Module-1: Introduction regulatory affairs:

Overview of judicial system in India, Medical Evidence, Privileged Communication and Professional Secrets, The Rights and Obligations of a Medical Professional to Patient, Medical Malpractice, Code of Medical Ethics.

Module-2: Drugs and Cosmetics Act & Schedule Y:

Introduction to Drugs and Cosmetics Act, Aims and Objectives, Definitions, Administrative bodies, Schedules to Drug Rules, Import of drugs, Manufacture of drugs, Sale of drugs, penalties for offence regarding sale of drugs, labelling and packaging of drugs . Schedule Y, Clinical trials, Studies in special populations, Post Marketing Surveillance, special studies. Bioavailability and Bioequivalence studies, Amendment of Schedule Y.

Module-3: Regulatory authorities & ICH:

Regulatory authorities in India- Indian FDA, DCGI, Schedule Y, ICMR, GEAC, AERB, DGFT, DTAB, DBT Guidelines and other important provisions, Indian regulatory approval process, regulatory timelines, approval timeline, approval letter. ICH and Process of Harmonization: History and structure of ICH, Process of Harmonization ICH Guidelines, Categories of ICH guidelines, Quality, Safety, and Efficacy Guidelines.

Module-4: International Regulatory bodies and Guidelines:

US Food and Drug Administration (USFDA): The FDA and Food Drug and Cosmetics Act, New drug development and approval : the principal steps.

India: Regulatory laws, Schedule Y, registration of new drugs, requirements for registration, regulatory environment and practices.

Medicines and Healthcare Products Regulatory Agency (MHRA): Overview of regulatory environment/ background, regulatory authorities, regulatory requirements and procedures.

European Agency for Evaluation of medicinal Products(EMEA): National registration , the decentralized procedures, mutual recognition procedures.

Module-5: Regulatory Requirements of Clinical Trial Application

Investigational New drug (IND): Classifications, IND application process

New Drug Application (NDA): Pre NDA meeting, NDA submission Check list, FDA NDA review

Abbreviated New drug Application (ANDA): ANDA content, ANDA Submission check list, FDA ANDA review check list, ANDA process for generic drugs, guidance documents for ANDAs

Examination Scheme:

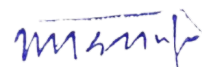
Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

- A guide book for regulatory submission: Sandy Weinberg.
- A guide to clinical drug research: A.Cohen& J. Posner.
- FDA Regulatory affairs: Douglas J. Posano& David Mantus.
- Introduction to regulatory affairs: Vedjignesh.
- Regulatory affairs: Fegodets.



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AUDIT AND INSPECTION

Course Code: CLR4206

Credit Units: 05

Course Objective:

To enrich the understanding of Audit and inspection procedure in clinical research for global business purposes. To know the importance of Audit and inspection for CRO, Sponsor and Hospital.

Course Contents:

Module 1: Introduction to Audits and Quality Assurance:

Quality Assurance, Definition, Quality system, The Quality Plan, Quality Assurance (QA), Quality Control (QC), Differentiating quality control and quality assurance, Structuring the quality assurance function, Critical Issues For Organizing The Quality Assurance Function, Overview Of QA Activities Audits: Definition of audit, Quality Assurance Audits In Clinical Research, Motives For Process Audit, Objectives Of Process Audit, Auditors, Conducting A Clinical Research Department Process Audit, Audit findings, Research Fraud and misconduct, site audits, FDA inspections, PL 483 warning letters, Auditing clinical data management function.

Module 2: Site Audits, Fraud and Misconduct:

Definition of audits as per ICH GCP, Goals and objectives of study site audits, Types of clinical trial site audits, Criteria for onsite audits, The audit process, Audit preparation activities, Common audit findings.

Module 3: FDA Inspections, PL 483, and Warning Letters:

Definitions, Differentiating inspection from audits, Types of inspections, Purpose of regulatory inspections, The process of inspection, forms, warning letters, Selection of the study site for inspection, Forms, warning letters.

Module 4: Clinical Data Management and Auditing CDM function:

Introduction to CDM, Computer system validation (CSV), Clinical Data Management flow.

Data Entry/Remote data entry: First data entry, Second data entry, heads up and heads down data entry, audit trail, , computerized system in clinical trials,

Data Capture: Definition, paper based and electronic data capture, dataflow in paper CRFs and e-CRFs, tools for data capture, advantages and disadvantages of paper CRF/ e-CRF

Data cleaning/validation: Definition, Discrepancy management system, Data Management team, Roles and responsibilities of key team members and sponsor, Introduction to data base design and build, data base validation, Clinical data entry process, data entry process, data entering. Electronic clinical trials, Clinical Trial registry of India (CTRI), Types of audits in CDM, Audit process, Activity-specific audits, Protocol audit, CRF audit, Common findings during a data management audit.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & Reference:

- Clinical trials audit-David machin
- Introduction to Audit & inspection-DJ Cockbuern
- Clinical trials audit preparation: a guide for good clinical practice inspection: Vera mihajlovic & madzarevic.


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REPORTING AND MEDICAL WRITING

Course Code: CLR4303

Credit Units: 05

Course Objective :

To enrich the student role and responsibility of medical writer in clinical trials. To know the importance of medical writer in clinical research.

Course Contents:

Module-1:

Fundamentals of Medical Writing & Data interpretation and presentation:

The Scope of Medical Writing, Qualities of effective medical writer, role and responsibilities of medical writer in clinical research,

Essential Documents prepared by medical writer-Importance of Essential Documents

Pre Study Document: Investigators Brochure, Financial aspects of the trial, Approval letter from the IRB, IRB Composition etc.

During the Study Documents: Updates on medical/laboratory/technical procedure tests, Subject enrolling log, Investigational product accountability at site, , Audit certificate etc

Post Study Documents: Final report by investigator to IRB, Final report by investigator to regulatory authorities, Clinical study report to document results and interpretation etc, Study Completion documents, Study Termination/closure documents

Module-2:

Study Protocol - The contents of a trial protocol should generally include the topics: General Information, Background Information, Trial Objectives and Purpose. Trial Design, Selection and Withdrawal of Subjects, Treatment of Subjects, Assessment of Efficacy, Assessment of Safety, Biostatistics, Direct Access to Source Data/Documents, Quality Control and Quality Assurance, Ethics, Data Handling and Record Keeping, Financing and Insurance, Publication Policy, Supplements, Annexure.

Case Report Forms (CRF) & e-CRF- Study Title, Inclusion Criteria, Exclusion Criteria, Patient Screening, Admission /discharge procedure, Visit wise, Period wise, Laboratory Analysis, Vital signs, Diet restriction, Concomitant medication, withdrawal/drop out details, Adverse Events Form, Serious Adverse Event Form.

Module-3:

Informed Consent Form/Assent Form- Study title, What is the purpose of research, The study design, Study Procedures, Women of childbearing potential, Possible risks , Possible benefits, Compensation, Possible benefits to other people, The alternatives you have, Cost to the participant, Confidentiality of the information of subject/patient, decision to participate/ not participate, Withdrawal of the consent, Right to new information, Contact persons, Patient consent form, Patient Information Sheet, Patient visit diary

Standard Operating Procedures (SOP) in Clinical Trials - Need of SOPs, What is SOPs, Benefits of SOPs, different types of SOPs, SOP Writing SOPs and Guideline, Implementation and monitoring of SOPs, Change control.

Module-4:

The Clinical Study Report

Structure of CSR and possible modifications, study patients, efficacy evaluation, safety evaluation, discussion and overall conclusions, tables, figures and graphs referred to but not included in the text, reference list, appendices. Reference ranges (normal ranges), Interpretation of normal values, Units of measurement, Factors Affecting interpretation of test.

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Investigator's Brochure, and Electronic Common Technical Document:

Contents of the Investigator's Brochure, Table of Contents, Summary, Introduction, Physical, Chemical, and Pharmaceutical Properties and Formulation, Non-clinical Studies, Effects in Humans, Summary of Data and Guidance for the Investigator, Components of the CTD, Electronic Common Technical Document

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & Reference:

- Clinician's Guide to Medical Writing :Robert B. Taylor. 1st ed. 2004.Springer Publications.
- Guidebook to Better Medical Writing :Robert L. Iles (Author), Debra Volkland. Iles
- Medical writing & clinical reporting: Beltas.
- Medical writing: Cam Johns tan.
- Medical writing & reporting: Dr.Nancy Snyder man.



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PHARMACOGENOMICS

Course Code: CLR4304

Credit Units: 04

Course Objective:

To enrich the student important role of pharmacogenomics in drug discovery in clinical trials
To know the importance of pharmacogenomics in clinical research

Course Contents:

Module 1: Introduction to pharmacogenomics:

History, Chronology of Events, Pharmacogenetics and Pharmacogenomics: The Difference, Benefits of Pharmacogenetics, Pharmacogenetics in Practice, Promise of Pharmacogenomics, Limitations, Pharmacogenomics drugs in the market, Future of Pharmacogenomics

Module 2: Determinants of drug response & Bioinformatics tools for pharmacogenomics:

Pharmacokinetics and pharmacodynamics of drug, drug properties that influence its pharmacokinetics and pharmacodynamics .Bioinformatics, Divisions of Bioinformatics, Fields Related to Bioinformatics, Application of Bioinformatics in various disciplines/fields, Major categories of Bioinformatics Tools with examples

Module 3: Pharmacogenetics of enzymes and transporters:

Xenobiotic -Phase I and II reactions Drug transporters-Structure and model of drug transporters, transport mechanisms, polarized expression of drug transporters, drug transporters in barrier epithelium, classification of drug transporters, ABC and SLC transporters, genetic variation and drug response, genetic variation in membrane transporters

Module 4: Clinical pharmacogenomics and clinical trials:

Pharmacogenomics in clinical practice, the role of drug metabolizing enzymes in cardiovascular pharmacology, Pharmacogenetics and clinical trials-Issues in clinical trials ethical implications of pharmacogenomics research, guidance on pharmacogenomics data.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & Reference:

- Basic and Clinical Pharmacology: BertrandKatzung
- Essentials of Medical Pharmacology :K. D Tripathi
- Pharmacology: Rang, Dale and Ritter
- Pharmacology and Pharmacotherapeutics:Satoskar,18th ed, 2003

PRACTICAL DEMONSTRATION (DRY LAB)

1. To navigate different component of NCBI including PUBMED
2. To search literature in NCBI-PUBMED using Bollean operators
3. To find out the details on a given molecule including gene, gene symbol, OMIM, chromosome location

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4. To find out the details on a given molecule including protein, HPRD architecture, localization in human protein atlas, proteins sequence,
5. To study drug-drug interaction to find out if there is synergism, antagonism, or additive outcome using COMPUSYN software
6. To count cells in a given sample for cell viability using trypan blue assay (Virtual)
7. To separate different cell types from blood samples and their segregation using surface markers
8. To perform BLAST to know if your sequence aligned with existing sequence or not using BLAST alignment tool
9. To perform in silico PCR using primer sequence to know the output with coding along or coding and non-coding sequences
10. To predict ORF to know if a sequence has potential to code for a protein
11. To determine which sequence in pool of DNA sequences is more or less stable based on Nitrogenous base content



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PROJECT MANAGEMENT AND PHARMACOVIGILANCE

Course Code: CLR4306

Credit Units: 05

Course Objective:

- To enrich the student role and responsibility of Project manager in clinical trials.
- To enrich the student role and responsibility of Pharmacovigilance and various safety monitoring's in clinical trials.
- To know the importance of Pharmacovigilance in clinical research.

Course Contents:

Module 1: Project Management Process & Project Development Plan in clinical research:

The triple constraints in Project Management, Project management activities, Project objectives, Project management Documents, Project control variables, Project Management & Clinical Trials, Role of Project Management in Clinical Trials, Major Roles of a Project Manager in a CRO, Ensuring Project Success. Initiating, Planning, Executing, Monitoring & Controlling, Closing .Preparation of Clinical Project Development Plan, Contents of Clinical Project Development, Plan, Review and Approval of CPDP.

Module 2: Clinical Research outsourcing & Services Offered by CROs:

Outsourcing in Clinical Research, Reasons for outsourcing to contract research organizations, Benefits of outsourcing, Out/In-Sourcing of Clinical Services, Scope and Future of CRO, List of Clinical Research Organizations in India, List of IT companies offering services in Clinical Research, Outsourcing in Clinical Trial Management, Clinical Trial Monitoring, Pharmacovigilance - Drug Safety, Data Management, Regulatory Affairs, Protocol Development, Site Management, Clinical Trial Supplies, Centralized Lab Management, Centralized ECG reading services, Centralized Imaging Services.

Module 3: Introduction to Pharmacovigilance and safety signals :

Introduction, Definition, requirement of Pharmacovigilance needed, Objectives of Pharmacovigilance, and Agencies concerned with Pharmacovigilance, Reporting ADRs, Methods involved in Pharmacovigilance, Scope of Pharmacovigilance, Adverse Event (AE), Adverse Drug Reaction(ADR), Serious Adverse Drug Reaction (SAE), Unexpected Adverse Reaction, Suspected-unexpected serious Adverse reaction (SUSAR), Reporting of AE & SAE. Risk management process, Signals, and Detection of Signal, Causality assessment.

Module 4: Pharmacovigilance regulations and Periodic safety update reports

Pharmacovigilance in India: Pharmacovigilance centers in India, CDSCO Indian PV guidelines National Pharmacovigilance Program (NPP)

Global Pharmacovigilance& safety standards- Pharmacovigilance activity in USA, Australia, WHO Monitoring of safety aspects – Uppsala Monitoring Center.

Adverse Event reporting form: MEDWATCH, CDSCO Adverse Event Reporting Form, CIOMS form for Serious Adverse event reporting, Medication errors reporting

Periodic safety update reports (PSUR) for marketed drugs : Brief Introduction and Purpose of Periodic safety Update Report, PSUR Content, PSUR Process, Various Regulatory Requirement for PSUR.


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Module 5: Pharmacoepidemiology

Pharmacoepidemiology, Guidelines for Good Pharmacoepidemiology Practices (GPP), Registries, Surveys.

Concepts and uses of epidemiology, Components of epidemiological studies – frequency distribution and determinants of diseases, Methods to measure and describe health of population, epidemiological triad.

Natural history of disease, Disease spectrum, Modes of transmission, Levels of prevention. Epidemiological principles of Intervention in prevention and control of disease, Measurement of morbidity and mortality, incidence, prevalence, age adjustment, standardization and Risk Measurement.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & Reference:

- Project Management - The Managerial Approach: Clifford Gray and Erik W. Larson
- Principles of project management: Richard A. Billows.
- Principles of project management & risk management: R.Max Wideman.
- Business development: the expanding role of the project management: Lew Ireland
- Textbook of therapeutics Drug and Disease Management: Eric T Herfindel, Dick R. Gourley, 6th ed.
- Assuring Data Quality And Validity In Clinical Trials For Regulatory Decision Making : Janet Woodcock, Frederick Ognibene, John Overbeke.2003;Welly Publication.

DIAGNOSTICS IN CLINICAL RESEARCH

Course Code: CLR4307

Credit Units: 04

Course Objective: To make the students understand the basics of diagnosis and related tests and clinical significance in the field of clinical research.

Course Contents:

Module-1:

Diagnosis in clinical research: Definition of diagnosis, types, different parameters used in diagnosis and its related basic tests.

Diabetes Profile: Diabetes mellitus; Blood glucose; Glucose tolerance test; Glycosylated hemoglobin; urine sugar.

Kidney Profile: Serum total protein; albumin; creatinine; urea; blood urea nitrogen; clearance test; Sodium and Potassium

Module-2:

Pancreatic Function Test: Serum amylase; lipase; secretin stimulation test; serum trypsinogen.

Liver Function Test: SGOT, SGPT, phosphatase, serum bilirubin; albumin; globulins; A/G ratio; gamma-glutamyltranspeptidase .

Module-3:

Cardiac Function Test: SGOT, SGPT, LDH, CK-MB, Troponins and heart-type fatty acid binding protein (H-FABP); Myoglobin; Brain type natriuretic peptide (BNP).

Lipid Profile: Total serum lipids; total serum cholesterol; triglyceride; HDL; LDL; VLDL; Apo 1 and Apo 2

Module-4:

Gastric and Intestinal Function Test: Examination of resting contents; fractional gastric analysis; serum pepsinogen; tubeless gastric analysis; Zollinger-Elison syndrome; lactose intolerance; xylose absorption test; inulin absorption test.


Enzymes in the diagnosis and clinical interpretation: Diagnosis, prognosis and assessment of myocardial infarction, hepatitis, jaundice, pancreatitis, cancer, neurodegenerative disorders.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & Reference:

- U Satyanarayan and U Chakrapani, Text book of Biochemistry, 4th Edition 2013, Elsevier.
- M N Chatterjea and Rana Shinde, Text book of Medical Biochemistry , 8th Edition 2012, Jaypee Brothers Medical Publishers (P) Ltd.
- Text Book of Pathophysiology by Dr. Rajpal Bansal, Dr. Anu Gupta


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PATHOPHYSIOLOGY AND THERAPEUTICS

Course Code: CLR4308

Credit Units: 04

Course Objective:

- To empower the students' knowledge with the understanding of pathophysiology of diseases.
- To develop professional interests in the field of diseases therapeutics and its significance in clinical research.

Course Contents:

Module-1:

Fundamentals of Pathophysiology: Definition, terminology, pathology of diseases including etiology, risk factors, signs and symptoms, Systemic pathology of blood vessels and lymphatic's, liver, exocrine pancreas, kidney, endocrine system, musculoskeletal system, nervous system, system associated diseases, communicable and non-communicable diseases overview of diagnosis of the disease and treatment.

Module-2:

Diseases and therapeutics: Etiologic and diseases management of Fever (Acute and chronic), Allergy, Stress, Burns, Obesity, HTN, Diabetes, CVD, Gout, Osteopenia, Osteoporosis, Peptic ulcer, diarrhoea, constipation, mal-absorption syndrome – carbohydrates, fat and lactose intolerance, and celiac disease. Inborn errors of metabolism, Phenylketonuria, Galactosemia, Alkaptonuria, Glomerulonephritis, Nephrotic syndrome, Acute and chronic renal failure, TB, AIDS, Hepatitis, cirrhosis, hepatic failure, pancreatitis, rheumatoid arthritis, schizophrenia, depression, migraine, anxiety, insomnia, thyroid and metabolic disorders and infectious diseases.

Module-3:

Cancer: Types of Cancer-Benign and malignant cancer; Cancer markers -CA15-3, CA19-9, CA-125, PSA, CEA, alpha fetoprotein, beta-HCG and other markers, cancer pathophysiology, therapeutics and research.

Module-4:

Advance laboratory diagnosis, clinical interpretation and research : Assessment of enzymes and hormones-T3, T4, TSH, Testosterone, Estrogens, Progesterone, Prolactin, FSH, ADH, Insulin and Glucagon, Lab testing and clinical interpretation of communicable and non-communicable diseases and latest advancements.

Examination Scheme:

Components	CT	HA	S/V/Q	ATTD	EE
Weightage (%)	15	5	5	5	70

Recommended books:

- Handbook of Pathophysiology by Joan P Frizzell
- Text Book of Pathophysiology by Dr.Rajpal Bansal, Dr.Anu Gupta
- Diabetes Mellitus: Williams and Wilkins Co., USA
- U Satyanarayan and U Chakrapani, Text book of Biochemistry, 4th Edition 2013, Elsevier.
- M N Chatterjea and RanaShinde, Text book of Medical Biochemistry, 8th Edition 2012, Jaypee Brothers Medical Publishers (P) Ltd.


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SUMMER INTERNSHIP EVALUATION

Course Code: CLR4335

Credit Units: 06

GUIDELINES FOR SUMMER TRAINING

The main objective of summer training is to familiarize students to laboratory environment and make them learn to handle equipments and softwares, design experiments and analyze the results. The student will be supervised by one or more faculty members and he or she will be required to submit a synopsis. While writing a synopsis emphasis should be given to make it publishable. But whether or not the results of a research project are publishable, the project should be communicated in the form of a research report written by the student. Initial drafts should be critiqued by the faculty guide and corrected by the student at each stage.

The File is the principal means by which the work carried out will be assessed and therefore great care should be taken in its preparation.

In general, the File should be comprehensive and include

- A short account of the activities that were undertaken as part of the project;
- A statement about the extent to which the project has achieved its stated goals.
- A statement about the outcomes of the evaluation and dissemination processes engaged in as part of the project;
- Any activities planned but not yet completed as part of the project, or as a future initiative directly resulting from the project;
- Any problems that have arisen that may be useful to document for future reference.

Report Layout

The report should contain the following components:

- TITLE PAGE
- CERTIFICATE
- ACKNOWLEDGEMENT
- ABBREVIATIONS
- CONTENTS WITH PAGE NUMBERS
- CHAPTER –
 - a. INTRODUCTION
 - b. REVIEW OF LITERATURE
 - c. MATERIALS & METHODS
 - d. RESULTS & DISCUSSION
 - e. SUMMARY AND CONCLUSION
 - f. REFERENCES
 - g. APPENDIX (OPTIONAL)
- 1 inch Margin on left side & 1" each on other sides.
- Single side of the paper to be used.
- Times New Roman.

Font Size

- 12 (Bold for headings)
- 12 (Normal for Matter)
- 14 (for Chapter Names)
- 1.5 line spacing
- Numbering on the right hand Top of the page
- Numbers on pages before chapters to be done in Roman at the bottom of the page

References

This should include papers and books referred to in the body of the report. These should be ordered alphabetically on the author's surname. The titles of journals preferably should not be abbreviated; if they are, abbreviations must comply with an internationally recognised system.

Examples

For research article

Voravuthikunchai SP, Lortheeranuwat A, Ninrprom T, Popaya W, Pongpaichit S, Supawita T. (2002) Antibacterial activity of Thai medicinal plants against enterohaemorrhagic *Escherichia coli* O157: H7. *Clin Microbiol Infect*, **8** (suppl 1): 116–117.

For Book

Kowalski, M. (1976) Transduction of effectiveness in *Rhizobium meliloti*. SYMBIOTIC NITROGEN FIXATION PLANTS (editor P.S. Nutman IBP), 7: 63-67


- Scientific names in Italics
- Cover Page containing - Title, Students Name, Supervisors Name, University, Name (along with logo), Course name & year of Submission in the prescribed format
- 2 copies to be submitted

ASSESSMENT OF THE PROJECT FILE

Essentially, marking will be based on the following criteria: the quality of the report, the technical merit of the project and the project execution.. Evaluation will compose of two components - Project report assessment and Viva - voce. Project report assessment will be done by the two internal faculty members in respective fields. A committee of three faculty members will conduct Viva-voce. Technical merit attempts to assess the quality and depth of the intellectual efforts put into the project will be assessed as per evaluation format.

Examination Scheme:

Project Report	50
Viva Voce	50
Total	100


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DISSERTATION

Course Code: CLR4437

Credit Units: 20

GUIDELINES FOR PROJECT FILE

Research experience is as close to a professional problem-solving activity as anything in the curriculum. It provides exposure to research methodology and an opportunity to work closely with a faculty guide. It usually requires the use of advanced concepts, a variety of experimental techniques, and state-of-the-art instrumentation.

Research is genuine exploration of the unknown that leads to new knowledge which often warrants publication. But whether or not the results of a research project are publishable, the project should be communicated in the form of a research report written by the student.

Sufficient time should be allowed for satisfactory completion of reports, taking into account that initial drafts should be critiqued by the faculty guide and corrected by the student at each stage.

The File is the principal means by which the work carried out will be assessed and therefore great care should be taken in its preparation.

In general, the File should be comprehensive and include

- A short account of the activities that were undertaken as part of the project;
- A statement about the extent to which the project has achieved its stated goals.
- A statement about the outcomes of the evaluation and dissemination processes engaged in as part of the project;
- Any activities planned but not yet completed as part of the project, or as a future initiative directly resulting from the project;
- Any problems that have arisen that may be useful to document for future reference.

Report Layout

The report should contain the following components:

➤ Title or Cover Page

The title page should contain the following information: Project Title; Student's Name; Course; Year; Supervisor's Name.

➤ Acknowledgements (optional)

Acknowledgment to any advisory or financial assistance received in the course of work may be given.

➤ Abstract

A good "Abstract" should be straight to the point; not too descriptive but fully informative. First paragraph should state what was accomplished with regard to the objectives. The abstract does not have to be an entire summary of the project, but rather a concise summary of the scope and results of the project

➤ Table of Contents

Titles and subtitles are to correspond exactly with those in the text.

➤ Introduction

Here a brief introduction to the problem that is central to the project and an outline of the structure of the rest of the report should be provided. The introduction should aim to catch the imagination of the reader, so excessive details should be avoided.

➤ Materials and Methods

This section should aim at experimental designs, materials used. Methodology should be mentioned in details including modifications if any.

➤ **Results and Discussion**

Present results, discuss and compare these with those from other workers, etc. In writing these section, emphasis should be given on what has been performed and achieved in the course of the work, rather than discuss in detail what is readily available in text books. Avoid abrupt changes in contents from section to section and maintain a lucid flow throughout the thesis. An opening and closing paragraph in every chapter could be included to aid in smooth flow.

Note that in writing the various sections, all figures and tables should as far as possible be next to the associated text, in the same orientation as the main text, numbered, and given appropriate titles or captions. All major equations should also be numbered and unless it is really necessary never write in “point” form.

➤ **Conclusion**

A conclusion should be the final section in which the outcome of the work is mentioned briefly.

➤ **Future prospects**

➤ **Appendices**

The Appendix contains material which is of interest to the reader but not an integral part of the thesis and any problem that have arisen that may be useful to document for future reference.

➤ **References/ Bibliography**

This should include papers and books referred to in the body of the report. These should be ordered alphabetically on the author's surname. The titles of journals preferably should not be abbreviated; if they are, abbreviations must comply with an internationally recognised system.

Examples

For research article

Voravuthikunchai SP, Lortheeranuwat A, Ninrprom T, Popaya W, Pongpaichit S, Supawita T. (2002) Antibacterial activity of Thai medicinal plants against enterohaemorrhagic *Escherichia coli* O157: H7. *Clin Microbiol Infect*, 8(suppl 1): 116–117.

For book

Kowalski, M. (1976) Transduction of effectiveness in *Rhizobium meliloti*. SYMBIOTIC NITROGEN FIXATION PLANTS (editor P.S. Nutman IBP), 7: 63-67

ASSESSMENT OF THE PROJECT FILE

Essentially, marking will be based on the following criteria: the quality of the report, the technical merit of the project and the project execution.

Technical merit attempts to assess the quality and depth of the intellectual efforts put into the project.

Project execution is concerned with assessing how much work has been put in.

The File should fulfill the following **assessment objectives**:

Range of Research Methods used to obtain information


Execution of Research

Data Analysis

Analyse Quantitative/ Qualitative information

Control Quality

Draw Conclusions


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Examination Scheme:

Project Report	50
Viva Voce	50
Total	100



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Master of Science - Molecular Medicine & Stem Cell Technologies

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Curriculum & Scheme of Examination

2022

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MICROBIOLOGY & VIROLOGY

Course Code: SCT4102

Credit Units: 03

Course Objective:

The course will offer thorough understanding of the biology of different forms of bacteria, fungi, protozoa and viruses, their role in disease development as well as in useful applications in biotechnology.

Course Contents:

Module I

Introduction and historical perspective: Discovery of the microbial world, role of microorganisms in transformation of organic matter and in the causation of diseases, development of pure culture methods. Methods in Microbiology: Principles of microbial nutrition, culture media, theory and practice of sterilization, pure culture techniques.

Module II

Prokaryotic structure and function: functional anatomy of bacteria, cell envelope, cell wall, cytoplasmic membrane, capsule, surface appendages, cytoplasm and cytoplasmic inclusions. Growth: Definition of growth, mathematical expression of growth, growth curve, measurement of growth, synchronous growth, continuous culture, culture collection and maintenance of cultures. Systematics and taxonomy: new approaches to bacterial taxonomy, classification including ribotyping, ribosomal RNA sequencing, characteristics of primary domains, taxonomy, nomenclature and Bergey's manual.

Module III

Metabolic diversity among microorganisms: photosynthesis in microorganisms, role of bacteriochlorophylls, carotenoids and phycobilins, Chemolithotrophy, hydrogen-iron-nitrite-oxidizing bacteria, nitrate and sulphate reduction, methanogenesis and acetogenesis, Fermentations, nitrogen fixation, plant microbe interactions (mycorrhizae).

Module IV:

Archaea as earliest life forms, thermophiles, psychrophiles, halophiles, alkalophiles, acidophiles, hyperthermophiles. Viruses: Bacterial, animal; structure of viruses; Reproduction and life cycle of RNA and DNA viruses; Viroids and prions. Algae and Fungi: Classification and Reproduction. Host-parasite relationship: Normal micro flora of skin, oral cavity, gastrointestinal tract, Respiratory infections; entry of pathogens into the host, types of toxins (Exo, endo, entero) and their mode of actions, Microbial pathogenesis: Disease reservoirs; Epidemiological terminologies; Infectious disease transmission; Sexually transmitted disease including AIDS, Food and water-borne diseases; pathogenic fungi.

Module V

Chemotherapy/antibiotics: Antimicrobial agents, sulfa drugs, antibiotics, penicillin and cephalosporins, broad spectrum antibiotics, antifungal antibiotics; mode of action.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:**Text:**

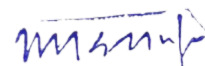
- General Microbiology, R.Y. Stanier, J.L. Ingraham, M.L. Wheelis and P.R. Painter, Macmillian
- Microbiology VI Edition, M.J. Pelczar, E.C.S. Chan and N.R. Kreig, Tata McGraw Hill Microbiology by Prescott
- The microbes – An Introduction to their Nature and Importance, P.V. Vandenmark and B.L. Batzing, Benjamin Cummings.

References:

- The Microbial World, Roger Y. Stanier, Prentice Hall
- Microbiology, Tortora, Funke and Chase, Benjamin & Cummings
- Principles of Fermentation Technology, Salisbury, Whitaker and Hall, Aditya Books Pvt. Ltd.
- Industrial Microbiology, Casida, New Age International
- Industrial Microbiology, Prescott and Dunn, C.B.S. Publishers Principles of Microbiology, R.M. Atlas, WMC. Brown Publisher.



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MOLECULAR BIOLOGY & rDNA TECHNOLOGY

Course Code: SCT4103

Credit Units: 02

Course Objective:

A complete understanding of molecular techniques like DNA sequencing, restriction mapping, PCR for the cloning and expression of genes can be obtained through the course.

Course Contents:

Module I

Purification of DNA from bacterial, plant and animal cells, manipulation of purified DNA. Introduction of DNA into living cells, transformation, transduction, electroporation, micro-injection.

Module II

Introduction to gene cloning and its uses, tools and techniques: plasmids, cosmids, transposons and other vectors, DNA, RNA, cDNA, viral and non-viral vectors.

Module III

Clinical applications of recombinant technology; Erythropoietin; Insulin analogs and its role in diabetes; Recombinant human growth hormone; Streptokinase and urokinase in thrombosis; Recombinant coagulation factors, Monoclonal antibodies and their role in cancer; Role of recombinant interferons; Immunostimulants; Immune-suppressors in organ transplants; Role of cytokine therapy in cancers.

Module IV

Analysis of DNA by Southern blotting, Analysis of RNA by Northern blotting, Analysis of proteins by Western blot techniques, Dot blots and slot blots, RFLP, AFLP.

PCR: Basic principles and its modification application and uses.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

Text:

- Gene cloning and DNA analysis by T.A. Brown

References:

- Recombinant DNA, J.D. Watson et al, W.H. Freeman and Company
- Principles of Gene Manipulation: An Introduction to Genetic Engineering, R.W. Old and S. B Primrose, Blackwell Science Inc
- Molecular Biotechnology: Principles and Applications of Recombinant DNA, B.R. Grick and J.J. Pasternak, ASM Press
- Molecular Biology of gene by Watson, Baker, Bell, Gann, Levine, Losick
- DNA Science by Micklos Freyer
- Principles of Gene manipulation and Genomics by Primrose and Twyman

BIOANALYTICAL TECHNOLOGIES & INSTRUMENTATION

Course Code: SCT4105

Credit Units: 02

Course Objective:

The course aims to educate students about bio-analytical instruments, principles of their proper functioning, and analysis methods applied to biological data obtained in experimental techniques, methodology and the safe laboratory practice.

Course Contents:

Module I

BSL I, BSLII, BSLIII laboratory facility development: design and regulatory requirements. Sampling and sample preparation: Sample fixing for various analytical applications and sample processing. Principles of microscopy, Light, dark field, fluorescence microscope, confocal microscope, transmission and Scanning electron microscopy, microtomy and analysis and measurement of image. Fluorescence activated cell sorter (FACS) basic principles and applications.

Module II

Electrophoresis of DNA, RNA and proteins. Capillary electrophoresis, Two-dimensional electrophoresis, Southern blotting, Northern blotting, Immunoprecipitation, Western blotting. Sequencing, Next Generation Sequencing, RNA-Seq. etc.

Module III: Centrifugation and Spectroscopy

Centrifugation techniques: Introduction, Basic principle of sedimentation, centrifuges and their uses, Density gradient and analytical centrifugation.

UV and visible spectroscopy, infrared and atomic absorption spectroscopy, fluorescence spectroscopy, mass spectrometry, MALDITOF, nuclear magnetic resonance and electron spin resonance spectroscopy.

Module IV: Chromatography

Introduction to chromatographic techniques: Theoretical basis of chromatographic separations. Column, Thin layer, Paper, Normal phase and reverse phase chromatography, Ion-exchange, Affinity and Gas Chromatography, High performance liquid chromatography (HPLC) and GLC.

Module V

Principles of X-ray diffraction and X-ray Crystallography. Theory and application of UV-VIS, IR, NMR, Fluorescence, Atomic absorption spectroscopy; X-ray diffraction. Introduction to mass spectroscopy Radioisotopic techniques: Introduction to radioisotopes, detection, measurement and uses of radioisotopes, counting efficiency and autoradiography, biotechnological applications

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

Text:

- Principles of Physical Biochemistry, K.E. Van Holde, Prentice Hall.
- Essentials of Biophysics, P. Narayanan, New Age International Publishers

References:

- Advanced Instrumentation, Data Interpretation, and Control of Biotechnological Processes, J.F. Van Impe, Kluwer Academic
- Crystal Structure Analysis, J.P. Glusker and K.N. Trueblood, Oxford University Press
- Crystallography made Crystal Clear, G. Rhodes, Academic Press
- Modern Spectroscopy, J.M. Hollas, John Wiley and Son Ltd.
- NMR Spectroscopy: Basic Principles, Concepts and Applications in Chemistry, H. Gunther, John Wi



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BIOSTATISTICS

Course Code: SCT4106

Credit Units: 03

Course Objective:

The course aims to develop competency and expertise in the application of statistical methods applied to biological data obtained in experimental techniques, methodology and the safe laboratory practice.

Course Contents:

Module I

Statistics and Biostatistics: Preliminary concepts; Measures of Central Tendency: Mean, Median, Mode
Measures of Dispersion: Range, Standard deviation, Variance

Module II: Probability

Random Experiments, Trial and Event, Sample Space, Mutually Exclusive or Disjoint Events, Mutually Exhaustive Events, Equally Probable Events, Complementary Event, Classical definition of Probability, Statistical definition of Probability, Axiomatic definition of Probability, Addition theorem, Multiplication theorem, Conditional Probability, Bayes' Theorem. Expectation.

Module III: Types of Probability Distributions

Introduction to Normal Distribution, Bernoulli Distribution, Uniform Distribution, Binomial Distribution, Poisson distribution, Exponential Distribution

Module IV: Correlation & Regression

Bivariate distribution Correlation, Types of Correlation, Simple Correlation Coefficient for ungrouped data, Properties and Interpretation of Correlation Coefficient, Coefficient of determination, Scatter diagram, Standard Error, Probable error of Correlation Coefficient. Rank correlation, Some examples. Regression lines and Regression Coefficients, Properties of Regression Coefficients, Some examples. Method of least square: Fitting of straight line

Module V: Hypothesis Testing

Parameter, Statistic, Null hypothesis, Alternative hypothesis, Critical region, Type I Error, Type II Error, Level of significance, P-value and its applications. One sample t-test, Paired t-test, Degrees of freedom for t-test, F test for equality of Population variances, Degrees of freedom for F-test. Normal test for sample mean and population mean, Normal test for two sample means. Chi-square Test: Test of goodness of fit, Test of Independence of attributes, Degrees of freedom for Chi-square test, Coefficient of contingency, Yates' correction for continuity. Analysis of Variance: One way and Two-way (only Examples)

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

Text:

- Introduction to Biostatistics, Ronald N. Fothergill and Eun Sun Lee, Publisher: Elsevier.
- Statistical Methodology, S.P. Gupta, Publisher: S. Chand & Co.
- Fundamentals of Statistics, S.C. Gupta. Publisher: S.Chand & Co.

References:

- Biostatistics: A manual of Statistical Methodology for use in Health, Nutrition and Anthropology, K. Visweswara Rao. Publisher: Jaypee Brothers Biostatistics: A foundation for analysis in the Health Sciences, W.W. Daniel, Publisher: John Wiley and Sons
- Fundamentals of Mathematical Statistics, S.C. Gupta and V.K. Kapoor, Publisher: S.Chand & Co.
- Statistical Analysis, Kaushal, T.L. Publisher: Kalyani Publishers
- Statistical Methods, Potri, D. Kalyani Publishers.
- Mathematical Statistics, H.C. Saxena, and V.K. Kapoor: S. Chand & Company
- Biostatistics, P.N. Arora and P.K. Malhan, Publisher: Himalaya Publishing House.



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BIOLOGICAL PROGRAMMING (BIOINFORMATICS)-I

Course Code: SCT4107

Credit Units: 01

Course Objective:

The course offers a basic understanding of bioinformatics tools and technologies for understanding different biological pathways at systems level as well as for characterizing cross-talks between different pathways.

Course Contents:

Module I: Introduction and overview

The NCBI data model; sequence databases, sequence retrieval, sequence file formats, submitting DNA and protein sequences; classification of biological databases. Sequence databases (EMBL, GenBank, DDBJ, -UNIPROT, PIR, TrEMBL),

Module II: Sequence alignment

Global and local alignments, statistical significance of alignments, scoring matrices and gap penalties, position specific scoring matrices, programs and methods for Pairwise and multiple alignment, pattern searching programs, family and superfamily representation - Pfam, hidden Markov models.

Module III: Predictive methods using DNA and protein sequences

ESTs: construction, databases, clustering, gene discovery and identification, and functional classification. Protein family/domain databases (PROSITE, PRINTS, Pfam, BLOCK, etc), Cluster databases-An Introduction, Specialised databases (KEGG, etc), Database technologies (Flat-file), Protein identification tools, physical properties, motifs and patterns

Module IV: Structure databases

Structural databases - PDB and MMDB, structure file formats, Secondary and tertiary structure prediction methods in proteins, Internal and external coordinate system, software to visualize secondary and tertiary structural information in protein.folding classes, structure classification databases – SCOP and CATH;

Module V: Comparative genome analysis

Phylogenetic analysis, Evolutionary Models, Character and distance based Tree building methods; tree evaluation, phylogenetic analysis, parsimony, maximum likelihood trees; Trees-splits and metrics on trees, tree interpretation, Distance – additive, ultrametric and nonadditive distances.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

Text:

- Computer Science, J.G. Brookshear, Pearson, Addison Wesley
- Introduction to Bioinformation – T.Attawood
- Essentials of Genomics and Bioinformatics, C.W. Sensen, John Wiley and Sons
- Bioinformatics: Sequence and Genome Analysis, D.W. Mount, Cold Spring Harbor Laboratory Press


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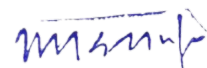

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References:

- Algorithms on Strings, Trees, and Sequences: Computer Science and Computational Biology, D. Gusfield, Cambridge University Press
- Bioinformatics: A Practical Guide to the Analysis of Genes and Proteins, A.D. Baxevanis and B.F.F. Quelling, Wiley – interscience.
- Bioinformatics: Sequence and Genome Analysis, D.W. Mount, Cold Spring Harbor Laboratory Press.
- Sequence Analysis in Molecular Biology: Treasure Trove or Trivial Pursuit, G. Von Heijne and G. Von Heijne, Academic Press.
- Structural Bioinformatics, Philip E. Bourne, Helge Weissig 2003
- Statistical Methods in Bioinformatics: An Introduction, G.R. Grant, W.J. Ewens, Springer Verlag



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CELL & MOLECULAR BIOLOGY LAB

Course Code: SCT4108

Credit Units: 01

Course Contents

Module I

Microscopy: Light microscopy, Bright field, Phase contrast.

Module II

Cell culture: aseptic suspension and adherent cell culture techniques. Cell number enumeration and cell passage methods, and methods for characterization of cells in culture and cell proliferation.

Module III

Induction and characterization of apoptosis and necrosis. Cell mitosis and meiosis and karyotyping techniques. Cell mounting techniques, and study of permanent slides of different types of cancer.

Module IV

Bacterial culture techniques, single cell clone isolation, bacterial transformation and transduction techniques.

Module V

Study of physical and chemical mutagens on growth of *E. coli*; PTC test.

Examination Scheme:

IA			EE			
Class Test (Practical Based)	Mid Term Viva	Attendance	Major Experiment	Minor Experiment/Spo tting	Practical Record	Viva
15	10	05	35	15	10	10


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MOLECULAR BIOLOGY & rDNA TECHNOLOGY LAB

Course Code: SCT4109

Credit Units: 01

Course Objective:

The laboratory experiments in Recombinant DNA Technology would certainly help to comprehend the theoretical aspects of the subject.

Course Contents:

Module I

Study of cloning (GFP cloning)

Module II

Design and execution of PCR, RT-PCR, quantitative RT-PCR

Module III

Study of Southern hybridization

Module IV

Study of RAPD

Module V

Site directed mutagenesis

Examination Scheme:

IA			EE			
Class Test (Practical Based)	Mid Term Viva	Attendance	Major Experiment	Minor Experiment/Spo tting	Practic al Record	Viva
15	10	05	35	15	10	10


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BIOANALYTICAL TECHNOLOGIES & INSTRUMENTATION LAB

Course Code: SCT4110

Credit Units: 01

Course Contents:

Module I

Cell disruption techniques

Module II

Centrifugation – low speed and high speed.

Module III

Spectrophotometer techniques

Module IV

Chromatography –Paper Chromatography and Thin Layer Chromatography

Module V

Electrophoresis –SDS Page and Agarose gel electrophoresis.

Examination Scheme:

IA			EE			
Class Test (Practical Based)	Mid Term Viva	Attendance	Major Experiment	Minor Experiment/Spo tting	Practic al Record	Viva
15	10	05	35	15	10	10


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RESEARCH PRESENTATION / LIT. REVIEW & PRESENTATION

Course Code: SCT4111

Credit Units: 01

Course Objective:

Students will learn how to do literature search on a particular topic, how to construct, organize and deliver a scientific presentation.

Examination Scheme:

Literature Search/Project Report	50
Presentation	50
Total	100



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TERM PAPER

Course Code: SCT4131

Credit Units: 01

METHODOLOGY

A term (or research) paper is primarily a record of intelligent reading in several sources on a particular subject.

The students will choose the topic at the beginning of the session in consultation with the faculty assigned. The progress of the paper will be monitored regularly by the faculty. At the end of the semester the detailed paper on the topic will be submitted to the faculty assigned. The evaluation will be done by Board of examiners comprising of the faculties.

GUIDELINES FOR TERM PAPER

The procedure for writing a term paper may consists of the following steps:

1. Choosing a subject
2. Finding sources of materials
3. Collecting the notes
4. Outlining the paper
5. Writing the first draft
6. Editing & preparing the final paper

1. Choosing a Subject

The subject chosen should not be too general.

2. Finding Sources of materials

- a) The material sources should be not more than 10 years old unless the nature of the paper is such that it involves examining older writings from a historical point of view.
- b) Begin by making a list of subject-headings under which you might expect the subject to be listed.
- c) The sources could be books and magazines articles, news stories, periodicals, scientific journals etc.

3. Collecting the notes

Skim through sources, locating the useful material, then make good notes of it, including quotes and information for footnotes.

- a) Get facts, not just opinions. Compare the facts with author's conclusion.
- b) In research studies, notice the methods and procedures, results & conclusions.
- c) Check cross references.

4. Outlining the paper

- a) Review notes to find main subdivisions of the subject.
- b) Sort the collected material again under each main division to find sub-sections for outline so that it begins to look more coherent and takes on a definite structure. If it does not, try going back and sorting again for main divisions, to see if another general pattern is possible.

5. Writing the first draft

Write the paper around the outline, being sure that you indicate in the first part of the paper what its purpose is. You may follow the following:

- a) statement of purpose
- b) main body of the paper
- c) statement of summary and conclusion

Avoid short, bumpy sentences and long straggling sentences with more than one main ideas.

6. Editing & Preparing the final Paper

- a) Before writing a term paper, you should ensure you have a question which you attempt to answer in your paper. This question should be kept in mind throughout the paper. Include only information/ details/ analyses of relevance to the question at hand. Sometimes, the relevance of a particular section may be clear to you but not to your readers. To avoid this, ensure you briefly explain the relevance of every section.
- b) Read the paper to ensure that the language is not awkward, and that it "flows" properly.
- c) Check for proper spelling, phrasing and sentence construction.
- d) Check for proper form on footnotes, quotes, and punctuation.
- e) Check to see that quotations serve one of the following purposes:
 - (i) Show evidence of what an author has said.
 - (ii) Avoid misrepresentation through restatement.
 - (iii) Save unnecessary writing when ideas have been well expressed by the original author.
- f) Check for proper form on tables and graphs. Be certain that any table or graph is self-explanatory.

Term papers should be composed of the following sections:

- 1) Title page
- 2) Table of contents
- 3) Introduction
- 4) Review
- 5) Discussion & Conclusion
- 6) References
- 7) Appendix

Generally, the introduction, discussion, conclusion and bibliography part should account for a third of the paper and the review part should be two thirds of the paper.

Discussion

The discussion section either follows the results or may alternatively be integrated in the results section. The section should consist of a discussion of the results of the study focusing on the question posed in the research paper.

Conclusion

The conclusion is often thought of as the easiest part of the paper but should by no means be disregarded. There are a number of key components which should not be omitted. These include:

- a) summary of question posed
- b) summary of findings
- c) summary of main limitations of the study at hand
- d) details of possibilities for related future research

References

From the very beginning of a research project, you should be careful to note all details of articles gathered.

The bibliography should contain ALL references included in the paper. References not included in the text in any form should NOT be included in the bibliography.

The key to a good bibliography is consistency. Choose a particular convention and stick to this.

Bibliographical conventions

Monographs

Crystal, D. (2001), Language and the internet. Cambridge: Cambridge University Press.

Edited Volumes

Gass, S./Neu, J. (eds.) (1996), Speech acts across cultures. Challenges to communication in a second language. Berlin/ NY: Mouton de Gruyter.

[(eds.) is used when there is more than one editor; and (ed.) where there is only one editor. In German the abbreviation used is (Hrsg.) for Herausgeber].

Edited Articles

Schmidt, R./Shimura, A./Wang, Z./Jeong, H. (1996), Suggestions to buy: Television commercials from the U.S., Japan, China, and Korea. In: Gass, S./Neu, J. (eds.) (1996), Speech acts across cultures. Challenges to communication in a second language. Berlin/ NY: Mouton de Gruyter: 285-316.

Journal Articles

McQuarrie, E.F./Mick, D.G. (1992), On resonance: A critical pluralistic inquiry into advertising rhetoric. Journal of consumer research 19, 180-197.

Electronic Book

Chandler, D. (1994), Semiotics for beginners [HTML document]. Retrieved [5.10.'01] from the World Wide Web, <http://www.aber.ac.uk/media/Documents/S4B/>.

Electronic Journal Articles

Watts, S. (2000) Teaching talk: Should students learn 'real German'? [HTML document]. German as a Foreign Language Journal [online] 1. Retrieved [12.09.'00] from the World Wide Web, <http://www.gfl-journal.com/>.

Other Websites

Verterhus, S.A. (n.y.), Anglicisms in German car advertising. The problem of gender assignment [HTML document]. Retrieved [13.10.'01] from the World Wide Web, <http://olaf.hiof.no/~sverrev/eng.html>.

Unpublished Papers

Takahashi, S./DuFon, M.A. (1989), Cross-linguistic influence in indirectness: The case of English directives performed by native Japanese speakers. Unpublished paper, Department of English as a Second Language, University of Hawai'i at Manoa, Honolulu.

Unpublished Theses/ Dissertations

Möhl, S. (1996), Alltagssituationen im interkulturellen Vergleich: Realisierung von Kritik und Ablehnung im Deutschen und Englischen. Unpublished MA thesis, University of Hamburg.

Walsh, R. (1995), Language development and the year abroad: A study of oral grammatical accuracy amongst adult learners of German as a foreign language. Unpublished PhD dissertation, University College Dublin.

Appendix

The appendix should be used for data collected (e.g. questionnaires, transcripts,...) and for tables and graphs not included in the main text due to their subsidiary nature or to space constraints in the main text.

Assessment Scheme:

Continuous Evaluation:

(Based on abstract writing, interim draft, general approach, research orientation, readings undertaken etc.)

40%

Final Evaluation:

60%

(Based on the organization of the paper, objectives/
problem profile/ issue outlining, comprehensiveness of the
research, flow of the idea/ ideas, relevance of material used/
presented, outcomes vs. objectives, presentation/ viva etc.)



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Haryana-122413



Registrar
Amity University Haryana
Manesar Gurgaon-122413

STEM CELL TECHNOLOGY

Course Code: SCT4201

Credit Units: 02

Course Objective: The objective of this paper is to familiarize the students with stem cell technology and its applications for betterment of the society. The course is designed to give a broad view of mammalian stem cells, reviewing where they are found in the body, the different types and how they are cultured. The topics will cover the basic biology of these stem cells as well as bioengineering and application of these stem cells to potential treatments of human diseases.

Course Contents:

Module I: Introduction to stem cells

Definition, properties, proliferation and, culture of stem cells, medical applications of stem cells, ethical and legal issues in use of stem cells.

Module II: Types of stem cells.

Stem Cell biology and therapy, types embryonic stem cell, Adult stem cell, Stem Cell Biology and Therapy, Embryonic Stem Cells, culture and the potential benefits of stem cell technology

Module III: Gene Therapy

Gene Therapy: Introduction, history and evolution of Gene therapy, optimal disease targets. Genetic perspectives for Gene Therapy, Gene Delivery methods: Viral vectors and Non-viral Vectors. Failures and successes of gene therapy. Future prospects of gene therapy.

Module IV: Therapeutic applications of stem cells

Applications of stem cells in cell replacement and gene therapy approaches. Stem cells in drug discovery.

Module V: Ethical Issues associated with stem cell-based regenerative medicine field

Regulatory and ethical considerations of stem cell and gene therapy. Assessing human stem cell safety, use of genetically modified stem cells in experimental gene therapies.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

Text:

- Stem Cell Biology, Daniel Marshak, Richard L. Gardener and David Gottlieb, Cold Spring Harbour Laboratory Press
- Stem cell biology and gene therapy, Booth C., Cell Biology International, Academic Press
- Stem Cell and Gene-Based Therapy: Frontiers in Regenerative Medicine, Alexander Battler, Jonathan Leo, Springer.

References:

- Stem Cell Biology and Gene Therapy. Quesenberry PJ, Stein GS, eds. (£65.00.) Wiley, 1998.
- Progress in gene therapy, Volume 2, Pioneering stem cell/gene therapy trials, Roger Bertolotti, Keiya Ozawa and H. Kirk Hammond, VSP international science publishers

- Stem Cells Handbook: Stewart Sell, Humana Press; Totowa NJ, USA; Oct. 2003,
- Human Embryonic Stem Cells: The Practical Handbook by Stephen Sullivan and Chad A Cowan.



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BIOLOGICAL PROGRAMMING (BIOINFORMATICS)-II

Course Code: SCT4204

Credit Units: 01

Course Objective:

It enables the students to access biological information networks and databases in order to understand the different techniques of biotechnology to build detection systems especially in the prevention and treatment of human diseases.

Course Contents:

Module I: Data Models and Database Management Systems

File systems vs. DBMS, advantages of DBMS, Levels of abstraction and data independence; Data models and their comparison; Entity relationship model -concepts, design, keys and features; Relational model - introduction, structure of the relational databases, integrity constraints, Relational algebra and calculus - selection and projection, set operations, renaming, Joins, Division etc.

Module II: Introduction to Biological scripting languages: BioJava

BioJava modules for sequence alignment, data mining, structure alignment.

Module III: BioPerl & BioPython

BioPerl & BioPython modules for sequence alignment, data mining, structure alignment,

Module IV: Introduction to R Programming

Introduction to R Programming R basics; Data structures in R; R programming fundamentals; Working with data in R; Strings and Dates in R;

Module V: R/Bioconductor for advanced biological data analysis

Overview of the Bioconductor; Pre-processing microarray data; Differential gene expression; Distances, prediction, and cluster analysis; Annotation and metadata Visualization; GO;

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

Text:

- Data Mining: Concept and techniques, J. Han and M. Kamber, Morgan Kaufman.
- Database Management, P.C. Desai.
- Bioinformatics and Computational Biology Solutions Using R and Bioconductor (Statistics for Biology and Health) by Vincent Carey and Sandrine Dudoit
- Statistics and Data Analysis for Microarrays Using R and Bioconductor by Sorin Drăghici

References:

- Introduction to Database Systems, C.J. Date, Addison Wesley Publishing.
- BioJava - www.biojava.org;
- BioPerl - www.bioperl.org;
- BioPython - www.biopython.org;
- R Programming Language: <http://cran.r-project.org/>;
- Bioconductor: <http://www.bioconductor.org> ;

MOLECULAR MEDICINE: PRINCIPLES AND APPLICATIONS

Course Code: SCT4205

Credit Units: 03

Course Objective

The students will be exposed to basic concepts related with human health development of different types of infectious and non-infectious diseases.

Course Contents

Module I: Medical Biotechnology

History and scope of medical biotechnology, current status and future prospects.

Module II: Classification of genetic diseases

Chromosomal disorders – Numerical disorders e.g. trisomies & monosomies, Structural disorders e.g. deletions, duplications, translocations & inversions, Chromosomal instability syndromes. Gene controlled diseases – Autosomal and X-linked disorders, Mitochondrial disorders.

Module III: Molecular basis of human diseases

Mechanism of disease development, Genetic susceptibility, Identification of targets for diagnosis and therapy: Acquired diseases, cardiovascular diseases, Neurological diseases, Hematology, Cancer. Pathogenic mutations: Gain of function mutations: Oncogenes, Huntingtons Disease, Pittsburg variant of alpha 1 antitrypsin. Loss of function: Tumour Suppressor. Dynamic Mutations - Fragile- X syndrome, Myotonic dystrophy. Mitochondrial diseases.

Module IV: Traditional and Modern Tools for Detection of Genomic Abnormalities

Classical gene mapping techniques, next generation sequencing technology.

Module V: Nucleic acid based Therapy

Gene silencing technology, siRNA, Aptamers, antisense oligodeoxynucleotides (AS-ODN), Ribozymes, Peptide Nucleic Acids

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

- Diagnostic and Therapeutic Antibodies (Methods in Molecular Medicine by Andrew J.T. George (Editor), Catherine E. Urch (Editor) Publisher: Humana Press; edition (August 15, 2000) ISBN-10: 0896037983
- Molecular Diagnosis of Infectious Diseases (Methods in Molecular Medicine) by Jochen Decker, U. Reischl Amazon Sales Rank: #287831 in Books
- Human Molecular Genetics by T. Strachan, Andrew Read Amazon Sales Rank
- Principles of Biostatistics by Marcello Pagano, Kimberlee Gauvreau
- Essentials of Epidemiology in Public Health, Second Edition by Ann Aschengrau, George R., III Seage
- Designing Clinical Research: An Epidemiologic Approach, by Stephen B. Hulley, Steven R. Cummings
- Journal articles and reviews

NANO-MEDICINE AND TECHNOLOGIES

Course Code: SCT4206

Credit Units: 03

Course Objective:

Nanotechnology is the branch of biotechnology that utilizes nanomaterials for biological applications to develop novel solutions to different scientific and medical problems. Students will learn basic concepts, techniques and technologies and applications of nanomaterials for biotechnology and medical applications.

Course Contents:

Module I: Introduction to Nanotechnology

Historical perspective of the developments in the field of nanotechnology. Classification of nanostructured materials, physical environment regulations governing nanomaterials, and rules governing health and safety regulations for chemicals and nanomaterials.

Module II: Investigation and manipulation of nanomaterials

Principal and applications of electron microscope, scanning probe microscope, optical microscope, Fourier transform Infrared spectroscopy, X-ray photoelectron spectroscopy, and X-ray diffraction for nanoscience and technology.

Module III: Nanostructures for medicinal applications and toxicity

Introduction to nanomedicine and nanobiotechnology materials, their applications and therapeutic and commercial implications. Micro- and nanoscale control of cellular environment for tissue engineering. Nanoparticle contrast agents for molecular magnetic resonance imaging. Nano-material-based cancer therapeutics.

Module IV: Safety and regulatory issues associated with nanomaterials

Nanomaterials and toxicity evaluation: cytotoxicity, genotoxicity, in-vivo-tests and assays. Biological barriers to nanocarrier-mediated delivery of therapeutic and imaging agents.

Module V: Societal implications of nanoscience

From first industrial revolution to nano-revolution. Implications of nanoscience and nanotechnology for society, nano policies, nano arms race, public perception and public involvement in nano discourse. Harnessing nanotechnology for economical and social development

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

Texts:

- Nanobiotechnology: Concepts, Applications and Perspectives by Christof M. Niemeyer and Chad A. Mirkin, First Wiley 2006, ISBN: 978-3-527-60591-0.
- Nanobiotechnology II: More Concepts and Applications by Chad A. Mirkin and Christofer M. ZNiemeyer, Wiley 2007, ISBN: 978-3-527-31673-1.
- Nano-The essentials- Understanding the nanoscience and technology by T. Pradeep, Tata McGraw-Hill Publishing Company Limited 2008, ISBN-10:0-07-154829-7/0071548297.

FERMENTATION TECHNOLOGY AND ITS APPLICATIONS IN MOLECULAR MEDICINE

Course Code: SCT4207

Credit Units: 03

The course will educate students about use microorganism to produce various compounds of commercial interest. The student will be exposed to various techniques available for large scale cultivation of microorganisms.

Course Contents:

Module I

Introduction to fermentation process, Batch and Continuous production systems of cultivation, Solid-state fermentation process.

Module II

Selection of industrial microorganisms, media for fermentation, aeration, pH, temperature and other requirements during fermentation, downstream processing and product recovery, food industry waste as fermentation substrate.

Module III

Production of compounds like, antibiotics, enzymes, organic acids, solvents, beverages, SCP.

Module IV

Production of fermented dairy products

Module V

Immobilized enzymes systems, production and applications.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

Text:

- Principles of Fermentation Technology by P.F. Stanbury, A. Whitaker, and S.J. Hall, Aditya Books (P) LTD.
- Industrial Microbiology by L.E. Casida, JR. New Age International (P) LTD.
- Biotechnology, A Text book of Industrial Microbiology, W. Crueger and A. Crueger, Sinauer Association.

References:

- Practical Biochemistry, Principles & Techniques, Keith Wilson and John Walker
- Biochemical Engineering Fundamentals, J.E. Bailey and D.F. Ollis, McGraw-Hill
- Protein Purification, M.R. Ladisch, R.C. Wilson, C.C. Painton and S.E. Builder, American Chemical Society

Text:

- Industrial Microbiology – Cassida
- Principles of fermentation Technology, Salisbury, Whitaker and Hall
- Industrial microbiology – Prescott & Duhn.

STEM CELL TECHNOLOGY LAB

Course Code: SCT4208

Credit Units: 01

Course Contents:

Module-I:

Stem cell isolation and characterization.

Module-II:

Generation of iPSC lines and characterization of their pluripotency profile and genome stability (Stem Cell Karyotype analysis).

Module-III:

Differentiation of iPSC into somatic cell lineages and characterization of stem cell-derived somatic cell populations.

Module-IV:

Functional characterization of stem cell-derived somatic cell populations.

Module-V:

Recent advances in stem cell therapeutics and stem cell-based drug discovery.

Examination Scheme:

IA			EE			
Class Test (Practical Based)	Mid Term Viva	Attendance	Major Experiment	Minor Experiment/Spo tting	Practical Record	Viva
15	10	05	35	15	10	10


Text & References:

Text:

- Stem Cell Biology, Daniel Marshak, Richard L. Gardener and David Gottlieb, Cold Spring Harbour Laboratory Press
- Stem cell biology and gene therapy, Booth C., Cell Biology International, Academic Press
- Stem Cell and Gene-Based Therapy: Frontiers in Regenerative Medicine, *Alexander Battler, Jonathan Leo*, Springer.

References:

- Stem Cell Biology and Gene Therapy. Quesenberry PJ, Stein GS, eds. (£65.00.) Wiley, 1998.
- Progress in gene therapy, Volume 2, Pioneering stem cell/gene therapy trials, Roger Bertolotti, Keiya Ozawa and H. Kirk Hammond, VSP international science publishers
- Stem Cells Handbook: Stewart Sell, Humana Press; Totowa NJ, USA; Oct. 2003,
- Human Embryonic Stem Cells: The Practical Handbook by Stephen Sullivan and Chad A Cowan.


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NANO-MEDICINES AND TECHNOLOGIES LAB

Course Code: SCT4209

Credit Units: 01

Course Objective:

This course offers understanding of generation of nano particles, their characterization and applications.

Course Contents:

1. Demonstration about occupational health and safety (OHS) and workplace health and safety (WHS) in nanotechnology.
2. Preparation of aqua regia, its handling and role in washing glass-ware for metal nanoparticles synthesis.
3. Optimization of temperature for metal nanoparticle preparations using biological materials.
4. Synthesis of silver nanoparticles and analysis of their surface Plasmon resonance (SPR) properties.
5. Neem extract mediated silver nanoparticle synthesis and analysis of their optical properties.
6. Dye degradation using silver nanoparticles synthesized in experiments 4 and 5.
7. Preparation of metal oxide nanoparticles and their characterization.
8. Interactions of silver nanoparticles with red blood cells.
9. Interaction of silver nanoparticles with bacterium and their antimicrobial properties.
10. Preparation of nanoparticles containing polymeric films.

Examination Scheme:

IA			EE			
Class Test (Practical Based)	Mid Term Viva	Attendance	Major Experiment	Minor Experiment/Spo tting	Practical Record	Viva
15	10	05	35	15	10	10

FUNDAMENTAL IMMUNOLOGY-I LAB

Course Code: SCT4210

Credit Units: 01

Course Contents:

1. Blood film preparation and identification of cells.
2. Immuno-diffusion.
3. Hemagglutination, Agglutination inhibition.
4. Rocket immune-electrophoresis.
5. Western blotting, ELISA.
6. Epitope prediction using Immuno-informatics tool.
7. Isolation of Peripheral blood mononuclear cells.
8. Phenotype analysis.

Examination Scheme:

IA			EE			
Class Test (Practical Based)	Mid Term Viva	Attendance	Major Experiment	Minor Experiment/Spo tting	Practica l Record	Viva
15	10	05	35	15	10	10

Note: Minor variation could be there depending on the examiner

BIOLOGICAL PROGRAMMING (BIOINFORMATICS)-II LAB

Course Code: SCT4211

Credit Units: 01

Course Contents:

Module I

Database creation using DDL and DML. Defining the primary and secondary keys. Implementation of selection, projection and joins (internal and external) with MySQL

Module II

Introduction to Linux Shell Programming, Running BioJava Scripts

Module III

Running BioPerl and BioPython Scripts

Module IV

Programming in R basic scripts

Module V

R/Bioconductor programming for DEGs, Visualization and annotation.

Examination Scheme:

IA			EE			
Class Test (Practical Based)	Mid Term Viva	Attendance	Major Experiment	Minor Experiment/Spo tting	Practical Record	Viva
15	10	05	35	15	10	10

Note: Minor variation could be there depending on the examiner


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CANCER BIOLOGY & CANCER THERAPEUTICS (T CELL AND ANTIBODY-BASED THERAPEUTICS)

Course Code: SCT4301

Credit Units: 03

Course Objective: The objective of this paper is to provide students greater understanding of different approaches for T cell-based and antibody-based cancer immunotherapy approaches.

Course Contents:

Module I

Biology and mechanism of cancer development. Chemotherapy, radiation therapy, immunotherapy of cancer.

Module II

History of Vaccine Development, Definition of Vaccine, Evolution of Vaccines, Process development for vaccines, Manufacturing of vaccines, Various aspects of vaccines, process development and manufacturing.

Module III

Clinical development of vaccines, Clinical end-point: Evolution of vaccines, General specifications and pharmaceuticals release criteria for the existing vaccines, Cold chain management of vaccines, Current vaccine research: Immune checkpoint strategies in cancer immunotherapy.

Module IV

Engineered anti-tumor immunity: T cell receptor (TCR) and chimeric antigen receptor technology development and TCR/CAR-engineered anti-tumor immunity.

Module V

Antibody-based cancer immunotherapy. Antibodies as drug carriers.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

- Diagnostic and Therapeutic Antibodies (Methods in Molecular Medicine by Andrew J.T. George (Editor), Catherine E. Urch (Editor) Publisher: Humana Press; edition (August 15, 2000) ISBN-10: 0896037983
- Molecular Diagnosis of Infectious Diseases (Methods in Molecular Medicine) by Jochen Decker, U. Reischl Amazon Sales Rank: #287831 in Books
- Human Molecular Genetics by T. Strachan, Andrew Read Amazon Sales Rank
- Principles of Biostatistics by Marcello Pagano, Kimberlee Gauvreau
- Essentials of Epidemiology in Public Health, Second Edition by Ann Aschengrau, George R., III Seage
- Designing Clinical Research: An Epidemiologic Approach, by Stephen B. Hulley, Steven R. Cummings
- Journal articles and reviews

VACCINES AND PRECLINICAL ANIMAL MODELS

Course Code: SCT4303

Credit Units: 02

Course Objective:

The application of Animal Biotechnology covers major areas related to commercial applications. Importance will also be given to areas like *in vitro* fertilization, animal cell and tissue culture, hormone vaccine and important enzyme production through animal biotechnology.

Course Contents:

Module I

Historical perspectives, sterilization methods, organ culture - culture techniques, plasma clot, raft methods, agar gel, grid method, organ engineering. Cell culture substrates, cultural media, natural and artificial media, initiation and maintenance of cell cultures, cell culture products, cryopreservation techniques, immobilized cultures

Module II

In vitro fertilization and embryo transfer

Module III

Somatic cell hybridization, hybridoma technology. Animal genetic engineering, vectors, gene transfer methods: microinjection, virus mediated and other methods of gene transfer

Module IV

Transgenic animals with new traits, transgenic animals as bioreactors for producing pharmaceutically important compounds and therapeutics. Animal models for cancer research.

Module V

Bioethical issues related to utilization of animals in ,

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References

- Cell Culture LabFax, M. Butler and M. Dawson, Bios scientific Publications Ltd.
- Cell Growth and Division – A Practical approach, R. Basega, IRL Press
- Culture of Animal Cells, R.I Freshney, Wiley-Leiss
- Comprehensive Biotechnology, Moo-Young, Alan T. Bullm Howard Dalton, Panima Publication

ETHICS OF BIOMEDICAL RESEARCH, INTELLECTUAL PROPERTY (IP), IP RIGHTS (IPR)

Course Code: SCT4306

Credit Units: 02

Course Objective

The aim of this course is to develop the understanding of relevance, business Impact and protection of Intellectual Property along with the types of Intellectual Property Rights: Patents, Trademarks, Copyrights, Industrial Designs, Geographical Indications and International Conventions, Biosafety and Bioethics

Course Contents

Module I: Basic Principles and Acquisition of Intellectual Property Rights

Basic Principles of Patent Law, Patent Application procedure, Drafting of a Patent Specification, Understanding Copyright Law, Basic Principles of Trade Mark and Design Rights, International Background of Intellectual Property

Module II: Ownership and Enforcement of Intellectual Property Rights

Patents-Objectives, Rights, Assignments, Defences in case of Infringement. Copyright-Objectives, Rights, Transfer of Copyright, work of employment Infringement, Defences for infringement. Trademarks-Objectives, Rights, Protection of goodwill, Infringement, Passing off, Defences. Designs-Objectives, Rights, Assignments, Infringements, Defences of Design Infringement, Enforcement of Intellectual Property Rights - Civil Remedies, Criminal Remedies, Border Security measures, Practical Aspects of Licensing - Benefits, Determinative factors, important clauses, licensing clauses.

Module III: Biotechnology and Intellectual Property Rights

Objective, Evolution, Basic Structure of Gene Techniques, Applications, Commercial Potential of Biotech Inventions, Rationale for Intellectual Property Protection. Patenting Biotechnology Inventions-Objective, Concept of Novelty, Concept of inventive step, Microorganisms, Moral Issues in Patenting Biotechnological inventions. Plant Varieties Protection-Objectives, Justification, International Position, Plant Varieties Protection in India Protection of Geographical Indications Objectives, Justification, International Position, Multilateral Treaties, National Level, Indian Position.

Module IV

Biosafety and Bioethics Management-Key to environmentally responsible use of biotechnology. Cartagena Protocol on Biosafety, Ethical implications of Biotechnological products and techniques. Biosafety: History, evolution and concept of biosafety; need and application of biosafety in laboratories and industries; biosafety guidelines and regulations, international and national norms of biosafety; Implementation of biosafety guidelines; Classification and Description of Biosafety levels. Good laboratory practice (GLP) and Good manufacturing practice (GMP), Use of GMO's and their release, GM products, issues in use of GMO's, risk for animal/human/agriculture and environment owing to GMOs. Bioethics: Introduction and need of bioethics, its relation with other branches, types of risk associated with genetically modified microorganisms, Ethical Issues involving GMOs; ethics related to human cloning, human genome project, prenatal diagnosis, agriculture and animal rights, data privacy of citizens health; ethical issues in India and abroad through case studies.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:***Text***

- Intellectual Property Rights by Birgitte Anderson, Edward Elgar Publishing
- Intellectual Property Rights and the Life Science Industries by Graham Dutfield, Ashgate Publishing

References

- WIPO Intellectual Property Handbook
- Intellectual Property by William Rodelph Cornish, David Clewelyn
- Globalising Intellectual Property Rights by Duncan Matthews
- Journals and Current magazines



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PLANT BIOTECHNOLOGY AND ITS APPLICATIONS IN MOLECULAR MEDICINE

Course Code: SCT4307

Credit Units: 02

Course Objective:

The application of Plant Biotechnology covers major areas related to commercial applications. Regeneration of plants through *in vitro* techniques offers a practical strategy for micro propagation. Importance will also be given to areas like *in vitro* fertilization, animal cell and tissue culture, hormone vaccine and important enzyme production through animal biotechnology.

Course Contents:

Module I

Historical perspective of plant tissue culture.
Tissue culture lab and organization
Sterilisation techniques
Types of nutrient media and media composition
Plant regeneration pathways
Role of phytohormones
Cell culture techniques- cell, tissue, organ cultures, callus culture, suspension culture
Culture techniques Callus culture, cell culture and protoplast cultures.

Module II

Organogenesis and somatic embryogenesis.
Applications of plant tissue and cell culture.
Micropropagation, pathogen free plants. production haploids,
Somaclonal variation.preservation of germplasm.

Module III

Genetic engineering in plants, - transformation vectors
Gene transfer techniques-vector mediated and vector less gene transfer.
Transgenic plants transgene integration and expression

Module IV

Transgenic crop with new traits-herbicide tolerance, insect and disease resistance,
Therapeutic proteins and compounds
Oral vaccines
Production of secondary metabolites via tissue culture
Bioethics of plant genetic engineering.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70


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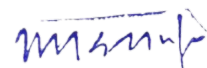

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Text & References:

- An Introduction to Plant Tissue Culture, M.K. Razdan, Oxford and IBH Publishing
- Experiments in Plant Tissue Culture, J.H. Dodds and L.K. Roberts, Cambridge University Press
- Plant Biotechnology and Transgenic Plants, K.M.O. Caldey, W.H. Barz and H.L. Wills, Marcel Dekker
- Plant Biotechnology, J. Hammond, P. McGarvey and V. Yusibov, Springer Verlag.
- Plant Cell & Tissue Culture for the Production of Food Ingredients, T-J Fu, G. Singh and W.R. Curtis, Kluwer Academic/Plenum Press
- Plant Tissue Culture: Theory & Practice, S.S. Bhojwani and M.K. Razdan, Elsevier Health Sciences



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FUNDAMENTAL IMMUNOLOGY-II LAB

Course Code: SCT4308

Credit Units: 01

Course Contents:

Module I

Blood film preparation and identification of cells. Identification of blood groups.

Module II

Isolation of serum. Purification of IgG through affinity chromatography

Module III

Immunohistochemistry. Lymphoid organs and their microscopic organization.

Module IV

WIDAL Test

Module V

Radial Immuno-diffusion Test. Ouchterlony Double diffusion Test. DOT, Sandwich ELISA.

Examination Scheme:

IA			EE			
Class Test (Practical Based)	Mid Term Viva	Attendance	Major Experiment	Minor Experiment/Spo tting	Practical Record	Viva
15	10	05	35	15	10	10


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GENOMICS & PROTEOMICS LAB

Course Code: SCT4309

Credit Units: 01

Course Contents:

Module I

Three dimensional Structures – In silico study – large molecular complexes RNA polymerase II, ribosome, unstructured proteins

Module II

Microarray and Microarray data analysis, DNA sequencing methods, next generation sequencing.

Module III

Comparison of two given genomes

Module IV

Inference of protein function from structure

Module V

Gene finding tools and Genome annotation.

Examination Scheme:

IA			EE			
Class Test (Practical Based)	Mid Term Viva	Attendance	Major Experiment	Minor Experiment/Spo tting	Practical Record	Viva
15	10	05	35	15	10	10


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STEM CELL CULTURE LAB

Course Code: SCT4310

Credit Units: 01

Course Objective:

Students will learn methods for isolation, culture and maintenance of immune cells, for example T cell lines, human primary T cells and antigen presenting cells. Students will also learn nuances of antigen-specific immune response generation, antigen processing and presentation, cell phenotype analysis, cell proliferation, cell death and cytotoxicity assays.

Course Contents:

1. Culture of immortalized immune cell lines, for example Jurkat, T2-A2 etc.
2. Isolation of CD4 and CD8+ T cells from human peripheral blood.
3. Cell phenotype analysis, calculation of CD4:CD8 ratio in normal healthy individual blood.
4. Isolation and characterization of antigen presenting cells.
5. Activation of T cells by non-specific stimulus as well as by engaging their T cell receptor (TCR).
6. Cell proliferation assay.
8. Generation, and phenotypic and functional characterization of antigen-specific T cell response.
9. B cell culture and hybridoma technology.

Examination Scheme:

IA			EE			
Class Test (Practical Based)	Mid Term Viva	Attendance	Major Experiment	Minor Experiment/Spo tting	Practical Record	Viva
15	10	05	35	15	10	10

SCIENTIFIC COMMUNICATION SKILL DEVELOPMENT (SEMINAR/ WORKSHOP)

Course Code: SCT4311

Credit Units: 01

Students will learn how to do literature search on a particular topic, how to construct, organize and deliver a scientific presentation.

Examination Scheme:

Literature Search/Project Report	50
Presentation	50
Total	100



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SUMMER INTERNSHIP EVALUATION

Course Code: SCT4335

Credit Units: 03

GUIDELINES FOR PROJECT FILE

Research experience is as close to a professional problem-solving activity as anything in the curriculum. It provides exposure to research methodology and an opportunity to work closely with a faculty guide. It usually requires the use of advanced concepts, a variety of experimental techniques, and state-of-the-art instrumentation.

Research is genuine exploration of the unknown that leads to new knowledge which often warrants publication. But whether or not the results of a research project are publishable, the project should be communicated in the form of a research report written by the student.

Sufficient time should be allowed for satisfactory completion of reports, taking into account that initial drafts should be critiqued by the faculty guide and corrected by the student at each stage.

The File is the principal means by which the work carried out will be assessed and therefore great care should be taken in its preparation.

Methodology

The students will be sent to various industries and institutes where they will undergo short term training. After the completion of the training the students will be required to submit project report which shall then be evaluated by two internal examiners. The students will then have to appear for a Viva Voce examination to be conducted by an external evaluator at the end of the semester.

In general, the File should be comprehensive and include

- A short account of the activities that were undertaken as part of the project;
- A statement about the extent to which the project has achieved its stated goals.
- A statement about the outcomes of the evaluation and dissemination processes engaged in as part of the project;
- Any activities planned but not yet completed as part of the project, or as a future initiative directly resulting from the project;
- Any problems that have arisen that may be useful to document for future reference.

Report Layout

The report should contain the following components:

➤ Title or Cover Page

The title page should contain the following information: Project Title; Student's Name; Course; Year; Supervisor's Name.

➤ Acknowledgements (optional)

Acknowledgment to any advisory or financial assistance received in the course of work may be given.

➤ Abstract

A good "Abstract" should be straight to the point; not too descriptive but fully informative. First paragraph should state what was accomplished with regard to the objectives. The abstract does not have to be an entire summary of the project, but rather a concise summary of the scope and results of the project

➤ Table of Contents

Titles and subtitles are to correspond exactly with those in the text.

➤ **Introduction**

Here a brief introduction to the problem that is central to the project and an outline of the structure of the rest of the report should be provided. The introduction should aim to catch the imagination of the reader, so excessive details should be avoided.

➤ **Materials and Methods**

This section should aim at experimental designs, materials used. Methodology should be mentioned in details including modifications if any.

➤ **Results and Discussion**

Present results, discuss and compare these with those from other workers, etc. In writing these section, emphasis should be given on what has been performed and achieved in the course of the work, rather than discuss in detail what is readily available in textbooks. Avoid abrupt changes in contents from section to section and maintain a lucid flow throughout the thesis. An opening and closing paragraph in every chapter could be included to aid in smooth flow.

Note that in writing the various sections, all figures and tables should as far as possible be next to the associated text, in the same orientation as the main text, numbered, and given appropriate titles or captions. All major equations

should also be numbered and unless it is really necessary never write in “point” form.

➤ **Conclusion**

A conclusion should be the final section in which the outcome of the work is mentioned briefly.

➤ **Future prospects**

➤ **Appendices**

The Appendix contains material which is of interest to the reader but not an integral part of the thesis and any problem that have arisen that may be useful to document for future reference.

➤ **References / Bibliography**

This should include papers and books referred to in the body of the report. These should be ordered alphabetically on the author's surname. The titles of journals preferably should not be abbreviated; if they are, abbreviations must comply with an internationally recognised system.

Examples

For research article

Voravuthikunchai SP, Lortheeranuwat A, Ninrpm T, Popaya W, Pongpaichit S, Supawita T. (2002) Antibacterial activity of Thai medicinal plants against enterohaemorrhagic *Escherichia coli* O157: H7. *Clin Microbiol Infec*, **8** (suppl 1): 116–117.

For book

Kowalski, M. (1976) Transduction of effectiveness in *Rhizobium meliloti*. SYMBIOTIC NITROGEN FIXATION PLANTS (editor P.S. Nutman IBP), **7**: 63-67

ASSESSMENT OF THE PROJECT FILE

Essentially, marking will be based on the following criteria: the quality of the report, the technical merit of the project and the project execution.

Technical merit attempts to assess the quality and depth of the intellectual efforts put into the project. Project execution is concerned with assessing how much work has been put in. The File should fulfill the following *assessment objectives*:

Range of Research Methods used to obtain information

Execution of Research

Data Analysis

Analyse Quantitative/ Qualitative information

Control Quality

Draw Conclusions

Examination Scheme:

Project Report 50

Viva Voce 50

Total 100



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TERM PAPER

Course Code: SCT4331

Credit Units: 02

METHODOLOGY

A term (or research) paper is primarily a record of intelligent reading in several sources on a particular subject.

The students will choose the topic at the beginning of the session in consultation with the faculty assigned. The progress of the paper will be monitored regularly by the faculty. At the end of the semester the detailed paper on the topic will be submitted to the faculty assigned. The evaluation will be done by Board of examiners comprising of the faculties.

GUIDELINES FOR TERM PAPER

The procedure for writing a term paper may consists of the following steps:

- Choosing a subject
- Finding sources of materials
- Collecting the notes
- Outlining the paper
- Writing the first draft
- Editing & preparing the final paper

1. Choosing a Subject

The subject chosen should not be too general.

2. Finding Sources of materials

- d) The material sources should be not more than 10 years old unless the nature of the paper is such that it involves examining older writings from a historical point of view.
- e) Begin by making a list of subject-headings under which you might expect the subject to be listed.
- f) The sources could be books and magazines articles, news stories, periodicals, scientific journals etc.

3. Collecting the notes

Skim through sources, locating the useful material, then make good notes of it, including quotes and information for footnotes.

- d) Get facts, not just opinions. Compare the facts with author's conclusion.
- e) In research studies, notice the methods and procedures, results & conclusions.
- f) Check cross references.

4. Outlining the paper

- c) Review notes to find main sub-divisions of the subject.
- d) Sort the collected material again under each main division to find sub-sections for outline so that it begins to look more coherent and takes on a definite structure. If it does not, try going back and sorting again for main divisions, to see if another general pattern is possible.

5. Writing the first draft

Write the paper around the outline, being sure that you indicate in the first part of the paper what its purpose is. You may follow the following:

- a) statement of purpose
- b) main body of the paper
- c) statement of summary and conclusion

Avoid short, bumpy sentences and long straggling sentences with more than one main ideas.

6. Editing & Preparing the final Paper

- g) Before writing a term paper, you should ensure you have a question which you attempt to answer in your paper. This question should be kept in mind throughout the paper. Include only information/details/ analyses of relevance to the question at hand. Sometimes, the relevance of a particular section may be clear to you but not to your readers. To avoid this, ensure you briefly explain the relevance of every section.
- h) Read the paper to ensure that the language is not awkward, and that it "flows" properly.
- i) Check for proper spelling, phrasing and sentence construction.
- j) Check for proper form on footnotes, quotes, and punctuation.
- k) Check to see that quotations serve one of the following purposes:
 - (iv) Show evidence of what an author has said.
 - (v) Avoid misrepresentation through restatement.
 - (vi) Save unnecessary writing when ideas have been well expressed by the original author.
- l) Check for proper form on tables and graphs. Be certain that any table or graph is self-explanatory.

Term papers should be composed of the following sections:

- Title page
- Table of contents
- Introduction
- Review
- Discussion & Conclusion
- References
- Appendix

Generally, the introduction, discussion, conclusion and bibliography part should account for a third of the paper and the review part should be two thirds of the paper.

Discussion

The discussion section either follows the results or may alternatively be integrated in the results section. The section should consist of a discussion of the results of the study focusing on the question posed in the research paper.

Conclusion

The conclusion is often thought of as the easiest part of the paper but should by no means be disregarded. There are a number of key components which should not be omitted. These include:

- summary of question posed
- summary of findings
- summary of main limitations of the study at hand
- details of possibilities for related future research

References

From the very beginning of a research project, you should be careful to note all details of articles gathered.

The bibliography should contain ALL references included in the paper. References not included in the text in any form should NOT be included in the bibliography.

The key to a good bibliography is consistency. Choose a particular convention and stick to this.

Bibliographical conventions

Monographs

Crystal, D. (2001), Language and the internet. Cambridge: Cambridge University Press.

Edited Volumes

Gass, S./Neu, J. (eds.) (1996), Speech acts across cultures. Challenges to communication in a second language. Berlin/ NY: Mouton de Gruyter.

[(eds.) is used when there is more than one editor; and (ed.) where there is only one editor. In German the abbreviation used is (Hrsg.) for Herausgeber].

Edited Articles

Schmidt, R./Shimura, A./Wang, Z./Jeong, H. (1996), Suggestions to buy: Television commercials from the U.S., Japan, China, and Korea. In: Gass, S./Neu, J. (eds.) (1996), Speech acts across cultures. Challenges to communication in a second language. Berlin/ NY: Mouton de Gruyter: 285-316.

Journal Articles

McQuarrie, E.F./Mick, D.G. (1992), On resonance: A critical pluralistic inquiry into advertising rhetoric. Journal of consumer research 19, 180-197.

Electronic Book

Chandler, D. (1994), Semiotics for beginners [HTML document]. Retrieved [5.10.'01] from the World Wide Web, <http://www.aber.ac.uk/media/Documents/S4B/>.

Electronic Journal Articles

Watts, S. (2000) Teaching talk: Should students learn 'real German'? [HTML document]. German as a Foreign Language Journal [online] 1. Retrieved [12.09.'00] from the World Wide Web, <http://www.gfl-journal.com/>.

Other Websites

Verterhus, S.A. (n.y.), Anglicisms in German car advertising. The problem of gender assignment [HTML document]. Retrieved [13.10.'01] from the World Wide Web, <http://olaf.hiof.no/~sverrev/eng.html>.

Unpublished Papers

Takahashi, S./DuFon, M.A. (1989), Cross-linguistic influence in indirectness: The case of English directives performed by native Japanese speakers. Unpublished paper, Department of English as a Second Language, University of Hawai'i at Manoa, Honolulu.

Unpublished Theses/ Dissertations

Möhl, S. (1996), Alltagssituationen im interkulturellen Vergleich: Realisierung von Kritik und Ablehnung im Deutschen und Englischen. Unpublished MA thesis, University of Hamburg.

Walsh, R. (1995), Language development and the year abroad: A study of oral grammatical accuracy amongst adult learners of German as a foreign language. Unpublished PhD dissertation, University College Dublin.

Appendix

The appendix should be used for data collected (e.g. questionnaires, transcripts,...) and for tables and graphs not included in the main text due to their subsidiary nature or to space constraints in the main text.

Assessment Scheme:

Continuous Evaluation:

40%

(Based on abstract writing, interim draft, general approach, research orientation, readings undertaken etc.)

Final Evaluation:

60%

(Based on the organization of the paper, objectives/ problem profile/ issue outlining, comprehensiveness of the research, flow of the idea/ ideas, relevance of material used/ presented, outcomes vs. objectives, presentation/ viva etc.)



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PROJECT/ DISSERTATION

Course Code: SCT4437

Credit Units: 18

Course Objective:

The students are expected to utilize their scheduled periods by undertaking the project that would be completed during the semester

Every student shall undertake a major Project. The major Project shall be undertaken in some biotechnology industry or laboratory of repute. Each student shall be assigned to a faculty who shall continuously monitor the progress of the Project in the concerned laboratory or industry. The faculty, in consultation with the concerned scientist of the industry/laboratory, shall decide the topic of the project. At the conclusion of the project the student shall submit a seminar and a dissertation. The dissertation shall be evaluated by the internal faculty/examiner. The student then shall have to appear for the viva voce examination.

GUIDELINES FOR PROJECT FILE

Research experience is as close to a professional problem-solving activity as anything in the curriculum. It provides exposure to research methodology and an opportunity to work closely with a faculty guide. It usually requires the use of advanced concepts, a variety of experimental techniques, and state-of-the-art instrumentation.

Research is genuine exploration of the unknown that leads to new knowledge which often warrants publication. But whether or not the results of a research project are publishable, the project should be communicated in the form of a research report written by the student.

Sufficient time should be allowed for satisfactory completion of reports, taking into account that initial drafts should be critiqued by the faculty guide and corrected by the student at each stage.

The File is the principal means by which the work carried out will be assessed and therefore great care should be taken in its preparation.

In general, the File should be comprehensive and include

- A short account of the activities that were undertaken as part of the project;
- A statement about the extent to which the project has achieved its stated goals.
- A statement about the outcomes of the evaluation and dissemination processes engaged in as part of the project;
- Any activities planned but not yet completed as part of the project, or as a future initiative directly resulting from the project;
- Any problems that have arisen that may be useful to document for future reference.

Report Layout

The report should contain the following components:

➤ Title or Cover Page

The title page should contain the following information: Project Title; Student's Name; Course; Year; Supervisor's Name.

➤ Acknowledgements (optional)

Acknowledgment to any advisory or financial assistance received in the course of work may be given.

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Examples

For research article


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Voravuthikunchai SP, Lortheeranuwat A, Ninrprom T, Popaya W, Pongpaichit S, Supawita T. (2002) Antibacterial activity of Thai medicinal plants against enterohaemorrhagic *Escherichia coli* O157: H7. *Clin Microbiol Infect*, 8 (suppl 1): 116–117.

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ASSESSMENT OF THE PROJECT FILE

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Data Analysis

Analyse Quantitative/ Qualitative information

Control Quality

Draw Conclusions

Examination Scheme:

Dissertation: 50

Viva Voce: 50

Total: 100



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ANALYSIS OF BUSINESS OF SCIENCE AND ALTERNATIVE CAREERS IN MOLECULAR MEDICINE & REGENERATIVE MEDICINE

Course Code: SCT4401

Credit Units: 01

Course Objective:

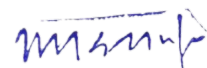
Students will be provided study material on business aspects of science/biotechnology. Material may include papers, articles, webinars etc.

Examination Scheme:

Assignment/Project/Viva: 100



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INDUSTRY TRENDS AND CAMPUS RECRUITMENT EVENTS AND CAREER COUNSELING

Course Code: SCT4402

Credit Units: 01

Course Objective:

Students will be provided study material on Molecular Medicine and Stem Cell Technology Industry trends. Material may include papers, articles, webinars etc..

Examination Scheme:

Assignment/project: 100



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Master of Science - Speech Language Pathology

FLEXILEARN

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Curriculum & Scheme of Examination

2022

AMITY UNIVERSITY HARYANA

GURUGRAM

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RESEARCH METHODS, EPIDEMIOLOGY AND STATISTICS

Course Code: SLP4101

Credit Units: 05

Objectives: After completing this course, the student will be able to understand

- a) clinical research designs and statistical methods,
- b) epidemiological issues and its relevance in speech-language research,
- c) evidence based practice in speech and language pathology, and
- d) ethical practices in research

Course Contents:

Module-1: Experimental Designs and Their Applicability in Speech-language Research

- a) Types of research- post facto research, normative research, standard group comparison, experimental research, clinical and applied research, sample surveys, evaluation research
- b) Methods of observation and measurement, strategies and designs in research
- c) Experimental designs, single subject designs and group designs
- d) Critical analysis of the research methods employed in Speech-language Pathology.
- e) Documentation and research writing
- f) Ethical considerations in research – National and international guidelines

Module-2: Epidemiology

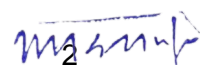
- a) Epidemiology: Definition, basic concepts – scope and function of epidemiology
- b) Study designs in epidemiology: Cohort studies, case-control studies, cross-sectional studies, clinical trials
- c) Measures in epidemiology – Ratios, proportions, rates, relative risk, odds ratio
- c) Identify biases and their consequences in published literature.
- d) Describe criteria for characterizing the causality of associations.
- e) Application of epidemiology in evaluation and screening procedures employed in Speech-language Pathology
- f) Application and impact of epidemiology on national and local policy; influence of epidemiology on ethical and professional issues

Module-3: Statistical Measures and their Features

- a) Review of data description and exploratory data analysis (Numerical summaries and graphical summaries)
- b) Probability concepts and models
- c) Statistical Inference – Estimation Confidence Intervals
- d) Statistical Inference – Basic concepts related to hypothesis testing –null hypothesis, alternative hypothesis, significance level, statistically significant, critical value,



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acceptance / rejection region, p-value, power, types of errors: Type I (α), Type II (β), one-sided (one-tailed) test, Two-sided (two-tailed) test

- e) Parametric and non-parametric approaches to hypothesis testing
- f) Categorical data analysis - contingency tables, Chi-square test for independence of attributes,
- g) Measures of association (Contingency coefficient, Cramer's V), Kappa coefficient

Module-4: Regression, Univariate and Multivariate Analysis

- a) Correlation, regression analysis and prediction including multiple regression; logistic regression; path analysis
- b) Analysis of Variance (ANOVA)- Basic models, assumptions, one way and two way ANOVA; Consequence of failure of assumptions underlying ANOVA; Tests for additivity, homogeneity, transformation; Post – hoc tests; Analysis of Covariance (ANOCOVA); Repeated measure ANOVA
- c) Multivariate analysis: Need for multivariate analysis, various methods including MANOVA, MANCOVA
- d) Introduction to principal component analysis, factor analysis, discriminate function, multidimensional scaling
- e) Evaluation of application of statistics to different research designs used in different publications
- f) Critical analysis of research articles in the field: Analysis of research designs in different areas of Speech-language Pathology

Module-5: Evidence Based Practice

- a) Introduction to Evidence Based Practice (EBP) and Steps to EBP from formulating foreground question, finding best current evidence, critical appraisal of best current evidence, summarizing evidence, integrating evidence and tracking progress.
- b) Concepts related to practical significance (effect size) vs. statistical significance, precision of measurement (confidence intervals)
- c) Levels of evidence: For experimental and non-experimental designs; treatment efficacy-randomized control study, quasi experimental study, correlation and case study, single subject designs, expert committee report, consensus conference
- d) Measures of diagnostic accuracy – positive and negative likelihood ratios; positive predictive value, negative predictive value, diagnostic odds ratio
- e) Concepts related to randomized control trials: Comparative groups- allocation concealment / random allocation; importance of participation and follow up in understanding, evaluating and applying randomized controlled trial results
- e) Methods of carrying out therapy trials; execution, indexing and reporting of therapy trials –efficacy studies; Conventions to study outcomes - i) Absolute risk reduction, ii) Absolute benefit increase, iii) Absolute risk increase, and iv) Absolute benefit reduction
- f) Systematic review and meta-analysis; importance of research publications in terms of systematic review, meta-analysis, clinical practice guidelines, health technology assessments.
- g) Challenges in implementation of EBP in Speech-language Pathology in India and future directions

Examination Scheme:

Components	CD	CA	MSE	A	EE
Weightage (%)	5	5	15	5	70

CD- Class discussion, CA- Class assignment, MSE – Midterm seasonal exam,
A- Attendance, EE- End semester examination

Recommended Reading

- Russell Carter, Jay Lubinsky (2016). Rehabilitation Research: Principles and Applications. Elsevier
- Robert E. Owens Jr., Dale Evan Metz, Kimberly A. Farinella (2014). Introduction to Communication Disorders: A Lifespan Evidence-Based Perspective. Pearson Education
- Laura M. Justice, Erin Redle (2013). Communication Sciences and Disorders: A Clinical Evidence-Based Approach. Pearson Education.
- Robert F. Orlikoff, Nicholas E. Schiavetti, Dale Evan Metz (2014). Evaluating Research in Communication Disorders. Pearson Education
- David L. Irwin, Mary Pannbacker, Norman J. Lass (2013). Clinical Research Methods in Speech-Language Pathology and Audiology. Second Edition. Plural Publishing
- Timothy Meline (2009). A Research Primer for Communication Sciences and Disorders. Pearson Education
- David L. Maxwell, Eiki Satake. (2006) Research and Statistical Methods in Communication Sciences and Disorders. Thomson/Delmar Learning.
- John C Reinard (2006). Communication Research Statistics. SAGE Publications
- Nicholas Schiavetti, Dale Evan Metz (2006). Evaluating Research in Communicative Disorders. Allyn & Bacon
- Tim Pring (2005). Research Methods in Communication Disorders. Wiley
- Donald G. Doehring (2002). Research Strategies in Human Communication Disorders. Pro-Ed
- Carole E. Johnson, Jeffrey L. Danhauer (2002). Handbook of Outcomes Measurement in Audiology. Singular
- David L. Maxwell, Eiki Satake (1997). Research and Statistical Methods in Communication Disorders. Williams & Wilkins



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SPEECH SCIENCE AND SPEECH PRODUCTION

Course Code: SLP4102

Credit Units: 05

Objectives: At the end of the course, the students will be able to

- a) describe the physiology of speech production,
- b) discuss acoustic theories of speech production,
- c) describe the acoustic characteristics of speech sounds, and
- d) know the application of acoustic analysis and speech synthesis.

Course Contents:

Module-1: Introduction to the Study of Speech Physiology

- a) Physiological aspects of speech production (respiration, laryngeal and articulator subsystem)
- b) Aerodynamics of speech: mechanics of airflow – laminar, orifice and turbulent flow: maintenance of airway pressure for speech
- c) Speech breathing
- d) Lower air way dynamics: anatomy, laryngeal and lung activity in speech: conversational speech and loud speech; glottal activity in the production of speech sounds and whisper
- e) Upper airway dynamics: constrictors in upper airway; aerodynamics of speech sounds
- f) Measures of respiratory analysis and instrumentation: intraoral and sub glottal pressure; instrumentation

Module-2 : Theories of Speech Production

- a) Acoustic theory of speech production: source and filter characteristics; output speech and its characteristics
- b) Critical evaluation of acoustic theory of speech production
- c) Aspects of speech acoustics
- d) Aspects of prosody and their realization
- e) Characteristics and production of vocal music: Contrast with speech production

Module-3: Instrumentation for Studying Speech

- a) Acoustic analysis of speech - techniques of digital signal processing, Long Term Average Spectrum
- b) Software for acquisition and acoustic analysis – freeware and patented software
- c) Spectrogram: Identification of sounds and their acoustic features through spectrogram
- d) Physiological measurements: Techniques and instrumentation like Electromyography, Stroboscope, Electroglottography, Ultrasound, EMMA, evoked potentials, FMRI, PET

Module-4 : Acoustic and Aerodynamic Characteristics of Speech Sounds

- a) vowels and diphthongs
- b) plosives
- c) nasal consonants
- d) fricatives
- e) other consonants - affricates, glides and liquids
- f) effects of context and speaker


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Module-5: Application of Acoustic Analysis and Speech Synthesis

- a) Applications of acoustic analysis in speech disorders.
- b) Forensic applications: semiautomatic and automatic methods.
- c) Infant cry analysis- characteristics of normal and abnormal cries, models, infant cry as a tool for early identification of high-risk babies
- d) Speech synthesis and its applications: articulator, parametric synthesis and analysis by synthesis

Examination Scheme:

Components	CD	CA	MSE	A	EE
Weightage (%)	5	5	15	5	70


CD- Class discussion, CA- Class assignment, MSE – Midterm seasonal exam,
A- Attendance, EE- End semester examination

Recommended Reading

- Borden, G. J., & Harris, K. S. (2011). Speech Science Primer, Philadelphia. Lippincott, William & Wilkins.
- Ferrand, C. T. (2007). Speech Science – An Integrated Approach to Theory and Practice. 2nd Edition, Boston, Allyn & Bacon.
- Hixon, T. J., Weismer, G., & Hoit, J. D. (2014). Preclinical Speech Sciences; Anatomy Physiology Acoustics Perception. San Diego, Plural Publishing.
- Hollien, H. (2002). Forensic Voice Identification. NY, Academic Press Inc.
- Kent, R. D., & Read, C. (2002). The Acoustic Analysis of Speech. New York, Delmar Learning.
- Ladefoged, P. (2001). An Introduction to the Sounds of Languages; Vowels and Consonants. Oxford, Black Well
- Raphael, L. J. (2007). Speech Science Primer. Philadelphia, Lippincott Williams & Wilkins.
- CIIL Publications on the production of sounds in different languages of India



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CLINICAL (INTERNAL)

Course Code: SLP4106

Credit Units: 10

Know how

- a) Perform acoustic analysis of speech including FFT, LPC, cepstrum and inverse filtering; acoustic analysis of vowels, diphthongs, plosives, nasals, fricatives, Affricates and other speech sounds using spectrograms on PRAAT
- b) Vowel synthesis using parametric and analysis by synthesis; demonstration of articulator synthesis
- c) Observation of stroboscopic evaluation of persons with voice disorders as part of team assessment
- d) Observation of endoscopic examination of persons with cleft lip and palate as part of team assessment
- e) Differential diagnosis of conditions relevant to speech and hearing as per DSM-V and ICD 10 classifications

Demonstrate

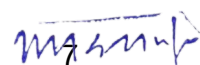
- a) Measurement of aerodynamic parameters using pyrometers and instrumentation for aerodynamic analysis
- b) Record language samples of 5 typically developing children and 5 children with language disorders, transcribe the samples using International Phonetic Alphabet (IPA) and perform analysis of language in terms of different components of language
- c) Carry out and interpret the acoustic measures of voice on two recorded samples and correlate with the perceptual analysis
- d) Complete perceptual analysis of speech samples of persons with CLP.
- e) Demonstration of therapy techniques for disorders of speech sound, voice, and fluency.
- f) Practice and learn to use the strategies of direct selection, scanning, encoding and word prediction in a communication board/book or aided AAC system in simulated situation
- g) Practice and learn to use finger spelling and signs for functional vocabulary
- h) Learn to operate AAC devices, aids and software

Do

- a) Complete evaluation, write detailed evaluation report, counsel persons with communication disorder and their families as required for the following:
 - 1) Five children with language disorders using appropriate tests/protocols: Autism Spectrum Disorders, Attention Deficit Hyperactivity Disorder (ADHD), cognitive impairment and global developmental delay.
 - 2) Five persons with stuttering using standardized tests (SSI, SPI etc.), including assessment of rate of speech, type, percent of dysfluencies, and quality of life measures.
 - 3) Five persons with voice disorders including perceptual assessment using different scales, acoustic analysis of voice and patient reported outcome measurement.
 - 4) Five children with speech sound disorders – record and transcribe speech samples (word and connected speech), carry out error analysis – pattern analysis, calculate percentage consonant correct, mean length of utterance.
- b) Plan and carry out appropriate intervention program for children and adults with voice and fluency disorders, children with language disorders and children with speech sound disorders.
- c) Plan and carry out intervention program for a child with language disorder using AAC



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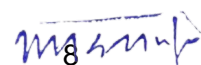
Examination Scheme:

Components	CRW	C/P/A	CT	A	VIVA
Weightage (%)	15	15	15	5	50

CRW- Clinical record writing, CPA- Case discussion/presentation/analysis, CT- Class test A- Attendance, Viva – External



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ADVANCED IN SPEECH SOUND DISORDER

Course Code: SLP4201

Credit Units: 05

Objectives: At the end of the course, the students will be able to

- a) describe recent theories and concepts related to phonological development and its disorders,
- b) diagnose and manage children with speech sound disorders,
- c) provide comprehensive care including speech therapy for persons with CLP as a member of the cleft palate team, and
- d) guide and counsel families of children with CLP.

Course Contents:

Module-1: Phonological Development and Disorders

- a) Recent concepts in theories of phonological development: Generative phonology, natural phonology, non-linear phonology, optimality theory
- b) Application of phonological theories in evaluation and management of phonological disorders
- c) Co-articulation – Types (anticipatory, carryover); Models of co-articulation - feature based, syllabic, allophonic, target, physiological and degree of articulator constriction models); Physiological / Acoustical / Perceptual studies in co-articulation
- d) Current concepts in taxonomy of speech sound disorders in children

Module-2: Assessment and Management of Children with Phonological Disorders


- a) Comprehensive phonological assessment procedures – Formal and informal; Independent and relational analyses; dynamic assessment
- b) Assessment of phonological awareness and phonological processing in children with speech sound disorders
- c) Critical appraisal of test material in Indian context - Specific issues in phonological assessment in multilingual environments
- d) Determining need for intervention and intervention decisions

Module-3: Management of Children with Speech Sound Disorders

- a) Evidence based approaches to intervention – Motor based approaches, linguistic based approaches; use of non-speech oro-motor activities
- b) Motor learning principles – applications to interventions
- c) Considerations in intervention: methods to measure clinical change and determining progress in therapy and generalization
- d) Specific considerations in intervention within multilingual contexts.
- e) Use of software applications (Apps) in intervention; Use of tele-health for intervention of speech sound disorders



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Module-4: Cleft Lip and Palate

- a) Phonological development in children with CLP
- b) Development of other language attributes (morphology, semantics, syntax, pragmatics)
- c) Velopharyngeal Closure- normal physiology, parameters affecting velopharyngeal closure and nature of velopharyngeal dysfunction in persons with CLP
- d) Perceptual assessment protocols for speech characteristics in children with repaired CLP
- e) Instrumental assessment of velopharyngeal closure- Imaging techniques, acoustic measurements, aerodynamic measurements

Module-5: Management of Persons with CLP

- a) Surgical, orthodontic and prosthodontic management in CLP.
- b) Early intervention for children with CLP – Methods and studies related to efficacy
- c) Speech and language therapy for persons with velopharyngeal dysfunction
- d) Current evidence based practices in assessment and management of CLP

Examination Scheme:

Components	CD	CA	MSE	A	EE
Weightage (%)	5	5	15	5	70

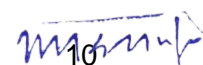
CD- Class discussion, CA- Class assignment, MSE – Midterm seasonal exam,
A- Attendance, EE- End semester examination

Recommended Reading

- Bernthal, J.E., Bankson, N.W., & Flipsen, P. (2013). Articulation and phonological disorders (7th Ed.). Boston, MA: Pearson.
- Dodd, B. (2013). Differential diagnosis and treatment of children with speech disorder (2nd Ed). NJ: Wiley.
- Vasanta, D. (2014). Clinical applications of phonetics and phonology. ISHA Monograph. Vol 14, No. 1. Indian Speech & Hearing Association.
- Velleman, S. L (2003). Resource guide for Childhood Apraxia of Speech. Delmar/Thomson Learning.
- Williams, A., McLeod, S., & McCauley, R. (2010). Interventions for speech sound disorders in children. Baltimore: Brookes.



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VOICE SCIENCE AND DISORDER

Course Code: SLP4202

Credit Units: 05

Objectives: At the end of the course, the student will be able to

- a) understand the bio-mechanics of voice production in normal individuals and in those with voice disorders,
- b) explain and assess the roles of breathing mechanism, vocal fold vibration, vocal tract resonance and enunciation in voice production,
- c) delineate the varying roles and responsibilities of a SLP in a trans-disciplinary (medical) team to assess and treat voice disorders in children, adults, geriatrics and specific population including professional voice users, and
- d) appraise different service delivery models and procedures to run a voice clinic


Course Contents:

Module-1: Voice Science

- a) Vocology – scope and objectives
- b) Breathing and voicing: lungs and airways, breathing mechanism as an interactive sound generating system: breathing oscillator & voicing oscillator, combining the breathing and voicing oscillators with voicing
- c) Vocal folds and voice: Biology of vocal fold tissue and lamina propria, muscular properties and vocal behaviors, biomechanics and voice control/modulation, voice fatigue, vocal injury and recovery, wound healing
- d) Resonance and voice: concepts of acoustic impedance, reactance, inertance, and compliance, acoustic impedance of the vocal tract, the effect of vocal tract reactance on self-sustained vocal fold oscillation, idealized vocal tract shapes and voice quality, modulating phonation with articulation and prosody

Module-2: Voice Assessment and Voice Disorders

- a) Vocometry: assessing vocal ability: principles, methods and procedures: General assessment principles, evaluation procedures, tools of measurement, purpose of measurement, measurement scales, auditory perceptual evaluation- speech breathing, voice quality, resonance, and overview of instrumentation for voice assessment: visualization techniques, acoustic analysis, aerodynamic analysis, glottography, nasometry and electromyography
- b) Voice disorders: issues in definition, incidence and prevalence, occupational risks and voice disorders
- c) Classification of voice pathologies, characteristics and path physiology: Structural, neuropathology, idiopathic, functional/behavioral - pathologies related to mechanical stress, tissue elasticity, fluid transport, airway environment and abnormal muscle activation
- d) Voice disorders in specific populations: Laryngectomy, pediatric voice disorders, aging voice, professional voice, vocal cord dysfunction/paradoxical vocal fold motion, transgender and transsexual voice


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Module-3: Voice Habilitation


- a) Voice management team, roles and functions
- b) Pharmacological and surgical effects on voice: Current trend in medical and surgical management: Medications for bacterial and other infections, allergies, edema, pain, asthma, cough, gastric and laryngopharyngeal reflux, stage fright, spasmodic dysphonic, mood conditions, sleep disturbance, hormone imbalances, etc. Voice surgeries – pre-operative and post-operative care and precautions
- c) Voice habilitation: Current views and approaches; EBP for voice and its disorders; Voice therapy methods for children and adults.
- d) Voice exercise principles and procedures: Physiological voice therapy methods Vs. Behavioral voice therapy methods, role of vocal hygiene and voice rest, basics of exercise physiology, general principles, types of exercises, exercise prescription and progress, vocal exercise techniques – vocal function exercises, resonant voice exercise, confidential voice therapy, and other voice exercises including psychological approaches, relapse and restoration
- e) Habilitation of persons with laryngectomy: Speech and medical considerations in laryngectomy, voice restoration in laryngectomees, counseling and quality of life

Module-4: Voice Needs and Problems in Professional Voice Users

- a) Vocal professionals and voice disorders: classification, pathologies affecting voice – frequency, personal and social impacts, occupational hazards and issues, nature of voice problems: repetitive strain injuries, acute injuries and chronic problems – presentation, assessment and treatment
- b) Laryngeal rest, modified voice rest/conservative voice use, vocal hygiene; laryngeal rest versus exercise: effects on wound healing, general wound healing processes
- c) Voice habilitation for singers and other elite vocal users: Demands on voice, nature of vocal training and use, voice fatigue and assessment, basic principles of motor learning, awareness training, and vocal exercises, concept of professional voice care team – role of medical and non-medical team players
- d) Voice habilitation for teachers: voice problems in teachers: nature and manifestation, use of voice in classroom and factors influencing, vocal loading and assessment, vocal fatigue, techniques to improve the speaking voice and delivery, voice projection techniques, vocal education and counseling

Module-5: Service Delivery and Other Professional Issues

- a) Scope of practice in the area of voice – training in endoscopy, documentation, tele practice – trends across globe and in India (practice guidelines, technical reports, position statements, knowledge and skills document relevant to voice as per RCI, ASHA, European Laryngological Society, and other relevant professional/statutory body). Issues in adopting and implementing the same in India.
- b) Patient compliance and concordance to voice management: Relevance of voice problems/voice problems as a public health concern, measuring severity of voice condition, measurement of compliance to management options, treatment variables and effects, patient-clinician interactions, socio cultural and economic considerations
- c) Voice clinics: SLP led clinics Vs. SLP in a medical team, space and other infrastructural requirements, specialty clinics considering needs of specific population such as singers, transgender, transsexuals, non-native speakers, broad casters, etc.


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- d) Research and ethics in clinical practice: overview of basic and applied research in voice, ethics in clinical research, informed consent, clinical trials, methods to popularize services- roles of associations, conferences, working groups, awareness movements/drives like world voice day, camps, public awareness programs, role of media, prevention of voice problems.

Examination Scheme:

Components	CD	CA	MSE	A	EE
Weightage (%)	5	5	15	5	70

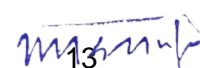
CD- Class discussion, CA- Class assignment, MSE – Midterm seasonal exam,
A- Attendance, EE- End semester examination

Recommended Reading

- American Speech-Language- Hearing Association. (2004a). Vocal tract visualization and imaging: Position statement. Available from www.asha.org/policy.
- American Speech-Language- Hearing Association. (2004b). Vocal tract visualization and imaging: Technical report. Available from www.asha.org/policy.
- Behrman, A. (2013). Speech & Voice Science (2nd Ed.). San Diego: Plural publishers.
- Hixon, T. J., Weismer, G., & Hoit, J. D. (2014). Preclinical Speech Science: Anatomy, Physiology, Acoustics, Perception (2nd Ed.). San Diego: Plural publishers.
- Sapienza, C.M., & Ruddy, B. H. (2013). Voice Disorders. (2nd Ed.). San Diego: Plural publishers.
- Sataloff, R. T. (2006). Vocal Health & Pedagogy: Advanced Assessment and Treatment. Vol. II. (2nd Ed.). San Diego: Plural publishers.
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- Sataloff, R. T. (2005). Voice Science. San Diego: Plural publishers.
- Scope of practice document – SLPA (2015) – Rehabilitation Council of India
- Stemple, J. C., Glaze, L. E., & Gerdeman, B. K. (2014). Clinical Voice Pathology: Theory & Management (5th Ed.). San Diego: Plural publishers.
- Titze, I. R., & Verdolini Abbott, K. (2012). Vocology: The Science and Practice of Voice Habilitation. Salt Lake City: National Center for Voice and Speech.



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DISORDER OF FLUENCY

Course Code: SLP4203

Credit Units: 05

Objectives: At the end of the course, the students will be able

- a) explain the nature, types and bases of fluency and its disorders,
- b) discuss the theories and models of stuttering,
- c) describe, diagnose and manage persons with different types of fluency disorders,
- d) implement a team of professional for evaluation and management of fluency disorders,
- e) counsel the clinical clientele, their family members and others to manage the problem, and
- f) evaluate research output in the area of fluency and its disorders

Course Contents:

Module-1: Overview of Fluency and its Disorders

- a) Dimensions of fluency disorders- recent advances; Suprasegment
- b) Development of fluent speech: Factors affecting fluency of speech
- c) Theories of stuttering - linguistic, articulator, audiological, laryngeal and genetic predisposition
- d) Neuro anatomical, neuro-physiological bases of fluency disorders
- e) Cortical activation patterns in stuttering – neuromotor problem
- f) Stuttering as a timing disorder
- g) Feedback and feed-forward models of stuttering.

Module-2: Types of Non-fluencies and Dysfluencies

- a) Normal non-fluency and developmental stuttering
- b) Cluttering- causes and characteristics
- c) Neurogenic, Psychogenic and other types of fluency disorders
- d) Stuttering in persons with multiple disability

Module-3: Assessment of Fluency and Dysfluency

- a) Objective tools for assessment of fluency and its disorders
- b) Subjective and perceptual assessment
- c) Electrophysiology in the evaluation of fluency disorders
- d) Functional radiological studies of stuttering
- e) Cognitive dimension of stuttering
- f) Diagnosis and differential diagnosis

Module-4: Management of Disorders of Fluency

- a) Spontaneous recovery and relapse
- b) Principles of therapy; skill training
- c) Approaches to management of fluency disorders in adults and children
- d) Group therapy
- e) Input from allied professionals in the management of fluency disorders
- f) Behavioral and work-place management

- g) Counseling - including parents and teachers
- h) Social help and advocacy groups
- i) Apps based and other innovative modes including tele mode.

Module-5: Recovery and Related Issues

- a) Relapse and recovery pattern in fluency disorders
- b) Efficacy and outcome measures of fluency therapy
- c) Evidence based practice
- d) Bilingualism / multilingualism relating to stuttering and cultural sensitivity
- e) Ethics in research and management of stuttering


Examination Scheme:

Components	CD	CA	MSE	A	EE
Weightage (%)	5	5	15	5	70

CD- Class discussion, CA- Class assignment, MSE – Midterm seasonal exam,
A- Attendance, EE- End semester examination

Recommended Reading

- Bloodstein, O., & Ratner, N. B. (2008). A Handbook on Stuttering (6th Ed.). Clifton Park, NY, Thomson Demer Learning.
- Conture, E., Curlee, R., & Rrichard F., (2007). Stuttering and Related Disorders of Fluency. 3rd Ed. N Y, Thieme Publishers.
- Corder, Akingham, R.J. (1998): Treatment efficacy for stuttering. Singular Publishing Group, San Diego.
- Curlee (1993): Stuttering and related disorders of fluency. Thieme Medical Publisher, New York.
- Ham, R.E. (1990): Therapy of stuttering pre-school through adolescence. Prentice Hall, Englewood-Cliffs.
- Manning, W. H. (2010). Clinical Decision Making in Fluency Disorders. 3rd Ed. NY, Delmer Language Learning
- Myers, (1992): Cluttering. Kibworth, Far Communication.
- Onslow, M., & Packman, A. (1999). The Handbook of Early Stuttering Intervention. USA, Singular Publishing Group.
- Peters, H.F.M. and others (Ed.) : (1991). Speech motor control and stuttering. Excerpta medicals, Amsterdam.
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- Rustin, L. and others (1996). Assessment and therapy for young dysfluent children. Whurr Publishers, London.
- Starkweather, C.W. and others (1990): Stuttering prevention. Inglewood Cliffs, Prentice Hall.
- Webster, R. L. (2014). From Stuttering to Fluent Speech, 6300 Cases Later: Unlocking Muscle Mischief Create Space. South Carolina, Independent Publishing Platform
- Wells (1987). Stuttering treatment. Prentice-Hall, New Jersey.


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CLINICAL (EXTERNAL)

Course Code: SLP4205

Credit Units: 10

Know how

- f) Perform acoustic analysis of speech including FFT, LPC, cepstrum and inverse filtering; acoustic analysis of vowels, diphthongs, plosives, nasals, fricatives, Affricates and other speech sounds using spectrograms on PRAAT
- g) Vowel synthesis using parametric and analysis by synthesis; demonstration of articulatory synthesis
- h) Observation of stroboscopic evaluation of persons with voice disorders as part of team assessment
- i) Observation of endoscopic examination of persons with cleft lip and palate as part of team assessment
- j) Differential diagnosis of conditions relevant to speech and hearing as per DSM-V and ICD 10 classifications

Demonstrate

- i) Measurement of aerodynamic parameters using spirometer and instrumentation for aerodynamic analysis
- j) Record language samples of 5 typically developing children and 5 children with language disorders, transcribe the samples using International Phonetic Alphabet (IPA) and perform analysis of language in terms of different components of language
- k) Carry out and interpret the acoustic measures of voice on two recorded samples and correlate with the perceptual analysis
- l) Complete perceptual analysis of speech samples of persons with CLP.
- m) Demonstration of therapy techniques for disorders of speech sound, voice, and fluency.
- n) Practice and learn to use the strategies of direct selection, scanning, encoding and word prediction in a communication board/book or aided AAC system in simulated situation
- o) Practice and learn to use finger spelling and signs for functional vocabulary
- p) Learn to operate AAC devices, aids and software

Do

- d) Complete evaluation, write detailed evaluation report, counsel persons with communication disorder and their families as required for the following:
 - 1) Five children with language disorders using appropriate tests/protocols: Autism Spectrum Disorders, Attention Deficit Hyperactivity Disorder (ADHD), cognitive impairment and global developmental delay.
 - 2) Five persons with stuttering using standardized tests (SSI, SPI etc.), including assessment of rate of speech, type, percent of dysfluencies, and quality of life measures.
 - 3) Five persons with voice disorders including perceptual assessment using different scales, acoustic analysis of voice and patient reported outcome measurement.
 - 4) Five children with speech sound disorders – record and transcribe speech samples (word and connected speech), carry out error analysis – pattern analysis, calculate percentage consonant correct, mean length of utterance.
- e) Plan and carry out appropriate intervention program for children and adults with voice and fluency disorders, children with language disorders and children with speech sound disorders.
- f) Plan and carry out intervention program for a child with language disorder using AAC

Examination Scheme:

Components	CRW	C/P/A	CT	A	VIVA
Weightage (%)	15	15	15	5	50

CRW- Clinical record writing, CPA- Case discussion/presentation/analysis, CT- Class test A- Attendance, Viva –External

NEUROGENIC SPEECH DISORDER

Course Code: SLP4301

Credit Units: 05

Objectives: At the end of the course, the student will be able to

- a) describe the neuroanatomical bases of speech motor control,
- b) explain the models relevant to speech motor control, and
- c) know the methods for assessment and management of neuromotor speech disorders.

Course Contents:

Module-1: Neuroanatomical and Physiological Substrates of Speech Motor Control

- a) Review of neuroanatomical substrates of speech motor control- motor and sensory cortex, sub cortical, cerebella and brain stem structures and their pathways; cranial nerves and peripheral nervous system, types of mechanoreceptors and their topography in speech
- b) Early models of speech motor control: Closed Loop, Open Loop, Associative Chain and Serial Order Model, Schema Theory, Task Dynamic Model, Mackay's Model, Gracco's Model,
- C) Recent Models of Speech Motor Control: DIVA Model
- d) Other speech control models related to development of speech motor control in children
- e) Age related changes in speech motor control

Module-2: Assessment and Management of Dysarthria in Adults

- a) Perceptual methods: Rating scales and tests for speech parameters, prosody, speech intelligibility, and comprehensibility and naturalness.
- b) Recent advances in use of aerodynamic and acoustic analysis of speech among persons with dysarthria
- c) Other physiological analyses of speech subsystems in persons with dysarthria
- d) Behavioral approaches for treatment of speech subsystems affected in persons with dysarthria
- e) Evidence based practice guidelines for management of dysarthria in adults

Module-3: Assessment and Management of Dysarthria in Children

- a) Behavioral approaches to correct posture, tone, and strength and sensori-motor treatment techniques
- b) Specific behavioral approaches in developmental dysarthria: McDonald's Approach and Hardy's Approach
- c) Application of facilitator approaches (neurodevelopment approach and methods for reflex inhibition) in the management of developmental dysarthrias– evidence base for facilitator approaches

Module-4: Assessment and Management of Apraxia of Speech (AOS) in Adults

- a) Assessment for suspected apraxia of speech, apraxia of speech and non-speech apraxia: Perceptual assessment protocols; physiological assessment of speech in adults with AOS
- b) Intervention methods for non-verbal apraxia



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- c) Intervention for AOS in adults: specific, programmed and nonspecific approaches– Evidence based practice
- d) Motor learning principles – applications in intervention of AOS

Module-5: Assessment and Management of Childhood Apraxia of Speech (CAS)

- a) Current status of nature of CAS as primary disorder and CAS as co-morbid condition in other neurodevelopmental disorders
- b) Assessment protocols for CAS and differential diagnosis from other speech sound disorders
- c) Intervention approaches for CAS – Evidence based practice
- d) Motor learning principles – applications in intervention of CAS

Examination Scheme:

Components	CD	CA	MSE	A	EE
Weightage (%)	5	5	15	5	70

CD- Class discussion, CA- Class assignment, MSE – Midterm seasonal exam,
A- Attendance, EE- End semester examination

Recommended Reading

- Burda, A. N. (2011). Communication and Swallowing Changes in Healthy Aging Adults. Chapter 7 & 8. MA, Jones & Barlett Learning.
- Murdoch, B. E. (2010). Acquired Speech and Language Disorders: A Neuroanatomical and Functional Neurological Approach (2nd Ed.). New Delhi, India: John Wiley
- Guenther F. H., & Perkell, J. S. (2004). A Neural Model of Speech Production and its Application to Studies of the Role of Auditory Feedback in Speech. UK, Oxford University Press.
- Maassen, B., Kent, R., Peters, H., Lieshout, P. V., & Hulstijn, W. (Eds.) (2009). Speech Motor Control in Normal and Disordered Speech. NY, Oxford University Press.
- Maassen, B., & Lieshout, P. V. (Eds.) (2010). Speech Motor Control: New Developments in Basic and Applied Research. NY, Oxford University Press.
- McNeil, M. R. (2008). Clinical Management of Sensorimotor Speech Disorders (2nd Ed.). New York, NY, Thieme.
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- Caruso, A. C., & Strand, E. A. (1999). Clinical Management of Motor Speech Disorders in Children. New York. Thieme.
- Crary, M. A. (1993). Developmental Motor Speech Disorders. San Diego, Singular Publishing Group.
- Dodd, B. (2005). Differential Diagnosis and Treatment of Children with Speech Disorders. London, Whurr Publishers.
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- Love, R. J. (2000). Childhood Motor Speech Disability (2nd Ed.). USA, Allyn & Bacon.
- Manasco, M. H. (2014). Introduction to Neurogenic Communication Disorders. MA, Jones & Barlett Learning.
- Weismer, G. (2007). Motor Speech Disorders: Essays for Ray Kent. San Diego, Plural Publishing Inc.
- Yorkston, K. M., Beukelman, D. R., Strand, E. A., & Hakel, M. (2010). Management of Motor Speech Disorders in Children and Adults (3rd Ed.). Austin, Texas; Pro-Ed Inc.

LANGUAGE AND LITERACY DISORDER

Course Code: SLP4304

Credit Units: 05

Objectives: At the end of the course, the student will be able to

- a) explain the relationships among language, literacy, and cognition and specifically the role of oral language in acquisition of literacy skills,
- b) discuss the development and related disorders pertaining to language and literacy among children,
- c) discuss evidence based assessments of language and literacy skills, and
- d) plan evidence based intervention for children with a focus on oral language based interventions

Course Contents:

Module-1: Reading: Development and Relationship with Language


- a) Concepts related to reading and its acquisition – Decoding, reading accuracy, reading fluency, reading comprehension;
- b) Differences among writing systems for languages; Importance of phoneme-grapheme correspondence for reading
- c) Foundations for development of reading in languages with different writing systems (Phonological processing, phonological awareness, orthographic skills, visual processing skills, oral language skills);
- a) Role of oral language in the acquisition of literacy – Aspects of oral language contributing to decoding (e.g., vocabulary and morphosyntax) and reading comprehension (e.g., syntax, syntactic awareness etc.) and spelling (e.g., morphological awareness)
- b) Stages of reading and writing development – emergent literacy to proficient reading comprehension; Models of reading development in English /alphabetic script and other writing systems.

Module-2: Disorders Related Language and Literacy

- a) Definition and differences among underachievement in school, learning disability, reading disability, dyslexia, dysgraphia, dyscalculia, language learning disability, language impairment/ specific language impairment; DSM V and ICD 10 classifications; challenges in use of classifications.
- b) Linguistic characteristics of students with reading/language/learning disabilities
- c) Issues related to co-morbidity and overlap among phonological disorders, specific language disorders, reading disability and auditory processing disorders with relation to development of reading
- d) Genetics of literacy disorders (family risk, molecular genetics etc.).

Module-3: Assessment

- a) Screening of children for language disorders in schools; Standardized tests to assess language and (English and other languages) in children 5-18years
- b) Other forms of assessments to identify children with language/learning disabilities - Criterion referenced assessments, language sampling, portfolio, dynamic assessment, curriculum-based assessment etc.
- c) Specific assessment tools for learning disability in India (e.g., NIMHANS battery, Dyslexia Assessment for Languages in India and other published tests)


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- d) informal assessment of different domains – Tasks and stimuli in specific languages for phonological awareness, orthographic skills, phonological processing, oral language skills etc.
- e) Brief overview of assessment of associated areas (auditory processing, visual processing, memory etc.)

Module-4: Evidence based Intervention for Literacy Development

- a) Intervention approaches to promote emergent literacy
- b) Intervention approaches to promote decoding and early reading skills
- c) Intervention approaches to promote development of reading comprehension
- d) Intervention approaches to promote spelling and written language output
- e) Research on cross-linguistics issues in intervention; intervention for children with Bilingual / multilingual background and reading intervention

Module-5: Issues related to Service Delivery and Related Laws/Policies

- a) Modes of service delivery for school-aged children (clinical, consultative, collaborative, language-based classroom, peer-mediated)
- b) Team members working children with literacy disorders; Response to Intervention– tiers and their role in instruction for poor readers; role of SLP in Response to Intervention
- c) Acts, regulations and policies relevant to education and children with special needs in India (e.g., Right to Education Act, Sarva Shiksha Abhiyan, regulations related to language exemption in examination, National Open School system).
- d) Dyslexia associations/groups in India

Examination Scheme:

Components	CD	CA	MSE	A	EE
Weightage (%)	5	5	15	5	70

CD- Class discussion, CA- Class assignment, MSE – Midterm seasonal exam,

A- Attendance, EE- End semester examination

Recommended Reading

- C. A. Stone, E. R. Silliman, B. J. Ehren, & G. P. Wallach (Eds.), (2016). *Handbook of language and literacy: Development and disorders* (2nd ed.), pp. 339-357. New York, NY: Guilford Press.
- Clarke, P. J., Truelove, E., Hulme, C., & Snowling, M. J. (2013). *Developing reading comprehension*. John Wiley & Sons.
- Nag, S., & Snowling, M. J. (2012). School underachievement and specific learning difficulties. *IACAPAP e-Textbook of Child and Adolescent Mental Health*. Geneva: International Association for Children and Adolescent Psychiatry and Allied Professions.
- Paul, R. & Norbury, C. (2012). *Language disorders from infancy through adolescence: Listening, speaking, reading, writing, and communicating* (4th Ed.). St. Louis, MO: Elsevier.
- Carroll, J. M., Bowyer-Crane, C., Duff, F. J., Hulme, C., & Snowling, M. J. (2011). *Developing language and literacy: Effective intervention in the early years*. John Wiley & Sons.
- Turnbull, K. L. P., & Justice, L. M. (2011). *Language development from theory to practice*. Pearson Higher Ed.
- Hulme, C., & Snowling, M. J. (2009). *Developmental disorders of language learning and cognition*. John Wiley & Sons.
- Cabell, S. Q., Justice, L. M., Kaderavek, J., Pence, K. L., & Breit-Smith, A. (2008). *Emergent literacy: Lessons for success*. Plural Publishing.
- Justice, L. M. (2006). *Clinical approaches to emergent literacy intervention*. Plural Publishing.

COGNITIVE COMMUNICATION DISORDER

Course Code: SLP4305

Credit Units: 05

Objectives: At the end of the course, the student will be able to

- a) describe various conditions in adults leading to cognitive communication disorders,
- b) acquire skills in issues related to assessment of cognitive communication disorders,
- c) acquire skills in management of cognitive communication disorders, and
- d) critically evaluate research articles related to cognitive communication disorders.

Course Contents:

Module-1: An Overview of Cognitive Communication Disorders - Aphasia Related, Traumatic Brain Injury (TBI) and Right Hemisphere Damage (RHD)

- a) Cognition- description of cognitive processes, mapping, mechanisms, concept, schema and properties
- b) Models of memory, cognitive-linguistic processes
- c) Cognitive communication disorders associated with TBI, disability following TBI-WHO-ICF classification, assessment and principles of cognitive rehabilitation of TBI
- e) Nature, assessment and management of various cognitive communication deficits in RHD

Module-2: Dementia and Related Cognitive Disorders


- a) Neuropathology in Alzheimer's Disease (AD), evaluation and intervention of cognitive communication disorders in AD and other dementias
- b) Cognitive communicative aspects in primary progressive aphasia (PPA), evaluation and management of PPA
- c) Role of speech-language pathologist working with persons with dementia

Module-3: Alcohol Induced Language Disorders and Metabolic Disorders of Language

- a) Cognitive communication deficits in alcohol induced and metabolic language disorders
- c) Assessment and management of body structure and function: quantifying and qualifying cognitive communication disorders of alcohol induced and metabolic disorders
- d) Assessment of swallowing in persons with cognitive communication disorders
- e) Differential diagnosis of cognitive communication disorders in adults

Module-4: Physiology, Pathology and Cognitive Communication Changes in young ageing with Aging

- a) Theories aging, and age related changes of the organ system, and cognition
- b) Psychological- death and bereavement, personality development and quality of life
- c) Physical changes and performance- range of motion, strength, endurance praxis, performance work
- d) Aging speech- voice, resonance and articulation and swallowing
- e) Language and cognitive aging: primary, secondary and tertiary aging factors


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Module-5: Ethno-Cultural Dynamics in Cognitive Communication Disorders and Cognitive Communication Approaches.

- a) Language as socio-cultural phenomena in aging
- b) Role of supportive relationships in cognitive communication disorders
- c) Cognitive communication approaches in rehabilitation
- d) Role of AAC in the intervention of cognitive communication disorders
- e) Team and partnerships in cognitive communication disorders
- f) Rights of persons with cognitive communication disorders

Examination Scheme:

Components	CD	CA	MSE	A	EE
Weightage (%)	5	5	15	5	70

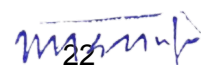
CD- Class discussion, CA- Class assignment, MSE – Midterm seasonal exam,
A- Attendance, EE- End semester examination

Recommended Reading

- Chapey, R. (2008). Language Intervention Strategies in Aphasia and Related Neurogenic Communication Disorders. Philadelphia, Lippincott Williams & Wilkins.
- Chop, C. W & Robnett, H. R (2015.). Gerontology for health care professional. MA: Jones and Bartlett Learning Burlington.
- Gazzaniga, S., Ivry, M. S., Mangun, R. B., & George, R. (2014). [Cognitive Neuroscience: The Biology of the Mind](#). New York, W. W. Norton & Company Inc.
- Laura, L. M., & Heather, M. C. (2006). Neurogenic Disorders of Language: Theory Driven Clinical Practice. New York, Thomson Delmar Learning.
- Sarno, T.M (1998). Acquired Aphasia. San Diego, Academic Press.
- Papathanasiou, P. Coppens, & C. Potagas (2013), Aphasia and Related Neurogenic Communication Disorders. Burlington, Jones & Bartlett.
- Morris, J. C. (1994). Handbook of Dementic Illnesses. NY, Marcel Dekker Inc.
- Murray, L.L. & Clark, M.H (2015). Neuro-genic Disorders of Language and cognition. Austin, Texas, Pro-Ed Inc.



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CLINICAL (INTERNAL)

Course Code: SLP4306

Credit Units: 10

Know how

- Observation of modified barium swallow and/or flexible endoscopic examination of swallowing as part of team assessment
- Observe and identify reports of persons with neurogenic communication disorders in tests such as EEG, CT Scan, MRI etc.
- Reversible and irreversible conditions that cause neurogenic communication disorders.
- Certification procedures
- Rights and privileges of persons with communication disorder
- Ethics in clinical practice

Demonstrate

- Perform assessment of typically developing child using assessment protocols for learning disability
- Demonstrate process of differential diagnosis for persons with adult language and cognitive communication disorders.
- Use of AAC for adults with communication disorders (e.g., alphabet supplementation board, software applications)
- Perform assessment of phonological awareness, visuospatial skills, orthographic skills on typically developing children.

Do

- Complete evaluation, write detailed evaluation report, counsel persons with communication disorder and their families as required for the following:
 - Three persons with aphasia using appropriate screening, diagnostic (WAB/ BDAE etc.) and performance tool
 - Bed side screening for five adults with communication disorders.
 - Three persons with adult cognition communication disorders using appropriate screening (ACE/MMSE/CLQT etc.), diagnostic (ABCD/CLAP etc.) and performance tool
 - Three persons with motor speech disorders including perceptual evaluation of speech subsystems, speech intelligibility assessment, instrumental assessments for respiration or phonology and quality of life assessment
 - Clinical swallow examination for five persons with concerns in swallowing
 - Three children at risk for language learning disability
- Plan and carry out intervention program for adults with neurogenic speech disorders, aphasia, cognitive communication disorders and dysphagia

Prepare a report for persons with communication disorders for medico-legal purposes

Examination Scheme:

Components	CRW	C/P/A	CT	A	VIVA
Weightage (%)	15	15	15	5	50

CRW- Clinical record writing, CPA- Case discussion/presentation/analysis, CT- Class test A- Attendance, Viva – External


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PRACTICES IN SPEECH-LANGUAGE PATHOLOGY

Course Code: SLP4401

Credit Units: 05

Objectives: At the end of the course, the students should be able

- a) know the role of an speech-language pathologist in different set-ups.
- b) liaise with other professionals in setting-up an speech-language clinic.
- c) audit speech-language practices in existing set-ups.
- d) implement acts and legislations relating to persons with speech-language impairment,
- e) advise Governments and other agencies on the formulation of policies and legislative acts relating to speech-language disability
- f) understand the legal implications of practice in speech-language pathology.

Course Contents:

Module-1: Scope of Practice, Laws, Regulations and Professional Ethics

- a) Scope of practice in global and Indian scenario
- b) Professional ethics-
- c) Existing acts, legislations, policies related to persons with communication impairment
- d) Role of speech-language pathologists in the formulation of acts, regulations and policies
- e) Implementation of acts, legislations, policies and welfare measures relating to persons with speech-language impairment
- f) Advocacy groups, NGOs
- g) Rights of citizens
- h) National and international standards related to Speech-language pathology

Module-2: Specialized Programs in Speech-language Pathology

- a) Need for specialized programs in Speech-language pathology: Geriatric and persons with multiple handicaps
- b) Other specializations (medical speech language pathology, forensic speech science)
- b) Health, wellness, and health care - Health promotion and disease prevention, quality of life and healthcare finances
- c) Disability-friendly environment including public education
- e) Culture and religion sensitive practice in speech-language practice
- e) Multilingual and multicultural sensitivity in therapeutics and management
- f) Prevention and early identification programs including societal participation

Module-3: Service Delivery Models in Speech-language Pathology

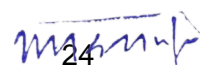
- a) Services in different medical / rehabilitation/ research /educational setups
- b) School based services pertaining to regular and special schools
- c) Community based practice in rural and urban areas
- d) Family empowerment program
- e) Home based delivery of services
- f) Autonomous practice in speech-language pathology
- g) Services for other groups of professionals (professional voice users)

Module-4: Tele-practice in Speech-language Pathology

- a) Information and communication technology in speech-language pathology practice



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- Infrastructure for video-conferencing and tele-practice in Speech-language Pathology
- Techniques/principles of remote testing for screening and diagnostic assessment for speech-language, intervention and counseling
- Challenges and limitations of tele-practice in Speech-language Pathology in screening, assessment and evaluation, selection of aids and appliances, therapeutics and counseling.

Module-5: Issues in Speech-Language Pathology Practice

- Entrepreneurship and planning to set up private practice/clinic for speech-language pathology practice: Clinical ethics
- Documentation in speech-language pathology practice: clinical / demographic data, database management and storage
- ICF framework for documentation /reports
- Quality control and auditing in speech-language pathology practice
- Documenting and implementing evidence based practice in speech-language pathology
- Understanding team approach: Work in cohesion with other professionals
- Information resources in speech-language pathology including books and journals, both electronic and print - Databases - Evidence based practice: Change scenario

Examination Scheme:

Components	CD	CA	MSE	A	EE
Weightage (%)	5	5	15	5	70

CD- Class discussion, CA- Class assignment, MSE – Midterm seasonal exam,
A- Attendance, EE- End semester examination

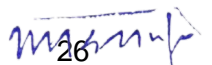
Recommended Reading

- Acts relating to disability, particularly hearing, enacted by the Indian Parliament.
- ASHA.2007. Scope of Practice in Speech-Language Pathology [Scope of Practice].Available at:<http://www.asha.org/policy>.
- ASHA. 2009a. Audiology and Speech-Language Pathology Outside the United States. Available at:http://www.aasha.org/members/international/intl_assoc.
- ASHA.2009b. Tele practices for SLPs and Audiologists. Available at: <http://www.asha.org/practice/telepractice>
- Cari M. Tellis, Orlando R. Baron (2015). Counseling and Interviewing in Speech- Language Pathology and Audiology
- College of Audiologists and Speech-Language Pathologists of Ontario.(2004). Use of Tele practice Approaches in Providing Services to Patients/Clients.
- David L. Irwin (2007). Ethics for speech-language pathologists and audiologists : an illustrative casebook
- Position paper Speech and language therapy in adult critical care. Royal college of Speech-language therapists. (2014), London
- Rizzo, S.R., & Trudeau, M.D. (1994).Clinical administration in audiology and speech language pathology. San Diego: Singular Publishing GroupInc.
- Rosemary Lubinski and Melanie W. Hudson. (2013), Professional Issues in Speech- Language Pathology and Audiology 4thEdition
- Sarah Ginsberg; Jennifer Friberg; CollennF. Visconti(2011). Scholarship of Teaching and Learning in Speech-Language Pathology and Audiology
- Speech-Language Pathology Medical Review Guidelines (2015). American Speech- Language-Hearing Association
- Stephen, R.R., Jr., Trudeau, D.M. (Eds.) (1994). Clinical administration in audiology & speech language pathology. San Diego: Singular Publishing GroupInc.

- Todd K Houston (2013). Tele practice in Speech-Language Pathology
- Trici Schraeder (2013). A Guide to School Services in Speech-Language Pathology 2nd Edition
- www.disabilityaffairs.gov.in (website of Department of Empowerment with Disabilities)
- www.rehabcouncil.nic.in (website of Rehabilitation Council of India)



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DISSERTATION

Course Code: SLP4437

Credit Units: 10

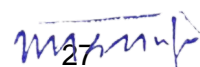
Examination Scheme:

Components	IE	EE
Weightage (%)	30	70

IE-Internal Examination, EE- External Examination



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CLINICAL (EXTERNAL)

Course Code: SLP4403

Credit Units: 10

Knowhow

- g) Observation of modified barium swallow and/or flexible endoscopic examination of swallowing as part of team assessment
- h) Observe and identify reports of persons with neurogenic communication disorders in tests such as EEG, CT Scan, MRI etc.
- i) Reversible and irreversible conditions that cause neurogenic communication disorders.
- j) Certification procedures
- k) Rights and privileges of persons with communication disorder
- l) Ethics in clinical practice

Demonstrate

- a) Perform assessment of typically developing child using assessment protocols for learning disability
- b) Demonstrate process of differential diagnosis for persons with adult language and cognitive communication disorders.
- c) Use of AAC for adults with communication disorders (e.g., alphabet supplementation board, software applications)
- d) Perform assessment of phonological awareness, visuospatial skills, orthographic skills on typically developing children.

Do

- c) Complete evaluation, write detailed evaluation report, counsel persons with communication disorder and their families as required for the following:
 - 1) Three persons with aphasia using appropriate screening, diagnostic (WAB/ BDAE etc.) and performance tool
 - 2) Bed side screening for five adults with communication disorders.
 - 3) Three persons with adult cognition communication disorders using appropriate screening (ACE/MMSE/CLQT etc.), diagnostic (ABCD/CLAP etc.) and performance tool
 - 4) Three persons with motor speech disorders including perceptual evaluation of speech subsystems, speech intelligibility assessment, instrumental assessments for respiration or phonology and quality of life assessment
 - 5) Clinical swallow examination for five persons with concerns in swallowing
 - 6) Three children at risk for language learning disability
- d) Plan and carry out intervention program for adults with neurogenic speech disorders, aphasia, cognitive communication disorders and dysphagia
- e) Prepare a report for persons with communication disorders for medico-legal purposes.

Examination Scheme:

Components	CRW	C/P/A	CT	A	VIVA
Weightage (%)	15	15	15	5	50

CRW- Clinical record writing, PA- Case discussion/presentation/analysis, CT- Class test A- Attendance, Viva – External


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Curriculum & Scheme of Examination

2022

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NUTRITIONAL BIOCHEMISTRY-I

Course Code: DAN4102

Credit Units: 04

Course Objectives

1. This subject makes students understand about the basic concepts of biochemistry like cell and the various processes involved in it like the release of energy.
2. Students are made to know about the various enzymes involved in the various biochemical reactions taking place in the human body.
3. The subject involves understanding of various nutrients and their involvement in the processes occurring in our body.
4. Biochemical structures, various acids, their classification are being learnt by the students.

Module – I :

Principles of Bioenergetics- Concept of free energy, Oxidation and reduction, concept of cell, high energy compounds (ATP, PEP, and Phosphagens), role of ATP/ADP cycle in transfer of high energy phosphates, concept of coupled reactions.

Module – II :

Carbohydrates-

Definition, classification.

Monosaccharides Classification, occurrence, structure, stereoisomerism (DL and RS systems) and Properties, derivatives of Monosaccharides- deoxy sugars and amino sugars. **Disaccharides** of nutritional importance (sucrose, maltose, lactose),

Polysaccharides Homopolysaccharides- starch, glycogen, cellulose, Heteropolysaccharides - glycoprotein, Proteoglycans, mucopolysaccharides, pectins.

Module – III :

Lipids : Definition, classification. Structure and functions of fatty acids (including essential fatty acids) Trans fatty acids, prostaglandins acylglycerols, phospholipids, sphingolipids, glycolipids, steroids (including role of cholesterol). Characterization of fats- saponification, iodine, acid, acetyl and peroxide value.

Module – IV :

Amino acids and Proteins: Common structural features, classification based on the nature of R group, non-protein amino acids, essential amino acids and titration curves of monoamino-monocarboxylic, monoamino-dicarboxylic and diamino-monocarboxylic acids. peptide bond, biological role of proteins, classification of proteins, levels of protein structure- primary, secondary (super secondary elements in brief), tertiary and quaternary structure, forces stabilizing protein structure, denaturation of proteins.

Module – V :

Enzymology: General Characteristics, classification and nomenclature, coenzyme, cofactor, prosthetic group, concept of holoenzyme and apoenzyme, units of enzyme activity, Enzyme kinetics- Michaelis-Menten and Lineweaver-Burk equation for monosubstrate reactions (turnover number), bisubstrate reactions.

Module – VI :

Nucleic acids: Nitrogenous bases, experimental proof of DNA and RNA as genetic material, Chargaff's rules, double helical model of DNA (A, B and Z), DNA packaging, types of RNA and their functions.

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Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

A – Attendance , CT- Class Test , S- Seminar , V- Viva , Q –Quiz , HA – Home Assignment , EE – End Term Exam

Texts and References:**Texts:**

- 1 Harper's Biochemistry- Robert K. Murray
- 2 Textbook of Biochemistry- West and Todd
- 3 Bio chemical aspect of Nutrition – S.X.C.- Okoyo
- 4 Food Chemistry – O.R. Fennema
- 5 Biochemistry – Voet and Voet
- 6 Principles of Biochemistry – A.L. Lehniger

References:

- 7 Outlines of Biochemistry- E. E. Conn
- 8 Practical Clinical Biochemistry- Harold Varley



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FOOD SCIENCE – I

Course Code: DAN4104

Credit Units: 04

Course Objectives:

1. Students learn about the various food groups and their structure and composition
2. Properties of all food groups are included in the subject to make students aware about the various processes
3. Cooking methods involved for making varieties of foods are being known by the students.
4. Various adulterants and their tests of presence are learnt by the students which they can utilize for doing quality check.
5. Evaluating the various foods on different measures is included to make students know about those measures and their use.

Course Contents:

Module – I

Physical & Physiological changes in food.

- a) Colloidal Chemistry as related to food emulsions, foams, sols & gels, osmotic pressure. b) Enzymatic browning immobilized enzymes & enzymes in food Processing.. c) Denaturation of Protein.

Module – II :Cereal and cereal Products:

(A) Cereal grains, structure & composition , Cereal products, Breakfast Cereals. Leavening agents and products.

Module – III :Sugar and Sugar Products

Manufacturing Process of Sugar Stages of sugar Cookery. Starch Structure , gelatinization, Modified Food Starches.

Module – IV :Fruits & Vegetables:

Pigments and colour in Food.

Module – V :Milk & Milk Products:

Composition and properties of milk. Dairy Products: Cultured milk , Yoghurt, butter, Whey, cheese etc.

Module – VI :

Meat , Poultry & Egg: Postmortem changes in meat, tenderizing meat, heat induced changes in meat, meat substitutes.

Egg: Structure & composition , changes during storage, functional properties of egg, egg substitutes.

Module – VII :Food Additives

- a) Meaning, need of food additives.
- b) Antioxidants, chelating agents, coloring agents, curing agents.
- c) Nutrient supplements, Non nutritive sweeteners, pH control agents.
- d) Preservatives, stabilizers and thickeners, Other Additives.
- e) Additives & Food Safety.

Module – VIII :Food Adulteration and Sensory evaluation

Definition, meaning and various tests used in Sensory evaluation & food product development.

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Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

A – Attendance , CT- Class Test , S- Seminar , V- Viva , Q –Quiz , HA – Home Assignment , EE – End Term Exam



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NUTRITIONAL BICHEMISTRY LAB

Course Code: DAN4106

Credit Units: 01

Course Objectives:

1. Students learn the process to identify the presence of one or more component present in food.
2. Practical teaches them about the preparation of solutions and buffers.
3. Qualitative and quantitative estimation of nutrients is learnt by the students.
4. The change in activity of certain foods on adding chemicals and observing them.

Course Content:

1. Preparation of standard solutions.
2. Preparation of buffers using buffer tables and verify pH
3. Extraction and quantitative estimation of total sugars and reducing sugar from food stuffs.
4. Isolation and estimation of casein from milk.
5. Quantitative estimation of proteins by kjeldahl's, Biuret and lowary's method (any two methods).
6. Effect of pH, concentration, time and temperature of incubation on enzyme activity.
7. Estimation of activity of alkaline phosphatase in Moong been seeds.

Examination Scheme:

IA				EE		
A	PR	LR	V	PR	WT	V
5	10	10	5	25	25	20



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FOOD SCIENCE – I LAB

Course Code: DAN4107

Credit Units: 01

Course Objectives:

1. This practical aims at making students learn about the presence and absence of adulterants in foods.
2. Various experiments to check the purity and quality of foods are included to make students know about them and their use in future.
3. Students learn about the sensory evaluation and the various types and its uses to check the quality of food.
4. Students are made to think about innovative recipes by focussing on new product development and then checking its acceptability.

Assessment of purity and quality of different food

- 1 Detection of metanil yellow in a given food sample .
- 2 Check the presence of rhodamine B in the given food sample.
- 3 Test the presence of sugar in honey.
- 4 Detection of NaHCO₃ in flour.
- 5 Check for the presence of vanaspati and rancidity in the ghee.
- 6 Check the milk for presence of protein, urea, sugar and starch.
7. Check the presence of mineral oil in the edible oil sample.

Sensory Evaluation of Foods\

- 1 Design of sensory experiment – selection of panel, types of panel, training of panel, development of score card , data analysis and interpretation of results.
- 2 Determination of test threshold for the different sensations sweet, salty, sour.
3. Conduct test to know the acceptability of a new product using rating test.

Examination Scheme:

IA				EE		
A	PR	LR	V	PR	WT	V
5	10	10	5	25	25	20

Text and Reference:

Texts:

1. Sharma, S. Practical biochemistry, classic publishing house, Jaipur, 1993.
2. Mody, N.I. Experimental food chemistry, Avi publishing company, INC, Westport, Connecticut.
3. A manual of laboratory techniques, National Institute of Nutrition. 1983.
4. Sathe, A.V. (1999) A first course in food analysis, New age International (p) limited Publishers, New Delhi.

Reference:

5. Sethi M. and Rao, E.S. (2001) Food Science Experiments and Applications, CBS Publishers & Distributors, New Delhi.

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THERAPEUTICS NUTRITION – I LAB

Course Code: DAN4108

Credit Units: 01

Course Objectives:

1. This practical aims to make students learn and make use of the various cooking methods.
2. Students learn to plan about the various diets of various diseases they have learnt in theory.
3. Calculation of nutritive values, the preparation of the planned recipe, its presentation and its evaluation is known by the students.
4. Including the correct choices of foods and the correct method of preparation is being learnt by the students.
5. Students learn the way of presenting a recipe to the person or patient.

Course Content:

Planning, Calculation, Preparation, serving and evaluation of therapeutic diets for diseases covered in theory

Examination Scheme:

IA				EE		
A	PR	LR	V	PR	WT	V
5	10	10	5	25	25	20



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ADVANCED NUTRITION-II

Course Code: DAN4201

Credit Units: 03

Course Objectives:

1. To understand about the digestion, absorption and transport of proteins, vitamins and minerals
2. To understand the role of nutrient interaction and drug-nutrient interaction in our body
3. To learn about the practical knowledge of various nutrients.
4. To learn about the physiological, pharmacological and therapeutic effects, toxicity and deficiency of vitamins.

Course Contents:

Module – I

Proteins: Classification, digestion, absorption and transport - review. Protein quality, methods of evaluating protein quality. Protein and amino acid requirements. Therapeutic applications of specific amino acids: Branched chain, glutamine arginine, homocysteine, cysteine, taurine.

Module – II :

Vitamins : Historical background, food sources, absorption and transport, biochemical function. Interactions with other nutrients. Physiological, pharmacological and therapeutic effects, toxicity and deficiency with respect to the following

- a) Fat soluble: Vitamins A, D, E & K.
- b) Water soluble: Thiamine, riboflavin, niacin, biotin, pyridoxine, folic acid, pantothenic acid, ascorbic acid, cyanocobalamin, choline, inositol.

Module – III :

Minerals

(Note: For each nutrient sources, bioavailability, function requirements, RDI/ESADDI, deficiency and toxicity, interactions with other nutrients are to be discussed)

Macro minerals: calcium, phosphorus, magnesium sodium, potassium and chloride.

Micro minerals: Iron, copper, zinc, manganese, iodine, fluoride.

Trace minerals: Selenium, cobalt, chromium, vanadium, silicon, boron, nickel.

Module – IV :Nutrient

Nutrient interaction, drug-nutrient interaction.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

A – Attendance , CT- Class Test , S- Seminar , V- Viva , Q –Quiz , HA – Home Assignment , EE – End Term Exam

Texts and References:

Texts:

- 1 Modern Nutrition in Health and Disease – Goodhearth, R. S.
- 2 Recommended dietary allowance for Indian – I.C.M.R., 1980
- 3 Nutrition and Development- Winick 1973, Univ. of Calombia.
- 4 Biology of Nutrition – Eclames 1972, Palaniuma Press
- 5 Foods & Nutrition – Krause 1972, Saunders.
- 6 Proteins and Human Foods 1970, Lowrie, Avi. Pub. Co.
- 7 Nut & Physical fitness-BoGert L.J.

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- 8 Principles of Nut. – Wilson, L.D. and Fisher. K.H.
9 Standardised diets for Hospital – National Nut. Advisory Committee
10 Nutrition in Health & Disease – Cooper, L. Barher, L. Mitchell, Hand Rynheraen.

References:

1. Nutrition A comprehensive: Beaton and McHanery, Treatise Vol-1, II, & III.
2. Human Nut. & Dietetics- Davidson S., Passmore, R., Brook, J.E. and Truswell.
3. Foods and Nut.- Rankin, W. Munn. Hildath E.N.
4. Iron deficiency – Holiberth, H.C. Harvorth, vannotti, N.Y.
5. Trace Elements in Human and Animal Nut. – Underwood, N.Y.
6. Essays in Biochemistry – Samul Graff, Tandon Book Dept. Sec. –16
7. Diabetes Mellitus- The Williams and Wilkinas Co., U.S.A.



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NUTRITIONAL BIOCHEMISTRY-II

Course Code: DAN4202

Credit Units: 04

Course Objectives:

1. To understand the metabolism of carbohydrate, amino acid, lipid metabolism and nucleotide.
2. To learn the mechanism of enzyme action and role of enzymes in medicine and food industry.
3. To understand the different bio physical techniques with their applications.
4. To learn about the regulation of metabolic pathways in our body.

Course Contents:

Module – I :

Metabolism of Carbohydrates: Review of glycolysis, fate of pyruvate: alcoholic and homolactic fermentation, Cori cycle, Citric acid cycle. Hexose monophosphate shunt, glycogenesis, glycogenolysis, gluconeogenesis, glyoxalate cycle. Regulation of blood glucose level.

Module – II :

Amino Acid Metabolism: Transamination, deamination, urea cycle, amino acids as biosynthetic precursors- biosynthesis of heme, biologically active amines and glutathione.

Module – III

Lipid Metabolism: Beta-oxidation of saturated and unsaturated fatty acids (including brief account of minor pathways of fatty acid oxidation), biosynthesis of fatty acids, triacylglycerols, Phospholipids, ketone body formation and their utilization, prostaglandins. Major alterations in carbohydrates, protein and fat metabolism in chronic nutrition related degenerative diseases.

Module – III :

Nucleotide Metabolism :Biosynthesis of purines and pyrimidines, DNA replication, transcription, translation, regulation of gene expression (Prokaryotes), mutagenesis and DNA repair, recombinant DNA technology and genetically modified foods.

Module – IV :

Enzymology :Mechanism of enzyme action (acid base catalysis, covalent catalysis, metal ion catalysis, electrostatic catalysis, proximity and orientation effect, preferential binding of the transition state complex, strain and distortion theory) Enzyme inhibition – irreversible(non-competitive, uncompetitive), reversible(competitive), feed back and product inhibition, regulation of enzyme activity by covalent modification, allosteric modification, isoenzymes, applications of enzymes in medicine and food industry

Module – V :

Biophysical Techniques: Chromatography- Column, Thin layer, Paper, Ionexchange, Affinity, Molecular exclusion, GLC and HPLC.

Electrophoresis- cellulose acetate and gel electrophoresis, isoelectric focusing. Spectrophotometry- Beer Lambert's Law, determination and application of extinction coefficient.

Centrifugation- sedimentation velocity and analytical methods, ultracentrifugation. Immunochemical Methods – RIA, ELISA. Use of Isotopes in biochemistry. *Regulation of metabolic pathways should be discussed along with.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

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A – Attendance , CT- Class Test , S- Seminar , V- Viva , Q –Quiz , HA – Home Assignment , EE – End Term Exam

Texts and References:

Texts:

- 1 Harper's Biochemistry- Robert K. Murray
- 2 Textbook of Biochemistry- West and Todd
- 3 Bio chemical aspect of Nutrition – S.X.C. - Okoyo
- 4 Food Chemistry – O.R. Fennema
- 5 Biochemistry – Voet and Voet

References:

- 6 Principles of Biochemistry – A.L. Lehniger
- 7 Outlines of Biochemistry- E. E. Conn
- 8 Practical Clinical Biochemistry- Harold Varley



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RESEARCH MEHODOLOGY

Course Code: DAN4203

Credit Units: 04

Course Objectives:

1. To understand the scientific approaches to research.
2. To appreciate the importance of scientific writing and develop competence in writing skills.
3. To identify the sources of variability and uncertainty in research.
4. To learn about the different methods of research.

Course Contents:

Module – I :

Nature of research in Home Science, scientific approach. Types of Research: Experimental, Field studies, Case study, and Survey research.

Designing research: Problem, hypothesis, concept and types of variables (dependent, independent, random, discrete, continuous, qualitative and quantitative).

Module – II

Methods of data collection: Interview, observation, questionnaire, rating scales. Research Designs: randomized groups, matched groups, pre and post test and factorial.

Sampling: Meaning, importance and types; random (simple, stratified, cluster), Non random (incidental, purposive, quota)

Module – III :

Statistics: Meaning, primary data, array, frequency, frequency distribution and its types.

Measures of central tendency: Mean, Median, Mode; Measures of dispersion: range, mean deviation, standard deviation, root mean square deviation, variance, moments about origin and moments about mean, Binomial and Normal distribution, Skewness and Kurtosis. Case studies of areas of current research. Formulating a research plan and its presentation

Module – IV :

Type of Articles (review, letters etc). Scientific paper format (Abstract, Introduction, Materials and Methods, Results, Discussion). Writing, evaluating, presenting and publishing the results of scientific research in the academic press (journals, conferences etc). Choosing the appropriate journal (Sources, Information, Instructions to authors, peer review system, journal evaluation)

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

A – Attendance , CT- Class Test , S- Seminar , V- Viva , Q –Quiz , HA – Home Assignment , EE – End Term Exam

Texts and References:

Texts:

1. S.C. Gupta & V.K. Kapoor: Fundamentals of Mathematical Statistics
2. S.C. Gupta: Fundamentals of statistics
- 3 G. Udny Yule, N.M.G. Kendall: An Introduction to the theory of Statistics

References:

- 4 Croxton, F.C. and Cowden, D. J. Applied General Statistics, Prentics hall Inc. 1955
- 2 Garrett. H. Statistical in Psychology and Education. Oxford book Co. 1960.
- 3 R.P. Hooda: Introduction to statistics. The MacMillon Co.
- 5 Scotharman, W. A. Textbook of Statistics, (Revised edition) 1973.
- 6 Kerlinge, Foundations of Behavioral Research
- 7 Sneedecor G. W. Statistical Methods. Applied Pacific Private Ltd., 1961.

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DIETETIC TECHNIQUES AND PATIENT COUNSELING

Course Code: DAN4205

Credit Units: 03

Course Objectives:

1. To understand the knowledge about the disease like gastrointestinal disorders, renal disease, liver diseases etc.
2. To familiarize the students with the layout and organization of the hospital.
3. To assess the medical profile of the patient like general details, family history, and associated complications, anthropometry, clinical status, biochemical and biophysical status.
4. To suggest the diet for the particular diseased condition.

Module I

Dietitian as part of the Medical Team and Outreach Services.

Clinical Information - Medical History and Patient Profile Techniques of obtaining relevant information, Retrospective information, Dietary Diagnosis, Assessing food and nutrient intakes, Lifestyles, Physical activity, Stress, Nutritional Status. Correlating Relevant Information and identifying areas of need.

The Care Process - Setting goals and objectives short term and long term, Counselling and Patient Education, Dietary Prescription.

Module II

Motivating Patients. Working with -

B. Hospitalized patients (adults, pediatric, elderly, and handicapped), adjusting and adopting to individual needs.

C. Outpatients (adults, pediatric, elderly, handicapped), patients' education, techniques and modes.

Follow up, Monitoring and Evaluation of outcome, Home visits

Module III

Teaching aids used by dietitians- charts, leaflets, posters etc., preparation of teaching material for patients suffering from Digestive disorders, Hypertension, Diabetes, Atherosclerosis & Hepatitis and cirrhosis.

Module IV

Maintaining records, Reporting findings, Applying findings, Resources and Aids for education and counselling, Terminating counselling, Education for individual patients, Use of regional language, linguistics in communication process, Counselling and education.

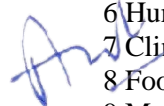
Texts and References:

Texts:

- 1 Modern Nutrition in Health and Disease – Goodhearth, R. S.
- 2 Recommended dietary allowance for Indian – I.C.M.R., 1980
- 3 Nutrition and Development- Winick 1973, Univ. of Calombia.
4. Biology of Nutrition – Eclames 1972, Palaniuma Press
- 5 Foods & Nutrition – Krause 1972, Saunders.

References:

- 6 Human Nutrition and dietetics- Davidson, S. Passmore, R. Brock- J.F. and Turswell A.S.
- 7 Clinical Dietetics and Nutrition - Anita, F.P.
- 8 Food Science and Technology: Pyke, Maonus.
- 9 Modern Nutrition in health and disease by Goodhearth R.S. Shills.


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NUTRITIONAL BIOCHEMISTRY-II LAB

Course Code: DAN4206

Credit Units: 01

Course Objectives:

1. To understand the use of instruments like chromatography, calorimeter, etc. in biochemical estimation .
2. To detect the purity of sample by using biochemical techniques.

Course Content:

1. Extraction and quantitative estimation of ascorbic acid.
- 2 Isolation and quantitative estimation of B1, B2 vitamins in various food stuffs.
- 3 Estimation of Moisture, Crude Fat, crude fiber and ash in the food stuffs.
- 4 Determination of energy value of foods using bomb calorie meter.
- 5 Determination of iodine value of given fat sample.
- 6 Determination of Sodium & Potassium of food /drinks through Flame Ph Meter
- 7 Separation of amino acids by paper chromatography, TLC.
8. Separation of proteins by gel electrophoresis



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ADVANCED NUTRITION-II LAB

Course Code: DAN4207

Credit Units: 01

Course Objectives:

1. To develop the new food product from different food groups.
2. To understand the knowledge about sensory evaluation of the food product

Course content:

1. Market and consumer survey to identify new products
2. Product development from different food groups and their sensory evaluation by different methods.
3. Two Visit to Food Industry



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THERAPEUTICS NUTRITION – II LAB

Course Code: DAN4208

Credit Units: 02

Course objectives:

1. Plan and prepare suitable therapeutic diets based on patient needs for various diseased condition.
2. To provide nutritional counseling for the prevention/ treatment of various disease in hospitals.
3. Prepare special therapeutic diets.

Course Contents:

- 1 Planning, Calculation, Preparation, serving and evaluation of therapeutic diets for diseases covered in theory
- 2 Study of the management of food services in selected Hospitals.
- 3 Visits to dietetic clinics in hospitals- case study of patients needing specific therapeutic diets.



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INSTITUTIONAL FOOD ADMINISTRATION

Course Code: DAN4302

Credit Units: 04

Course Objectives:

1. To understand management aspects related to food services and its application
2. Develop general knowledge on the origins and development of food service systems in hotels, restaurants, and institutions.
3. To identify variety of managerial, production, and service areas that is typical of the food service industry.
4. To understand managerial responsibilities as they relate to food service functions including menu planning, purchasing, storing, preparation, and recipe development.
5. To understand role of food safety, food budgeting and food standards.

Course Contents:

Module I :

Food service system and management

- (i) Introduction to food service system
- (ii) Evaluation of the food service industry
- (iii) Characteristics of the various types of food service units – commercial, institutional, hospital, military, any other
- (iv) Scope and development of food service institution in India
- (v) Effects of environmental changes on different types of establishments

Module II :

Food service management

- (a) Definitions, principles and functions of Management
- (b) Approaches to management – traditional, system approach, management by objectives
- (c) Financial management – (i) Definition, application of management accounting to catering operations
- (ii) Budgeting, determining the financial needs sources
- (iii) Book- keeping and accounting

Module III : Food service organization

- (a) Definition and types of organization in food
- (b) Tools of organization Chart, job description, job specification, work schedule and communication
- (c) Recruitment, induction, training, motivation and performance appraisal of personnel
- (d) Administrative leadership

Module IV: Planning and service of food

- (a) Menu planning
- (i) Types of menu structure
- (ii) Factors affecting menu planning
- (iii) Menu evaluation

Module V :Delivery and service of food

- (a) Food service system Conventional, commissary, assembly service
- (b) Service of food: Self-service, tray service, waiter service, portable meals, banquets
- (c) Food service in selected types of organizations Hospitals, schools, colleges, industrial canteens, airlines and space
- (d) Customer relationships

Module VI :

Quality and Quantity control

- (a) Construction and selection of recipes by quantity cooking

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- (b) Standardization of recipe, recipe format and adjustment
- (c) Product standard and production control

Module VII:

Food cost accounting / Analysis

- (a) Importance of costing and food cost control
- (b) Methods of costing
- (c) Cost classification into materials, labor and overheads and their percentage analysis
- (d) Reports and trend analysis

Food purchasing, selection and storage

- (a) Purchasing –
 - (i) Forecasting, product selection, purchasing , specification
 - (ii) Methods and procedure of purchasing
- (i) Elements of receiving process
- (ii) Inventory control
- (c) Storage -
 - (i) Dry
 - (ii) Refrigerated and cold storage

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

A – Attendance , CT- Class Test , S- Seminar , V- Viva , Q –Quiz , HA – Home Assignment , EE – End Term Exam

Text and References:

Texts:

1. West, B Bessie & Wood, Levelle (1988): Food service in institutions 6th Edition. Revised by F.V., Shuggart S.G. & Palgne-Palacio June Macmillian Publication company New York.
2. Sethi Mohini (1993): Catering Management An integrated approach 2nd Edition, Wiley publication.
3. Kotas Richard & Jayawardardene, C., (1994): Profitable Food and Beverage Management, Hodder Stoughton Publication.

References:

1. Brodner, J., Maschal, H.T., Carlon, H. M.(1982): Profitable Food and Beverage Operation 4th Edition, Hayden Book company New Jersey.
2. Green, E. F., Drake, C.G., Sweeny, J.F. (1972): Profitable Food and Beverage Management, Planning Operatio Hayden Book company New Jersey.
3. Knootz, H.O., Donnel C (1968): Principles of Management , McGraw Hill Book Company.



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COMMUNITY NUTRITION LAB

Course Code: DAN4305

Credit Units: 01

Course Objectives:

1. To learn method of socio-economic survey.
2. To perform dietary survey.
3. To study clinical examination to assess nutrient deficiencies.
4. To plan and conduct nutrition education program.

Course Content:

Conduct of socio - economic survey

Conduct of Diet survey

Conduct of Clinical Examination

Planning, conducting and Evaluating Nutrition Education Programme.

Examination Scheme:

IA				EE		
A	PR	LR	V	PR	WT	V
5	10	10	5	25	25	20



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FOOD SCIENCE-II LAB

Course Code: DAN4306

Credit Units: 02

Course Objectives:

1. To conduct appropriate experiments of food science and interpret the results.
2. To study effect of various treatments on food.
3. To learn basic culinary skills in various food groups.
3. To plan and perform nutrient rich recipes.

Course content:

Practical related to theory papers i.e : Effect of various treatments on the foods mentioned in syllabi

Examination Scheme:

IA				EE		
A	PR	LR	V	PR	WT	V
5	10	10	5	25	25	20



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FOOD MICROBIOLOGY- II LAB

Course Code: DAN4307

Credit Units: 02

1. To learn basic microbiological apparatus and equipments used in the laboratory.
2. To study and perform sterilization techniques used in microbiology.
3. To study and perform staining of bacteria and microscopic examination.
4. To perform isolation and culture techniques used in food microbiology.
5. To demonstrate RIA and ELISA

Course content:

1. Microbiological apparatus and equipments-a basic introduction, instruments needed for isolation, cultivation and maintenance of microbes, tools needed in microbiology laboratory for inoculation and culturing
2. Cleaning and sterilization procedures for glassware.
3. Preparation and sterilization of laboratory media.
4. Staining of bacteria- gram's staining, use of oil immersion lens, micrometry, and microscopic enumeration.
5. Spread plating, pour plating, streaking techniques.
6. Enrichment of isolated cultures, SPC, MPC. Coli count and coli confirmations.
7. Study of biochemical characteristics of isolated cultures-
 - Fermentation reaction · Starch cultures
 - IMVIC Tests · Catalase test
 - Oxidase test · Urease test
 - H₂S test · Coagulase test
8. Microbiological analysis of milk- raw, boiled and pasteurized - MBRT Test.
9. Demonstration of Techniques of
 - Radio immune Assay (RIA)
 - Enzyme Linked Immuno Sorbent Assay (ELISA)

Examination Scheme:

IA				EE		
A	PR	LR	V	PR	WT	V
5	10	10	5	25	25	20



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SUMMER INTERNSHIP

Course Code: DAN4335

Credit Units: 06

Objectives:

Summer internships are usually eight weeks long and it is full time. The students are required to do internships during the summer than during any other time of the year. These short term experiences provide a real insight into what it's actually like working in a particular job or career field. There's ample time to get into a regular work routine and gain valuable knowledge and skills. Internship objectives include:

- Developing personally and professionally while gaining confidence and real-world experience
- Meeting and networking with practitioners in one's area of interest
- Mentoring and performance feedback from the site supervisor
- Earning academic credit while getting paid or non paid.

General Guidelines:

Every student of post graduate courses will be required to undergo a practical training in an organization approved by the Institute for eight weeks, normally in the Summer Vacation, after the end of the fourth semester examinations. The candidates shall be required to undergo training in the various areas of the organization concerned. The organization may assign a specific project to the candidate, which will be completed by him/her during the period of training. The work done by the candidate during the training period shall be submitted in the form of a report as per the guidelines provided by the Department.

Chapter Scheme for the SIP Report:

Chapter I: Introduction	- 10 marks
Chapter II: Conceptual Framework/National/International Scenario	- 05 marks
Chapter III: Presentation, Analysis and Findings / Case Studies	- 20 marks
Chapter IV: Conclusion and Recommendations	- 10 marks
Hospital Chief Dietitian Marking	-30 marks



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The Chief Dietitian is asked to evaluate the student based on his/her performance as well as their conduct. The report has to be written in font Times New Roman, 12 points, 1.5 line spacing on both sides of the paper, Spiral Bound. The report should comprise of a maximum of 70 pages and has to be submitted in two copies.

THE COMPONENTS OF A SIP REPORT

The outcome of Summer Internship is the Project Report. A project report should have the following components:

- 1) Cover Page: This should contain the title of the project proposal, to whom it is submitted, for which degree, the name of the author, name of the supervisor, year of submission of the project work, name of the University.
- 2) Acknowledgement: Various organizations and individuals who might have provided assistance /co-operation during the process of carrying out the study.
- 3) Table of Content: Page-wise listing of the main contents in the report, i.e., different Chapters and its main Sections along with their page numbers.
- 4) Body of the Report: The body of the report should have these four logical divisions
 - a. *Introduction*: This will cover the background, rationale/ need / justification, brief review of literature, objectives, methodology (the area of the study, sample, type of study, tools for data collection, and method of analysis), Limitations of the Study, and Chapter Planning.
 - b. *Conceptual Framework / National and International Scenario*: (relating to the topic of the Project).
 - c. *Presentation of Data, Analysis and Findings / Case studies* : (using the tools and techniques mentioned in the methodology).
 - d. *Conclusion and Recommendations*: In this section, the concluding observations based on the main findings and suggestions are to be provided.
- 5) Bibliography or References: This section will include the list of books and articles which have been used in the project work, and in writing a project report.
- 6) Annexure: Questionnaires (if any), relevant reports, etc.

Evaluation Scheme:

SIP Report	Power Point Presentation & Viva
75 marks	25 marks



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FOOD PROCESSING & TECHNOLOGY

Course Code: DAN4402

Credit Units: 03

Course objectives:

1. To understand principles of food preservation and its application of the different food.
2. To impart systematic knowledge of basic and applied aspects food processing and technology
3. To gain in depth knowledge about processing and preservation techniques of milk and milk product technology and fruits and vegetable technology.
4. To gain knowledge about industrial processing of legumes and oil seeds.

Module I:

Processing technology of foods & nutritional implications for the following:

- Cereals & Pulses- Wheat grain characteristics and products, Rice processing, Pulses Processing & their elimination of toxic factors. Fermentation & Germination Nuts & Oilseeds- Nuts Oilseeds Processing, solvent extraction purification, hydrogenation and tempering products - butter, margarine etc
- Flesh Foods: Processing & Their Products.

Module II:

Milk and Milk Products:- Classification and standardization, Pasteurization, homogenization, packing of milk. Milk Products- Fortified milk, Skim milk, Concentrated milks, Cream, Butter, Cheese, Ice cream and Indigenous milk products: Khoa, Paneer, Curd, Yoghurt, Ghee.

Module III:

- Fruits & Vegetables: Physiological and biochemical changes during ripening, handling & storage & fruit processing. Processing of vegetables, canning, freezing, dehydration, pickles & chutneys. Beverages & Appetizers : Classification, Coffee, Tea, coco chocolates, Fruit beverages, soups, Vegetable Beverages, Carbonated & Noncarbonated beverages, Alcoholic beverages.

Module IV:

- a). Physical principles in Food Processing Operations:
 - b). Food Deterioration, Methods of Preservation and Processing: Thermal Processing, Refrigeration, Freezing, Dehydration, Ionizing radiations, Fermentation, concentration.
 - c). Chemical Principles of Food Processing:
 - d). Preservation/processing by sugar, salt, smoke, acid and chemicals.
 - e). Chemical & biochemical reactions affecting food quality & safety.
- Some Recent concepts in Food Technology -
- Biotechnology in food.
 - Algae as food - Spirulina
 - Low cost nutrient supplement.
 - Packaging of foods.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

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NUTRITION FOR HEALTH & FITNESS

Course Code: DAN4403

Credit Units: 03

Course objectives:

1. Students learn about the meaning and importance of general health and fitness.
2. Detailed study of various sports and the diet involved for best outcome is being included.
3. Subject aims to make students understand how nutrition is important pre and post games and how it makes an influence on the performance of the player.
4. Nutrition and diet of injured athletes, specially abled athletes, along with the influence of environmental conditions are being learnt by the students.

Module I:

Physical Fitness and health status: meaning, concept, assessment criteria and management
Healthy life style: Strategies, factors that promote life style changes, self management skills. Body composition in exercise and sport

Module II:

Physical Activity: need, principles of physical activity Energy input and output: Different energy systems for endurance and power activity, Fuels and nutrients to support physical activity.

Module III:

Nutrition in Sports: Sports specific requirement, Diet manipulation, Pre-game, during and post-game meals. Diets for athletes with high energy requirements, stress, fracture and injury
Water and electrolyte balance: Losses and their replenishment during exercise and sports events, effect of dehydration, sports drinks.

Module IV:

Special Nutrition considerations for female, older and disabled athletes. Nutrition of athletes in hot, cold and high altitude environments
Nutrition education of athletes and coaches.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

Books Recommended

- Ira Walinaky, (1998) Nutrition in Exercise and sport
- Charles B. Corbin, Ruth Lindsey and grey walk (2000) Concepts of fitness and wellness
- Robert A. Robergers and Scott O. Roberts (2000) exercise physiology.



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COMMUNITY NUTRITION-II LAB

Course Code: DAN4404

Credit Units: 02

Course Objectives:

1. To conduct socio-economic and dietary survey in detail.
2. To conduct of clinical examination with ICMR score card.
3. To design, perform, interpret and evaluate nutrition education program.
4. To critically review various nutritional programs conducted in villages
5. To cook recipes for various socio-economic groups: LIG, MIG, HIG.

Course content:

1. Conduct of socio - economic survey with Nutritional status parameters
2. Conduct of Dietary survey with detail calculations
3. Conduct of Clinical Examination with ICMR score card.
4. Planning, conducting and Evaluating Nutrition Education Programme.
5. Evaluation of various nutritional programmes conducted in villages.
6. Cooking of recipes for Low income group , Middle income group and High Income group.

Examination Scheme:

IA				EE		
A	PR	LR	V	PR	WT	V
5	10	10	5	25	25	20



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FOOD PROCESSING AND TECHNOLOGY LAB

Course Code: DAN4405

Credit Units: 01

Course Objectives:

1. To study physical dimensions of grains and other properties.
2. To determine pectin strength in various fruits and vegetables.
3. To study various food adulterants present in common foods.
4. To study tests used in sensory appraisal.
5. To prepare culture media of various microorganisms.

Course content:

1. Determination of physical dimensions of grains (Length, Breadth, Thickness and Bulk density)
2. Determination of wet and dry gluten content of flours.
3. Testing the pectin strength of different fruits and vegetables.
4. Determination of PH and titrable acidity of a food sample.
5. Determination of Total solids as soluble and insoluble in foods
6. Test for adulterants
7. Food Evaluation using different sensory tests
8. Total microbial count
9. Determination of pasteurization effect in milk by MBRT
10. Preparation of culture media for different organisms

Examination Scheme:

IA				EE		
A	PR	LR	V	PR	WT	V
5	10	10	5	25	25	20



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DISSERTATION

Course Code: DAN4437

Credit Units: 06

Course Objectives:

1. To understand comprehensive knowledge of the literature in the field of nutrition.
2. To conduct and apply appropriate research methods, collect & interpret data systematically; to conduct research ethically.
3. To learn importance of scientific writing and develop competence in writing skills.
4. To do research work and submit dissertation at the end of semester.

GUIDELINES FOR PROJECT FILE AND PROJECT REPORT

Research experience is as close to a professional problem-solving activity as anything in the curriculum. It provides exposure to research methodology and an opportunity to work closely with a faculty guide. It usually requires the use of advanced concepts, a variety of experimental techniques, and state-of-the-art instrumentation.

Research is genuine exploration of the unknown that leads to new knowledge which often warrants publication. But whether or not the results of a research project are publishable, the project should be communicated in the form of a research report written by the student.

Sufficient time should be allowed for satisfactory completion of reports, taking into account that initial drafts should be critically analyzed by the faculty guide and corrected by the student at each stage.

PROJECT FILE

The Project File may be a very useful tool for undertaking an assignment along-with a normal semester, an exploratory study, sponsored projects, a project undertaken during summer period or any other period as per curricula where the researcher is working with a company/organization. The project/ assignment may also be a part of the bigger research agenda being pursued by a faculty/ institution/ department

The Project File is the principal means by which the work carried out will be assessed and therefore great care should be taken in its preparation. This file may be considered in continuous assessment.

In general, the File should be comprehensive and include:

- A short account of the activities that were undertaken as part of the project;
- A statement about the extent to which the project has achieved its stated objectives;
- A statement about the outcomes of the evaluation and dissemination processes engaged in as part of the project;
- Any activities planned but not yet completed as part of the project, or as a future initiative directly resulting from the project;
- Any problems that have arisen and may be useful to document for future reference.

PROJECT REPORT

The Project Report is the final research report that the student prepares on the project assigned to him. In case of sponsored project the lay out of the project could be as prescribed by the sponsoring organization. However, in other cases the following components should be included in the project report:

Title or Cover Page

The title page should contain Project Title; Student's Name; Programme; Year and Semester and Name of the Faculty Guide.

Acknowledgement(s)

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Acknowledgment to any advisory or financial assistance received in the course of work may be given. It is incomplete without student's signature.



Abstract

A good "Abstract" should be straight to the point; not too descriptive but fully informative. First paragraph should state what was accomplished with regard to the objectives. The abstract does not have to be an entire summary of the project, but rather a concise summary of the scope and results of the project. It should not exceed more than 1000 words.



Table of Contents

Titles and subtitles are to correspond exactly with those in the text.



Introduction

Here a brief introduction to the problem that is central to the project and an outline of the structure of the rest of the report should be provided. The introduction should aim to catch the imagination of the reader, so excessive details should be avoided.



Materials and Methods

This section should aim at experimental designs, materials used (wherever applicable). Methodology should be mentioned in details including modifications undertaken, if any. It includes organization site(s), sample, instruments used with its validation, procedures followed and precautions.



Results and Discussion

Present results, discuss and compare these with those from other workers, etc. In writing this section, emphasis should be laid on what has been performed and achieved in the course of the work, rather than discuss in detail what is readily available in text books. Avoid abrupt changes in contents from section to section and maintain a lucid flow throughout the thesis. An opening and closing paragraph in every chapter could be included to aid in smooth flow.

Note that in writing the various sections, all figures and tables should as far as possible be next to the associated text, in the same orientation as the main text, numbered, and given appropriate titles or captions. All major equations should also be numbered and unless it is really necessary, do not write in "point" form.

While presenting the results, write at length about the the various statistical tools used in the data interpretation. The result interpretation should be simple but full of data and statistical analysis. This data interpretation should be in congruence with the written objectives and the inferences should be drawn on data and not on impression. Avoid writing straight forward conclusion rather, it should lead to generalization of data on the chosen sample.

Results and its discussion should be supporting/contradicting with the previous research work in the given area. Usually one should not use more than two researches in either case of supporting or contradicting the present case of research.



Conclusion(s) & Recommendations

A conclusion should be the final section in which the outcome of the work is mentioned briefly.

Check that your work answers the following questions:

- Did the research project meet its aims (check back to introduction for stated aims)?
- What are the main findings of the research?
- Are there any recommendations?
- Do you have any conclusion on the research process itself?

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Implications for Future Research

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This should bring out further prospects for the study either thrown open by the present work or with the purpose of making it more comprehensive.



Appendices

The Appendices contain material which is of interest to the reader but not an integral part of the thesis and any problem that have arisen that may be useful to document for future reference.



References

References should include papers, books etc. referred to in the body of the report. These should be written in the alphabetical order of the author's surname. The titles of journals preferably should not be abbreviated; if they are, abbreviations must comply with an internationally recognised system.

Examples:

For research article:

Voravuthikunchai SP, Lortheeranuwat A, Ninrprom T, Popaya W, Pongpaichit S, Supawita T. (2002) Antibacterial activity of Thai medicinal plants against enterohaemorrhagic *Escherichia coli* O157: H7. *Clin Microbiol Infect* , **8** (suppl 1): 116–117.

For book:

Kowalski,M.(1976) Transduction of effectiveness in *Rhizobium meliloti*. SYMBIOTIC NITROGEN FIXATION PLANTS (editor P.S. Nutman IBP), **7**: 63-67

The Layout Guidelines for the Project File & Project Report:

- A4 size Paper
 - Font: Arial (10 points) or Times New Roman (12 points)
 - Line spacing: 1.5
 - Top and bottom margins: 1 inch/ 2.5 cm; left and right margins: 1.25 inches/ 3 cm

ASSESSMENT OF THE PROJECT FILE AND THE PROJECT REPORT

Essentially, the assessment will be based on the quality of the report, the technical merit of the project and the project execution. Technical merit attempts to assess the quality and depth of the intellectual efforts put into the project. Project execution is concerned with assessing how much work has been put in.

The Project should fulfill the following *assessment objectives*:

- Range of Research Methods used to obtain information
- Execution of Research
- Data Analysis (Analyze Quantitative/ Qualitative information)
- Quality Control
- Conclusions

Assessment Scheme:

Continuous Evaluation: 40% (Based on punctuality, regularity of work, adherence to plan and methodology, refinements/ mid-course corrections etc. as reflected in the Project File.)

Final Evaluation: 60% (Based on the Documentation in the file, Final report layout, analysis and results, achievement of objectives, presentation/ viva)

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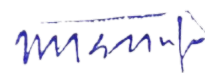
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Examination Scheme:

Research Originality	Dissertation (including all Chapters)	Research Paper	Power Point Presentation & Viva
20	40	10 marks	30 marks



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Curriculum & Scheme of Examination 2022

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LABORATORY MANAGEMENT AND QUALITY CONTROL

Course Code: MLT4108

Credit Units: 3

Course Objective: To allow students to understand the laboratory management and quality control.

Course Contents:

Module-I: General Concept of Laboratory Management: Strategic planning; quality system management; human resource management; laboratory design and service model; regulation, accreditation and legislation; safety- biomedical hazard, chemical hazard, ergonomic hazard.

Module-II: Clinical Laboratory Informatics: Information flow (patient's registration/ID), test order, sample collection, labeling, performing test, releasing result & report, feedback. LIS selection, Implementations & management; good laboratory practice

Module-III: Quality Control: Introduction, analytical variability and calibration; calibration issue in quality control; proficiency testing; Westgard rules; quality control of the product, chemicals, reagent; good, reliable, authentic report; total quality management framework of laboratory; essential elements of quality assurance programme; quality laboratory processes, quality assurance, quality assessment, quality control, quality planning and quality improvement

Module-IV: Internal Quality control: Control of pre-analytical variables, control of analytical variables, laboratory precision, accuracy & sensitivity; validation of methods; reference materials and calibrating definitive methods; sources of variation in laboratory test results. Systemic and random errors; quality control charts: Levy-Jenning chart, Cusum chart and Gaussian curve; Internal and external factors for quality control assurance; reference values

Examination Scheme:

Components	CT	HA	S/V/Q	ATTD	EE
Weightage (%)	15	5	5	5	70

Recommended books:

- Praful B. Godkar, Darshan P. Godkar. Text book of Medical Laboratory Technology, 3rd Edition 2014, Bhalani Publishing House.
- J Ochei and A Kolhatkar. Medical Laboratory Science- Theory and Practice, 1st Edition 2000, Tata Mcgraw Hill Publishing Co. Ltd.
- Mc Pherson and Pincus. Henry's Clinical Diagnosis and management by Laboratory Method, 23rd Edition, Elsevier.



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CLINICAL IMMUNOLOGY

Course Code: MLT4113

Credit Units: 4

Course Objective: To familiarize the students about the immune system and its role in infections, allergy and transplantation.

Course Contents:

Module-I: Introduction to Immunology: History of immunology; innate immunity; acquired immunity.

Immunoglobulin: Structure, function and types of immunoglobulin; monoclonal and polyclonal antibody; adjuvant.

Antigen: Types of antigens; antigenicity; haptens

Module-II: Immune Response: Primary and secondary immune response; phagocytosis; antigen processing and presentation; humoral and cell mediated immune response; hemolytic disease of newborn.

Complement System: Complement portions and functions; classical, alternative pathway and lectin pathway.

Hypersensitivity: Introduction, types and complications of hypersensitive reactions; allergies

Module-III: Clinical Transplantation: Types of transplant; types of donor; HLA typing; transplant rejection; ethical issues; artificial organ; laboratory-grown organ; organ trafficking;

Autoimmunity: Factor affecting autoimmunity; pathogenesis of autoimmunity; autoimmune disease; diagnosis; immunological tolerance.

Module-IV: Vaccines: Effectiveness; adverse effects; types; recombinant vaccines

Antigen and Antibody Reactions: General features; precipitation; agglutination; flocculation; complement fixation test; neutralization; opsonisation.

Examination Scheme:

Components	CT	HA	S/V/Q	ATTD	EE
Weightage (%)	15	5	5	5	70

Recommended books:

- Dale Male, Jonathan Brostoff, David B Roth and Ivan RoittKuby Immunology, 7th Edition 2012, Mosby (Elsevier).
- C P Baveja, Text book of Microbiology, 4th Edition 2010, Arya Publication.
- Arti Kapil, Ananthanarayan and Paniker's Textbook of Microbiology, 9th Edition 2013, Orient BlackSwan.
- D.R.Arora / BrijBala Arora, Textbook of Microbiology, 5th Edition 2016, CBS Publishers & Distributors Pvt. Ltd..
- B S Nagoba and D V Bedpathsk, Immunology, 1st Edition 2008, BI Publications.
- J Ochei and A Kolhatkar, Medical Laboratory Science- Theory and Practice, 1st Edition 2000, Tata Mcgraw Hill Publishing Co Ltd.
- Praful B. Godkar, Darshan P. Godkar, Text book of Medical Laboratory Technology, 3rd Edition 2014, Bhalani Publishing House.
- Peter Lydyard, Alex Whelan, Michael Fanger, Instant Notes in Immunology 3rd Edition 2011, BIOS Scientific Publisher.
- William E. Paul, Fundamental Immunology 7th Edition 2013, WoultersKluwar / Lippincott Williams & Wilkins.
- T Doan, R Mervold, S Visseli, C Waltenbough, Immunology 2nd Edition 2013, WoultersKluwar / Lippincott Williams & Wilkins.

ADVANCED LABORATORY TECHNIQUE

Course Code: MLT4114

Credit Units: 4

Course Objective: To enable the students to understand the working principle of latest laboratory techniques.

Course Contents:

Module-I: Principles & Application of Chromatography: Definition and types of Chromatography; Paper Chromatography; Thin Layer Chromatography; Adsorption Chromatography; Partition Chromatography; Ion-exchange Chromatography; Gel Filtration; Affinity Chromatography; Column Chromatography; High Performance liquid Chromatography (HPLC).

Module-II: Electrophoresis: Definition, General Methodology; Factors affecting migration of charged particles; Theory and applications of paper, SDS-PAGE and agarose gel electrophoresis; Isoelectric Focusing; Two Dimensional Electrophoresis; Protein purification and Evaluation; Densitometry

Module-III: Immunological Technique: Enzyme Linked immunosorbent assay; Radioimmunoassay; Immunodiffusion, Florescent immunoassay; Immunofluorescence, Immunoarray, Chemiluminosence assay.

Module-IV: Molecular Techniques: Recombinant DNA technology; Polymerase chain reaction; RT PCR; RFLP; DNA Probe; DNA finger printing; Sequencing; Eastern blot; Southern blot; Northern blot; Gel documentation, DNA microarray, FISH, RFLP.

Examination Scheme:

Components	CT	HA	S/V/Q	ATTD	EE
Weightage (%)	15	5	5	5	70

Recommended books:

- Keith Wilson & John Walker. Principles and techniques of biochemistry and molecular biology. Cambridge University Press, 7th Edition, (2015)
- S.V.S. Rana. Biotechniques theory and Practice Rastogi Publications, 3rd edition, (2012)
- U Satyanarayan and U Chakrapani, Text book of Biochemistry, 4th Edition 2013, Elsevier.
- M N Chatterjea and Rana Shinde, Text book of Medical Biochemistry , 8th Edition 2012, Jaypee Brothers Medical Publishers (P) Ltd.
- Mc Pherson and Pincus. Henry's Clinical Diagnosis and management by Laboratory Method, 23rd Edition, Elsevier.



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LAB COURSE

Course Code: MLT4105

Credit Unit: 1

Course Objective:

- To impart the basic knowledge of principles, procedure and clinical importance of laboratory various test.
- To familiarize with basic knowledge of instruments commonly utilized in the clinical laboratory.

Serology

1. HIV test.
2. HCV test.
3. HBsAg test.
4. widal test.
5. ASO test.
6. CRP test.
7. RA test.
8. VDRL and RPR test.
9. Coomb's test.

Molecular Pathology and Cytogenetics

1. To demonstrate PCR.
2. To demonstrate recombinant DNA technology.
3. To demonstrate DNA finger printing.
4. To demonstrate RT PCR and RFLP.

Examination Scheme:

Components	Internal Assessment	Attendance	Record	EE
Weightage (%)	20	5	5	70

Recommended books:

- DM Vasudevan, Subir Kumar Das, Practical Textbook of Biochemistry for Medical Students, Jaypee & Brothers Medical Publishers Pvt. Ltd.
- P K Godkar, Text Book of Medical Laboratory Technology 13th edition, Bhalani Publication.
- Ranjna Chawla, Practical Clinical Biochemistry: Methods and Interpretations 4th edition, Jaypee & Brothers Medical Publishers Pvt. Ltd.
- Shivaraja Shankara YM, ,ShankaraGanesh MK, Laboratory Manual for Practical Biochemistry, .Jaypee & Brothers Medical Publishers Pvt. Ltd
- Medical Laboratory Science: Theory and practice by J. Ochei, Arundhati kolhatkar, Mcgraw Hill Education, 1stedition (2008).



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CLINICAL TRAINING

Course Code: MLT4112

Credits Units: 2

Course objective: The purpose of a Clinical training is to provide hands on practical experience in relevant sections of diagnostic labs as per the need of healthcare system. Students will participate in samples collection, documentation, transportation, receiving, processing and dispatch of reports. Students will help in the performance of clinical protocols, quality maintenance and laboratory research. In some cases, students may be deputed in community services or assist in organizing camps like blood testing or blood donation camp.

Students will be sent to diagnostic laboratory or hospital once a week outside campus or may be within the campus if facility available.

Second Semester:

1. Serology Lab
2. Molecular Lab

Note: Students must submit training report during examination and the same would be evaluated through Viva voice and presentation.

Examination Scheme:

Components	Viva	A	ME	EE
Weightage (%)	10	5	15	70



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MOLECULAR DIAGNOSTICS

Course Code: MLT4208

Credit Units: 3

Course Objective: To enable the students to understand genetic diseases and its diagnosis.

Course Contents:

Module-I: Mendelian Disease: Autosomal recessive disorders; autosomal dominant disorders; sex linked inheritance; hemophilia; sickle-cell anaemia; phenylketonuria; cystic fibrosis; tay-sachs disease; xerodermapigmentosa; pedigree analysis; proband

Chromosomal Disorders: Normal chromosomes; Numerical disorders; Structural abnormalities; Down syndrome; Turner syndrome; Klinefelters syndrome.

Module-II: Karyotyping: Human karyogram, banding technique, applications of karyotyping; prenatal diagnosis; DNA profiling.

Nucleic acid extraction: Plasmid DNA; eukaryotic genomic DNA and Mitochondrial DNA extraction.

Module-III: Mutation: Introduction; molecular basis of mutation, mutagens.

Gene Therapy: Introduction; types and current approach and advancement

Module-IV: Molecular Diagnosis: Molecular based diagnosis of bacterial, viral, parasitic and fungal infections; ethical issues related to molecular diagnostics; future of molecular diagnostics.

Examination Scheme:

Components	CT	HA	S/V/Q	ATTD	EE
Weightage (%)	15	5	5	5	70

Recommended books:

- U. Satyanarayana. Biotechnology, 1st Edition 2013. BOOKS & ALLIED Ltd.
- U Satyanarayan and U Chakrapani. Text book of Biochemistry, 4th Edition 2013, Elsevier.
- M N Chatterjea and Rana Shinde. Text book of Medical Biochemistry, 8th Edition 2012, Jaypee Brothers Medical Publishers (P) Ltd.



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RESEARCH METHODOLOGY AND BIOSTATISTICS

Course Code: MLT4211

Credit Units: 3

Course Objective: The course aims to promote the students to progress in research aspects in the medical diagnostic, pharmaceutical, biotechnology, and medical treatment field.

Course Contents:

Module-I: Basics of Research: Meaning and purpose; Types, (Educational, Clinical, Experimental, Historical descriptive, Basic applied and Patent oriented Research); Formulation of hypothesis; Characteristic of designing a research work.

Scientific writing: Characteristics - Logical format for writing thesis and papers; essential features of abstract, introduction, review of literature, materials and methods, and discussion; effective illustration - tables and figures; reference styles - harvard and vancouver systems.

Literature Survey- use of library, books, journals-medlines-internet, and reprints of articles as a source for literature survey.

Module-II: Biostatistics: Collection and classification of data - diagrammatic and graphic representation of data, statistical tools, its importance in data analysis; measurement of central tendency; standard deviation; normal distribution; test of significance based on large samples and small samples; student t test; correlation and regression; Chi square test for independence of attributes; ANOVA

Module-III: Patenting and ethical issues in research patenting: definition of patent; the patents system in India and present status; intellectual property rights; what may be patented? ; Who may apply for patents?; preparation of patent- proposal; registration of patents in foreign countries & vice versa; research funding agency.

Module-IV: ETHICS: Ethics in animal experimentation; cpcsea guidelines - animal care, animal husbandry, feed, bedding, water, sanitation and cleanliness, waste disposal, anesthesia and euthanasia; composition of (human) institutional ethical committee (IEC) - general ethical issues; specific principles for chemical evaluation of drugs, herbal remedies and human genetics research, ethics in food and drug safety; environmental release of microorganisms and genetically engineered organisms; ethical issues in human gene therapy and human cloning.

Examination Scheme:

Components	CT	HA	S/V/Q	ATTD	EE
Weightage(%)	15	5	5	5	70

Recommended books:

- R.A. Day. How to write a scientific paper. Cambridge University Press.
- Cooray P.G. Guide to scientific and technical writing.
- Carter V. Good and Douglas E seats Methods of Research.
- Alley, Michael. The craft of scientific writing. Englewood Cliffs. N.N. Prentice 1987.
- Sundar Rao, Jesudian Richard - An Introduction to Biostatistics. S.P. Gupta - Fundamentals of statistics, Sultan Chand.

CLINICAL NUTRITION

Course Code: MLT4213

Credit Units: 4

Course Objective: To prepare the students to understand the structure, function and properties carbohydrates, proteins and lipids.

Course Contents:

Module-I: Carbohydrate: Introduction; biomedical importance; physical and chemical properties; structure- classification- monosaccharide, disaccharide, polysaccharide; triose, tetrose, pentose and hexoses sugars; digestion and absorption of carbohydrate; quantitative & qualitative test of carbohydrate; reducing and non-reducing sugars.

Module-II: Amino acid: Introduction; importance; physical & chemical properties; essential and non-essential amino acid; glucogenic and ketogenic amino acid.

Protein: Properties; functions; structure- primary, secondary, tertiary and quaternary; albumin, globulin and fibrinogen; clinical importance; digestion and absorption of protein; qualitative and quantitative test of protein and amino acid.

Module-III: Lipid: Introduction; importance; physical & chemical properties; structure of fat and fatty acid; essential and non-essential fatty acid; triglyceride and cholesterol structure and function; glycolipids; phospholipids; lipoproteins; digestion and absorption of fat; qualitative and quantitative test of lipids.

Module-IV: Nucleic Acid: Introduction; importance; physical & chemical properties; structure; Nucleoside; nucleotide; DNA and RNA- structure, function and biomedical importance.

Vitamins: Introduction; classification; importance; source; RDA; normal range and clinical significance.

Minerals: Introduction; classification; micro and macro minerals; importance; source; RDA; normal range and clinical significance.

Examination Scheme:

Components	CT	HA	S/V/Q	ATTD	EE
Weightage (%)	15	5	5	5	70

Recommended books:

- U Satyanarayan and U Chakrapani, Text book of Biochemistry, 4th Edition 2013, Elsevier.
- M N Chatterjea and Rana Shinde, Text book of Medical Biochemistry, 8th Edition 2012, Jaypee Brothers Medical Publishers (P) Ltd
- D M Vasudevan, Sreekumari S, Kannan Vidhyathan. Textbook of Biochemistry for Medical students, 8th Edition 2016, Jaypee & Brothers Medical Publishers (P) Ltd.
- S Ramakrishana, Test Book of Medical Biochemistry, 3rd Illustrated Edition 2004, Orient Longman.
- S Chitiprol, Biochemistry: Instant Notes for Medical students, 1st Edition 2006, Jaypee Brothers Medical Publishers (P) Ltd
- DM Vasudevan, Subir Kumar Das, Practical Textbook of Biochemistry for Medical Students, 2nd Edition 2013, Jaypee Brothers Medical Publishers (P) Ltd
- Albert L Lehninger, Michel M Cox, David L Nension, Lehninger Principle of Biochemistry, 6th Edition 2013, W H Freeman & Co.
- Robert Kincaid Murray, David Bender, Kathleen M. Botham, Peter J. Kennelly, Harpers Illustrated Biochemistry, 30th Edition 2015, McGraw Hill Professional.
- Donald Voet, Judith G. Voet, Charlotte W. Pratt. Fundamentals of Biochemistry: Life at the Molecular Level: Life at the Molecular Level. Fifth Edition 2016, Wiley

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CLINICAL BIOCHEMISTRY LAB COURSE-I

Course Code: MLT4215

Credit Unit: 1

Course Objective

- To impart the basic knowledge of principles, procedure and clinical importance of laboratory various test.
- To familiarize with basic knowledge of instruments commonly utilized in the clinical laboratory.

Course Contents:

- 1) Carbohydrates: estimation of glucose (F, PP & R)
- 2) Protein: estimation of serum albumin, total protein and A/G ration.
- 3) Triglycerides : estimation of serum triglycerides
- 4) Cholesterol : estimation of total cholesterol
- 5) SGPT : estimation of SGPT
- 6) SGOT : estimation of SGOT
- 7) Alkaline phosphatase : estimation of alkaline phosphatase
- 8) Acid phosphatase : estimation of acid phosphatase
- 9) Bilirubin : estimation of serum bilirubin
- 10) Blood urea : estimation of blood urea in blood sample
- 11) Creatinine : estimation of serum creatinine
- 12) Calcium : estimation of serum calcium

Examination Scheme:

Components	Internal Assessment	Attendance	File	EE
Weightage(%)	20	5	5	70

Recommended books:

- Medical Laboratory Science: Theory and practice by J. Ochei, Arundhati kolhatkar, McGraw Hill Education, 1st edition (2008).
- P K Godkar, Text Book of Medical Laboratory Technology 13th edition, Bhalani Publication.



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CLINICAL BIOCHEMISTRY CLINICAL TRAINING-I

Course Code: MLT4216

Credit Units: 2

Course Objective: The purpose of a Clinical training is to provide hands on practical experience in relevant sections of diagnostic labs as per the need of healthcare system. Students will participate in samples collection, documentation, transportation, receiving, processing and dispatch of reports. Students will help in the performance of clinical protocols, quality maintenance and laboratory research. In some cases, students may be deputed in community services or assist in organizing camps like blood testing or blood donation camp.

Students will be sent to diagnostic laboratory or hospital once a week outside campus or may be within the campus if facility available.

Plan for clinical training:

1. Clinical Pathology Lab
2. Instrumentation Lab

Note: Students must submit training report during examination and the same would be evaluated through Viva voice and presentation.

Examination Scheme:

Components	Viva	A	ME	EE
Weightage (%)	10	5	15	70



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GENERAL MICROBIOLOGY

Course Code: MLT4217

Credit Units: 4

Course Objective:

- To provide detailed knowledge of anatomy and physiology of microorganisms.
- To become students aware about applications of microorganisms in the industry, health-care, environment and research fields.

Course Contents:

Module-I: General Microbiology: Introduction, history of microbiology; importance and scopes; safety measurements in microbiology laboratory; terminology related to microbiology.

Microorganisms: Introduction and Classification; morphological characteristics of various medically important microorganisms; microbial metabolism and reproduction; importance of normal micro-flora.

Module-II: Microbial Genetics: Introduction, principles of microbial genetics, structure and functions of genetic material, transformation; transduction, conjugation, lysogenic conversion, transposition, gene transfer by artificial methods, mutation, bacteriophages.

Module-III: Microbial Pathogenicity: Mechanism and transmission of microbial Infections, classification of infections, virulence factors affecting microbial pathogenicity, role of microorganisms in hospital acquired infections.

Module-IV: Microscopy: Introduction and types of microscopy; working, components, applications and preventive maintenance of different microscopes.

Sterilisation and Disinfection: Introduction, importance and types of sterilization; sterilization indicators; calibration and preventive maintenance of sterilizing equipments and instruments; mode of action, properties and uses of disinfectants and antiseptics, efficiency testing of disinfectants.

Examination Scheme

Components	CA	A	ME	EE
Weightage (%)	15	5	10	70

Recommended books:

- C P Baveja, Text book of Microbiology, Arya Publication.
- R. Ananthanarayan and Arti Kapil, Ananthanarayan and Paniker's Textbook of Microbiology, Orient BlackSwan.
- D.R.Arora / Brij Bala Arora, Textbook of Microbiology 4th, CBS Publishers & Distributors.
- Eds J. G. Collee, J. P. Duguid, A. G. Fraser & B. P. Marmio, Mackie and McCartney: Practical medical microbiology 13th Edition, Churchill Livingstone.
- R C Dubay & D.K.Maheshwari, Practical Microbiology revised edition, S Chand & Company LTD.
- Suvarna, Layton & Bancroft, Suvarna Bancroft's Theory & Pract. Of Histological Techniques, Churchill Livingstone.
- Joanne Willey, Linda Sherwood, Christopher J. Woolverton, Prescott's Microbiology 9th edition, McGraw-Hill Education.
- Gary W Procop & Elmer W. Koneman Koneman's Color Atlas and Textbook of Diagnostic Microbiology 7th, Wolter Kluwer.
- F. H. Kayser, K. A. Bienz, J. Eckert, Medical Microbiology, Thieme Stuttgart, New York.
- Michael Ford, Medical Microbiology 2nd Edition, Oxford university press.
- Neal Chamberlain, Medical Microbiology: The Big Picture, Mc Graw Hill Medical.

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CLINICAL BACTERIOLOGY

Course Code: MLT4219

Credit Units: 4

Course Objective:

- To impart the knowledge of morphology, culture characteristics, pathogenicity, lab diagnosis and prophylaxis of major bacterial pathogens.
- To provide the understanding of special laboratory techniques.

Course Contents:

Module-I: Bacteriology: Introduction, history and importance in health care sector

Staining: Gram stain, AFB stain, Albert's stain and special stains for spore, capsule and flagella.

Biochemical test: Catalase, coagulase, oxidase, indole, MR, VP, citrate, urease and triple sugar iron agar. Identification of bacteria by conventional method, molecular method and automatic methods.

Special laboratory techniques: Bacteriological examination of water, milk and air.

Module-II: Gram positive bacteria: Morphology, pathogenicity, lab diagnosis and prophylaxis of: Staphylococci, Streptococci, Pneumococcus, Enterococcus, Bacillus, Corynebacterium, Clostridia, Mycobacterium Tuberculosis, Mycobacterium leprae, Actinomycetes and Listeria.

Module-III: Gram negative bacteria: Morphology, pathogenicity, lab diagnosis and prophylaxis of: Neisseria gonorrhoeae, Neisseria meningitidis, Escherichia coli, Shigella, Klebsiella, Proteus, Yersinia, Salmonella, Vibrio, Aeromonas.

Module-IV: Gram negative bacteria

Pseudomonas, Campylobacter, Bacteroides, Fusobacterium, Brucella, Haemophilus, Bordetella and Helicobacter pylori

Miscellaneous bacteria: Morphology, Pathogenicity, lab diagnosis and prophylaxis of: Spirochetes, Rickettsiae, Chlamydia and Mycoplasma and Ureaplasma. Bacterial Vaginosis.

Examination Scheme:

Components	CT	HA	S/V/Q	ATTD	EE
Weightage (%)	15	5	5	5	70

Recommended books:

- C P Baveja, Text book of Microbiology, 4th Edition 2010, Arya Publication.
- Arti Kapil, Ananthanarayan and Paniker's Textbook of Microbiology, 9th Edition 2013, Orient BlackSwan.
- D.R.Arora / Brij Bala Arora, Textbook of Microbiology, 5th Edition 2016, CBS Publishers & Distributors.
- Mark Gladwin, Trattler William, C. Scott, Mahan, Clinical Microbiology Made Ridiculously Simple. 6th Edition 2013, Medmaster.
- Eds J. G. Collee, J. P. Duguid, A. G. Fraser & B. P. Marmio, Mackie and McCartney: Practical medical microbiology, 14th Edition 2007, Church New Delhi (India): Elsevierill Livingston.
- R C Dubay & D.K.Maheshwari, Practical Microbiology, Revised edition 2014, S Chand & Company LTD.
- Dr. C.P. Baveja, Dr. V. Baveja, Textbook of Microbiology for MLT, 2nd Edition, Arya Publication.

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- Joanne Willey, Linda Sherwood, Christopher J. Woolverton, Prescott's Microbiology, 9th Edition 2014, McGraw-Hill Education.
- Gary W Procop & Elmer W. Koneman Koneman's Color Atlas and Textbook of Diagnostic Microbiology, 7th Edition 2016, Wolters Kluwer Health.
- F. H. Kayser, K. A. Bienz, J. Eckert, Medical Microbiology, 10th German Edition 2005, Thieme Stuttgart, New York.
- Michael Ford, Medical Microbiology, 2nd Edition 2014, Oxford university press.
- Neal Chamberlain, Medical Microbiology: The Big Picture, 1st Edition 2008, McGraw Hill Medical.



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CLINICAL MICROBIOLOGY LAB COURSE-I

Course Code: MLT4220

Credit Unit: 1

Course Objective:

- To impart the basic knowledge of principles, procedure and clinical importance of laboratory various test.
- To familiarize with basic knowledge of instruments commonly utilized in the clinical laboratory.

Course Contents:

- 1) **Preparation of culture media:** Peptone water, Nutrient broth, Selenite F broth, Thiosulfate citrate bile salt sucrose agar, Nutrient agar, Blood agar, chocolate agar, MacConkey's agar, Mueller-Hinton, Salmonella-Shigella agar, Xylose Lysine Deoxycholate agar, L J Medium, TSI agar, citrate agar, urease agar.
- 2) **Staining method:** Simple stain, Gram stain, ZN Stain, Albert stain, Negative stain,
- 3) **Culture Method:** Streak culture, Lawn Culture, Stroke Culture, Pour plate culture, Liquid culture.
- 4) **Biochemical tests:** Catalase test, Coagulase test, CAMP reaction, Bile solubility test,
- 5) Widal test
- 6) Hanging drop preparation and Satellitism.

Examination Scheme:

Components	Internal Assessment	Attendance	File	EE
Weightage(%)	20	5	5	70

Recommended books:

- C P Baveja, Text book of Microbiology, 4th Edition 2010, Arya Publication.
- Arti Kapil, Ananthanarayan and Paniker's Textbook of Microbiology, 9th Edition 2013, Orient BlackSwan.
- D.R.Arora / Brij Bala Arora, Textbook of Microbiology, 5th Edition 2016, CBS Publishers & Distributors.
- Eds J. G. Collee, J. P. Duguid, A. G. Fraser & B. P. Marmio, Mackie and McCartney: Practical medical microbiology, 14th Edition 2007, Church New Delhi (India): Elsevierill Livingston.
- R C Dubay & D.K.Maheshwari, Practical Microbiology, Revised edition 2014, S Chand & Company LTD.
- Mark Gladwin, Trattler William, C. Scott, Mahan, Clinical Microbiology Made Ridiculously Simple. 6th Edition 2013, Medmaster.
- Dr. C.P. Baveja, Dr. V. Baveja, Textbook of Microbiology for MLT, 2nd Edition, Arya Publication.
- Joanne Willey, Linda Sherwood, Christopher J. Woolverton, Presscot's Microbiology, 9th Edition 2014, McGraw-Hill Education.
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CLINICAL MICROBIOLOGY CLINICAL TRAINING-I

Course Code: MLT4221

Credit Units: 2

Course Objective: The purpose of a Clinical training is to provide hands on practical experience in relevant sections of diagnostic labs as per the need of healthcare system. Students will participate in samples collection, documentation, transportation, receiving, processing and dispatch of reports. Students will help in the performance of clinical protocols, quality maintenance and laboratory research. In some cases, students may be deputed in community services or assist in organizing camps like blood testing or blood donation camp.

Students will be sent to diagnostic laboratory or hospital once a week outside campus or may be within the campus if facility available.

Plan for clinical training:

1. Microbiology Lab
2. Bacteriology Lab

Note: Students must submit training report during examination and the same would be evaluated through Viva voice and presentation.

Examination Scheme:

Components	Viva	A	ME	EE
Weightage (%)	10	5	15	70



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SUMMER PROJECT EVALUATION

Course Code: MLT4335

Credit Units: 6

Summer Project report:

The Project Report is the final research report that the student prepares on the project assigned to him. In case of sponsored project the layout of the project could be as prescribed by the sponsoring organization. However, in other cases the following components should be included in the project report:

- **Title or Cover Page:** The title page should contain Project Title; Student's Name; Programme; Year and Semester and Name of the Faculty Guide.
- **Acknowledgement(s):** Acknowledgment to any advisory or financial assistance received in the course of work may be given. It is incomplete without student's signature.
- **Abstract:** A good "Abstract" should be straight to the point; not too descriptive but fully informative. First paragraph should state what was accomplished with regard to the objectives. The abstract does not have to be an entire summary of the project, but rather a concise summary of the scope and results of the project. It should not exceed more than 1000 words.
- **Table of Contents:** Titles and subtitles are to correspond exactly with those in the text.
- **Introduction:** Here a brief introduction to the problem that is central to the project and an outline of the structure of the rest of the report should be provided. The introduction should aim to catch the imagination of the reader, so excessive details should be avoided.
- **Materials and Methods:** This section should aim at experimental designs, materials used (wherever applicable). Methodology should be mentioned in details including modifications undertaken, if any. It includes organization site(s), sample, instruments used with its validation, procedures followed and precautions.
- **Results and Discussion:** Present results, discuss and compare these with those from other workers, etc. In writing this section, emphasis should be laid on what has been performed and achieved in the course of the work, rather than discuss in detail what is readily available in text books. Avoid abrupt changes in contents from section to section and maintain a lucid flow throughout the thesis. An opening and closing paragraph in every chapter could be included to aid in smooth flow. Note that in writing the various sections, all figures and tables should as far as possible be next to the associated text, in the same orientation as the main text, numbered, and given appropriate titles or captions. All major equations should also be numbered and unless it is really necessary, do not write in "point" form. While presenting the results, write at length about the various statistical tools used in the data interpretation. The result interpretation should be simple but full of data and statistical analysis. This data interpretation should be in congruence with the written objectives and the inferences should be drawn on data and not on impression. Avoid writing straight forward conclusion rather; it should lead to generalization of data on the chosen sample. Results and its discussion should be supporting / contradicting with the previous research work in the given area. Usually one should not use more than two researches in either case of supporting or contradicting the present case of research.
- **Conclusion(s) & Recommendations:** A conclusion should be the final section in which the outcome of the work is mentioned briefly.

Check that your work answers the following questions:

- Did the research project meet its aims (check back to introduction for stated aims)?
- What are the main findings of the research?
- Are there any recommendations?

• Do you have any conclusion on the research process itself?

- **Implications for Future Research:** This should bring out further prospects for the study either thrown open by the present work or with the purpose of making it more comprehensive.
- **Appendices:** The Appendices contain material which is of interest to the reader but not an integral part of the thesis and any problem that have arisen that may be useful to document for future reference.
- **References:** References should include papers, books etc. referred to in the body of the report. These should be written in the alphabetical order of the author's surname. The titles of journals preferably should not be abbreviated; if they are, abbreviations must comply with an internationally recognised system.

Examples:

- For research article:

Voravuthikunchai SP, Lortheeranuwat A, Ninrprom T, Popaya W, Pongpaichit S, Supawita T. (2002) Antibacterial activity of Thai medicinal plants against enterohaemorrhagic Escherichia coli O157: H7. Clin Microbiol Infect, 8 (suppl 1): 116–117.

- For book:

Kowalski, M. (1976) Transduction of effectiveness in Rhizobium meliloti. SYMBIOTIC NITROGEN FIXATION PLANTS (editor P.S. Nutman IBP), 7: 63-67

The Layout Guidelines for the Project File & Project Report:

- A4 size Paper
- Font: Arial (10 points) or Times New Roman (12 points)
- Line spacing: 1.5
- Top and bottom margins: 1 inch/ 2.5 cm; left and right margins: 1.25 inches/ 3 cm

ASSESSMENT OF THE PROJECT FILE AND THE PROJECT REPORT

Essentially, the assessment will be based on the quality of the report, the technical merit of the project and the project execution. Technical merit attempts to assess the quality and depth of the intellectual efforts put into the project. Project execution is concerned with assessing how much work has been put in.

The Project should fulfil the following assessment objectives:

- Range of Research Methods used to obtain information
- Execution of Research
- Data Analysis (Analyze Quantitative/ Qualitative information)
- Quality Control
- Conclusions

Assessment Scheme:

Continuous Evaluation:

40% (Based on punctuality, regularity of work, adherence to plan and methodology, refinements/mid-course corrections etc. as reflected in the Project File.)

Final Evaluation:

60% (Based on the Documentation in the file, Final report layout, analysis and results, achievement of objectives, presentation/ viva)

It is recommended that the final evaluation should be carried out by internal supervisors.

Examination Scheme:

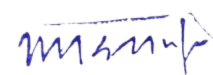
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Components	Continuous assessment (External Supervisor-20 & Internal Supervisor-20)	Final Evaluation (Attendance >75%-5, Viva-10, Presentation- 15 & Final report- 30)
Weightage (%)	40	60



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SPECIALIZATION - CLINICAL BIOCHEMISTRY

CLINICAL ENDOCRINOLOGY

Course Code: MLT4307

Credit Units: 4

Course Objective: To make the students to understand the basics of hormones function; clinically important hormones; diagnostic procedure and clinical interpretations.

Course Contents:

Module-I: Basics of Endocrinology: Exocrine and endocrine; anatomical aspects of human endocrine system; regulation of endocrine system; chemical nature of human hormones; hormone receptors; mechanism of peptide and non-peptide hormones action; secondary messenger.

Hypothalamus: Introduction; production, secretion regulation and functions of hypothalamic hormones.

Module-II: Pituitary gland: Introduction; production, secretion regulation and functions of pituitary hormones; related disorders.

Pineal gland: Introduction; production, secretion regulation and functions of pineal hormones; related disorders.

Thyroid gland: Introduction; production, secretion regulation and functions of thyroid hormones; related disorders; thyroid function test.

Module-III: Parathyroid glands: Introduction; production, secretion regulation and functions of parathyroid hormones;

Adrenal gland: Introduction; production, secretion regulation and functions of adrenal hormones; related disorders.

Pancreas: Introduction; production, secretion regulation and functions of insulin and glucagon; somatostatin; related disorders.

Module-IV: Testes and Ovary: Introduction; production, secretion regulation and functions of testes and ovarian hormones; related disorders.

Other Biologically Important Hormones: Hormones involving contraception; calcium metabolism; renin angiotensin; urotensin; erythropoietin; anti-mullerian hormone.

Examination Scheme:

Components	CT	HA	S/V/Q	ATTD	EE
Weightage (%)	15	5	5	5	70

Recommended Books:

- U Satyanarayan and U Chakrapani. Text book of Biochemistry, 4th Edition 2013, Elsevier.
- M N Chatterjea and Rana Shinde. Text book of Medical Biochemistry , 8th Edition 2012, Jaypee Brothers Medical Publishers (P) Ltd
- D M Vasudevan, SreekumariS, Kannan Vidhyathan. Textbook of Biochemistry for Medical students, 8th Edition 2016, Jaypee& Brothers Medical Publishers (P) Ltd.
- S Ramakrishna, Test Book of Medical Biochemistry. 3rd Illustrated Edition 2004, Orient Longman.
- S Chitiprol. Biochemistry: Instant Notes for Medical students, 1st Edition 2006, Jaypee Brothers Medical Publishers (P) Ltd
- DM Vasudevan, Subir Kumar Das. Practical Textbook of Biochemistry for Medical Students, 2nd Edition 2013, Jaypee Brothers Medical Publishers (P) Ltd

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- Ranjna Chawla. Practical Clinical Biochemistry: Methods and Interpretations, 4th Edition 2014, Jaypee Brothers Medical Publishers (P) Ltd
- David T Punmmmer. An introduction to practical biochemistry, 3rd Edition 2004, Tata McGraw-Hill Education Private Limited
- YM ShivarajaShankara, MK Ganesh, AR Shivashankara. Laboratory Manual for Practical Biochemistry. 2nd Edition 2013, Jaypee Brothers Medical Publishers (P) Ltd
- Albert L Lehninger, Michel M Cox, David L Nension. Lehninger Principle of Biochemistry, 6th Edition 2013, W H Freeman & Co.
- Robert Kincaid Murray, David Bender, Kathleen M. Botham, Peter J. Kennelly. Harpers Illustrated Biochemistry, 30th Edition 2015, McGraw Hill Professional.
- Michael Lieberman, Allan D. Marks, Colleen M. Smith, Dawn B. Marks. Essential Medical Biochemistry, 2nd Edition 2007, Lippincott Williams & Wilkins.
- Donald Voet, Judith G. Voet, Charlotte W. Pratt. Fundamentals of Biochemistry: Life at the Molecular Level: Life at the Molecular Level. Fifth Edition 2016, Wiley
- Henry M. Kronenberg, ShlomoMelmed, Kenneth S. Polonsky, P. Reed Larsen. William Textbook of Endocrinology, 11th ed. Saunders Elsevier 2008
- Bolander, F. F. Molecular Endocrinology, III ed. Academic Press, 2004.
- Nelson Cox. Lehninger's Principle of Biochemistry. 3rd ed. MacMillianWorth Publ. 2000.
- Mac E. Hadely. Endocrinology: 5th ed. Pearson Education, 2000.



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CLINICAL ENZYMOLOGY

Course Code: MLT4308

Credit Units: 4

Course Objective: To make the students to understand the basics of enzymes function; clinically important enzymes; diagnostic procedure and clinical interpretations.

Course Contents:

Module-I: Basic Enzymology: Historical perspective; general characteristics; factor affecting enzyme activity; nomenclature and IUB classification; holoenzyme; apoenzyme; co-factors; co-enzymes; prosthetic group; metallozyme; enzyme assay; units; Michaelis-Menten equation.

Module-II: Enzyme inhibition: Introduction; types; enzyme inhibitors; applications

Co-enzyme: NAD; NADP; FAD; Co-enzyme A TTP; Lipic acid; Vitamin B12; Tetrahydrofolate

Module-III: Enzymes In Clinical Medicine: Introduction; intra-cellular and extra-cellular enzymes; CPK; CK-MB; LDH; SGOT; SGPT; cholinesterase; amylase; lipase; aldolase; alkaline and acid phosphatase; Glucose-6-phosphatase; 5-nuceotidease; GGT.

Module-IV: Enzymes in the Diagnosis of Diseases: Diagnosis, prognosis and assessment of myocardial infarction, hepatitis, jaundice, pancreatitis, cancer, neurodegenerative disorders.

Examination Scheme:

Components	CT	HA	S/V/Q	ATTD	EE
Weightage (%)	15	5	5	5	70

Recommended books:

- U Satyanarayan and U Chakrapani. Text book of Biochemistry, 4th Edition 2013, Elsevier.
- M N Chatterjea and Rana Shinde. Text book of Medical Biochemistry , 8th Edition 2012, Jaypee Brothers Medical Publishers (P) Ltd
- D M Vasudevan, Sreekumari S, Kannan Vidhyathan, Textbook of Biochemistry for Medical students, 8th Edition 2016, Jaypee & Brothers Medical Publishers (P) Ltd.
- P K Godkar, Text Book of Medical Laboratory Technology, 3rd Edition 2014, Bhalani Publishing House.
- Ranjna Chawla, Practical Clinical Biochemistry: Methods and Interpretations, 4th Edition 2014, Jaypee Brothers Medical Publishers (P) Ltd
- David T Punmmmer, An introduction to practical biochemistry, 3rd Edition 2004, Tata McGraw-Hill Education Private Limited
- YM Shivaraja Shankara, MK Ganesh, AR Shivashankara. Laboratory Manual for Practical Biochemistry. 2nd Edition 2013, Jaypee Brothers Medical Publishers (P) Ltd
- Carl A Buttis, David E. Bruns, Teitz fundamental of clinical chemistry and molecular diagnosis, 7th Edition 2015, Elsevier.
- Albert L Lehninger, Michel M Cox, David L Nension, Lehninger Principle of Biochemistry, 6th Edition 2013, W H Freeman & Co.
- Robert Kincaid Murray, David Bender, Kathleen M. Botham, Peter J. Kennelly, Harpers Illustrated Biochemistry, 30th Edition 2015, McGraw Hill Professional.
- Michael Lieberman, Allan D. Marks, Colleen M. Smith, Dawn B. Marks, Marks' Essential Medical Biochemistry, 2nd Edition 2007, Lippincott Williams & Wilkins.
- Donald Voet, Judith G. Voet, Charlotte W. Pratt. Fundamentals of Biochemistry: Life at the Molecular Level: Life at the Molecular Level. Fifth Edition 2016, Wiley

ADVANCED CHEMICAL PATHOLOGY

Course Code: MLT4313

Credit Units: 4

Course Objective:

- To empower the students' knowledge with the procedure to diagnose human disease.
- To develop professional interests in the field of diagnosis.

Course Contents:

Module-I: Urine chemistry: Colour, pH, bile salt and pigment, glucose, protein, ketones, nitrites, urobilinogen, casts and crystals, amylase, sodium, potassium, chloride, occult blood, Diagnostic Strip and its working principle; future aspects of urine chemistry in diagnosis.

Module-II: Cancer: Benign and malignant cancer; Cancer markers and its uses -CA15-3, CA19-9, CA-125, PSA, CEA, alpha fetoprotein, beta-HCG and other marks; common techniques.

Module-III: Advance diagnostic procedure: Separation of abnormal haemoglobin, isoenzymes, lipoproteins and serum proteins.

Module-IV: Hormone profile: Advance techniques for estimation of T3, T4, TSH, Testosterone, Oestrogen, Progesterone, Prolactin, FSH, ADH, Insulin and Glucagon

Examination Scheme:

Components	CT	HA	S/V/Q	ATTD	EE
Weightage (%)	15	5	5	5	70

Recommended books:

- Praful B. Godkar, Darshan P. Godkar. Text Book of Medical Laboratory Technology, 3rd Edition 2014, Bhalani Publishing House.
- U Satyanarayan and U Chakrapani, Text book of Biochemistry, 4th Edition 2013, Elsevier.
- M N Chatterjea and Rana Shinde, Text book of Medical Biochemistry, 8th Edition 2012, Jaypee Brothers Medical Publishers (P) Ltd.



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CLINICAL BIOCHEMISTRY LAB COURSE-II

Course Code: MLT4314

Credit Units: 1

Course Objective

- To impart the basic knowledge of principles, procedure and clinical importance of laboratory various test.
- To familiarize with basic knowledge of instruments commonly utilized in the clinical laboratory.
 - a. Lipid profile.
 - b. Liver function test
 - c. Pancreas function test
 - d. Cardiac profile
 - e. Cancer markers
 - f. Diabetic profile.
 - g. Kidney function test.
 - h. Gastric function test
 - i. To study hormonal assessment to diagnose disorders related to:
 - a. Pituitary gland
 - b. Hypothalamus
 - c. Thyroid gland
 - d. Parathyroid gland
 - e. Pancreas
 - f. Adrenal gland
 - g. Testes and ovary.

Examination Scheme:


Components	Internal Assessment	Attendance	Record	EE
Weightage (%)	20	5	5	70

Recommended books:

- DM Vasudevan, Subir Kumar Das, Practical Textbook of Biochemistry for Medical Students, Jaypee & Brothers Medical Publishers Pvt. Ltd.
- P K Godkar, Text Book of Medical Laboratory Technology 13th edition, Bhalani Publication.
- Ranjna Chawla, Practical Clinical Biochemistry: Methods and Interpretations 4th edition, Jaypee & Brothers Medical Publishers Pvt. Ltd.
- Shivaraja Shankara YM, ,ShankaraGanesh MK, Laboratory Manual for Practical Biochemistry, .Jaypee & Brothers Medical Publishers Pvt. Ltd
- Teitz, Fundamental of Clinical Chemistry and Molecular Diagnosis, Carl A Butts, David E. Bruns Elsevier.
- Medical Laboratory Science: Theory and practice by J. Ochei, Arundhati kolhatkar, McGraw Hill Education, 1st edition (2008).



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CLINICAL BIOCHEMISTRY CLINICAL TRAINING-II

Course Code: MLT4315

Credit Units: 2

Course objective: The purpose of a Clinical training is to provide hands on practical experience in relevant sections of diagnostic labs as per the need of healthcare system. Students will participate in samples collection, documentation, transportation, receiving, processing and dispatch of reports. Students will help in the performance of clinical protocols, quality maintenance and laboratory research. In some cases, students may be deputed in community services or assist in organizing camps like blood testing or blood donation camp.

Students will be sent to diagnostic laboratory or hospital once a week outside campus or may be within the campus if facility available.

Plan for clinical training:

1. Clinical Biochemistry Lab
2. Collection centre

Note: Students must submit training report during examination and the same would be evaluated through Viva voice and presentation.

Examination Scheme:

Components	Viva	A	ME	EE
Weightage (%)	10	5	15	70



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CLINICAL VIROLOGY

Course Code: MLT4317

Credit Units: 4

Course Objectives:

- To impart knowledge about harmful effects of virus in human health.
- To develop understanding of morphology, cultivation, transmission, Pathogenicity, and control strategies of clinically important Virus.
- To familiarize with techniques of sample collection, transport and processing to diagnose viral infection.

Course Contents:

Module-I: Virology: The nature of viruses, Classification of viruses, structure of virus, Cultivation and replication of virus, Bacteriophage, Interferon, Viral vaccines and antiviral drugs, sample collection, transport and storage of sample for viral diagnosis.

Module-II: Clinically important DNA virus: Herpes simplex virus, Varicella Zoster virus, Cytomegalovirus, Epstein-Barr virus, Poxviridae, Adenoviridae, Parvoviridae, Papillomaviridae.

Module-III: Clinically important of RNA virus: Orthomyxoviruses, Paramyxoviruses, Rubella virus, Picornaviruses, Dengue virus, Chikungunya virus, Japanese B encephalitis virus, Kyasanur Forest disease virus, Rhabdoviruses, HIV and other Retroviruses.

Module-IV: Clinically important of miscellaneous virus: Hepatitis viruses, Oncogenic viruses, Hantaviruses, Arenaviruses, Ebola virus, Coronaviruses, Slow viruses, Rotavirus. Emerging viral infections – SARS, Avian influenza, H1N1.

Examination Scheme:

Components	CT	HA	S/V/Q	ATTD	EE
Weightage (%)	15	5	5	5	70

Recommended books:

- C P Baveja, Text book of Microbiology, 4th Edition 2010, Arya Publication.
- Arti Kapil, Ananthanarayan and Paniker's Textbook of Microbiology, 9th Edition 2013, Orient BlackSwan.
- Mark Gladwin, Trattler William, C. Scott, Mahan Clinical Microbiology Made Ridiculously Simple, 6th Edition 2013, Medmaster
- D.R.Arora / Brij Bala Arora, Textbook of Microbiology, 5th Edition 2016, CBS Publishers & Distributors.
- Eds J. G. Collee, J. P. Duguid, A. G. Fraser & B. P. Marmio, Mackie and McCartney: Practical medical microbiology, 14th Edition 2007, Church New Delhi (India): Elsevierill Livingston.
- R C Dubay & D.K.Maheshwari, Practical Microbiology, Revised edition 2014, S Chand & Company LTD.
- Joanne Willey, Linda Sherwood, Christopher J. Woolverton, Prescott's Microbiology, 9th Edition 2014, McGraw-Hill Education.
- Gary W Procop & Elmer W. Koneman Koneman's Color Atlas and Textbook of Diagnostic Microbiology, 7th Edition 2016, Wolters Kluwer Health.
- F. H. Kayser, K. A. Bienz, J. Eckert, Medical Microbiology, 10th German Edition 2005, Thieme Stuttgart, New York.
- Michael Ford, Medical Microbiology, 2nd Edition 2014, Oxford university press.
- Neal Chamberlain, Medical Microbiology: The Big Picture, 1st Edition 2008, Mc Graw Hill Medical.

CLINICAL MYCOLOGY

Course Code: MLT4318

Credit Units:4

Course Objectives:

- The subject includes the study of fungi (yeasts and moulds) which can cause infectious disease in humans.
- It discusses the present classification of fungi, modes of transmission, and infection, disease spectrum.
- Laboratory isolation and identification techniques by cultural and non cultural methods and susceptibility testing to antifungal agents will be emphasized.

Course Contents:

Module-I: Mycology: Introduction of Mycology, Characteristic of Fungi, Taxonomy of Fungi, Immunity to Fungal diseases, Fungal culture media, Fungal reagent and staining, Discuss the procedures used in properly collecting specimens for mycology; Diagnosis of fungal disease; Anti Fungal drugs.

Module-II: Superficial Mycoses: Malassezia Versicolor, Atopic Dermatitis, Malassezia Folliculitis and Systemic Malassezia infection. Tinea Nigra, White Piedra, Black Piedra, Dermatophytes, Tinea Capitis, Dermatophytid or id reaction, wood,s lamp examination.

Module-III: Subcutaneous Mycoses: Mycetoma, Sporotrichosis, Chromoblastomycosis, Phaeohyphomycosis, Rhinosporidiosis and Lobomycosis.

Module-IV: Systemic and Opportunistic Mycoses: Histoplasmosis, Blastomycosis, Coccidioidomycosis and Paracoccidioidomycosis. Candidiasis, Cryptococcosis, Pneumocystosis, Penicilliosis Marneffeii, Aspergillosis, Zygomycosis and Oppertunistic Mycoses.

Examination Scheme:

Components	CT	HA	S/V/Q	ATTD	EE
Weightage (%)	15	5	5	5	70

Recommended books:

- C P Baveja, Text book of Microbiology, 4th Edition 2010, Arya Publication.
- Arti Kapil, Ananthanarayan and Paniker's Textbook of Microbiology, 9th Edition 2013, Orient BlackSwan.
- Mark Gladwin, Trattler William, C. Scott, Mahan, Clinical Microbiology Made Ridiculously Simple. 6th Edition 2013, Medmaster.
- D.R.Arora / Brij Bala Arora, Textbook of Microbiology, 5th Edition 2016, CBS Publishers & Distributors.
- Eds J. G. Collee, J. P. Duguid, A. G. Fraser & B. P. Marmio, Mackie and McCartney: Practical medical microbiology, 14th Edition 2007, Church New Delhi (India): Elsevierill Livingston.
- R C Dubay & D.K.Maheshwari, Practical Microbiology, Revised edition 2014, S Chand & Company LTD.
- Joanne Willey, Linda Sherwood, Christopher J. Woolverton, Presscot's Microbiology, 9th Edition 2014, McGraw-Hill Education.
- Gary W Procop & Elmer W. Koneman Koneman's Color Atlas and Textbook of Diagnostic Microbiology, 7th Edition 2016, Wolters Kluwer Health.

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- F. H. Kayser, K. A. Bienz, J. Eckert, Medical Microbiology, 10th German Edition 2005, Thieme Stuttgart, New York.
- Michael Ford, Medical Microbiology, 2nd Edition 2014, Oxford university press.
- Neal Chamberlain, Medical Microbiology: The Big Picture, 1st Edition 2008, Mc Graw Hill Medical.
- Jagdish Chander, Text book of medical Mycology, 3rd Edition 2009, Mehta publishers.



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CLINICAL PARASITOLOGY

Course Code: MLT4319

Credit Units:4

Course Objectives:

- To provide advanced knowledge and understanding of medically important parasites.
- To equip students with the fundamental understanding of parasitological techniques.

Course Contents:

Module-I: Parasitology: Introduction to parasites and host, classification of parasites and hosts, relationship between parasites and host, transmission of parasitic infections, preventive measurements for parasitic infections, terminology related to parasitology.

Module-II: Protozoology: Detailed study and laboratory techniques for diagnosis of medically important protozoa such as intestinal protozoa, blood and tissue protozoa.

Module-III: Helminthology: Detailed study and laboratory techniques for diagnosis of medically important parasitic worms; for example- intestinal, blood and tissue parasitic worms.

Module-IV: Laboratory Techniques: Collection and processing of different clinical samples for parasitological investigations; laboratory techniques for intestinal parasites, blood parasites, tissue parasites; advanced diagnostic techniques and molecular laboratory techniques.

Examination Scheme

Components	CA	A	ME	EE
Weightage (%)	15	5	10	70

Recommended books:

- Arora & Arora, Text book of Medical parasitology, CBS Publishers.
- Saugata Ghosh, Paniker's text book of medical parasitology, Jaypee.
- KD Chatterjee, Protozoology and Helminthology 13th edition, CBS Publishers & Distributors pvt.
- Parasitic diseases in man by Richard Knight English Language Book Society (ELBS).
- Subhash Chandra Parija, Textbook of Medical Parasitology : Protozoology & Helminthology, 4th Edition.
- T V Rajan, Textbook of Medical Parasitology, B I Publications.
- World Health Organization, Basic laboratory methods in medical parasitology, World Health Organization.
- Lynne S. Garcia, Diagnostic Medical Parasitology 5th Edition, ASM Press.
- David T. John, William A. Petri Jr., Markell and Voge's Medical Parasitology 9th, Saunders Elseviers.
- World Health Organization, Basic laboratory methods in medical parasitology, World Health Organization.

PHARMACEUTICAL MICROBIOLOGY

Course Code: MLT4320

Credit Units: 3

Course Objective:

- A provide detailed knowledge about antimicrobial action and resistance.
- To become students aware about applications of microorganisms in the industry, health-care, environment and research fields.

Course Contents:

Module-I: Antimicrobial Agents: Introduction and types of antimicrobial agents; terminology related to pharmaceutical microbiology; history of development of antimicrobial drugs or agents, concept of R & D.

Action Mechanism: Mode of action and activity spectrum of major antibiotic classes, antifungal agents, antiviral agents, prophylactic usage and adverse reactions.

Module-II: Antibiotic and antimicrobial Resistance: introduction and importance, Mechanism of resistance- enzymatic destruction and modification, decreased permeability, promotion of antibiotic reflux, alteration and protection of target sites, bind-up antibiotics etc; molecular genetics of antibiotics resistance in bacteria- role off plasmid, transposable genetic elements, DNA integration elements.

Module-III: Multidrug Resistance: Mechanism and significance of multidrug resistance among microbes; detailed study about - multidrug resistant TB, Malaria, MRSA, VRE, MDR GNR, MDR viruses and fungus.

Module-IV: Sterilization and quality control: Microbial contamination and spoilage of microbial agents and their sterilization, FDA and govt. regulatory practices and policies, quality control.

Vaccines: Introduction, types, working mechanism and applications, adverse effects, terminology related to vaccines.

Examination Scheme

Components	CA	A	ME	EE
Weightage (%)	15	5	10	70

Recommended books:

- Hugo, WB and Russell, AD. Pharmaceutical Microbiology, (2003). Blackwell Science, Oxford, UK.
- Krogsgaard L, Lilijefors T. and Madsen, U. Textbook of Drug Design and Discovery, (2004). Taylor and Francis, London.
- Geoffrey Hanlon and Norman Hodges. Essential Microbiology for pharmacy and pharmaceutical science. (2013). Wiley Blackwell.
- S. P. Vyas & V. K. Dixit. Pharmaceutical Biotechnology. (2003) CBS Publishers & Distributors, New Delhi.
- Bhatia R and Ichhpujani RL. Quality Assurance in Microbiology. (1995). CBS Publishers, New Delhi.
- Gregory Gregoriadis. Drug Carriers in biology & Medicine. (2001). Academic Press New York.
- Davis, B. D., Dulbecco, R, Eisen, H. N., Ginsberg, R. S. Microbiology. (1990). Harper and Row Publishers, Singapore. F. H. Kayser, K. A. Bienz, J. Eckert, Medical Microbiology, Thieme Stuttgart, New York.
- Quality Assurance in Microbiology by Rajesh Bhatia, Rattan Lal Ichhpujani. CBS publishers & distributors, New Delhi.
- Quniolinone antimicrobial agents- Edited by David C. Hooper, John S. Wolfson. ASM Washington DC.

CLINICAL MICROBIOLOGY LAB COURSE-II

Course Code: MLT4321

Credit Units: 1

Course Objective:

- To impart the basic knowledge of principles, procedure and clinical importance of laboratory various test.
- To familiarize with basic knowledge of instruments commonly utilized in the clinical laboratory

LIST OF PRACTICAL EXERCISES:

Virology, Mycology and Parasitology sections:

- Collection, transportation and preservation of specimens Specimen for viral diagnosis.
- Isolation and identification of viruses from specimens.
- Preparation of glassware and media for tissue culture.
- Preparation and maintenance of tissue culture.
- Virus isolation in tissue culture and identification.
- Use of chick embryo – inoculation by various routes.
- Use of laboratory animals for isolation of viruses, preparation of antisera and complement etc.
- Serological tests in virology.
- Antigen detection by various techniques.
- Collection of specimens for fungal examination.. Direct KOH examination.
- LPCB and India ink staining.
- Concentration techniques for stool and blood samples.
- Wet mount preparation of stool.
- Slide culture techniques.

Examination Scheme:

Components	Internal Assessment	Attendance	Record	EE
Weightage (%)	20	5	5	70

Recommended books:

- Arora & Arora, Text book of Medical parasitology, CBS Publishers.
- Saugata Ghosh, Paniker's text book of medical parasitology, Jaypee.
- KD Chatterjee, Protozoology and Helminthology 13th edition, CBS Publishers & Distributors pvt.
- C P Baveja, Text book of Microbiology, 4th Edition 2010, Arya Publication.
- Arti Kapil, Ananthanarayan and Paniker's Textbook of Microbiology, 9th Edition 2013, Orient BlackSwan.
- Michael Ford, Medical Microbiology, 2nd Edition 2014, Oxford university press.
- Neal Chamberlain, Medical Microbiology: The Big Picture, 1st Edition 2008, Mc Graw Hill Medical.



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CLINICAL MICROBIOLOGY CLINICAL TRAINING-II

Course Code: MLT4322

Credit Units: 2

Course Objective: The purpose of a Clinical training is to provide hands on practical experience in relevant sections of diagnostic labs as per the need of healthcare system. Students will participate in samples collection, documentation, transportation, receiving, processing and dispatch of reports. Students will help in the performance of clinical protocols, quality maintenance and laboratory research. In some cases, students may be deputed in community services or assist in organizing camps like blood testing or blood donation camp.

Students will be sent to diagnostic laboratory or hospital once a week outside campus or may be within the campus if facility available.

Plan for clinical training:

- Serology Lab
- Microbiology lab

Note: Students must submit training report during examination and the same would be evaluated through Viva voice and presentation.

Examination Scheme:

Components	Viva	A	ME	EE
Weightage (%)	10	5	15	70



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ON JOB TRAINING

Course Code: MLT4401

Credit Units: 9

On-the-job training, also known as OJT, is teaching the skills, knowledge, and competencies that are needed to perform a specific job within the workplace and work environment. The main purpose is to correlate laboratory investigations, through case studies and laboratory tests and their correlations. Implementation of Quality controls and guidelines for implementation in accreditation programmes. Students will learn in an environment in which they will need to practice the knowledge and skills which he/she learnt in the class. On-the-job training uses the regular or existing workplace tools, machines, documents, equipment, knowledge, and necessary skills required for an employee to learn to effectively perform his or her job where ever he/she is sent for OJT.

Examination Scheme:

Components	Continuous assessment (External Supervisor-20 & Internal Supervisor-20)	Final Evaluation (Attendance >75%- 5, Viva-10, Presentation- 15 & Final report- 30)
Weightage (%)	40	60



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CLINICAL RESEARCH-DISSERTATION

Course Code: MLT4437

Credit Units: 9

GUIDELINES FOR PROJECT FILE AND PROJECT REPORT

Research experience is as close to a professional problem-solving activity as anything in the curriculum. It provides exposure to research methodology and an opportunity to work closely with a faculty guide. It usually requires the use of advanced concepts, a variety of experimental techniques, and state-of-the-art instrumentation.

Research is genuine exploration of the unknown that leads to new knowledge which often warrants publication. But whether or not the results of a research project are publishable, the project should be communicated in the form of a research report written by the student.

Sufficient time should be allowed for satisfactory completion of reports, taking into account that initial drafts should be critically analyzed by the faculty guide and corrected by the student at each stage.

PROJECT FILE

The Project File may be a very useful tool for undertaking an assignment along-with a normal semester, an exploratory study, sponsored projects, a project undertaken during summer period or any other period as per curricular where the researcher is working with a company/organization. The project/ assignment may also be a part of the bigger research agenda being pursued by a faculty/ institution/ department. The Project File is the principal means by which the work carried out will be assessed and therefore great care should be taken in its preparation. This file may be considered in continuous assessment.

In general, the File should be comprehensive and include:

- A short account of the activities that were undertaken as part of the project;
- A statement about the extent to which the project has achieved its stated objectives;
- A statement about the outcomes of the evaluation and dissemination processes engaged in as part of the project;
- Any activities planned but not yet completed as part of the project, or as a future initiative directly resulting from the project;
- Any problems that have arisen and may be useful to document for future reference.

PROJECT REPORT

The Project Report is the final research report that the student prepares on the project assigned to him. In case of sponsored project the layout of the project could be as prescribed by the sponsoring organization. However, in other cases the following components should be included in the project report:

- **Title or Cover Page:** The title page should contain Project Title; Student's Name; Programme; Year and Semester and Name of the Faculty Guide.
- **Acknowledgement(s):** Acknowledgment to any advisory or financial assistance received in the course of work may be given. It is incomplete without student's signature.
- **Abstract:** A good "Abstract" should be straight to the point; not too descriptive but fully informative. First paragraph should state what was accomplished with regard to the objectives. The abstract does not have to be an entire summary of the project, but rather a concise summary of the scope and results of the project. It should not exceed more than 1000 words.
- **Table of Contents:** Titles and subtitles are to correspond exactly with those in the text.
- **Introduction:** Here a brief introduction to the problem that is central to the project and an outline of the structure of the rest of the report should be provided. The introduction should aim to catch the imagination of the reader, so excessive details should be avoided.

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- **Materials and Methods:** This section should aim at experimental designs, materials used (wherever applicable). Methodology should be mentioned in details including modifications undertaken, if any. It includes organization site(s), sample, instruments used with its validation, procedures followed and precautions.
- **Results and Discussion:** Present results, discuss and compare these with those from other workers, etc. In writing this section, emphasis should be laid on what has been performed and achieved in the course of the work, rather than discuss in detail what is readily available in text books. Avoid abrupt changes in contents from section to section and maintain a lucid flow throughout the thesis. An opening and closing paragraph in every chapter could be included to aid in smooth flow. Note that in writing the various sections, all figures and tables should as far as possible be next to the associated text, in the same orientation as the main text, numbered, and given appropriate titles or captions. All major equations should also be numbered and unless it is really necessary, do not write in “point” form. While presenting the results, write at length about the various statistical tools used in the data interpretation. The result interpretation should be simple but full of data and statistical analysis. This data interpretation should be in congruence with the written objectives and the inferences should be drawn on data and not on impression. Avoid writing straight forward conclusion rather; it should lead to generalization of data on the chosen sample. Results and its discussion should be supporting/contradicting with the previous research work in the given area. Usually one should not use more than two researches in either case of supporting or contradicting the present case of research.
- **Conclusion(s) & Recommendations:** A conclusion should be the final section in which the outcome of the work is mentioned briefly.

Check that your work answers the following questions:

- Did the research project meet its aims (check back to introduction for stated aims)?
- What are the main findings of the research?
- Are there any recommendations?
- Do you have any conclusion on the research process itself?

- **Implications for Future Research:** This should bring out further prospects for the study either thrown open by the present work or with the purpose of making it more comprehensive.
- **Appendices:** The Appendices contain material which is of interest to the reader but not an integral part of the thesis and any problem that have arisen that may be useful to document for future reference.
- **References:** References should include papers, books etc. referred to in the body of the report. These should be written in the alphabetical order of the author's surname. The titles of journals preferably should not be abbreviated; if they are, abbreviations must comply with an internationally recognised system.

Examples:

- For research article:

Voravuthikunchai SP, Lortheeranuwat A, Ninrprom T, Popaya W, Pongpaichit S, Supawita T. (2002) Antibacterial activity of Thai medicinal plants against enterohaemorrhagic Escherichia coli O157: H7. Clin Microbiol Infect, 8 (suppl 1): 116–117.

- For book:

Kowalski, M. (1976) Transduction of effectiveness in Rhizobium meliloti. SYMBIOTIC NITROGEN FIXATION PLANTS (editor P.S. Nutman IBP), 7: 63-67

The Layout Guidelines for the Project File & Project Report:

- A4 size Paper
- Font: Arial (10 points) or Times New Roman (12 points)
- Line spacing: 1.5
- Top and bottom margins: 1 inch/ 2.5 cm; left and right margins: 1.25 inches/ 3 cm

ASSESSMENT OF THE PROJECT FILE AND THE PROJECT REPORT

Essentially, the assessment will be based on the quality of the report, the technical merit of the project and the project execution. Technical merit attempts to assess the quality and depth of the intellectual efforts put into the project. Project execution is concerned with assessing how much work has been put in.

The Project should fulfil the following assessment objectives:

- Range of Research Methods used to obtain information
- Execution of Research
- Data Analysis (Analyze Quantitative/ Qualitative information)
- Quality Control
- Conclusions

Assessment Scheme:**Continuous Evaluation:**

40% (Based on punctuality, regularity of work, adherence to plan and methodology, refinements/mid-course corrections etc. as reflected in the Project File.)

Final Evaluation:

60% (Based on the Documentation in the file, Final report layout, analysis and results, achievement of objectives, presentation/ viva)

It is recommended that the Final evaluation should be carried out by a panel of evaluators.

Examination Scheme:

Components	Continuous assessment (External Supervisor-20 & Internal Supervisor-20)	Final Evaluation (Attendance >75%-5, Viva-10, Presentation- 15 & Final report- 30)
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Curriculum & Scheme of Examination

2022

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DEMOGRAPHY

Course Code: MHA4102

Credit Units: 03

Course Objective:

To present students some basic techniques and concepts in population sciences.

Course Contents

Module-I: Population Fundamentals

Science of demography, Demographic cycle, Population trends and demographic indicators, Demography and Family Planning and its role in population policy of India.

Module-II: Demographic Studies

- Fundamentals of population studies and its links with health.
- Methods of demographic data collection, sources of data, population census, population composition, world population growth, growth of Indian population, morbidity, mortality, ageing, migration/urbanization, population projections life tables.

Module-III: Family Planning

Fertility and fertility factors, Family planning, Population policies & programmes and National Population Policy.

Examination Scheme:

Components	CP	V	A	ME	EE
Weightage (%)	5	5	5	15	70

Texts& References:

- AshaBhende and Tara Kanitkar. *Principles of population Studies*, Himalaya Pub Houses,
- John Weeks, *Population*, Wordsworth pub, 1994.
- S.N.Singh, M.K.Premi, P.S.Bhatia. *Population Transition In India*, B. R. Publishing Corporation.
- P.B. Desai. *Population in the context of India's development*, UGC – UNFPA project.
- Peter Cox. *Demography*, Cambridge University Press
- K.B. Pathak, F. Ram. *Techniques of Demographic Analysis*, Himalaya Publishing Houses.
- *Health Monitor*, Foundation for Research in Health S.
- International Institute for Population Sciences. *National Family Health Survey – 1, 2 and 3*, Mumbai.
- K. Srinivasan. *Basic Graphic Techniques and Applications*, Sage Publications, 1998



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BIOSTATISTICS

Course Code: MHA4105

Credit Units: 3

Course Objective: The aim of this course is to develop the understanding of various statistical tools used for decisions making and how each applies to and can be used in the Hospital environment.

Course Contents:

Module-I: Introduction

Classification of data, Source of data, data organization Method of scaling - nominal, ordinal, ratio and interval scale, building composite scales, measuring reliability and validity of scales.

Module-II: Properties of measurement & Probability distributions

- Measurement of central tendency, measurement of dispersion – Range, Mean deviation & Standard deviation.
- Concepts of probability, Probability distributions – Binomial, Poisson & Normal Probability Distribution.

Module-III: Sampling

Sampling methods, Sampling Errors; Sampling distribution.

Module-IV: Testing Hypothesis

Hypothesis Testing to compare two populations – Student's T-test, Interpretation of computer output of ANOVA, Chi – Square Test, F-test.

Module-V: Forecasting Techniques

Correlation-Karl Person, Spearman's Rank methods, Regression Analysis, least squares method, coefficient of determination, Time Series Analysis.

Module-VI: Statistical methods and application:

SPSS processing, Transformation and manipulation of SPSS file, Statistical procedures-descriptive, univariate, bivariate and multivariate statistics.

Examination Scheme:

Components	CP	V	A	ME	EE
Weightage (%)	5	5	5	15	70

Text & References:

- P.S.S. SundarRao. *An Introduction to Biostatistics: A manual for students in Health Sciences*, J.Richard Prentice Hall, 1996.
- B.K. Mahajan. *Methods in Biostatistics*, Jaypee Brothers
- Daniel, Wayne.W. *Bio-Statistics: A foundation for Analysis in the Health Sciences*, John Wiley and Sons Pub, 1991.
- K. VishwasRao. *Bio-Statistics: A Manual of statistical methods for use in the Health, Nutrition and Anthropology*, Jaypee Brothers Medical Pub, 1996.
- Verma B.L., Shukla G.D. *Bio-Statistics perspective in Health care research and practice*, C.B.S. Pub, 1993.
- Krishnaiah, P.K. Rao, C.R. (ed), *Handbook of Statistics*, Elsevier Science Pub, 1988.

INFORMATION TECHNOLOGY FOR MANAGERS

Course Code: MHA4106

Credit Units: 3

Course Objective: This course will expose students to developments in computer technology and understand the working of a computer system. It will introduce end-user computing and build skills in using IT and understanding various technologies like internet, telecom, DBMS concepts, e-commerce etc. The course will expose the students to the latest trends in computer.

Course Contents:

Module-I: Modern Computer Systems

Evolution of Computer Systems, Input, output and storage technologies, Computer Assisted Control and Automation, (e.g. Delhi Metro , Digitally Controlled Car engines etc.), Computer Controlled Biometric/RFID based Access Control , Contemporary hardware and software platforms(Open Source, Web Software etc.), Storage of Data Resources

Module-II: Data Resource Management

Introduction to DBMS, Benefits of DBMS over traditional file system, Types of DBMS, Application of DBMS using MS-ACCESS / ORACLE as a tool for understanding of DBMS concepts. SQL Query handling, Forms, Concept of Data Warehouses and Data Marts, Introduction to Data Centers. Storage Technologies and Architecture (DAT, NAS, SAN etc.). Live examples of storage strategies of companies like Google, Amazon Wal-Mart dealing with storage crisis

Module-III: Telecommunications and Computer Networks

Networked Enterprise :- Components, Types of networks, Advantages of Network Environment, Business Uses of Internet, Intranet and Extranet, Web 2.0/3.0, Distributed/Cloud/Grid Computing, GSM & CDMA, GPRS ,3G & 4G technologies, VOIP and IPTV.

Module-IV: Electronic Commerce Systems

Introduction to e-Commerce and M-Commerce, Advantages and Disadvantages of each. Concept of B2B, B2C, C2C , with examples. Concept of Internet Banking and Online Shopping, Electronic Payment Systems. Project Discussion:- Development of e-commerce store (Web Site Development, Internet Publicity, Payment Gateway, Packaging & Delivery , After Sales Support) .

Module-V: E-governance

Concept of e-governance, World Perspective, Indian Perspective, Technologies for e-governance, e-governance as an effective tool to manage the country's citizens and resources, Advantages and Disadvantage of E-governance, E-governance perspective in India. Discussion on MCA21 Project, Bhoomi etc.

Module-VI: Security Management

The Information Security, System Vulnerability and Abuse, Security Threats (Malicious Software, Hacking etc.) and counter measure. Definition of Cyber Crime and Types. Antivirus, Firewalls, Anti-Spyware, Security Audit, Discussion on Overview of IT-ACT 2000.



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Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70

Text & References:

- Norton P (2010), Introduction to Computers, Tata McGraw-Hill
- Potter T (2010), Introduction to Computers, John Wiley & Sons (Asia) Pvt Ltd
- Morley D & Parker CS (2009), Understanding Computers – Today and Tomorrow, Thompson Press
- Jawadekar, WS (2009); Management Information System; Tata McGraw Hill
- Mclead R & Schell G (2009), Management Information Systems; Pearson Prentice Hall
- O'Brein, JA (2009); Introduction to Information Systems; Tata McGraw Hill



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ESSENTIALS OF HEALTHCARE SYSTEM

Course Code: MHA4107

Credit Units: 3

Course Objective: To provide the students a basic insight into the main features of Indian health care delivery system and how it compares with the other systems of the world.

Course Contents:

Module-I: Health and Development

Concept of Health, illness, sickness and disease; Public health Indicators, Health and its determinants, Disease Burden in terms of DALY, Social context of Health – Culture, health belief model and social issues affecting health like urbanization etc; Gender and health, Nutrition and Health, Nutritional Transition.

Module-II: Healthcare Systems

Evolution of Health Planning in India, Concept and Elements of Primary Health Care, Rural Healthcare system in India – Structure & Current Scenario, Indian Public Health Standards, Organization and Management of Public Healthcare System, Issues in healthcare delivery system,

Module-III: Health Policies and Schemes

Millennium development goals, National Health Policy, Integrated Child Development Scheme, Health Sector Reforms, Five year Plans, Reproductive and Child Health Programme, Universal Immunization Coverage, National Health Mission and National Urban Health Mission.

Module-IV: NRHM

Goals & Strategies of NRHM, expected outcomes and its various components like Accredited Social Health Activists, Mobile Medical Units, JananiSurkshaYojna, JSSK, Village Health & Sanitation Committee, RogaKalyanSamiti etc.

Module-V: National Health Programmes

Management and Implementation of National Health Programmes– Revised National Tuberculosis Control Programme, National AIDS control Programme, National programme for Control of Blindness, Vector Borne Diseases Control Programme, National Leprosy Eradication Programme, National Cancer Control Programme, National Diabetes Control Programme and National Mental Health Programme.

Examination Scheme:

Components	CP	V	A	ME	EE
Weightage (%)	5	5	5	15	70

Text & References:

- K Park, *Preventive and Social Medicine*, BansaridasBhanot Publishing House.
- Brijesh C Purohit. *Health Care System in India: Towards Measuring Efficiency in Delivery of Services*.
- Maxcy-Rosenau-Last, *Public Health & Preventive Medicine*, 14th Edition Ed Robert Wallace.


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HOSPITAL PLANNING

Course Code: MHA4203

Credit Units: 03

Course Objective

To expose the students to planning and operation of hospitals in a detailed manner which will include all facets of hospital planning activities covering every department that is involved both in clinical care as well as supportive services.

Course Contents

Module-I: Introduction to Hospital Planning

Conception of idea, formation of hospital planning team, market survey, feasibility study, selection of location, Financial planning of hospitals, Macro level planning, Conception to commissioning- site development, architects brief working drawings and specifications, engineering drawing, equipment planning, bed distribution, space allocation, interior designing and construction of building - commissioning, shake down period

Module-II: Planning for Medical and Ancillary services

Out-patient services, Emergency services, Day care services, Inpatient services and Intensive Care Units (ICU), Surgical suites, Labor and delivery suites-LDRP suites and Physical Therapy department.

Module-III: Planning for Supportive Services

Admitting department, Medical Records department, Laboratory services, blood banking & Radiological services, Pharmacy & Medical store, Medical gas system, HVAC, CSSD, Food & Beverages and Laundry & linen services.

Module-IV: Planning for Advanced facilities

Cardiac catheterization laboratory, various endoscopy units, Radiotherapy unit, IVF unit and Dialysis unit.

Module-V: Recent Advances in Hospital Planning

Green Hospitals, Energy efficiency in hospitals, Robotics in Hospitals and Geriatric Care

Examination Scheme:

Components	CP	V	A	ME	EE
Weightage (%)	5	5	5	15	70

Texts & References:

- *Modern Trends in Planning & Designing of Hospitals: Principles and Practice*: Shakti Kumar Gupta, Sunil Kant, R Chandrashekhar, Sidharth Satpathy, by Jaypee – 2007
- *Hospitals: Facilities Planning and Management*, GD Kunders by Tata Mcgraw Hill
- *Hospital Planning*: Charles Butler, Addison Erdman
- Dr Malhotra's series: *Step by Step – Hospital designing & Planning*, by Jaypee 2007


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HEALTH ECONOMICS

Course Code: MHA4204

Credit Units: 3

Course Objective: To study principles of economics and its application in Hospitals.

Course Contents:

Module-I: Nature and scope of Economics

Fundamental Concepts –Scarcity & Choice, Macroeconomics & Microeconomics, Economic Agents – Consumer, Producer & government, Market – Free market mechanism and chained Market Mechanism.

Module-II: Demand and Supply Market

Law of Demand, Shift in Demand Curve, Law of Supply, Shift in Supply curve, Market Equilibrium, Concept of elasticity – Price elasticity of Demand & Supply.

Module-III: Healthcare Market

- Market Failure: Imperfect competition, Risk & uncertainty, Moral Hazard, Adverse selection, Externalities, Public Good, Asymmetric Information and concern of Equity. Market of unqualified medical care providers.
- Demand for Healthcare: Need, Want & demand, Healthcare as an investment, Determinants of demand – Price factors (opportunity cost), Patient factors & Physician factors – Supplier Induced Demand; Insurance and demand for healthcare.

Module-IV: Costs

Classification of costs on the basis of traceability, cost behavior, controllability and selection among alternatives; Total, Average and Marginal costs.

Module-V: Health Expenditure

Public Expenditure on Health, Expenditure and Allocations under Five-Year Plans, its SWOT analysis, National Health Accounts.

Examination Scheme:

Components	CP	V	A	ME	EE
Weightage (%)	5	5	5	15	70

Text & References:

- Ceri J Phillips. *Health Economics- An introduction for health professionals*, Blackwell publishing.
- Clewer Ann and D Perkins. *Economics for healthcare management*, Prentice Hall.
- Folland S, A.C. Goodman, and M. Stano, *The economics of health & Healthcare*, Prentice Hall



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RESEARCH METHODOLOGY

Course Code: MHA4205

Credit Units: 03

Course Objectives:

- To provide basic understanding towards research principles and methods.
- To introduce important analytical tools for research data analysis.
- To assist in the development of research proposals/reports.

Course Contents:

Module-I: Basics of Research

Definitions & uses of research in healthcare, Steps Involved in Research Process, Variables in research, Measurement scales, Formulation of research problems, writing research questions, Development of conceptual framework.

Module-II: Sampling & Research Designs

Sampling, Sampling Procedure, Various types of Sampling Techniques, Sample size determination, reliability & validity in research, Research Designs- Non-experimental & experimental research designs.

Module-III: Review of Literature & Hypothesis

Review of literature, Hypothesis- Meaning and types of hypothesis, Hypothesis testing, Type I & Type II errors in hypothesis testing.

Module-IV: Data Collection

Types of Data: Secondary and Primary, Different methods of data collection- Observation method, interview method, Questionnaire and schedule, Data Management: editing, entry and preparing data sets for analysis; Design and development of questionnaire.

Module-V: Research Reports

Structure and Components of Research Report, Types of Reports, Layout of Research Report, Method of writing a research report.

Module-VI: Research Ethics & Reference Writing

History of ethics in health research, Principles and Concepts in research ethics – confidentiality and privacy, informed consent, vulnerable subjects and special treatments, standards of care – principles, review processes etc.; Vancouver style of reference writing.

Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70

Text & References:

- Gummerrson, E. *Qualitative methods in Management Research*, Sage publications
- Verkevieser et al, *Designing and conducting Health Systems Research Projects* WHO and IDRC
- Grundy F and Reinke W A, *Health Practice Research and formalize Managerial Methods*, Geneva, WHO
- *Designing and conducting Health surveys*, Jossey Bass Publishers.

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HOSPITAL MATERIALS MANAGEMENT

Course Code: MHA4206

Credit Units: 03

Course Objective: Hospitals carry a large inventory of drugs, sophisticated and highly costly equipment besides beds, furniture and linen. The student should be conversant with Inventory and various methods of control and Purchase management.

Course Contents:

Module-I: Introduction

Definition, scope and importance of materials management; aims, objectives & principles of materials management; Material Cycle; Material Codification-advantages and types.

Module-II: Stores Management

Responsibilities and functioning of stores, types of Medical Stores, planning of hospital stores, duties of officer in-charge and storekeeper; location, lay-out planning and design of hospital stores, preservation of stores, documentation & evaluation of stores and role of computers in hospital stores management.

Module-III: Purchase Management

Objectives and elements of good purchasing system, Procurement procedure, Tendering system, modes of tenders, Purchase order and its types, types of purchasing systems.

Module-IV: Inventory Management

Inventory control, Basic inventory model, types of inventory, objectives and scope of inventory control, Lead time, Buffer stock, Re-order level, Economic order quantity (EOQ), Inventory control costs – Purchase cost, shortage cost, inventory carrying cost & inventory acquisition cost; Inventory ordering systems; Inventory control Techniques- ABC, VED, SDE, SAP, FSN, HML, XYZ, SOS, GOLF, MUSIC; and Supply chain management.

Module-V: Stock Verification, Condemnation and disposal

Process and need for stock verification, Techniques of verification, Pilferage, Stock distribution methods, criteria and procedure of stock condemnation and disposal.

Module-VI: Equipment Management

Classification of Hospital equipments, Planning and selection of equipments, factors affecting utilization of equipments, equipment failure, training & development, documentation, equipment maintenance and its types and Equipment audit.

Module-VII: Legal aspects

Role and functions of Director General of supplies and disposal, Registration and blacklisting of firms, Law of contract, Letter of credit & its types, Import & export policy & pricing of goods and Duty of customs.

Examination Scheme:

Components	CP	V	A	ME	EE
Weightage (%)	5	5	5	15	70


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Texts & References:

- *Hospital Stores Management- An Integrated Approach*, by Dr. Gupta Shakti, Jaypee Brothers.
- *Material Management* by Dr. Pawan Arora, Global India Publication Pvt Ltd
- *Handbook of Materials Management*, P. Gopalkrishnan, Eastern Economy Edition
- *Procurement and Materials management for Hospitals*, Rex H Gregor, Harold C. Mickey



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HOSPITAL STUDY-I

Objective:

To have a practical exposure of various departments of a hospital. It is included in the syllabus to make the students aware of the functioning of different departments of hospital.

Training:


1. Central Sterile Supply Dept.
2. Hospital Library
3. Emergency Dept
4. Critical Care Unit
5. Medical Record
6. Operation Theatre
7. Maintenance Department
8. Bio-Medical Department

Central Sterile Supply Department (CSSD)

- 1) Location
- 2) Equipments
- 3) Items processed by Central Sterile Supply Department
- 4) Sterilization technique
 - a) Heat
 - b) Gas
 - c) Liquid
 - d) Ionizing radiation
 - e) Others
- 5) Work flow
- 6) Clean zone, dirty zone
- 7) Pooling of materials, equipments
- 8) Process of receiving and distribution of materials
- 10) Cleaning, drying and packing of sterilized materials
- 11) Segregation of Dirty zone and clean zone
- 12) Process of receiving and distribution of materials
- 13) Quality control checking of sterilization in collaboration with Micro-biology Lab.
- 14) Organization & Staffing
- 15) CSSD Committee

Emergency Dept

- 1) Location
- 2) Basic lay out of Emergency Dept
 - (a) Receiving patients
 - (b) Patient examination zone
 - (c) Patient investigation zone
 - (d) Procedure room
 - (d) Cardio Pulmonary Resuscitation Unit
 - (e) Dead bodies identification and segregation
 - (f) EMO's Office


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- (g) Nursing Station
- 3) Infrastructural facilities
- 4) Equipments
- 5) Legal procedure system
- 6) Emergency Operation Theatre
- 7) Admission procedure
- 8) Billing for day care procedure in Emergency Dept.
- 9) Staffing
- 10) Security

Critical Care Unit

- 1) Organizational structure
- 2) Bed orientation pattern
- 3) Lighting system
- 4) Monitoring system
- 5) Maintenance of sterility and general cleanliness
- 6) Administration of CCU
- 7) Workflow
- 8) Equipment maintenance
- 9) Maintenance of uninterrupted gas and power supply system
 - 1) Continuous wall flow oxygen
 - 2) Compressed air
 - 3) Suction Apparatus (Vacuum Pump)
 - 4) Uninterrupted Power Supply (UPS) line

Medical Records

- a) Assembly of records
- b) Quantitative and qualitative analysis
- c) Different classification of records
- d) Methods of deficiency check
- e) Completion of incomplete records
- f) Retrieval of medical records
- g) Coding system
- h) Indexing system
- i) Generation of statistics and analysis
- j) Reporting to various statutory authorities
- k) Methods of numbering
 - i) Serial number
 - ii) Unit number system
 - iii) Serial unit numbering
- l) Filing System
 - i) Decentralized system
 - ii) Centralized system
 - iii) Various other methods
- m) Types of forms

- 1) Location
- 2) Zoning of Operation Theatre
- 3) Infrastructural facilities
- 4) Centralized and decentralized Operation Theatres
- 5) Equipment requirement
- 6) Procurement and maintenance including annual maintenance contract
- 7) Functions and policies of Operation Theatres
- 8) Manpower requirement
- 9) Duties and responsibilities including standard operation procedures
- 10) Safety procedures
- 11) Methods of checking operating rooms for readiness to receive patient
- 12) Periodical sterilization / fumigation
- 13) Sterile supply

Maintenance Department

Observation of

- a) Location of different maintenance departments
- b) Lay out
- c) Power Generation and supply
- d) Demineralization Plant with R.O. facility for Dialysis unit
- e) Oxygen Plant
- f) Effluent Treatment Plant
- g) Air Condition Plant and distribution system
- h) Maintenance of the medical equipments, calibration
- i) Maintenance of total hospital building – civil, electrical and mechanical
- j) Organization

Bio-Medical Department

- 1) Bio Medical equipment and their function
- 2) Importance and fundamental functions of Bio-Medical Equipments
- 3) Maintenance procedures of Bio-Medical Equipments
- 4) AMC of Bio Medical Equipments



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SUMMER INTERNSHIP EVALUATION

Course Code: MHA4335

Credits Units: 06

Training Objective:

To provide on the job experience, as an understudy in a hospital, to help the student understand systems and procedures and learn to make decisions considering the Hospital as an integral unit.

Duration: 2 months

Format for Report Writing

1. Abstract
2. Introduction
3. Aims & Objectives
4. Operational definitions
5. Significance of Study
6. Review of literature
7. Research methodology
8. Data Analysis
9. Results
10. Discussion
11. Conclusion
12. Recommendations
13. Limitations of study
14. Future prospects of study
15. References

Guidelines for presentation-

- Powerpoint presentation
- Time for presentation: 20 minutes
- Time for discussion: 10 minutes

Examination Scheme

Components	Presentation	Report submitted	Viva-Voce
Weightage (%)	25	50	25



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OPERATIONS RESEARCH

Course Code: MHA4302

Credit Units: 03

Course Objectives:

- To provide basic OR approach to problem solving.
- To introduce important analytical tools for managerial decision making.
- To introduce concepts of resource allocation & health service planning.

Course Contents:

Module-I: Introduction

The OR approach to problem-solving and decision-making, Scope and limitations of OR in managerial decision-making.

Module-II: Introduction to OR Techniques

Linear Programming, Decision Tree Analysis, Queuing theory, PERT/CPM.

Module-III: OR Models

Replacement models, Sensitivity analysis, Assignment models, Inventory control models, Forecasting.

Module-IV: Applications of OR in Hospitals and Health Agencies

Resource allocation, Health services planning, Deployment of health human power, Materials Management, Equipment replacement, Patient scheduling.

Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70

Text & References:

- *Operations Research in Hospitals: Diagnosis and Prognosis*, David H. Stimson, Ruth H. Stimson
- *Operations Research and Healthcare: A handbook of methods and Applications*, Margaret L. Brandeau, Francois Sainfort, William P. Pierskalla
- *Patients hospitals and Operational Research*, Taylor Francis
- *Operations Research* by P. Rama Murthy
- *Operations Research: Methods, Models and Applications*, Jay E. Aronson and Stanley Zionts



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QUALITY MANAGEMENT

Course Code: MHA4303

Credit Units: 03

Course Objective:

To understand the concept of quality and its relation to healthcare scenario

Course Contents:

Module-I: Basics of Quality Management

Definitions, principles of quality, benefits of quality management, dimensions of quality in primary healthcare and various quality frameworks

Module-II: Quality Improvement Approaches

- Quality Assurance cycle and developing standards.
- TQM Quality Gurus: Deming, Juran and Crosby principles.
- Benchmarking: Principles, types and process of benchmarking
- Medical Audit: Clinical Audit, its methodology and related statistics.

Module-III: Quality Improvement Tools and techniques:

- Tools: Brainstorming, Cause effect Analysis, Flow chart, Pareto Analysis, etc
- Lean Management: 4P model, Lean principles and its tools - 5 S technique, 3 M technique, Kaizen's theory, Jidoka & Andon, Throughput & Takt Time.
- Six Sigma: Variations in performance, DMAIC & DFSS methodology, Champions, black belts and green belts, Six sigma applications and its benefits.

Module-IV: Accreditation

Benefits of Hospital Accreditation, ISO certification, Quality Council of India (QCI), National Accreditation Board for Hospitals & Healthcare Providers (NABH) – accreditation procedure, assessment criteria and its standards; and Joint Commission International (JCI)

Module-V: Cost and Quality

Prevention cost, Appraisal Cost, Internal & External failure costs, Net & Total cost of quality.

Examination Scheme:

Components	CP	V	A	ME	EE
Weightage (%)	5	5	5	15	70

Text & References:

- *Quality Management in Hospitals* by S. K. Joshi
- *Total Quality Management* – Aswathappa – Himalaya Books House
- *Quality Management* – P. C. Tripathy
- *Hospital Quality Assurance: Risk Management & Program evaluation*, Jesus J. Pena
- Donald E. Lighter and Douglas C Fair: *Quality Management in Health Care – Principles and Methods*, Jones and Bartlett publishers, second edition.
- Daigh RD. *Financial implications of a quality improvement process*.
- McLaughlin CP and Kalauzny AD. *Total quality management in health*, Healthcare management review.

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MEDICAL & HEALTH LAWS

Course Code: MHA4304

Credit Units: 03

Course Objectives:

To acquaint the students with various legal aspects concerning type and character of the health care organizations and its duties towards patients and its employees.

To familiarize the students in matters of liability of hospital medical negligence and medical malpractice in diagnosis, administration of drugs, surgery etc.

Course Contents:

Module-I: Introduction

Law pertaining to establishment of hospitals and legal requirements under Medical Council Acts.

Module-II: Hospitals as an Industry

Basic concepts of labour laws in India, Hospitals as an 'industry' - application of labour enactments, Discipline in hospitals and Trade union act

Module-III: Hospital's duties towards Patients

Essentials of Contractual obligations in hospital services, duties towards patients, Rights of patients and Code of ethics.

Module-IV: Acts pertaining to Hospitals

Legal aspects relating to Organ transplantation, MTP Act 1971, Basics of Drugs and Cosmetic Acts, Euthanasia. ESI Act, PNDT Act, Human experimentation, Clinical trials, Industrial dispute Act, Central Births & Death Registration Act.

Module-V: Legal liabilities of Hospitals

Legal liability of hospitals - criminal, civil and tortuous; Absolute liability and vicarious liability, Medical negligence, Legal remedies available to patients under contract law, tort, criminal law, Consumer protection Act and Medical Jurisprudence.

Module-VI: Medical ethics, CPA & Auditory procedures

Consumer protection act, Autopsy, Use of investigational drugs, Introduction/need & procedures for medical audit, Audit administration & Regulating committees.

Confidentiality and professional secrecy, ethics of trust and ethics of rights – autonomy and informed consent,

Medical ethics – basic issues, importance, process of developing and implementing ethics and values in an institution – codes of conduct: Hippocrates oath and declaration of Geneva – MCI regulation – professional conduct, etiquette and ethics.

Examination Scheme:

Components	CP	V	A	ME	EE
Weightage (%)	5	5	5	15	70

Text & References:

- *Medico-legal Aspects of Patient Care*, 3rd Edition, R. C. Sharma, Peepee Publishers & Distributors- 2008

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MANAGEMENT OF CLINICAL SERVICES

Course Code: MHA4305

Credit Units: 03

Course Objectives:

- To enable the students gain insights into various aspects like importance, functions, policies and procedures, equipping, controlling, co-ordination, communication, staffing, reporting and documentation of clinical services in a hospital.
- To understand the processes and details related to effective patient care and to further increase the satisfaction level of patients

Course Contents:

Module-I: Hospital as a system

Concept of patient care, Role of Hospital Administration towards the patient and towards the Hospital, Patient safety and patient risk management.

Module-II: Out-Patient Department

- Organization & management of OPD: Overview of the department, its functions, location and physical facilities
- Daycare services; Auxiliary, Ancillary & Domiciliary facilities in the OPD.

Module-III: Inpatient Department

- Organization & management of OPD: Overview of department, its functions, Ward design (general & specialized), Nursing Administration, Isolation unit, Janitor's closet.
- Assessment of IPD in terms of Patient Days, Bed Utilization Rate, Ward Occupancy, and Average length of stay.

Module-IV: Accident and Emergency Services

Organization & management of department, Physical facilities and Manpower planning, Triaging, Centralized Accident & Trauma services (CATS) and Observation unit.

Module-V: Operation Theatres

Organization & Management of OT complex, Pre-op & Post-op area, Zoning, ventilation & lighting, Modular systems, Methods of fumigation and OT scheduling.

Module-VI: Intensive Care Units

Organization & Management of ICUs, Types of ICUs, Staffing in ICUs, Specialized ICUs – ICCU, NICU, PICU etc, and Critical care scoring

Module-VII: Specialty Services

Rehabilitation unit, Nuclear Medicine department, Burns Unit, Obstetrics & gynecology unit, Pediatric unit, Transplantation Unit etc.

Module-VIII: Other Hospital Functional Activities

Biomedical Waste Management: segregation, collection, transportation & disposal, Nosocomial Infections & its control, Patient safety


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Examination Scheme:

Components	CP	V	A	ME	EE
Weightage (%)	5	5	5	15	70

Texts & References:

- *Principles of Hospital Administration and Planning*, Shakharkar B.M.
- *Modern trends in Planning and designing of Hospitals: Principles and Practice*: Shakti Kumar Gupta, Sunil Kant, R Chandrashekhar.
- *Management of Hospitals & Health services*: Strategic issues and performance, Rockwell Schulz, Alton C. Johnson
- Shakharkar B.M., *Principles of Hospital Administration and Planning*
- *Hospital managerial services* Volume -4, S.L. Goel, R. Kumar
- *Hospital Core Services: Hospital administration in 21st century* Vol 1 Kumar R, S.L. Goel
- *Hospital Management*, Dr. A.K. Malhotra, Global India Publications Pvt ltd, New Delhi
- *Hospital Management : A guide to departments*, Howard S. Roland, Beatrice L Rowland



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HOSPITAL MANAGEMENT INFORMATION SYSTEM

Course Code: MHA4401

Credit Units: 02

Course Objective:

To understand the various indicators of health and health information system and health management information system in hospitals

Course Contents

Module-I: Introduction

Concept of information as a resource, understanding the principles of information systems and Classification of information in hospitals.

Module-II: Managing Hospital Information Systems

- Data generated for HIS; Functions, Benefits and applications of HIS, HIS components, various performance Indicators, HIS model and data movement.
- HIS modules: Various HIS Modules for Clinicians Access, Nursing Access, In-patient Module, Registration Module, Diagnostic services Module, Dietetics Module, OT Module and Accident & Emergency Module etc.

Module-III: Role of Information Technology in Hospitals

Computerization in Hospitals, advantages of computerized system, database interface, IT Components of HIS and various softwares available in the healthcare market.

Module-IV: Management Information System

Concept of MIS, functions of MIS, developing MIS, types of MIS, developing indicators, identifying data and developing tools of measurement and applications of MIS.

Module-V: Telemedicine


Concept of Telemedicine and its evolution, Telemedicine network in India, and Strengths & Opportunities for Telemedicine in India.

Examination Scheme:

Components	CP	V	A	CT 1	CT 2
Weightage (%)	20	15	5	30	30

Text & References

- *Management Information System (MIS) in Hospitals: A computer based approach for quality in hospital services and administration*, by Anil Kumar Saini
- S.C. Joshi & S.N. Mehta. *National Information System: Planning and Management*, Global vision publishing house.
- *Information Technology in health care: Socio technical approaches*, 2010. IOS Press BV


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HEALTH INSURANCE AND MEDICAL TOURISM

Course Code: MHA4402

Credit Units: 02

Course Objective:

To acquaint students to the concept of HI and various HI products, so that the students are ready for challenges of healthcare insurance which is emerging as a sector holding great promise.

Course Contents

Module-I: Introduction

History of Health Insurance, Principles of Health Insurance, Public Financing, Private Financing, Current trends in Health Insurance - International and Indian scenario, Economic and financial management of Health Insurance

Module-II: Health Insurance systems in India

- Private Health Insurance: Individual Health Plans, Mediclaim, Floaters plans, Third Party Administration, Benefits Management, Claims Management, IRDA
- Social Health Insurance: ESI, CGHS, RSBY
- Social and Community based Insurance: Microfinance

Module-III: Medical Tourism

Basic Concepts of Medical Tourism, Scope of Medical Tourism in India.

Examination Scheme:

Components	CP	V	A	CT 1	CT 2
Weightage (%)	20	15	5	30	30

Text & References:

- Usha Mehta, A.D. Narde. *Health Insurance in India and Abroad*, Allied Publishers.
- Thomas K. T., Sakthivel R. *Health Insurance In India: Overcoming Challenges and Looking Ahead*, Lambert Academic Publishing, 2012.
- Michelle A. Green, JoAnne C. Rowell. *Understanding Health Insurance- A guide to billing and reimbursement*.
- William S Stevens. *Health Insurance- Current Issues and Background*, Nova Science Publishers.



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DISASTER MANAGEMENT

Course Code: MHA4403

Credit Units: 02

Course Objectives:

- To learn, identify and assess disasters in the community.
- To set-forth policies and procedures for disaster preparedness and to prepare hospital disaster plan.

Course Contents

Module-I: Basics of Disaster Management

Definitions, Determining risk of disaster, Classification of disaster on the basis of origin, source, onset & anticipated response; Disaster process, Effects of Disasters – Health issues, characteristics and geography of disasters, Impact of Disasters on the Hospitals.

Module-II: Disaster Management Process

Phases of disaster management, leadership, organization of medical relief, Triage, Disaster Response – local, national & International; Disaster Management Act – 2005.

Module-III: Disaster preparedness

Hospital Disaster Plan – its pre-requisites, principles and components; Hospital disaster management committee and its role; Hospital disaster manual.

Module-IV: Fire Safety

Grades of fire and its causes; elements of fire safety, various fire extinguishers; and fire safety training.

Examination Scheme:

Components	CP	V	A	CT 1	CT 2
Weightage (%)	20	15	5	30	30

Text & References:

- *A guide to emergency health management after natural disasters*, American health organization scientific publication.
- *Emergency vector control after Natural disaster*, American health organization scientific publication.
- *District Health facilities*, WHO regional publication western pacific services.
- *Medical supply management after natural disaster*, American health organization scientific publication.



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HOSPITAL STUDY-III

Objective:

To have a practical exposure of various departments of a hospital. It is included in the syllabus to make the students aware of the functioning of different departments of hospital.

Training:

1. Diagnostic Imaging
2. Dental Service
3. Dialysis Unit
4. Burn Units
5. Blood Bank
6. Mortuary
7. Telemedicine
8. Medical transcription

Diagnostic Imaging

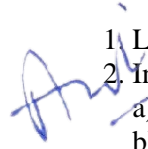
- 1) Various types of machines like;
 - a) CT
 - b) MRI
 - c) PET
 - d) USG with color Doppler
- 2) Advantages / disadvantages of different types of machine
- 3) Basic functioning and maintenance
- 4) Special licensing requirement
- 5) Special structural requirements
- 6) Staffing and manpower planning
- 7) Cost analysis and profitability
- 8) Operation and maintenance

Dental Services

- a) Location
- c) Laboratory
- d) Recovery Room
- e) Waiting Room
- f) Storage
- i) Lighting
- j) Plumbing
- k) Ventilation
- l) Equipment and maintenance

Dialysis Unit

1. Location
2. Infrastructural facility
 - a) for day care dialysis or out patient dialysis
 - b) for inpatient dialysis


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3. Various types of dialysis units
4. Special arrangement for maintaining sterility
5. Ambulatory dialysis system
6. Procurement, installation and maintenance of various types of dialysis machines
7. Arrangement for stand-by unit

Burn Unit

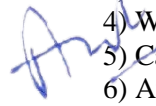
1. Location
2. Infrastructural facility
3. Special equipment requirement for Burn Unit
4. Laboratory facility
5. Communication facility
6. Maintenance of Asepsis
7. Manpower

Blood Bank

- 1) Location
- 2) Reception
- 3) Special arrangements for voluntary donors
- 4) Administrative Office
- 5) Record Keeping
- 6) Servicing rooms
- 7) Bleeding Room
- 8) Storage Room
- 9) Storage equipment
- 10) Regulatory requirement
- 11) Blood safety procedures
- 12) Receipt, storing and delivery of blood
- 13) Triple screening and check method
- 14) Record keeping
- 15) Medico-legal aspects
- 16) Physical facilities
- 17) Waiting facilities
- 18) Laboratory facilities
- 19) Issuance of Blood Donor Card
- 20) Safety devices
- 21) Liquid waste management
- 22) Procedure for discarding
- 23) Staffing

Mortuary

- 1) Location
- 2) Physical facilities
- 3) Body refrigerator
- 4) Walk in refrigerator
- 5) Capacity requirement of Mortuary
- 6) Autopsy facility


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- 7) Preservation / identification/labeling of viscera / body fluids and other materials for medicolegal purposes
- 8) Embalming procedures
- 9) Methods of long distance transportation of dead bodies
- 10) Arrangements for religious rites
- 11) Mortuary traffic control
 - a) Internal
 - b) External
- 12) Identification of bodies using triple check system
- 13) Maintenance of records
- 14) Various legal requirements
- 15) Disposal of unclaimed bodies

Telemedicine

1. Infrastructure – both end – (1) Hospital end (2) Nodal Centre
2. Requirement of:
 - a) Computer Monitors
 - b) Cameras
 - c) Internet connection
3. Observation of telemedicine techniques and practical demonstration
4. Manpower requirement

Medical Transcription

1. Observation of techniques and demonstration
2. Infrastructural requirement
3. Trained manpower
4. Transmission modes


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DISSERTATION

Course Code: MHA4437

Credit Units: 15

Internship Objective:

To impart the practical knowledge through research methods, help formulate a rigorous research problem related to hospital on the basis of their observation, help do an independent study, and encourage working in a team.

Pedagogy

- Identifying several situations amenable to dissertation work, writing a proposal and making a presentation to the Departmental Research Committee.
- Reporting to the committee on the progress of research work periodically.
- Making use of a variety of research methods.
- Defending the inference before the Examining Committee.

Report Contents

Every student will do a detailed study on the topic selected for the dissertation, and is expected to prepare a two or three proposals which he intends to take up for the Dissertation. The Assigned guide will examine this and decide on the topic of dissertation. Report will comprise of following contents:

1. Abstract
2. Introduction
3. Aims & Objectives
4. Operational definitions
5. Significance of Study
6. Review of literature
7. Research methodology
8. Data Analysis
9. Results
10. Discussion
11. Conclusion
12. Recommendations
13. Limitations of study
14. Future prospects of study
15. References

Evaluation

The Departmental Research Committee and an expert from Hospital industry will evaluate the dissertation.

Components	Presentation	Report submitted	Viva-voce
Weightage (%)	25	50	25



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Curriculum & Scheme of Examination

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EPIDEMIOLOGY, PUBLIC HEALTH & COMMUNITY OPTOMETRY

Course Code: OPT4101

Credit Units: 03

Course Objective: To inculcate the knowledge, sensitivity and clinical exposure of community optometry. The outcomes of the course are: thorough understanding of conducting of screening for specific eye conditions, and resultant implications through theoretical and practical exposure. By the end of the course the student will be able to use the knowledge of the skills gained in promotion and preventive measures of community optometry.

Course Contents:

Module-I: Public health concepts

History of public health

History of public health optometry (including epidemiology, manpower, projections, community reimbursement mechanisms)

Organizations of health services (principles of primary, secondary and tertiary care) Health Care Delivery systems in India and determinants of health.

Detriments of health care delivery system

Planning of health services (including relevant legislation and implication to optometric practice).

Health manpower protection and in the practice of ophthalmology

Multidisciplinary and institutional practice modes

Global medicine and evolution of Public Health in India

Public Health optometry: concepts and implementation

Module-II: Levels of prevention-optometrist's role in community

Optometry's role as a primary care professional

Module-III: Health systems

Concepts of Health systems

National Health Programs

Effective delivery of eye care services

Module- IV: Global Blindness and visual impairment

Refractive error and low vision as public health issues

Socioeconomic implications of blindness and visual impairment

Vision screening

Organizing eye camps

Eye Donation and Eye Banking

Role of civil societies in blindness prevention

Vision2020 : the Right to Sight

National and International Agencies in eye Care

NPCB

DBCS

Module-V: Epidemiology

Public health and epidemiology

Prevalence ,incidence and distribution of visual impairment
Basics of Epidemiology study methods
Incidence , prevalence , risk factors , odd ratio
Childhood blindness
Refractive errors and presbyopia
Age related cataract
Low Vision
Diabetic retinopathy
Glaucoma
Age related Macular Degeneration
Trachoma
Corneal blindness

Examination Scheme:

Components	A	CT	P	HA	EE
Weightage (%)	5	10	10	5	70

A: Attendance, CT: Class Test, HA: Home Assignment, P: Presentation, EE: End Semester Exam



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APPLIED OPTICS

Course Code: OPT4110

Credit Units: 04

Course Objective: This course mainly deals with Optical management of refractive errors-new modalities the advanced techniques in subjective and objective refraction and Spectacle Dispensing. This course leads to a rewarding career as an optometrist, a specialist trained to dispense and to recognize basic ocular disorders. This allows students to recommend the right spectacle lens based on the condition of the eye

Course Contents:

Module-I: Ophthalmic Lens types,

Lens materials Properties of lenses (Refractive index, base curve, specific gravity, Abbe Value, UV cut off, etc)

Prism

Tints and coatings

Module-II: Bifocals/Multifocals

Module-III: Progressive addition lenses

Dispensing PAL, PAL trouble shooting, PALs in detail for Essilor, Hoya, Zeiss, Seiko, Rodenstock lenses

Module-IV: Spectacle FRAMES:

Facial fitting principles

Spectacle delivery

Dispensing problem prescriptions

Frame types and parts

Classification of spectacle frames-material, weight, temple position, coloration Frame construction

Frame Measurements and markings

Frame manipulation and repair

Facial measurements and frame choice

Measuring the interpupillary distance and pupillometer

Special purpose frames (sports, kids, reading)

Module-V: Lens Ordering

Lens edge thickness calculation Writing spectacle lens order

Facial measurements - Interpupillary distance measurement and measuring heights (single vision, multifocal, progressives)

Measurement of effective diameter minimum blank size Glazing and edging Hands on

Module-VI: Lens Verification

Lens verification and axis marking and fitting of all lens types

Final checking of finished spectacle with frame adjustments

Delivery and follow-up

Troubleshooting complaints and handling patient's questions.

Optical centre marking

Axis marking

Surface power measurement using Geneva lens measure Identify various types of Frames and mountings


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Project: Different brands for spectacle frames and sunglasses –Indian & international Demonstration-safety eyewear, different filters, recumbent spectacle, Ptosis spectacle,

Workshop

PRACTICE MANAGMENT

Building a Successful Optometry Practice
Basic Operational Costs/Income Spread sheet
Marketing a optometry Practice

Developing an Internal Marketing Plan for optometric Practice
Developing an External Marketing Plan for optometric Practice

Managing a optometry Practice
Developing a Plan to Manage a Contact Lens Practice Standards of Practice

Eight Categories of Professional Obligation
Ethics in optometry
Laws related to optometry practice

Examination Scheme:

Components	A	CT	P	HA	EE
Weightage (%)	5	10	10	5	70

A: Attendance, CT: Class Test, HA: Home Assignment, P: Presentation, EE: End Semester Exam

Text & Reference Books:

- The fine art of prescribing glasses , Benjmin Milder, Butterworth Heinnemann,
- Spectacle frame dispensing: H Obstfeld: Butterworth Heinnemann
- essentials of ophthalmic lens finishing , C.W.Brooks and Irvin Borish, Butterworth Heinnemann
- Bennett's OPhthalmic prescription work Bennet & K.G wakefield, butterworth heinmann
- Systems of ophthalmic dispensing , Brook & Borish, Butterworth heinmann
- Clinical Optics , Troy Fennin ,Theodore Grosvenor, Butterworth Heinmann



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CLINIC-I (GENERAL)

Course Code: OPT4105

Credit Units: 3

Course Contents:

This course includes minimum of 90 hours of supervised clinical training. The clinics involve primary care clinics and community work.

The objective of clinics in this semester is to be able to examine the eye and understand the basic eye procedures with clinical management.

A logbook is maintained and 15 case sheets with complete management and follow up are mandatory for submission. The log book needs to be signed by the supervisor.

Examination Scheme:

Components	Attd.	Log Book	Case Sheets	Viva-EE	EE-Practical
Weightage (%)	5	10	15	20	50



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RESEARCH METHODOLOGY & BIOSTATISTICS-I

Course Code: OPT4106

Credit Units: 03

Research Methodology

Course Objective: This course is a brief overview about research design that is intended to cover the basics of designing and implementing a scientific study. It will provide the students the basic knowledge in Bio-statistics. At the completion of the course, the students will have the knowledge of data collection, statistical application and finally ready for research project. This will enable the student to gain understanding of different research methodologies and appropriate research design to be able to conduct research projects.

Course Contents:

Module-I:

Introduction to research methods, Variables in research, Reliability and validity in research, Formulation of research problems and writing research questions, Hypothesis, Null and Research Hypothesis, Type I and Type II errors in hypothesis testing

Module-II:

Introduction of epidemiology, Descriptive epidemiology, Experimental and non experimental research designs, Screening, Sampling methods, Biological variability, normal distribution

Module-III:

Bias and Confounding, Association and causation, Odds ratio and relative risk, sensitivity and specificity Data collection methods- Observation method, Interview method, Questionnaires and schedules Construction,

Module-IV:

Critical analysis of research papers, Conducting a literature review, Writing Research proposals, Development of conceptual framework in research

Module-V: Introduction to Biostatistics

Introduction to Statistics, Classification of data, Source of data, Method of scaling - nominal, ordinal, ratio and interval scale, measuring reliability and validity of scales, Measures of Central tendency, Measures of Dispersion, Skewness and kurtosis, Sampling, Sample size determination

Examination Scheme:

Components	CP	V	A	ME	EE
Weightage (%)	5	5	5	15	70

(CP – Class Performance; V-Viva; A- Attendance; ME- Mid-Term Exam, EE – End semester Exam)

Text & References:

Text books:

- Research Methodology: A Step By Step Guide For Beginners: Ranjit Kumar
- Research Methodology: Methods and Techniques : By C. R. Kothari


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RESEARCH METHODOLOGY & BIOSTATISTICS-II

Course Code: OPT4212

Credit Units: 03

Course Objective:

Introduction to Biostatistics and Implementing Statistical Tests and Procedures. This course is intended to provide a better understanding of data analysis and statistical issues in design of experiments, as well as the techniques and terminology commonly used to elicit and communicate evidence concerning scientific hypotheses. Students will learn to properly interpret the strength of statistical arguments made by researchers, and how to weigh statistical and clinical evidence in assessing a scientific hypothesis. Emphasis will be placed on conceptual understanding of issue. This is intended for students interested in learning how to conduct data analysis and how to interpret the output of statistical software. The implementation of these techniques through Excel and JMP will be illustrated by real datasets taken from clinical and public health studies. Students will learn where to find the relevant information from the statistical output tables generated by the software. Emphasis will be placed on application of statistical methods to real datasets.

Course Contents:

Module-I:

Introduction to SPSS

Module-II:

Concept of probability and Probability distributions – Binomial Probability distribution, Poisson Probability distribution and Normal Probability distribution

Module-III:

Data entry. Data coding and cleaning, tests for Normality, chi square test two sample tests (t test, man whitney test and wilcoxon signed rank test)

Module-IV:

Three or more sample testing (One way AND Repeated measures ANOVA, Kruskal Wallis test and Friedman test)

Module-V:

Correlation-Karl Person, Spearman's Rank correlation methods, Regression Analysis, Scientific writing (Writing research papers and thesis), Ethical Issues in Research, Principles and Concepts in research ethics – confidentiality and privacy, informed consent

Examination Scheme:

Components	A	HA (log book)	CT-I	CT-II	EE- Practical/ Viva
Weightage (%)	5	10	10	5	70

A: Attendance, CT: Class Test, HA: Home Assignment, EE: End Semester Exam

Text & References:

Text books:

- B.K. Mahajan. Methods in Biostatistics, Jaypee Brothers
- P.S.S. Sundar Rao. An Introduction to Biostatistics: A manual for students in Health Sciences, J.Richard Prentice Hall, 1996.

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Reference Books:

- Daniel, Wayne.W. Bio-Statistics: A foundation for Analysis in the Health Sciences, John Wiley and Sons Pub, 1991.
- K. Vishwas Rao. Bio-Statistics: A Manual of statistical methods for use in the Health, Nutrition and Anthropology, Jaypee Brothers Medical Pub, 1996.
- Verma B.L., Shukla G.D. Bio-Statistics perspective in Health care research and practice, C.B.S. Pub, 1993.
- Krishnaiah, P.K. Rao, C.R. (ed), Handbook of Statistics, Elsevier Science Pub, 1988.



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ADVANCED CONTACT LENS -I

Course Code: OPT4204

Credit Units: 4

Course Objective: Contact lenses are an essential part of optometric practice; not only for practice success, but also in the management of certain ocular conditions that require visual or therapeutic rehabilitation. This course introduces all aspects of contact lens practice to the optometry student. It begins with soft and rigid gas permeable contact lenses, and continues through toric, multifocal and specialty lenses in the next semester. This semester gives overview of contact lens related complications and their management which is discussed in detail in the next semester, A hands-on practical provides experience with the various lens types, and online materials encourage independent learning.

Course Contents:

Module-I: Introduction to Contact Lenses

History of Contact Lenses ,Contact Lens Materials and Manufacturing ,Optics of Contact Lenses, Soft & Rigid Gas Permeable Contact Lens Design ,Contact Lens Fabrication, Contact Lens Verification

Module-II: Contact Lens Fitting

Examining the Prospective Contact Lens Patient, Selecting Lens Type, Wear Mode and Replacement Rate

Fitting Spherical GP Contact Lenses, Fitting Spherical Soft Contact Lenses, Correcting Astigmatism with Contact Lenses

Module-III: Contact Lens Fitting

Fitting SiHyCLs, The Dispensing Visit and After-Care, Contact Lenses for Sports, Presbyopic Contact Lens Options

Module-IV: Care and Maintenance

Contact Lens Contamination ,CL Care and CL Care Products ,Rigid CL Care ,Hydrogel and Silicone Hydrogel CL Care

Module-V: Complications

Defending the Ocular Surface in Contact Lens Wear

Rigid Contact Lens Complications

Soft Contact Lens Complications

Dry Eye and Contact Lenses

Examination Scheme:

Components	A	CT	P	HA	EE
Weightage (%)	5	10	5	10	70

A: Attendance, CT: Class Test, HA: Home Assignment, P: Presentation, EE: End Semester Exam

Recommended Text & Reference books:

- IACLE modules A,B,C,D,E
- Text book Of Contact Lenses 5th edition by Sinha Rajesh ,jaypee publication 2017
- Contact lens Primer
- Essentials of Contact lens practice

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- Silicone hydrogels: the rebirth of continuous wear contact lense, Deborah F. Sweeney, Butterworth Heinemann
- Clinical manual of Contact Lenses, Edward S. Bennett and Vinita Allee Henry, Lippincott Williams and Wilkins, 2008
- Medical Contact Lens Practice, Elisabeth A. W. Millis
- Contact Lenses, Anthony J. Phillips and Lynne Speedwell
- The CLAO Guide to Basic Science and Clinical Practice: Volumes 1, 2, 3, Contact Lens Association of Ophthalmologists



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CLINICS-II (SPECIALITY)

Course Code: OPT4205

Credit Units: 3

The objective of clinics in this semester is to be able to examine the eye and understand the classified eye procedures with clinical management with special reference to low vision, binocular vision, pediatric care and contact lens.

An approximate of guided 150 hours needs to be completed in this semester. The students will be by rotation go to community clinics, Campus clinics, associated hospital partners and optical / optometric clinics.

The logbook has to be maintained and 30 case sheets of SELECTED speciality in the semester with complete management and follow up are mandatory for submission at the end of the semester

The log book needs to be signed by the supervisor during every visit. No case record will be considered without the supervisor's signature.

Examination Scheme:

Components	A	Log Book	Case Sheets	Viva-EE	EE-Practical
Weightage (%)	5	10	15	20	50

A: Attendance, EE: End Semester Exam



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PROJECT (Research)

Course Code: OPT4232

Credit Units: 02

Research Project Data update

Examination Scheme:

Components	Results & Analysis	Data Collection	Conclusion & Discussion	Total
Weightage (%)	40	40	20	100


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Syllabus - Third Semester

TEACHING METHODOLOGY

Course Code: OPT4307

Credit Units: 3

Course Contents:

Module-I:

Introduction, Understanding how adults learn, How to enhance student learning

Module-II:

Teaching strategies to enhance Learning, How to structure your course, leaning activities

Module-III:

Effective learning and Teaching activities in eye Care,

Methods of teaching, presentation, demonstration, case studies, Role plays, group discussion

Module-IV:

Student Assessment and evaluation techniques, formative and summative assessment, marking and providing feedback

Examination Scheme:

Components	A	Assignment-1	Assignment-2	Assignment-3	Project	Total
Weightage (%)	5	20	20	20	35	100

A: Attendance

Text book/ Reference Book

As recommended by the faculty



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ADVANCED CONTACT LENS-II

Course Code: OPT4303

Credit Units: 4

Course Objective: This course gives both in-depth theoretical knowledge and clinical exposure in Contact lens at advanced level and in therapeutic conditions. It prepares student to develop competency in handling all types of specialty lenses. This course also deals with all complications related to contact lenses and its management.

Course Contents:

Module-I: Children and Contact Lenses

Module-II: Fitting Scleral and Mini-Scleral Contact Lenses, Fitting an Ocular Prosthesis

Module-III: Myopia Control and Orthokeratology

Module-IV: Special Topics

Contact Lenses for Keratoconus ,Special Applications of Contact Lenses, Advanced Techniques and Instrumentation ,The Working Environment and Contact Lenses

Module-V: Business Aspects of Contact Lens Practice

Contact lenses (CLs) in practice, Financial factors in a CL practice, Managing &marketing techniques for a CL practice, Employee management, Record Keeping
Professionalism & standards of care


Examination Scheme:

Components	A	CT	P	HA	EE
Weightage (%)	5	10	10	5	70

A: Attendance, CT: Class Test, HA: Home Assignment, P: Presentation, EE: End Semester Exam

Recommended Text & Reference books:

- IACLE modules B,C,D,E
- Text book Of Contact Lenses 5th edition by Sinha Rajesh ,jaypee publication 2017
- Contact lens Primer
- Essentials of Contact lens practice
- Silicone hydrogels: the rebirth of continuous wear contact lense, Deborah F. Sweeney, Butterworth Heinemann
- Clinical manual of Contact Lenses, Edward S. Bennett and Vinita AlleeHenry,Lippincott Williams and Wilkins, 2008
- Medical Contact Lens Practice, Elisabeth A. W. Millis
- Contact Lenses, Anthony J. Phillips and Lynne Speedwell
- The CLAO Guide to Basic Science and Clinical Practice: Volumes 1, 2, 3, Contact Lens Association of Ophthalmologists


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OCULAR DISEASE AND DIAGNOSTICS-II

Course Code: OPT4308

Credit Units: 04

Course Objective: In this course latest articles published in optometry and vision science journals will be discussed. Periodic Journal club presentation would be conducted. This will enable the student to develop skill on critical appraisal of publications and also help to keep abreast of latest developments in the field of optometry and vision science. The course would also provide insight on understanding and/or incorporation of scientific evidence in clinical practice.

This course examines selected areas of recent research in optometry. Current advances in methodology, specifics of research design, and impact of research findings will be emphasized. Selected topics are based on participating faculty expertise will be assigned to the students.

Students will be assigned topics of presentation during the semester and they will have to present base literature review and latest advancements.

Text & Reference books /journals:

Clinical and experimental optometry, Edited By: H. Barry Collin
Optometry & vision science ,journal of American academy of optometry
Optometry journal of American optometric association
Ophthalmic and Physiological Optics Journal of the College of Optometrists, UK
Contact lens & anterior eye : the journal of the British Contact Lens Association
British Contact Lens Association

CLINICAL DECISION MAKING IN OPTOMETRIC CARE-I

Course Objective: Upon completing this course, the student will achieve a moderately-high level of competence with respect to a modest list of patient presentations commonly encountered by primary care optometrists. By the course's end, the student will be able to conduct a comprehensive, primary-care optometric examination, reach a diagnosis, and outline a management plan for the vast majority of patients seen during the year. The course will cover the general areas of ocular disease, refraction, functional vision analysis, and patient communication.

Course Contents: In this course, the student will begin with refreshing their basic knowledge on common eye disease of the anterior segment. The course would further orient towards clinical decision making skills, interpretation and improving their clinical skill set, clinical management of optometry. They will learn and develop skills on evidence/intuitive based management for the commonly seen eye diseases and learn appropriate referral & co management guidelines for secondary or tertiary ophthalmic care

The mode of delivery would be through cases scenarios discussion, problem based learning and seminar/workshops and Presentations. Records need to be maintained in the following pathologies.

The following common conditions will be covered in this semester:

Module-I: Lid and Adnexa:

Eyelid cysts

GPC

Hordeum

Chenosis

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Xanthelasma
Ectropion VKC Entropion

Module-II: Cornea :corneal dystrophy Corneal edema corneal infiltrates
corneal opacities Fuchs endothelial dystrophy fungal keratitis
Hypopyon
Keratoconus follicular conjunctivitis Iritis
pterygium PMD Pingecula ptosis
Rheumatoid and eye Acne and eye Scleritis Episcleritis
Stevenson johnson syndrome Synechia
Terriens marginal degeneration

Module-III: Dry eye and its interpretation and management Workshop

Module-IV: Diseases of sclera and conjunctiva

Abrasion
Allergic eye disease Aniridia
Atopic Keratoconjunctivitis Bacterial Conjunctivitis Blephritis
Chalazion
Epiphora
Scleritis Episcleritis
ophthalmia neonatrum Trachoma
Trichiasis

Module-V: Lens and its abnormalities –

Cataract Ectopia Lentis
IOL, power calculations – post-refractive surgery , analysis of surgically induced astigmatism ,
complications of cataract surgery

Module-VI: Diseases of Uvea /

Endophthalmitis
Anterior uveitis

Examination Scheme:

Components	A	Presentation	Presentation-EE	Case Records	EE-Viva	EE-Viva
Weightage (%)	5	20	20	5	30	20

A: Attendance, EE: End Semester Exam

Text books:

- Kanski, Clinical Ophthalmology: A Systematic Approach – May 2011 Edition, Jack J. Kanski MD MS FRCS FRCOphth, Brad Bowling FRCSEd(Ophth), Elsevier health science division
- Optometric Management Of Visual Handicap, Helen Farral, Blackwell Scientific Publications, 1991
- Ocular Differential Diagnosis, Roy
- Clinical Decision Making In Optometry, Ellen Richter Ettinger OD MS FAAO
- Anterior segment disease and Management by Andrian Bruce


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CLINICS-III (SPECIALITY)

Course Code: OPT4305

Credit Units: 3

The objective of clinics in this semester is to be able to examine the eye and understand the eye procedures with clinical management with special reference to complete optometric care.

A minimum of guided 240 hours need to be completed in this semester. The students will be by rotation go to community clinic, Campus clinics, associated hospital partners and optical / optometric clinics.

The logbook has to be maintained and 30 case sheets of complete case management and follow up are mandatory for submission.

The log book needs to be signed by the supervisor every time a case is recorded in it. No case will be considered without the supervisor's signature.

Examination Scheme:

Components	A	Assignment (log book)	Case Sheets	Viva-EE	EE- Practical
Weightage (%)	5	15	10	20	50

A: Attendance, EE: End Semester Exam



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ENVIRONMENTAL OPTOMETRY

Course Code: OPT4306

Credit Units: 3

Course Objective: Occupational optometry is the portion of optometric practice that is concerned with the efficient and safe visual functioning of an individual within the work environment. It encompasses more than just the prevention of occupational eye injuries, although that certainly is a major component. It also includes vision assessments of workers/patients, taking into account their specific vision requirements and the demands these requirements place upon them. Optometrists provide occupational vision services at three general areas or levels: primary care, eye safety consultation, vision consultation.

After the completion of the course the student should be able to

Complete an occupational history on each adult patient

Diagnose and manage occupationally induced conditions (making referrals when necessary)

Assess his or her patients' occupational vision demands and provide appropriate treatments as necessary

Educate patients on the need to incorporate eye safety principles into their daily activities.

Performing an eye-safety workplace assessment

Overseeing the procurement of eye protection devices (both prescription and nonprescription)

Course Contents:

Module-I: Introduction

Module-II: Work place survey

Oculo visual hazard analysis

Ergonomic Factor

Work place lighting assessment

Module-III: Matching the worker to the task

Visual standards

Clinical evaluation

Personal protective strategies

Module-IV: Pitfalls of industrial consulting

Module-V: Visual Health in selected industries

Module-VI: References and standards

Examination Scheme:

Components	Attd.	Case Studies	Field Visit	Assignment	Class Test
Weightage (%)	5	30	10	5	50

Test Books:

- Eye Essentials: Environmental & Occupational Optometry, G Carson, S Doshi, W Harvey, Butterworth Heinemann
- BHVI module for environmental optometry
- R V North: Work and the eye, Second edition, Butterworth Heinemann, 2001
- G W Good: Occupational Vision Manual available in the following website: www.aoa.org
- N.A. Smith: Lighting for Occupational Optometry, HHSC Handbook Series, Safchem Services, 1999

• Anshel : Visual Ergonomics Handbook, CRC Press, 2005

INTERNSHIP

Eye care clinic: This sequence of courses gives students direct patient care experience and responsibilities in affiliated health centers, hospitals or in private practices. Clinical preceptors will evaluate and guide the student through the process of providing eye care. Students are graded on key clinical tools: technical skills, knowledge base, analytical skills, diagnostic skills, management and treatment, communication skills, efficiency, attitude, and professionalism. The clinical grade is honors, pass, remedial, or fail based on a midterm and final preceptor evaluation; on meeting documentation requirements, such as maintaining documentation; and on submitting patient logs, and site evaluations.


The AUG department of Optometry monitors the quality and quantity of patient encounters for each student. Through the clinical assignments, students will gain proficiency in full scope primary care optometry and contact lenses. All students must satisfy a minimum number of patient encounters during the course of their assignments. Some students may be assigned to specific sites in order to assure a clinical experience based on their projects. Some students may meet the contact lens requirement through affiliations set up on behalf of the students during the summer vacations with private practitioners who meet the College's program standards.

Four rotations during the final semester complete the clinical requirements, with mandatory assignments in Primary Care, Advanced Care and Specialty Care. Students choose an additional assignment in one of the mandatory categories or from a list of elective sites based on their projects. The College currently has affiliated clinical sites located around the campus and in other states.

Clinical sites that provide comprehensive eye care services for patients of all age brackets are categorized as Primary Care sites. Typically, these sites are eye care hospitals or private optometric practices. Clinical sites that provide professional specialty care are categorized as Specialty Care clinics. These include clinics specializing in visual therapy/binocular vision, contact lenses, pediatrics, geriatrics, patients with disabilities, or low vision. The rotation provides training in all of these specialty areas.



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CLINICAL OPTOMETRY (GENERAL)

Course Code: OPT4401

Credit Units: 05

Objective: It is expected that upon completion the student will be able to carry out the standard clinical procedures safely and efficiently

Upon completion of the course the student must be able to

Take down a comprehensive history

Do a complete and proper refraction

Do a torch light examination

Do a binocular vision assessment

Use a slit lamp to do a complete anterior segment examination and posterior segment as required

Must be able to take the decision to dilate the eye as per need

Must be able to give a preliminary diagnosis

Each student must be able to complete 20 such examinations under supervision and maintain verified case records for the same.

Tutorial (Presentations) – Each student must also make 1 presentation on instruments and present it at the study center.

Case Presentation:

Each student must do two case discussions during the semester and of the patients. Thus each student presents 2 case discussions at a time and presents it at the study centre.

The hard copy of the presentations will have to be submitted for the term end exam.

Examination Scheme:

Components	Attd.	Case Records	Assignments	Clinical Supervisors Evaluation	Case Discussion	Practical + Viva
Weightage (%)	5	10	10	15	10	50



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ADVANCE APPLIED OPTICS AND ADVANCE CORNEA & CONTACT LENS

Course Code: OPT4409 & OPT4410

Credit Units: 10 & 10

Course Contents:

MODULE I- Insert and remove contact lenses and instruct patients in these procedures.

MODULE II- Fit soft contact lenses.

MODULE III- Manage the aftercare of patients wearing soft contact lenses

MODULE IV- Advise on contact lens materials and care regimes

MODULE V- Manage the aftercare of patients wearing rigid gas permeable contact lens.

MODULE VI- Fit rigid gas permeable contact lenses.

MODULE VII- Fit contact lenses to patients with astigmatism.

MODULE VIII- Techniques used in fitting contact lenses and to advise patients requiring complex visual correction.

MODULE IX- Fit multifocal, contact Lenses

MODULE X- Fit special contact lenses e.g Rose K , Orthokeratology, Scleral

MODULE XI- Dispensing, ordering & verification of spectacle

Examination Scheme:

Components	A	Case Records	Clinical Supervisors Evaluation	EE Practical + Viva
Weightage (%)	5	10	15	70

A: Attendance, EE: End Semester Exam

CLINICAL INTERNSHIP-DISSERTATION

Course Code: OPT4437

Credit Units: 10

Course Contents:

MODULE-I: Thesis Proposal Development is an independent tutorial conducted by the student's advisor, and involves a comprehensive literature survey of the chosen research area. Through regular meetings, the student and advisor discuss this literature in detail, and the student writes a paper, reviewed by the advisor, summarizing the literature. This paper should help in the development of the thesis proposal and thesis.

MODULE-II: Thesis Proposal At the end of the Semester 2. each student must submit to the university with the signed approval of the advisor, a thesis proposal defining the thesis project, the methods and design of the experiments needed for completion, the progress to date, and plans for completion.

MODULE-III: Thesis Preparation

This is involving preparation of the thesis. The thesis must include a cover and title page, abstract, table of contents, Introduction of the thesis topic with a comprehensive review of the literature, appropriately organized methods, results, and discussion sections for the experiments performed, and a final conclusions section summarizing the outcome of the project. The student should submit a draft of the thesis to the advisor by the end of the third semester. Plans should be in place for the thesis examination to be held in the final exam.

MODULE-IV: Thesis submission

Project Work and Practical Training

A Full time student admitted to M.Optom course will have to be involved in teaching under-graduate students for lectures, demonstrations and hands-on practical sessions.

All students will have to choose ONE speciality subject at start of first year M.Optom and inform the University through School of Optometry in writing within 3 months of being admitted for the first Semester M.Optom

As a part of clinical training during the first year M.Optom every student will document minimum number of cases specified in clinically examined by them. These clinical cases will have to be submitted before end of 4th semester

Every student will have to do a dissertation thesis during the second year M.Optom for this. Every student should submit a protocol which will have to be approved and accepted by post graduate teaching faculty at School of Optometry within second semester of starting first year.

Two copies of the dissertation thesis will have to be submitted before 15th May in second year. Some post graduate students may have to work with ophthalmic and optical industry in their projects of practitioner education, research and other related activities which will be given as assignments by the School of Optometry, Amity medical school.

Examination Scheme:

Components	A	Clinical Supervisors Evaluation	EE Practical + Viva
Weightage (%)	5	25	70

Attendance, EE: End Semester Exam

Examination & Rules of passing for first and Second Year M.Optom

Format for term end examination Theory papers

Each theory examination will be of 100 marks and 3 Hours duration, 70% marks will be taken as external marks.

Each theory examination paper will have total three Sections

Examination Pattern:

Each semester examination will consists of both internal assessment and term end examination in the subjects prescribed in syllabus for each semester. The Faculty will conduct the internal assessments as per schedule prepared by school of optometry.

Amity University, Gurgaon will conduct university every term end examination

Eligibility for a student to appear in term for semester-term end Examination

Minimum 50% marks in internal assessment i.e. minimum 15marks in theory internal and minimum 25 marks in practical/Viva/Oral

Minimum 75% attendance for all course , If of these eligibility conditions have not been satisfied, the student will not be allowed to appear for semester term end examinations

Duration of examination at end for each semester term for each written/practical/clinical examination will be such as may be notified from time to time on recommendation of the Amity University, Gurgaon authorities.

Results and passing for each semester Examination:

A student will be declared to have passed in particular theory subjects provided he/she has secured not less than 50% marks out of 100(15 marks out of 30 in internal assessment and 35 marks out of 70 in term end examination) in each theory subject for every semester.

A student will be declared to have passed in a particular subject provided he/she has secured not less than 50 marks out of 100 [25 marks out of 50 in internal Assessment and 25 marks out of 50 in terms end examination] in each practical subject for every semester.

A student will be declared to have “PASSED” the complete semester Examination provided he/she has secured 50% marks individually in all theory and practical subjects of that semester.

If a student fails or does not appear for semester examination for semester I& III he/she will still be allowed to attend the theory classes and practical sessions for the semester II & IV Respectively ,which falls in same academic year.

A student who has not appeared or has failed in the semester examination for semester I& III will have to appear for the internal and external exams for only that subject along with semester exam for the current semester i.e. .II and IV respectively.

Only when the student is declared pass all subject of semester I and semester II examinations will be admitted to the second year of the course.

A student who has not appeared or has failed in the semester examination for semester I & II will not be admitted to the second year of the course. He/ She will have to get readmitted in the first year and pay the fees as prescribed by the university.


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Allowed to keep term: If the student secures minimum 50% marks in at least three subjects of first year M.Optom, he/she will be allowed to keep term for second year. However he/she will have to pass in all the subjects of first year M.Optom in order to become eligible to apply/appear for second year final M.Optom University Examinations.

Repeat term: If the student fails in four or all five subjects of first year, he/she will be asked to pay the tuition fees proportionate to the number of subjects failed and the university examination fees and then appear for the midterm external examinations in those subjects in which he/she failed earlier. But they are not required to appear for internal examinations and neither repeat project.

Second Year M.Optom Passing: The internal examination and external examination marks will be added as the final marks of that subject for each year. Only when the student secures minimum 50% marks [Internal+External=combined] in all subjects of both the years and has completed the M.Optom Course and will be eligible for post graduate degree of Master of Clinical optometry [M.Optom]

Repeat Dissertation: If the M.Optom student has failed in subject of the second year M.Optom the student will be required to either repeat the same dissertation project OR Choose different dissertation project and appear for the year end examination only.
He/she cannot take midterm examination for this subject in month of February every year.

If any student fails three times successively in the same subject at the university examinations for either first or second year M.Optom, He/She will not be allowed to continue the M.Optom course and his admission stands cancelled.

Award of the Degree:

A student who has secured 50% marks in every subject of final second year M.Optom Examination will be Eligible for conferment of Master of clinical Optometry [M.Optom] Post Graduate Degree by Amity university, Gurgaon

Award of Gold Medal:


Gold Medal will be awarded to the student who secures maximum marks in first and second ,Third& Fourth semester M.Optom added together, The candidate should have cleared each and every subject in every term in the first attempt.

Guidelines for Master research project work:

Basic reading material: Introductory reading material on research methodology, how to do a literature search and statistical methods should be provided at the beginning of the semester.

The students should read the material thoroughly and can mail their queries to their guides. a. Assignment 1: Exercises should be also given based on the reading material

The student should learn to do a through pubmed search in their area of research interest.. Read the recent research articles initially. Find out the research gaps. Based on that set up your research


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aim. Your research aim should not be a repetition of an already done research. Substantiate the necessity (Gap in current research) for the proposed study. (Assignment II: mailed to guide)

Discuss with your peers and clinicians regarding the Originality & objective of the study, feasibility of the study and other ethical issues involved: Very important

Institutional Review Board and Ethics committee approval

Consent form certified

As they begin the research, it would be wise to also meet the statistician

Sample size estimation

Microsoft excel or access proforma design

Prepare a rough draft of the protocol (Assignment III)

Emphasize on the methodology

The final protocol should be ready by end of second semester

Update your research activities at least once in a month to your guide (Data collection proforma as excel sheet).

Data entry should be done in Excel appropriately. Consult with your local statistician for any queries and also discuss with your guide. (Assignment IV)

End of your data collections takes to Analysis: Kindly discuss with your guide and a statistician (Assignment V: on the basics of statistics pertaining to your research interest)*

In the thesis introduction, literature and methodology should be ready before the end of fourth semester.

Submission of the final thesis to the guide should be done before one month of the deadline given. So that your guide will have enough time to review and make corrections



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Master of Optometry-Practitioner

FLEXILEARN

-Freedom to design your degree



Curriculum & Scheme of Examination

2022

AMITY UNIVERSITY HARYANA

GURUGRAM

A handwritten signature in blue ink, appearing to read 'Anil'.

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EPIDEMIOLOGY, PUBLIC HEALTH & COMMUNITY OPTOMETRY

Course Code: OPP4101

Credit Units: 03

Course Objective: To inculcate the knowledge, sensitivity and clinical exposure of community optometry. The outcomes of the course are: thorough understanding of conducting of screening for specific eye conditions, and resultant implications through theoretical and practical exposure. By the end of the course the student will be able to use the knowledge of the skills gained in promotion and preventive measures of community optometry.

Course Contents:

Module-I: Public health concepts

History of public health, History of public health optometry (including epidemiology, manpower, projections, and community reimbursement mechanisms), Organizations of health services (principles of primary, secondary and tertiary care) Health Care Delivery systems in India and determinants of health. Detriments of health care delivery system planning of health services (including relevant legislation and implication to optometric practice). Health manpower protection and in the practice of ophthalmology Multidisciplinary and institutional practice modes Global medicine and evolution of Public Health in India, Public Health optometry: concepts and implementation

Module-II: Levels of prevention-optometrist's role in community
Optometry's role as a primary care professional, preventable blindness

Module-III: Health systems

Concepts of Health systems National Health Programs Effective delivery of eye care services,
Role of civil societies in blindness prevention:
Vision2020: the Right to Sight
National and International Agencies in eye Care, NPCB
DBCS

Module-IV: Global Blindness and visual impairment

Refractive error and low vision as public health issues
Socioeconomic implications of blindness and visual impairment
Vision screening
Organizing eye camps
Eye Donation and Eye Banking

Module-V: Epidemiology

Prevalence, incidence and distribution of visual impairment
Basics of Epidemiology study methods
Incidence, prevalence, risk factors, odd ratio
Childhood blindness
Refractive errors and presbyopia
Age related macular degeneration
Low Vision
Diabetic retinopathy
Glaucoma
Age related Macular Degeneration
Trachoma
Corneal blindness

Examination Scheme:

Components	A	CT	P (field report)	HA	EE
Weightage (%)	5	10	10	5	70

A: Attendance, CT: Class Test, HA: Home Assignment, P: Presentation, EE: End Semester Exam

Text book and reference

- Community eye health journal
- Epidemiology of Eye Diseases, by Gordon and Drawin

CLINIC-I (GENERAL)

Course Code: OPP4105

Credit Units: 3

This course includes minimum of 90 hours of supervised clinical training. The clinics involve primary care clinics and community work.

The objective of clinics in this semester is to be able to examine the eye and understand the basic eye procedures with clinical management.

A logbook is maintained and case sheets with complete management and follow up are mandatory for submission.

The log book needs to be signed by the supervisor.

Examination Scheme:

Components	Attd.	Log Book	Case Sheets	Viva-EE	EE-Practical
Weightage (%)	5	10	15	20	50



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RESEARCH METHODOLOGY & BIOSTATISTICS

Course Code: OPP4106

Credit Units: 04

Research Methodology

Course Objective: This course is a brief overview about research design that is intended to cover the basics of designing and implementing a scientific study. It will provide the students the basic knowledge in Bio-statistics. At the completion of the course, the students will have the knowledge of data collection, statistical application and finally ready for research project. This will enable the student to gain understanding of different research methodologies and appropriate research design to be able to conduct research projects.

Course Contents:

Module-I:

Introduction to research methods, Variables in research, Reliability and validity in research, Formulation of research problems and writing research questions, Hypothesis, Null and Research Hypothesis, Type I and Type II errors in hypothesis testing

Module-II:

Introduction of epidemiology, Descriptive epidemiology, Experimental and non experimental research designs, Screening, Sampling methods, Biological variability, normal distribution

Module-III:

Bias and Confounding, Association and causation, Odds ratio and relative risk, sensitivity and specificity Data collection methods- Observation method, Interview method, Questionnaires and schedules Construction,

Module-IV:

Critical analysis of research papers, Conducting a literature review, Writing Research proposals, Development of conceptual framework in research

Module-V: Introduction to Biostatistics

Introduction to Statistics, Classification of data, Source of data, Method of scaling - nominal, ordinal, ratio and interval scale, measuring reliability and validity of scales, Measures of Central tendency, Measures of Dispersion, Skewness and kurtosis, Sampling, Sample size determination

Examination Scheme:

Components	CP	V	A	ME	EE
Weightage (%)	5	5	5	15	70

(CP – Class Performance; V-Viva; A- Attendance; ME- Mid-Term Exam, EE – End semester Exam)

Text & References:

Text books:

- Research Methodology: A Step By Step Guide For Beginners : Ranjit Kumar
- Research Methodology: Methods and Techniques : By C. R. Kothari



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LOW VISION CARE AND GERIATRIC OPTOMETRY

Course Code: OPP4109

Credit Units: 04

Course Objectives: This course gives both in-depth theoretical knowledge and clinical exposure in Low Vision care. The outcomes of this course are: Thorough understanding of the causes of the low vision, its functional and psychosocial consequences, and rehabilitational measures through didactic lectures and clinical postings.

Course Contents:

Module-I: Introduction to Low Vision

Definition of low vision. The impact of low vision. Prevalence of low vision

Module-II: Causes and symptoms of low vision

Common causes of low vision. Low vision symptoms and conditions. Functional implication of diseases causing visual impairment. Disorder related to geriatric population and visual disability. Ocular changes with ageing.

Module-III: Clinical assessment of low vision patient

Purpose of low vision assessment, Steps of low vision assessment. Diverse types of magnification, Different methods and formulae for calculating magnification, how to determine resolution ability, predict distance required to meet resolution goal, Measure lens power, Measure equivalent viewing distance, Calculate equivalent viewing distance for different devices

Module-IV: Assistive technology in Low Vision devices

Different type of optical / non-optical low vision devices and their uses, Computer assistive Technology for low vision patient CTV, electronic magnifier, hand held electronic magnification. Mobility devices

Module-V: Non –optical low vision devices

Relative size magnification Large-print clocks, timers, calculators, remote controls, watches, books, Glare & contrast control, Posture and comfort maintenance device, Hand writing and written communication device Orientation and mobility device, Sensory substitution device Medical management device

Examination Scheme:

Components	A	CT	P	HA	EE
Weightage (%)	5	10	10	5	70

A: Attendance, CT: Class Test, HA: Home Assignment, P: Presentation, EE: End Semester Exam

Recommended Text books:

- Management & Practice of Low Visual Acuity - A T Dowis
- Low Vision Principles & Practice - C Dickinson
- Optometric Management of Visual Handicap - H Farrell
- Eye Essentials - Low Vision Assessment - J McNaughton
- Low Vision Manual - Jackson and Wolfson
- The Art and Practice of Low Vision (2nd Edition) - P. D. Freeman and R. T. Jose
- Essentials of Low Vision Practice, Richard L. Brilliant OD

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APPLIED OPTICS

Course Code: OPP4110

Credit Units: 04

Course Objective: This course mainly deals with Optical management of refractive errors-new modalities the advanced techniques in subjective and objective refraction and Spectacle Dispensing. This course leads to a rewarding career as an optometrist, a specialist trained to dispense and to recognize basic ocular disorders. This allows students to recommend the right spectacle lens based on the condition of the eye

Course Contents:

Module-I: Ophthalmic Lens types,

Lens materials Properties of lenses (Refractive index, base curve, specific gravity, Abbe Value, UV cut off,etc)

Prism

Tints and coatings

Bifocals/Multifocals

Module-II: Progressive addition lenses

PAL design

Indication and advantages

Dispensing PAL,

PAL trouble shooting

Market availability

Module-III: Spectacle FRAMES:

Facial fitting principles

Spectacle delivery

Dispensing problem prescriptions

Frame types and parts

Classification of spectacle frames-material, weight, temple position, coloration Frame construction

Frame Measurements and markings

Frame manipulation and repair

Facial measurements and frame choice

Measuring the interpupillary distance and pupillometer

Special purpose frames (sports, kids, reading)

identify various types of Frames and mountings

Module-IV: Lens Ordering and lens verification

Lens edge thickness calculation Writing spectacle lens order

Facial measurements - Interpupillary distance measurement and measuring heights (single vision, multifocal, progressives)

Measurement of effective diameter minimum blank size Glazing and edging Hands on

Lens verification and axis marking and fitting of all lens types

Final checking of finished spectacle with frame adjustments

Delivery and follow-up

Troubleshooting complaints and handling patient's questions.

Optical centre marking

Axis marking

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Project: Different brands for spectacle frames and sunglasses –Indian & international
Demonstration- safety eyewear, different filters, recumbent spectacle, Ptosis spectacle,

Examination Scheme

Components	A	CT	P	HA	EE
Weightage (%)	5	10	10	5	70

A: Attendance, CT: Class Test, HA: Home Assignment, P: Presentation, EE: End Semester Exam

Text & Reference Books:

- The fine art of prescribing glasses, Benjmin Milder, Butterworth Heinnemann,
- Spectacle frame dispensing: H Obstfeld: Butterworth Heinnemann
- essentials of ophthalmic lens finishing , C.W. Brooks and Irvin Borish, Butterworth Heinnemann
- Bennett's OPhthalmic prescription work Bennet & K.G wakefield, butterworth heinmann
- Systems of ophthalmic dispensing , Brook & Borish, Butterworth heinmann
- Clinical Optics , Troy Fennin , Theodore Grosvenor, Butterworth Heinmann



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PROJECT

Course Code: OPP4132

Credit Units: 04

RESEARCH PROJECT:

Students will prepare the protocol during this semester after doing extensive literature search. Each student will be reporting to guide/supervisor who helps the student to go about in systematically. Research proposal need to be presented in front of the experts before going ahead with data collection. In institute which has Institute research board and ethics committee student can be encouraged to present the proposal in it.



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ADVANCED CONTACT LENS -I

Course Code: OPP4204

Credit Units: 4

Course Objective: Contact lenses are an essential part of optometric practice; not only for practice success, but also in the management of certain ocular conditions that require visual or therapeutic rehabilitation. This course introduces all aspects of contact lens practice to the optometry student. It begins with soft and rigid gas permeable contact lenses, and continues through toric, multifocal and specialty lenses in the next semester. This semester gives overview of contact lens related complications and their management which is discussed in detail in the next semester, A hands-on practical provides experience with the various lens types, and online materials encourage independent learning.

Course Contents:

Module-I: Basics of Contact Lenses

History of Contact Lenses, Contact Lens Materials and Manufacturing, Optics of Contact Lenses, Soft & Rigid Gas Permeable Contact Lens Design, Contact Lens Verification

Module-II: Contact Lens Fitting

Examining the Prospective Contact Lens Patient, Selecting Lens Type, Wear Mode and Replacement schedule

Fitting Spherical GP Contact Lenses, Fitting Spherical Soft Contact Lenses, Correcting Astigmatism with Contact Lenses

Module-III: Advanced materials and designs

Fitting Silicone Hydrogels,

The Dispensing Visit and After-Care, Contact Lenses for Sports, Presbyopia Contact Lens Options in contact lens wear

Module-IV: Care and Maintenance

Contact Lens Contamination, CL Care and CL Care Products, Rigid CL Care, Hydrogel and Silicone Hydrogel CL Care, Dry Eye and Contact Lenses

Module-V: Complications with contact lenses

Defending the Ocular Surface in Contact Lens Wear, Rigid Contact Lens Complications, Soft Contact Lens Complications

Examination Scheme

Components	A	CT	P	HA	EE
Weightage (%)	5	10	5	10	70

A: Attendance, CT: Class Test, HA: Home Assignment, P: Presentation, EE: End Semester Exam

Recommended Text & Reference books:

- IACLE modules A, B, C, D, E,
- Text book Of Contact Lenses 5th edition by Sinha Rajesh, Jaypee publication 2017
- Contact lens Primer
- Essentials of Contact lens practice

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- Silicone hydrogels: the rebirth of continuous wear contact lenses, Deborah F. Sweeney, Butterworth Heinemann
- Clinical manual of Contact Lenses, Edward S. Bennett and Vinita Alee Henry, Lippincott Williams and Wilkins, 2008
- Medical Contact Lens Practice, Elisabeth A. W. Millis
- Contact Lenses, Anthony J. Phillips and Lynne Speedwell
- The CLAO Guide to Basic Science and Clinical Practice: Volumes 1, 2, 3, Contact Lens Association of Ophthalmologists



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CLINICS-II (SPECIALITY)

Course Code: OPP4205

Credit Units: 3

The objective of clinics in this semester is to be able to examine the eye and understand the classified eye procedures with clinical management with special reference to low vision, binocular vision, pediatric care and contact lens.

An approximate of guided 150 hours needs to be completed in this semester. The students will be by rotation go to community clinics, Campus clinics, associated hospital partners and optical / optometric clinics.

The logbook must be maintained and 30 case sheets of SELECTED specialty in the semester with complete management and follow up are mandatory for submission at the end of the semester

The log book needs to be signed by the supervisor during every visit. No case record will be considered without the supervisor's signature.

Examination Scheme

Components	Attd.	Log Book	Case Sheets	Viva-EE	EE-Practical
Weightage (%)	5	10	15	20	50

A: Attendance, EE: End Semester Exam



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LOW VISION CARE AND REHABILITATION

Course code: OPP4212

Credit Units: 4

Course Objectives: This course gives both in-depth theoretical knowledge and clinical exposure in Low Vision care. The outcomes of this course are: Thorough understanding of the causes of the low vision, its functional and psychosocial consequences, and rehabilitational measures through didactic lectures and clinical postings. This course introduces low vision rehabilitation and geriatrics. The course teaches the role optometrists perform in treating the level 1 low vision patient who has moderate visual impairment. The course also addresses how to refer the level 2 patient who has advanced visual impairment to comprehensive low vision care.

Course Contents:

Module-I: Orientation and mobility

Orientation and mobility skill set cane skills, sighted guide technique, using a cane
Using other senses for orientation, Dos and don'ts for orientation and mobility
Driving with Low vision, Visual functioning, how to enhance visual functioning, residual vision, classification of activities of daily living, basic step towards independent living, how to achieve independent living

Module-II: The vision related rehabilitation network

Rehabilitation services network, state rehabilitation Programs & services, Private rehabilitation programs & services, low vision practitioner's role in rehabilitation service network, building a referral network, ensuring accessibility to service, financial resources,

Module-III: Visual Disorders

The Epidemiology of Vision Impairment, Vision Impairment in the paediatric population, Children with Multiple Impairments, Dual Vision and Hearing Impairment, Diabetes Mellitus and Vision Impairment, Vision Problems associated with Multiple Sclerosis, Vision Impairment related to Acquired Brain Injury, Vision and Dementia, Low Vision and HIV infection

Module-IV: The Functional Perspective

Low Vision and Psychophysics, Visual Disorders – The Psychosocial Perspective, Vision Impairment and Cognition, Spatial orientation and Mobility of people with vision impairments, Social skills Issues in vision impairment, Communication and language: Issues and concerns, Developmental perspectives on Aging and vision loss, Vision and cognitive Functioning in old age, Interactions of Vision Impairment with other Disabilities and sensory Impairments.

The Role of psychosocial Factors in adaptation to vision Impairment and Habitation outcomes for Adults and Older adults and children, Social support and adjustment to vision Impairment across the life span, Associated Depression, Disability and rehabilitation

Module-V: The Environment and Vision Impairment:

Indian Disabilities act, Children's Environments, Environments of Older people
Outdoor environments, Lighting to enhance visual capabilities, Signage and way finding. Accessible Environments through Technology



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Examination Scheme

Components	A	CT	P	HA	EE
Weightage (%)	5	10	10	5	70

A: Attendance, CT: Class Test, HA: Home Assignment, P: Presentation, EE: End Semester Exam

Recommended Text books:

- Essentials of Low Vision Practice, Richard L. Brilliant OD
- Management & Practice of Low Visual Acuity - A T Dowis
- Low Vision Principles & Practice - C Dickinson
- Optometric Management of Visual Handicap - H Farrall
- Eye Essentials - Low Vision Assessment - J Macnaughton
- Low Vision Manual - Jackson and Wolffsohn
- The Art and Practice of Low Vision (2nd Edition) - P. D. Freeman and R. T. Jose
- Primary Low Vision Care, Nowakovski.R, Appleton and Lange



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PROJECT

Course Code: OPP4232

Credit Units: 04

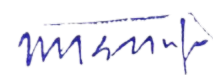
Data Collection, Literature search, Presentation of the progress of the project to the guide

Examination Scheme

Components	Overall Progress	Literature Review	Presentation	Total
Weightage (%)	40	40	20	100



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ADVANCED CONTACT LENS-II

Course Code: OPP4303

Credit Units: 4

Course Objective: This course gives both in-depth theoretical knowledge and clinical exposure in Contact lens at advanced level and in therapeutic conditions. It prepares student to develop competency in handling all types of specialty lenses. This course also deals with all complications related to contact lenses and its management.

COURSE COMPETENCIES:

Ability to understand corneal physiology and oxygen needs
Ability to diagnose and manage complications due to contact lenses
Ability to fit specialized contact lenses
Keratoconus
Rose 'lenses
Mini scleral lenses
Handling complications

Course Contents:

Module-I: & II: Ability to fit specialized contact lenses

Keratoconus
Rose 'lenses
Mini scleral lenses
Hybrid lenses
Orthokeratology
Scleral lenses: Dry eyes, SJS, Post PK, Post C3R, Post LASIK ectasia
Ability to fit custom made ocular prosthesis
Ability to fit paediatric contact lenses

Module-III: Contact lens complications

For all types of lenses

Module-IV: Business Aspects of Contact Lens Practice

Contact lenses (CLs) in practice, Financial factors in a CL practice, Managing & marketing techniques for a CL practice, Employee management, Record Keeping, Professionalism & standards of care
Communication skill
Recent advances

Examination Scheme

Components	A	CT	P	HA	EE
Weightage (%)	5	10	10	5	70

A: Attendance, CT: Class Test, HA: Home Assignment, P: Presentation, EE: End Semester Exam

Recommended Text & Reference books:

- IACLE modules B, C, D, E
- Text book Of Contact Lenses 5th edition by Sinha Rajesh, Jaypee publication 2017
- Contact lens Primer

- Essentials of Contact lens practice
- Silicone hydrogels: the rebirth of continuous wear contact lenses, Deborah F. Sweeney, Butterworth Heinemann
- Clinical manual of Contact Lenses, Edward S. Bennett and Vinita AlleeHenry, Lippincott Williams and Wilkins, 2008
- Medical Contact Lens Practice, Elisabeth A. W. Millis
- Contact Lenses, Anthony J. Phillips and Lynne Speedwell
- The CLAO Guide to Basic Science and Clinical Practice: Volumes 1, 2, 3, Contact Lens Association of Ophthalmologists



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CLINICS-III (SPECIALITY)

Course Code: OPP4305

Credit Units: 4

The objective of clinics in this semester is to be able to examine the eye and understand the eye procedures with clinical management with special reference to complete optometric care.

A minimum of guided 240 hours need to be completed in this semester. The students will be by rotation go to community clinic, Campus clinics, associated hospital partners and optical / optometric clinics.

The logbook has to be maintained and 30 case sheets of complete case management and follow up are mandatory for submission.

The log book needs to be signed by the supervisor every time a case is recorded in it. No case will be considered without the supervisor's signature.

Examination Scheme

Components	A	Assignment (log book)	Case sheets	EE-Viva	EE- Practical
Weightage (%)	5	15	10	20	50

A: Attendance, EE: End Semester Exam



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ENVIRONMENTAL OPTOMETRY

Course Code: OPP4306

Credit Units: 3

Course Objective: Occupational optometry is the portion of optometric practice that is concerned with the efficient and safe visual functioning of an individual within the work environment. It encompasses more than just the prevention of occupational eye injuries, although that certainly is a major component. It also includes vision assessments of workers/patients, considering their specific vision requirements and the demands these requirements place upon them. Optometrists provide occupational vision services at three general areas or levels: primary care, eye safety consultation, vision consultation.

After the completion of the course the student should be able to

Complete an occupational history on each adult patient

Diagnose and manage occupationally induced conditions (making referrals when necessary)

Assess his or her patients' occupational vision demands and provide appropriate treatments as necessary

Educate patients on the need to incorporate eye safety principles into their daily activities.

Performing an eye-safety workplace assessment

Overseeing the procurement of eye protection devices (both prescription and nonprescription)

Course Contents:

Module-I: Introduction

Module-II: Work place survey

Oculi visual hazard analysis

Ergonomic Factor

Work place lighting assessment

Module-III: Matching the worker to the task

Visual standards

Clinical evaluation

Personal protective strategies

Module-IV: Pitfall of industrial consulting

Module-V: Visual Health in selected industries

Module-VI: References and standards

Examination Scheme

Components	A	Case Studies	Field Visit	Assignment	Class Test
Weightage (%)	5	30	20	15	30

Test Books:

- Eye Essentials: Environmental & Occupational Optometry, G Carson, S Doshi, W Harvey, ButterworthHeinemann
- BHVI module for environmental optometry
- R V North: Work and the eye, Second edition, Butterworth Heinemann, 2001
- G W Good: Occupational Vision Manual available in the following website: www.aoa.org
- N.A. Smith: Lighting for Occupational Optometry, HHSC Handbook Series, Sachem Services, 1999
- J Anshul: Visual Ergonomics Handbook, CRC Press, 2005

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TEACHING METHODOLOGY

Course Code: OPP4307

Credit Units: 3

Course Contents:

Module-I:

Introduction, understanding how adults learn, how to enhance student learning

Module-II:

Teaching strategies to enhance Learning, how to structure your course, leaning activities

Module-III:

Effective learning and Teaching activities in eye Care,

Methods of teaching, presentation, demonstration, case studies, Role plays, group discussion

Module-IV:

Student Assessment and evaluation techniques, formative and summative assessment, marking and providing feedback

Examination Scheme

Components	Attd.	Assignment-1	Assignment-2	Assignment-3	CP	Total
Weightage (%)	5	20	20	20	35	100

Text book/ Reference Book

As recommended by the faculty



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PROJECT


Course Code: OPP4332

Credit Units: 06

Research Project Data update

Examination Scheme

Components	Results & Analysis	Data Collection	Conclusion & Discussion	Total
Weightage (%)	40	40	20	100


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INTERNSHIP

Eye care clinic: This sequence of courses gives students direct patient care experience and responsibilities in affiliated health centers, hospitals or in private practices. Clinical preceptors will evaluate and guide the student through the process of providing eye care. Students are graded on key clinical tools: technical skills, knowledge base, analytical skills, diagnostic skills, management and treatment, communication skills, efficiency, attitude, and professionalism. The clinical grade is honors, pass, remedial, or fail based on a midterm and final preceptor evaluation; on meeting documentation requirements, such as maintaining documentation; and on submitting patient logs, and site evaluations.

The AUG department of Optometry monitors the quality and quantity of patient encounters for each student. Through the clinical assignments, students will gain proficiency in full scope primary care optometry and contact lenses. All students must satisfy a minimum number of patient encounters during their assignments. Some students may be assigned to specific sites to assure a clinical experience based on their projects. Some students may meet the contact lens requirement through affiliations set up on behalf of the students during the summer vacations with private practitioners who meet the College's program standards.

Four rotations during the final semester complete the clinical requirements, with mandatory assignments in Primary Care, Advanced Care and Specialty Care. Students choose an additional assignment in one of the mandatory categories or from a list of elective sites based on their projects. The College currently has affiliated clinical sites located around the campus and in other states.

Clinical sites that provide comprehensive eye care services for patients of all age brackets are categorized as Primary Care sites. Typically, these sites are eye care hospitals or private optometric practices. Clinical sites that provide professional specialty care are categorized as Specialty Care clinics. These include clinics specializing in visual therapy/binocular vision, contact lenses, pediatrics, geriatrics, patients with disabilities, or low vision. The rotation provides training in these specialty areas.



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CLINICAL OPTOMETRY (GENERAL)

Course Code: OPP4401

Credit Units: 06

Objective: It is expected that upon completion the student will be able to carry out the standard clinical procedures safely and efficiently

PATIENT HISTORY

1.1 Communicates with the patient

1.1.1 Modes and methods of communication are employed which consider the physical, emotional, intellectual and cultural background of the patient.

1.1.2 A structured, efficient, rational and comfortable exchange of information between the optometrist and the patient takes place.

1.2 Makes general observations of patient

1.3 Obtains the case history

1.4 Obtains and interprets patient information from other professionals

2. PATIENT EXAMINATION

2.1 Formulates

2.1.1 An examination plan based on the patient history is designed to obtain the information necessary for diagnosis and management.

2.1.2 Tests and procedures appropriate to the patient's condition and abilities are selected.

2.2 Implements examination plan

2.2.1 Tests and procedures which will efficiently provide the information required for diagnosis are performed.

2.2.2 The examination plan and procedures are progressively modified based on findings.

2.3 Assesses the ocular adnexa and the eye

2.3.1 The structure and health of the ocular adnexa and their ability to function are assessed.

2.3.2 The structure and health of the anterior segment and its ability to function are assessed.

2.3.3 The structure and health of the ocular media and their ability to function are assessed.

2.3.4 The structure and health of the posterior segment and its ability to function are assessed.

2.3.5 The nature of the disease state is determined.

2.3.6 Microbiological tests are selected and ordered

2.4 Assesses central and peripheral sensory visual function and the integrity of the visual pathways

2.4.1 Vision and visual acuity are measured.

2.4.2 Visual fields are measured.

2.4.3 Colour vision is assessed.

2.4.4 Pupil function is assessed.

2.5 Assesses refractive status

2.6 Assesses oculomotor and binocular function.

2.6.1 Eye alignment and the state of fixation are assessed.

2.6.2 The quality and range of the patient's eye movements are determined.

2.6.3 The status of sensory fusion is determined.

2.6.4 The adaptability of the vergence system is determined.

2.6.5 Placement and adaptability of accommodation are assessed.

2.7 Assesses visual information processing



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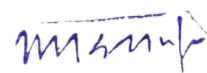
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Examination Scheme

Components	Attd.	Case Records	Assignments	Clinical Supervisors Evaluation	Case Discussion	Practical + Viva
Weightage (%)	5	10	10	15	10	50



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ADVANCE APPLIED OPTICS

Course Code: OPP4410

Credit Units: 10

Course Contents:

MODULE I- Spectacle prescription & interpretation, transposition, Add and near power relation, Prescription for various requirements. e.g intermediate uses /computer use

MODULE II- Facial measurements – IPD, Frame size, bridge size, facial wrap, Pantoscopic tilt

MODULE III-Deciding most suitable type of single vision and bifocal Lens

MODULE IV- Lens selection of Progressive addition lenses as per patient needs

MODULE V- Frame selection and recommendation as per patient needs and facial type, communication & counselling of patient regarding frame selection

MODULE VI- Dispensing, ordering & verification of spectacle

MODULE VII- latest Technology in ophthalmic lenses and frames

Examination Scheme

Components	Attd.	Case Records	Clinical Supervisors Evaluation	EE Practical + Viva
Weightage (%)	5	30	30	35



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ADVANCE CORNEA & CONTACT LENS

Course Code: OPP4411

Credit Units: 10

Course Contents:

Insert and remove contact lenses and instruct patients in these procedures.

Fit soft contact lenses.

Manage the aftercare of patients wearing soft contact lenses

Advise on contact lens materials and care regimes

Manage the aftercare of patients wearing rigid gas permeable contact lens.

Fit rigid gas permeable contact lenses.

Fit contact lenses to patients with astigmatism.

Techniques used in fitting contact lenses and to advise patients requiring complex visual correction.

Fit multifocal, contact Lenses

- Fit special contact lenses e.g Rose K , Orthokeratology, Scleral

Dispensing, ordering & verification of spectacle

Contact lens complications

Examination Scheme

Components	Attd.	Case Records	Clinical Supervisors Evaluation	EE Practical + Viva
Weightage (%)	5	10	15	70



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CLINICAL DISSERTATION

Course Code: OPP4437

Credit Units: 11

Course Contents:

MODULE-I: Thesis Proposal Development is an independent tutorial conducted by the student's advisor, and involves a comprehensive literature survey of the chosen research area. Through regular meetings, the student and advisor discuss this literature in detail, and the student writes a paper, reviewed by the advisor, summarizing the literature. This paper should help in the development of the thesis proposal and thesis.

MODULE-II: Thesis Proposal At the end of the Semester 2. each student must submit to the university with the signed approval of the advisor, a thesis proposal defining the thesis project, the methods and design of the experiments needed for completion, the progress to date, and plans for completion.

MODULE-III: Thesis Preparation

This is involving preparation of the thesis. The thesis must include a cover and title page, abstract, table of contents, Introduction of the thesis topic with a comprehensive review of the literature, appropriately organized methods, results, and discussion sections for the experiments performed, and a final conclusions section summarizing the outcome of the project. The student should submit a draft of the thesis to the advisor by the end of the third semester. Plans should be in place for the thesis examination to be held in the final exam.

MODULE-IV: Thesis submission

Project Work and Practical Training

A Full-time student admitted to M.Optom course will have to be involved in teaching under-graduate students for lectures, demonstrations and hands-on practical sessions.

All students will have to choose ONE specialty subject at start of first year M.Optom and inform the University through School of Optometry in writing within 3 months of being admitted for the first Semester M.Optom

As a part of clinical training during the first year M. Optom every student will document

Minimum number of cases specified in clinically examined by them. These clinical cases will have to be submitted before end of 4th semester

Every student will have to do a dissertation thesis during the second year M. Optom for this. Every student should submit a protocol which will have to be approved and accepted by post graduate teaching faculty at School of Optometry within second semester of starting first year.

Two copies of the dissertation thesis will have to be submitted before 15th May in second year.

Some post graduate students may have to work with ophthalmic and optical industry in their projects of practitioner education, research and other related activities which will be given as assignments by the School of Optometry, Amity medical school.

Examination & Rules of passing for first and Second Year M. Optom

Format for term end examination Theory papers

Each theory examination will be of 100 marks and 3 Hours duration, 70% marks will be taken as external marks.

Each theory examination paper will have total three Sections

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Examination Pattern:

Each semester examination will consist of both internal assessment and term end examination in the subjects prescribed in syllabus for each semester. The Faculty will conduct the internal assessments as per schedule prepared by school of optometry.

**Amity University, Gurgaon will conduct university every term end examination
Eligibility for a student to appear in term for semester-term end Examination**

Minimum 50% marks in internal assessment i.e. minimum 15marks in theory internal and minimum 25 marks in practical/Viva/Oral

Minimum 75% attendance for all course, if of these eligibility conditions have not been satisfied, the student will not be allowed to appear for semester term end examinations

Duration of examination at end for each semester term for each written/practical/clinical examination will be such as may be notified from time to time on recommendation of the Amity University, Gurgaon authorities.

Results and passing for each semester Examination:

A student will be declared to have passed theory subjects provided he/she has secured not less than 50% marks out of 100 (15 marks out of 30 in internal assessment and 35 marks out of 70 in term end examination) in each theory subject for every semester.

A student will be declared to have passed in a subject provided he/she has secured not less than 50 marks out of 100 [25 marks out of 50 in internal Assessment and 25 marks out of 50 in terms end examination] in each practical subject for every semester.

A student will be declared to have “PASSED” the complete semester Examination provided he/she has secured 50% marks individually in all theory and practical subjects of that semester.

If a student fails or does not appear for semester examination for semester I& III he/she will still be allowed to attend the theory classes and practical sessions for the semester II & IV Respectively, which falls in same academic year.

A student who has not appeared or has failed in the semester examination for semester I& III will have to appear for the internal and external exams for only that subject along with semester exam for the current semester i.e. II and IV respectively.

Only when the student is declared pass all subject of semester I and semester II examinations will be admitted to the second year of the course.

A student who has not appeared or has failed in the semester examination for semester I & II will not be admitted to the second year of the course. He/ She will have to get readmitted in the first year and pay the fees as prescribed by the university.

Allowed to keep term: If the student secures minimum 50% marks in at least three subjects of first year M. Optom, he/she will be allowed to keep term for second year. However, he/she will have to pass in all the subjects of first year M. Optom to become eligible to apply/appear for second year final M. Optom University Examinations.


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Repeat term: If the student fails in four or all five subjects of first year, he/she will be asked to pay the tuition fees proportionate to the number of subjects failed and the university examination fees and then appear for the midterm external examinations in those subjects in which he/she failed earlier. But they are not required to appear for internal examinations and neither repeat project.

Second Year M. Optom Passing: The internal examination and external examination marks will be added as the final marks of that subject for each year. Only when the student secures minimum 50% marks [Internal External=combined] in all subjects of both the years and has completed the M. Optom. Course and will be eligible for post graduate degree of Master of Clinical optometry [M. Optom]

Repeat Dissertation: If the M. Optom student has failed in subject of the second year M. Optom the student will be required to either repeat the same dissertation project OR Choose different dissertation project and appear for the year end examination only.
He/she cannot take midterm examination for this subject in month of February every year.

If any student fails three times successively in the same subject at the university examinations for either first or second year M. Optom, Hershel will not be allowed to continue the M. Optom course and his admission stands cancelled.

Award of the Degree:

A student who has secured 5.5 CGPAM. Optom Examination will be Eligible for conferment of Master of clinical Optometry [M. Optom] Post Graduate Degree by Amity university, Gurgaon

Award of Gold Medal:

Gold Medal will be awarded to the student who secures maximum marks in first and second, Third& Fourth semester M. Optom added together, the candidate should have cleared each subject in every term in the first attempt.

Guidelines for Master research project work:

Basic reading material: Introductory reading material on research methodology, how to do a literature search and statistical methods should be provided at the beginning of the semester.

The students should read the material thoroughly and can mail their queries to their guides. a. Assignment 1: Exercises should be also given based on the reading material

The student should learn to do a thorough Pub Med search in their area of research interest. Read the recent research articles initially. Find out the research gaps. Based on that set up your research aim. Your research aim should not be a repetition of an already done research. Substantiate the necessity (Gap in current research) for the proposed study. (Assignment II: mailed to guide)

Discuss with your peers and clinicians regarding the Originality & objective of the study, feasibility of the study and other ethical issues involved: Very important

Institutional Review Board and Ethics committee approval

Consent form certified

As they begin the research, it would be wise to also meet the statistician

Sample size estimation

Microsoft excel or access proforma design

Prepare a rough draft of the protocol (Assignment III)

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Emphasize on the methodology

The final protocol should be ready by end of FIRST semester

Update your research activities at least once in a month to your guide (Data collection proforma as excel sheet).

Data entry should be done in Excel appropriately. Consult with your local statistician for any queries and discuss with your guide. (Assignment IV)

End of your data collections takes to Analysis: Kindly discuss with your guide and a statistician (Assignment V: on the basics of statistics pertaining to your research interest) *

In the thesis introduction, literature and methodology should be ready before the end of fourth semester.

Submission of the final thesis to the guide should be done before one month of the deadline given. So that your guide will have enough time to review and make corrections



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Master of Public Health

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Curriculum & Scheme of Examination

2022

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DEMOGRAPHY

Course Code: PUH4101

Credit Units: 03

Course Objective:

To present students some basic techniques and concepts in population sciences.

Course Contents

Module I: Population Fundamentals

Science of demography, Demographic cycle, Population trends and demographic indicators, Demography and Family Planning and its role in population policy of India.

Module II: Demographic Studies

- Fundamentals of population studies and its links with health.
- Methods of demographic data collection, sources of data, population census, population composition, world population growth, growth of Indian population, morbidity, mortality, ageing, migration/ urbanization

Module III: Family Planning

Fertility and fertility factors, Family planning, Population policies & programmes and National Population Policy, Family Planning 2020 India Commitment

Examination Scheme:

Components	P	V	A	ME	EE
Weightage (%)	10	5	5	10	70

Text & References:

- Asha Bhende and Tara Kanitkar. *Principles of population Studies*, Himalaya Pub Houses,
- John Weeks, *Population*, Wordsworth pub, 1994.
- S.N.Singh, M.K.Premi, P.S.Bhatia. *Population Transition In India*, B. R. Publishing Corporation.
- P.B. Desai. *Population in the context of India's development*, UGC – UNFPA project.
- Peter Cox. *Demography*, Cambridge University Press
- K.B. Pathak, F. Ram. *Techniques of Demographic Analysis*, Himalaya Publishing Houses.

- *Health Monitor*, Foundation for Research in Health S.
- International Institute for Population Sciences. *National Family Health Survey – 1, 2 and 3*, Mumbai.
- K. Srinivasan. *Basic*
- *graphic Techniques and Applications*, Sage Publications, 1998

SOCIAL & BEHAVIORAL ASPECTS OF HEALTH

Course Code: PUH4103

Credit Units: 02

Course Objective

To highlight the diseases and conditions that are of concern to a future public health professional. It highlights the social and behavioral issues in public health.

Course Contents

Module I: Introduction

Psychology and Public Health, Sociology & Public Health, Culture and Health, rural/urban migration, Urban Health

Module II: Family & Health

Inter-relationships between culture, society and environment, Ecology of health and disease, Demographic features of health and disease, interrelationship between human ecology, occupation, social changes and specific disease patterns.

Module III:

Cultural constraints to provision and utilization of healthcare, Socio-economics of health care, Socio-economic cost of disease

Examination Scheme:

Components	CP	V	A	ME	EE
Weightage (%)	10	5	5	10	70

Text & References:

- Marmot, Michael. 2005. Social determinants of Health Inequalities
- Linda Brannon, Jess Feist. *Health Psychology: An Introduction to Behavior and Health*, seventh edition.
- Jeannine Coreil. *Social and Behavioral foundations of Public Health*, Second edition.
- M Robin Dimatteo and Leslie R. Martin. *Health Psychology*, Pearson Education.

- Kaplan, R.M., Sallis J. F. Jr. & Patterson, T.L., Health & Human Behavior, McGraw-Hill, Inc.

HEALTHCARE DELIVERY SYSTEM & POLICIES

Course Code: PUH 4104

Credit Units: 03

Course Objective:

To provide the students a basic insight into the main features of Indian health care delivery system and how it compares with the other systems of the world.

Course Contents:

Module I: Health and Development

Concept of Health, illness, sickness and disease; Public health Indicators, Health and its determinants, Disease Burden in terms of DALY, Social context of Health – Culture, health belief model and social issues affecting health like urbanization etc; Gender and health, Nutrition and Health- National Nutrition Mission and Mid-Day Meal Program

Module II: Healthcare Systems & Delivery

Millennium development goals, Sustainable Development goals, Evolution of Health Planning in India, Concept and Elements of Primary Health Care, Rural Healthcare system in India , Indian Public Health Standards, Five Year Plans

Module III: Health Policies and Schemes

National Health Policy, Integrated Child Development Scheme, Reproductive Maternal Newborn Child and adolescent Health Scheme, , Universal Immunization Program, PradhanMantriSurakshitMatritvaAbhiyan, Ayushman Bharat, RashtriyaBalSwasthyaKaryakram, Rashtriya Kishore SwasthyaKaryakram, Mission Indradhanush, RashtriyaArogyaNidhi, PradhanMantriSwasthyaSurakshaYojna and National Oral Health Program.

Module IV: National Health Mission

National Urban Health Mission (NUHM), National Rural Health Mission, National AYUSH Mission, National Nutrition Mission,

Examination Scheme:

Components	CP	V	A	ME	EE
Weightage (%)	10	5	5	10	70

Text & References:

- K Park, *Preventive and Social Medicine*, Bansaridas Bhanot Publishing House.
- Brijesh C Purohit. *Health Care System in India: Towards Measuring Efficiency in Delivery of Services*
- Maxcy-Rosenau-Last, *Public Health & Preventive Medicine*, 14th Edition Ed Robert Wallace

BIOSTATISTICS**Course Code: PUH4106****Credit Units: 03**

Course Objective: The aim of this course is to develop the understanding of various statistical tools used for decisions making and how each applies to and can be used in the environment.

Course Contents:**Module I: Introduction**

Classification of data, Source of data, data organization Method of scaling - nominal, ordinal, ratio and interval scale, building composite scales, measuring reliability and validity of scales.

Module II: Properties of measurement & Probability distributions

- Measurement of central tendency, measurement of dispersion – Range, Mean deviation & Standard deviation.
- Concepts of probability, Probability distributions – Binomial, Poisson & Normal Probability Distribution.

Module III: Sampling

Sampling methods, Sampling Errors; Sampling distribution.

Module IV: Testing Hypothesis

Hypothesis Testing to compare two populations – Student's T-test, Interpretation of computer output of ANOVA, Chi – Square Test, F-test.

Module V: Forecasting Techniques

Correlation-Karl Person, Spearman's Rank methods, Regression Analysis, least squares method, coefficient of determination, Time Series Analysis

Examination Scheme:

Components	CP/P	V	A	ME	EE
Weightage (%)	10	5	5	10	70

Text & References:

- B.K. Mahajan. *Methods in Biostatistics*, Jaypee Brothers
- P.S.S. Sundar Rao. *An Introduction to Biostatistics: A manual for students in Health Sciences*, J.Richard Prentice Hall, 1996.
- Daniel, Wayne.W. *Bio-Statistics: A foundation for Analysis in the Health Sciences*, John Wiley and Sons Pub, 1991.
- K. Vishwas Rao. *Bio-Statistics: A Manual of statistical methods for use in the Health, Nutrition and Anthropology*, Jaypee Brothers Medical Pub, 1996.
- Verma B.L., Shukla G.D. *Bio-Statistics perspective in Health care research and practice*, C.B.S. Pub, 1993.
- Krishnaiah, P.K. Rao, C.R. (ed), *Handbook of Statistics*, Elsevier Science Pub, 1988.

APPLIED EPIDEMIOLOGY

Course Code: PUH4201

Credit Units: 03

Course Objective

To furnish the students with knowledge and skills regarding general principles of clinical trials research including regulatory, ethical principles & guidelines and theoretical idea about the design conduct and analysis of clinical trials

Course Contents

Module I: Epidemiological Methods & Screening for disease.

Sources of epidemiological data, concepts of screening, criteria for screening, sensitivity and specificity, disease surveillance, techniques for randomization, adverse events, investigation of an epidemic and role of a healthcare facility in its control.

Module II: Epidemiology and Public Health

Epidemiology and Public Health, different epidemiological perspectives, use of epidemiological tools for health planning and making a community diagnosis,

Module III: Epidemiological Tools

Epidemiological tools for monitoring and evaluation of health programmes, epidemiological considerations in development of management information systems, epidemiological basis for formulation of health interventions, interpretation of published epidemiological studies.

Examination Scheme:

Components	CP	V	A	ME	EE
Weightage (%)	10	5	5	10	70

Text & References

- Barkar, D.J.P., *Practical Epidemiology* : Churchill pub, 1982.
- E.A. Knox (ed). *Epidemiology in health care planning*, Oxford University Press, 1979.
- PV Sathe & AP Sathe. *Epidemiology & Management for Healthcare for all*.
- Aschengrau and Seage: *Essentials of Epidemiology in Public Health*
- Friis Robert: *Epidemiology for Public Health Practice*, Third Edition
- Szklo Moyses: *Epidemiology: Beyond the Basics*

ENVIRONMENTAL HEALTH & SANITATION

Course Code: PUH4204

Credit Units: 02

Course Objective

To provide the comprehensive knowledge in issues related to environment affecting health, sanitation and means of sustainable development.

Course Contents

Module I: Air, Noise and Water Pollution

- Air pollution: Pollutants and their resources, effects on human health, vegetation and climate of air pollution, ventilation, air pollution control legislation.
- Noise pollution: sources and effects, control measures
- Water pollution: sources, classification of water pollutants- organic waste, oxygen demanding waste, disease causing wastes, synthetic organic compounds. Sewage and agricultural run – off, inorganic pollutants suspended solids and sediments, radioactive materials, purification of water and waste water treatment.

Module II: Waste management

- Biomedical Waste management: classification, methods of treatment and disposal-compositing, sanitary land filling, thermal process, recycling and reuse.
- Hazardous waste management: sources, treatment and disposal.

Module III: Sustainable development and Environment

Climate change- ozone depletion, global warming, green house effect, urban problems related to energy, water conservation, rainwater harvesting, watershed management, resettlement and rehabilitation of people, waste minimization and cleaner production.

Examination Scheme:

Components	CP	V	A	ME	EE
Weightage (%)	5	5	5	15	70

Text & References:

- Moeller, D.W. *Environmental Health*, Harvard University Press, 2004

RESEARCH METHODOLOGY

Course Code: PUH4205

Credit Units: 03

Course Objectives:

- To provide basic understanding towards research principles and methods.
- To introduce important analytical tools for research data analysis.
- To assist in the development of research proposals/reports.

Course Contents:

Module I: Basics of Research

Definitions & uses of research in healthcare, Steps Involved in Research Process, Variables in research, Measurement scales, Formulation of research problems, writing research questions, Development of conceptual framework.

Module II: Sampling & Research Designs

Sampling, Sampling Procedure, Various types of Sampling Techniques, Sample size determination, reliability & validity in research, Research Designs- Non-experimental & experimental research designs.

Module III: Review of Literature & Hypothesis

Review of literature, Hypothesis- Meaning and types of hypothesis, Hypothesis testing, Type I & Type II errors in hypothesis testing.

Module III: Data Collection

Types of Data: Secondary and Primary, Different methods of data collection- Observation method, interview method, Questionnaire and schedule, Data Management: editing, entry and preparing data sets for analysis; Design and development of questionnaire.

Module IV: Research Reports

Structure and Components of Research Report, Types of Reports, Layout of Research Report, Method of writing a research report.

Module V: Research Ethics & Reference Writing

History of ethics in health research, Principles and Concepts in research ethics – confidentiality and privacy, informed consent, vulnerable subjects and special treatments, standards of care – principles, review processes etc.; Vancouver style of reference writing.

Examination Scheme:

Components	CP	V	A	ME	EE
Weightage (%)	10	5	5	10	70

Text & References

- Gummerrson, E. *Qualitative methods in Management Research*, Sage publications
- Verkevieser et al, *Designing and conducting Health Systems Research Projects* WHO and IDRC
- Grundy F and Reinke W A, *Health Practice Research and formalize Managerial Methods*, Geneva, WHO
- *Designing and conducting Health surveys*, Jossey Bass Publishers.

NATIONAL HEALTH PROGRAMMES

Course Code: PUH4206

Credit Units: 03

Course Objective

To give an idea about the background objectives, action plan, targets, operations, achievements and constraints of various National Health Programmes

Course Contents


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Module I: Introduction

Brief outline of health situation in India, Organization network for health and family welfare services at the centre, state, district and block level.

Module III: Key Health programmes in India – 1

National Health Mission, including Reproductive Child Health, Family Planning Programme, Universal Immunization Programme, Child Survival and Safe Motherhood Programme, Integrated Child Development Scheme, National AYUSH Mission, National Nutrition Mission.

Module III: Key Health programmes in India – 2

Ayushman Bharat, Pradhan Mantri Surakshit Matritva Abhiyan, Family Planning 2020, Reproductive Maternal Newborn Child and Adolescent Health Program, Rashtriya Bal Swasthya Karyakram, Rashtriya Kishore Swasthya Program, Mission Indradhanush, Pradhan Mantri, Rashtriya Arogya Nidhi, National Oral Health Program.

Examination Scheme:

Components	CP	V	A	ME	EE
Weightage (%)	10	5	5	10	70

Text & References

- GOI 2005, National Rural Health Mission: Meeting People's Health needs in rural areas, Framework for implementation, 2005-2012, MoHFW.
- GOI 2005, Report of National Commission on Macroeconomics and Health, MoHFW.
- GOI, MoHFW, Annual Report of various years.
- National Health Programmes of India by J Kishore

OPERATIONS RESEARCH

Course Code : PUH4301

Credit Units: 02

Course objectives:

- To provide basic OR approach to problem solving.
- To introduce important analytical tools for managerial decision making.

_ To introduce concepts of resource allocation & health service planning.

Course Contents:

Module I: Introduction

The OR approach to problem-solving and decision-making, Scope and limitations of OR in managerial decision-making.

Module II: Introduction to OR Techniques

Linear Programming, Decision Tree Analysis, Queuing theory, PERT/CPM.

Module III: OR Models

Replacement models, Sensitivity analysis, Assignment models, Inventory control models, Forecasting.

Module III: Applications of OR in Hospitals and Health Agencies

Resource allocation, Health services planning, Deployment of health human power, Materials Management, Equipment replacement, Patient scheduling.

Examination Scheme:

Components	CP	V	A	ME	EE
Weightage (%)	10	5	5	10	70

Text & References:

Operations Research in Hospitals: Diagnosis and prognosis, David H. Stimson, Ruth H. Stimson

Operations Research and Healthcare: A handbook of methods and Applications, Margaret L. Brandeau, Francois Sainfort, William P. Pierskalla

Patients Hospitals and Operational Research, Taylor Francis

Operations Research by P. Rama Murthy

Operations Research: Methods, Models and Applications, Jay E. Aronson and Stanley

QUALITY IN HEALTH CARE

Course Code: PUH4302

Credit Units: 01

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Course Objective: To understand the concept of quality and its relation to healthcare scenario benefits of quality managements, dimensions of quality in primary healthcare and various quality frameworks

Module I: Basics of Quality Management

Definitions, principles of quality, benefits of quality management, dimensions of quality in primary healthcare and various quality frameworks

Module II: Quality Improvement Approaches

Quality assurance cycle and developing standards.

TQM Quality Gurus: Deming, Juran and Crosby principles.

Benchmarking principles: Principles, types and process of benchmarking.

Medical Audits: Clinical Audit, its methodology and related statistics.

Module III: Quality Improvement Tools and Techniques:

Tools: Brainstorming, Cause effect analysis, Flow chart, Pareto Analysis, etc.

Lean Management: 4P model, Lean principles and its tools, 5 S technique, 3M techniques,

Kaizens theory, Jidoka & Andon, Throughput & Takt Time.

Six Sigma: Variation in performance, DMAIC & DFFS methodology, Champions, black belts and green belts, Six sigma applications and its benefits

Module IV: Accreditation

Benefits of hospital Accreditation, ISO certification, Quality Council of India (QCI),

National Accreditation Board for Hospitals & Healthcare providers (NABH) – Accreditation procedure assessment criteria and its standards

Module V: Cost and Quality

Prevention cost, Appraisal Cost, Internal & external failure costs, Net & Total cost of quality.

Examination Scheme:

Components	CP	V	A	ME	EE
Weightage (%)	10	5	5	10	70

Text & References:

- Total Quality Management- Aswathappa- Himalaya Book House
- Quality Management- P.C. Tripathy
- Hospital Quality Assurance: Risk Management & Program evaluation, Jesus J. Pena
- Donald E. Lighter and Douglas C Fair: Quality Management in Health care- Principles and Methods, Jones and Bartlett publishers, second edition.

- McLaughlin cp and Kalauzny AD. Total quality management in health , Healthcare management review



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NUTRITION

Course Code: PUH4303

Credit Units: 3

Course Objective: To cover the basics of human, community nutrition and issues related to food safety.

Course Contents

Module I: Basics of Nutrition

Classification of Foods by origin, chemical composition, predominant function & by nutritive value; Nutrients: Macro & Micro nutrients, Nutritional profiles of Principle Foods, Assessment of Nutritional status.

Module II: Disease specific nutrition

Nutritional Requirements, Diet modifications during various diseased condition – diabetes, obesity, heart diseases, civil and kidney, TB, HIV etc, Deficiency disorders & dietary management – PCM, anaemia, goitre and vitamin & mineral deficiency.

Module III: Community nutrition

Nutritional problems in Public Health, Nutritional surveillance, Prevalence of under nutrition and malnutrition in India, Malnutrition infection and infestation, effect of malnutrition in infancies, pregnant and lactating mothers, Nutrition organization programmes – national, international & voluntary organizations undertaken to combat malnutrition, policy & programmes for nutrition related issues and Balanced diet for preschool going children adolescents, pregnant and lactating mothers, old age & athletes.

Module IV: Food Safety

General principles of Hygiene, importance of food borne illness, prevention of contamination, food intoxicants, food additives, food standards, importance of safe drinking water, purification methods, Food borne diseases, Prevention of Food Adulteration Act 1954 and National Nutrition Policy 1993.

Examination Scheme:


Components	CP	V	A	ME	EE
Weightage (%)	10	5	5	10	70

Text & References:

- Dr. M Swaminathan. *Advanced textbook on food and Nutrition*, Bangalore Publishing Co. Ltd., 1974
- C Gopalan. *Recent Trends in Nutrition*, Oxford University Press, 1993.
- E. Savage King. *Nutrition for Developing Countries*, Oxford University Press, 1992.
- Dr. C. Gopalan. *Nutrition problems and Programmes in South East Asia*, WHO, 1987.
- Sumati R. Mudambi, M.V. Rajagopal, V.R. Damodharan *Fundamentals of food and Nutrition*, Wiley Eastern Ltd. , 1982.
- Nutritional Sciences: Sreelakshmi



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WOMEN & CHILD HEALTH

Course Code: PUH4304

Credit Units: 03

Course Objective

To impart an understanding of the scope of women and child health and to enable students to find and interpret relevant information on women and child health.

Course Contents

Module I: Women's Health

Concepts, definition and measures; customs, norms, attitudes and practices pertaining to various aspects of women's health including menstruation, puberty, childbirth and menopause; sexual and reproductive rights, infertility.

Module II: Adolescent Sexual Health & Family Planning

Adolescent sexual health & contraception: role and involvement of men in reproductive health, methods of family planning, contraception behavior, measurement and service delivery, quality of family planning care

Module III: Women's Health status in India

Gender, autonomy, empowerment and status of women, domestic violence in India, maternal mortality and morbidity, abortion, HIV, STIs.

Module IV: Child Health

Growth and development from infancy to childhood; Child health & morbidity; neonatal, infant & child mortality; IMR & U5MR; breastfeeding, weaning & supplementary feeding

Module V: Child Health Initiatives in India

Programmes and policies related to child health and development, health of physically and mentally challenges children, behavioral disorders, child abuse.

Examination Scheme:

Components	CP	V	A	ME	EE
Weightage (%)	10	5	5	10	70

Text & References:

- Dutta DC 2005. *Textbook of Obstetric and Gynaecology*, Rawat Pub.
- Gupta SD 2005. *Adolescent and Youth reproductive health in India*.
- Jejeebhoy S. 1998. *Adolescent sexual and reproductive health in India: review of the evidence from India*. Social science and medicine; 46-10.

HEATH PROGRAMME MANAGEMENT

Course Code: PUH4305

Credit Units: 03

Course Objective: To train the students in project management with special focus on formulation, implementation, monitoring and evaluation.

Course Contents

Module I: Introduction

Need for programme planning, Concept of programme planning, Process of planning: need assessment, community diagnosis. Micro-planning: need assessment in the community, Community involvement in planning.

Module II: Project Management Cycle

Situation analysis-SWOT, strategy formulation, Planning tools, Quality assurance in project management, activity based implementation plan, gender issues in project management, monitoring, MIS, evaluating, developing action plans, developing action plans for implementation.

Module III: System's Approach on Health Planning

Data needs for health planning, drawing national health plan, problem identification and priority setting, evolving a logical framework - setting goals, objectives and targets. Feasibility analysis and budgeting, Plan implementation, monitoring and evaluation.

Module IV: National Health Program Planning in India


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Role of Health Ministry, Planning Commission and Directorate of Health Services. Role of NGOs in Health planning and development. Analyzing the achievements of Five Year Plans in the health sector.

Examination Scheme:

Components	CP	V	A	ME	EE
Weightage (%)	10	5	5	10	70

Text & References

- David Shirley. *Project Management for health care*, CRC press.
- Beaufort B. Longest, Jr. *Managing Health programs and projects*, Jossey Bass publications.

SUMMER INTERNSHIP (EVALUTION)

Course Code: PUH4335

Credits Units: 06

Training Objective: To expose the student to various programmes/ activities in health sector and develop a comprehensive understanding of programme design, strategies and planned intervention.

Duration: 2 months

Format for Report Writing

1. Abstract
2. Introduction
3. Aims & Objectives
4. Operational definitions
5. Significance of Study
6. Review of literature
7. Research methodology
8. Data Analysis
9. Results
10. Discussion
11. Conclusion
12. Recommendations
13. Limitations of study

- 14. Future prospects of study
- 15. References

Guidelines for presentation-

- Power point presentation
- Time for presentation: 20 minutes
- Time for discussion: 10 minutes

Examination Scheme

Components	Presentation	Report submitted	Viva-voce
Weightage (%)	25	50	25

HEALTH INFORMATION SYSTEM

Course Code: PUH4401

Credit Units: 02

Course Objective

To understand the various indicators of health and health information system and health management information system in India.

Course Contents

Module I: Basics

Concept of information as a resource, understanding the principles of information system and Classification of information in health sector.

Module II: Managing Hospital Information Systems

- Data generated for HIS; Functions, Benefits and applications of HIS, HIS components, various performance Indicators, HIS model and data movement.
- HIS modules: Various HIS Modules for Clinicians Access, Nursing Access, In-patient Module, Registration Module, Diagnostic services Module, Dietetics Module, OT Module and Accident & Emergency Module etc.

- Setting strategic objectives for information systems, organizing an information systems department, Principles of systems development, Importance of security and confidentiality of data.

Module III: Role of Information Technology in Hospitals

Principles of information processing, Role of information technology in information processing, Role of database management systems, Role of communication in managing hospital information systems.

Module IV: Management Information System

Concept of Management Information System (MIS). Developing indicators, identifying data and developing tools of measurement. Use of MIS: monitoring progress and evaluation, hospital planning, monitoring employees, monitoring health development, decision making. Computerization of MIS: demonstration and critical analysis of different MIS software packages used in health projects in hospitals

Module V: Telemedicine

Concept of Telemedicine and its evolution, Telemedicine network in India, and Strengths & Opportunities for Telemedicine in India.

Examination Scheme:


Components	CP	V	A	ME	EE
Weightage (%)	10	5	5	10	70

Text & References

- S.C. Joshi & S.N. Mehta. *National Information System: Planning and Management*, Global vision publishing house.
- Jorgan Darre. *Implementing a Health Information System in India: Challenges and Opportunities for Scaling and Sustainability*
- *Information Technology in health care: Socio technical approaches, 2010*. IOS Press BV



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HEALTH INSURANCE

Course Code: PUH4402

Credit Units: 01

Course Objective

To acquaint students to the concept of HI and various HI products, so that the students are ready for challenges of healthcare insurance which is emerging as a sector holding great promise.

Course Contents

Module I: Introduction

History of Health Insurance, Principles of Health Insurance, Public Financing, Private Financing, Current trends in Health Insurance - International and Indian scenario, Economic and financial management of Health Insurance

Module II Health Insurance systems in India

- Private Health Insurance: Individual Health Plans, Mediclaim, Floaters plans, Third Party Administration, Benefits Management, Claims Management, IRDA
- Social Health Insurance: ESI, CGHS, RSBY
- Social and Community based Insurance: Microfinance

Examination Scheme:

Components	CP	V	A	CT 1	CT 2
Weightage (%)	20	15	5	30	30

Text & References

- Usha Mehta, A.D. Narde. *Health Insurance in India and Abroad*, Allied Publishers.
- Thomas K. T., Sakthivel R. *Health Insurance In India: Overcoming Challenges and Looking Ahead*, Lambert Academic Publishing, 2012.
- Michelle A. Green, JoAnne C. Rowell. *Understanding Health Insurance- A guide to billing and reimbursement*.
- William S Stevens. *Health Insurance- Current Issues and Background*, Nova Science Publishers.



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DISASTER MANAGEMENT

Course Code: PUH4403

Credit Units: 02

Course Objective

- To learn, identify and assess disasters in the community.
- To set-forth policies and procedures for disaster preparedness and to prepare disaster plan.

Course Contents

Module I: Basics of Disaster Management

Definitions, Determining risk of disaster, Classification of disaster on the basis of origin, source, onset & anticipated response; Disaster process, Effects of Disasters – Health issues, characteristics and geography of disasters, Impact of Disasters on the Hospitals

Module II: Disaster Management Process

Phases of disaster management, leadership, organization of medical relief, Triaging, Disaster Response – local, national & International; Disaster Management Act – 2005.

Module III: Disaster preparedness

Hospital Disaster Plan – its pre-requisites, principles and components; Hospital disaster management committee and its role; Hospital disaster manual.

Module IV: Fire Safety

Grades of fire and its causes; elements of fire safety, various fire extinguishers; and fire safety training.

Examination Scheme:

Components	CP	V	A	ME	EE
Weightage (%)	10	5	5	10	70

Text & References

- *A guide to emergency health management after natural disasters*, American health organization scientific publication.
- *Emergency vector control after Natural disaster*, American health organization scientific publication.
- *District Health facilities*, WHO regional publication western pacific services.
- *Medical supply management after natural disaster*, American health organization scientific publication.

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DISSERTATION

Course Code: PUH4437

Credits Units: 15

Internship Objective:

To impart the practical knowledge through research methods, help formulate a rigorous research problem related to public health sector on the basis of their observation, help do an independent study and encourage working in a team.

Pedagogy

- Identifying several situations amenable to dissertation work, writing a proposal and making a presentation to the Dissertation faculty advisory committee.
- Reporting to the committee on the progress of research work periodically.
- Making use of a variety of research methods.
- Defending the inference before the Examining Committee.

Report Contents:

Every student will do a detailed study on the topic selected for the dissertation, and is expected to prepare a two or three proposals which he intends to take up for the Dissertation. The Assigned guide will examine this and decide on the topic of dissertation. Report will comprise of following contents:

1. Abstract
2. Introduction
3. Aims & Objectives
4. Operational definitions
5. Significance of Study
6. Review of literature
7. Research methodology
8. Data Analysis
9. Results
10. Discussion
11. Conclusion
12. Recommendations
13. Limitations of study
14. Future prospects of study
15. References

Evaluation Scheme

Components	Presentation	Report submitted	Viva-voce
Weightage (%)	25	50	25

STEM CELL TECHNOLOGY

Programme Structure-2018

Course Code	Course Title	Lecture (L) Hours /Week	Tutorial (T) Hours /Week	Total Credits
SCT2151	Introduction to Stem Cell Technology	3	-	3
SCT2251	Fundamental Human Embryology & Developmental Biology	3	-	3
SCT2351	Fundamental Cell Biology and Human Anatomy & Physiology	3	-	3
SCT2451	Human Pluripotent Stem Cell Culture & Differentiation Methods	3	-	3
SCT2551	Therapeutic Applications of Human Pluripotent Stem Cells	3	-	3
SCT2651	Project & Paper Presentation	-	-	3
	TOTAL			18



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STEM CELL TECHNOLOGY

Syllabus - Semester First

INTRODUCTION TO STEM CELL TECHNOLOGY

Course Code: SCT2151

Credit Units: 03

Course Objective: The objective of this paper is to familiarize the students with stem cell technology and its applications for betterment of the society. The course is designed to give a broad view of mammalian stem cells, reviewing where they are found in the body, the different types and how they are cultured. The topics will cover the basic biology of these stem cells as well as bioengineering and application of these stem cells to potential treatments of human diseases.

Course Contents:

Module I: Introduction to stem cells

Definition, properties, proliferation, culture of stem cells, medical applications of stem cells, ethical and legal issues in use of stem cells.

Module II: Types of stem cells.

Stem Cell biology and therapy, types embryonic stem cell, Adult stem cell, Stem Cell Biology and Therapy, Embryonic Stem Cells, culture and the potential benefits of stem cell technology

Module III: Therapeutic applications of stem cells

Gene Therapy: Introduction, History and evolution of Gene therapy, optimal disease targets, Failures and successes with gene therapy and future prospects, Genetic Perspectives for Gene Therapy, **Gene Delivery** methods: Viral vectors and Non-viral Vectors

Module IV: Ethical Issues associated with stem cell-based regenerative medicine field

Regulatory and Ethical Considerations of stem cell and Gene Therapy, Assessing Human Stem Cell Safety, Use of Genetically Modified Stem Cells in Experimental Gene Therapies.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

Text:

- Stem Cell Biology, Daniel Marshak, Richard L. Gardener and David Gottlieb, Cold Spring Harbour Laboratory Press
- Stem cell biology and gene therapy, Booth C., Cell Biology International, Academic Press
- Stem Cell and Gene-Based Therapy: Frontiers in Regenerative Medicine, *Alexander Battler, Jonathan Leo*, Springer,

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References:

- Stem Cell Biology and Gene Therapy. Quesenberry PJ, Stein GS, eds. (£65.00.) Wiley, 1998.
- Progress in gene therapy, Volume 2, Pioneering stem cell/gene therapy trials, Roger Bertolotti, Keiya Ozawa and H. Kirk Hammond, VSP international science publishers
- Stem Cells Handbook: Stewart Sell, Humana Press; Totowa NJ, USA; Oct. 2003,
- Human Embryonic Stem Cells: The Practical Handbook by Stephen Sullivan and Chad A Cowan.



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Syllabus - Semester Second

FUNDAMENTAL HUMAN EMBRYOLOGY AND DEVELOPMENTAL BIOLOGY

Course Code: SCT2251

Credit Units: 03

Course Objective: The objective of this course is to familiarize students with fundamental process of human embryology and developmental biology and progression of pluripotent stem cells through different phases of development.

Course Contents:

Module-I: Basics principles of human embryogenesis--gametogenesis, fertilization and embryo development.

Module-II:

Ectoderm, mesoderm and endoderm development and process of organogenesis during human development.

Module-III:

Molecular regulation of embryogenesis and organogenesis processes during human development.

Module-IV:

Different types of stem cells, process and mechanism of stem cell subset development and their spatial organization during human development.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

Text:

- Human embryology and developmental biology 5th Edition by Bruce M. Carson.
- Larsen's Human Embryology (Schoenwolf, Larsen's Human Embryology) 4th Edition
- Atlas of Human Anatomy (Netter Basic Science) 7th Edition
- Developmental Biology, S.F. Gilbert, Sinauer Associates Inc.
- Gray's Anatomy for Students 3rd Edition by Richard Drake, Wayne Vogl and Adam W. M. Mitchell.

References:

- The Developing Human: Clinically Oriented Embryology 10th Edition by Keith L. Moore, T. V. N. Persaud MD and Mark G. Torchia.
- Developmental Biology, Tenth Edition 11th Edition by Scott F. Gilbert.
- Molecular Developmental Biology 2nd Edition by T. Subramoniam.


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Syllabus - Semester Third

FUNDAMENTAL CELL BIOLOGY, HUMAN ANATOMY AND PHYSIOLOGY

Course Code: SCT2351

Credit Units: 03

Course Objective: The objective of this course is to familiarize students with basic organization of adult somatic cells, human anatomy and normal physiology. Students will learn basic principles and mechanisms that dictate maintenance of pluripotency in pluripotent stem cells and their differentiation into adult stem cells, somatic cells, tissues and organs.

Course Contents:

Module-I:

Cell anatomy, organizational components, cell division mechanisms in normal adult cells and in pluripotent stem cells.

Module-II:

Introduction to epigenetics and its role in maintenance of pluripotency and differentiation of pluripotent stem cells into different somatic cell lineages.

Module-III:

Basics of Human anatomy & physiology and role of pluripotent stem cells and adult stem cells in maintenance of normal

Module-IV:

Effect of breach in normal cellular physiology and homeostasis on human development.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

Text:

- Molecular Biology of the Cell. B. Alberts, D. Bray, J. Lewis, M. Raff, K. Roberts and J.D. Watson, Garland Publishing
- Cell Biology, Thomas D. Pollard MD
- Atlas of Human Anatomy (Netter Basic Science) 7th Edition
- Gray's Anatomy for Students 3rd Edition by Richard Drake, Wayne Vogl and Adam W. M. Mitchell.

References:

- The Developing Human: Clinically Oriented Embryology 10th Edition by Keith L. Moore, T. V. N. Persaud MD and Mark G. Torchia.
- Gene VIII, Benjamin Lewin 2005, Oxford University Press
- Cell and Molecular Biology, Gerald Karp, John Wiley and Sons Inc.
- Cell and Molecular Biology, DeRobertis, B.I. Publication Pvt. Ltd.

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Syllabus - Semester Fourth

HUMAN PLURIPOTENT STEM CELL CULTURE & DIFFERENTIATION METHODS

Course Code: SCT2451

Credit Units: 03

Course Objective: The objective of this paper is to provide students greater understanding of different types of stem cells.

Course Contents:

Module-I:

Isolation of human Embryonic stem cells, generation of human induced pluripotent stem cells. History of human pluripotent stem cell development.

Module-II:

Methodologies for pluripotent stem cell culture, characterization of pluripotency and differentiation into different lineages.

Module-III:

Methods to engineer pluripotent stem cells for treatment of genetically impaired conditions/diseases.

Module-IV:

Ethical and regulatory issues affective pluripotent stem cell-based cell replacement therapies. Technological challenges towards development of pluripotent stem cell-based cell replacement therapies.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

- Human Pluripotent Stem Cells: Methods and Protocols (Methods in Molecular Biology) 2011th Edition by Philip H. Schwartz (Editor), Robin L. Wesselschmidt.
- Atlas of Human Pluripotent Stem Cells: Derivation and Culturing (Stem Cell Biology and Regenerative Medicine) 2011 by Michal Amit and Joseph Itskovitz-Eldor.
- Stem Cell and Gene-Based Therapy: Frontiers in Regenerative Medicine, *Alexander Battler, Jonathan Leo*, Springer,

References:

- Stem Cell Biology, Daniel Marshak, Richard L. Gardener and David Gottlieb, Cold Spring Harbour Laboratory Press
- Stem cell biology and gene therapy, Booth C., Cell Biology International, Academic Press


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Syllabus - Semester Fifth

THERAPEUTIC APPLICATIONS OF HUMAN PLURIPOTENT STEM CELLS

Course Code: SCT2551

Credit Units: 03

Course Objective: The objective of this paper is to familiarize students with different therapeutic areas that can benefit with pluripotent stem cell-based cell replacement therapies.

Course Contents:

Module-I:

Principles of cell replacement therapy and application of pluripotent stem cells in cell replacement therapy.

Module-II:

Application of pluripotent stem cells in neuronal disease management and treatment.

Module-III:

Application of pluripotent stem cells in ocular and cardiovascular diseases management and treatment.

Module-IV:

Application of pluripotent stem cells in treatment of autoimmune complications and cancer management and treatment.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

Text:

- Frontiers in Pluripotent Stem Cells Research and Therapeutic Potentials Bench-To-Bedside, 2018, by Kuldip S. Sidhu.
- Patient-Specific Induced Pluripotent Stem Cell Models: Generation and Characterization (Methods in Molecular Biology) 1st ed. by Andras Nagy (Editor) and Kursad Turksen (Editor)
- Stem Cell and Gene-Based Therapy: Frontiers in Regenerative Medicine, *Alexander Battler, Jonathan Leo*, Springer.

References:

- Stem Cell Biology and Gene Therapy. Quesenberry PJ, Stein GS, eds. (£65.00.) Wiley, 1998.
- Stem Cells Handbook: Stewart Sell, Humana Press; Totowa NJ, USA; Oct. 2003.
- Frontiers in Pluripotent Stem Cells Research and Therapeutic Potentials Bench-To-Bedside, 2018, by Kuldip S. Sidhu.


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Syllabus - Semester Sixth

PROJECT & PAPER PRESENTATION

Course Code: SCT2651

Credit Units: 03

Course Objective: The objective of this course is to help students acquire scientific skills to formulate research hypothesis and design research projects to test those hypotheses. The course will also help students to acquire/improve research presentation skills.

Course Contents:

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	-	-	100	-



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Curriculum & Scheme of Examination

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PLANT & ANIMAL DIVERSITY LAB

Course Code: BLS2106

Credit Units-02

Course Contents:

Module I: Algae & Fungi

Study of Algal types with the help of permanent slides and also by preparing suitable slides as prescribed in the theory course. (Chlamydomonas, Chara, Sargassum, Polysiphonia,)

Study of Fungal types with the help of permanent slides and also by preparing suitable slides as prescribed in the theory course. (Eurotium, Morchella, Agaricus)

Module II: Bryophytes & Pteridophytes

Study of Bryophytes like Riccia, Marchantia, Anthoceros pteridophytes like Selaginella, Equisetum, and Marsilea with the help of permanent slides and also by cutting sections and making suitable preparations with the help of permanent slides and also by cutting sections and making suitable preparations.

List of Practicals

- Study of the following specimens (classification and characteristics):
Amoeba, Euglena, Plasmodium, Paramecium, Sycon, Hyalonema, and Euplectella, Obelia, Physalia, Aurelia, Taenia solium, Male and female Ascaris lumbricoides, Aphrodite, Nereis, Pheretima, Hirudinaria, Palaemon, Crab, Limulus, Palamnaeus, Scolopendra, Pila, Unio, Loligo, Octopus, star fish.
- Study of the following permanent slides:
T.S. and L.S. of Sycon, Study of life history stages of Plasmodium, T.S. of Male and female Ascaris

IA			EE			
Class Test (Practical Based)	Mid Term Viva	Attendance	Major Experiment	Minor Experiment/Spotting	Practical Record	Viva
15	10	05	35	15	10	10

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CHEMISTRY LAB - I

Course Code: BLS2107

Credit Units: 01

Course Contents:

INORGANIC CHEMISTRY

Module I

Volumetric analysis: Oxidation-reduction titration using KMnO_4 and $\text{K}_2\text{Cr}_2\text{O}_7$

Module II

Iodometry titrations: Estimation of sodium thiosulphate & potassium dichromate.

Module III

Preparation of the following inorganic compounds: Prussian blue from iron fillings, chrome alum, cuprous chloride and potassium trioxalatochromate.

PHYSICAL CHEMISTRY

Module IV

Determination of surface tension and viscosity of liquids

Module V

Heat of neutralisation of a strong acid and a strong base.

Module VI

Solubility curve of KNO_3 or benzoic acid.



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PHYSICS LAB - I

Course Code: BLS2108

Credit Units-01

Course Contents:

1. Young's modulus – non uniform bending – pin and microscope.
2. Rigidity modulus – Static Torsion Method Using Scale and Telescope.
3. Rigidity modulus – Torsional oscillation method (without symmetric masses).
4. Determination of Co-efficient of Viscosity – Graduated Burette.
5. Surface Tension and Interfacial Tension – By drop weight method.
6. Specific Heat Capacity of a liquid – by Newton's Law of Cooling.
7. Sonometer – Determining A.C. Frequency. (Screw Gauge is given).
8. Sonometer – frequency of tuning fork.
9. Newton's Rings – Radius of Curvature.
10. Air Wedge – Determination of thickness of thin wire.

Any other experiment carried out in the class.

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.



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PLANT DIVERSITY LAB

Course code: BLS2206

Credit Unit: 1

Course objective:

Course objective is to provide the knowledge about plant science that should be useful to understand and apply different concepts about the diversity and complexity of plants.

Course Contents:

Module I:

Gymnosperms Study of the Gymnosperms like *Cycas*, and *Pinus* by cutting sections and making suitable temporary preparations.

Module II:

Taxonomy Detailed description and identification of locally available plants of the families as prescribed in theory course.

Module III:

Plant Anatomy Anatomy of normal dicot and monocot roots, stems & leaves.

Module IV:

Embryology Study of permanent slides of the:

- a) T.S. anther, pollen, germinating pollen
- b) L.S. ovule types
- c) Endosperm
- d) Embryos
- e) L.S. caryopsis
- f) Dissection of embryo

Module V:

Plant Pathology Examination of local diseased plants representing bacterial, viral, fungal parasites. Study of symptoms caused by parasites, study of selected diseased specimen (mentioned under theory) through specimens, temporary presentations.

Module VI:

Ecology Measurement of temperature (Soil). Demonstration of Soil texture, carbonate, sulphate, pH, soil moisture percentage. A comparative study of plants (with external and internal characters) to water availability.

Examination Scheme:

IA			EE			
Class Test (Practical Based)	Mid Term Viva	Attendance	Major Experiment	Minor Experiment/Spotting	Practical Record	Viva
15	10	05	35	15	10	10


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CHEMISTRY LAB-II

Course Code: BLS2207

Credit Units: 01

Module I

Qualitative analysis of inorganic mixtures, containing not more than four ionic species (excluding insoluble substances) out of the following:

Pb²⁺, Hg²⁺, Hg₂²⁺, Ag¹⁺, Bi³⁺, Cu²⁺, Cd²⁺, As³⁺, Sn²⁺, Sn⁴⁺, Fe²⁺, Fe³⁺, Al³⁺, Co²⁺, Ni²⁺, Mn²⁺, Zn²⁺, Ba²⁺, Sr²⁺, Ca²⁺, Mg²⁺, NH₄¹⁺, K¹⁺, CO₃²⁻, S²⁻, SO₃²⁻, NO₂¹⁻, CH₃COO¹⁻, F¹⁻, Cl¹⁻, Br¹⁻, I¹⁻, NO₃¹⁻, SO₄²⁻, C₂O₄²⁻, PO₄³⁻, BO₃³⁻.

Module II

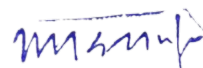
Purification of Organic compounds by crystallization (from water or alcohol) and distillation.

Examination Scheme:

IA			EE			
Class Test (Practical Based)	Mid Term Viva	Attendance	Major Experiment	Minor Experiment/Spotting	Practical Record	Viva
15	10	05	35	15	10	10



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PHYSICS LAB-II

Course Code: BLS2208

Credit Units: 01

Course Contents:

1. Spectrometer Grating – Minimum Deviation – Mercury Lines.
2. Spectrometer – Refractive Index of a liquid – Hollow Prism.
3. Potentiometer – Calibration of High Range Ammeter.
4. Potentiometer – Calibration of Low Range Voltmeter.
5. Determination of M and BH using Deflection Magnetometer in Tan C position and vibration magnetometer.
6. Figure of merit and voltage sensitiveness of table galvanometer.
7. Construction of AND, OR gates using diodes and NOT by transistors.
8. Zener diode – Voltage Regulation.
9. NAND / NOR as universal gate.
10. Demorgan's theorem verification.

Any other experiments can be carried out in class.

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.



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PLANT ANATOMY LAB

Course Code BLS2305

Credit Units: 01

Module-I

Microscopy, Photography, and Plant Diversity

Module-II

Experimental study of Plant Cells; Cell Walls and Pits; Shoot Apical Meristem; Shoot Apical Meristem

Module-III

Experimental study of Xylum, Phloem; Vascular Cambium and Wood

Examination Scheme:

IA			EE			
Class Test (Practical Based)	Mid Term Viva	Attendance	Major Experiment	Minor Experiment/Spotting	Practical Record	Viva
15	10	05	35	15	10	10



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ANIMAL ANATOMY LAB

Course Code: BLS2305

Credit Units : 01

Module-I

Study of permanent slides (mammalian tissues)

1. T. S. of long bone
2. Study of smooth, skeletal and cardiac muscle
3. T. S. of spleen
4. T.S. of thyroid gland
5. T. S. of pancreas
6. T.S. of adrenal gland

Module II

Preparation of stains

1. Ehrlich's Alum Haematoxylin
2. Deafield's Harmatoxylin
3. Acetocarmine
4. Eosin

Module III

Temporary mounting of buccal mucosa, skeletal muscle, blood smear.

Module IV

Histological preparation : Fixation to section cutting and staining of a suitable mammalian tissue

Examination Scheme:

IA			EE			
Class Test (Practical Based)	Mid Term Viva	Attendance	Major Experiment	Minor Experiment/Spotting	Practical Record	Viva
15	10	05	35	15	10	10



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CELL BIOLOGY AND GENETICS LAB

Course Code: BLS2306

Credit Units : 01

Course Contents:

Module I

Cell fractionation and separation of cell organelles by ultra centrifugation

Module II

Isolation of chloroplast from spinach

Module III

Isolation of mitochondria

Module IV

1. Study of gene interaction.
2. Study of bacterial conjugation.
3. Study of bacterial transduction.
4. Study of physical and chemical mutagens on growth of E. coli.

Examination Scheme:

IA			EE			
Class Test (Practical Based)	Mid Term Viva	Attendance	Major Experiment	Minor Experiment/Spotting	Practical Record	Viva
15	10	05	35	15	10	10



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PROJECT (WITH PRESENTATION AND EVALUATION)

Course Code: BLS2332

Credit Units: 04

Objectives:

The aim of the project is to provide the students with an opportunity to further their intellectual and personal development in the chosen field by undertaking a significant practical unit of activity. The project can be defined as a scholarly inquiry into a problem or issues, involving a systematic approach to gathering and analysis of information / data, leading to production of a structured report.

Chapter Scheme and distribution of marks:

Chapter 1: Introduction – 10 marks

Chapter 2: Conceptual Framework/ National/International Scenario – 25 marks

Chapter 3: Presentation, Analysis & Findings -- 25 marks

Chapter 4: Conclusion & Recommendations -- 10 marks

Chapter 5: Bibliography -- 05 marks

Project Report	Power Point Presentation & Viva
75 marks	25 marks

Components of a Project Report

The outcome of Project Work is the Project Report. A project report should have the following components:

1) Cover Page: This should contain the title of the project proposal, to whom it is submitted, for which degree, the name of the author, name of the supervisor, year of submission of the project work, name of the University.

2) Acknowledgement: Various organizations and individuals who might have provided assistance /co-operation during the process of carrying out the study.

3) Table of Content: Page-wise listing of the main contents in the report, i.e., different Chapters and its main Sections along with their page numbers.

4) Body of the Report: The body of the report should have these four logical divisions

a) **Introduction:** This will cover the background, rationale/ need / justification, brief review of literature, objectives, methodology (the area of the study, sample, type of study, tools for data collection, and method of analysis), Limitations of the Study, and Chapter Planning.

b) **Conceptual Framework / National and International Scenario:** (relating to the topic of the Project).

c) **Presentation of Data, Analysis and Findings:** (using the tools and techniques mentioned in the methodology).

d) **Conclusion and Recommendations:** In this section, the concluding observations based on the main findings and suggestions are to be provided.

5) Bibliography or References: This section will include the list of books and articles which have been used in the project work, and in writing a project report.

6) Annexures: Questionnaires (if any), relevant reports, etc.

(The main text of the Project should normally be in the range of 5000 words. However, there may be annexure in addition to the main text)

The Steps of a Project Report

Step I : Selection of the topic for the project by taking following points into consideration:

- Suitability of the topic.
- Relevance of the topic
- Time available at the disposal.
- Feasibility of data collection within the given time limit.
- Challenges involved in the data collection (time & cost involved in the data collection, possibility of getting responses, etc.)

Step II : Finalisation of the Topic and preparation of Project Proposal in consultation with the Supervisor.

Step III : Collection of information and data relating to the topic and analysis of the same.

Step IV : Writing the report dividing it into suitable chapters, viz.,

Chapter 1: Introduction,

Chapter 2: Conceptual Framework / National & International Scenario,

Chapter 3: Analysis & Findings

Chapter 4: Conclusion and Recommendations.

Step V : The following documents are to be attached with the Final Project Report.

1) Approval letter from the supervisor (Annexure-IA)

2) Student's declaration (Annexure-IB)

3) Certificate from the Competent Authority of the Organisation / Institution, if the student undertakes the Project Work in any Organisation / Institution.

Guidelines for Evaluation:

- Each of the students has to undertake a Project individually under the supervision of a teacher and to submit the same following the guidelines stated below.
- Language of Project Report and Viva-Voce Examination may be English. The Project Report must be typed and hard bound.
- Failure to submit the Project Report or failure to appear at the Viva-voce Examination will be treated as "Absent" in the Examination. He /she has to submit the Project Report and appear at the Viva-Voce Examination in the subsequent years (within the time period as per University Rules).
- No marks will be allotted on the Project Report unless a candidate appears at the Viva-Voce Examination. Similarly, no marks will be allotted on Viva-Voce Examination unless a candidate submits his/her Project Report.
- Evaluation of the Project Work to be done jointly by one internal expert and one external expert with equal weightage, i.e., average marks of the internal and external experts will be allotted to the candidate.



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MICROBIOLOGY

Course Code: BLS2403

Credit Units: 03

Course Objective:

To acquaint the students about the microbiology and role of various microorganisms in different biotechnological applications, various techniques for their cultivation and control

Course Contents:

Module I: Introduction and historical perspective

Discovery of microbial world, Concept of pure culture, Theory and practice of sterilization; Isolation of microorganisms, staining methods, microscopy, preservation of microbial cultures

Module II

Microbial Physiology: cell structure and function. Microbial growth: Growth curve, Enumeration of cells by direct and indirect methods, Microbial fermentations, Microbial Stress Responses.

Module III

Evolutionary microbiology and microbial diversity: Microbial evolution and systematics, prokaryotic diversity: bacteria and archaea, eukaryotic microorganisms (structure of algae and fungi), microbial community analysis (overview), classical and molecular taxonomy.

Virology: Viruses and virions, growth and quantification, viral replication, viroids and prions, Bacterial, plant and animal viruses,

Module IV

Microbial Ecology Methods in microbial ecology (culture dependent and culture independent techniques), microbial habitats and nutrient cycling (Carbon, sulphur and nitrogen cycles), plant-microbes, animal-microbes interactions. Soil microorganisms associated with vascular plants, bioremediation and biodegradation.

Module V

Applied microbiology: Biocatalysts, microbial metabolites, wine production, single cell proteins, microbial transformation of steroids, role of microbes in food industry, production of dairy products (fermented milks and cheese), Role of microbes in Agriculture (biofertilizers, biopesticides), Waste water treatment.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

- Brock Biology of Microorganisms by Madigan, Martinko, Stahl, Clark, Publisher : 13th Edition, Prentice Hall
- General Microbiology by R.Y. Stainer et al. Publisher : McMillan
- Microbiology, Prescott and Dunn, C.B.S. Publishers

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BIOSTATS & BIOINFORMATICS

Course Code: BLS2404

Credit Units: 03

Course Objective:

Course objective is to provide the knowledge that should be useful to understand different concepts of molecular properties of basic life molecules like proteins nucleic acids and their relative structure and function across the genus or kingdom

Module I:

Introduction to Molecular modeling, data bases for proteins and DNA – PDB and MMDB, structure file formats, visualizing structural information, advance structure modeling, Internal and external co-ordinate system, cartesian and cylindrical polar co-ordinate system, Potential energy calculations using semiempirical potential energy function,

Module II:

Software and Programmes for sequence comparison and analysis, Phylogenetics analysis software, Molecular Structure drawing tool,

Module III:

Molecular modeling/Docking, Molecular mechanics and dynamics, Knowledge base structure prediction, Molecular Design, structure similarity searching; Secondary structure prediction in proteins, prediction of buried residues in proteins

Module IV

Application of molecular modeling & computational biology/Bioinformatics in Agriculture, Human health, Environment, Biotechnology, Molecular Biology, Neurobiology, Drug Designing, Veterinary Science.

Module V: Introduction to the following Statistical terms

Parameter, Statistic, Null hypothesis, Alternative hypothesis, Critical region, Type1 Error, Type 11 Error, Level of significance, P-value and its applications.

Test of Significance for Small samples: One sample t-test, Paired t-test, Degrees of freedom for t-test, F test for equality of Population variances, Degrees of freedom for F-test.

Test of Significance for Large samples: Normal test for sample mean and population mean, Normal test for two sample means.

Chi-square Test: Test of goodness of fit, Test of Independence of attributes, Degrees of freedom for Chisquare test, Coefficient of contingency, Yates' correction for continuity.

Analysis of Variance: One way and Two way (only Examples)

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70



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Text & References:

- Bioinformatics: Sequence and Genome Analysis, D.W. Mount, Cold Spring Harbor Laboratory Press.

References:

- Algorithms on Strings, Trees, and Sequences: Computer Science and Computational Biology, D. Gusfield, Cambridge University Press.
- Biocomputing hypertext coursebook at <http://www.techfak.unibielefeld.de/bcd/Curric/welcome.html/>
- Bioinformatics: A Practical Guide to the Analysis of Genes and Proteins, A.D. Baxevanis and B.F.F. Ouellette, Wiley-interscience.
- Computational Modeling of Genetic and Biochemical Networks, J.M. Bower and H. Bolouri, MIT Press
- Computational Molecular Biology: An Algorithmic Approach, P.A. Pevzner, MIT Press
- Computer Methods for Macromolecular Sequence Analysis, R.F. Doolittle, J.N. Abelson, M.I. Simon, Academic press
- Essentials of Genomics and Bioinformatics, C.W. Sensen, John Wiley and Sons Inc.
- Introduction to Bioinformatics, T. Attwood and D. Parry-Smith, Prentice Hall
- Introduction to Computational Biology: Maps, Sequences and Genomes, M. Waterman, Chapman and Hall
- Sequence Analysis in Molecular Biology: Treasure Trove or Trivial Pursuit, G. V. Heijne and G.V. Heijne, Academic Press
- Introduction to Biostatistics, Ronald N. Forthfer and Eun Sun Lee, Publisher: Elsevier.
- Statistical Methodology, S.P. Gupta, Publisher: S. Chand & Co.
- Fundamentals of Statistics, S.C. Gupta. Publisher: S.Chand & Co.
- Biostatistics: A manual of Statistical Methodology for use in Health, Nutrition and Anthropology, K. Visweswara Rao. Publisher: Jaypee Brothers
- Biostatistics: A foundation for analysis in the Health Sciences, W.W. Daniel, Publisher: John Wiley and Sons
- Fundamentals of Mathematical Statistics, S.C. Gupta and V.K. Kapoor, Publisher: S.Chand & Co.
- Statistical Analysis, Kaushal, T.L. Publisher: Kalyani Publishers
- Statistical Methods, Potri, D. Kalyani Publishers.
- Mathematical Statistics, H.C. Saxena, and V.K. Kapoor: S. Chand & Company
- Biostatistics, P.N. Arora and P.K. Malhan, Publisher: Himalaya Publishing House.



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ECOLOGY & EVOLUTION

Course Code BLS2405

Credit Units : 03

Course Objective:

The term environment is used to describe, in the aggregate, all the external forces, influences and conditions, which affect the life, nature, behaviour and the growth, development and maturity of living organisms. At present a great number of environment issues, have grown in size and complexity day by day, threatening the survival of mankind on earth. A study of environmental studies is quite essential in all types of environmental sciences, environmental engineering and industrial management. The objective of environmental studies is to enlighten the masses about the importance of the protection and conservation of our environment and control of human activities which has an adverse effect on the environment.

Course Contents:

Module I: The multidisciplinary nature of environmental studies

Definition, scope and importance

Need for public awareness

Module II: Natural Resources

Renewable and non-renewable resources:

Natural resources and associated problems

Forest resources: Use and over-exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forests and tribal people.

Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems.

Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies.

Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies.

Energy resources: Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources, case studies.

Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification.

- Role of an individual in conservation of natural resources.
- Equitable use of resources for sustainable lifestyles.

Module III: Ecosystems

Concept of an ecosystem

Structure and function of an ecosystem

Producers, consumers and decomposers

Energy flow in the ecosystem

Ecological succession

Food chains, food webs and ecological pyramids

Introduction, types, characteristic features, structure and function of the following ecosystem:

- a. Forest ecosystem
- b. Grassland ecosystem
- c. Desert ecosystem
- d. Aquatic ecosystems (ponds, streams, lakes, rivers, ocean estuaries)

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Module IV: Biodiversity and its conservation

Introduction – Definition: genetic, species and ecosystem diversity

Biogeographical classification of India

Value of biodiversity: consumptive use, productive use, social, ethical aesthetic and option values

Biodiversity at global, national and local levels

India as a mega-diversity nation

Hot-spots of biodiversity

Threats to biodiversity: habitat loss, poaching of wildlife, man wildlife conflicts

Endangered and endemic species of India

Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity

Module V: Environmental Pollution

Definition Causes, effects and control measures of:

- a. Air pollution
- b. Water pollution
- c. Soil pollution
- d. Marine pollution
- e. Noise pollution
- f. Thermal pollution
- g. Nuclear pollution

Solid waste management: Causes, effects and control measures of urban and industrial wastes.

Role of an individual in prevention of pollution.

Pollution case studies.

Disaster management: floods, earthquake, cyclone and landslides.

Module VI: Social Issues and the Environment

From unsustainable to sustainable development

Urban problems and related to energy

Water conservation, rain water harvesting, watershed management

Resettlement and rehabilitation of people; its problems and concerns. Case studies.

Environmental ethics: Issues and possible solutions

Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case studies.

Wasteland reclamation

Consumerism and waste products

Environmental Protection Act

Air (Prevention and Control of Pollution) Act

Water (Prevention and control of Pollution) Act

Wildlife Protection Act

Forest Conservation Act

Issues involved in enforcement of environmental legislation

Public awareness

Module VII: Human Population and the Environment

Population growth, variation among nations

Population explosion – Family Welfare Programmes

Environment and human health

Human Rights

Value Education

HIV / AIDS

Women and Child Welfare

Role of Information Technology in Environment and Human Health
Case Studies

Module VIII: Field Work

Visit to a local area to document environmental assets-river / forest/ grassland/ hill/ mountain.

Visit to a local polluted site – Urban / Rural / Industrial / Agricultural

Study of common plants, insects, birds

Study of simple ecosystems-pond, river, hill slopes, etc (Field work equal to 5 lecture hours)

Examination Scheme:

Components	CT	HA	S/V/Q	A	EE
Weightage (%)	15	5	5	5	70

Text & References:

- Agarwal, K.C. 2001 Environmental Biology, Nidi Publ. Ltd. Bikaner.
- Bharucha Erach, The Biodiversity of India, Mapin Publishing Pvt. Ltd., Ahmedabad 380 013, India, Email:mapin@icenet.net (R)
- Brunner R.C., 1989, Hazardous Waste Incineration, McGraw Hill Inc. 480p
- Clark R.S., Marine Pollution, Clanderson Press Oxford (TB)
- Cunningham, W.P. Cooper, T.H. Gorhani, E & Hepworth, M.T. 2001, Environmental Encyclopedia, Jaico Publ. House, Mumabai, 1196p
- De A.K., Environmental Chemistry, Wiley Eastern Ltd.
- Down to Earth, Centre for Science and Environment (R)
- Gleick, H.P. 1993. Water in Crisis, Pacific Institute for Studies in Dev., Environment & Security. Stockholm Env. Institute Oxford Univ. Press. 473p
- Hawkins R.E., Encyclopedia of Indian Natural History, Bombay Natural History Society, Bombay (R)
- Heywood, V.H & Waston, R.T. 1995. Global Biodiversity Assessment. Cambridge Univ. Press 1140p.
- Jadhav, H & Bhosale, V.M. 1995. Environmental Protection and Laws. Himalaya Pub. House, Delhi 284 p.
- Mckinney, M.L. & School, R.M. 1996. Environmental Science Systems & Solutions, Web enhanced edition. 639p.
- Mhaskar A.K., Matter Hazardous, Techno-Science Publication (TB)
- Miller T.G. Jr. Environmental Science, Wadsworth Publishing Co. (TB)
- Odum, E.P. 1971. Fundamentals of Ecology. W.B. Saunders Co. USA, 574p
- Rao M N. & Datta, A.K. 1987. Waste Water treatment. Oxford & IBH Publ. Co. Pvt. Ltd. 345p.
- Sharma B.K., 2001. Environmental Chemistry. Geol Publ. House, Meerut
- Survey of the Environment, The Hindu (M)
- Townsend C., Harper J, and Michael Begon, Essentials of Ecology, Blackwell Science
- Trivedi R.K., Handbook of Environmental Laws, Rules Guidelines, Compliances and Standards, Vol I and II, Enviro Media (R)
- Trivedi R. K. and P.K. Goel, Introduction to air pollution, Techno-Science Publication (TB)
- Wanger K.D., 1998 Environnemental Management. W.B. Saunders Co. Philadelphia, USA 499p

PLANT PHYSIOLOGY LAB

Course Code: BLS2406

Credit Units: 01

Plant Physiology

- Effects of plant growth hormones on rooting and shooting.
- Estimation of salicylic acid as secondary signaling molecule in plants
- Separation of photosynthetic pigments through thin layer chromatography
- Determination of Respiration Quotient (RQ)

Examination Scheme:

IA			EE			
Class Test (Practical Based)	Mid Term Viva	Attendance	Major Experiment	Minor Experiment/Spotting	Practical Record	Viva
15	10	05	35	15	10	10



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ANIMAL PHYSIOLOGY LAB

Course Code: BLS2406

Credit Units: 01

Animal Physiology

- Enumeration of red blood cells using hemocytometer.
- Estimation of haemoglobin using Sahli's hemoglobinometer.
- Preparation of haemin and hemochromogen crystals.
- Enumeration of total and differential count of white blood cells.
- Effect of pH on amylase activity from saliva.
- Biochemical analysis: carbohydrate, proteins and fats.
- Estimation of serum bilirubin (direct and indirect method).

Examination Scheme:

IA			EE			
Class Test (Practical Based)	Mid Term Viva	Attendance	Major Experiment	Minor Experiment/Spotting	Practical Record	Viva
15	10	05	35	15	10	10



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MICROBIOLOGY LAB

Course Code: BLS2407

Credit Units: 01

Course Contents:

- Laboratory safety and instrument handling, General rules and regulations, Aseptic techniques, preparation of culture media for cultivation of specific microorganisms.
Observation of permanent slides (*E.coli*, *Yeast*, *Sarcina*, *Streptococcus*, *Acid fast staining*)
- Isolation and enumeration of microorganisms from air, water and rhizosphere (actinomycetes, bacteria and fungi), serial dilution and viable plate counting methods, Use of differential, selective and enriched media.
- Staining techniques: Simple staining, differential Gram staining, endospore staining, lactophenol cotton blue staining for fungi
- Growth curve measurement of bacterial population by turbidometry
- Biochemical tests – Triple Sugar Iron test (TSI) , Indole test. Methyl red test. Voges proskaeur test, Citrate utilization test (IMViC), starch hydrolysis, casein hydrolysis, catalase test
- Water microbiology- presumptive, confirmed and complete test for water potability.

Examination Scheme:

IA			EE			
Class Test (Practical Based)	Mid Term Viva	Attendance	Major Experiment	Minor Experiment/Spotting	Practical Record	Viva
15	10	05	35	15	10	10

Text & References:

- Microbiology: A laboratory Manual, Seventh Edition, by: Cappuccino and Sherman
- Microbes in Action, Fourth Edition:by Harry W. Seeley, Cornell University; Paul J. Vandemark, late of Cornell University; John J. Lee,



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MOLECULAR BIOLOGY

Course Code: BLS2501

Credit Units: 03

Course Objective:

The objective of the course is to provide a clear understanding of DNA (genetic material) so that they can manipulate it and understand basic tools and techniques involved in its manipulation. Strong foundation in molecular biology enables the students to familiarize themselves with Genetic engineering technology.

Course Contents:

Module I: DNA replication and repair

DNA structure, DNA replication; DNA repair mechanism,

Module II: Transcription of DNA

Transcription in prokaryotes and eukaryotes, RNA polymerase – Composition and function; transcription mechanism; transcription factor and their role, inhibition of RNA synthesis

Module III: Processing of RNA

Processing of ribosomal and transfer RNA's processing of mRNA-5'cap formation; 3' polyadenylation ; RNA splicing , RNA editing , RNA degradation.

Module IV: Translation

Translation mechanism in prokaryotes and eukaryotes; ribosomes, initiation of translation, elongation, termination, amino acid activation; inhibitors, post translation modification of protein

Module V: Regulation of gene expression

Regulation in prokaryotes – repressors and negative control, positive control, role of c AMP, **Amprceptor** protein, lac, tryp, His and ara operons, Regulation in Eukaryotes=promoters and enhancers, transcriptional regulatory protein, transcriptional activators, eukaryotic repressor.

Module VI: Gene Silencing

Antisense molecules; Biochemistry of ribozyme, Hammer head, hairpin ribozymes. Application of antisense and ribozymes in genetic engineering.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70



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Text & References:**Text:**

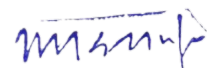
- Concepts of Genetics, W.S. Klug, and M.R. Cummings 2004, Pearson Education

References:

- Genome, T.A. Brown, John Willey & Sons Inc.
- Molecular Biology of the Cell by Alberts Bruce, Bray Demos, and Watson James D.
- Gene VIII, Benjamin Lewin 2005, Oxford University Press
- Molecular Cell Biology, H. Lodish, A. Berk, S. Zipursky, P Matsundaira, D. Baltimore and J.E. Barnell, W.H. Freeman and Company.
- Molecular Cloning: A Laboratory Manual (3-Vilcume set), J. Sambrook, E.F. Fritsch and T. Maniatis, Cold spring Harbor Laboratory Press.
- Molecular Biology of the Gene, J.D. Watson, A.M. Weiner and N.H. Hopkins, Addison-Wesley Publishing.
- Introduction to Practical Molecular Biology, P.D. Dabre, John Wiley and Sons Inc



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IMMUNOLOGY

Corse Code: BLS2503

Credit Units: 03

Course Objective:

Role of antibody engineering in biomedical applications and the importance of immuno genetics in disease processes, tissue transplantation and immune regulation are some of the areas of attributes of this course which can help the students to understand the biotechnology related to human kind.

Course Contents:

Module I

Historical perspective of immune system and immunity; Innate and specific immunity, Humoral immunity, Cell-mediated immunity

Module II

Antibody structure in relation to function and antigen-binding; Types of antibodies and their structures: isotypes, allotypes, idiotypes; Genetic basis of antibody diversity

Module III

The organs and cells of the immune system; Histocompatibility: structure of MHC class I, II & III antigens & their mode of antigen presentation, MHC restriction; Antigens & antigenicity;

Module IV

Measurement of antigen – antibody interaction: agglutination, immunodiffusion, immuno-electrophoresis, ELISA, RIE, production of monoclonal antibodies.

Module V

Complement system; Autoimmunity; Hypersensitivity

Module VI:

Hybridoma Technology; Introduction to transplantation immunology, Introduction to Cancer immunology, Vaccines (attenuated and recombinant);

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

Text:

- Kuby Immunology, R.A. Goldsby, T.J. Kindt, and B.A. Osborne, Freeman

References:

- Immunology, Roitt, Mosby – Yearbook Inc.
- Basic Immunology, A.K. Abbas and A.H. Lichtman, Saunders W.B. Company
- Fundamentals of Immunology, W. Paul, Lippincott Williams and Wilkins
- Immunology, W.L. Anderson, Fence Creek Publishing (Blackwell).
- Immunology: A Short Course, E. Benjamin, R. Coico and G. Sunshine, Wiley-Leiss Inc.

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BIO-ANALYTICAL AND BIOPHYSICAL TECHNIQUES

Course Code: BLS2504

Credit Units: 02

Course Objective:

The students will be exposed to basic concepts related with techniques and instrumentation widely used in Biotechnology.

Course Contents:

Module I: Buffers & Sample preparation

Preparation of solutions, concept of pH and buffer, types of buffers and their preparation, pH meter. Cell Disruption techniques, ultra filtration, dialysis and reverse osmosis.

Module II: Centrifugation

Principle of centrifugation, rotors, different types of centrifuges, ultra centrifugation.

Module III: Microscopy

Principles of microscopy, types of microscopy Bright field, Dark field, phase contrast and fluorescence microscopy. Electron microscopy: Transmission and scanning electron microscopy.

Module IV: Radioisotope techniques

Study of radioisotopes in biological samples, proportional and GM counter, scintillation counters, autoradiography.

Module V: Electrophoresis & Chromatography

SDS-PAGE, isoelectric focusing, two-dimensional electrophoresis; Paper, TLC, gel filtration, ion-exchange chromatography, affinity chromatography, HPLC and GLC

Module VI: Spectroscopy

UV and visible spectroscopy, Infrared and Atomic absorption spectroscopy, fluorescence spectroscopy.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

Text:

- Principles of Physical Biochemistry, K.E. Van Holde, Prentice Hall.
- Essentials of Biophysics, P. Narayanan, New Age International Publishers

References:

- Advanced Instrumentation, Data Interpretation, and Control of Biotechnological Processes, J.F. Van Impe, Kluwer Academic
- Crystal Structure Analysis, J.P. Glusker and K.N. Trueblood, Oxford University Press
- Crystallography made Crystal Clear, G. Rhodes, Academic Press
- Modern Spectroscopy, J.M. Hollas, John Wiley and Son Ltd.
- NMR Spectroscopy: Basic Principles, Concepts and Applications in Chemistry, H. Gunther, John Wiley and Sons Ltd.

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BIOMATERIALS

Course Code: BLS2505

Credit Units : 02

Module I

Introduction to biomaterials: definition, classification, properties and requirements

Module -II

- Biomaterials used in medicine: ceramics, polymers, metals, composites
- Bone tissue engineering scaffolds

Module -III

Applications of biomaterials in medicine

- Sterilisation
- Surface modification of biomaterials
- Medical imaging
- Bioreactors
- Medical Device/ Advanced Therapy Medicinal Product
- Good Manufacturing Practice facilities

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70



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MOLECULAR BIOLOGY LAB

Course Code: BLS2506

Credit Units: 01

Course Contents:

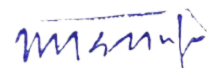
1. Isolation of genomic DNA.
2. Isolation of plasmid DNA.
3. Isolation of eukaryotic total RNA.
4. Study of in vitro transcription.
5. In vitro study of translation

Examination Scheme:

IA			EE			
Class Test (Practical Based)	Mid Term Viva	Attendance	Major Experiment	Minor Experiment/Spotting	Practical Record	Viva
15	10	05	35	15	10	10



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IMMUNOLOGY LAB

Course Code: BLS2507

Credit Units: 01

Module I

Blood film preparation and identification of cells.

Module II

Isolation of serum, Purification of IgG through affinity chromatography

Module III

Lymphoid organs and their microscopic organization.

Module IV

WIDAL Test

Module V

Radial Immuno Diffusion Test; Ouchterlony Double diffusion Test

Module VI: ELISA

Dot, Sandwich

Examination Scheme:

IA			EE			
Class Test (Practical Based)	Mid Term Viva	Attendance	Major Experiment	Minor Experiment/Spotting	Practical Record	Viva
15	10	05	35	15	10	10



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BIOCHEMISTRY AND BIOANALYTICAL LAB

Course Code: BLS2508

Credit Units: 01

Module I: Solutions and buffers

Preparation of molar, normal and % (w/v) solutions. preparation of buffers of different pH and molar strength.

Module II: Carbohydrates

Extraction and estimation of carbohydrates from given plant/animal materials: determination of total sugars by Anthrone method Separation of sugars by thin layer chromatography

Module III: Proteins

Extraction of total proteins; Estimation of proteins by Lowery/ Bradford Method; Electrophoretic (SDS-PAGE) separation of isolated proteins

Module IV: Lipids

Extraction of total lipids; estimation of phospholipids/glycolipids; thin layer chromatographic separation of lipids

Module IV: Nucleic Acid

Extraction and estimation of DNA and RNA by UV-spectrophotometer

Examination Scheme:

IA			EE			
Class Test (Practical Based)	Mid Term Viva	Attendance	Major Experiment	Minor Experiment/Spotting	Practical Record	Viva
15	10	05	35	15	10	10

Text & References:

- Practical book of Biochemistry by Plummer
- Practical book of Biochemistry by S.K. Sawhney and Randhir Singh



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SUMMER INTERSHIP PROJECT (EVALUATION)

Course Code: BLS2535

Credit Units: 04

Objectives:

The aim of the project is to provide the students with an opportunity to further their intellectual and personal development in the chosen field by undertaking a significant practical unit of activity. The project can be defined as a scholarly inquiry into a problem or issues, involving a systematic approach to gathering and analysis of information / data, leading to production of a structured report.

Chapter Scheme and distribution of marks:

Chapter 1: Introduction – 10 marks

Chapter 2: Conceptual Framework/ National/International Scenario – 25 marks

Chapter 3: Presentation, Analysis & Findings -- 25 marks

Chapter 4: Conclusion & Recommendations -- 10 marks

Chapter 5: Bibliography -- 05 marks

Project Report	Power Point Presentation & Viva
75 marks	25 marks

Components of a Project Report

The outcome of Project Work is the Project Report. A project report should have the following components:

1) Cover Page: This should contain the title of the project proposal, to whom it is submitted, for which degree, the name of the author, name of the supervisor, year of submission of the project work, name of the University.

2) Acknowledgement: Various organizations and individuals who might have provided assistance /co-operation during the process of carrying out the study.

3) Table of Content: Page-wise listing of the main contents in the report, i.e., different Chapters and its main Sections along with their page numbers.

4) Body of the Report: The body of the report should have these four logical divisions

a) **Introduction:** This will cover the background, rationale/ need / justification, brief review of literature, objectives, methodology (the area of the study, sample, type of study, tools for data collection, and method of analysis), Limitations of the Study, and Chapter Planning.

b) **Conceptual Framework / National and International Scenario:** (relating to the topic of the Project).

c) **Presentation of Data, Analysis and Findings:** (using the tools and techniques mentioned in the methodology).

d) **Conclusion and Recommendations:** In this section, the concluding observations based on the main findings and suggestions are to be provided.

5) Bibliography or References: This section will include the list of books and articles which have been used in the project work, and in writing a project report.

6) Annexures: Questionnaires (if any), relevant reports, etc.

(The main text of the Project should normally be in the range of 5000 words. However, there may be annexure in addition to the main text)

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The Steps of a Project Report

Step I : Selection of the topic for the project by taking following points into consideration:

- Suitability of the topic.
- Relevance of the topic
- Time available at the disposal.
- Feasibility of data collection within the given time limit.
- Challenges involved in the data collection (time & cost involved in the data collection, possibility of getting responses, etc.)

Step II : Finalisation of the Topic and preparation of Project Proposal in consultation with the Supervisor.

Step III : Collection of information and data relating to the topic and analysis of the same.

Step IV : Writing the report dividing it into suitable chapters, viz.,

Chapter 1: Introduction,

Chapter 2: Conceptual Framework / National & International Scenario,

Chapter 3: Analysis & Findings

Chapter 4: Conclusion and Recommendations.

Step V : The following documents are to be attached with the Final Project Report.

1) Approval letter from the supervisor (Annexure-IA)

2) Student's declaration (Annexure-IB)

3) Certificate from the Competent Authority of the Organisation / Institution, if the student undertakes the Project Work in any Organisation / Institution.

Guidelines for evaluation:

- Each of the students has to undertake a Project individually under the supervision of a teacher and to submit the same following the guidelines stated below.
- Language of Project Report and Viva-Voce Examination may be English. The Project Report must be typed and hard bound.
- Failure to submit the Project Report or failure to appear at the Viva-voce Examination will be treated as "Absent" in the Examination. He /she has to submit the Project Report and appear at the Viva-Voce Examination in the subsequent years (within the time period as per University Rules).
- No marks will be allotted on the Project Report unless a candidate appears at the Viva-Voce Examination. Similarly, no marks will be allotted on Viva-Voce Examination unless a candidate submits his/her Project Report.
- Evaluation of the Project Work to be done jointly by one internal expert and one external expert with equal weightage, i.e., average marks of the internal and external experts will be allotted to the candidate.



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RECOMBINANT DNA TECHNOLOGY

Course Code: BLS2601

Credit Units: 03

Course Objective:

A complete understanding of molecular techniques can be obtained through the course. The successful application of biotechnology largely depends on these advanced molecular techniques.

Course Contents:

Module I

Restriction endonuclease, methyltransferase, ligase, polymerase, kinase, phosphatase, nuclease, transferase, reverse transcriptase.

Module II

Cloning vectors: Plasmids, bacteriophages (Lambda and M13), phagemids, cosmids, artificial chromosomes (YAC, BAC). expression vectors (Bacteria and yeast); Basic cloning strategy and screening clones; Gene libraries

Module III

Blotting techniques and hybridization: Southern, Northern and Western blotting techniques. Radioactive and non-radioactive probes.

Module IV

Principles of PCR, types of PCRs and its applications

Module V

DNA sequencing (Maxam Gilbert, Sanger's and automated), protein engineering.


Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

Text:

- Principles of Gene Manipulation: An Introduction to Genetic Engineering, R.W. Old and S. B Primrose, Blackwell Science Inc.
- Recombinant DNA, J.D. Watson et al, W.H. Freeman and Company.


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References:

- Molecular Biotechnology: Principles and Applications of Recombinant DNA, B.R. Grick and J.J. Pasternak, ASM Press.
- Molecular and Cellular Cells Methods in Biology and Medicine, P.B Kaufman, W. Wu, D. Kim and C.J. Cseke, CRC Press.
- Milestones in Biotechnology: Classic Papers on Genetic Engineering, J.A. Bavies and W.S. Reznikoff, Butterworth Heinemann.
- Gene Expression Technology, D.V. Goeddel in Methods in Methods in Enzymology, Academic Press Inc.
- DNA Cloning: A Practical Approach, D.M. Glover and B.D. Hames, IRL Press.
- Molecular Cloning: A Laboratory Manual, J. Sambrook, E.F. Fritsch and T. Maniatis, Cold Spring Harbor Laboratory Press.



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GENOMICS AND PROTEOMICS

Course Code: BLS2602

Credit Units: 03

Course Objective:

The course helps in developing a detailed understanding of eukaryotic genome complexity and organization. Current research on the molecular basis of the control of gene expression in eukaryotic system has developed a detailed understanding of techniques of gene diagnostics and DNA profile to acquire the fundamentals of genomics and Proteomics.

Course Contents:

GENOMICS

Module I: Genome Evolution

Origin of genomes, functional genomics. Forward genetics

Module II: Structural Genomics

Chromosome structure and Genome organization, Genome sequencing methods, Gene identification Genome annotation methods

Module III: Comparative Genomics

Phylogeny, COGS [Cluster of orthologues genes], paralogues and gene displacement.

Module IV: Functional Genomics

ESTs, SAGE, DNA Microarrays, Application of Microarrays, Real Time PCR

Module V: Genotyping Background and Applications.

Genetic and physical mapping: Introduction to molecular markers-RFLP, RAPD, AFLP, SSRs. Genetic and physical maps, FISH for genome analysis, DNA fingerprinting; Single nucleotide polymorphisms, RNA interference, antisense RNA, siRNA, miRNA, ; Human Genome Project.

PROTEOMICS

Module VI

Basics of Proteomics: Protein preparation and Separation, 2D Gel Electrophoresis, mass spectrometry, post translation modification.

Protein-Protein Interaction, Protein Microarray, Application of Microarray in proteome analysis.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70


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Text & References:

Text:

- Bioinformatics: A practical guide to the analysis of genes and proteins, A.D. Baxevanis and B.F.F. Ouellette,
- John Wiley and Sons Inc.
- Bioinformatics: From Genomes to Drugs, T. Lengauer, John Wiley and Sons Inc.
- Bioinformatics: Sequence and Genome Analysis, D.W. Mount, Cold Spring Harbor Laboratory Press
- DNA Microarrays: A Practical Approach, M. Schlöten, Oxford University Press.
- Genomes II, T.A. Brown
- Biotechnology and Genomics by P.K.Gupta

References:

- A Primer of Genome Science, Greg Gibson and Spencer V. Muse
- Database Annotation in Molecular Biology : Principles and Practice, Arthur M. Lesk
- DNA : Structure and Function, Richard R. Sinden
- Recombinant DNA (Second Edition), James D. Watson and Mark Zoller
- Gene Cloning and DNA Analysis – An introduction (Fourth Edition), T.A. Brown
- Genes & Genomes, Maxine Singer and Paul Berg
- Essential of Genomics and Bioinformatics, C.W. Sensen, John Wiley and Sons Inc.
- Functional Genomics – A Practical Approach, S.P. Hunt and R. Livesey, Oxford University Press
- Proteomics, T. Palzkill, Kluwer Academic Publishers
- Statistical Genomics: Linkage, Mapping and QTL Analysis, B. Liu, CRC Press.
- Genome II by T.A.Brown



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IPR, BIOSAFETY AND BIOETHICS

COURSE CODE: BLS2603

Credit Units: 02

Course Objective:

The objectives of the course are to explain the biosafety and bioethics. Students will study and assess biosafety, and bioethics related to genetically engineered plant, animal and microbial products.

Course Contents:

Module I: Biotechnology and Intellectual Property Rights

Biotechnology and the Law- Objective, Evolution, Basic Structure of Gene Techniques, Applications, Commercial Potential of Biotech Inventions, Rationale for Intellectual Property Protection. Patenting Biotechnology Inventions-Objective, Concept of Novelty, Concept of inventive step, Microorganisms, Moral Issues in Patenting Biotechnological inventions. Plant Varieties Protection-Objectives, Justification, International Position, Plant Varieties Protection in India Protection of Geographical Indications Objectives, Justification, International Position, Multilateral Treaties, National Level, Indian Position.

Protection of Traditional Knowledge- Objective, Concept of Traditional Knowledge, Holders, Issues concerning, Bio-Prospecting and Bio-Piracy, Alternative ways, Protectability, need for a Sui-Generis regime, Traditional Knowledge on the International Arena, at WTO, at National level, Traditional Knowledge Digital Library.

Module II: Biosafety

Definition and requirement; biosafety in relation to human health, environment, transgenic research and applications, biosafety laws, guidelines and conventions, biosafety regulation: principles and practices in microbial and biomedical labs, guidelines for research involving DNA molecule ; Regulation bodies at National and International level

Module III: Bioethics

Definition of bioethics, importance of bioethics, Bioethics in plant, animal and microbial genetic engineering, Ethical issues in healthcare, Biopiracy and ethical conflicts Legal and socioeco'omic impact of the products and techniques in Biotechnology,

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

Text:

- *Coyle's information highway handbook*; A Practical File on the New Information Order, American Library Association, 2000.
- *American Indian Cultural & Research Journal (UCLA)*

References:

- Refer to Periodicals, Industry directories, Articles and report in journals on the regulatory issues,
- "Biotechnology" series by Rehm & Reed.

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APPLIED BIOLOGY

Course Code: BLS2604

Credit Units: 03

Course Contents:

Module I

Introduction to fermentation, the fermentation industry, Production process batch and Continuous system of cultivation, Solid-state fermentation

Module II

Selection of industrial microorganisms, media for fermentation, aeration, pH, temperature and other requirements during fermentation, downstream processing and product recovery, food industry waste as fermentation substrate.

Module III

Production of compounds like, antibiotics, enzymes, organic acids, solvents, beverages, SCP.

Module IV

Production of fermented dairy products

Module V

Immobilized enzymes systems, production and applications.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

Text:

- Industrial Microbiology – Cassida

References:

- Principles of fermentation Technology, Salisbury, Whitaker and Hall
- Industrial microbiology – Prescott & Duhn.



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RECOMBINANT DNA TECHNOLOGY LAB

Course Code: BLS2605

Credit Units: 01

Course Objective:

The laboratory experiments in Recombinant DNA Technology would certainly help to comprehend the theoretical aspects of the subject.

Course Contents:

Module I

Study of cloning

Module II

Study of PCR

Module III

Study of Southern hybridization

Module IV

Study of RAPD

Examination Scheme:

IA			EE			
Class Test (Practical Based)	Mid Term Viva	Attendance	Major Experiment	Minor Experiment/Spotting	Practical Record	Viva
15	10	05	35	15	10	10



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APPLIED BIOLOGY LAB

Course Code: BLS2606

Credit Units: 01

Course Contents:

Module I

Conventional filtration and membrane based filtration

Module II

Protein precipitation and recovery

Module III

Aqueous two-phase separation

Module IV

Ion exchange chromatography

Module V

Gel Permeation chromatography

Module VI

Electrophoresis

Examination Scheme:

IA			EE			
Class Test (Practical Based)	Mid Term Viva	Attendance	Major Experiment	Minor Experiment/Spotting	Practical Record	Viva
15	10	05	35	15	10	10

Text & References:

Text:

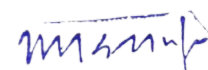
- Practical Biochemistry, Sawhney and Singh

References:

- Practical Biochemistry, Principles & Techniques, Keith Wilson and John Walker
- Chromatographic and Membrane Processes in Biotechnology, C.A. Costa and J.S. Cabral, Kluwer Academic Publisher
- Protein Purification, M.R. Lodisch, R.C. Wilson, C.C. Painton and S.E. Builder, American Chemical Society



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Bachelor of Science (Honors) Biotechnology

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Curriculum & Scheme of Examination

2022

AMITY UNIVERSITY HARYANA

GURUGRAM

A handwritten signature in blue ink, appearing to read 'Anil'.

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A handwritten signature in blue ink, appearing to read 'Manesar'.

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COMPUTER APPLICATIONS

Course Code: BTH2103

Credit Units: 03

Course Objective:

To provide computer skills and knowledge for commerce students, and to make them complacent with the use of new tools of IT

Course Contents:

Module I

General features of a Computer. Generation of computers. Personal Computer, Workstation, Mainframe Computer and super Computers. Computer applications – data processing, information processing, Application areas of computer.

Module II

Computer organization. Central processing module. Computer memory- primary memory and secondary memory. Secondary storage devices – magnetic and optical media. Input and output modules. OMR, OCR, MICR, scanner, mouse, Modem.

Module III

Computer hardware and software. Machine language and high level language. Application software. Computer program. Operating system. Computer virus, Antivirus and Computer security, Windows OS and its features.

Computer arithmetic. Binary, octal and hexadecimal number systems. Algorithm and flowcharts. Illustrations. Elements of database and its applications.

Module IV

Introduction to MS office Packages- Ms-Word – Editing a Document – Move and Copy text – Formatting text and paragraph – Finding and Replacing text and spelling checking – Using tabs, Tables, and other features, Enhancing document – using mail merge and other features.

Introduction to Worksheet- Getting started with excel – Editing Cells and using commands and functions – Moving And Coping, Inserting and Deleting Rows and Columns – Getting help and formatting a worksheet – Printing the worksheet – Creating Charts – using formulae and functions in excel.

Introduction to Power Point Presentation

Module V

Computer Networks & Internet Technology

Examination Scheme:

Components	A	P	HA	CT	EE
Weightage (%)	5	5	5	15	70

A-Attendance; P -Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination

Text & References:

- Craig Stinson “Running Microsoft Windows-98” – Microsoft press.
- Joshua C. Nossiter. “ Using Excel – 5 for Windows”
- “Working with Word” – Aptech Computer Education
- “Power Point Presentation” – Aptech Computer Education.
- Malhotra, Computer Applications in Business

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- Rajaraman V, Analysis and Design of Information System, Prentice Hall of India, New Delhi
- Murdick, RG and Ross, JE Information Systems for Modern Management
- Kanter, J, Management Oriented MIS, Prentice Hall of India
- Bhattacharya SK, Management Planning and Information Systems



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PLANT SCIENCES- I LAB

Course Code: BTH2104

Credit Units: 01

Course Contents:

Module I

Microscopic study of *Chlamydomonas*, *Volvox*, *Spirogyra*, *Chara* and *Polysiphonia* (Fresh preparations and permanent slides)

Module II

Fresh microscopic preparation of *Aspergillus* and *Agaricus*.

Module III

Microscopic study of fresh preparations of *Riccia*, *Marchantia* and *Anthoceros*.

Module IV

Microscopic study of fresh preparations of *Selaginella*, *Equisetum* and *Marsilea*.


Study algal diversity of pond water.

Module VII

Study of soil fungal diversity.

Examination Scheme:

IA			EE			
Class Test (Practical Based)	Mid Term Viva	Attendance	Major Experiment	Minor Experiment/Spotting	Practical Record	Viva
15	10	05	35	15	10	10


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ANIMAL SCIENCES-I LAB

Course Code: BTH2105


Credit Units: 01

Course Contents:

- 1) Preparation of slides of amoeba, paramecium.
- 2) Dissection of earthworm and digestive system of earth worm
- 3) Dissection of cockroach and glycerin preparation of mouth parts.
- 4) Dissection of Pila.
- 5) Use specimens and permanent slides.

Examination Scheme:

IA			EE			
Class Test (Practical Based)	Mid Term Viva	Attendance	Major Experiment	Minor Experiment/Spotting	Practical Record	Viva
15	10	05	35	15	10	10


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COMPUTER APPLICATIONS LAB

Course Code: BTH2106


Credit Units: 01

Course Contents:

1. Introduction to computers and its peripherals
2. Introduction to Word and its application
3. Introduction to Excel and its application
4. Introduction to Powerpoint and its application
5. Introduction to paint and its application
6. Introduction to internet and its application

Examination Scheme:

IA			EE			
Class Test (Practical Based)	Mid Term Viva	Attendance	Major Experiment	Minor Experiment/Spotting	Practical Record	Viva
15	10	05	35	15	10	10


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MICROBIAL BIOTECHNOLOGY

Course Code: BTH2107

Credit Units: 03

Course Objective:

The basic knowledge of Microbiology gained in the previous semester would be applied in the various disciplines like evolution, Immunology & Industrial fermentation.

Course Contents:

Module I

Microbial nutrition and growth -The definition of growth, growth curve, measurement of growth and growth yields, synchronous growth, culture collection and maintenance of cultures.

Module II

Microbial evolution, systematics and taxonomy - new approaches to bacterial taxonomy,

Module III

Host-parasite relationship (Normal micro flora of skin, oral cavity, gastrointestinal tract), types of toxins (Exo,endo, entero) and their mode of actions,

Module IV

Microbes in extreme environments: Archae as the earliest forms, thermophiles, psychrophiles, halophiles, alkalophiles, acidophiles, hyperthermophiles.

Module V

Introduction to industrially important microbes and microbial fermentative products (Production of antibiotics with special reference to penicillin & streptomycin, enzymes, biotransformation of steroids), food products from microbes (Dairy & SCP etc)

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

Text:

- The Microbial World, Roger Y. Stanier, Prentice Hall
- Microbiology, Prescott and Dunn, C.B.S. Publishers

References:

- General Microbiology, R.Y. Stanier, J.L. Ingraham, M.L. Wheelis and P.R. Painter, Macmillan
- Microbiology VI Edition, M.J. Pelczar, E.C.S. Chan and N.R. Kreig, Tata McGraw Hill
- Principles of Microbiology, R.M. Atlas, Wm C. Brown Publisher.
- The microbes – An Introduction to their Nature and Importance, P.V. Vandenmark and B.L. Batzing, Benjamin Cummings.
- Microbiology, Tortora, Funke and Chase, Benjamin & Cummings
- Principles of Fermentation Technology, Salisbury, Whitaker and Hall, Aditya Books Pvt. Ltd.
- Industrial Microbiology, Casida, New Age International

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FOOD BIOTECHNOLOGY

Course Code: BTH2108

Credit Units: 03

Course Objective:

This course will provide a broad grounding in concepts, techniques and issues involved in food products and their processing.

Course Contents:

Module I: Introduction

Scope and importance of food industry; Concept of 'functional food'; Advances and trends, ethical issues, quality control, legislation, FDA & FPO (India), RDT and other technologies involved in development of food products; GM food and GM crops.

Module II: Techniques used in Food Industry

Sterilization, isolation, screening and strain improvement, cell harvesting and disruption, recovery and purification, production of organic acids – citric acid, lactic acid and acetic acid;

Module III: Dairy Biotechnology

Starter cultures, prebiotics, probiotics – their use as flavor enhancers and disease/ infection combats, applications in production of cheese, butter, ice-cream, yoghurt; Modified milk proteins.

Module IV: Microbial, Plant and Animal Biotechnology

Production of SCP (Single cell protein), production of baker's yeast, brewing industry, applications of transgenic plants in food production, transgenic fish, and transgenic poultry.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

Text:

- Food Biotechnology - 2. 1988. R.D. King and P.S.J. Cheetham (Eds.). Elsevier Applied Science, NY.

References:

- Introduction to Food Biotechnology. Green, Perry Johnson. 2002. CRC Press, Boca Raton, Florida.
- Food Biotechnology-Techniques and Applications. Gauri S. Mittal. 1992. Technomic Publishing Co., Inc., Lancaster, PA.


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AGRICULTURE BIOTECHNOLOGY

Course Code: BTH2109

Credit Units: 03

Course Objective:

The agriculture plant biotechnology course basically meant for understanding the basic techniques of plant tissue culture and genetic engineering in plants along with the latest ongoing research on the different aspects of plants and its products to redefine agriculture priorities and produce human resource with academic, scientific and technical expertise along with management or business experience.

MODULE I Plant Regeneration Technologies

Introduction and historical perspective, organ culture, cell suspension, organogenesis, somatic embryogenesis, micropropagation, anther and ovary culture-haploid production, embryo culture and rescue, protoplast culture, somatic hybridization and cybrids.

MODULE II Transgenic Plants Technology

Genetic Transformation, Methods for gene transfer in plants, Molecular mechanism of *Agrobacterium* mediated transformation. Selectable markers, Reporter gene and Promoters used in plant transformation vectors.

MODULE III Industrial and Agricultural Application


Biotic stress tolerance; insect, pest and pathogen resistance. Abiotic stress tolerance; salt, water and drought tolerance. Herbicide tolerance. Molecular farming

Examination Scheme:

Components	H/S	A	CT	EE
Weightage (%)	10	5	15	70

References

1. Plant Biotechnology: The Genetic Manipulation of Plants. A. Slater, N. W. Scott and M. R. Power. 2008. Oxford University Press
2. Recent Advances in Plant Biotechnology: Ara Kirakosyan and Peter B. Kaufan. 2009. Springer
3. Plant Tissue Culture: Theory and Practice. S.S. Bhojwani and M.K. Razdan. Elsevier Health Science
4. An Introduction to Plant Tissue Culture. M.K. Razdan. Oxford and IBH Publishing.


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TERM PAPER

Course Code: BTH2131

Credit Units: 02

A term (or research) paper is primarily a record of intelligent reading in several sources on a particular subject.

The students will choose the topic at the beginning of the session in consultation with the faculty assigned. The progress of the paper will be monitored regularly by the faculty. At the end of the semester the detailed paper on the topic will be submitted to the faculty assigned. The evaluation will be done by Board of examiners comprising of the faculties.

GUIDELINES FOR TERM PAPER

The procedure for writing a term paper may consists of the following steps:

1. Choosing a subject
2. Finding sources of materials
3. Collecting the notes
4. Outlining the paper
5. Writing the first draft
6. Editing & preparing the final paper

1. Choosing a Subject

The subject chosen should not be too general.

2. Finding Sources of materials

- a) The material sources should be not more than 10 years old unless the nature of the paper is such that it involves examining older writings from a historical point of view.
- b) Begin by making a list of subject-headings under which you might expect the subject to be listed.
- c) The sources could be books and magazines articles, news stories, periodicals, scientific journals etc.

3. Collecting the notes

Skim through sources, locating the useful material, then make good notes of it, including quotes and information for footnotes.

- a) Get facts, not just opinions. Compare the facts with author's conclusion.
- b) In research studies, notice the methods and procedures, results & conclusions.
- c) Check cross references.

4. Outlining the paper

- a) Review notes to find main sub-divisions of the subject.
- b) Sort the collected material again under each main division to find sub-sections for outline so that it begins to look more coherent and takes on a definite structure. If it does not, try going back and sorting again for main divisions, to see if another general pattern is possible.

5. Writing the first draft

Write the paper around the outline, being sure that you indicate in the first part of the paper what its purpose is. You may follow the following:

- a) statement of purpose
- b) main body of the paper
- c) statement of summary and conclusion

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Avoid short, bumpy sentences and long straggling sentences with more than one main ideas.

6. Editing & preparing the final Paper

- a) Before writing a term paper, you should ensure you have a question which you attempt to answer in your paper. This question should be kept in mind throughout the paper. Include only information/ details/ analyses of relevance to the question at hand. Sometimes, the relevance of a particular section may be clear to you but not to your readers. To avoid this, ensure you briefly explain the relevance of every section.
- b) Read the paper to ensure that the language is not awkward, and that it "flows" properly.
- c) Check for proper spelling, phrasing and sentence construction.
- d) Check for proper form on footnotes, quotes, and punctuation.
- e) Check to see that quotations serve one of the following purposes:
- f) Show evidence of what an author has said.
- g) Avoid misrepresentation through restatement.
- h) Save unnecessary writing when ideas have been well expressed by the original author.
- i) Check for proper form on tables and graphs. Be certain that any table or graph is self-explanatory.

Term papers should be composed of the following sections:

- 1) Title page
- 2) Table of contents
- 3) Introduction
- 4) Review
- 5) Discussion & Conclusion
- 6) References
- 7) Appendix

Generally, the introduction, discussion, conclusion and bibliography part should account for a third of the paper and the review part should be two thirds of the paper.

Discussion

The discussion section either follows the results or may alternatively be integrated in the results section. The section should consist of a discussion of the results of the study focusing on the question posed in the research paper.

Conclusion

The conclusion is often thought of as the easiest part of the paper but should by no means be disregarded. There are a number of key components which should not be omitted. These include:

- a) summary of question posed
- b) summary of findings
- c) summary of main limitations of the study at hand
- d) details of possibilities for related future research

References

From the very beginning of a research project, you should be careful to note all details of articles gathered.

The bibliography should contain ALL references included in the paper. References not included in the text in any form should NOT be included in the bibliography.

The key to a good bibliography is consistency. Choose a particular convention and stick to this.

Conventions

Monographs

Crystal, D. (2001), Language and the internet. Cambridge: Cambridge University Press.

Edited volumes

Gass, S./Neu, J. (eds.) (1996), Speech acts across cultures. Challenges to communication in a second language. Berlin/ NY: Mouton de Gruyter.

[(eds.) is used when there is more than one editor; and (ed.) where there is only one editor. In German the abbreviation used is (Hrsg.) for Herausgeber].

Edited articles

Schmidt, R./Shimura, A./Wang, Z./Jeong, H. (1996), Suggestions to buy: Television commercials from the U.S., Japan, China, and Korea. In: Gass, S./Neu, J. (eds.) (1996), Speech acts across cultures. Challenges to communication in a second language. Berlin/ NY: Mouton de Gruyter: 285-316.

Journal articles

McQuarrie, E.F./Mick, D.G. (1992), On resonance: A critical pluralistic inquiry into advertising rhetoric. Journal of consumer research 19, 180-197.

Electronic book

Chandler, D. (1994), Semiotics for beginners [HTML document]. Retrieved [5.10.'01] from the World Wide Web, <http://www.aber.ac.uk/media/Documents/S4B/>.

Electronic journal articles

Watts, S. (2000) Teaching talk: Should students learn 'real German'? [HTML document]. German as a Foreign Language Journal [online] 1. Retrieved [12.09.'00] from the World Wide Web, <http://www.gfl-journal.com/>.

Other websites

Verterhus, S.A. (n.y.), Anglicisms in German car advertising. The problem of gender assignment [HTML document]. Retrieved [13.10.'01] from the World Wide Web, <http://olaf.hiof.no/~sverrev/eng.html>.

Unpublished papers

Takahashi, S./DuFon, M.A. (1989), Cross-linguistic influence in indirectness: The case of English directives performed by native Japanese speakers. Unpublished paper, Department of English as a Second Language, University of Hawai'i at Manoa, Honolulu.

Unpublished theses/ dissertations

Möhl, S. (1996), Alltagssituationen im interkulturellen Vergleich: Realisierung von Kritik und Ablehnung im Deutschen und Englischen. Unpublished MA thesis, University of Hamburg.

Walsh, R. (1995), Language development and the year abroad: A study of oral grammatical accuracy amongst adult learners of German as a foreign language. Unpublished PhD dissertation, University College Dublin.

Appendix

The appendix should be used for data collected (e.g. questionnaires, transcripts, ...) and for tables and graphs not included in the main text due to their subsidiary nature or to space constraints in the main text.

Assessment Scheme:

Continuous Evaluation:

40%

(Based on abstract writing, interim draft, general approach, research orientation, readings undertaken etc.)

Final Evaluation:

60%

(Based on the organization of the paper, objectives/ problem profile/ issue outlining, comprehensiveness of the research, flow of the idea/ ideas, relevance of material used/ presented, outcomes vs. objectives, presentation/ viva etc.)


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PROJECT

Course Code: BTH2132

Credit Units: 03

Objectives:

The aim of the project is to provide the students with an opportunity to further their intellectual and personal development in the chosen field by undertaking a significant practical unit of activity. The project can be defined as a scholarly inquiry into a problem or issues, involving a systematic approach to gathering and analysis of information / data, leading to production of a structured report.

Chapter Scheme and distribution of marks:

Chapter 1: Introduction – 10 marks

Chapter 2: Conceptual Framework/ National/International Scenario – 25 marks

Chapter 3: Presentation, Analysis & Findings -- 25 marks

Chapter 4: Conclusion & Recommendations -- 10 marks

Chapter 5: Bibliography -- 05 marks

Project Report	Power Point Presentation & Viva
75 marks	25 marks

Components of a Project Report

The outcome of Project Work is the Project Report. A project report should have the following components:

1) Cover Page: This should contain the title of the project proposal, to whom it is submitted, for which degree, the name of the author, name of the supervisor, year of submission of the project work, name of the University.

2) Acknowledgement: Various organizations and individuals who might have provided assistance /co-operation during the process of carrying out the study.

3) Table of Content: Page-wise listing of the main contents in the report, i.e., different Chapters and its main Sections along with their page numbers.

4) Body of the Report: The body of the report should have these four logical divisions

a) **Introduction:** This will cover the background, rationale/ need / justification, brief review of literature, objectives, methodology (the area of the study, sample, type of study, tools for data collection, and method of analysis), Limitations of the Study, and Chapter Planning.

b) **Conceptual Framework / National and International Scenario:** (relating to the topic of the Project).

c) **Presentation of Data, Analysis and Findings:**(using the tools and techniques mentioned in the methodology).

d) **Conclusion and Recommendations:** In this section, the concluding observations based on the main findings and suggestions are to be provided.

5) Bibliography or References: This section will include the list of books and articles which have been used in the project work, and in writing a project report.

6) Annexures: Questionnaires (if any), relevant reports, etc.

(The main text of the Project should normally be in the range of 5000 words. However, there may be annexure in addition to the main text)

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The Steps of a Project Report

Step I : Selection of the topic for the project by taking following points into consideration:

- Suitability of the topic.
- Relevance of the topic
- Time available at the disposal.
- Feasibility of data collection within the given time limit.
- Challenges involved in the data collection (time & cost involved in the data collection, possibility of getting responses, etc.)

Step II : Finalisation of the Topic and preparation of Project Proposal in consultation with the Supervisor.

Step III : Collection of information and data relating to the topic and analysis of the same.

Step IV : Writing the report dividing it into suitable chapters, viz.,

Chapter 1: Introduction,

Chapter 2: Conceptual Framework / National & International Scenario,

Chapter 3: Analysis & Findings


Chapter 4: Conclusion and Recommendations.

Step V : The following documents are to be attached with the Final Project Report.

- 1) Approval letter from the supervisor (Annexure-IA)
- 2) Student's declaration (Annexure-IB)
- 3) Certificate from the Competent Authority of the Organisation / Institution, if the student undertakes the Project Work in any Organisation / Institution.

Guidelines for Evaluation:

- Each of the students has to undertake a Project individually under the supervision of a teacher and to submit the same following the guidelines stated below.
- Language of Project Report and Viva-Voce Examination may be English. The Project Report must be typed and hard bound.
- Failure to submit the Project Report or failure to appear at the Viva-voce Examination will be treated as "Absent" in the Examination. He /she has to submit the Project Report and appear at the Viva-Voce Examination in the subsequent years (within the time period as per University Rules).
- No marks will be allotted on the Project Report unless a candidate appears at the Viva-Voce Examination. Similarly, no marks will be allotted on Viva-Voce Examination unless a candidate submits his/her Project Report.
- Evaluation of the Project Work to be done jointly by one internal expert and one external expert with equal weightage, i.e., average marks of the internal and external experts will be allotted to the candidate.


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WORKSHOP / CERTIFICATION

Course Code: BTH2133

Credit Units: 01

Objectives

A workshop is primarily an activity based academic event that is organized to provide the students a one to one and hands on experience on any aspect of their learning. The communication in a workshop has to be necessarily two way. The trainer has to make sure that the aspect covered are practically practiced by the participants. The student will choose the option of workshop from amongst their concentration electives. The evaluation will be done by Board of examiners comprising of the faculties.

Major Themes for Workshop

The workshop may be conducted on any of the following major themes:

Accounting

Finance

Human Resources

Marketing

Economics

Operations

Supply Chain Management

These themes are merely indicative and other recent and relevant topics of study may be included.

Guidelines for Workshop

The procedure for earning credits from workshop consists of the following steps:

Relevant study material and references will be provided by the trainer in advance.

The participants are expected to explore the topic in advance and take active part in the discussions held

Attending and Participating in all activities of the workshop

Group Activities have to be undertaken by students as guided by the trainer.

Evaluation of workshop activities would be done through test and quiz at the end of the workshop.

Submitting a write up of atleast 500 words about the learning outcome from the workshop.

Methodology

The methodology followed at the workshop could be based on any one or more of the following methods:

Case Study

Business Game

Simulation

Group Activity


Role Play

Business Planning

Quiz

Evaluation Scheme:

Attendance	Active Participation	Multiple Choice Questions/ Quiz	Solving the case/ Assignment/ Write up	Total
10	30	30	30	100


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PLANT SCIENCES-II LAB

Course code: BTH2205

Credit Units: 01

Course objective:

Course objective is to provide the knowledge about plant science that should be useful to understand and apply different concepts about the diversity and complexity of plants.

Course Contents:

Module I:

Gymnosperms Study of the Gymnosperms like *Cycas*, and *Pinus* by cutting sections and making suitable temporary preparations.

Module II:

Taxonomy Detailed description and identification of locally available plants of the families as prescribed in theory course.

Module III:

Plant Anatomy Anatomy of normal dicot and monocot roots, stems & leaves.

Module IV:

Embryology Study of permanent slides of the:

- T.S. anther, pollen, germinating pollen
- L.S. ovule types
- Endosperm
- Embryos
- L.S. caryopsis
- Dissection of embryo

Module V:

Plant Pathology Examination of local diseased plants representing bacterial, viral, fungal parasites. Study of symptoms caused by parasites, study of selected diseased specimen (mentioned under theory) through specimens, temporary presentations.

Module VI:

Ecology Measurement of temperature (Soil). Demonstration of Soil texture, carbonate, sulphate, pH., soil moisture percentage. A comparative study of plants (with external and internal characters) to water availability.

Examination Scheme:

IA			EE			
Class Test (Practical Based)	Mid Term Viva	Attendance	Major Experiment	Minor Experiment/Spotting	Practical Record	Viva
15	10	05	35	15	10	10

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PLANT PHYSIOLOGY LAB

Course Code: BTH2207


Credit Units: 01

Plant Physiology

- Effects of plant growth hormones on rooting and shooting.
- Estimation of salicylic acid as secondary signaling molecule in plants
- Separation of photosynthetic pigments through thin layer chromatography
- Determination of Respiration Quotient (RQ)

Examination Scheme:

IA			EE			
Class Test (Practical Based)	Mid Term Viva	Attendance	Major Experiment	Minor Experiment/Spotting	Practical Record	Viva
15	10	05	35	15	10	10


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ANIMAL PHYSIOLOGY LAB

Course Code: BTH2208


Credit Units: 01

Animal Physiology

- Enumeration of red blood cells using hemo cytometer.
- Estimation of haemoglobin using Sahli's hemoglobinometer.
- Preparation of haemin and hemochromogen crystals.
- Enumeration of total and differential count of white blood cells.
- Effect of pH on amylase activity from saliva.
- Biochemical analysis: carbohydrate, proteins and fats.
- Estimation of serum bilirubin (direct and indirect method).

Examination Scheme:

IA			EE			
Class Test (Practical Based)	Mid Term Viva	Attendance	Major Experiment	Minor Experiment/Spotting	Practical Record	Viva
15	10	05	35	15	10	10


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MOLECULAR MODELING

Course Code: BTH2209

Credit Units: 03

Course Objective:

Course objective is to provide the knowledge that should be useful to understand different concepts of molecular properties of basic life molecules like proteins nucleic acids and their relative structure and function across the genus orkingdom

Module I:

Introduction to Molecular modeling, data bases for proteins and DNA – PDB and MMDB, structure file formats, visualizing structural information, advance structure modeling, Internal and external co-ordinate system, cartesian and cylindrical polar co-ordinate system, Potential energy calculations using semiempirical potential energy function,

Module II:

Software and Programmes for sequence comparision and analysis, Phylogenetics analysis software, Molecular Structure drawing tool,

Module III:

Molecular modeling/Docking, Molecular mechanics and dynamics, Knowledge base structure prediction, Molecular Design, structure similarity searching; Secondary structure prediction in proteins, prediction of buried residues in proteins

Module IV

Application of molecular modeling & computational biology/Bioinformatics in Agriculture, Human health, Environment, Biotechnology, Molecular Biology, Neurobiology, Drug Designing, Veterinary Science.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

Text:

- Bioinformatics: Sequence and Genome Analysis, D.W. Mount, Cold Spring Harbor Laboratory Press.

References:

- Algorithms on Strings, Trees, and Sequences: Computer Science and Computational Biology, D. Gusfield, Cambridge University Press.
- Biocomputing hypertext coursebook at <http://www.techfak.unibielefeld.de/bcd/Curric/welcome.html/>
- Bioinformatics: A Practical Guide to the Analysis of Genes and Proteins, A.D. Baxevanis and B.F.F. Ouellette, Wiley-interscience.
- Computational Modeling of Genetic and Biochemical Networks, J.M. Bower and H. Bolouri, MIT Press
- Computational Molecular Biology: An Algorithmic Approach, P.A. Pevzner, MIT Press

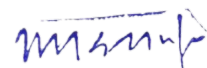
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- Computer Methods for Macromolecular Sequence Analysis, R.F. Doolittle, J.N. Abelson, M.I. Simon, Academic press
- Essentials of Genomics and Bioinformatics, C.W. Sensen, John Wiley and Sons Inc.
- Introduction to Bioinformatics, T. Attwood and D. Parry-Smith, Prentice Hall
- Introduction to Computational Biology: Maps, Sequences and Genomes, M. Waterman, Chapman and Hall
- Sequence Analysis in Molecular Biology: Treasure Trove or Trivial Pursuit, G. V. Heijne and G.V. Heijne, Academic Press



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BIO-SAFETY & BIOETHICS

Course Code: BTH2210

Credit Units: 03

Course Objective:

The objectives of the course are to explain the biosafety and bioethics. Students will study and assess biosafety, and bioethics related to genetically engineered plant, animal and microbial products.

Course Contents:

Module I: Biosafety

Definition and requirement; biosafety in relation to human health, environment, transgenic research and applications, biosafety laws, guidelines and conventions, biosafety regulation: principles and practices in microbial and biomedical labs, guidelines for research involving DNA molecule ; Regulation bodies at National and International level

Module II Bioethics

Definition of bioethics, importance of bioethics, Bioethics in plant, animal and microbial genetic engineering, Ethical issues in healthcare, Biopiracy and ethical conflicts Legal and socioeco'omic impact of the products and techniques in Biotechnology,

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70


Text & References:

Text:

- *Coyle's information highway handbook*; A Practical File on the New Information Order, American Library Association, 2000.
- *American Indian Cultural & Research Journal (UCLA)*

References:

- Refer to Periodicals, Industry directories, Articles and report in journals on the regulatory issues,
- "Biotechnology" series by Rehm & Reed.


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BIOINFORMATICS

Course Code: BTH2211

Credit Units: 03

Course Objective:

The course involves a basic understanding of computer and bioinformatics tools and skills in the field of biology.

Course Contents:

Module I: Computers

General introduction (characteristics, capabilities, generations), software, hardware : organization of hardware (input devices, memory, control unit arithmetic logic unit, output devices); software : (System software; application software, languages -low level, high level), interpreter, compiler, data processing; batch, on-line, real-time (examples from bioindustries; e.g. application of computers in co-ordination of solute concentration, pH, temperature, etc., of a fermenter in operation); internet application.

Module II: Basic Bioinformatics

Introduction to Internet, Search Engines (Google, Yahoo, Entrezetc)

Module III: Biological Databases

Sequence databases (EMBL, GenBank, DDBJ, -UNIPROT, PIR, TrEMBL), Protein family/domain databases (PROSITE, PRINTS, Pfam, BLOCK, etc), Cluster databases-An Introduction, Specialised databases (KEGG, etc), Database technologies (Flat-file), Structural databases (PDB)

Module IV:

Trees-splits and metrics on trees, tree interpretation, Distance – additive, ultrametric and nonadditive distances, tree building methods, phylogenetic analysis.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

Text:

- Computer Science, J.G. Brookshear, Pearson, Addison Wesley
- Introduction to Bioinformation – T.Attawood

References:

- A book on C by Kelley : Programming in C, Addison-Wesley Publishing
- Introduction to C++ for Engineers and Scientists, Prentice-Hall
- Schaum's Outline of Introduction of Computer Science, P. Cushman and R. Mata-Toledo, McGraw Hill Trade
- Bioinformatics – Managing Scientific Data, Zoe' Lacroix and Terence Critchlow
- Bioinformatics – Sequence, Structure and Databanks, Des Higgins & Willie Taylor
- Structural Bioinformatics, Philip E. Bourne, Helge Weissig 2003
- Statistical Methods in Bioinformatics: An Introduction, G.R. Grant, W.J. Ewens, Springer Verlag

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TERM PAPER

Course Code: BTH2231

Credit Units: 02

A term (or research) paper is primarily a record of intelligent reading in several sources on a particular subject.

The students will choose the topic at the beginning of the session in consultation with the faculty assigned. The progress of the paper will be monitored regularly by the faculty. At the end of the semester the detailed paper on the topic will be submitted to the faculty assigned. The evaluation will be done by Board of examiners comprising of the faculties.

GUIDELINES FOR TERM PAPER

The procedure for writing a term paper may consists of the following steps:

- Choosing a subject
- Finding sources of materials
- Collecting the notes
- Outlining the paper
- Writing the first draft
- Editing & preparing the final paper

1. Choosing a Subject

The subject chosen should not be too general.

2. Finding Sources of materials

- d) The material sources should be not more than 10 years old unless the nature of the paper is such that it involves examining older writings from a historical point of view.
- e) Begin by making a list of subject-headings under which you might expect the subject to be listed.
- f) The sources could be books and magazines articles, news stories, periodicals, scientific journals etc.

3. Collecting the notes

Skim through sources, locating the useful material, then make good notes of it, including quotes and information for footnotes.

- d) Get facts, not just opinions. Compare the facts with author's conclusion.
- e) In research studies, notice the methods and procedures, results & conclusions.
- f) Check cross references.

4. Outlining the paper

- c) Review notes to find main sub-divisions of the subject.
- d) Sort the collected material again under each main division to find sub-sections for outline so that it begins to look more coherent and takes on a definite structure. If it does not, try going back and sorting again for main divisions, to see if another general pattern is possible.

5. Writing the first draft

Write the paper around the outline, being sure that you indicate in the first part of the paper what its purpose is. You may follow the following:

- a) statement of purpose
- b) main body of the paper
- c) statement of summary and conclusion

Avoid short, bumpy sentences and long straggling sentences with more than one main ideas.

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6. Editing & Preparing the final Paper

- j) Before writing a term paper, you should ensure you have a question which you attempt to answer in your paper. This question should be kept in mind throughout the paper. Include only information/ details/ analyses of relevance to the question at hand. Sometimes, the relevance of a particular section may be clear to you but not to your readers. To avoid this, ensure you briefly explain the relevance of every section.
- k) Read the paper to ensure that the language is not awkward, and that it "flows" properly.
- l) Check for proper spelling, phrasing and sentence construction.
- m) Check for proper form on footnotes, quotes, and punctuation.
- n) Check to see that quotations serve one of the following purposes:
- o) Show evidence of what an author has said.
- p) Avoid misrepresentation through restatement.
- q) Save unnecessary writing when ideas have been well expressed by the original author.
- r) Check for proper form on tables and graphs. Be certain that any table or graph is self-explanatory.

Term papers should be composed of the following sections:

- Title page
- Table of contents
- Introduction
- Review
- Discussion & Conclusion
- References
- Appendix

Generally, the introduction, discussion, conclusion and bibliography part should account for a third of the paper and the review part should be two thirds of the paper.

Discussion

The discussion section either follows the results or may alternatively be integrated in the results section. The section should consist of a discussion of the results of the study focusing on the question posed in the research paper.

Conclusion

The conclusion is often thought of as the easiest part of the paper but should by no means be disregarded. There are a number of key components which should not be omitted. These include:

- e) summary of question posed
- f) summary of findings
- g) summary of main limitations of the study at hand
- h) details of possibilities for related future research

References

From the very beginning of a research project, you should be careful to note all details of articles gathered.

The bibliography should contain ALL references included in the paper. References not included in the text in any form should NOT be included in the bibliography.

The key to a good bibliography is consistency. Choose a particular convention and stick to this.

Conventions

Monographs

Crystal, D. (2001), Language and the internet. Cambridge: Cambridge University Press.

Edited volumes

Gass, S./Neu, J. (eds.) (1996), Speech acts across cultures. Challenges to communication in a second language. Berlin/ NY: Mouton de Gruyter.

[(eds.) is used when there is more than one editor; and (ed.) where there is only one editor. In German the abbreviation used is (Hrsg.) for Herausgeber].

Edited articles

Schmidt, R./Shimura, A./Wang, Z./Jeong, H. (1996), Suggestions to buy: Television commercials from the U.S., Japan, China, and Korea. In: Gass, S./Neu, J. (eds.) (1996), Speech acts across cultures. Challenges to communication in a second language. Berlin/ NY: Mouton de Gruyter: 285-316.

Journal articles

McQuarrie, E.F./Mick, D.G. (1992), On resonance: A critical pluralistic inquiry into advertising rhetoric. Journal of consumer research 19, 180-197.

Electronic book

Chandler, D. (1994), Semiotics for beginners [HTML document]. Retrieved [5.10.'01] from the World Wide Web, <http://www.aber.ac.uk/media/Documents/S4B/>.

Electronic journal articles

Watts, S. (2000) Teaching talk: Should students learn 'real German'? [HTML document]. German as a Foreign Language Journal [online] 1. Retrieved [12.09.'00] from the World Wide Web, <http://www.gfl-journal.com/>.

Other websites

Verterhus, S.A. (n.y.), Anglicisms in German car advertising. The problem of gender assignment [HTML document]. Retrieved [13.10.'01] from the World Wide Web, <http://olaf.hiof.no/~sverrev/eng.html>.

Unpublished papers

Takahashi, S./DuFon, M.A. (1989), Cross-linguistic influence in indirectness: The case of English directives performed by native Japanese speakers. Unpublished paper, Department of English as a Second Language, University of Hawai'i at Manoa, Honolulu.

Unpublished theses/ dissertations

Möhl, S. (1996), Alltagssituationen im interkulturellen Vergleich: Realisierung von Kritik und Ablehnung im Deutschen und Englischen. Unpublished MA thesis, University of Hamburg.

Walsh, R. (1995), Language development and the year abroad: A study of oral grammatical accuracy amongst adult learners of German as a foreign language. Unpublished PhD dissertation, University College Dublin.

Appendix

The appendix should be used for data collected (e.g. questionnaires, transcripts, ...) and for tables and graphs not included in the main text due to their subsidiary nature or to space constraints in the main text.

Assessment Scheme:

Continuous Evaluation:


40%

(Based on abstract writing, interim draft, general approach, research orientation, readings undertaken etc.)

Final Evaluation:

60%

(Based on the organization of the paper, objectives/ problem profile/ issue outlining, comprehensiveness of the research, flow of the idea/ ideas, relevance of material used/ presented, outcomes vs. objectives, presentation/ viva etc.)


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PROJECT

Course Code: BTH2232

Credit Units: 03

Objectives:

The aim of the project is to provide the students with an opportunity to further their intellectual and personal development in the chosen field by undertaking a significant practical unit of activity. The project can be defined as a scholarly inquiry into a problem or issues, involving a systematic approach to gathering and analysis of information / data, leading to production of a structured report.

Chapter Scheme and distribution of marks:

Chapter 1: Introduction – 10 marks

Chapter 2: Conceptual Framework/ National/International Scenario – 25 marks

Chapter 3: Presentation, Analysis & Findings -- 25 marks

Chapter 4: Conclusion & Recommendations -- 10 marks

Chapter 5: Bibliography -- 05 marks

Project Report	Power Point Presentation & Viva
75 marks	25 marks

Components of a Project Report

The outcome of Project Work is the Project Report. A project report should have the following components:

1) Cover Page: This should contain the title of the project proposal, to whom it is submitted, for which degree, the name of the author, name of the supervisor, year of submission of the project work, name of the University.

2) Acknowledgement: Various organizations and individuals who might have provided assistance /co-operation during the process of carrying out the study.

3) Table of Content: Page-wise listing of the main contents in the report, i.e., different Chapters and its main Sections along with their page numbers.

4) Body of the Report: The body of the report should have these four logical divisions

a) **Introduction:** This will cover the background, rationale/ need / justification, brief review of literature, objectives, methodology (the area of the study, sample, type of study, tools for data collection, and method of analysis), Limitations of the Study, and Chapter Planning.

b) **Conceptual Framework / National and International Scenario:** (relating to the topic of the Project).

c) **Presentation of Data, Analysis and Findings:**(using the tools and techniques mentioned in the methodology).

d) **Conclusion and Recommendations:** In this section, the concluding observations based on the main findings and suggestions are to be provided.

5) Bibliography or References: This section will include the list of books and articles which have been used in the project work, and in writing a project report.

6) Annexures: Questionnaires (if any), relevant reports, etc.

(The main text of the Project should normally be in the range of 5000 words. However, there may be annexure in addition to the main text)

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The Steps of a Project Report

Step I : Selection of the topic for the project by taking following points into consideration:

- Suitability of the topic.
- Relevance of the topic
- Time available at the disposal.
- Feasibility of data collection within the given time limit.
- Challenges involved in the data collection (time & cost involved in the data collection, possibility of getting responses, etc.)

Step II : Finalisation of the Topic and preparation of Project Proposal in consultation with the Supervisor.

Step III : Collection of information and data relating to the topic and analysis of the same.

Step IV : Writing the report dividing it into suitable chapters, viz.,

Chapter 1: Introduction,

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Chapter 3: Analysis & Findings

Chapter 4: Conclusion and Recommendations.

Step V : The following documents are to be attached with the Final Project Report.


1) Approval letter from the supervisor (Annexure-IA)

2) Student's declaration (Annexure-IB)

3) Certificate from the Competent Authority of the Organisation / Institution, if the student undertakes the Project Work in any Organisation / Institution.

Guidelines for Evaluation:

- Each of the students has to undertake a Project individually under the supervision of a teacher and to submit the same following the guidelines stated below.
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- Failure to submit the Project Report or failure to appear at the Viva-voce Examination will be treated as "Absent" in the Examination. He /she has to submit the Project Report and appear at the Viva-Voce Examination in the subsequent years (within the time period as per University Rules).
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WORKSHOP / CERTIFICATION

Course Code: BTH2233

Credit Units: 01

Objectives

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Major Themes for Workshop

The workshop may be conducted on any of the following major themes:

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Finance

Human Resources

Marketing

Economics

Operations

Supply Chain Management

These themes are merely indicative and other recent and relevant topics of study may be included.

Guidelines for Workshop

The procedure for earning credits from workshop consists of the following steps:

Relevant study material and references will be provided by the trainer in advance.

The participants are expected to explore the topic in advance and take active part in the discussions held

Attending and Participating in all activities of the workshop

Group Activities have to be undertaken by students as guided by the trainer.

Evaluation of workshop activities would be done through test and quiz at the end of the workshop.

Submitting a write up of atleast 500 words about the learning outcome from the workshop.

Methodology

The methodology followed at the workshop could be based on any one or more of the following methods:

Case Study

Business Game

Simulation

Group Activity

Role Play

Business Planning

Quiz

Evaluation Scheme:

Attendance	Active Participation	Multiple Choice Questions/ Quiz	Solving the case/ Assignment/ Write up	Total
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MICROBIOLOGY

Course Code: BTH2302

Credit Units: 03

Course Objective:

To acquaint the students about the microbiology and role of various microorganisms in different biotechnological applications, various techniques for their cultivation and control.

Course Contents:

Module I: Introduction and historical perspective

Discovery of microbial world, Concept of pure culture, Theory and practice of sterilization; Isolation of microorganisms, staining methods, microscopy, preservation of microbial cultures

Module II

Microbial Physiology: cell structure and function. Microbial growth: Growth curve, Enumeration of cells by direct and indirect methods, Microbial fermentations, Microbial Stress Responses.

Module III

Evolutionary microbiology and microbial diversity: Microbial evolution and systematics, prokaryotic diversity: bacteria and archaea, eukaryotic microorganisms (structure of algae and fungi), microbial community analysis (overview), classical and molecular taxonomy.

Virology: Viruses and virions, growth and quantification, viral replication, viroids and prions, Bacterial, plant and animal viruses,

Module IV

Microbial Ecology Methods in microbial ecology (culture dependent and culture independent techniques), microbial habitats and nutrient cycling (Carbon, sulphur and nitrogen cycles), plant-microbes, animal-microbes interactions. Soil microorganisms associated with vascular plants, bioremediation and biodegradation.

Module V

Applied microbiology: Biocatalysts, microbial metabolites, wine production, single cell proteins, microbial transformation of steroids, role of microbes in food industry, production of dairy products (fermented milks and cheese), Role of microbes in Agriculture (biofertilizers, biopesticides), Waste water treatment.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

- Brock Biology of Microorganisms by Madigan, Martinko, Stahl, Clark, Publisher : 13th Edition, Prentice Hall
- General Microbiology by R.Y. Stainer et al. Publisher : McMillan
- Microbiology, Prescott and Dunn, C.B.S. Publishers

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ENZYMOLGY

Course Code: BTH2303

Credit Units: 03

Course Objective:

The course aims to provide an understanding of the principles and application of proteins, secondary metabolites and enzyme biochemistry in therapeutic applications and clinical diagnosis. The theoretical understanding of biochemical systems would certainly help to interpret the results of laboratory experiments.

Course Contents:

Module I: Enzymes

Introduction and scope, Nomenclature, Mechanism of Catalysis. Specificity of enzyme action, monomeric and oligomeric enzymes, Enzyme inhibition.

Module II Enzyme Kinetics

Single substrate steady state kinetics; MichaelisMenten equation, Linear plots, Inhibitors and activators; Multisubstrate systems; Allosteric enzymes

Module III

Immobilization of Enzymes; Advantages, Carriers, adsorption, covalent coupling, cross-linking and entrapment methods, Micro-environmental effects.

Module VI: Biotechnological applications of enzymes

Large scale production and purification of enzymes, enzyme utilization in industry, enzymes and recombinant DNA technology

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

Text:

- Biotechnological Innovations in Chemical Synthesis, R.C.B. Currell, V.D. Mieras, Biotol Partners Staff, Butterworth Heinemann.
- Enzyme Technology, M.F. Chaplin and C. Bucke, Cambridge University Press.
- Enzymes: A Practical Introduction to Structure, Mechanism and Data Analysis, R.A. Copeland, John Wiley and Sons Inc.

References:

- Enzymes Biochemistry, Biotechnology, Clinical Chemistry, Trevor Palner
- Enzyme Kinetics: Behavior and Analysis of Rapid Equilibrium and Steady State Enzyme Systems, I.H. Segel, Wiley-Interscience
- Industrial Enzymes & their applications, H. Uhlig, John Wiley and Sons Inc.

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BIOCHEMISTRY LAB

Course Code: BTH2305

Credit Units: 01

Course Contents:

Module I: Solutions and buffers

Preparation of molar, normal and % (w/v) solutions preparation of buffers of different pH and molar strength.

Module II: Carbohydrates

Extraction and estimation of carbohydrates from given plant/animal materials: determination of total sugars by Anthrone method Separation of sugars by thin layer chromatography

Module III: Proteins

Extraction of total proteins; Estimation of proteins by Lowery/ Bradford Method; Electrophoretic (SDS-PAGE) separation of isolated proteins

Module IV: Lipids

Extraction of total lipids; estimation of phospholipids/glycolipids; thin layer chromatographic separation of lipids

Module IV: Nucleic Acid


Extraction and estimation of DNA and RNA by UV-spectrophotometer

Examination Scheme:

IA			EE			
Class Test (Practical Based)	Mid Term Viva	Attendance	Major Experiment	Minor Experiment/Spotting	Practical Record	Viva
15	10	05	35	15	10	10

Text & References:

- Practical book of Biochemistry by Plummer
- Practical book of Biochemistry by S.K. Sawhney and Randhir Singh


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MICROBIOLOGY LAB

Course Code: BTH2306

Credit Units: 01

Course Contents:

- Laboratory safety and instrument handling, General rules and regulations, Aseptic techniques, preparation of culture media for cultivation of specific microorganisms.
Observation of permanent slides (*E.coli*, *Yeast*, *Sarcina*, *Streptococcus*, *Acid fast staining*)
- Isolation and enumeration of microorganisms from air, water and rhizosphere (actinomycetes, bacteria and fungi), serial dilution and viable plate counting methods, Use of differential, selective and enriched media.
- Staining techniques: Simple staining, differential Gram staining, endospore staining, lactophenol cotton blue staining for fungi
- Growth curve measurement of bacterial population by turbidometry
- Biochemical tests – Triple Sugar Iron test (TSI), Indole test, Methyl red test, Voges-Proskauer test, Citrate utilization test (IMViC), starch hydrolysis, casein hydrolysis, catalase test
- Water microbiology- presumptive, confirmed and complete test for water potability.

Examination Scheme:

IA			EE			
Class Test (Practical Based)	Mid Term Viva	Attendance	Major Experiment	Minor Experiment/Spotting	Practical Record	Viva
15	10	05	35	15	10	10

Text & References:

- Microbiology: A laboratory Manual, Seventh Edition, by: Cappuccino and Sherman
- Microbes in Action, Fourth Edition: by Harry W. Seeley, Cornell University; Paul J. Vandemark, late of Cornell University; John J. Lee,


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ENZYMOLGY LAB

Course Code: BTH2307

Credit Units: 01

Course Objective:

The laboratory will help the students to isolate enzymes from different sources, enzyme assays and studying their kinetic parameters which have immense importance in industrial processes.

Course Contents:

Module I

Isolation of enzymes from plant and microbial sources.

Module II

Enzyme assay; activity and specific activity – determination of amylase, nitrate reductase, cellulase, protease.

Module III

Purification of Enzyme by ammonium sulphate fractionation.

Module IV: Enzyme Kinetics

Effect of varying substrate concentration on enzyme activity, determination of Michaelis-Menten constant (K_m) and Maximum Velocity (V_{max}) using Lineweaver-Burk plot.

Module V

Effect of Temperature and pH on enzyme activity.

Examination Scheme:

IA			EE			
Class Test (Practical Based)	Mid Term Viva	Attendance	Major Experiment	Minor Experiment/Spotting	Practical Record	Viva
15	10	05	35	15	10	10

Note: Minor variation could be there depending on the examiner.


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GENETICS & CELL BIOLOGY LAB

Course Code: BTH2308

Credit Units: 01

Course Contents:

Module I

Cell fractionation and separation of cell organelles by ultra centrifugation.

Module II

Isolation of chloroplast from spinach

Module III

Isolation of mitochondria.

Module IV

Study of apoptosis by TUNEL method.

Site directed mutagenesis


Mutation detection and analysis

Mitosis

Meiosis

Examination Scheme:

IA			EE			
Class Test (Practical Based)	Mid Term Viva	Attendance	Major Experiment	Minor Experiment/Spotting	Practical Record	Viva
15	10	05	35	15	10	10


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INTELLECTUAL PROPERTY RIGHTS

Course Code: BTH2309

Credit Units: 03

Course Objective:

The aim of this course is to develop the understanding of relevance, business impact and protection of Intellectual property along with the types of Intellectual Property Rights; Patents, Copyrights, Trademarks, Industrial Designs, Geographical Indications and International Conventions, Biosafety and Bioethics

Course Contents:

Module I

General Overview of Intellectual Property Rights, WIPO, WTO, Trade Related Intellectual Property Rights.

Module II

Patent - Basic requirements of Patentability, Patentable Subject Matter, Procedure for Obtaining Patent, Provisional and Complete Specification

Module III

Copyright - Objectives of copyright, Rights conferred by registration of copyright, Infringement of copyright

Module IV

Trademarks-Basic Principles of Trademark, Rights conferred by Registration of Trademark, Infringement of Trademark

Module V

Geographical Indications-Objectives of Geographical Indications, Rights conferred, Infringement of Geographical Indications, International Position, Indian Position, Bioprospecting and Biopiracy.

Module VI

Biosafety and Bioethics Management-Key to environmentally responsible use of biotechnology. Cartagena Protocol on Biosafety, Ethical implications of Biotechnological products and techniques.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

Text:

- Intellectual Property Rights by Brigitte Anderson, Edward Elgar Publishing
- Intellectual Property Rights and the Life Sciences Industries by Graham Dutfield, Ashgate Publishing

References:

- WIPO Intellectual Property Handbook
- Intellectual Property Rights by William Rodelph Cornish, David Clewelyn
- Journals and Current magazines

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PHARMACEUTICAL BIOTECHNOLOGY

Course Code: BTH2310

Credit Units: 03

Course Objective:

The objective of this course to apply the basic concepts in the specific field of Pharmaceutical Biotechnology Industry. The student will gain insight into the working of a pharma industry, various classes of biotech products and the regulations governing production and marketing of pharmaceutical products.

Course Contents:

Module I

Introduction and History, Drug Discovery Process, Methods of Drug Discovery and development.

Module II

Physicochemical Properties, Effects of route of administration, Drug Targets, Pharmacokinetics and pharmacodynamics of drugs, Drug Toxicity.

Module III

DNA vaccines, Vaccines & Monoclonal antibody based pharmaceuticals, Antibiotics, Characterisation and Bioanalytical aspects of Recombinant proteins as pharmaceutical drugs.

Module IV

Formulation of Biotechnological Products, Drug Delivery, Examples of some Biotechnological products in clinical development

Module V: Regulations

Role of FDA, ICH Guidelines, cGMP, The Regulation of Pharmaceutical Biotechnological Products and Ethical Issues.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70


Text & References:

Text:

- Pharmaceutical Biotechnology - by Oliver. Kayser, Rainer Helmut Müller Series: Pharmaceutical Biotechnology , Vol. 9 Pearlman, Rodney; Wang, Y. John (Eds.) 1996.

References:

- Development and Manufacture of Protein Pharmaceuticals Series: Pharmaceutical Biotechnology , Vol. 14 Nail, Steve L.; Akers, Michael J. (Eds.) 2002
- Pharmaceutical Biotechnology: Fundamentals and Applications, Third Edition, Editor Daan J.A. Crommelin, Robert D Sindelar.
- Pharmaceutical Biotechnology, Vyas, S. P., CBS Publishers & Distributors, 2002, Delhi


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CLINICAL BIOTECHNOLOGY

Course Code: BTH2311

Credit Units: 03

Course Objective:

To develop an understanding of role of biochemistry and molecular biology in the diagnosis and clinical management of disease

Course Contents:

Module I

Clinical significance of biochemical tests and their role in the diagnosis and monitoring of disease, Clinical characteristic of disease. Role of clinical biochemistry in detection, diagnosis of diseases

Module II

Genetic disease, example of genetic diseases. transplantation/gene therapy.

Module III

Clinically important taxonomic grouping of bacteria, etiology, transmission; Epidemics, pandemics and endemics disease. Control measure of microbial diseases. Hygiene regulations.

Module IV

Manipulation of reproduction and development for application in medicine, agriculture, aquaculture and conservation.

Module V

Management of Clinical Data.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

Text:

- Marshall, W J, Clinical Chemistry, 3rd edition, Mosby, 1997.
- Harper's Biochemistry K. Robert, M.D. Murray, D.K. Granner, P.A. Mayes and V.I. Rodwell, McGraw Hill/ Appleton and Lange

References:

- Sudbery, P. Human molecular genetics. Addison Wesley Longman (1998)
- Principles of Biochemistry, A.L. Lehninger, D.L. Nelson, M.M. Cox. , Worth Publishing
- Principles of Physical Biochemistry, K.E. Van Holde, W.C. Johnson, Prentice Hall
- Tools of Biochemistry, T.G. Cooper, John Wiley and Sons Inc.
- Enzymes Biochemistry, Biotechnology, Clinical Chemistry, Trevor Palner
- Biochemistry (Fifth Edition), Lubert Stryer
- Physical Biochemistry, David Freifeider
- Annual Review of Biochemistry (1995-2004)
- Enzyme Kinetics: Behaviour and Analysis of Rapid Equilibrium and Steady State Enzyme Systems, J.H. Segel, Wiley-Interscience
- Industrial Enzymes & their applications, H. Uhlig., John Wiley and Sons Inc.

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TERM PAPER

Course Code: BTH2331

Credit Units: 02

A term (or research) paper is primarily a record of intelligent reading in several sources on a particular subject.

The students will choose the topic at the beginning of the session in consultation with the faculty assigned. The progress of the paper will be monitored regularly by the faculty. At the end of the semester the detailed paper on the topic will be submitted to the faculty assigned. The evaluation will be done by Board of examiners comprising of the faculties.

GUIDELINES FOR TERM PAPER

The procedure for writing a term paper may consists of the following steps:

- Choosing a subject
- Finding sources of materials
- Collecting the notes
- Outlining the paper
- Writing the first draft
- Editing & preparing the final paper

1. Choosing a Subject

The subject chosen should not be too general.

2. Finding Sources of materials

- g) The material sources should be not more than 10 years old unless the nature of the paper is such that it involves examining older writings from a historical point of view.
- h) Begin by making a list of subject-headings under which you might expect the subject to be listed.
- i) The sources could be books and magazines articles, news stories, periodicals, scientific journals etc.

3. Collecting the notes

Skim through sources, locating the useful material, then make good notes of it, including quotes and information for footnotes.

- g) Get facts, not just opinions. Compare the facts with author's conclusion.
- h) In research studies, notice the methods and procedures, results & conclusions.
- i) Check cross references.

4. Outlining the paper

- e) Review notes to find main sub-divisions of the subject.
- f) Sort the collected material again under each main division to find sub-sections for outline so that it begins to look more coherent and takes on a definite structure. If it does not, try going back and sorting again for main divisions, to see if another general pattern is possible.

5. Writing the first draft

Write the paper around the outline, being sure that you indicate in the first part of the paper what its purpose is. You may follow the following:

- a) statement of purpose
- b) main body of the paper
- c) statement of summary and conclusion

Avoid short, bumpy sentences and long straggling sentences with more than one main ideas.

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6. Editing & Preparing the final Paper

- s) Before writing a term paper, you should ensure you have a question which you attempt to answer in your paper. This question should be kept in mind throughout the paper. Include only information/ details/ analyses of relevance to the question at hand. Sometimes, the relevance of a particular section may be clear to you but not to your readers. To avoid this, ensure you briefly explain the relevance of every section.
- t) Read the paper to ensure that the language is not awkward, and that it "flows" properly.
- u) Check for proper spelling, phrasing and sentence construction.
- v) Check for proper form on footnotes, quotes, and punctuation.
- w) Check to see that quotations serve one of the following purposes:
- x) Show evidence of what an author has said.
- y) Avoid misrepresentation through restatement.
- z) Save unnecessary writing when ideas have been well expressed by the original author.
- aa) Check for proper form on tables and graphs. Be certain that any table or graph is self-explanatory.

Term papers should be composed of the following sections:

- Title page
- Table of contents
- Introduction
- Review
- Discussion & Conclusion
- References
- Appendix

Generally, the introduction, discussion, conclusion and bibliography part should account for a third of the paper and the review part should be two thirds of the paper.

Discussion

The discussion section either follows the results or may alternatively be integrated in the results section. The section should consist of a discussion of the results of the study focusing on the question posed in the research paper.

Conclusion

The conclusion is often thought of as the easiest part of the paper but should by no means be disregarded. There are a number of key components which should not be omitted. These include:

- i) summary of question posed
- j) summary of findings
- k) summary of main limitations of the study at hand
- l) details of possibilities for related future research

References

From the very beginning of a research project, you should be careful to note all details of articles gathered.

The bibliography should contain ALL references included in the paper. References not included in the text in any form should NOT be included in the bibliography.

The key to a good bibliography is consistency. Choose a particular convention and stick to this.

Conventions

Monographs

Crystal, D. (2001), *Language and the internet*. Cambridge: Cambridge University Press.

Edited volumes

Gass, S./Neu, J. (eds.) (1996), *Speech acts across cultures. Challenges to communication in a second language*. Berlin/ NY: Mouton de Gruyter.

[(eds.) is used when there is more than one editor; and (ed.) where there is only one editor. In German the abbreviation used is (Hrsg.) for Herausgeber].

Edited articles

Schmidt, R./Shimura, A./Wang, Z./Jeong, H. (1996), *Suggestions to buy: Television commercials from the U.S., Japan, China, and Korea*. In: Gass, S./Neu, J. (eds.) (1996), *Speech acts across cultures. Challenges to communication in a second language*. Berlin/ NY: Mouton de Gruyter: 285-316.

Journal articles

McQuarrie, E.F./Mick, D.G. (1992), *On resonance: A critical pluralistic inquiry into advertising rhetoric*. *Journal of consumer research* 19, 180-197.

Electronic book

Chandler, D. (1994), *Semiotics for beginners* [HTML document]. Retrieved [5.10.'01] from the World Wide Web, <http://www.aber.ac.uk/media/Documents/S4B/>.

Electronic journal articles

Watts, S. (2000) *Teaching talk: Should students learn 'real German'?* [HTML document]. *German as a Foreign Language Journal* [online] 1. Retrieved [12.09.'00] from the World Wide Web, <http://www.gfl-journal.com/>.

Other websites

Verterhus, S.A. (n.y.), *Anglicisms in German car advertising. The problem of gender assignment* [HTML document]. Retrieved [13.10.'01] from the World Wide Web, <http://olaf.hiof.no/~sverrev/eng.html>.

Unpublished papers

Takahashi, S./DuFon, M.A. (1989), *Cross-linguistic influence in indirectness: The case of English directives performed by native Japanese speakers*. Unpublished paper, Department of English as a Second Language, University of Hawai'i at Manoa, Honolulu.

Unpublished theses/ dissertations

Möhl, S. (1996), *Alltagssituationen im interkulturellen Vergleich: Realisierung von Kritik und Ablehnung im Deutschen und Englischen*. Unpublished MA thesis, University of Hamburg.

Walsh, R. (1995), *Language development and the year abroad: A study of oral grammatical accuracy amongst adult learners of German as a foreign language*. Unpublished PhD dissertation, University College Dublin.

Appendix

The appendix should be used for data collected (e.g. questionnaires, transcripts, ...) and for tables and graphs not included in the main text due to their subsidiary nature or to space constraints in the main text.

Assessment Scheme:

Continuous Evaluation:


40%

(Based on abstract writing, interim draft, general approach, research orientation, readings undertaken etc.)

Final Evaluation:

60%

(Based on the organization of the paper, objectives/ problem profile/ issue outlining, comprehensiveness of the research, flow of the idea/ ideas, relevance of material used/ presented, outcomes vs. objectives, presentation/ viva etc.)


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PROJECT

Course Code: BTH2332

Credit Units: 03

Objectives:

The aim of the project is to provide the students with an opportunity to further their intellectual and personal development in the chosen field by undertaking a significant practical unit of activity. The project can be defined as a scholarly inquiry into a problem or issues, involving a systematic approach to gathering and analysis of information / data, leading to production of a structured report.

Chapter Scheme and distribution of marks:

Chapter 1: Introduction – 10 marks

Chapter 2: Conceptual Framework/ National/International Scenario – 25 marks

Chapter 3: Presentation, Analysis & Findings -- 25 marks

Chapter 4: Conclusion & Recommendations -- 10 marks

Chapter 5: Bibliography -- 05 marks

Project Report	Power Point Presentation & Viva
75 marks	25 marks

Components of a Project Report

The outcome of Project Work is the Project Report. A project report should have the following components:

1) Cover Page: This should contain the title of the project proposal, to whom it is submitted, for which degree, the name of the author, name of the supervisor, year of submission of the project work, name of the University.

2) Acknowledgement: Various organizations and individuals who might have provided assistance /co-operation during the process of carrying out the study.

3) Table of Content: Page-wise listing of the main contents in the report, i.e., different Chapters and its main Sections along with their page numbers.

4) Body of the Report: The body of the report should have these four logical divisions

a) **Introduction:** This will cover the background, rationale/ need / justification, brief review of literature, objectives, methodology (the area of the study, sample, type of study, tools for data collection, and method of analysis), Limitations of the Study, and Chapter Planning.

b) **Conceptual Framework / National and International Scenario:** (relating to the topic of the Project).

c) **Presentation of Data, Analysis and Findings:**(using the tools and techniques mentioned in the methodology).

d) **Conclusion and Recommendations:** In this section, the concluding observations based on the main findings and suggestions are to be provided.

5) Bibliography or References: This section will include the list of books and articles which have been used in the project work, and in writing a project report.

6) Annexures: Questionnaires (if any), relevant reports, etc.

(The main text of the Project should normally be in the range of 5000 words. However, there may be annexure in addition to the main text)

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The Steps of a Project Report

Step I : Selection of the topic for the project by taking following points into consideration:

- Suitability of the topic.
- Relevance of the topic
- Time available at the disposal.
- Feasibility of data collection within the given time limit.
- Challenges involved in the data collection (time & cost involved in the data collection, possibility of getting responses, etc.)

Step II : Finalisation of the Topic and preparation of Project Proposal in consultation with the Supervisor.

Step III : Collection of information and data relating to the topic and analysis of the same.

Step IV : Writing the report dividing it into suitable chapters, viz.,

Chapter 1: Introduction,

Chapter 2: Conceptual Framework / National & International Scenario,

Chapter 3: Analysis & Findings


Chapter 4: Conclusion and Recommendations.

Step V : The following documents are to be attached with the Final Project Report.

- 1) Approval letter from the supervisor (Annexure-IA)
- 2) Student's declaration (Annexure-IB)
- 3) Certificate from the Competent Authority of the Organisation / Institution, if the student undertakes the Project Work in any Organisation / Institution.

Guidelines for Evaluation:

- Each of the students has to undertake a Project individually under the supervision of a teacher and to submit the same following the guidelines stated below.
- Language of Project Report and Viva-Voce Examination may be English. The Project Report must be typed and hard bound.
- Failure to submit the Project Report or failure to appear at the Viva-voce Examination will be treated as "Absent" in the Examination. He /she has to submit the Project Report and appear at the Viva-Voce Examination in the subsequent years (within the time period as per University Rules).
- No marks will be allotted on the Project Report unless a candidate appears at the Viva-Voce Examination. Similarly, no marks will be allotted on Viva-Voce Examination unless a candidate submits his/her Project Report.
- Evaluation of the Project Work to be done jointly by one internal expert and one external expert with equal weightage, i.e., average marks of the internal and external experts will be allotted to the candidate.


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WORKSHOP / CERTIFICATION

Course Code: BTH2333

Credit Units: 01

Objectives

A workshop is primarily an activity based academic event that is organized to provide the students a one to one and hands on experience on any aspect of their learning. The communication in a workshop has to be necessarily two way. The trainer has to make sure that the aspect covered are practically practiced by the participants. The student will choose the option of workshop from amongst their concentration electives. The evaluation will be done by Board of examiners comprising of the faculties.

Major Themes for Workshop

The workshop may be conducted on any of the following major themes:

Accounting

Finance

Human Resources

Marketing

Economics

Operations

Supply Chain Management

These themes are merely indicative and other recent and relevant topics of study may be included.

Guidelines for Workshop

The procedure for earning credits from workshop consists of the following steps:

- Relevant study material and references will be provided by the trainer in advance.
- The participants are expected to explore the topic in advance and take active part in the discussions held
- Attending and Participating in all activities of the workshop
- Group Activities have to be undertaken by students as guided by the trainer.
- Evaluation of workshop activities would be done through test and quiz at the end of the workshop.
- Submitting a write up of atleast 500 words about the learning outcome from the workshop.

Methodology

The methodology followed at the workshop could be based on any one or more of the following methods:

Case Study

Business Game

Simulation

Group Activity

Role Play

Business Planning

Quiz

Evaluation Scheme:

Attendance	Active Participation	Multiple Choice Questions/ Quiz	Solving the case/ Assignment/ Write up	Total
10	30	30	30	100


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INTRODUCTORY IMMUNOLOGY

Course Code: BTH2402

Credit Units: 03

Course Objective:

Role of antibody engineering in biomedical applications and the importance of immuno genetics in disease processes, tissue transplantation and immune regulation are some of the areas of attributes of this course which can help the students to understand the biotechnology related to human kind.

Course Contents:

Module I

Historical perspective of immune system and immunity; Innate and specific immunity, Humoral immunity, Cell-mediated immunity

Module II

Antibody structure in relation to function and antigen-binding; Types of antibodies and their structures: isotypes, allotypes, idiotypes; Genetic basis of antibody diversity

Module III

The organs and cells of the immune system; Histocompatibility: structure of MHC class I, II & III antigens & their mode of antigen presentation, MHC restriction; Antigens & antigenicity;

Module IV

Measurement of antigen – antibody interaction: agglutination, immunodiffusion, immuno-electrophoresis, ELISA, RIE, production of monoclonal antibodies.

Module V

Complement system; Autoimmunity; Hypersensitivity

Module VI:

Hybridoma Technology; Introduction to transplantation immunology, Introduction to Cancer immunology, Vaccines (attenuated and recombinant);

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

Text:

- Kuby Immunology, R.A. Goldsby, T.J. Kindt, and B.A. Osborne, Freeman

References:

- Immunology, Roitt, Mosby – Yearbook Inc.
- Basic Immunology, A.K. Abbas and A.H. Lichtman, Saunders W.B. Company
- Fundamentals of Immunology, W. Paul, Lippincott Williams and Wilkins
- Immunology, W.L. Anderson, Fence Creek Publishing (Blackwell).
- Immunology: A Short Course, E. Benjamin, R. Coico and G. Sunshine, Wiley-Leiss Inc.

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INSTRUMENTATION & BIOANALYTICAL TECHNIQUES

Course Code: BTH2403

Credit Units: 02

Course Objective:

The students will be exposed to basic concepts related with techniques and instrumentation widely used in Biotechnology.

Course Contents:

Module I: Buffers & Sample preparation

Preparation of solutions, concept of pH and buffer, types of buffers and their preparation, pH meter. Cell Disruption techniques, ultra filtration, dialysis and reverse osmosis.

Module II: Centrifugation

Principle of centrifugation, rotors, different types of centrifuges, ultra centrifugation

Module III: Microscopy

Principles of microscopy, types of microscopy Bright field, Dark field, phase contrast and fluorescence microscopy. Electron microscopy: Transmission and scanning electron microscopy.

Module IV: Radioisotope techniques

Study of radioisotopes in biological samples, proportional and GM counter, scintillation counters, autoradiography.

Module V: Electrophoresis & Chromatography

SDS-PAGE, isoelectric focusing, two-dimensional electrophoresis; Paper, TLC, gel filtration, ion-exchange chromatography, affinity chromatography, HPLC and GLC

Module VI: Spectroscopy

UV and visible spectroscopy, Infrared and Atomic absorption spectroscopy, fluorescence spectroscopy.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

Text:

- Principles of Physical Biochemistry, K.E. Van Holde, Prentice Hall.
- Essentials of Biophysics, P. Narayanan, New Age International Publishers

References:

- Advanced Instrumentation, Data Interpretation, and Control of Biotechnological Processes, J.F. Van Impe, Kluwer Academic
- Crystal Structure Analysis, J.P. Glusker and K.N. Trueblood, Oxford University Press
- Crystallography made Crystal Clear, G. Rhodes, Academic Press
- Modern Spectroscopy, J.M. Hollas, John Wiley and Son Ltd.
- NMR Spectroscopy: Basic Principles, Concepts and Applications in Chemistry, H. Gunther, John Wiley and Sons Ltd.

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RESEARCH METHODOLOGY

Course Code: BTH2404

Credit Units: 02

Course Objective:

To develop understanding of information and library science research issues in the domain of bioinformatics through review of journal articles, invited talks, and critical group discussions of methods. The main objectives for this course are to develop: familiarity with information and library science-oriented problems in the biomedical sciences, an understanding of research methods in the biomedical domain, critical thinking and evaluation skills and presentation and summarization skills.

Course Contents:

Module I

Introduction: Science, Scientific research. Role of a researcher in different stages of a project, Routes to research funding (academic and commercial)

Module II

Research – Definition – Importance and Meaning of research – Characteristics of research – Types of Research – Steps in research – Identification, Selection and formulation of research problem – Research questions – Research design – Formulation of Hypothesis – Review of Literature.

Module III: Sampling techniques

Types of sampling, Steps in sampling; Advantages and limitations of sampling. Collection of Data;; Statistics in Research.

Module IV

Type of Articles (review, letters etc). Scientific paper format (Abstract, Introduction, Materials and Methods, Results, Discussion). Writing, evaluating, presenting and publishing the results of scientific research in the academic press (journals, conferences etc). Choosing the appropriate journal (Sources, Information, Instructions to authors, peer review system, journal evaluation)

Module V

Case studies of areas of current research. Formulating a research plan and its presentation

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

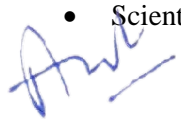
Text & References:

Text:

- Statistical Methods By S.P. Gupta

References:

- Research Methodology Methods and Techniques by C.R. Kothari
- Statistics(Theory and Practice) by B.N. Gupta
- Research Methodology Methods and statistical Techniques by Santosh Gupta
- Scientific journals and magazines


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IN SILICO ANALYSIS OF BIOMOLECULES

Course Code: BTH2405

Credit Units: 02

Course Objective: The objective is to describe relational data models and database management systems with an emphasis on biologically important techniques to store various data on DNA sequencing structures genetic mapping etc.

Course Content:

Module I: Introduction and overview

The NCBI data model; sequence databases, sequence retrieval, sequence file formats, submitting DNA and protein sequences. Types of biological databases, Databases and rapid sequence analysis

Module II: Sequence alignment

Global and local alignments, Pairwise and multiple alignment, programs and methods for sequence alignment, pattern searching programs, family and superfamily representation, structural inference, dynamic programming algorithms, alignment by hidden Markov models,

Module III: Phylogenetic prediction

Phylogenetic analysis, parsimony, tree evaluation, maximum likelihood trees, analysis software.

Module IV: Predictive methods using DNA and protein sequences

ESTs – databases, clustering, gene discovery and identification, and functional classification. Protein identification, physical properties, motifs and patterns, structure,

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70


Text & References:

Text:

- Essentials of Genomics and Bioinformatics, C.W. Sensen, John Wiley and Sons
- Bioinformatics: Sequence and Genome Analysis, D.W. Mount, Cold Spring Harbor Laboratory Press

References:

- Algorithms on Strings, Trees, and Sequences: Computer Science and Computational Biology, D. Gusfield, Cambridge University Press
- Bioinformatics: A Practical Guide to the Analysis of Genes and Proteins, A.D. Baxevanis and B.F.F. Quellet, Wiley – interscience.
- Bioinformatics: Sequence and Genome Analysis, D.W. Mount, Cold Spring Harbor Laboratory Press.
- Sequence Analysis in Molecular Biology: Treasure Trove or Trivial Pursuit, G. Von Heijne and G. Von Heijne, Academic Press.


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MOLECULAR BIOLOGY LAB

Course Code: BTH2406


Credit Units: 01

Course Contents:

1. Isolation of genomic DNA.
2. Isolation of plasmid DNA.
3. Isolation of eukaryotic total RNA.
4. Study of in vitro transcription.
5. Invitro study of translation

Examination Scheme:

IA			EE			
Class Test (Practical Based)	Mid Term Viva	Attendance	Major Experiment	Minor Experiment/Spotting	Practical Record	Viva
15	10	05	35	15	10	10


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INTRODUCTORY IMMUNOLOGY LAB

Course Code: BTH2407

Credit Units: 01

Course Contents:

Module I

Blood film preparation and identification of cells.

Module II

Isolation of serum, Purification of IgG through affinity chromatography

Module III

Lymphoid organs and their microscopic organization.

Module IV

WIDAL Test

Module V


Radial Immuno Diffusion Test; Ouchterlony Double diffusion Test

Module VI: ELISA

Dot, Sandwich

Examination Scheme:

IA			EE			
Class Test (Practical Based)	Mid Term Viva	Attendance	Major Experiment	Minor Experiment/Spotting	Practical Record	Viva
15	10	05	35	15	10	10


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IN SILICO ANALYSIS OF BIOMOLECULES LAB

Course Code: BTH2408


Credit Units: 01

Course Contents:

1. Basics of sequence analysis Retrieving a sequence-nucleic acid/Protein
2. Local and Global Alignment- concepts Pair wise sequence alignment
3. Multiple sequence alignment
4. Dynamic Programming – Smith Watermann Algorithm Needleman Wunsch Algorithm
5. Motif and pattern searching
6. Phylogentic prediction and analysis
7. Structure predication
8. Finding transcription regulatory signals
9. Docking

Examination Scheme:

IA			EE			
Class Test (Practical Based)	Mid Term Viva	Attendance	Major Experiment	Minor Experiment/Spotting	Practical Record	Viva
15	10	05	35	15	10	10


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NANO BIOTECHNOLOGY

Course Code: BTH2409

Credit Units: 03

Course Objective:

Nanotechnology is one of the most important emerging fields in today's scenario and holds tremendous potential in the field of Biotechnology. The objective of this course is to introduce this emerging field to the students so that they can apply this to develop new drug delivery systems and biomarkers.

Course Contents:

Module I: Introduction to Nanotechnology

Overview of nanotechnology developments, different nanostructured materials, properties related to nanostructured surfaces, atomic theory and bonding, quantum theory, electromagnetic properties of matter, molecular structure and macromolecules, intramolecular and intermolecular forces, solubility and solvation, thermodynamics and fluid behaviour.

Module II: Nanostructured Materials

Choice of nanomaterials, carbon nanotubes and nanowires, Physical characteristics of nanomaterials and nanostructured surfaces, quantum dots, nanostructured thin films, pattern surfaces, composites, magnetic nanoparticles, scaffolds, gels and drug delivery systems.

Module III: Nanobiostructure Systems – Drug Delivery

The assembly of drug delivery systems, preparation and assembly of pharmaceutical molecule into nanometric material within the parameters of GLP and health and safety standards.

Module IV: Nanobiostructure Systems - Biosensor

The functional assembling of the components of a nanostructured biosensor, putting together a bioreceptor and putting together nanometric support and a signal transduction system. Assembly and production of a nanobiosensor.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

- Molecular Engineering of Nanosystems by Edward A. Rietman.
- Nanobiotech- Concepts, Applications and Perspectives, Christot, Chad Mirkin.
- Nanoscale Science and technology, Robert W Kelsall, Mark Geoghegan, Ian W Hamley.
- Nano surface chemistry, Morton Rosoff.


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FORENSIC BIOTECHNOLOGY

Course Code: BTH2410

Credit Units: 03

Course Objective:

An introduction to forensic science and application of biotechnology in Forensic sciences can be understood by studying the various modules of this paper.

Course Contents:

Module I

History and Development of Forensic Science, Definition of Forensic Science, Scope of Forensic Science, Need of Forensic Science, Basic Principles of Forensic Science, Tools and Techniques of Forensic Science.

Module II

Organizational setup of Forensic Science Laboratories, CFSL, FSL, GEQD, FPB, NICFS, Central Detective Training School, NCRB (Maintenance of Crime Records), NPA Mobile Forensic Science Laboratory, Branch of Forensic Science,

Module III

Modus Operandi and MOB and its role in Criminal Investigation, Methods of Investigation: Narco analysis; Hypnosis etc. Limitations and legal aspects.

Brain fingerprinting, Criminal Profiling, Profile of the victim and culprit, investigative strategy, crime scene characteristics, criminal behavior on the internet, limitations.

Module IV

Education of Forensic Science, Role of Media, Human Rights & Criminal Justice System.

Ethics in Forensic Science, Duties of Forensic Scientist, History and Development of Finger Print as Science for Personal Identification, Type of Finger Prints, Classification of Finger Prints

Presentation of Expert Evidence: Data, Reports, Evidence in the Court.

Module VII:

MLP, SLP technology, PCR technology in crime detection, STR and databases, mitochondrial DNA and Y chromosome analysis in forensic science, DNA chip technology, role of molecular biology and biotechnology in crime detection.

Text & References:

- Nanda, B.B. and Tewari, R.K. (2001) : Forensic Science in India : A vision for the twenty first century Select Publisher, New Delhi.
- James, S.H and Nordby, J.J. (2003) Forensic Science : An introduction to scientific and investigative techniques CRC Press,
- Barnett (2001): Ethics in Forensic Science.
- O'Hara & Osterburg : Introduction to Criminalistics, 1949, The MacMillan Co., 1964.
- Osterburg: Crime Laboratory.
- Saferstien: Forensic Science, Handbook, Vol. I, II & III, Prentice Hall Inc. USA.
- Saferstein: Criminalistics, 1976, Prentice Hall Inc., USA.
- Nickolas : Scientific Criminal Investigation
- Deforest, Gansellen & Lee: Introduction to Criminalistics.
- Sharma, B.R. : Forensic Science in Criminal Investigation and Trials, Central Law Agency, Allahabad, 1974.
- Kirk : Criminal Investigation, 1953, Interscience Publisher Inc. New York.
- Molecular Biology and Biotechnology, 4th Edn, J.M Walker and R. Rapley, Panima Books


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GENETICALLY MODIFIED ORGANISM

Course Code: BTH2411

Credit Units: 03

Course Contents:

Module I

Microbial genetic engineering, genetically modified microbes of industrial importance.

Module II

Plants genetic engineering, Transgenic crop with new traits-herbicide tolerance, insect and disease resistance, Therapeutic proteins and compounds; Molecular farming of biopharmaceuticals.

Module III


Animal genetic engineering; Transgenic animals with new traits, transgenic animals as bioreactors for producing pharmaceutically important compounds and therapeutic etc.

Module IV

Detection and diagnosis of genetically modified organisms.

Text & References:

- Principles of Fermentation Technology, Salisbury, Whitaker and Hall, Aditya Books Pvt. Ltd.
- Industrial Microbiology, Casida, New Age International
- Industrial Microbiology, Prescott and Dunn, C.B.S. Publishers Principles of Microbiology, R.M. Atlas, WMC. Brown Publisher
- Plant Biotechnology and Transgenic Plants, K.M.O. Caldey, W.H. Barz and H.L. Wills, Marcel Dekker
- Plant Biotechnology, J. Hammond, P. McGarvey and V. Yusibov, Springer Verlag.
- Culture of Animal Cells, R.I Freshney, Wiley-Leiss
- Comprehensive Biotechnology, Moo-Young, Alan T. Bullm Howard Dalton, Panima Publication


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TERM PAPER

Course Code: BTH2431

Credit Units: 02

A term (or research) paper is primarily a record of intelligent reading in several sources on a particular subject.

The students will choose the topic at the beginning of the session in consultation with the faculty assigned. The progress of the paper will be monitored regularly by the faculty. At the end of the semester the detailed paper on the topic will be submitted to the faculty assigned. The evaluation will be done by Board of examiners comprising of the faculties.

GUIDELINES FOR TERM PAPER

The procedure for writing a term paper may consists of the following steps:

- Choosing a subject
- Finding sources of materials
- Collecting the notes
- Outlining the paper
- Writing the first draft
- Editing & preparing the final paper

1. Choosing a Subject

The subject chosen should not be too general.

2. Finding Sources of materials

- j) The material sources should be not more than 10 years old unless the nature of the paper is such that it involves examining older writings from a historical point of view.
- k) Begin by making a list of subject-headings under which you might expect the subject to be listed.
- l) The sources could be books and magazines articles, news stories, periodicals, scientific journals etc.

3. Collecting the notes

Skim through sources, locating the useful material, then make good notes of it, including quotes and information for footnotes.

- j) Get facts, not just opinions. Compare the facts with author's conclusion.
- k) In research studies, notice the methods and procedures, results & conclusions.
- l) Check cross references.

4. Outlining the paper

- g) Review notes to find main sub-divisions of the subject.
- h) Sort the collected material again under each main division to find sub-sections for outline so that it begins to look more coherent and takes on a definite structure. If it does not, try going back and sorting again for main divisions, to see if another general pattern is possible.

5. Writing the first draft

Write the paper around the outline, being sure that you indicate in the first part of the paper what its purpose is. You may follow the following:

- a) statement of purpose
- b) main body of the paper
- c) statement of summary and conclusion

Avoid short, bumpy sentences and long straggling sentences with more than one main ideas.

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6. Editing & Preparing the final Paper

- bb) Before writing a term paper, you should ensure you have a question which you attempt to answer in your paper. This question should be kept in mind throughout the paper. Include only information/ details/ analyses of relevance to the question at hand. Sometimes, the relevance of a particular section may be clear to you but not to your readers. To avoid this, ensure you briefly explain the relevance of every section.
- cc) Read the paper to ensure that the language is not awkward, and that it "flows" properly.
- dd) Check for proper spelling, phrasing and sentence construction.
- ee) Check for proper form on footnotes, quotes, and punctuation.
- ff) Check to see that quotations serve one of the following purposes:
- gg) Show evidence of what an author has said.
- hh) Avoid misrepresentation through restatement.
- ii) Save unnecessary writing when ideas have been well expressed by the original author.
- jj) Check for proper form on tables and graphs. Be certain that any table or graph is self-explanatory.

Term papers should be composed of the following sections:

- Title page
- Table of contents
- Introduction
- Review
- Discussion&Conclusion
- References
- Appendix

Generally, the introduction, discussion, conclusion and bibliography part should account for a third of the paper and the review part should be two thirds of the paper.

Discussion

The discussion section either follows the results or may alternatively be integrated in the results section. The section should consist of a discussion of the results of the study focusing on the question posed in the research paper.

Conclusion

The conclusion is often thought of as the easiest part of the paper but should by no means be disregarded. There are a number of key components which should not be omitted. These include:

- m) summary of question posed
- n) summary of findings
- o) summary of main limitations of the study at hand
- p) details of possibilities for related future research

References

From the very beginning of a research project, you should be careful to note all details of articles gathered.

The bibliography should contain ALL references included in the paper. References not included in the text in any form should NOT be included in the bibliography.

The key to a good bibliography is consistency. Choose a particular convention and stick to this.

Conventions

Monographs

Crystal, D. (2001), *Language and the internet*. Cambridge: Cambridge University Press.

Edited volumes

Gass, S./Neu, J. (eds.) (1996), *Speech acts across cultures. Challenges to communication in a second language*. Berlin/ NY: Mouton de Gruyter.

[(eds.) is used when there is more than one editor; and (ed.) where there is only one editor. In German the abbreviation used is (Hrsg.) for Herausgeber].

Edited articles

Schmidt, R./Shimura, A./Wang, Z./Jeong, H. (1996), *Suggestions to buy: Television commercials from the U.S., Japan, China, and Korea*. In: Gass, S./Neu, J. (eds.) (1996), *Speech acts across cultures. Challenges to communication in a second language*. Berlin/ NY: Mouton de Gruyter: 285-316.

Journal articles

McQuarrie, E.F./Mick, D.G. (1992), *On resonance: A critical pluralistic inquiry into advertising rhetoric*. *Journal of consumer research* 19, 180-197.

Electronic book

Chandler, D. (1994), *Semiotics for beginners* [HTML document]. Retrieved [5.10.'01] from the World Wide Web, <http://www.aber.ac.uk/media/Documents/S4B/>.

Electronic journal articles

Watts, S. (2000) *Teaching talk: Should students learn 'real German'?* [HTML document]. *German as a Foreign Language Journal* [online] 1. Retrieved [12.09.'00] from the World Wide Web, <http://www.gfl-journal.com/>.

Other websites

Verterhus, S.A. (n.y.), *Anglicisms in German car advertising. The problem of gender assignment* [HTML document]. Retrieved [13.10.'01] from the World Wide Web, <http://olaf.hiof.no/~sverrev/eng.html>.

Unpublished papers

Takahashi, S./DuFon, M.A. (1989), *Cross-linguistic influence in indirectness: The case of English directives performed by native Japanese speakers*. Unpublished paper, Department of English as a Second Language, University of Hawai'i at Manoa, Honolulu.

Unpublished theses/ dissertations

Möhl, S. (1996), *Alltagssituationen im interkulturellen Vergleich: Realisierung von Kritik und Ablehnung im Deutschen und Englischen*. Unpublished MA thesis, University of Hamburg.

Walsh, R. (1995), *Language development and the year abroad: A study of oral grammatical accuracy amongst adult learners of German as a foreign language*. Unpublished PhD dissertation, University College Dublin.

Appendix

The appendix should be used for data collected (e.g. questionnaires, transcripts, ...) and for tables and graphs not included in the main text due to their subsidiary nature or to space constraints in the main text.

Assessment Scheme:

Continuous Evaluation:


40%

(Based on abstract writing, interim draft, general approach, research orientation, readings undertaken etc.)

Final Evaluation:

60%

(Based on the organization of the paper, objectives/ problem profile/ issue outlining, comprehensiveness of the research, flow of the idea/ ideas, relevance of material used/ presented, outcomes vs. objectives, presentation/ viva etc.)


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PROJECT

Course Code: BTH2432

Credit Units: 03

Objectives:

The aim of the project is to provide the students with an opportunity to further their intellectual and personal development in the chosen field by undertaking a significant practical unit of activity. The project can be defined as a scholarly inquiry into a problem or issues, involving a systematic approach to gathering and analysis of information / data, leading to production of a structured report.

Chapter Scheme and distribution of marks:

Chapter 1: Introduction – 10 marks

Chapter 2: Conceptual Framework/ National/International Scenario – 25 marks

Chapter 3: Presentation, Analysis & Findings -- 25 marks

Chapter 4: Conclusion & Recommendations -- 10 marks

Chapter 5: Bibliography -- 05 marks

Project Report	Power Point Presentation & Viva
75 marks	25 marks

Components of a Project Report

The outcome of Project Work is the Project Report. A project report should have the following components:

1) Cover Page: This should contain the title of the project proposal, to whom it is submitted, for which degree, the name of the author, name of the supervisor, year of submission of the project work, name of the University.

2) Acknowledgement: Various organizations and individuals who might have provided assistance /co-operation during the process of carrying out the study.

3) Table of Content: Page-wise listing of the main contents in the report, i.e., different Chapters and its main Sections along with their page numbers.

4) Body of the Report: The body of the report should have these four logical divisions

a) **Introduction:** This will cover the background, rationale/ need / justification, brief review of literature, objectives, methodology (the area of the study, sample, type of study, tools for data collection, and method of analysis), Limitations of the Study, and Chapter Planning.

b) **Conceptual Framework / National and International Scenario:** (relating to the topic of the Project).

c) **Presentation of Data, Analysis and Findings:**(using the tools and techniques mentioned in the methodology).

d) **Conclusion and Recommendations:** In this section, the concluding observations based on the main findings and suggestions are to be provided.

5) Bibliography or References: This section will include the list of books and articles which have been used in the project work, and in writing a project report.

6) Annexures: Questionnaires (if any), relevant reports, etc.

(The main text of the Project should normally be in the range of 5000 words. However, there may be annexure in addition to the main text)

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The Steps of a Project Report

Step I : Selection of the topic for the project by taking following points into consideration:

- Suitability of the topic.
- Relevance of the topic
- Time available at the disposal.
- Feasibility of data collection within the given time limit.
- Challenges involved in the data collection (time & cost involved in the data collection, possibility of getting responses, etc.)

Step II : Finalisation of the Topic and preparation of Project Proposal in consultation with the Supervisor.

Step III : Collection of information and data relating to the topic and analysis of the same.

Step IV : Writing the report dividing it into suitable chapters, viz.,

Chapter 1: Introduction,

Chapter 2: Conceptual Framework / National & International Scenario,

Chapter 3: Analysis & Findings


Chapter 4: Conclusion and Recommendations.

Step V : The following documents are to be attached with the Final Project Report.

- 1) Approval letter from the supervisor (Annexure-IA)
- 2) Student's declaration (Annexure-IB)
- 3) Certificate from the Competent Authority of the Organisation / Institution, if the student undertakes the Project Work in any Organisation / Institution.

Guidelines for Evaluation:

- Each of the students has to undertake a Project individually under the supervision of a teacher and to submit the same following the guidelines stated below.
- Language of Project Report and Viva-Voce Examination may be English. The Project Report must be typed and hard bound.
- Failure to submit the Project Report or failure to appear at the Viva-voce Examination will be treated as "Absent" in the Examination. He /she has to submit the Project Report and appear at the Viva-Voce Examination in the subsequent years (within the time period as per University Rules).
- No marks will be allotted on the Project Report unless a candidate appears at the Viva-Voce Examination. Similarly, no marks will be allotted on Viva-Voce Examination unless a candidate submits his/her Project Report.
- Evaluation of the Project Work to be done jointly by one internal expert and one external expert with equal weightage, i.e., average marks of the internal and external experts will be allotted to the candidate.


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WORKSHOP / CERTIFICATION

Course Code: BTH2433

Credit Units: 01

Objectives

A workshop is primarily an activity based academic event that is organized to provide the students a one to one and hands on experience on any aspect of their learning. The communication in a workshop has to be necessarily two way. The trainer has to make sure that the aspect covered are practically practiced by the participants. The student will choose the option of workshop from amongst their concentration electives. The evaluation will be done by Board of examiners comprising of the faculties.

Major Themes for Workshop

The workshop may be conducted on any of the following major themes:

Accounting

Finance

Human Resources

Marketing

Economics

Operations

Supply Chain Management

These themes are merely indicative and other recent and relevant topics of study may be included.

Guidelines for Workshop

The procedure for earning credits from workshop consists of the following steps:

- Relevant study material and references will be provided by the trainer in advance.
- The participants are expected to explore the topic in advance and take active part in the discussions held
- Attending and Participating in all activities of the workshop
- Group Activities have to be undertaken by students as guided by the trainer.
- Evaluation of workshop activities would be done through test and quiz at the end of the workshop.
- Submitting a write up of atleast 500 words about the learning outcome from the workshop.

Methodology

The methodology followed at the workshop could be based on any one or more of the following methods:

Case Study

Business Game

Simulation

Group Activity

Role Play

Business Planning

Quiz

Evaluation Scheme:

Attendance	Active Participation	Multiple Choice Questions/ Quiz	Solving the case/ Assignment/ Write up	Total
10	30	30	30	100

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MARINE BIOTECHNOLOGY

Course Code: BTH2504

CreditUnits: 03

Course Contents:

Module I

The marine ecosystem and its functioning: intertidal, estuarine, salt marsh, mangrove, coral reef, coastal & deep sea ecosystems. Marine viruses, Bacteria and their significance Hydrothermal vents; Marine Biodiversity: defining, measurement and conservation strategies.

Module II

Nutrients cycling: carbon, nitrogen sulphur & phosphorus.

Global climate changes: impact on species diversity & productivity, oceans as a carbon sink, effects on corals bleaching. Biological rhythms.

Module III

Important Marine Products: Bioactive compounds from marine organisms, GFP, RFP characteristics and their applications; Green mussel adhesive protein, Chitosan and its applications

Module IV

Probiotic bacteria and their importance in aquaculture; Vaccines in aquaculture: Fish ,shrimps & prawns; Marine food analysis-spoilage, quality control; Techniques for identification of bacterial & viral pathogens in aquaculture and Remedies.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

- Biodiversity (2004) Borua, P.K
- Text book of Marine Ecology (1989). Nair N.B. &Thampy, D.M.
- Drugs from sea. (2000). Fusetani, N.
- Microbiology of deep sea hydrothermal vents. (1995). Karl, D.M.
- The search from bioactive compounds from microorganisms. (1992). Omum, S.
- Recent Advances in Marine Biotechnology. Vol.2 (1998) Fingerman, M., Nagabushanam, R., Thompson, M.
- Recent Advances in Marine Biotechnology Volume 3 – Milton fingerman et al., 1999.
- Environmental Biotechnology – Gareth M.Evams et al., 2003
- Biotechnology, Recombinant DNA Technology, Environmental Biotechnology – S.Mahesh et al., 2003.


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BIOSENSORS

Course Code: BTH2505

Credit Units: 03

Course Objective:

On completion of the module students should Be able to Appreciate the basic configuration and distinction among biosensor systems, To gain an understanding of general biosensor principles and terms, To be able to design, model, simulate, fabricate, and test a biosensor, To gain an overall knowledge of biosensor types, applications, requirements, and capabilities to allow improved interaction with physicians, clinicians, and biomedical engineers, and to enable the student to conduct biomedical engineering research.

Course Contents:

Module I: Biosensors

Definition, History, Properties of biosensors, Design features of Biosensors, The Biological Component, SignalTransduction: Amperometric Biosensors, Potentiometric Biosensors, Detection of H^+ cation, Detections of NH_4^+ cation, Detection of CN^- anion, Calorimetric biosensors, Optical Biosensors, Measuring the change in light reflectance, Measuring luminescence, Pizo-electric biosensors, Immunosensors, Commercial examples of biosensors. Biosensors markets- Opportunities and obstacles.

Module II: Biomedical sensors

Sensors and transducers: an overview, measurement systems, Classification of Biomedical sensors and transducers, why do we need Biomedical sensors and Transducers? Important Design considerations and system calibration, the future of Biosensors and Transducers, Sensing Layer: The importance of computers in sensors and Transducer technology, Recent Engineering Solutions to Health care using Biosensors and Transducers, Modern health care solutions.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

Text:


- Affinity Biosensors: Techniques and Protocol by K.R. Rogers and A. Mulchandani, Humana Press.
- Biosensors and their Applications by V.C. Yang and T.T. Ngo, Plenum Publishing Corporation.
- Chemical Sensors and Biosensors by B.R. Eggins, John Wiley and Sons Inc.


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References:

- Sensors and Sensing in Biology and Engineering by F.G. Barth, et al, Springer Verlag.
- Biosensors by Minh Canh. Tran
- Biosensors: Theory and Applications by Donald G. Buerk
- Enzyme and Microbial Biosensors: : Techniques and Protocols - by Kim R. Rogers, Ashok Mulchandani
- Biosensors in Environmental Monitoring - by Ursula Bilitewski, Anthony P. F. Turner.
- Biosensors: Micro electrochemical Devices - by Marc J. C. Lambrechts
- Biosensors with Fiberoptics - by Donald Lee Wise, Lemuel B. Wingard
- Biosensors and Their Applications - by That Tjien Ngo, Victor Chi-Min Yang
- Thermal Biosensors, Bioactivity, Bioaffinity -by Prakash K. Bhatia
- Novel Approaches in Biosensors and Rapid Diagnostic Assays - by ZviLiron, Avraham Bromberg, Morly Fisher
- Biosensors - by Anthony E. G. Cass.


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MODERN KILLER DISEASES

Course Code: BTH2506

Credit Units: 03

Course Contents:

Module I

Definition of disease, Modern and ancient human diseases: AIDS, Cancer, hepatitis, influenza, diphtheria, Botulism, tetanus, diarrhoea, Malaria, tuberculosis Rabies diseases

Module II

Mode of infection, mechanism of infection of important human disease and their symptoms

Module III


Available therapies to killer diseases

Module III

Bottlenecks in development of therapy of killer diseases

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70


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BIOFUEL AND GREEN BIOTECHNOLOGY

Course Code: BTH2507

Credit Units: 03

Course Objective:

This course will acquaint the students with bioenergy resources, their properties, preparation, processing alongwith the details of equipments utilized for the purpose.

Course Contents:

Module I: Biomass Sources, Characteristics & Preparation: Biomass Sources and Classification

Chemical composition and properties of different biomass materials and bio-fuels – Sugar cane molasses for fermentation ethanol; Sources and processing of oils and fats for liquid fuels- Energy plantations - Preparation of woody biomass; Drying, Storage and Handling of Biomass.

Module II: Biogas Technology

Feedstock for biogas production, biodegradable organic matter, Operating parameters for biogas production, Dry and wet fermentation

Module III: Bio-Ethanol and Bio-Diesel Technology

Production of Fuel Ethanol by Fermentation of Sugars. Trans-esterification of Oils to Produce Bio-Diesel.

Module IV: Pyrolysis and Gasification of Biomass

Thermo-chemical conversion of ligno-cellulose biomass - Pyrolysis of biomass, Thermo-chemical gasification principles

Module V: Combustion of Biomass and Cogeneration Systems

Combustion of Woody Biomass, Cogeneration in Biomass Processing Industries. Use of biogases for cogeneration.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

Text:

- Biotechnology and Alternative Technologies for Utilization of Biomass or Agricultural Wastes, A. Chakravarthy, Oxford & IBH publishing Co., New Delhi, 1989.

References:

- Biogas Systems: Principles and Applications, K.M. Mital, New Age International Publishers (p) Ltd., 1996.
- Biomass Energy Systems, P. VenkataRamana and S.N. Srinivas, Tata Energy Research Institute, New Delhi, 1996.
- Fuels from Biomass and Wastes, D.L. Klass and G.M. Emert, Ann Arbor Science publ. Inc. Michigan, 1985.
- Bio-gas Technology, Khandelwal K.C. and Mahdi, Tata McGraw-Hill pub. Co. Ltd., New Delhi
- Advances in bio-gas Technology, O.P. Chawla, I.C.A.R., New Delhi. 1970.

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ARTIFICIAL NEURAL NETWORKS

Course Code: BTH2508

Credit Units: 03

Course Objective:

This course will enable the students to gain knowledge about a relatively newer area of science. The course is designed to model the different technical properties, applications, besides the closely related aspects of artificial neural networks.

Course Contents:

Module I

Historical background, Why is learning hard?

Module II

Memorization, generalization and function approximation, Linear Associators, Perceptrons and Capacity, Multilayer neural networks, Maximum Likelihood and Gradient Descent learning, Stochastic gradient descent for supervised learning.

Module III

The back propagation algorithm, Aspects of Learning Theory and Generalization, Bias vs. variance, Overtraining, pruning and regularization, VC dimension and how much data is enough?

Module IV

Neural networks and analog VLSI, Selected Applications

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70


Text & References:

Text:

- Neural Networks: A Comprehensive Foundation by S. Haykin, Prentice Hall.

References:

- Neural Networks for Pattern Recognition by C. Bishop, Oxford University Press.


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TERM PAPER

Course Code: BTH2531

Credit Units: 02

A term (or research) paper is primarily a record of intelligent reading in several sources on a particular subject.

The students will choose the topic at the beginning of the session in consultation with the faculty assigned. The progress of the paper will be monitored regularly by the faculty. At the end of the semester the detailed paper on the topic will be submitted to the faculty assigned. The evaluation will be done by Board of examiners comprising of the faculties.

GUIDELINES FOR TERM PAPER

The procedure for writing a term paper may consists of the following steps:

- Choosing a subject
- Finding sources of materials
- Collecting the notes
- Outlining the paper
- Writing the first draft
- Editing & preparing the final paper

1. Choosing a Subject

The subject chosen should not be too general.

2. Finding Sources of materials

- m) The material sources should be not more than 10 years old unless the nature of the paper is such that it involves examining older writings from a historical point of view.
- n) Begin by making a list of subject-headings under which you might expect the subject to be listed.
- o) The sources could be books and magazines articles, news stories, periodicals, scientific journals etc.

3. Collecting the notes

Skim through sources, locating the useful material, then make good notes of it, including quotes and information for footnotes.

- m) Get facts, not just opinions. Compare the facts with author's conclusion.
- n) In research studies, notice the methods and procedures, results & conclusions.
- o) Check cross references.

4. Outlining the paper

- i) Review notes to find main sub-divisions of the subject.
- j) Sort the collected material again under each main division to find sub-sections for outline so that it begins to look more coherent and takes on a definite structure. If it does not, try going back and sorting again for main divisions, to see if another general pattern is possible.

5. Writing the first draft

Write the paper around the outline, being sure that you indicate in the first part of the paper what its purpose is. You may follow the following:

- a) statement of purpose
- b) main body of the paper
- c) statement of summary and conclusion

Avoid short, bumpy sentences and long straggling sentences with more than one main ideas.

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6. Editing & Preparing the final Paper

- kk) Before writing a term paper, you should ensure you have a question which you attempt to answer in your paper. This question should be kept in mind throughout the paper. Include only information/ details/ analyses of relevance to the question at hand. Sometimes, the relevance of a particular section may be clear to you but not to your readers. To avoid this, ensure you briefly explain the relevance of every section.
- ll) Read the paper to ensure that the language is not awkward, and that it "flows" properly.
- mm) Check for proper spelling, phrasing and sentence construction.
- nn) Check for proper form on footnotes, quotes, and punctuation.
- oo) Check to see that quotations serve one of the following purposes:
- pp) Show evidence of what an author has said.
- qq) Avoid misrepresentation through restatement.
- rr) Save unnecessary writing when ideas have been well expressed by the original author.
- ss) Check for proper form on tables and graphs. Be certain that any table or graph is self-explanatory.

Term papers should be composed of the following sections:

- Title page
- Table of contents
- Introduction
- Review
- Discussion & Conclusion
- References
- Appendix

Generally, the introduction, discussion, conclusion and bibliography part should account for a third of the paper and the review part should be two thirds of the paper.

Discussion

The discussion section either follows the results or may alternatively be integrated in the results section. The section should consist of a discussion of the results of the study focusing on the question posed in the research paper.

Conclusion

The conclusion is often thought of as the easiest part of the paper but should by no means be disregarded. There are a number of key components which should not be omitted. These include:

- q) summary of question posed
- r) summary of findings
- s) summary of main limitations of the study at hand
- t) details of possibilities for related future research

References

From the very beginning of a research project, you should be careful to note all details of articles gathered.

The bibliography should contain ALL references included in the paper. References not included in the text in any form should NOT be included in the bibliography.

The key to a good bibliography is consistency. Choose a particular convention and stick to this.

Conventions

Monographs

Crystal, D. (2001), *Language and the internet*. Cambridge: Cambridge University Press.

Edited volumes

Gass, S./Neu, J. (eds.) (1996), *Speech acts across cultures. Challenges to communication in a second language*. Berlin/ NY: Mouton de Gruyter.

[(eds.) is used when there is more than one editor; and (ed.) where there is only one editor. In German the abbreviation used is (Hrsg.) for Herausgeber].

Edited articles

Schmidt, R./Shimura, A./Wang, Z./Jeong, H. (1996), *Suggestions to buy: Television commercials from the U.S., Japan, China, and Korea*. In: Gass, S./Neu, J. (eds.) (1996), *Speech acts across cultures. Challenges to communication in a second language*. Berlin/ NY: Mouton de Gruyter: 285-316.

Journal articles

McQuarrie, E.F./Mick, D.G. (1992), *On resonance: A critical pluralistic inquiry into advertising rhetoric*. *Journal of consumer research* 19, 180-197.

Electronic book

Chandler, D. (1994), *Semiotics for beginners* [HTML document]. Retrieved [5.10.'01] from the World Wide Web, <http://www.aber.ac.uk/media/Documents/S4B/>.

Electronic journal articles

Watts, S. (2000) *Teaching talk: Should students learn 'real German'?* [HTML document]. *German as a Foreign Language Journal* [online] 1. Retrieved [12.09.'00] from the World Wide Web, <http://www.gfl-journal.com/>.

Other websites

Verterhus, S.A. (n.y.), *Anglicisms in German car advertising. The problem of gender assignment* [HTML document]. Retrieved [13.10.'01] from the World Wide Web, <http://olaf.hiof.no/~sverrev/eng.html>.

Unpublished papers

Takahashi, S./DuFon, M.A. (1989), *Cross-linguistic influence in indirectness: The case of English directives performed by native Japanese speakers*. Unpublished paper, Department of English as a Second Language, University of Hawai'i at Manoa, Honolulu.

Unpublished theses/ dissertations

Möhl, S. (1996), *Alltagssituationen im interkulturellen Vergleich: Realisierung von Kritik und Ablehnung im Deutschen und Englischen*. Unpublished MA thesis, University of Hamburg.

Walsh, R. (1995), *Language development and the year abroad: A study of oral grammatical accuracy amongst adult learners of German as a foreign language*. Unpublished PhD dissertation, University College Dublin.

Appendix

The appendix should be used for data collected (e.g. questionnaires, transcripts, ...) and for tables and graphs not included in the main text due to their subsidiary nature or to space constraints in the main text.

Assessment Scheme:

Continuous Evaluation:


40%

(Based on abstract writing, interim draft, general approach, research orientation, readings undertaken etc.)

Final Evaluation:

60%

(Based on the organization of the paper, objectives/ problem profile/ issue outlining, comprehensiveness of the research, flow of the idea/ ideas, relevance of material used/ presented, outcomes vs. objectives, presentation/ viva etc.)


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PROJECT

Course Code: BTH2532

Credit Units: 03

Objectives:

The aim of the project is to provide the students with an opportunity to further their intellectual and personal development in the chosen field by undertaking a significant practical unit of activity. The project can be defined as a scholarly inquiry into a problem or issues, involving a systematic approach to gathering and analysis of information / data, leading to production of a structured report.

Chapter Scheme and distribution of marks:

Chapter 1: Introduction – 10 marks

Chapter 2: Conceptual Framework/ National/International Scenario – 25 marks

Chapter 3: Presentation, Analysis & Findings -- 25 marks

Chapter 4: Conclusion & Recommendations -- 10 marks

Chapter 5: Bibliography -- 05 marks

Project Report	Power Point Presentation & Viva
75 marks	25 marks

Components of a Project Report

The outcome of Project Work is the Project Report. A project report should have the following components:

1) Cover Page: This should contain the title of the project proposal, to whom it is submitted, for which degree, the name of the author, name of the supervisor, year of submission of the project work, name of the University.

2) Acknowledgement: Various organizations and individuals who might have provided assistance /co-operation during the process of carrying out the study.

3) Table of Content: Page-wise listing of the main contents in the report, i.e., different Chapters and its main Sections along with their page numbers.

4) Body of the Report: The body of the report should have these four logical divisions

a) **Introduction:** This will cover the background, rationale/ need / justification, brief review of literature, objectives, methodology (the area of the study, sample, type of study, tools for data collection, and method of analysis), Limitations of the Study, and Chapter Planning.

b) **Conceptual Framework / National and International Scenario:** (relating to the topic of the Project).

c) **Presentation of Data, Analysis and Findings:**(using the tools and techniques mentioned in the methodology).

d) **Conclusion and Recommendations:** In this section, the concluding observations based on the main findings and suggestions are to be provided.

5) Bibliography or References: This section will include the list of books and articles which have been used in the project work, and in writing a project report.

6) Annexures: Questionnaires (if any), relevant reports, etc.

(The main text of the Project should normally be in the range of 5000 words. However, there may be annexure in addition to the main text)

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The Steps of a Project Report

Step I : Selection of the topic for the project by taking following points into consideration:

- Suitability of the topic.
- Relevance of the topic
- Time available at the disposal.
- Feasibility of data collection within the given time limit.
- Challenges involved in the data collection (time & cost involved in the data collection, possibility of getting responses, etc.)

Step II : Finalisation of the Topic and preparation of Project Proposal in consultation with the Supervisor.

Step III : Collection of information and data relating to the topic and analysis of the same.

Step IV : Writing the report dividing it into suitable chapters, viz.,

Chapter 1: Introduction,

Chapter 2: Conceptual Framework / National & International Scenario,

Chapter 3: Analysis & Findings


Chapter 4: Conclusion and Recommendations.

Step V : The following documents are to be attached with the Final Project Report.

- 1) Approval letter from the supervisor (Annexure-IA)
- 2) Student's declaration (Annexure-IB)
- 3) Certificate from the Competent Authority of the Organisation / Institution, if the student undertakes the Project Work in any Organisation / Institution.

Guidelines for Evaluation:

- Each of the students has to undertake a Project individually under the supervision of a teacher and to submit the same following the guidelines stated below.
- Language of Project Report and Viva-Voce Examination may be English. The Project Report must be typed and hard bound.
- Failure to submit the Project Report or failure to appear at the Viva-voce Examination will be treated as "Absent" in the Examination. He /she has to submit the Project Report and appear at the Viva-Voce Examination in the subsequent years (within the time period as per University Rules).
- No marks will be allotted on the Project Report unless a candidate appears at the Viva-Voce Examination. Similarly, no marks will be allotted on Viva-Voce Examination unless a candidate submits his/her Project Report.
- Evaluation of the Project Work to be done jointly by one internal expert and one external expert with equal weightage, i.e., average marks of the internal and external experts will be allotted to the candidate.


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WORKSHOP / CERTIFICATION

Course Code: BTH2533

Credit Units: 01

Objectives

A workshop is primarily an activity based academic event that is organized to provide the students a one to one and hands on experience on any aspect of their learning. The communication in a workshop has to be necessarily two way. The trainer has to make sure that the aspect covered are practically practiced by the participants. The student will choose the option of workshop from amongst their concentration electives. The evaluation will be done by Board of examiners comprising of the faculties.

Major Themes for Workshop

The workshop may be conducted on any of the following major themes:

Accounting

Finance

Human Resources

Marketing

Economics

Operations

Supply Chain Management

These themes are merely indicative and other recent and relevant topics of study may be included.

Guidelines for Workshop

The procedure for earning credits from workshop consists of the following steps:

- Relevant study material and references will be provided by the trainer in advance.
- The participants are expected to explore the topic in advance and take active part in the discussions held
- Attending and Participating in all activities of the workshop
- Group Activities have to be undertaken by students as guided by the trainer.
- Evaluation of workshop activities would be done through test and quiz at the end of the workshop.
- Submitting a write up of atleast 500 words about the learning outcome from the workshop.

Methodology

The methodology followed at the workshop could be based on any one or more of the following methods:

Case Study

Business Game

Simulation

Group Activity

Role Play

Business Planning

Quiz

Evaluation Scheme:

Attendance	Active Participation	Multiple Choice Questions/ Quiz	Solving the case/ Assignment/ Write up	Total
10	30	30	30	100

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GENOMICS AND PROTEOMICS

Course Code: BTH2602

Credit Units: 02

Course Objective:

The course helps in developing a detailed understanding of eukaryotic genome complexity and organization. Current research on the molecular basis of the control of gene expression in eukaryotic system has developed a detailed understanding of techniques of gene diagnostics and DNA profile to acquire the fundamentals of genomics and Proteomics.

Course Contents:

GENOMICS

Module I: Genome Evolution

Origin of genomes, functional genomics. Forward genetics

Module II: Structural Genomics

Chromosome structure and Genome organization, Genome sequencing methods, Gene identification Genome annotation methods

Module III: Comparative Genomics

Phylogeny, COGS [Cluster of orthologues genes], paralogues and gene displacement.

Module IV: Functional Genomics

ESTs, SAGE, DNA Microarrays, Application of Microarrays, Real Time PCR

Module V: Genotyping Background and Applications.

Genetic and physical mapping: Introduction to molecular markers-RFLP, RAPD, AFLP, SSRs. Genetic and physical maps, FISH for genome analysis, DNA fingerprinting; Single nucleotide polymorphisms, RNA interference, antisense RNA, siRNA, miRNA, ; Human Genome Project.

PROTEOMICS

Module VI

Basics of Proteomics: Protein preparation and Separation, 2D Gel Electrophoresis, mass spectrometry, post translation modification.

Protein-Protein Interaction, Protein Microarray, Application of Microarray in proteome analysis.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70


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Text & References:

Text:

- Bioinformatics: A practical guide to the analysis of genes and proteins, A.D. Baxevanis and B.F.F. Ouellette,
- John Wiley and Sons Inc.
- Bioinformatics: From Genomes to Drugs, T. Lengauer, John Wiley and Sons Inc.
- Bioinformatics: Sequence and Genome Analysis, D.W. Mount, Cold Spring Harbor Laboratory Press
- DNA Microarrays: A Practical Approach, M. Schlöner, Oxford University Press.
- Genomes II, T.A. Brown
- Biotechnology and Genomics by P.K.Gupta

References:

- A Primer of Genome Science, Greg Gibson and Spencer V. Muse
- Database Annotation in Molecular Biology : Principles and Practice, Arthur M. Lesk
- DNA : Structure and Function, Richard R. Sinden
- Recombinant DNA (Second Edition), James D. Watson and Mark Zoller
- Gene Cloning and DNA Analysis – An introduction (Fourth Edition), T.A. Brown
- Genes & Genomes, Maxine Singer and Paul Berg
- Essential of Genomics and Bioinformatics, C.W. Sensen, John Wiley and Sons Inc.
- Functional Genomics – A Practical Approach, S.P. Hunt and R. Livesey, Oxford University Press
- Proteomics, T. Palzkill, Kluwer Academic Publishers
- Statistical Genomics: Linkage, Mapping and QTL Analysis, B. Liu, CRC Press.
- Genome II by T.A.Brown


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INDUSTRIAL BIOTECHNOLOGY

Course Code: BTH2603

Credit Units: 03

Course Objective:

The objective of this course is to use microorganism to produce various compounds of commercial interest. The student will be exposed to various techniques available for large scale cultivation of microorganisms.

Course Contents:

Module I

Introduction to fermentation, the fermentation industry, Production process batch and Continuous system of cultivation, Solid-state fermentation

Module II

Selection of industrial microorganisms, media for fermentation, aeration, pH, temperature and other requirements during fermentation, downstream processing and product recovery, food industry waste as fermentation substrate.

Module III

Production of compounds like, antibiotics, enzymes, organic acids, solvents, beverages, SCP.

Module IV

Production of fermented dairy products

Module V

Immobilized enzymes systems, production and applications.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

Text:

- Industrial Microbiology – Cassida

References:

- Principles of fermentation Technology, Salisbury, Whitaker and Hall
- Industrial microbiology – Prescott&Duhn.


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STRESS BIOLOGY

Course Code: BTH2604

Credit Units: 03

Course Contents:

Module I

Introduction to stress biology; Types of stresses; Molecular biology of stress responses

Module II

Microbial Stress Responses.

Module III

Biotic and abiotic stress response mechanisms in Plants

Module IV


Biotic and abiotic stress response mechanisms in Animals.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

- Heribert Hirt, Plant Stress Biology: From Genomics to Systems Biology. Wiley-Blackwell (2009).
- K.V. Madhava Rao, A.S. Raghavendra, Janardhan Reddy (2005). Physiology and Molecular Biology of Stress Tolerance in Plants. Springer.
- Gary Moberg, Joy A. Mench. The Biology of Animal Stress: Basic Principles and Implications for Animal Welfare. CABI Publishing.
- Jose M. Requena. Stress Response in Microbiology. Publisher: Caister Academic Press:


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RECOMBINANT DNA TECHNOLOGY LAB

Course Code: BTH2605

Credit Units: 02

Course Objective:

The laboratory experiments in Recombinant DNA Technology would certainly help to comprehend the theoretical aspects of the subject.

Course Contents:

Module I

Study of cloning

Module II

Study of PCR

Module III


Study of Southern hybridization

Module IV

Study of RAPD

Examination Scheme:

IA			EE			
Class Test (Practical Based)	Mid Term Viva	Attendance	Major Experiment	Minor Experiment/Spotting	Practical Record	Viva
15	10	05	35	15	10	10


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BIOSAFETY MANAGEMENT

Course Code: BTH2606

Credit Units: 03

Course Objective:

Course addresses management and engineering design concepts required for process safety in chemical and biotechnology systems, with pharmaceutical manufacturing applications. Content focuses on sound engineering principles and practices as they apply to industrial situations, project design, risk mitigation, process and equipment integrity, and engineering codes and standards.

Course Contents:

Module I: Hazards

Chemical hazards classification. Radiation hazards and control of exposure to radiation. Types of fire and fire prevention methods. Mechanical hazards. Electrical hazards

Module II: Psychology and Hygiene

Industrial psychology Industrial hygiene. Safety in plant site selection and plant layout. Industrial lighting and ventilation. Industrial noise.

Module III: Occupational diseases and control

Occupational diseases and prevention methods. Safe housekeeping, Instrumentation for safe operation. Personal protective equipments. Safety in chemical operations and processes.

Module IV: Management

Safety organization – safety committee – safety education and training. Management process. Philosophy and need for Industrial safety. Role of Government in Industrial safety.

Module V: Laws

Factory Act. ESI Act, Environmental Act. Workmen's Compensation Act. Advantages of adopting safety laws.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

Text:

- Guide for Safety in the Chemical laboratory second edition, Manufacturing Chemists Association. Van Nostrand Reinhold Company, New York.
- Safety and Accident Prevention in Chemical Operation 2nd Edn., H.H. Fawcett & W.S. Wood Wiley Interscience,

References:

- Industrial Safety and Laws by Indian School of Labour Education, Madras.

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DRUG DESIGN AND DEVELOPMENT

Course Code: BTH2607

Credit Units: 03

Course Objective:

The above course will be aimed to identify and design drugs that could be potentially useful in the identification of the candidate drugs, which have efficacy in cell culture or animal models, and thus the most effective compounds could be employed based on the above results for being moved through preclinical studies to clinical trials.

Course Contents:

Module I: Drug targets classification

DNA, RNA, Enzymes involved in nucleic acid metabolism, Signal transduction across membrane GPCR, small molecule receptors, neuropeptide receptors, ion channels.

Module II: Target discovery and validation strategies

New target discovery, biological activity, types of screening, natural products, General overview of validation techniques.

Module III: Structure-based design

Drug design to discovery and development, drug metabolism, toxicity and pharmacokinetics, problems and drawbacks on drug discovery and development.

Module IV: Basic concepts of Drug Delivery

Basic terminologies in drug delivery and drug targeting, Concepts of Bio availability, Process of drug absorption, Drug delivery considerations for the new biotherapeutics
Introduction to routes of administration of drugs

Module V: Delivery of Genetic material

New generation technologies in genetic drug delivery, Nanotechnology, Genetically engineered cell implants in drug deliver.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

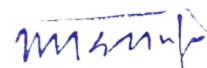
- Drug Delivery and Targeting, A.M. Hillery, A.W. Lloyd and J. Swarbrick, Harwood Academic Publisher
- Pharmaceutical Dosage Forms and Drug Delivery Systems, H.C. Ansel, L.V. Allen and N.G. Popovich, Lippincott Williams and Wilkins Publisher
- Introduction to Biophysical Methods for Protein and Nucleic Acid Research, J.A. Glasel and M.P. Deutscher, Academic Press.
- Principles of Drug Action, W.B. Pratt and P. Taylor, Churchill Livingstone.
- Principles of Medicinal Chemistry, W.O. Foye, T.L. Lemke, and D.A. Williams, Williams and Wilkins

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- Side Effects and Drug Design, E.J. Lien, Marcel Dekker.
- The Anticancer Drugs, W.B. Pratt, R.W. Ruddon, W.D. Ensminger, and J. Maybaum, Oxford University Press.
- Drug Delivery: Engineering Principles for Drug Therapy (Topics in Chemical Engineering), W.M. Saltzman, Oxford University Press.
- Handbook of Biodegradable Polymers (Drug Targeting and Delivery), A.J. Domb, J. Kost and D.M. Wiseman, Dunitz Martin Ltd.



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BIOPROCESS TECHNOLOGY

Course Code: BTH2608

Credit Units: 03

Course Objective:

The objective of the course is to apply the principles of biochemical engineering in large scale cultivation of microorganism for production of important products.

Course Contents:

Module I

Basic principle in bioprocess technology. Advantage of bioprocess over chemical process. Media formulation, Cell culture techniques; Inoculum development and aseptic transfers.

Module II

Process technology for the production of primary metabolites, eg. biomass, ethanol, acetone-butanol, citric acid, amino acids, polysaccharides and plastics.

Ethanol: production by batch, continuous and cell recycle adopted by various technologies practiced in Indian distilleries using molasses and grains. Computation of fermentation efficiency, distillation efficiency and overall efficiency of ethanol production, recovery, uses, glucose effect etc. Power alcohol – definition, uses, merits and demerits of various technologies for its production.

Amino Acid: Genetic Control of metabolic pathway.

Lysine: Indirect and direct fermentation – mechanism of ph of metabolic block in accumulation of L-lysine by inhibition and repression mechanism.

Biomass: Bakers and distillers yeast production using various raw materials, “bios” factors for growth, Crabtree effect, harvesting, different forms and uses.

What are mushroom, different forms of common mushroom production from agro based raw materials and uses. Biofertilizers, biocompost and biopesticides

Module III

Production of secondary metabolites – penicillin, cephalosporins, streptomycin, tetracycline etc. Metabolites from plant and animal cell culture

Penicillin: Classification, various penicillin as precursor and ‘R’ – side chain, penicillinase, 6-APA, penicillin production, harvest and recovery, uses of various forms etc.

Streptomycin: chemical structure, production, harvest and recovery, use by-product of streptomycin fermentation etc.

Tetracycline: chemical structure, production, harvest and recovery, use by-product of tetracycline fermentation etc.

Module IV


Microbial production of industrial enzymes – glucose isomerase, penicillin acylase, cellulase, amylase, lipase, protease etc.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

- Biochemical Engineering- Kinetics, Mass Transport, Reactors and Gene Expression, W F Weith, John Wiley and Sons Inc
- Biochemical Engineering, S Aiba, A E Humphery and N F Millis, University of Tokyo Press
- Bioprocess Engineering Basic Concepts, M.L. Shuler and F. Kargi, Prentice Hall
- Bioprocess Engineering, B.K. Lydersen, K.L. Nelson, B.K. Lyderson and N. D'Elia, John Wiley and Sons Inc.
- Bioprocess Engineering Principles, P Doran, Academic Press
- Biotechnology. A Textbook of Industrial Microbiology, W. Crueger and a. Crueger, Sinauer Associates.
- Principles of Fermentation Technology, P.F. Stanbury and A. Whitaker, Pergamon Press
- Process Engineering in Biotechnolgy, A T Jackson , Prentice Hall



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TERM PAPER

Course Code: BTH2631

Credit Units: 02

A term (or research) paper is primarily a record of intelligent reading in several sources on a particular subject.

The students will choose the topic at the beginning of the session in consultation with the faculty assigned. The progress of the paper will be monitored regularly by the faculty. At the end of the semester the detailed paper on the topic will be submitted to the faculty assigned. The evaluation will be done by Board of examiners comprising of the faculties.

GUIDELINES FOR TERM PAPER

The procedure for writing a term paper may consists of the following steps:

- Choosing a subject
- Finding sources of materials
- Collecting the notes
- Outlining the paper
- Writing the first draft
- Editing & preparing the final paper

1. Choosing a Subject

The subject chosen should not be too general.

2. Finding Sources of materials

- The material sources should be not more than 10 years old unless the nature of the paper is such that it involves examining older writings from a historical point of view.
- Begin by making a list of subject-headings under which you might expect the subject to be listed.
- The sources could be books and magazines articles, news stories, periodicals, scientific journals etc.

3. Collecting the notes

Skim through sources, locating the useful material, then make good notes of it, including quotes and information for footnotes.

- p) Get facts, not just opinions. Compare the facts with author's conclusion.
- q) In research studies, notice the methods and procedures, results & conclusions.
- r) Check cross references.

4. Outlining the paper

- k) Review notes to find main sub-divisions of the subject.
- l) Sort the collected material again under each main division to find sub-sections for outline so that it begins to look more coherent and takes on a definite structure. If it does not, try going back and sorting again for main divisions, to see if another general pattern is possible.

5. Writing the first draft

Write the paper around the outline, being sure that you indicate in the first part of the paper what its purpose is. You may follow the following:

- a) statement of purpose
- b) main body of the paper
- c) statement of summary and conclusion

Avoid short, bumpy sentences and long straggling sentences with more than one main ideas.

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6. Editing & preparing the final Paper

- tt) Before writing a term paper, you should ensure you have a question which you attempt to answer in your paper. This question should be kept in mind throughout the paper. Include only information/ details/ analyses of relevance to the question at hand. Sometimes, the relevance of a particular section may be clear to you but not to your readers. To avoid this, ensure you briefly explain the relevance of every section.
- uu) Read the paper to ensure that the language is not awkward, and that it "flows" properly.
- vv) Check for proper spelling, phrasing and sentence construction.
- ww) Check for proper form on footnotes, quotes, and punctuation.
- xx) Check to see that quotations serve one of the following purposes:
- yy) Show evidence of what an author has said.
- zz) Avoid misrepresentation through restatement.
- aaa) Save unnecessary writing when ideas have been well expressed by the original author.
- bbb) Check for proper form on tables and graphs. Be certain that any table or graph is self-explanatory.

Term papers should be composed of the following sections:

- Title page
- Table of contents
- Introduction
- Review
- Discussion & Conclusion
- References
- Appendix

Generally, the introduction, discussion, conclusion and bibliography part should account for a third of the paper and the review part should be two thirds of the paper.

Discussion

The discussion section either follows the results or may alternatively be integrated in the results section. The section should consist of a discussion of the results of the study focusing on the question posed in the research paper.

Conclusion

The conclusion is often thought of as the easiest part of the paper but should by no means be disregarded. There are a number of key components which should not be omitted. These include:

- u) summary of question posed
- v) summary of findings
- w) summary of main limitations of the study at hand
- x) details of possibilities for related future research

References

From the very beginning of a research project, you should be careful to note all details of articles gathered.

The bibliography should contain ALL references included in the paper. References not included in the text in any form should NOT be included in the bibliography.

The key to a good bibliography is consistency. Choose a particular convention and stick to this.

Conventions

Monographs

Crystal, D. (2001), Language and the internet. Cambridge: Cambridge University Press.

Edited volumes

Gass, S./Neu, J. (eds.) (1996), Speech acts across cultures. Challenges to communication in a second language. Berlin/ NY: Mouton de Gruyter.

[(eds.) is used when there is more than one editor; and (ed.) where there is only one editor. In German the abbreviation used is (Hrsg.) for Herausgeber].

Edited articles

Schmidt, R./Shimura, A./Wang, Z./Jeong, H. (1996), Suggestions to buy: Television commercials from the U.S., Japan, China, and Korea. In: Gass, S./Neu, J. (eds.) (1996), Speech acts across cultures. Challenges to communication in a second language. Berlin/ NY: Mouton de Gruyter: 285-316.

Journal articles

McQuarrie, E.F./Mick, D.G. (1992), On resonance: A critical pluralistic inquiry into advertising rhetoric. Journal of consumer research 19, 180-197.

Electronic book

Chandler, D. (1994), Semiotics for beginners [HTML document]. Retrieved [5.10.'01] from the World Wide Web, <http://www.aber.ac.uk/media/Documents/S4B/>.

Electronic journal articles

Watts, S. (2000) Teaching talk: Should students learn 'real German'? [HTML document]. German as a Foreign Language Journal [online] 1. Retrieved [12.09.'00] from the World Wide Web, <http://www.gfl-journal.com/>.

Other websites

Verterhus, S.A. (n.y.), Anglicisms in German car advertising. The problem of gender assignment [HTML document]. Retrieved [13.10.'01] from the World Wide Web, <http://olaf.hiof.no/~sverrev/eng.html>.

Unpublished papers

Takahashi, S./DuFon, M.A. (1989), Cross-linguistic influence in indirectness: The case of English directives performed by native Japanese speakers. Unpublished paper, Department of English as a Second Language, University of Hawai'i at Manoa, Honolulu.


Unpublished theses/ dissertations

Möhl, S. (1996), Alltagssituationen im interkulturellen Vergleich: Realisierung von Kritik und Ablehnung im Deutschen und Englischen. Unpublished MA thesis, University of Hamburg.

Walsh, R. (1995), Language development and the year abroad: A study of oral grammatical accuracy amongst adult learners of German as a foreign language. Unpublished PhD dissertation, University College Dublin.

Appendix

The appendix should be used for data collected (e.g. questionnaires, transcripts, ...) and for tables and graphs not included in the main text due to their subsidiary nature or to space constraints in the main text.


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Assessment Scheme:

Continuous Evaluation:


40%

(Based on abstract writing, interim draft, general approach, research orientation, readings undertaken etc.)

Final Evaluation:

60%

(Based on the organization of the paper, objectives/ problem profile/ issue outlining, comprehensiveness of the research, flow of the idea/ ideas, relevance of material used/ presented, outcomes vs. objectives, presentation/ viva etc.)


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PROJECT

Course Code: BTH2632

Credit Units: 03

Objectives:

The aim of the project is to provide the students with an opportunity to further their intellectual and personal development in the chosen field by undertaking a significant practical unit of activity. The project can be defined as a scholarly inquiry into a problem or issues, involving a systematic approach to gathering and analysis of information / data, leading to production of a structured report.

Chapter Scheme and distribution of marks:

Chapter 1: Introduction – 10 marks

Chapter 2: Conceptual Framework/ National/International Scenario – 25 marks

Chapter 3: Presentation, Analysis & Findings -- 25 marks

Chapter 4: Conclusion & Recommendations -- 10 marks

Chapter 5: Bibliography -- 05 marks

Project Report	Power Point Presentation & Viva
75 marks	25 marks

Components of a Project Report

The outcome of Project Work is the Project Report. A project report should have the following components:

1) Cover Page: This should contain the title of the project proposal, to whom it is submitted, for which degree, the name of the author, name of the supervisor, year of submission of the project work, name of the University.

2) Acknowledgement: Various organizations and individuals who might have provided assistance /co-operation during the process of carrying out the study.

3) Table of Content: Page-wise listing of the main contents in the report, i.e., different Chapters and its main Sections along with their page numbers.

4) Body of the Report: The body of the report should have these four logical divisions

a) **Introduction:** This will cover the background, rationale/ need / justification, brief review of literature, objectives, methodology (the area of the study, sample, type of study, tools for data collection, and method of analysis), Limitations of the Study, and Chapter Planning.

b) **Conceptual Framework / National and International Scenario:** (relating to the topic of the Project).

c) **Presentation of Data, Analysis and Findings:**(using the tools and techniques mentioned in the methodology).

d) **Conclusion and Recommendations:** In this section, the concluding observations based on the main findings and suggestions are to be provided.

5) Bibliography or References: This section will include the list of books and articles which have been used in the project work, and in writing a project report.


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6) Annexures: Questionnaires (if any), relevant reports, etc.

(The main text of the Project should normally be in the range of 5000 words. However, there may be annexure in addition to the main text)

The Steps of a Project Report

Step I : Selection of the topic for the project by taking following points into consideration:

- Suitability of the topic.
- Relevance of the topic
- Time available at the disposal.
- Feasibility of data collection within the given time limit.
- Challenges involved in the data collection (time & cost involved in the data collection, possibility of getting responses, etc.)

Step II : Finalisation of the Topic and preparation of Project Proposal in consultation with the Supervisor.

Step III : Collection of information and data relating to the topic and analysis of the same.

Step IV : Writing the report dividing it into suitable chapters, viz.,

Chapter 1: Introduction,

Chapter 2: Conceptual Framework / National & International Scenario,

Chapter 3: Analysis & Findings

Chapter 4: Conclusion and Recommendations.

Step V : The following documents are to be attached with the Final Project Report.


1) Approval letter from the supervisor (Annexure-IA)

2) Student's declaration (Annexure-IB)

3) Certificate from the Competent Authority of the Organisation / Institution, if the student undertakes the Project Work in any Organisation / Institution.

Guidelines for Evaluation:

- Each of the students has to undertake a Project individually under the supervision of a teacher and to submit the same following the guidelines stated below.
- Language of Project Report and Viva-Voce Examination may be English. The Project Report must be typed and hard bound.
- Failure to submit the Project Report or failure to appear at the Viva-voce Examination will be treated as "Absent" in the Examination. He /she has to submit the Project Report and appear at the Viva-Voce Examination in the subsequent years (within the time period as per University Rules).
- No marks will be allotted on the Project Report unless a candidate appears at the Viva-Voce Examination. Similarly, no marks will be allotted on Viva-Voce Examination unless a candidate submits his/her Project Report.
- Evaluation of the Project Work to be done jointly by one internal expert and one external expert with equal weightage, i.e., average marks of the internal and external experts will be allotted to the candidate.


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WORKSHOP / CERTIFICATION

Course Code: BTH2633

Credit Units: 01

Objectives

A workshop is primarily an activity based academic event that is organized to provide the students a one to one and hands on experience on any aspect of their learning. The communication in a workshop has to be necessarily two way. The trainer has to make sure that the aspect covered are practically practiced by the participants. The student will choose the option of workshop from amongst their concentration electives. The evaluation will be done by Board of examiners comprising of the faculties.

Major Themes for Workshop

The workshop may be conducted on any of the following major themes:

Accounting

Finance

Human Resources

Marketing

Economics

Operations

Supply Chain Management

These themes are merely indicative and other recent and relevant topics of study may be included.

Guidelines for Workshop

The procedure for earning credits from workshop consists of the following steps: Relevant study material and references will be provided by the trainer in advance. The participants are expected to explore the topic in advance and take active part in the discussions held. Attending and participating in all activities of the workshop. Group Activities have to be undertaken by students as guided by the trainer. Evaluation of workshop activities would be done through test and quiz at the end of the workshop. Submitting a write up of atleast 500 words about the learning outcome of the workshop.

Methodology

The methodology followed at the workshop could be based on any one or more of the following methods:

Case Study

Business Game

Simulation

Group Activity

Role Play

Business Planning

Quiz

Evaluation Scheme:

Attendance	Active Participation	Multiple Choice Questions/ Quiz	Solving the case/ Assignment/ Write up	Total
10	30	30	30	100


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2022

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A handwritten signature in blue ink, appearing to read 'Anil'.

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A handwritten signature in blue ink, appearing to read 'Manesar'.

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INTRODUCTION TO COMPUTERS AND PROGRAMMING IN C

Course Code: BTE2104

Credit Units: 03

Course Objective:

The objective of this course module is to acquaint the students with the basics of computers system, its components, data representation inside computer and to get them familiar with various important features of procedure oriented programming language i.e. C.

Course Contents:

Module I: Introduction

Introduction to computer, history, von-Neumann architecture, memory system (hierarchy, characteristics and types), H/W concepts (I/O Devices), S/W concepts (System S/W & Application S/W, utilities). Data Representation: Number systems, character representation codes, Binary, octal, hexadecimal and their interconversions. Binary arithmetic, floating point arithmetic, signed and unsigned numbers, Memory storage unit.

Module II: Programming in C

History of C, Introduction of C, Basic structure of C program, Concept of variables, constants and data types in C, Operators and expressions: Introduction, arithmetic, relational, Logical, Assignment, Increment and decrement operator, Conditional, bitwise operators, Expressions, Operator precedence and associativity. Managing Input and output Operation, formatting I/O.

Module III: Fundamental Features in C

C Statements, conditional executing using if, else, nesting of if, switch and break Concepts of loops, example of loops in C using for, while and do-while, continue and break. Storage types (automatic, register etc.), predefined processor, Command Line Argument.

Module IV: Arrays and Functions

One dimensional arrays and example of iterative programs using arrays, 2-D arrays Use in matrix computations.

Concept of Sub-programming, functions Example of user defined functions. Function prototype, Return values and their types, calling function, function argument, function with variable number of argument, recursion.

Module V: Advanced features in C

Pointers, relationship between arrays and pointers Argument passing using pointers, Array of pointers. Passing arrays as arguments.

Strings and C string library.

Structure and Union. Defining C structures, Giving values to members, Array of structure, Nested structure, passing strings as arguments.

File Handling.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

Text:

- “ANSI C” by E Balagurusamy
- Yashwant Kanetkar, “Let us C”, BPB Publications, 2nd Edition, 2001.
- Herbert Schildt, “C: The complete reference”, Osbourne McGraw Hill, 4th Edition, 2002.
- V. Raja Raman, “Computer Programming in C”, Prentice Hall of India, 1995.

References:

- Kernighan & Ritchie, “C Programming Language”, The (Ansi C Version), PHI, 2nd Edition.
- J. B Dixit, “Fundamentals of Computers and Programming in ‘C’.
- P.K. Sinha and Priti Sinha, “Computer Fundamentals”, BPB publication.



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ELECTRICAL SCIENCE

Course Code: BTE2106

Credit Units: 03

Course Objective:

The objective of the course is to provide a brief knowledge of Electrical Engineering to students of all disciplines. This Course includes some theorems related to electrical, some law's related to flow of current, voltages, basic knowledge of Transformer, basic knowledge of electromagnetism, basic knowledge of electrical network.

Course Contents:

Module I: Basic Electrical Quantities

Basic Electrical definitions-Energy, Power, Charge, Current, Voltage, Electric Field Strength, Magnetic Flux Density, etc., Resistance, Inductance and Capacitance. Ideal Source, Independent Source and Controlled Source

Module II: Network Analysis Techniques & Theorems

Circuit Principles: Ohm's Law, Kirchoff's Current Law, Kirchoff's Voltage Law Network Reduction: Star-Delta Transformation, Source Transformation, Nodal Analysis, Loop analysis. Superposition theorem, Thevenin's Theorem, Norton's theorem and Reciprocity theorem.

Module III: Alternating Current Circuits

Peak, Average and RMS values for alternating currents, Power calculation: reactive power, active power, Complex power, power factor, impedance, reactance, conductance, susceptance Resonance: series Resonance, parallel resonance, basic definition of Q factor & Band-width.

Module IV: Transformers

Basic Transformer Operation principle, Construction, Voltage relations, current relations, Linear circuit models, open circuit test, short circuit test, Transformer Efficiency.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

- R.J. Smith, R.C. Dorf: Circuits, devices and Systems
- B.L. Thareja: Electrical Technology: Part -1 & 2
- V. Deltoro: Electrical Engineering fundamentals
- Schaum's Series: Electrical Circuits



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PROGRAMMING IN C LAB

Course Code: BTE2108

Credit Units: 01

Software Required: Turbo C

Course Contents:

- C program involving problems like finding the nth value of cosine series, Fibonacci series. Etc.
- C programs including user defined function calls
- C programs involving pointers, and solving various problems with the help of those.
- File handling

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.



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ELECTRICAL SCIENCE LAB

Course Code: BTE2110

Credit Units: 01

List of Experiments:

- To verify KVL & KCL in the given network.
- To verify Superposition Theorem.
- To verify Maximum Power Transfer Theorem.
- To verify Reciprocity Theorem.
- To determine and verify R_{Th} , V_{Th} , R_N , I_N in a given network.
- To perform open circuit & short circuit test on a single-phase transformer.
- To study transient response of a given RLC Circuit.
- To perform regulation, ratio & polarity test on a single-phase transformer.
- To measure power & power factor in a three phase circuit by two wattmeter method.
- To measure power & power factor in a three phase load using three ammeter & three voltmeter method.

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.



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ENGINEERING CHEMISTRY LAB

Course Code: BTE2113

Credit Units: 01

Course Contents:

List of Experiments:(Any 10 Experiments)

1. To determine the ion exchange capacity of a given cation exchanger.
2. To determine the temporary, permanent and total hardness of a sample of water by complexometric titration method.
3. To determine the type and extent of alkalinity of given water sample.
4. To determine the number of water molecules of crystallization in Mohr's salt (ferrous ammonium sulphate) provided standard potassium dichromate solution (0.1N) using diphenylamine as internal indicator.
5. To determine the ferrous content in the supplied sample of iron ore by titrimetric analysis against standard $K_2Cr_2O_7$ solution using potassium ferricyanide $[K_3Fe(CN)_6]$ as external indicator.
6. (a) To determine the surface tension of a given liquid by drop number method.
(b) To determine the composition of a liquid mixture A and B (acetic acid and water) by surface tension method.
7. To prepare and describe a titration curve for phosphoric acid – sodium hydroxide titration using pH-meter.
8. (a) To find the cell constant of conductivity cell.
(b) Determine the strength of hydrochloric acid solution by titrating it against standard sodium hydroxide solution conductometrically
9. Determination of Dissolved oxygen in the given water sample.
- 10 To determine the total residual chlorine in water.
- 11 Determination of amount of oxalic acid and H_2SO_4 in 1 L of solution using N/10 NaOH and N/10 $KMnO_4$ solution.
- 12 Determination of viscosity of given oil by means of Redwood viscometer I.
- 13 To determine flash point and fire point of an oil by Pensky Martin's Apparatus
- 14 To determine the Iodine value of the oil.

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

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OBJECT ORIENTED PROGRAMMING IN C++

Course Code: BTE2203

Credit Units: 03

Course Objective:

The objective of this module is to introduce object oriented programming. To explore and implement the various features of OOP such as inheritance, polymorphism, Exceptional handling using programming language C++. After completing this course student can easily identify the basic difference between the programming approaches like procedural and object oriented.

Course Contents:

Module I: Introduction

Review of C, Difference between C and C++, Procedure Oriented and Object Oriented Approach. Basic Concepts: Objects, classes, Principles like Abstraction, Encapsulation, Inheritance and Polymorphism. Dynamic Binding, Message Passing. Characteristics of Object-Oriented Languages. Introduction to Object-Oriented Modeling techniques (Object, Functional and Dynamic Modeling).

Module II: Classes and Objects

Abstract data types, Object & classes, attributes, methods, C++ class declaration, Local Class and Global Class, State identity and behaviour of an object, Local Object and Global Object, Scope resolution operator, Friend Functions, Inline functions, Constructors and destructors, instantiation of objects, Types of Constructors, Static Class Data, Array of Objects, Constant member functions and Objects, Memory management Operators.

Module III: Inheritance

Inheritance, Types of Inheritance, access modes – public, private & protected, Abstract Classes, Ambiguity resolution using scope resolution operator and Virtual base class, Aggregation, composition vs classification hierarchies, Overriding inheritance methods, Constructors in derived classes, Nesting of Classes.

Module IV: Polymorphism

Polymorphism, Type of Polymorphism – Compile time and runtime, Function Overloading, Operator Overloading (Unary and Binary) Polymorphism by parameter, Pointer to objects, this pointer, Virtual Functions, pure virtual functions.

Module V: Strings, Files and Exception Handling

Manipulating strings, Streams and files handling, formatted and Unformatted Input output. Exception handling, Generic Programming – function template, class Template Standard Template Library: Standard Template Library, Overview of Standard Template Library, Containers, Algorithms, Iterators, Other STL Elements, The Container Classes, General Theory of Operation, Vectors.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

Text & References:

Text:

- A.R. Venugopal, Rajkumar, T. Ravishanker “Mastering C++”, TMH, 1997
- R. Lafore, “Object Oriented Programming using C++”, BPB Publications, 2004.
- “Object Oriented Programming with C++” By E. Balagurusamy.
- Schildt Herbert, “C++: The Complete Reference”, Wiley DreamTech, 2005.

References:

- Parsons “Object Oriented Programming with C++”, BPB Publication, 1999.
- Steven Ch. Lawlor, “The Art of Programming Computer Science with C++”, Vikas Publication, 2002.
- Yashwanth Kanethkar, “Object Oriented Programming using C++”, BPB, 2004

OBJECT ORIENTED PROGRAMMING IN C++ LAB

Course Code: BTE2205

Credit Units: 01

Software Required: Turbo C++

Course Contents:

- Creation of objects in programs and solving problems through them.
- Different use of private, public member variables and functions and friend functions.
- Use of constructors and destructors.
- Operator overloading
- Use of inheritance in and accessing objects of different derived classes.
- Polymorphism and virtual functions (using pointers).
- File handling.

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab



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ENGINEERING GRAPHICS LAB

Course Code: BTE2206

Credit Units: 01

Course Objective:

This course will provide students concepts on the drawings of different curves like straight line, parabola, ellipse etc. After completion of this course, students will be able to draw different figures manually and will be capable of using various instruments involved in drawings.

Course Contents:

Module I: General

Importance, Significance and scope of engineering drawing, Lettering, Dimensioning, Scales, Sense of proportioning, Different types of projections, Orthographic Projection, B.I.S. Specifications.

Module II: Projections of Point and Lines

Introduction of planes of projection, Reference and auxiliary planes, projections of points and Lines in different quadrants, traces, inclinations, and true lengths of the lines, projections on Auxiliary planes, shortest distance, intersecting and non-intersecting lines.

Module III: Planes other than the Reference Planes

Introduction of other planes (perpendicular and oblique), their traces, inclinations etc., Projections of points and lines lying in the planes, conversion of oblique plane into auxiliary Plane and solution of related problems.

Module IV: Projections of Plane Figures

Different cases of plane figures (of different shapes) making different angles with one or both reference planes and lines lying in the plane figures making different given angles (with one of both reference planes). Obtaining true shape of the plane figure by projection.

Module V: Projection of Solids

Simple cases when solid is placed in different positions, Axis faces and lines lying in the faces of the solid making given angles.

Module VI: Development of Surface

Development of simple objects with and without sectioning. Isometric Projection

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

Text & References:

- M.B. Shah & B.C. Rana, Engineering Drawing, Pearson Education, 2007
- PS Gill, Engineering Drawing, Kataria Publication
- ND Bhatt, Engineering Drawing, Charotar publications
- N Sidheshwar, Engineering Drawing, Tata McGraw Hill
- CL Tanta, Mechanical Drawing, “Dhanpat Rai”


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LIFE SCIENCES

Course Code: BTE2210

Credit Units: 03

Course Objective:

The objective of the course is to provide students an understanding of the very basic molecules of life- DNA, RNA, proteins and how these molecules, when form further complex molecules like carbohydrates, vitamins and lipids, then functioning of body takes place. Since technology is advancing in every field, emphasis is also given on the understanding of application of some biotechnological concepts used in our daily life like biofuels, biofertilizers. An introduction to the origin of earth, the environment-air, water and land, origin of life on Earth, how life evolved from a single cell, some environmental problems and measures to be taken to combat them.

Course Contents:

Module I: Cell Biology

Organization of cell (Inorganic-Water and Ions; Organic-Proteins, Lipids and Carbohydrates constituents) Physical structure of the cell-Brief introduction to the Cell Membrane, Cytoplasm and its Organelles (Nucleus, Mitochondria, Golgi, Endoplasmic Reticulum, Lysosomes, Peroxisomes, Ribosomes, Chloroplasts), Cell cycle.

Module II: Introduction to Cell Physiology

Transport of substances through the cell membrane- Osmosis, Diffusion and its types, Active transport (Sodium-potassium pump) and Passive transport, Membrane potential, Measuring Membrane Potential, Action Potential

Module III: Environmental Biotechnology

Biosensors, Biochips and Biofilms, GMO's and Biofertilizers
Biofuels
Gene Therapy, Stem cell and Nanobiomolecules
Bio Informatics- Introduction and Applications

Module IV: Ecology & Environment

Ecosystem- Structure and functions, Food chain, Food web, Energy flow, Ecological pyramids
Energy sources- Conventional (Coal, Petrol, Natural gas) and Non-conventional (Solar, Wind, Geothermal, Hydro and Biomass)
Pollution- Air, Water, Land, Thermal and Nuclear
Conferences and Protocols- Stockholm, Montreal, Rio-de-Janerio, Kyoto
Environmental issues- Green House Effect, Global Warming and Warning, El-Nino, Acid Rain, Sustainable Development, Environmental Disasters (Earthquake, Floods, Drought and Cyclones)

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

- Fundamentals of Environmental Chemistry, G.S.Sodhi, Narosa Publishers.
- Introduction to Environmental Pollution, B.K Sharma, H.Kaur, Goel Publishers.
- Biochemistry Styrier.
- Cell Biology, C B Pawar.
- Biochemistry, Lehninger.

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CELL BIOLOGY & GENETICS

Course Code: BTE2301

Credit Units: 03

Course Objective

Cell biology connects different fields of biotechnology by incorporating elements of biology, maths, physics and chemistry. The objective of the course is to understand the structure and function of cellular and sub cellular components of cells and tissues. It also focuses on the understanding of basic principles of genetics, incorporating the concepts of classical, molecular and population genetics. Compilation is required for recent advances in genetic principles for strong foundation in Biotechnology.

Course Contents

Module I

Cell theory, pre-cellular evolution, prokaryotic and eukaryotic cells. Cell cycle: molecular events, cell division, mitosis and meiosis.

Module II

Cellular organelles - structure and function of cell wall, plasma membrane nucleus, Mitochondria, Chloroplast, Nucleus, lysosomes, peroxisomes, golgi bodies, and transport across membranes. Cell locomotion- cytoskeleton, structure and function of cilia and flagella.

Module III

Cellular signaling –general mechanism of signaling and structures of the various types of receptors. Types of cancer, etiology of cancer, metastasis, cytological role of p53 and p21 genes in cancer development. Apoptosis.

Module IV

Genetics: classical and molecular genetics, Mendelian principles of inheritance, human genetics. Extension of Mendelism: Allelic variations, influence of environment on expression, penetrance and expressivity, epistasis, pleiotropy. Chromosomal basis of inheritance; linkage, crossing over and chromosome mapping.

Module V

Mutation and mutagenic agents, types of mutations. Numerical and structural changes in chromosomes with emphasis on human syndromes/plant breeding and genetic counseling. Economic importance of mutation

Module VI

Classical and modern concept of gene, pseudoallelism, position effect, intragenic crossing over & complementation (cistron, recon & nutron) Benzer's work on rII locus in T₂ bacteriophage. Genetics of Population: Hardy- Weinburg Law and its deviations.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70


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Text & References:

Text:

- Cell and Molecular Biology, Gerald Karp, John Wiley and Sons Inc.
- Cell and Molecular Biology, DeRobertis, B.I. Publication Pvt. Ltd.
- Genetics, P.K. Gupta, Rastogi Publication
- Concepts of Genetics (Sixth Edition), William S. Klug and Michael R, Cummings, Pearson Education

References:

- Cell in Development and Inheritance, E.B. Wilson, Macmillan
- Developmental Biology, S.F. Gilbert, Sinauer Associates Inc.
- Essential Cell Biology : An Introduction to the Molecular Biology of the Cell, B. Alberts, D. Bray, A. Johnson, J. Lewis, M. Roff, K. Robert, P. Walter and K. Roberts, Garland Publishing Company
- Molecular Cell Biology, H.Lodish, A.Berk, S.L. Zipursky, P. Matsudaura, D. Baltimore and J. Danell, W.H. Freeman and Company.
- Genetics, M.W. Strickberger, Prentice Hall College Division
- Genetics, P.J.Russell, Benjamin/Cummings
- Principles of Genetics, E J Gardner, John Wiley & Sons Inc.
- Genetics, R. Goodenough, International Thomson Publishing
- Introduction to Genetic Analysis, A.J. F. Griffiths, W.H. Freeman and Company
- Principles of Genetics, D.P. Snustad & M.J. Simmons, John Wiley and Sons Inc.
- Molecular Biology of the Gene (Fifth Edition), J.D. Watson, A.M. Weiner and N.H. Hopkins, Addison – Wesley Publishing



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BIOSTATISTICS

Course Code: BTE2303

Credit Units: 03

Course Objective:

The course aims to develop competency and expertise in the application of statistical methods applied to biological data obtained in experimental techniques, methodology and the safe laboratory practice.

Course Contents:

Module I

Statistics and Biostatistics: Preliminary concepts; Measures of Central Tendency: Mean, Median, Mode
Measures of Dispersion: Range, Standard deviation, Variance

Module II: Probability

Random Experiments, Trial and Event, Sample Space, Mutually Exclusive or Disjoint Events, Mutually Exhaustive Events, Equally Probable Events, Complementary Event, Classical definition of Probability, Statistical definition of Probability, Axiomatic definition of Probability, Addition theorem, Multiplication theorem, Conditional Probability, Bayes' Theorem. Expectation.

Module III: Continuous Distribution

Normal Distribution, Properties of Normal distribution

Module IV: Correlation

Bivariate distribution Correlation, Types of Correlation, Simple Correlation Coefficient for ungrouped data, Properties and Interpretation of Correlation Coefficient, Coefficient of determination, Scatter diagram, Standard Error, Probable error of Correlation Coefficient. Rank correlation, Some examples.

Module V: Regression

Definition, Regression lines and Regression Coefficients, Properties of Regression Coefficients, Some examples. Method of least square: Fitting of straight line

Module VI: Introduction to the following Statistical terms

Parameter, Statistic, Null hypothesis, Alternative hypothesis, Critical region, Type I Error, Type II Error, Level of significance, P-value and its applications.

Test of Significance for Small samples: One sample t-test, Paired t-test, Degrees of freedom for t-test, F test for equality of Population variances, Degrees of freedom for F-test.

Test of Significance for Large samples: Normal test for sample mean and population mean, Normal test for two sample means.

Chi-square Test: Test of goodness of fit, Test of Independence of attributes, Degrees of freedom for Chi-square test, Coefficient of contingency, Yates' correction for continuity.

Analysis of Variance: One way and Two way (only Examples)

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

Text:

- Introduction to Biostatistics, Ronald N. Forthfer and Eun Sun Lee, Publisher: Elsevier.
- Statistical Methodology, S.P. Gupta, Publisher: S. Chand & Co.
- Fundamentals of Statistics, S.C. Gupta. Publisher: S.Chand & Co.

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References:

- Biostatistics: A manual of Statistical Methodology for use in Health, Nutrition and Anthropology, K. Visweswara Rao. Publisher: Jaypee Brothers Biostatistics: A foundation for analysis in the Health Sciences, W.W. Daniel, Publisher: John Wiley and Sons
- Fundamentals of Mathematical Statistics, S.C. Gupta and V.K. Kapoor, Publisher: S.Chand & Co.
- Statistical Analysis, Kaushal, T.L. Publisher: Kalyani Publishers
- Statistical Methods, Potri, D. Kalyani Publishers.
- Mathematical Statistics, H.C. Saxena, and V.K. Kapoor: S. Chand & Company
- Biostatistics, P.N. Arora and P.K. Malhan, Publisher: Himalaya Publishing House.



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DATABASE MANAGEMENT SYSTEM

Course Code: BTE2304

Credit Units: 02

Course Objective:

It enables the students to access biological information networks and databases in order to understand the different techniques of biotechnology to build detection systems especially in the prevention and treatment of human diseases.

Course Contents:

Module I: Overview and historical perspective

File systems vs. DBMS, advantages of DBMS

Module II: Describing and storing data in DBMS

Levels of abstraction and data independence; Data models and their comparison; Entity relationship model -concepts, design, keys and features; Relational model -introduction, structure of the relational databases, integrity constraints, Relational algebra and calculus -selection and projection, set operations, renaming, Joins, Division etc.

Module III: SQL and Perl

Module IV: Database design

Functional dependencies, Normal forms; Concurrency control and database discovery -concept of transaction: atomicity, consistency, isolation and durability, transactions and schedules, concurrent execution of transactions, Lock based concurrency control, Database recovery

Module V: Current trends

Distributed databases and multimedia databases;

Module VI: Data warehousing and Data Mining

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

Text:

- Data Mining: Concept and techniques, J. Han and M. Kamber, Morgan Kaufman.
- Database Management, P.C. Desai.

References:

- Introduction to Database Systems, C.J. Date, Addison Wesley Publishing.
- Data Mining, A.K. Pujari, Sangam Books Ltd.
- Principles of Database and Knowledge Based systems, J.D. Ullman, Computer Science Press.
- The Data Warehouse Lifecycle Toolkit, John Wiley and Sons Inc.
- The Data Warehouse Toolkit, R. Kimball et al, John Wiley and Sons Inc.

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CELL BIOLOGY & GENETICS LAB

Course Code: BTE2307

Credit Units: 02

Course Contents

Module I

Microscopy: Light microscopy, Bright field, Phase contrast.

Module II

Study of chromoplasts, chloroplast in plant cell; Mitosis and Meiosis

Module III

Study of permanent slides of types of cancer; Study of apoptosis

Module IV

Study of gene interaction; chromosomal translocation in *Rhoeo discolor*

Module V

Study of bacterial conjugation and bacterial transduction

Module IV

Study of physical and chemical mutagens on growth of *E. coli*; PTC test

Examination Scheme:

IA			EE			
Class Test (Practical Based)	Mid Term Viva	Attendance	Major Experiment	Minor Experiment/Spotting	Practical Record	Viva
15	10	05	35	15	10	10



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DATABASE MANAGEMENT SYSTEMS LAB

Course Code: BTE2308

Credit Units: 01

Course Contents:

Module I

Database creation using DDL and DML.

Module II

Defining the primary and secondary keys.

Module III

Implementation of selection, projection and joins (internal and external) with SQL and Perl .

Module IV

Normalization of databases with SQL and Perl

Module V

Implementation of transactions and schedules.

Module VI

Detection of association rules and knowledge recovery.

Examination Scheme:

IA			EE			
Class Test (Practical Based)	Mid Term Viva	Attendance	Major Experiment	Minor Experiment/Spotting	Practical Record	Viva
15	10	05	35	15	10	10

Note: Minor variation could be there depending on the examiner



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INDUSTRIAL BIOTECHNOLOGY

Course Code: BTE2309

Credit Units: 02

Course Objective:

The objective of this course is to use microorganism to produce various compounds of commercial interest. The student will be exposed to various techniques available for large scale cultivation of microorganisms.

Course Contents:

Module I

Introduction to fermentation, the fermentation industry, Production process batch and Continuous system of cultivation, Solid-state fermentation

Module II

Selection of industrial microorganisms, media for fermentation, aeration, pH, temperature and other requirements during fermentation, downstream processing and product recovery, food industry waste as fermentation substrate.

Module III

Production of compounds like, antibiotics, enzymes, organic acids, solvents, beverages, SCP.

Module IV

Production of fermented dairy products

Module V

Immobilized enzymes systems, production and applications.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

Text:

- Industrial Microbiology – Cassida

References:

- Principles of fermentation Technology, Salisbury, Whitaker and Hall
- Industrial microbiology – Prescott & Duhn.



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FERMENTATION TECHNOLOGY

Course Code: BTE2310

Credit Units: 02

Objective of the course is for the acquaintance of large scale cultivation of microbes for production of industrially important products.

Course Contents

Module I: Fermentation Technology-An Overview

Development and overview of fermentation processes, strain development, media design and optimization, commercial media for fermentation

Module II: Bioproduct Production

Production of Organic acids: citric acid, acetic acid, lactic acid

Production of ethanol

Production of Antibiotics: penicillins, tetracyclins, chloramphenicol

Production of Recombinant products

Production of Industrial enzymes: cellulase, amylase, protease

Production of vitamins: B₁₂, riboflavin, fermented dairy products.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & references:

Text:

- Principles of Fermentation Technology by P.F. Stanbury, A. Whitaker, and S.J. Hall, Aditya Books (P) LTD.
- Industrial Microbiology by L.E.Casida, JR. New Age International (P) LTD.*
- Biotechnology, A Text book of Industrial Microbiology, W. Crueger and A. Crueger, Sinauer Association.*

References:

- Practical Biochemistry, Principles & Techniques, Keith Wilson and John Walker
- Biochemical Engineering Fundamentals, J.E. Bailey and D.F. Ollis, McGraw-Hill
- Protein Purification, M.R. Ladisch, R.C. Wilson, C.C. Painton and S.E. Builder, American Chemical Society



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DRUG DESIGN AND DEVELOPMENT

Course Code: BTE2311

Credit Units: 02

Course Objective:

The above course will be aimed to identify and design drugs that could be potentially useful in the identification of the candidate drugs, which have efficacy in cell culture or animal models, and thus the most effective compounds could be employed based on the above results for being moved through preclinical studies to clinical trials.

Course Contents:

Module I: Drug targets classification

DNA, RNA, post-translational, processing enzymes, metabolic enzymes involved in nucleic acid synthesis, G-protein coupled receptors (monomeric transmembrane proteins), small molecule receptors, neuropeptide receptors, ion channels (monomeric multi-transmembrane) proteins, ligand-gated ion channels (oligomeric transmembrane proteins), transporters (multi-transmembrane proteins).

Module II: Target discovery and validation strategies

Genomics (new target discovery), biological activity directed and other types of screening, natural products, combinatorial chemistry; General overview of validation techniques.

Module III: Structure-based design

Drug design to discovery and development, drug metabolism, toxicity and pharmacokinetics, toxicology considerations, problems and drawbacks on drug discovery and development.

'de novo' design methodologies : indirect drug design, pharmacophore development and receptor mapping, combinatorial libraries and new strategies and recent technologies in drug design.

Module IV: Basic concepts of Drug Delivery

Introductory lecture (1-2), Concepts of Bio availability, Process of drug absorption, Pharmacokinetic processes, Timing for optimal therapy, Drug delivery considerations for the new biotherapeutics

Basic terminologies in drug delivery and drug targeting, Drug release, Drug targeting, Doses forms, Various routes of administration of drugs (just introduction), Strategies for enhanced therapeutic efficacies (Basic principles)

Module V: Delivery of Genetic material

Basic principles of gene expression, Viral and nonviral vectors in gene delivery, Clinical applications of gene therapy and antisense therapy

New generation technologies in Drug delivery and targeting

Nanotechnology / Nanobiotechnology, Use of biosensors and challenge of chronopharmacology, Microchips and controlled drug delivery, genetically engineered cell implants in drug deliver.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

Text:

- Drug Delivery and Targeting, A.M. Hillery, A.W. Lloyd and J. Swarbrick, Harwood Academic Publisher
- Pharmaceutical Dosage Forms and Drug Delivery Systems, H.C. Ansel, L.V. Allen and N.G. Popovich, Lippincott Williams and Wilkins Publisher

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References:

- Introduction to Biophysical Methods for Protein and Nucleic Acid Research, J.A. Glasel and M.P. Deutscher, Academic Press.
- Principles of Drug Action, W.B. Pratt and P. Taylor, Churchill Livingston.
- Principles of Medicinal Chemistry, W.O. Foye, T.L. Lemke, and D.A. Williams, Williams and Wilkins
- Side Effects and Drug Design, E.J. Lien, Marcel Dekker.
- The Anticancer Drugs, W.B. Pratt, R.W. Ruddon, W.D. Ensminger, and J. Maybaum, Oxford University Press.



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RECOMBINANT DNA TECHNOLOGY

Course Code: BTE2312

Credit Units: 02

Course Objective:

A complete understanding of molecular techniques like DNA sequencing, restriction mapping, PCR for the cloning and expression of genes can be obtained through the course.

Course Contents:

Module I

Purification of DNA from bacterial, plant and animal cells, manipulation of purified DNA.

Module II

Introduction of DNA into living cells

Module III

Introduction to gene cloning and its uses, tools and techniques: plasmids and other vectors, DNA, RNA, cDNA.

Module IV

Production of proteins from cloned genes: gene cloning in medicine (Pharmaceutical agents such as insulin, growth hormones, recombinant vaccines), gene therapy for genetic diseases.

Module V

Analysis of DNA by Southern blotting, Analysis of RNA by Northern blotting, Analysis of proteins by Western blot techniques, Dot blots and slot blots, RFLP, AFLP.

PCR: Basic principles and its modification application and uses.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

Text:

- Gene cloning and DNA analysis by T.A. Brown

References:

- Recombinant DNA, J.D. Watson et al, W.H. Freeman and Company
- Principles of Gene Manipulation: An Introduction to Genetic Engineering, R.W. Old and S. B Primrose, Blackwell Science Inc
- Molecular Biotechnology: Principles and Applications of Recombinant DNA, B.R. Grick and J.J. Pasternak, ASM Press
- Molecular Biology of gene by Watson, Baker, Bell, Gann, Levine, Losick
- DNA Science by Micklos Freyer
- Principles of Gene manipulation and Genomics by Primrose and Twyman


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TERM PAPER

Course Code: BTE2331

Credit Units: 02

METHODOLOGY

A term (or research) paper is primarily a record of intelligent reading in several sources on a particular subject.

The students will choose the topic at the beginning of the session in consultation with the faculty assigned. The progress of the paper will be monitored regularly by the faculty. At the end of the semester the detailed paper on the topic will be submitted to the faculty assigned. The evaluation will be done by Board of examiners comprising of the faculties.

GUIDELINES FOR TERM PAPER

The procedure for writing a term paper may consists of the following steps:

1. Choosing a subject
2. Finding sources of materials
3. Collecting the notes
4. Outlining the paper
5. Writing the first draft
6. Editing & preparing the final paper

1. Choosing a Subject

The subject chosen should not be too general.

2. Finding Sources of materials

- a) The material sources should be not more than 10 years old unless the nature of the paper is such that it involves examining older writings from a historical point of view.
- b) Begin by making a list of subject-headings under which you might expect the subject to be listed.
- c) The sources could be books and magazines articles, news stories, periodicals, scientific journals etc.

3. Collecting the notes

Skim through sources, locating the useful material, then make good notes of it, including quotes and information for footnotes.

- a) Get facts, not just opinions. Compare the facts with author's conclusion.
- b) In research studies, notice the methods and procedures, results & conclusions.
- c) Check cross references.

4. Outlining the paper

- a) Review notes to find main sub-divisions of the subject.
- b) Sort the collected material again under each main division to find sub-sections for outline so that it begins to look more coherent and takes on a definite structure. If it does not, try going back and sorting again for main divisions, to see if another general pattern is possible.

5. Writing the first draft

Write the paper around the outline, being sure that you indicate in the first part of the paper what its purpose is. You may follow the following:

- a) statement of purpose
- b) main body of the paper
- c) statement of summary and conclusion

Avoid short, bumpy sentences and long straggling sentences with more than one main ideas.

6. Editing & Preparing the final Paper

- a) Before writing a term paper, you should ensure you have a question which you attempt to answer in your paper. This question should be kept in mind throughout the paper. Include only information/details/ analyses of relevance to the question at hand. Sometimes, the relevance of a particular section

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may be clear to you but not to your readers. To avoid this, ensure you briefly explain the relevance of every section.

- b) Read the paper to ensure that the language is not awkward, and that it "flows" properly.
- c) Check for proper spelling, phrasing and sentence construction.
- d) Check for proper form on footnotes, quotes, and punctuation.
- e) Check to see that quotations serve one of the following purposes:
 - (i) Show evidence of what an author has said.
 - (ii) Avoid misrepresentation through restatement.
 - (iii) Save unnecessary writing when ideas have been well expressed by the original author.
- f) Check for proper form on tables and graphs. Be certain that any table or graph is self-explanatory.

Term papers should be composed of the following sections:

- 1) Title page
- 2) Table of contents
- 3) Introduction
- 4) Review
- 5) Discussion & Conclusion
- 6) References
- 7) Appendix

Generally, the introduction, discussion, conclusion and bibliography part should account for a third of the paper and the review part should be two thirds of the paper.

Discussion

The discussion section either follows the results or may alternatively be integrated in the results section. The section should consist of a discussion of the results of the study focusing on the question posed in the research paper.

Conclusion

The conclusion is often thought of as the easiest part of the paper but should by no means be disregarded. There are a number of key components which should not be omitted. These include:

- a) summary of question posed
- b) summary of findings
- c) summary of main limitations of the study at hand
- d) details of possibilities for related future research

References

From the very beginning of a research project, you should be careful to note all details of articles gathered.

The bibliography should contain ALL references included in the paper. References not included in the text in any form should NOT be included in the bibliography.

The key to a good bibliography is consistency. Choose a particular convention and stick to this.

Bibliographical conventions

Monographs

Crystal, D. (2001), Language and the internet. Cambridge: Cambridge University Press.

Edited Volumes

Gass, S./Neu, J. (eds.) (1996), Speech acts across cultures. Challenges to communication in a second language. Berlin/ NY: Mouton de Gruyter.

[(eds.) is used when there is more than one editor; and (ed.) where there is only one editor. In German the abbreviation used is (Hrsg.) for Herausgeber].

Edited Articles

Schmidt, R./Shimura, A./Wang, Z./Jeong, H. (1996), Suggestions to buy: Television commercials from the U.S., Japan, China, and Korea. In: Gass, S./Neu, J. (eds.) (1996), Speech acts across cultures. Challenges to communication in a second language. Berlin/ NY: Mouton de Gruyter: 285-316.

Journal Articles

McQuarrie, E.F./Mick, D.G. (1992), On resonance: A critical pluralistic inquiry into advertising rhetoric. Journal of consumer research 19, 180-197.

Electronic Book

Chandler, D. (1994), Semiotics for beginners [HTML document]. Retrieved [5.10.'01] from the World Wide Web, <http://www.aber.ac.uk/media/Documents/S4B/>.

Electronic Journal Articles

Watts, S. (2000) Teaching talk: Should students learn 'real German'? [HTML document]. German as a Foreign Language Journal [online] 1. Retrieved [12.09.'00] from the World Wide Web, <http://www.gfl-journal.com/>.

Other Websites

Verterhus, S.A. (n.y.), Anglicisms in German car advertising. The problem of gender assignment [HTML document]. Retrieved [13.10.'01] from the World Wide Web, <http://olaf.hiof.no/~sverrev/eng.html>.

Unpublished Papers

Takahashi, S./DuFon, M.A. (1989), Cross-linguistic influence in indirectness: The case of English directives performed by native Japanese speakers. Unpublished paper, Department of English as a Second Language, University of Hawai'i at Manoa, Honolulu.

Unpublished Theses/ Dissertations

Möhl, S. (1996), Alltagssituationen im interkulturellen Vergleich: Realisierung von Kritik und Ablehnung im Deutschen und Englischen. Unpublished MA thesis, University of Hamburg.

Walsh, R. (1995), Language development and the year abroad: A study of oral grammatical accuracy amongst adult learners of German as a foreign language. Unpublished PhD dissertation, University College Dublin.

Appendix

The appendix should be used for data collected (e.g. questionnaires, transcripts,...) and for tables and graphs not included in the main text due to their subsidiary nature or to space constraints in the main text.

Assessment Scheme:

Continuous Evaluation:

40%

(Based on abstract writing, interim draft, general approach, research orientation, readings undertaken etc.)

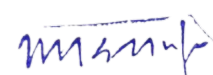
Final Evaluation:

60%

(Based on the organization of the paper, objectives/ problem profile/ issue outlining, comprehensiveness of the research, flow of the idea/ ideas, relevance of material used/ presented, outcomes vs. objectives, presentation/ viva etc.)



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PROJECT

Course Code: BTE2332

Credit Units: 02

Objectives:

The aim of the project is to provide the students with an opportunity to further their intellectual and personal development in the chosen field by undertaking a significant practical unit of activity. The project can be defined as a scholarly inquiry into a problem or issues, involving a systematic approach to gathering and analysis of information / data, leading to production of a structured report.

Chapter Scheme and distribution of marks:

Chapter 1: Introduction – 10 marks

Chapter 2: Conceptual Framework/ National/International Scenario – 25 marks

Chapter 3: Presentation, Analysis & Findings -- 25 marks

Chapter 4: Conclusion & Recommendations -- 10 marks

Chapter 5: Bibliography -- 05 marks

Project Report	Power Point Presentation & Viva
75 marks	25 marks

Components of a Project Report

The outcome of Project Work is the Project Report. A project report should have the following components:

1) Cover Page: This should contain the title of the project proposal, to whom it is submitted, for which degree, the name of the author, name of the supervisor, year of submission of the project work, name of the University.

2) Acknowledgement: Various organizations and individuals who might have provided assistance /co-operation during the process of carrying out the study.

3) Table of Content: Page-wise listing of the main contents in the report, i.e., different Chapters and its main Sections along with their page numbers.

4) Body of the Report: The body of the report should have these four logical divisions

a) **Introduction:** This will cover the background, rationale/ need / justification, brief review of literature, objectives, methodology (the area of the study, sample, type of study, tools for data collection, and method of analysis), Limitations of the Study, and Chapter Planning.

b) **Conceptual Framework / National and International Scenario:** (relating to the topic of the Project).

c) **Presentation of Data, Analysis and Findings:** (using the tools and techniques mentioned in the methodology).

d) **Conclusion and Recommendations:** In this section, the concluding observations based on the main findings and suggestions are to be provided.

5) Bibliography or References: This section will include the list of books and articles which have been used in the project work, and in writing a project report.

6) Annexures: Questionnaires (if any), relevant reports, etc.

(The main text of the Project should normally be in the range of 5000 words. However, there may be annexure in addition to the main text)

The Steps of a Project Report

Step 1: Selection of the topic for the project by taking following points into consideration:

- Suitability of the topic.
- Relevance of the topic

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- Time available at the disposal.
- Feasibility of data collection within the given time limit.
- Challenges involved in the data collection (time & cost involved in the data collection, possibility of getting responses, etc.)

Step II : Finalisation of the Topic and preparation of Project Proposal in consultation with the Supervisor.

Step III : Collection of information and data relating to the topic and analysis of the same.

Step IV: Writing the report dividing it into suitable chapters, viz.,

Chapter 1: Introduction,

Chapter 2: Conceptual Framework / National & International Scenario,

Chapter 3: Analysis & Findings

Chapter 4: Conclusion and Recommendations.

Step V: The following documents are to be attached with the Final Project Report.

1) Approval letter from the supervisor (Annexure-IA)

2) Student's declaration (Annexure-IB)


3) Certificate from the Competent Authority of the Organisation / Institution, if the student undertakes the Project Work in any Organisation / Institution.

Guidelines for Evaluation:

- Each of the students has to undertake a Project individually under the supervision of a teacher and to submit the same following the guidelines stated below.
- Language of Project Report and Viva-Voce Examination may be English. The Project Report must be typed and hard bound.
- Failure to submit the Project Report or failure to appear at the Viva-voce Examination will be treated as "Absent" in the Examination. He /she has to submit the Project Report and appear at the Viva-Voce Examination in the subsequent years (within the time period as per University Rules).
- No marks will be allotted on the Project Report unless a candidate appears at the Viva-Voce Examination. Similarly, no marks will be allotted on Viva-Voce Examination unless a candidate submits his/her Project Report.
- Evaluation of the Project Work to be done jointly by one internal expert and one external expert with equal weightage, i.e., average marks of the internal and external experts will be allotted to the candidate.



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WORKSHOP / CERTIFICATION

Course Code: BTE2333

Credit Units: 02

Objectives

A workshop is primarily an activity based academic event that is organized to provide the students a one to one and hands on experience on any aspect of their learning. The communication in a workshop has to be necessarily two way. The trainer has to make sure that the aspect covered are practically practiced by the participants. The student will choose the option of workshop from amongst their concentration electives. The evaluation will be done by Board of examiners comprising of the faculties.

Major Themes for Workshop

The workshop may be conducted on any of the following major themes:

Accounting

Finance

Human Resources

Marketing

Economics

Operations

Supply Chain Management

These themes are merely indicative and other recent and relevant topics of study may be included.

Guidelines for Workshop

The procedure for earning credits from workshop consists of the following steps:

Relevant study material and references will be provided by the trainer in advance.

The participants are expected to explore the topic in advance and take active part in the discussions held

Attending and Participating in all activities of the workshop

Group Activities have to be undertaken by students as guided by the trainer.

Evaluation of workshop activities would be done through test and quiz at the end of the workshop.

Submitting a write up of at least 500 words about the learning outcome from the workshop.

Methodology

The methodology followed at the workshop could be based on any one or more of the following methods:

Case Study

Business Game

Simulation

Group Activity

Role Play

Business Planning

Quiz

Evaluation Scheme:

Attendance	Active Participation	Multiple Choice Questions/ Quiz	Solving the case/ Assignment/ Write up	Total
10	30	30	30	100



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MICROBIOLOGY

Course Code: BTE2401

Credit Units: 03

Course Objective:

The course imparts the knowledge of different types of microorganisms that are invisible to our naked eyes. Discovery origin and evaluation of different forms of bacteria, fungi, protozoa and viruses constitute the basics of biotechnology.

Course Contents:

Module I

Introduction and historical perspective - Discovery of the microbial world, controversy over spontaneous generation, role of microorganisms in transformation of organic matter and in the causation of diseases, development of pure culture methods. Methods in Microbiology -Principles of microbial nutrition, Culture media, Theory and practice of sterilization, pure culture techniques.

Module II

Prokaryotic structure and function - functional anatomy of bacteria: cell envelope, cell wall, cytoplasmic membrane, capsule, surface appendages, cytoplasm and cytoplasmic inclusions. Growth - The definition of growth, mathematical expression of growth, growth curve, measurement of growth, synchronous growth, continuous culture, culture collection and maintenance of cultures.

Module III

Systematics and taxonomy - new approaches to bacterial taxonomy, classification including ribotyping, ribosomal RNA sequencing, characteristics of primary domains, taxonomy, nomenclature and Bergey's manual.

Module IV

Metabolic Diversity among microorganisms - photosynthesis in microorganisms, role of bacteriochlorophylls, carotenoids and phycobilins, Chemolithotrophy, hydrogen-iron-nitrite-oxidizing bacteria, nitrate and sulphate reduction, methanogenesis and acetogenesis, Fermentations, nitrogen fixation, plant microbe interactions (mycorrhizae).

Module V: Archaea

Archaea as earliest life forms, thermophiles, psychrophiles, halophiles, alkalophiles, acidophiles, hyperthermophiles Viruses: Bacterial, animal; structure of viruses; Reproduction and life cycle of RNA and DNA viruses; Viroids and prions. Algae and Fungi: Classification and Reproduction.

Module VI

Host-parasite relationship - Normal micro flora of skin, oral cavity, gastrointestinal tract, Respiratory infections; entry of pathogens into the host, types of toxins (Exo, endo, entero) and their mode of actions, Microbial pathogenesis -Disease reservoirs; Epidemiological terminologies; Infectious disease transmission; Sexually transmitted disease including AIDS, Food and water- borne diseases; pathogenic fungi.

Module VII

Chemotherapy/antibiotics -Antimicrobial agents, sulfa drugs, antibiotics -penicillin and cephalosporins, broad spectrum antibiotics, antifungal antibiotics; mode of action.



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Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:**Text:**

- General Microbiology, R.Y. Stanier, J.L. Ingraham, M.L. Wheelis and P.R. Painter, Macmillan
- Microbiology VI Edition, M.J. Pelczar, E.C.S. Chan and N.R. Kreig, Tata McGraw Hill
- Microbiology by Prescott
- The microbes – An Introduction to their Nature and Importance, P.V. Vandenmark and B.L. Batzing, Benjamin Cummings.

References:

- The Microbial World, Roger Y. Stanier, Prentice Hall
- Microbiology, Tortora, Funke and Chase, Benjamin & Cummings
- Principles of Fermentation Technology, Salisbury, Whitaker and Hall, Aditya Books Pvt. Ltd.
- Industrial Microbiology, Casida, New Age International
- Industrial Microbiology, Prescott and Dunn, C.B.S. Publishers Principles of Microbiology, R.M. Atlas, WMC. Brown Publisher.



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ENZYMOMOLOGY AND ENZYME TECHNOLOGY

Course Code: BTE2403

Credit Units: 03

Course Objective:

The course aims to provide an understanding of the principles and application of proteins, secondary metabolites and enzyme biochemistry in therapeutic applications and clinical diagnosis. The theoretical understanding of biochemical systems would certainly help to interpret the results of laboratory experiments.

Course Contents:

Module I: Enzymes

Introduction and scope, Nomenclature, Mechanism of Catalysis.

Module II: Enzyme Kinetics

Single substrate steady state kinetics; Michaelis Menten equation, Linear plots, King-Altman's method; Inhibitors and activators; Multisubstrate systems; ping-pong mechanism, Alberty equation, Sigmoidal kinetics and Allosteric enzymes

Module III

Immobilization of Enzymes; Advantages, Carriers, adsorption, covalent coupling, cross-linking and entrapment methods, Micro-environmental effects.

Module IV: Enzyme reactors

Reactors for batch/continuous enzymatic processing, choice of reactor type; idealized enzyme reactor systems, Mass transfer in enzyme reactors: Steady state analysis of mass transfer and biochemical reaction in enzyme reaction.

Module V: Bioprocess Design

Physical parameters, reactor operational stability, Immobilized cells.

Module VI: Challenges and future trends

Enzyme catalysis in organic media; catalytic antibodies and non protein biomolecules as catalysts, biocatalysts from extreme thermophilic and hyper thermophilic Archae and Bacteria.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

Text:

- Biotechnological Innovations in Chemical Synthesis, R.C.B. Currell, V.D. Mieras, Biotol Partners Staff, Butterworth Heinemann.
- Enzyme Technology, M.F. Chaplin and C. Bucke, Cambridge University Press.
- Enzymes: A Practical Introduction to Structure, Mechanism and Data Analysis, R.A. Copeland, John Wiley and Sons Inc.

References:

- Enzymes Biochemistry, Biotechnology, Clinical Chemistry, Trevor Palner.
- Enzyme Kinetics: Behaviour and Analysis of Rapid Equilibrium and Steady State Enzyme Systems, J.H. Segel, Wiley-Interscience.
- Industrial Enzymes & their applications, H. Uhlig, John Wiley and Sons Inc.

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CHEMICAL ENGINEERING PRINCIPLES

Course Code: BTE2404

Credit Units: 02

Course Objective:

The knowledge gained through chemical reaction engineering and material and energy balances will help the students to understand the tools and techniques of biotechnology.

Course Contents:

Module I: Material and Energy Balances

Units and dimensions, Dimensional analysis; Simple problems on material balance calculations involving unit processes and reactive systems; Available electron balances.

Basic energy concepts -enthalpy changes in chemical/biochemical reactions and in non-reactive processes, Energy balance calculations, Use of Steam tables; Heat of reaction and energy balance for microbial processes.

Module II: Chemical reaction engineering

Kinetics of homogenous reactions: Concepts of reaction rate, order of reaction and molecularity, Analysis of batch reactors for kinetic interpretation of data and isothermal reactor design for single and multiple reactions, Design equations for CSTR and plug flow reactors.

Module III: Instrumentation and process control

Principles of measurement: error, accuracy and sensitivity; Measurement of flow, pressure, temperature, level, pH, viscosity and chemical composition.

Basic concepts of feedback control, control loop and its elements, Dynamic behaviour of first, second and higher order physical systems, controller hardware, choice of controllers and settings. Introduction to advanced control systems: feed forward, cascade and ratio control.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

Text:

- Basic Principles and Calculations in Chemical Engineering, D.M. Himmelblau, Prentice Hall
- Basic Principles of Chemical Engineering, E.I. Shaheen, Houghton Mifflin

References:

- Chemical Process Control, An introduction to Theory and Practice, G. Stephanopoulos, Prentice Hall Inc.
- Chemical Reaction Engineering, O. Levenspiel, John Wiley and Sons Inc.
- Elementary Principles of Chemical Processes, R.M. Felder and R.W. Rousseau, John Wiley and Sons Inc.
- Fundamentals of Chemical Reaction Engineering, C.D. Holland and R.G. Anthony, Prentice Hall Inc.
- Process Modelling, Simulation and Control for Chemical Engineers, W.L. Luyben, McGraw Hill


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METHODS AND INSTRUMENTATION IN BIOTECHNOLOGY

Course Code: BTE2405

Credit Units: 03

Course Objective:

The students will be exposed to techniques and instruments that are used in biotech industries.

Course Contents:

Module I: Electrophoresis

Gel electrophoresis, SDS-PAGE, isoelectric focusing, two-dimensional electrophoresis, immuno electrophoresis, capillary electrophoresis

Module II: Chromatography

Paper, TLC, gel filtration, ion-exchange chromatography, affinity chromatography, HPLC and GLC

Module III: Spectroscopy

UV and visible spectroscopy, Infrared and Atomic absorption spectroscopy, fluorescence spectroscopy, Mass Spectrometry, MALDITOF, Nuclear Magnetic Resonance and Electron Spin Resonance spectroscopy,

Module IV

X-ray diffraction and X-ray Crystallography

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

Text:

- Principles of Physical Biochemistry, K.E. Van Holde, Prentice Hall.
- Essentials of Biophysics, P. Narayanan, New Age International Publishers

References:

- Advanced Instrumentation, Data Interpretation, and Control of Biotechnological Processes, J.F. Van Impe, Kluwer Academic
- Crystal Structure Analysis, J.P. Glusker and K.N. Trueblood, Oxford University Press
- Crystallography made Crystal Clear, G. Rhodes, Academic Press
- Modern Spectroscopy, J.M. Hollas, John Wiley and Son Ltd.
- NMR Spectroscopy: Basic Principles, Concepts and Applications in Chemistry, H. Gunther, John Wi



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MICROBIOLOGY LAB

Course Code: BTE2406

Credit Units: 02

Course Contents:


1. Preparation of solid and liquid media.
2. Isolation and maintenance of organisms by plating, streaking and serial dilution.
3. Preparation of slant cultures.
4. Growth curve measurement of bacterial population by turbidometry.
5. Measurement of bacterial population by dilution method.
6. Effect of temperature, pH, carbon and nitrogen sources on growth of bacteria.
7. Microscopic examination of bacteria by gram staining.
8. Endospore staining.
9. Capsule staining.
10. Isolation and identification of Rhizobium from root nodules.

Examination Scheme:

IA			EE			
Class Test (Practical Based)	Mid Term Viva	Attendance	Major Experiment	Minor Experiment/Spotting	Practical Record	Viva
15	10	05	35	15	10	10



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ENZYMOLGY AND ENZYME TECHNOLOGY LAB

Course Code: BTE2408

Credit Units: 01

Course Objective:

The laboratory will help the students to isolate enzymes from different sources, enzyme assays and studying their kinetic parameters which have immense importance in industrial processes.

Course Contents:

Module I

Isolation of enzymes from plant and microbial sources.

Module II

Enzyme assay; activity and specific activity – determination of amylase, nitrate reductase, cellulase, protease.

Module III

Purification of Enzyme by ammonium sulphate fractionation.

Module IV

Enzyme Kinetics: Effect of varying substrate concentration on enzyme activity, determination of Michaelis-Menten constant (K_m) and Maximum Velocity (V_{max}) using Lineweaver-Burk plot.

Module V

Effect of Temperature and pH on enzyme activity.

Module VI

Enzyme immobilization

Examination Scheme:

IA			EE			
Class Test (Practical Based)	Mid Term Viva	Attendance	Major Experiment	Minor Experiment/Spotting	Practical Record	Viva
15	10	05	35	15	10	10

Text & References:

Text:

- *Practical Biochemistry, Sawhney and Singh*

References:

- Practical Biochemistry, Principles & Techniques, Keith Wilson and John Walker



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METHODS AND INSTRUMENTATION IN BIOTECHNOLOGY LAB

Course Code: BTE2409

Credit Units: 01

Course Contents:

Module I

Cell disruption techniques

Module II

Centrifugation – low speed and high speed.

Module III

Spectrophotometer techniques

Module IV

Chromatography –Paper Chromatography and Thin Layer Chromatography

Module V

Electrophoresis –SDS Page and Agarose gel electrophoresis.

Examination Scheme:

IA			EE			
Class Test (Practical Based)	Mid Term Viva	Attendance	Major Experiment	Minor Experiment/Spotting	Practical Record	Viva
15	10	05	35	15	10	10



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MARINE BIOTECHNOLOGY

Course Code: BTE2410

Credit Units: 02

Course Objective

The students will be exposed to basic concepts related to marine life. Also the subject deals with the scope and application of marine biota in biotechnology.

Course Contents

Module I

The marine ecosystem and its functioning: intertidal, estuarine, salt marsh, mangrove, coral reef, coastal & deep sea ecosystems. Marine viruses, Bacteria and their significance; Hydrothermal vents; Marine Biodiversity: defining, measurement and conservation strategies.

Module II

Nutrients cycling: carbon, nitrogen sulphur & phosphorus.

Global climate changes: impact on species diversity & productivity, oceans as a carbon sink, effects on corals bleaching. Biological rhythms.

Module III

Important Marine Products: Bioactive compounds from marine organisms, GFP, RFP characteristics and their applications; Green mussel adhesive protein, Chitosan and its applications

Module IV

Probiotic bacteria and their importance in aquaculture; Vaccines in aquaculture: Fish, shrimps & prawns; Marine food analysis-spoilage, quality control; Techniques for identification of bacterial & viral pathogens in aquaculture and Remedies.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

- Biodiversity (2004) Borua, P.K
- Text book of Marine Ecology (1989). Nair N.B. & Thamby, D.M.
- Drugs from sea. (2000). Fusetani, N.
- Microbiology of deep sea hydrothermal vents. (1995). Karl, D.M.
- The search from bioactive compounds from microorganisms. (1992). Omum, S.
- Recent Advances in Marine Biotechnology. Vol.2 (1998) Fingerman, M., Nagabushanam, R., Thompson, M.
- Recent Advances in Marine Biotechnology Volume 3 – Milton fingerman et al., 1999.
- Environmental Biotechnology – Gareth M.Evams et al., 2003
- Biotechnology, Recombinant DNA Technology, Environmental Biotechnology – S.Mahesh et al., 2003.


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VACCINE DEVELOPMENT

Course Code: BTE2411

Credit Units: 02

Course Objective

The students will be exposed to basic concepts related with development of vaccines.

Course Contents

Module I

History of Vaccine Development

Definition of Vaccine

Evolution of Vaccines

Module II

Process development for vaccines

Manufacturing of vaccines

Various aspects of vaccines, process development and manufacturing

Module III

Clinical development of vaccines

Clinical end-point: Evolution of vaccines

General specifications and pharmaceuticals release criteria for the existing vaccines

Cold chain management of vaccines

Current vaccine research

Examination Scheme:

Components	H/S	A	CT	EE
Weightage (%)	10	5	15	70

Text & Reference

- Vaccines, 4th Edition by Stanley A. Plotkin, Elsevier publication
- Vaccines and Immunotherapy by Stanley J. Cryz Elsevier science publishing co.
- Journal articles and reviews



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AGRICULTURAL BIOTECHNOLOGY

Course code: BTE2412

Credit Units: 02

Course Objective:

This course aims to facilitate the students to meet the following learning objectives.

By the end of this course the student should be able to:

- Describe the history of crop development over the centuries by natural processes, human selection and breeding
- Explain the role of mutagenesis-based plant breeding in green revolution, and the consequences of green revolution including its impacts on global health and environment
- Understand and clearly describe the science underlying molecular breeding and marker assisted selection
- Understand and clearly describe the science underlying genetic engineering and GM crops (with focus on *Agrobacterium*-mediated and particle-bombardment methods)
- Be able to enumerate biological risks (health and environmental) of GM crops, and explain the principles & methodologies of risk assessment
- Examine the causes and effects of the public's concerns about GM technology
- Be aware of the regulatory and legal system to test and monitor release and use of GM crops.

Course Contents:

Module-I: History of crop improvement, and pre-genetic engineering plant biotechnology:

Traditional breeding; Mutagenesis-based breeding; Role of tissue culture in crop improvement, Molecular breeding and marker assisted selection.

Module-II: Genetic engineering of plants: *Agrobacterium* mediated transformation; Particle bombardment mediated transformation; Limitations of conventional transgenics and solutions offered by gene targeting and gene editing technologies.

Module-III: GM crops and the society: Biological (Environmental and Health) risks of GM; Risk assessment; Concerns and fears about GM technology; Regulatory and Legal system to test and monitor GM crops

Examination Scheme:

Components	H/S	A	CT	EE
Weightage (%)	10	5	15	70

References

- Plant Biotechnology: The Genetic Manipulation of Plants. A. Slater, N. W. Scott and M. R. Fower.2008. Oxford University Press
- Plant Tissue Culture: Theory and Practice. S.S. Bhojwani and M.K.Razdan. Elsevier Health Science
- https://www.isaaa.org/resources/publications/agricultural_biotechnology/download/Agricultural_Biotechnology.pdf
- https://www.isaaa.org/kc/inforesources/publications/biotechninagriculture/Biotech_in_Agriculture.pdf
- <https://www.fao.org/3/i1905e/i1905e.pdf>

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NATURAL PRODUCTS AND MEDICINAL CHEMISTRY

Course Code: BTE2413

Credit Units: 02

Course Objective: The students will be exposed to basic concepts related with natural products and medicinal chemistry and its biological application.

Course Contents:

Natural Products

Module I

Introductory bio-organic chemistry: enzymatic transformations, co-factors, examples from carbohydrate chemistry.

Module II

Isoprenoids, Terpenes and Flavonoids: biosynthetic origins of the group, survey of classes, electron-deficient rearrangements, chemical synthesis, steroids; Alkaloids: shikimate pathway to aromatic amino acids, pyridoxyl phosphate mediated transformations in alkaloid biosynthesis

Medicinal Chemistry

Module III

Drug processing in mammals

The molecular basis of drug action

The multiphore conceptualization of drugs

Messenger and non-messenger target systems

Examination Scheme:

Components	H/S	A	CT	EE
Weightage (%)	10	5	15	70

Text & References:

- G.A. Poulton and C. Spino, "Natural Products Chemistry", available as a Chemistry 433 Course Pack in the Bookstore.
- J. Mann, "Chemical Aspects of Biosynthesis", Oxford Science, 1994, QP517 B57M36 and P.M. Dewick, "Medicinal Natural Products: a Biosynthetic Approach, 1997
- Introduction to Natural Products, 2004 by Albert T. Sneden
- Medicinal Chemistry by Graham Pat



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STEM CELL TECHNOLOGY

Course Code: BTE2414

Credit Units: 02

Course Objective: The objective of this paper is to familiarize the students with stem cell technology and its applications for betterment of the society. The course is designed to give a broad view of mammalian stem cells, reviewing where they are found in the body, the different types and how they are cultured. The topics will cover the basic biology of these stem cells as well as bioengineering and application of these stem cells to potential treatments of human diseases.

Course Contents:

Module I

Definition, properties, proliferation, culture of stem cells, medical applications of stem cells, ethical and legal issues in use of stem cells.

Module II

Stem Cell biology and therapy, types embryonic stem cell, Adult stem cell, Stem Cell Biology and Therapy, Embryonic Stem Cells, culture and the potential benefits of stem cell technology

Module III

Gene Therapy: Introduction, History and evolution of Gene therapy, optimal disease targets, Failures and successes with gene therapy and future prospects, Genetic Perspectives for Gene Therapy, **Gene Delivery** methods: Viral vectors and Non-viral Vectors

Module IV

Regulatory and Ethical Considerations of stem cell and Gene Therapy, Assessing Human Stem Cell Safety, Use of Genetically Modified Stem Cells in Experimental Gene Therapies.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

Text:

- Stem Cell Biology, Daniel Marshak, Richard L. Gardener and David Gottlieb, Cold Spring Harbour Laboratory Press
- Stem cell biology and gene therapy, Booth C., Cell Biology International, Academic Press
- Stem Cell and Gene-Based Therapy: Frontiers in Regenerative Medicine, *Alexander Battler, Jonathan Leo*, Springer,

References:

- Stem Cell Biology and Gene Therapy. Quesenberry PJ, Stein GS, eds. (£65.00.) Wiley, 1998.
- Progress in gene therapy, Volume 2, Pioneering stem cell/gene therapy trials, Roger Bertolotti, Keiya Ozawa and H. Kirk Hammond, VSP international science publishers
- Stem Cells Handbook: Stewart Sell, Humana Press; Totowa NJ, USA; Oct. 2003,
- Understanding Biotechnology by Aluizio Borém, Fabrício R. Santos, David E. Bowen, Prentice Hall

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TERM PAPER

Course Code: BTE2431

Credit Units: 02

METHODOLOGY

A term (or research) paper is primarily a record of intelligent reading in several sources on a particular subject.

The students will choose the topic at the beginning of the session in consultation with the faculty assigned. The progress of the paper will be monitored regularly by the faculty. At the end of the semester the detailed paper on the topic will be submitted to the faculty assigned. The evaluation will be done by Board of examiners comprising of the faculties.

GUIDELINES FOR TERM PAPER

The procedure for writing a term paper may consists of the following steps:

- Choosing a subject
- Finding sources of materials
- Collecting the notes
- Outlining the paper
- Writing the first draft
- Editing & preparing the final paper

1. Choosing a Subject

The subject chosen should not be too general.

2. Finding Sources of materials

- d) The material sources should be not more than 10 years old unless the nature of the paper is such that it involves examining older writings from a historical point of view.
- e) Begin by making a list of subject-headings under which you might expect the subject to be listed.
- f) The sources could be books and magazines articles, news stories, periodicals, scientific journals etc.

3. Collecting the notes

Skim through sources, locating the useful material, then make good notes of it, including quotes and information for footnotes.

- d) Get facts, not just opinions. Compare the facts with author's conclusion.
- e) In research studies, notice the methods and procedures, results & conclusions.
- f) Check cross references.

4. Outlining the paper

- c) Review notes to find main sub-divisions of the subject.
- d) Sort the collected material again under each main division to find sub-sections for outline so that it begins to look more coherent and takes on a definite structure. If it does not, try going back and sorting again for main divisions, to see if another general pattern is possible.

5. Writing the first draft

Write the paper around the outline, being sure that you indicate in the first part of the paper what its purpose is. You may follow the following:

- a) statement of purpose
- b) main body of the paper
- c) statement of summary and conclusion

Avoid short, bumpy sentences and long straggling sentences with more than one main ideas.

6. Editing & Preparing the final Paper

- g) Before writing a term paper, you should ensure you have a question which you attempt to answer in your paper. This question should be kept in mind throughout the paper. Include only information/

details/ analyses of relevance to the question at hand. Sometimes, the relevance of a particular section may be clear to you but not to your readers. To avoid this, ensure you briefly explain the relevance of every section.

- h) Read the paper to ensure that the language is not awkward, and that it "flows" properly.
- i) Check for proper spelling, phrasing and sentence construction.
- j) Check for proper form on footnotes, quotes, and punctuation.
- k) Check to see that quotations serve one of the following purposes:
 - (iv) Show evidence of what an author has said.
 - (v) Avoid misrepresentation through restatement.
 - (vi) Save unnecessary writing when ideas have been well expressed by the original author.
- l) Check for proper form on tables and graphs. Be certain that any table or graph is self-explanatory.

Term papers should be composed of the following sections:

- Title page
- Table of contents
- Introduction
- Review
- Discussion & Conclusion
- References
- Appendix

Generally, the introduction, discussion, conclusion and bibliography part should account for a third of the paper and the review part should be two thirds of the paper.

Discussion

The discussion section either follows the results or may alternatively be integrated in the results section. The section should consist of a discussion of the results of the study focusing on the question posed in the research paper.

Conclusion

The conclusion is often thought of as the easiest part of the paper but should by no means be disregarded. There are a number of key components which should not be omitted. These include:

- e) summary of question posed
- f) summary of findings
- g) summary of main limitations of the study at hand
- h) details of possibilities for related future research

References

From the very beginning of a research project, you should be careful to note all details of articles gathered.

The bibliography should contain ALL references included in the paper. References not included in the text in any form should NOT be included in the bibliography.

The key to a good bibliography is consistency. Choose a particular convention and stick to this.

Bibliographical conventions

Monographs

Crystal, D. (2001), Language and the internet. Cambridge: Cambridge University Press.

Edited Volumes

Gass, S./Neu, J. (eds.) (1996), Speech acts across cultures. Challenges to communication in a second language. Berlin/ NY: Mouton de Gruyter.

[(eds.) is used when there is more than one editor; and (ed.) where there is only one editor. In German the abbreviation used is (Hrsg.) for Herausgeber].

Edited Articles

Schmidt, R./Shimura, A./Wang, Z./Jeong, H. (1996), Suggestions to buy: Television commercials from the U.S., Japan, China, and Korea. In: Gass, S./Neu, J. (eds.) (1996), Speech acts across cultures. Challenges to communication in a second language. Berlin/ NY: Mouton de Gruyter: 285-316.

Journal Articles

McQuarrie, E.F./Mick, D.G. (1992), On resonance: A critical pluralistic inquiry into advertising rhetoric. Journal of consumer research 19, 180-197.

Electronic Book

Chandler, D. (1994), Semiotics for beginners [HTML document]. Retrieved [5.10.'01] from the World Wide Web, <http://www.aber.ac.uk/media/Documents/S4B/>.

Electronic Journal Articles

Watts, S. (2000) Teaching talk: Should students learn 'real German'? [HTML document]. German as a Foreign Language Journal [online] 1. Retrieved [12.09.'00] from the World Wide Web, <http://www.gfl-journal.com/>.

Other Websites

Verterhus, S.A. (n.y.), Anglicisms in German car advertising. The problem of gender assignment [HTML document]. Retrieved [13.10.'01] from the World Wide Web, <http://olaf.hiof.no/~sverrev/eng.html>.

Unpublished Papers

Takahashi, S./DuFon, M.A. (1989), Cross-linguistic influence in indirectness: The case of English directives performed by native Japanese speakers. Unpublished paper, Department of English as a Second Language, University of Hawai'i at Manoa, Honolulu.

Unpublished Theses/ Dissertations

Möhl, S. (1996), Alltagssituationen im interkulturellen Vergleich: Realisierung von Kritik und Ablehnung im Deutschen und Englischen. Unpublished MA thesis, University of Hamburg.

Walsh, R. (1995), Language development and the year abroad: A study of oral grammatical accuracy amongst adult learners of German as a foreign language. Unpublished PhD dissertation, University College Dublin.

Appendix

The appendix should be used for data collected (e.g. questionnaires, transcripts,...) and for tables and graphs not included in the main text due to their subsidiary nature or to space constraints in the main text.

Assessment Scheme:

Continuous Evaluation:

40%

(Based on abstract writing, interim draft, general approach, research orientation, readings undertaken etc.)

Final Evaluation:

60%

(Based on the organization of the paper, objectives/ problem profile/ issue outlining, comprehensiveness of the research, flow of the idea/ ideas, relevance of material used/ presented, outcomes vs. objectives, presentation/ viva etc.)


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PROJECT

Course Code: BTE2432

Credit Units: 02

Objectives:

The aim of the project is to provide the students with an opportunity to further their intellectual and personal development in the chosen field by undertaking a significant practical unit of activity. The project can be defined as a scholarly inquiry into a problem or issues, involving a systematic approach to gathering and analysis of information / data, leading to production of a structured report.

Chapter Scheme and distribution of marks:

Chapter 1: Introduction – 10 marks

Chapter 2: Conceptual Framework/ National/International Scenario – 25 marks

Chapter 3: Presentation, Analysis & Findings -- 25 marks

Chapter 4: Conclusion & Recommendations -- 10 marks

Chapter 5: Bibliography -- 05 marks

Project Report	Power Point Presentation & Viva
75 marks	25 marks

Components of a Project Report

The outcome of Project Work is the Project Report. A project report should have the following components:

1) Cover Page: This should contain the title of the project proposal, to whom it is submitted, for which degree, the name of the author, name of the supervisor, year of submission of the project work, name of the University.

2) Acknowledgement: Various organizations and individuals who might have provided assistance /co-operation during the process of carrying out the study.

3) Table of Content: Page-wise listing of the main contents in the report, i.e., different Chapters and its main Sections along with their page numbers.

4) Body of the Report: The body of the report should have these four logical divisions

a) **Introduction:** This will cover the background, rationale/ need / justification, brief review of literature, objectives, methodology (the area of the study, sample, type of study, tools for data collection, and method of analysis), Limitations of the Study, and Chapter Planning.

b) **Conceptual Framework / National and International Scenario:** (relating to the topic of the Project).

c) **Presentation of Data, Analysis and Findings:** (using the tools and techniques mentioned in the methodology).

d) **Conclusion and Recommendations:** In this section, the concluding observations based on the main findings and suggestions are to be provided.

5) Bibliography or References: This section will include the list of books and articles which have been used in the project work, and in writing a project report.

6) Annexures: Questionnaires (if any), relevant reports, etc.

(The main text of the Project should normally be in the range of 5000 words. However, there may be annexure in addition to the main text)

The Steps of a Project Report

Step I: Selection of the topic for the project by taking following points into consideration:

- Suitability of the topic.
- Relevance of the topic
- Time available at the disposal.
- Feasibility of data collection within the given time limit.
- Challenges involved in the data collection (time & cost involved in the data collection, possibility of getting responses, etc.)

Step II : Finalisation of the Topic and preparation of Project Proposal in consultation with the Supervisor.

Step III : Collection of information and data relating to the topic and analysis of the same.

Step IV : Writing the report dividing it into suitable chapters, viz.,

Chapter 1: Introduction,

Chapter 2: Conceptual Framework / National & International Scenario,

Chapter 3: Analysis & Findings

Chapter 4: Conclusion and Recommendations.

Step V : The following documents are to be attached with the Final Project Report.

1) Approval letter from the supervisor (Annexure-IA)

2) Student's declaration (Annexure-IB)

3) Certificate from the Competent Authority of the Organisation / Institution, if the student undertakes the Project Work in any Organisation / Institution.

Guidelines for Evaluation:

- Each of the students has to undertake a Project individually under the supervision of a teacher and to submit the same following the guidelines stated below.
- Language of Project Report and Viva-Voce Examination may be English. The Project Report must be typed and hard bound.
- Failure to submit the Project Report or failure to appear at the Viva-voce Examination will be treated as "Absent" in the Examination. He /she has to submit the Project Report and appear at the Viva-Voce Examination in the subsequent years (within the time period as per University Rules).
- No marks will be allotted on the Project Report unless a candidate appears at the Viva-Voce Examination. Similarly, no marks will be allotted on Viva-Voce Examination unless a candidate submits his/her Project Report.
- Evaluation of the Project Work to be done jointly by one internal expert and one external expert with equal weightage, i.e., average marks of the internal and external experts will be allotted to the candidate.



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WORKSHOP / CERTIFICATION

Course Code: BTE2433

Credit Units: 02

Objectives

A workshop is primarily an activity based academic event that is organized to provide the students a one to one and hands on experience on any aspect of their learning. The communication in a workshop has to be necessarily two way. The trainer has to make sure that the aspect covered are practically practiced by the participants. The student will choose the option of workshop from amongst their concentration electives. The evaluation will be done by Board of examiners comprising of the faculties.

Major Themes for Workshop

The workshop may be conducted on any of the following major themes:

Accounting

Finance

Human Resources

Marketing

Economics

Operations

Supply Chain Management

These themes are merely indicative and other recent and relevant topics of study may be included.

Guidelines for Workshop

The procedure for earning credits from workshop consists of the following steps:

Relevant study material and references will be provided by the trainer in advance.

The participants are expected to explore the topic in advance and take active part in the discussions held

Attending and Participating in all activities of the workshop

Group Activities have to be undertaken by students as guided by the trainer.

Evaluation of workshop activities would be done through test and quiz at the end of the workshop.

Submitting a write up of at least 500 words about the learning outcome from the workshop.

Methodology

The methodology followed at the workshop could be based on any one or more of the following methods:

Case Study

Business Game

Simulation

Group Activity


Role Play

Business Planning

Quiz

Evaluation Scheme:

Attendance	Active Participation	Multiple Choice Questions/ Quiz	Solving the case/ Assignment/ Write up	Total
10	30	30	30	100


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MOLECULAR BIOLOGY

Course Code: BTE2501

Credit Units: 03

Course Objective:

The aim is to extend understanding of the molecular mechanisms via which genetic information is stored, expressed and transmitted among generations.

Course Contents:

Module I: DNA Replication and repair

Mechanism of Prokaryotic and Eukaryotic DNA replication, Enzymes and accessory proteins involved in DNA replication, DNA repair Mechanism.

Module II: Transcription

Prokaryotic transcription, Eukaryotic transcription, RNA polymerase, General and specific transcription factors, Regulatory elements.

Module III: Modifications in RNA

5'-cap formation, transcription termination, 3'-end processing and polyadenylation, Splicing, Editing, Nuclear export of mRNA and mRNA stability.

Module IV: Translation

Prokaryotic and Eukaryotic translation, the translation Machinery; Mechanisms of initiation, elongation and termination, regulation of translation, co- and post-translational modifications of proteins.

Module V: Regulation of Gene Expression in prokaryotic and eukaryotic systems

Lac operon, Ara operon, regulation in Eukaryotes

Module VI: Antisense and Ribozyme technology

Molecular mechanism of antisense molecules, inhibition of splicing, polyadenylation and translation, disruption of RNA structure and capping, Biochemistry of Ribozyme; Hammerhead, hairpin and other ribozymes, strategies for designing ribozymes, applications of antisense and ribozyme technologies.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

Text:

- Concepts of Genetics, W.S. Klug, and M.R. Cummings 2004, Pearson Education
- Genome, T.A. Brown, John Wiley & Sons Inc.
- Molecular Biology of the Cell. B. Alberts, D. Bray, J. Lewis, M. Raff, K. Roberts and J.D. Watson, Garland Publishing
- Gene VIII, Benjamin Lewin 2005, Oxford University Press


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References:

- Molecular Cell Biology, H. Lodish, A. Berk, S. Zipursky, P. Matsundaira, D. Baltimore and J. E. Barnell, W.H. Freeman and Company.
- Molecular Cloning: A Laboratory Manual (3-Volume set), J. Sambrook, E.F. Fritsch and T. Maniatis, Cold Spring Harbor Laboratory Press.
- Molecular Biology of the Gene, J.D. Watson, A.M. Weiner and N.H. Hopkins, Addison-Wesley Publishing.



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BIOINFORMATICS

Course Code: BTE2504

Credit Units: 03

Course Objective:

The course involves a basic understanding of computer and bioinformatics tools and skills in the field of biology.

Course Contents:

Module I: Introduction and overview

The NCBI data model; sequence databases, sequence retrieval, sequence file formats, submitting DNA and protein sequences; classification of biological databases

Module II: Biological Databases

Sequence databases (EMBL, GenBank, DDBJ, -UNIPROT, PIR, TrEMBL), Protein family/domain databases (PROSITE, PRINTS, Pfam, BLOCK, etc), Cluster databases-An Introduction, Specialised databases (KEGG, etc), Database technologies (Flat-file), Structural databases (PDB)

Module III: Sequence alignment

Global and local alignments, statistical significance of alignments, scoring matrices and gap penalties, position specific scoring matrices, programs and methods for Pairwise and multiple alignment, pattern searching programs, family and superfamily representation - Pfam, hidden Markov models

Module IV: Phylogenetic prediction

Phylogenetic analysis, Evolutionary Models, Character and distance based Tree building methods; tree evaluation, phylogenetic analysis, parsimony, maximum likelihood trees; Trees-splits and metrics on trees, tree interpretation, Distance – additive, ultrametric and nonadditive distances.

Module V: Predictive methods using DNA and protein sequences

ESTs: construction, databases, clustering, gene discovery and identification, and functional classification. Protein identification tools, physical properties, motifs and patterns, structure, folding classes, structure classification databases – Scop and Cath;

Module VI: Structure databases

Structural databases - PDB and MMDB, structure file formats, Secondary and tertiary structure prediction methods in proteins, Internal and external co-ordinate system, software to visualize secondary and tertiary structural information in protein.

Module VII: Comparative genome analysis

Reconstruction of metabolic pathways; Genome analysis, genome anatomy, genome rearrangements with inversions, signed inversions, gene identification, gene expression, expression analysis, gene identification and functional classification.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

Text:

- Computer Science, J.G. Brookshear, Pearson, Addison Wesley
- Introduction to Bioinformation – T.Attawood
- Essentials of Genomics and Bioinformatics, C.W. Sensen, John Wiley and Sons
- Bioinformatics: Sequence and Genome Analysis, D.W. Mount, Cold Spring Harbor Laboratory Press

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References:

- Algorithms on Strings, Trees, and Sequences: Computer Science and Computational Biology, D. Gusfield, Cambridge University Press
- Bioinformatics: A Practical Guide to the Analysis of Genes and Proteins, A.D. Baxevanis and B.F.F. Quelling, Wiley – interscience.
- Bioinformatics: Sequence and Genome Analysis, D.W. Mount, Cold Spring Harbor Laboratory Press.
- Sequence Analysis in Molecular Biology: Treasure Trove or Trivial Pursuit, G. Von Heijne and G. Von Heijne, Academic Press.
- Structural Bioinformatics, Philip E. Bourne, Helge Weissig 2003
- Statistical Methods in Bioinformatics: An Introduction, G.R. Grant, W.J. Ewens, Springer Verlag



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MOLECULAR BIOLOGY LAB

Course Code: BTE2505

Credit Units: 01

Course Contents:

Module I

Preparation of DNA: genomic, Plasmid

Module II

Isolation of RNA

Module III

RFLP analysis

Module IV

Gel filtration

Module V

Preparation of Competent Cells

Module VI

Restriction Digestion and Ligation of DNA

Examination Scheme:

IA			EE			
Class Test (Practical Based)	Mid Term Viva	Attendance	Major Experiment	Minor Experiment/Spotting	Practical Record	Viva
15	10	05	35	15	10	10



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ANIMAL BIOTECHNOLOGY LAB

Course Code: BTE2506

CreditUnits: 02

Course Contents:

1. Preparation, standardization and sterilization of culture media
2. Inoculation of specific tissues for callusing
3. Inoculation and maintenance of cell lines
4. Study of toxicity on cell lines

Examination Scheme:

IA			EE			
Class Test (Practical Based)	Mid Term Viva	Attendance	Major Experiment	Minor Experiment/Spotting	Practical Record	Viva
15	10	05	35	15	10	10



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PLANT BIOTECHNOLOGY LAB

Course Code: BTE2507

Credit Units: 02

Course Contents:

Module I

Sterilization of glasswares and equipments.
Preparation of cotton plugs and culture media
Preparation of stocks for culture media
Preparation of culture media

Module II

Preparation and sterilization of different explants
Inoculation of explants on culture media

Module III

Study of viability of seeds
Embryo culture

Examination Scheme:

IA			EE			
Class Test (Practical Based)	Mid Term Viva	Attendance	Major Experiment	Minor Experiment/Spotting	Practical Record	Viva
15	10	05	35	15	10	10



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BIOINFORMATICS LAB

Course Code: BTE2508

Credit Units: 01

List of Experiments/Exercises

1. Basics of sequence analysis Retrieving a sequence-nucleic acid/Protein
2. Local and Global Alignment- concepts Pair wise sequence alignment
3. Multiple sequence alignment
4. DOT Matrix Analysis
5. Analysis Using Scoring Matrices
6. Dynamic Programming – Smith Watermann Algorithm Needleman Wunsch Algorithm
7. Protein identification, physical properties, motifs and patterns, structure, folding classes, structure classification
8. ESTs – databases, clustering, gene discovery and identification, and functional classification.
9. Molecular Structure drawing tool, Molecular modeling/Docking.

Examination Scheme:

IA			EE			
Class Test (Practical Based)	Mid Term Viva	Attendance	Major Experiment	Minor Experiment/Spotting	Practical Record	Viva
15	10	05	35	15	10	10

Note: Minor variation could be there depending on the examiner.



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SUMMER INTERNSHIP EVALUATION-I

Course Code: BTE2535

Credit Units: 03

GUIDELINES FOR PROJECT FILE

Research experience is as close to a professional problem-solving activity as anything in the curriculum. It provides exposure to research methodology and an opportunity to work closely with a faculty guide. It usually requires the use of advanced concepts, a variety of experimental techniques, and state-of-the-art instrumentation.

Research is genuine exploration of the unknown that leads to new knowledge which often warrants publication. But whether or not the results of a research project are publishable, the project should be communicated in the form of a research report written by the student.

Sufficient time should be allowed for satisfactory completion of reports, taking into account that initial drafts should be critiqued by the faculty guide and corrected by the student at each stage.

The File is the principal means by which the work carried out will be assessed and therefore great care should be taken in its preparation.

Methodology

The students will be sent to various industries and institutes where they will undergo short term training. After the completion of the training the students will be required to submit project report which shall then be evaluated by two internal examiners. The students will then have to appear for a Viva Voce examination to be conducted by an external evaluator at the end of the semester.

In general, the File should be comprehensive and include

- A short account of the activities that were undertaken as part of the project;
- A statement about the extent to which the project has achieved its stated goals.
- A statement about the outcomes of the evaluation and dissemination processes engaged in as part of the project;
- Any activities planned but not yet completed as part of the project, or as a future initiative directly resulting from the project;
- Any problems that have arisen that may be useful to document for future reference.

Report Layout

The report should contain the following components:

➤ Title or Cover Page

The title page should contain the following information: Project Title; Student's Name; Course; Year; Supervisor's Name.

➤ Acknowledgements (optional)

Acknowledgment to any advisory or financial assistance received in the course of work may be given.

➤ Abstract

A good "Abstract" should be straight to the point; not too descriptive but fully informative. First paragraph should state what was accomplished with regard to the objectives. The abstract does not have to be an entire summary of the project, but rather a concise summary of the scope and results of the project

➤ Table of Contents

Titles and subtitles are to correspond exactly with those in the text.

➤ Introduction

Here a brief introduction to the problem that is central to the project and an outline of the structure of the report should be provided. The introduction should aim to catch the imagination of the reader, so excessive details should be avoided.

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➤ **Materials and Methods**

This section should aim at experimental designs, materials used. Methodology should be mentioned in details including modifications if any.

➤ **Results and Discussion**

Present results, discuss and compare these with those from other workers, etc. In writing these section, emphasis should be given on what has been performed and achieved in the course of the work, rather than discuss in detail what is readily available in text books. Avoid abrupt changes in contents from section to section and maintain a lucid flow throughout the thesis. An opening and closing paragraph in every chapter could be included to aid in smooth flow.

Note that in writing the various sections, all figures and tables should as far as possible be next to the associated text, in the same orientation as the main text, numbered, and given appropriate titles or captions. All major equations should also be numbered and unless it is really necessary never write in "point" form.

➤ **Conclusion**

A conclusion should be the final section in which the outcome of the work is mentioned briefly.

➤ **Future prospects**

➤ **Appendices**

The Appendix contains material which is of interest to the reader but not an integral part of the thesis and any problem that have arisen that may be useful to document for future reference.

➤ **References / Bibliography**

This should include papers and books referred to in the body of the report. These should be ordered alphabetically on the author's surname. The titles of journals preferably should not be abbreviated; if they are, abbreviations must comply with an internationally recognised system.

Examples

For research article

Voravuthikunchai SP, Lortheeranuwat A, Ninrprom T, Popaya W, Pongpaichit S, Supawita T. (2002) Antibacterial activity of Thai medicinal plants against enterohaemorrhagic *Escherichia coli* O157: H7. *Clin Microbiol Infec*, **8** (suppl 1): 116–117.

For book

Kowalski, M. (1976) Transduction of effectiveness in *Rhizobium meliloti*. SYMBIOTIC NITROGEN FIXATION PLANTS (editor P.S. Nutman IBP), **7**: 63-67

ASSESSMENT OF THE PROJECT FILE

Essentially, marking will be based on the following criteria: the quality of the report, the technical merit of the project and the project execution.

Technical merit attempts to assess the quality and depth of the intellectual efforts put into the project.

Project execution is concerned with assessing how much work has been put in.

The File should fulfill the following *assessment objectives*:

Range of Research Methods used to obtain information

Execution of Research

Data Analysis

Analyse Quantitative/ Qualitative information

Control Quality

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Draw Conclusions

Examination Scheme:

Project Report	50
Viva Voce	50
Total	100



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BIOFUEL AND GREEN TECHNOLOGY

Course Code: BTE2509

Credit Units: 02

Course Objective:

This course will acquaint the students with bioenergy resources, their properties, preparation, processing along with the details of equipments utilized for the purpose.

Course Contents:

Module I: Biomass Sources, Characteristics & Preparation: Biomass Sources and Classification

Chemical composition and properties of different biomass materials and bio-fuels – Sugar cane molasses for fermentation ethanol; Sources and processing of oils and fats for liquid fuels- Energy plantations - Preparation of woody biomass; Drying, Storage and Handling of Biomass.

Module II: Biogas Technology

Feedstock for biogas production, biodegradable organic matter, Operating parameters for biogas production, Dry and wet fermentation

Module III: Bio-Ethanol and Bio-Diesel Technology

Production of Fuel Ethanol by Fermentation of Sugars. Trans-esterification of Oils to Produce Bio-Diesel.

•

Module IV: Pyrolysis and Gasification of Biomass

Thermo-chemical conversion of ligno-cellulose biomass - Pyrolysis of biomass, Thermo-chemical gasification principles

Module V: Combustion of Biomass and Cogeneration Systems

Combustion of Woody Biomass, Cogeneration in Biomass Processing Industries. Use of biogases for cogeneration.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

Text:

- Biotechnology and Alternative Technologies for Utilization of Biomass or Agricultural Wastes, A. Chakravarthy, Oxford & IBH publishing Co., New Delhi, 1989.

References:

- Biogas Systems: Principles and Applications, K.M. Mital, New Age International Publishers (p) Ltd., 1996.
- Biomass Energy Systems, P. Venkata Ramana and S.N. Srinivas, Tata Energy Research Institute, New Delhi, 1996.
- Fuels from Biomass and Wastes, D.L. Klass and G.M. Emert, Ann Arbor Science publ. Inc. Michigan, 1985.
- Bio-gas Technology, Khandelwal K.C. and Mahdi, Tata McGraw-Hill pub. Co. Ltd., New Delhi
- Advances in bio-gas Technology, O.P. Chawla, I.C.A.R., New Delhi. 1970.

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STEM CELLS AND TISSUE ENGINEERING

Course Code: BTE2510

Credit Units: 02

Course Objective:

The course is designed to give a broad view of mammalian stem cells, reviewing where they are found in the body, different types and how they are cultured. The topics will cover the basic biology of these stem cells as well as bioengineering and application of these stem cells to potential treatments of human diseases.

Course Contents:

Module I

Stem Cell biology; types; embryonic stem cell, Adult stem cell and potential benefits of stem cell technology, Bone marrow transplants, Immunotherapy, Autoimmune Diseases and Promise of Stem Cell-Based Therapies, Stem Cells and Diabetes, Stem Cells and heart Repair

Module II

Gene Therapy: Introduction, History and evolution of Gene therapy, optimal disease targets, Failures and successes of gene therapy and future prospects; Gene Therapy and Immune System: Genetic Immunization, Innate and Acquired Immune Response to Gene Therapy

Module III

Gene Delivery methods; Viral vectors: Adenoviral, Adeno-associated virus (AAV), Retroviral, Lentiviral, Herpes Virus; Non-viral Vectors and Physical Methods & Combinatorial methods. Genetic perspectives for Gene Therapy, Gene Therapy for Cancer and Vascular Disorders, Nervous System.

Module IV

Regulatory and Ethical Considerations of Cell and Gene Therapy, Assessing Human Stem Cell Safety, Use of Genetically Modified Stem Cells in Experimental Gene Therapies.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

Text:

- Stem cell biology and gene therapy, Booth C., Cell Biology International, Academic Press
- Stem Cell and Gene-Based Therapy: Frontiers in Regenerative Medicine, Alexander Battler, Jonathan Leo, Springer,

References:

- Stem Cell Biology and Gene Therapy. Quesenberry PJ, Stein GS, eds. (£65.00.) Wiley, 1998.
- Progress in gene therapy, Volume 2, Pioneering stem cell/gene therapy trials, Roger Bertolotti, Keiya Ozawa and H. Kirk Hammond, VSP international science publishers
- Stem Cells Handbook: Stewart Sell, Humana Press; Totowa NJ, USA; Oct. 2003,
- Understanding Biotechnology by Aluizio Borém, Fabrício R. Santos, David E. Bowen, Prentice Hall
- Cell Therapy: Stem Cell Transplantation, Gene Therapy, and Cellular Immunotherapy (Cancer: Clinical Science in Practice) George Morstyn, William Sheridan, Cambridge University Press,

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JAVA-I

Course Code: BTE2511

Credit Units: 02

Course Objective:

The objective is to introduce students to a modern programming language and help them gain sufficient fluency to undertake research projects with a programming component; to lay the foundations for more advanced study of object-oriented languages

Emphasis is on to understand the basic concepts of programming; to learn the syntax and semantics of Java; to be able to use a program development environment

Course Contents:

Module I

Introduction to Java - Features, Inheritance, Strings, Packages, Interfaces; Multi- Threading, Applet Programming: AWT- Components, Menus, Layout manager, etc., Event Handling,, Java Packages - java.util, -java.io; exception handling,

Module II

Collection API - Arrays, Collection Interfaces, Concrete Collections, The Collections Framework, Legacy Collections

Module III

Swing

Module IV

- JDBC
- Introduction to Client Server Application
- Java Drivers
- java.sql Package
- Installing and setting up JDBC
- Basic JDBC Programming concepts
- Populating a database
- Executing Queries
- Scrollable and Updateable Result Sets

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

- Complete reference by Herbert Schildt TataMcGraw Hill
- Programming with java A Primer by Balagurusamy Publisher: TataMcGraw Hill
- Core Java 2 – Volume I – Fundamentals by Cay S. Horstmann and Gary Cornell published by Sun Microsystems Press, A Prentice Hall Title
- Thinking in Java – by Bruce Eckel published by Prentice Hall Computer Books


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TERM PAPER

Course Code: BTE2531

Credit Units: 02

METHODOLOGY

A term (or research) paper is primarily a record of intelligent reading in several sources on a particular subject.

The students will choose the topic at the beginning of the session in consultation with the faculty assigned. The progress of the paper will be monitored regularly by the faculty. At the end of the semester the detailed paper on the topic will be submitted to the faculty assigned. The evaluation will be done by Board of examiners comprising of the faculties.

GUIDELINES FOR TERM PAPER

The procedure for writing a term paper may consists of the following steps:

- Choosing a subject
- Finding sources of materials
- Collecting the notes
- Outlining the paper
- Writing the first draft
- Editing & preparing the final paper

1. Choosing a Subject

The subject chosen should not be too general.

2. Finding Sources of materials

- g) The material sources should be not more than 10 years old unless the nature of the paper is such that it involves examining older writings from a historical point of view.
- h) Begin by making a list of subject-headings under which you might expect the subject to be listed.
- i) The sources could be books and magazines articles, news stories, periodicals, scientific journals etc.

3. Collecting the notes

Skim through sources, locating the useful material, then make good notes of it, including quotes and information for footnotes.

- g) Get facts, not just opinions. Compare the facts with author's conclusion.
- h) In research studies, notice the methods and procedures, results & conclusions.
- i) Check cross references.

4. Outlining the paper

- e) Review notes to find main sub-divisions of the subject.
- f) Sort the collected material again under each main division to find sub-sections for outline so that it begins to look more coherent and takes on a definite structure. If it does not, try going back and sorting again for main divisions, to see if another general pattern is possible.

5. Writing the first draft

Write the paper around the outline, being sure that you indicate in the first part of the paper what its purpose is. You may follow the following:

- a) statement of purpose
- b) main body of the paper
- c) statement of summary and conclusion

Avoid short, bumpy sentences and long straggling sentences with more than one main ideas.

6. Editing & Preparing the final Paper

- m) Before writing a term paper, you should ensure you have a question which you attempt to answer in your paper. This question should be kept in mind throughout the paper. Include only information details/ analyses of relevance to the question at hand. Sometimes, the relevance of a particular section

may be clear to you but not to your readers. To avoid this, ensure you briefly explain the relevance of every section.

- n) Read the paper to ensure that the language is not awkward, and that it "flows" properly.
- o) Check for proper spelling, phrasing and sentence construction.
- p) Check for proper form on footnotes, quotes, and punctuation.
- q) Check to see that quotations serve one of the following purposes:
 - (vii) Show evidence of what an author has said.
 - (viii) Avoid misrepresentation through restatement.
 - (ix) Save unnecessary writing when ideas have been well expressed by the original author.
- r) Check for proper form on tables and graphs. Be certain that any table or graph is self-explanatory.

Term papers should be composed of the following sections:

- Title page
- Table of contents
- Introduction
- Review
- Discussion & Conclusion
- References
- Appendix

Generally, the introduction, discussion, conclusion and bibliography part should account for a third of the paper and the review part should be two thirds of the paper.

Discussion

The discussion section either follows the results or may alternatively be integrated in the results section. The section should consist of a discussion of the results of the study focusing on the question posed in the research paper.

Conclusion

The conclusion is often thought of as the easiest part of the paper but should by no means be disregarded. There are a number of key components which should not be omitted. These include:

- i) summary of question posed
- j) summary of findings
- k) summary of main limitations of the study at hand
- l) details of possibilities for related future research

References

From the very beginning of a research project, you should be careful to note all details of articles gathered.

The bibliography should contain ALL references included in the paper. References not included in the text in any form should NOT be included in the bibliography.

The key to a good bibliography is consistency. Choose a particular convention and stick to this.

Bibliographical conventions

Monographs

Crystal, D. (2001), Language and the internet. Cambridge: Cambridge University Press.

Edited Volumes

Gass, S./Neu, J. (eds.) (1996), Speech acts across cultures. Challenges to communication in a second language. Berlin/ NY: Mouton de Gruyter.

[(eds.) is used when there is more than one editor; and (ed.) where there is only one editor. In German the abbreviation used is (Hrsg.) for Herausgeber].

Edited Articles

Schmidt, R./Shimura, A./Wang, Z./Jeong, H. (1996), Suggestions to buy: Television commercials from the U.S., Japan, China, and Korea. In: Gass, S./Neu, J. (eds.) (1996), Speech acts across cultures. Challenges to communication in a second language. Berlin/ NY: Mouton de Gruyter: 285-316.

Journal Articles

McQuarrie, E.F./Mick, D.G. (1992), On resonance: A critical pluralistic inquiry into advertising rhetoric. Journal of consumer research 19, 180-197.

Electronic Book

Chandler, D. (1994), Semiotics for beginners [HTML document]. Retrieved [5.10.'01] from the World Wide Web, <http://www.aber.ac.uk/media/Documents/S4B/>.

Electronic Journal Articles

Watts, S. (2000) Teaching talk: Should students learn 'real German'? [HTML document]. German as a Foreign Language Journal [online] 1. Retrieved [12.09.'00] from the World Wide Web, <http://www.gfl-journal.com/>.

Other Websites

Verterhus, S.A. (n.y.), Anglicisms in German car advertising. The problem of gender assignment [HTML document]. Retrieved [13.10.'01] from the World Wide Web, <http://olaf.hiof.no/~sverrev/eng.html>.

Unpublished Papers

Takahashi, S./DuFon, M.A. (1989), Cross-linguistic influence in indirectness: The case of English directives performed by native Japanese speakers. Unpublished paper, Department of English as a Second Language, University of Hawai'i at Manoa, Honolulu.

Unpublished Theses/ Dissertations

Möhl, S. (1996), Alltagssituationen im interkulturellen Vergleich: Realisierung von Kritik und Ablehnung im Deutschen und Englischen. Unpublished MA thesis, University of Hamburg.

Walsh, R. (1995), Language development and the year abroad: A study of oral grammatical accuracy amongst adult learners of German as a foreign language. Unpublished PhD dissertation, University College Dublin.

Appendix

The appendix should be used for data collected (e.g. questionnaires, transcripts,...) and for tables and graphs not included in the main text due to their subsidiary nature or to space constraints in the main text.

Assessment Scheme:

Continuous Evaluation:

40%

(Based on abstract writing, interim draft, general approach, research orientation, readings undertaken etc.)

Final Evaluation:

60%

(Based on the organization of the paper, objectives/ problem profile/ issue outlining, comprehensiveness of the research, flow of the idea/ ideas, relevance of material used/ presented, outcomes vs. objectives, presentation/ viva etc.)



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PROJECT

Course Code: BTE2532

Credit Units: 02

Objectives:

The aim of the project is to provide the students with an opportunity to further their intellectual and personal development in the chosen field by undertaking a significant practical unit of activity. The project can be defined as a scholarly inquiry into a problem or issues, involving a systematic approach to gathering and analysis of information / data, leading to production of a structured report.

Chapter Scheme and distribution of marks:

Chapter 1: Introduction – 10 marks

Chapter 2: Conceptual Framework/ National/International Scenario – 25 marks

Chapter 3: Presentation, Analysis & Findings -- 25 marks

Chapter 4: Conclusion & Recommendations -- 10 marks

Chapter 5: Bibliography -- 05 marks

Project Report	Power Point Presentation & Viva
75 marks	25 marks

Components of a Project Report

The outcome of Project Work is the Project Report. A project report should have the following components:

1) Cover Page: This should contain the title of the project proposal, to whom it is submitted, for which degree, the name of the author, name of the supervisor, year of submission of the project work, name of the University.

2) Acknowledgement: Various organizations and individuals who might have provided assistance /co-operation during the process of carrying out the study.

3) Table of Content: Page-wise listing of the main contents in the report, i.e., different Chapters and its main Sections along with their page numbers.

4) Body of the Report: The body of the report should have these four logical divisions

a) **Introduction:** This will cover the background, rationale/ need / justification, brief review of literature, objectives, methodology (the area of the study, sample, type of study, tools for data collection, and method of analysis), Limitations of the Study, and Chapter Planning.

b) **Conceptual Framework / National and International Scenario:** (relating to the topic of the Project).

c) **Presentation of Data, Analysis and Findings:** (using the tools and techniques mentioned in the methodology).

d) **Conclusion and Recommendations:** In this section, the concluding observations based on the main findings and suggestions are to be provided.

5) Bibliography or References: This section will include the list of books and articles which have been used in the project work, and in writing a project report.

6) Annexures: Questionnaires (if any), relevant reports, etc.

(The main text of the Project should normally be in the range of 5000 words. However, there may be annexure in addition to the main text)

The Steps of a Project Report

Step I: Selection of the topic for the project by taking following points into consideration:

- Suitability of the topic.

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- Relevance of the topic
- Time available at the disposal.
- Feasibility of data collection within the given time limit.
- Challenges involved in the data collection (time & cost involved in the data collection, possibility of getting responses, etc.)

Step II : Finalisation of the Topic and preparation of Project Proposal in consultation with the Supervisor.

Step III : Collection of information and data relating to the topic and analysis of the same.

Step IV : Writing the report dividing it into suitable chapters, viz.,
 Chapter 1: Introduction,
 Chapter 2: Conceptual Framework / National & International Scenario,
 Chapter 3: Analysis & Findings
 Chapter 4: Conclusion and Recommendations.

Step V : The following documents are to be attached with the Final Project Report.

- 1) Approval letter from the supervisor (Annexure-IA)
- 2) Student's declaration (Annexure-IB)
- 3) Certificate from the Competent Authority of the Organisation / Institution, if the student undertakes the Project Work in any Organisation / Institution.

Guidelines for Evaluation:

- Each of the students has to undertake a Project individually under the supervision of a teacher and to submit the same following the guidelines stated below.
- Language of Project Report and Viva-Voce Examination may be English. The Project Report must be typed and hard bound.
- Failure to submit the Project Report or failure to appear at the Viva-voce Examination will be treated as "Absent" in the Examination. He /she has to submit the Project Report and appear at the Viva-Voce Examination in the subsequent years (within the time period as per University Rules).
- No marks will be allotted on the Project Report unless a candidate appears at the Viva-Voce Examination. Similarly, no marks will be allotted on Viva-Voce Examination unless a candidate submits his/her Project Report.
- Evaluation of the Project Work to be done jointly by one internal expert and one external expert with equal weightage, i.e., average marks of the internal and external experts will be allotted to the candidate.



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WORKSHOP / CERTIFICATION

Course Code: BTE2533

Credit Units: 02

Objectives

A workshop is primarily an activity based academic event that is organized to provide the students a one to one and hands on experience on any aspect of their learning. The communication in a workshop has to be necessarily two way. The trainer has to make sure that the aspect covered are practically practiced by the participants. The student will choose the option of workshop from amongst their concentration electives. The evaluation will be done by Board of examiners comprising of the faculties.

Major Themes for Workshop

The workshop may be conducted on any of the following major themes:

Accounting

Finance

Human Resources

Marketing

Economics

Operations

Supply Chain Management

These themes are merely indicative and other recent and relevant topics of study may be included.

Guidelines for Workshop

The procedure for earning credits from workshop consists of the following steps:

Relevant study material and references will be provided by the trainer in advance.

The participants are expected to explore the topic in advance and take active part in the discussions held

Attending and Participating in all activities of the workshop

Group Activities have to be undertaken by students as guided by the trainer.

Evaluation of workshop activities would be done through test and quiz at the end of the workshop.

Submitting a write up of at least 500 words about the learning outcome from the workshop.

Methodology

The methodology followed at the workshop could be based on any one or more of the following methods:

Case Study

Business Game

Simulation

Group Activity

Role Play

Business Planning

Quiz

Evaluation Scheme:

Attendance	Active Participation	Multiple Choice Questions/ Quiz	Solving the case/ Assignment/ Write up	Total
10	30	30	30	100



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RECOMBINANT DNA TECHNOLOGY

Course Code: BTE2601

Credit Units: 03

Course Objective:

A complete understanding of molecular techniques can be obtained through the course. The successful application of biotechnology largely depends on these advanced molecular techniques.

Course Contents:

Module I: Enzymes used in RDT

Restriction endonuclease, methyltransferase, ligase, polymerase, kinase, phosphatase, nuclease, transferase, reverse transcriptase.

Module II: Cloning vectors

Plasmids, bacteriophages (Lambda and M13), phagemids, cosmids, artificial chromosomes (YAC, BAC). expression vectors (Bacteria and yeast), vector engineering (fusion tags, antibiotic markers), codon optimization, host engineering

Module III: Blotting techniques and hybridization

Southern, Northern and Western blotting techniques. Radioactive and non-radioactive probes.

Module IV: Nucleic acid amplification and its applications

Principles of PCR, designing of primers

Module V: Cloning Techniques

Basic cloning experiment: Design of cloning strategy and stepwise experimental procedure, Complementation, colony and plaque hybridization, restriction, PCR, plus-minus screening, immunoscreening.

Module VI: DNA Libraries

Purpose of constructing DNA libraries. Construction of cDNA and genomic libraries.

Module VII: Sequencing of DNA

DNA sequencing (Maxam Gilbert, Sanger's and automated), protein engineering.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

Text:

- Principles of Gene Manipulation: An Introduction to Genetic Engineering, R.W. Old and S. B Primrose, Blackwell Science Inc.
- Recombinant DNA, J.D. Watson et al, W.H. Freeman and Company.



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References:

- Molecular Biotechnology: Principles and Applications of Recombinant DNA, B.R. Grick and J.J. Pasternak, ASM Press.
- Molecular and Cellular Cells Methods in Biology and Medicine, P.B Kaufman, W. Wu, D. Kim and C.J. Cseke, CRC Press.
- Milestones in Biotechnology: Classic Papers on Genetic Engineering, J.A. Bavies and W.S. Reznikoff, Butterworth Heinemann.
- Gene Expression Technology, D.V. Goeddel in Methods in Methods in Enzymology, Academic Press Inc.
- DNA Cloning: A Practical Approach, D.M. Glover and B.D. Hames, IRL Press.
- Molecular Cloning: A Laboratory Manual, J. Sambrook, E.F. Fritsch and T. Maniatis, Cold Spring Harbor Laboratory Press.



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BIOPROCESS TECHNOLOGY

Course Code: BTE2602

Credit Units: 03

Course Objective:

The objective of the course is to apply the principles of biochemical engineering in large scale cultivation of microorganism for production of important products.

Course Contents:

Module I

Advantage of bioprocess over chemical process. Basic principle in bioprocess technology. Media formulation, Cell culture techniques; Inoculum development and aseptic transfers. Different types of pumps, valves, and line materials, piping conventions etc. used in Biochemical Process

Module II

Process technology for the production of primary metabolites, eg. biomass, ethanol, acetone-butanol, citric acid, amino acids, polysaccharides and plastics.

Ethanol: production by batch, continuous and cell recycle adopted by various technologies practiced in Indian distilleries using molasses and grains. Computation of fermentation efficiency, distillation efficiency and overall efficiency of ethanol production, recovery, uses, glucose effect etc. Power alcohol – definition, uses, merits and demerits of various technologies for its production.

Amino Acid: Genetic Control of metabolic pathway.

Lysine: Indirect and direct fermentation – mechanism of ph of metabolic block in accumulation of L-lysine by inhibition and repression mechanism.

Biomass: Bakers and distillers yeast production using various raw materials, “bios” factors for growth, Crabtree effect, harvesting, different forms and uses.

What are mushroom, different forms of common mushroom production from agro based raw materials and uses. Biofertilizers, biocompost and biopesticides

Module III

Production of secondary metabolites – penicillin, cephalosporins, streptomycin, tetracycline etc. Metabolites from plant and animal cell culture

Penicillin: Classification, various penicillin as precursor and ‘R’ – side chain, penicillinase, 6-APA, penicillin production, harvest and recovery, uses of various forms etc.

Streptomycin: chemical structure, production, harvest and recovery, use by-product of streptomycin fermentation etc.

Tetracycline: chemical structure, production, harvest and recovery, use by-product of tetracycline fermentation etc.

Module IV

Microbial production of industrial enzymes – glucose isomerase, penicillin acylase, cellulase, amylase, lipase, protease etc.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

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Text & References:

- Biochemical Engineering- Kinetics, Mass Transport, Reactors and Gene Expression, W F Weith, John Wiley and Sons Inc
- Biochemical Engineering, S Aiba, A E Humphery and N F Millis, University of Tokyo Press
- Bioprocess Engineering Basic Concepts, M.L. Shuler and F. Kargi, Prentice Hall
- Bioprocess Engineering, B.K. Lydersen, K.L. Nelson, B.K. Lyderson and N. D'Elia, John Wiley and Sons Inc.
- Bioprocess Engineering Principles, P Doran, Academic Press
- Biotechnology. A Textbook of Industrial Microbiology, W. Crueger and a. Crueger, Sinauer Associates.
- Principles of Fermentation Technology, P.F. Stanbury and A. Whitaker, Pergamon Press
- Process Engineering in Biotechnolgy, A T Jackson, Prentice Hall



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IMMUNOLOGY AND IMMUNOTECHNOLOGY

Course Code: BTE2603

Credit Units: 03

Course Objective:

Role of antibody engineering in biomedical applications and the importance of immuno genetics in disease processes, tissue transplantation and immune regulation are some of the areas of attributes of this course which can help the students to understand the biotechnology related to human kind.

Course Contents:

Module I: Introduction

Phylogeny of Immune System, Innate and acquired immunity, clonal nature of Immune Response. Organization and structure of lymphoid organs Nature and Biology of antigens and super antigens Antibody structure and function; Types of immunity- innate, acquired, active and passive.

Module II: Major Histocompatibility

MHC, BCR and TCR, generation of antibody diversity, Complement system

Module III: Cells of the immune system

Hematopoiesis and differentiation, lymphocyte trafficking, B-Lymphocytes, T -Lymphocytes, macrophages, dendritic cells, natural killer, lymphokines and lymphokine activated killer cells, eosinophils, neutrophils and mast cells

Module IV: Regulation of immune response

Antigen processing and presentation, activation of B and T lymphocytes, cytokines and their role in immune regulation, T cell regulation and MHC restriction, immunological tolerance

Module V: Cell mediated toxicity

Mechanism of T cell and NK cell mediated lysis and macrophage mediated cytotoxicity.

Module VI: Hypersensitivity

Module VII: Autoimmunity

Module VIII: Tumor immunology, Immunity to infectious agents

Module IX: Transplantation Immunology

Module X: Synthetic vaccines

Vaccines: General consideration, idotype network hypothesis, Synthetic vaccines

Module XI: Hnmunological Techniques

Immuno diffusion, immuno-electrophoresis, ELISA, RIA, fluorescence activated cell sorter

Module XII: Hybridoma technology and its applications

Fusion of myeloma cells with lymphocytes

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

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Text & References:

Text:

- Basic Immunology, A.K. Abbas and A.H. Lichtman, Saunders W.B. Company
- Basic Immunology, A.K. Abbas and A.H. Lichtman, Saunders W.B. Company

References:

- Fundamentals of Immunology, W. Paul, Lippincott Williams and Wilkins
- Immunology, W.L. Anderson, Fence Creek Publishing (Blackwell).
- Immunology: A Short Course, E. Benjamin, R. Coico and G. Sunshine, Wiley-Leiss Inc.
- Immunology, Roitt, Mosby – Yearbook Inc.
- Kuby Immunology, R.A. Goldsby, T.J. Kindt, and B.A. Osborne, Free



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FUNDAMENTALS OF BIOCHEMICAL ENGINEERING

Course Code: BTE2604

Credit Units: 02

Course Objective:

The course material on the kinetics of microbial growth, substrate utilization and product formation etc. may help the students to understand the various principles involved in instrumentation and control of bioprocess.

Course Contents:

Module I

Kinetics of microbial growth, substrate utilization and product formation.

Module II

Sterilization of air and medium.

Module III

Batch, continuous, cell recycle and fed batch reactors; mass and energy balance in microbial processes, Bioreactor design, Different types of bioreactors, their parts and functions. Different types of valves.

Module IV

Mass transfer in Biological reactions; Scale-up principles; Instrumentation and control of bioprocesses.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

Text:

- Biochemical Engineering- Kinetics, Mass Transport, Reactors and Gene Expression, W F Weith, John Wiley and Sons Inc
- Biochemical Engineering, S Aiba, A E Humphery and N F Millis, University of Tokyo Press
- Biochemical Engineering Fundamentals, J E Bailly and D F Ollis, McGraw Hill
- Bioprocess Engineering Principles, P Doran, Academic Press

References:

- Chemical Engineering, J M Coulson, and J F Richardson, Butterworth Heinemann
- Fermentation and Biochemical Engineering Handbook: Principles, Process Design, and Equipment, HC Vogel, CL Todaro, CC Todaro, Noyes Data Corporation/Noyes Publications
- Process Engineering in Biotechnology, A T Jackson, Prentice Hall



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RECOMBINANT DNA TECHNOLOGY LAB

Course Code: BTE2605

Credit Units: 02

Course Objective:

The laboratory experiments in Recombinant DNA Technology would certainly help to comprehend the theoretical aspects of the subject.

Course Contents:

Module I

Study of cloning (GFP CLONING)

Module II

Study of PCR

Module III

Study of Southern hybridisation

Module IV

Study of RAPD

Module V

Site directed mutagenesis

Examination Scheme:

IA			EE			
Class Test (Practical Based)	Mid Term Viva	Attendance	Major Experiment	Minor Experiment/Spotting	Practical Record	Viva
15	10	05	35	15	10	10



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BIOPROCESS TECHNOLOGY LAB

Course Code: BTE2606

Credit Units: 02

Course Contents:

Module I

Isolation of industrially important micro organisms for microbial processes.

Module II

Determination of Thermal Death Point and Thermal death time of micro organisms for design of a sterilizer

Module III

Determination of growth curve of a supplied micro organism and also determine substrate degradation profile and to compute specific growth rate and growth yield from the data obtained.

Module IV

Comparative studies of ethanol production using different substrates.

Module V

Production of single cell protein

Module VI

Production and estimation of alkaline protease

Module VII


Sauer Krant fermentation

Module VIII

Use of alginate for cell immobilization

Examination Scheme:

IA			EE			
Class Test (Practical Based)	Mid Term Viva	Attendance	Major Experiment	Minor Experiment/Spotting	Practical Record	Viva
15	10	05	35	15	10	10


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IMMUNOLOGY AND IMMUNOTECHNOLOGY LAB

Course Code: BTE2607

Credit Units: 01

Course Contents:

Module I

Blood film preparation and identification of cells.

Module II

Identification of blood group.

Module III

Isolation of serum.

Module IV

Lymphoid organs and their microscopic organization.

Module V

WIDAL Test

Module VI

Radial Immuno Diffusion Test

Module VII

Ouchterlony Double diffusion Test

Module VIII: Elisa

DOT, SANDWICH

Module IX

Purification of IgG through affinity chromatography

Module X

Immunohistochemistry

Examination Scheme:

IA			EE			
Class Test (Practical Based)	Mid Term Viva	Attendance	Major Experiment	Minor Experiment/Spotting	Practical Record	Viva
15	10	05	35	15	10	10



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PHARMACEUTICAL BIOTECHNOLOGY

Course Code: BTE2608

Credit Units: 02

Course Objective:

The main objectives are to cover representative pharmaceutical dosage forms, and general issues of formulation, production, quality requirements, validation and uses and to gain an understanding of the challenges associated with quality pharmaceutical manufacturing

Course Contents:

Module I

Introduction to Physical Pharmaceutics - Metrology and Calculations,

Module II

Molecular structure, properties and States of Matter, Solutions, Phase Equilibria, Micromeritic and Powder Rheology, Surface and Interfacial Phenomena, Dispersion Systems, Diffusion & Dissolution, Kinetics and drug stability, Viscosity & Rheology

Module III

Polymer Science and Applications, Formulations and Development, Packaging

Module IV

Introduction to Industrial Processing, Transport Phenomena (Fluid Flow, Heat Transfer and Mass Transfer)

Module V

Particulate Technology (Particle Size, Size reduction, Size Separation, Powder Flow and Compaction), Unit Operations (Mixing, Evaporation, Filtration, Centrifugation, Extraction, Distillation, and Drying)

Module VI

Materials of Pharmaceutical Plant Construction, Good Manufacturing Practice (GMP's) Guidelines

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

Text:

- Bentley's Pharmaceutics by E A Rawlins
- Pharmaceutical Sciences by Remington

References:

- Physical Pharmacy by Alfred Martin.
- Cooper and Gunn's Tutorial Pharmacy


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JAVA-II

Course Code: BTE2611

Credit Units: 02

Course Objective

The objective is to introduce students to a serverside programming language and help them gain sufficient fluency to undertake research projects with a programming component; to lay the foundations for study of web technologies and different tools used for the same.

Emphasis is on to understand the basic concepts of web programming; to learn the syntax and semantics of Servlet and JSP; to be able to use a server side program development environment

Course Contents

Module I

HTML and JavaScript, Creating and processing HTML forms

Module II

Java Servlets

Introduction to Server Side Application Development

Basics of Servlet Programming

Web Container

Session Tracking

Servlet Context

Module III: JSP

Advantage of JSP technology (Comparision with ASP / Servlet)

JSP Architecture, JSP Access Model

JSP Syntax Basic (Directions, Declarations, Expression, Scriptlets, Comments)

JSP Implicit Object, Object Scope

Synchronization Issue

Exception Handling

Session Management

Module IV: Java Network Programming

Connecting to a server

Implementing Servers in Java

URL Connections

Reading and Posting data

Security and the Network

Java Beans

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

- Complete reference by Herbert Schildt TataMcGraw Hill
- Professional Java XML Programming with Servlets and JSP by Alexander Nakhimovsky and Tom Myers published by Wrox Press Ltd.
- More Servlets and Java Server Pages by Marty Hall published by Sun Microsystems Press, A Prentice Hall Title.
- Special Edition – Using Java Server Pages and Servlets by Mark Wutka published by Que

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TERM PAPER

Course Code: BTE2631

Credit Units: 02

METHODOLOGY

A term (or research) paper is primarily a record of intelligent reading in several sources on a particular subject.

The students will choose the topic at the beginning of the session in consultation with the faculty assigned. The progress of the paper will be monitored regularly by the faculty. At the end of the semester the detailed paper on the topic will be submitted to the faculty assigned. The evaluation will be done by Board of examiners comprising of the faculties.

GUIDELINES FOR TERM PAPER

The procedure for writing a term paper may consists of the following steps:

- Choosing a subject
- Finding sources of materials
- Collecting the notes
- Outlining the paper
- Writing the first draft
- Editing & preparing the final paper

1. Choosing a Subject

The subject chosen should not be too general.

2. Finding Sources of materials

- j) The material sources should be not more than 10 years old unless the nature of the paper is such that it involves examining older writings from a historical point of view.
- k) Begin by making a list of subject-headings under which you might expect the subject to be listed.
- l) The sources could be books and magazines articles, news stories, periodicals, scientific journals etc.

3. Collecting the notes

Skim through sources, locating the useful material, then make good notes of it, including quotes and information for footnotes.

- j) Get facts, not just opinions. Compare the facts with author's conclusion.
- k) In research studies, notice the methods and procedures, results & conclusions.
- l) Check cross references.

4. Outlining the paper

- g) Review notes to find main sub-divisions of the subject.
- h) Sort the collected material again under each main division to find sub-sections for outline so that it begins to look more coherent and takes on a definite structure. If it does not, try going back and sorting again for main divisions, to see if another general pattern is possible.

5. Writing the first draft

Write the paper around the outline, being sure that you indicate in the first part of the paper what its purpose is. You may follow the following:

- a) statement of purpose
- b) main body of the paper
- c) statement of summary and conclusion

Avoid short, bumpy sentences and long straggling sentences with more than one main ideas.

6. Editing & Preparing the final Paper

- s) Before writing a term paper, you should ensure you have a question which you attempt to answer in your paper. This question should be kept in mind throughout the paper. Include only information details/ analyses of relevance to the question at hand. Sometimes, the relevance of a particular section

may be clear to you but not to your readers. To avoid this, ensure you briefly explain the relevance of every section.

- t) Read the paper to ensure that the language is not awkward, and that it "flows" properly.
- u) Check for proper spelling, phrasing and sentence construction.
- v) Check for proper form on footnotes, quotes, and punctuation.
- w) Check to see that quotations serve one of the following purposes:
 - (x) Show evidence of what an author has said.
 - (xi) Avoid misrepresentation through restatement.
 - (xii) Save unnecessary writing when ideas have been well expressed by the original author.
- x) Check for proper form on tables and graphs. Be certain that any table or graph is self-explanatory.

Term papers should be composed of the following sections:

- Title page
- Table of contents
- Introduction
- Review
- Discussion & Conclusion
- References
- Appendix

Generally, the introduction, discussion, conclusion and bibliography part should account for a third of the paper and the review part should be two thirds of the paper.

Discussion

The discussion section either follows the results or may alternatively be integrated in the results section. The section should consist of a discussion of the results of the study focusing on the question posed in the research paper.

Conclusion

The conclusion is often thought of as the easiest part of the paper but should by no means be disregarded. There are a number of key components which should not be omitted. These include:

- m) summary of question posed
- n) summary of findings
- o) summary of main limitations of the study at hand
- p) details of possibilities for related future research

References

From the very beginning of a research project, you should be careful to note all details of articles gathered.

The bibliography should contain ALL references included in the paper. References not included in the text in any form should NOT be included in the bibliography.

The key to a good bibliography is consistency. Choose a particular convention and stick to this.

Bibliographical conventions

Monographs

Crystal, D. (2001), Language and the internet. Cambridge: Cambridge University Press.

Edited Volumes

Gass, S./Neu, J. (eds.) (1996), Speech acts across cultures. Challenges to communication in a second language. Berlin/ NY: Mouton de Gruyter.

[(eds.) is used when there is more than one editor; and (ed.) where there is only one editor. In German the abbreviation used is (Hrsg.) for Herausgeber].

Edited Articles

Schmidt, R./Shimura, A./Wang, Z./Jeong, H. (1996), Suggestions to buy: Television commercials from the U.S., Japan, China, and Korea. In: Gass, S./Neu, J. (eds.) (1996), Speech acts across cultures. Challenges to communication in a second language. Berlin/ NY: Mouton de Gruyter: 285-316.

Journal Articles

McQuarrie, E.F./Mick, D.G. (1992), On resonance: A critical pluralistic inquiry into advertising rhetoric. Journal of consumer research 19, 180-197.

Electronic Book

Chandler, D. (1994), Semiotics for beginners [HTML document]. Retrieved [5.10.'01] from the World Wide Web, <http://www.aber.ac.uk/media/Documents/S4B/>.

Electronic Journal Articles

Watts, S. (2000) Teaching talk: Should students learn 'real German'? [HTML document]. German as a Foreign Language Journal [online] 1. Retrieved [12.09.'00] from the World Wide Web, <http://www.gfl-journal.com/>.

Other Websites

Verterhus, S.A. (n.y.), Anglicisms in German car advertising. The problem of gender assignment [HTML document]. Retrieved [13.10.'01] from the World Wide Web, <http://olaf.hiof.no/~sverrev/eng.html>.

Unpublished Papers

Takahashi, S./DuFon, M.A. (1989), Cross-linguistic influence in indirectness: The case of English directives performed by native Japanese speakers. Unpublished paper, Department of English as a Second Language, University of Hawai'i at Manoa, Honolulu.

Unpublished Theses/ Dissertations

Möhl, S. (1996), Alltagssituationen im interkulturellen Vergleich: Realisierung von Kritik und Ablehnung im Deutschen und Englischen. Unpublished MA thesis, University of Hamburg.

Walsh, R. (1995), Language development and the year abroad: A study of oral grammatical accuracy amongst adult learners of German as a foreign language. Unpublished PhD dissertation, University College Dublin.

Appendix

The appendix should be used for data collected (e.g. questionnaires, transcripts,...) and for tables and graphs not included in the main text due to their subsidiary nature or to space constraints in the main text.

Assessment Scheme:

Continuous Evaluation:

40%

(Based on abstract writing, interim draft, general approach, research orientation, readings undertaken etc.)

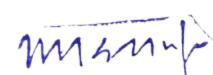
Final Evaluation:

60%

(Based on the organization of the paper, objectives/ problem profile/ issue outlining, comprehensiveness of the research, flow of the idea/ ideas, relevance of material used/ presented, outcomes vs. objectives, presentation/ viva etc.)



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PROJECT

Course Code: BTE2632

Credit Units: 02

Objectives:

The aim of the project is to provide the students with an opportunity to further their intellectual and personal development in the chosen field by undertaking a significant practical unit of activity. The project can be defined as a scholarly inquiry into a problem or issues, involving a systematic approach to gathering and analysis of information / data, leading to production of a structured report.

Chapter Scheme and distribution of marks:

Chapter 1: Introduction – 10 marks

Chapter 2: Conceptual Framework/ National/International Scenario – 25 marks

Chapter 3: Presentation, Analysis & Findings -- 25 marks

Chapter 4: Conclusion & Recommendations -- 10 marks

Chapter 5: Bibliography -- 05 marks

Project Report	Power Point Presentation & Viva
75 marks	25 marks

Components of a Project Report

The outcome of Project Work is the Project Report. A project report should have the following components:

1) Cover Page: This should contain the title of the project proposal, to whom it is submitted, for which degree, the name of the author, name of the supervisor, year of submission of the project work, name of the University.

2) Acknowledgement: Various organizations and individuals who might have provided assistance /co-operation during the process of carrying out the study.

3) Table of Content: Page-wise listing of the main contents in the report, i.e., different Chapters and its main Sections along with their page numbers.

4) Body of the Report: The body of the report should have these four logical divisions

a) **Introduction:** This will cover the background, rationale/ need / justification, brief review of literature, objectives, methodology (the area of the study, sample, type of study, tools for data collection, and method of analysis), Limitations of the Study, and Chapter Planning.

b) **Conceptual Framework / National and International Scenario:** (relating to the topic of the Project).

c) **Presentation of Data, Analysis and Findings:** (using the tools and techniques mentioned in the methodology).

d) **Conclusion and Recommendations:** In this section, the concluding observations based on the main findings and suggestions are to be provided.

5) Bibliography or References: This section will include the list of books and articles which have been used in the project work, and in writing a project report.

6) Annexures: Questionnaires (if any), relevant reports, etc.

(The main text of the Project should normally be in the range of 5000 words. However, there may be annexure in addition to the main text)

The Steps of a Project Report

Step 1: Selection of the topic for the project by taking following points into consideration:

- Suitability of the topic.
- Relevance of the topic

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- Time available at the disposal.
- Feasibility of data collection within the given time limit.
- Challenges involved in the data collection (time & cost involved in the data collection, possibility of getting responses, etc.)

Step II : Finalisation of the Topic and preparation of Project Proposal in consultation with the Supervisor.

Step III : Collection of information and data relating to the topic and analysis of the same.

Step IV : Writing the report dividing it into suitable chapters, viz.,

Chapter 1: Introduction,

Chapter 2: Conceptual Framework / National & International Scenario,

Chapter 3: Analysis & Findings

Chapter 4: Conclusion and Recommendations.

Step V : The following documents are to be attached with the Final Project Report.

1) Approval letter from the supervisor (Annexure-IA)

2) Student's declaration (Annexure-IB)

3) Certificate from the Competent Authority of the Organisation / Institution, if the student undertakes the Project Work in any Organisation / Institution.

Guidelines for Evaluation:

- Each of the students has to undertake a Project individually under the supervision of a teacher and to submit the same following the guidelines stated below.
- Language of Project Report and Viva-Voce Examination may be English. The Project Report must be typed and hard bound.
- Failure to submit the Project Report or failure to appear at the Viva-voce Examination will be treated as "Absent" in the Examination. He /she has to submit the Project Report and appear at the Viva-Voce Examination in the subsequent years (within the time period as per University Rules).
- No marks will be allotted on the Project Report unless a candidate appears at the Viva-Voce Examination. Similarly, no marks will be allotted on Viva-Voce Examination unless a candidate submits his/her Project Report.
- Evaluation of the Project Work to be done jointly by one internal expert and one external expert with equal weightage, i.e., average marks of the internal and external experts will be allotted to the candidate.



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WORKSHOP / CERTIFICATION

Course Code: BTE2633

Credit Units: 02

Objectives

A workshop is primarily an activity based academic event that is organized to provide the students a one to one and hands on experience on any aspect of their learning. The communication in a workshop has to be necessarily two way. The trainer has to make sure that the aspect covered are practically practiced by the participants. The student will choose the option of workshop from amongst their concentration electives. The evaluation will be done by Board of examiners comprising of the faculties.

Major Themes for Workshop

The workshop may be conducted on any of the following major themes:

Accounting

Finance

Human Resources

Marketing

Economics

Operations

Supply Chain Management

These themes are merely indicative and other recent and relevant topics of study may be included.

Guidelines for Workshop

The procedure for earning credits from workshop consists of the following steps:

Relevant study material and references will be provided by the trainer in advance.

The participants are expected to explore the topic in advance and take active part in the discussions held

Attending and Participating in all activities of the workshop

Group Activities have to be undertaken by students as guided by the trainer.

Evaluation of workshop activities would be done through test and quiz at the end of the workshop.

Submitting a write up of at least 500 words about the learning outcome from the workshop.

Methodology

The methodology followed at the workshop could be based on any one or more of the following methods:

Case Study

Business Game

Simulation

Group Activity

Role Play

Business Planning

Quiz

Evaluation Scheme:

Attendance	Active Participation	Multiple Choice Questions/ Quiz	Solving the case/ Assignment/ Write up	Total
10	30	30	30	100



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GENOMICS AND PROTEOMICS

Course Code: BTE2701

Credit Units: 03

Course Objective:

The course helps in developing a detailed understanding of eukaryotic genome complexity and organization. Current research on the molecular basis of the control of gene expression in eukaryotic system has developed a detailed understanding of techniques of gene diagnostics and DNA profile to acquire the fundamentals of genomics and Proteomics.

Course Contents:

Module I: Genome Evolution

Origin of genomes, Acquisition of new genes, Noncoding DNA and Genome Evolution, Human Genome Project., Forward genetics (Phenotype to gene structure) and Reverse genetics (Gene structure to phenotype). DNA sequencing – chemical and enzymatic methods

Module II: Structural Genomics

Structural Genomics: Study of 3D- Structure of Protein

Protein Structure, Basics of High Throughput Determination of Protein Structure, Protein Structure Initiative Project, Computational Protein Structure Modeling, Protein Structure and Function.

Module III: Comparative Genomics

Phylogeny, COGS [Cluster of orthologues genes], Introduction to System Biology, Metabolic Reconstruction, The Basic Principles and Methodology. Gene Identification Methods.

Module IV: Functional Genomics

cDNA Microarrays, Oligonucleotide Microarray Chips, Application of Microarrays with examples, Microarray Data Analysis; Real Time PCR.

Module V: Genotyping Background and Applications of Genomics

Genetic and physical mapping, Introduction to molecular markers, DNA fingerprinting, Single nucleotide polymorphisms, RNA interference, antisense RNA, siRNA, MiRNA.

PROTEOMICS

Module VI: Fundamentals of Proteomics

Introduction to Proteomics, 2D Gel Electrophoresis

Protein Identification and Analysis:


- Protein preparation and Separation
- Protein Identification by mass spectrometry and its applications.
- Identification of post translation modification
- Current concepts of peptide sequencing with MS-MS methods, MALDI-TOF mass spectrometry and nanospray MS

Protein Expression Mapping, Unstructured Proteins.

High-throughput cloning of ORFs, Chromatography

Protein- Protein Interaction Mapping. Its application in health and disease.

Protein Chip/Array. Experimental design and its application. Application of Microarray in proteome analysis.


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Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:**Text:**

- Bioinformatics: A practical guide to the analysis of genes and proteins, A.D. Baxevanis and B.F.F. Ouellette, John Wiley and Sons Inc.
- Bioinformatics: From Genomes to Drugs, T. Lengauer, John Wiley and Sons Inc.
- Bioinformatics: Sequence and Genome Analysis, D.W. Mount, Cold Spring Harbor Laboratory Press
- DNA Microarrays: A Practical Approach, M. Schlöner, Oxford University Press.
- Genomes II, T.A. Brown
- Biotechnology and Genomics by P.K.Gupta

References:

- A Primer of Genome Science, Greg Gibson and Spencer V. Muse
- Database Annotation in Molecular Biology : Principles and Practice, Arthur M. Lesk
- DNA : Structure and Function, Richard R. Sinden
- Recombinant DNA (Second Edition), James D. Watson and Mark Zoller
- Gene Cloning and DNA Analysis – An introduction (Fourth Edition), T.A. Brown
- Genes & Genomes, Maxine Singer and Paul Berg
- Essential of Genomics and Bioinformatics, C.W. Sensen, John Wiley and Sons Inc.
- Functional Genomics – A Practical Approach, S.P. Hunt and R. Livesey, Oxford University Press
- Proteomics, T. Palzkill, Kluwer Academic Publishers
- Statistical Genomics: Linkage, Mapping and QTL Analysis, B. Liu, CRC Press.
- Genome II by T.A.Brown



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IPR, BIOSAFETY & BIOETHICS

Course Code: BTE2702

Credit Units: 02

Course Objective

The aim of this course is to develop the understanding of relevance, business Impact and protection of Intellectual Property along with the types of Intellectual Property Rights: Patents, Trademarks, Copyrights, Industrial Designs, Geographical Indications and International Conventions, Biosafety and Bioethics

Course Contents

Module I: Basic Principles and Acquisition of Intellectual Property Rights

Basic Principles of Patent Law, Patent Application procedure, Drafting of a Patent Specification, Understanding Copyright Law, Basic Principles of Trade Mark and Design Rights, International Background of Intellectual Property

Module II: Ownership and Enforcement of Intellectual Property Rights

Patents-Objectives, Rights, Assignments, Defences in case of Infringement. Copyright-Objectives, Rights, Transfer of Copyright, work of employment Infringement, Defences for infringement. Trademarks-Objectives, Rights, Protection of goodwill, Infringement, Passing off, Defences. Designs-Objectives, Rights, Assignments, Infringements, Defences of Design Infringement, Enforcement of Intellectual Property Rights - Civil Remedies, Criminal Remedies, Border Security measures, Practical Aspects of Licensing - Benefits, Determinative factors, important clauses, licensing clauses.

Module III: Information Technology Related Intellectual Property Rights

Computer Software and Intellectual Property-Objective, Copyright Protection, Reproducing, Defences, Patent Protection, Database and Data Protection-Objective, Need for Protection, UK Data Protection Act, 1998, US Safe Harbor Principle, Enforcement. Protection of Semi-conductor Chips-Objectives Justification of protection, Criteria, Subject-matter of Protection, WIPO Treaty, Trips, SCPA. Domain Name Protection-Objectives, domain name and Intellectual Property, Registration of domain names, disputes under Intellectual Property Rights, Jurisdictional Issues, International Perspective.

Module IV: Biotechnology and Intellectual Property Rights

Biotechnology and the Law- Objective, Evolution, Basic Structure of Gene Techniques, Applications, Commercial Potential of Biotech Inventions, Rationale for Intellectual Property Protection. Patenting Biotechnology Inventions-Objective, Concept of Novelty, Concept of inventive step, Microorganisms, Moral Issues in Patenting Biotechnological inventions. Plant Varieties Protection-Objectives, Justification, International Position, Plant Varieties Protection in India Protection of Geographical Indications Objectives, Justification, International Position, Multilateral Treaties, National Level, Indian Position.

Module V

Protection of Traditional Knowledge- Objective, Concept of Traditional Knowledge, Holders, Issues concerning, Bio-Prospecting and Bio-Piracy, Alternative ways, Protectability, need for a Sui-Generis regime, Traditional Knowledge on the International Arena, at WTO, at National level, Traditional Knowledge Digital Library.

Module VI

Biosafety and Bioethics Management-Key to environmentally responsible use of biotechnology. Cartagena Protocol on Biosafety, Ethical implications of Biotechnological products and techniques.


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Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:***Text***

- Intellectual Property Rights by Birgitte Anderson, Edward Elgar Publishing
- Intellectual Property Rights and the Life Science Industries by Graham Dutfield, Ashgate Publishing

References

- WIPO Intellectual Property Handbook
- Intellectual Property by William Rodelph Cornish, David Clewelyn
- Globalising Intellectual Property Rights by Duncan Matthews
- Journals and Current magazines



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RESEARCH METHODOLOGY AND REPORT WRITING

Course Code: BTE2703

Credit Units: 02

Course Objective

To develop understanding of information and library science research issues in the domain of bioinformatics through review of journal articles, invited talks, and critical group discussions of methods. The main objectives for this course are to develop: familiarity with information and library science-oriented problems in the biomedical sciences, an understanding of research methods in the biomedical domain, critical thinking and evaluation skills and presentation and summarization skills.

Course Contents

Module I

Introduction: Science, Scientific Field and Biological research. Role of a researcher in different stages of a project, Routes to research funding (academic and commercial)

Module II

Research – Definition – Importance and Meaning of research – Characteristics of research – Types of Research – Steps in research – Identification, Selection and formulation of research problem – Research questions – Research design – Formulation of Hypothesis – Review of Literature.

Module III: Sampling techniques

Sampling theory – types of sampling – Steps in sampling – Sampling and Non-sampling error – Sample size – Advantages and limitations of sampling. Collection of Data: Primary Data – Meaning – Data Collection methods – Secondary data – Meaning - Relevance's, Limitations and cautions. Statistics in Research.

Module IV

Type of Articles (review, letters etc). Scientific paper format (Abstract, Introduction, Materials and Methods, Results, Discussion). Writing, evaluating, presenting and publishing the results of scientific research in the academic press (journals, conferences etc). Choosing the appropriate journal (Sources, Information, Instructions to authors, peer review system, journal evaluation)

Module V

Case studies of areas of current research. Formulating a research plan and its presentation

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

Text:

- Statistical Methods By S.P. Gupta

References:

- Research Methodology Methods and Techniques by C.R. Kothari
- Statistics(Theory and Practice) by B.N. Gupta
- Research Methodology Methods and statistical Techniques by Santosh Gupta
- Scientific journals and magazines

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GENOMICS AND PROTEOMICS LAB

Course Code: BTE2704

Credit Units: 02

Course Contents:

Module I

Three dimensional Structures – In silico study – large molecular complexes RNA polymerase II, ribosome, unstructured proteins

Module II

DNA sequencing methods

Module III

Gene finding tools and Genome annotation

Module IV

Comparison of two given genomes

Module V

Analysis of 2D – IEF data

Module VI

Microarray and Microarray data analysis

Module VII

Inference of protein function from structure

Module VIII

Inference of protein function and structure

Module IX

Two-hybrid methods

Examination Scheme:

IA			EE			
Class Test (Practical Based)	Mid Term Viva	Attendance	Major Experiment	Minor Experiment/Spotting	Practical Record	Viva
15	10	05	35	15	10	10



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SUMMER INTERNSHIP EVALUATION-II

Course Code: BTE2735

Credit Units: 03

GUIDELINES FOR PROJECT FILE

Research experience is as close to a professional problem-solving activity as anything in the curriculum. It provides exposure to research methodology and an opportunity to work closely with a faculty guide. It usually requires the use of advanced concepts, a variety of experimental techniques, and state-of-the-art instrumentation.

Research is genuine exploration of the unknown that leads to new knowledge which often warrants publication. But whether or not the results of a research project are publishable, the project should be communicated in the form of a research report written by the student.

Sufficient time should be allowed for satisfactory completion of reports, taking into account that initial drafts should be critiqued by the faculty guide and corrected by the student at each stage.

The File is the principal means by which the work carried out will be assessed and therefore great care should be taken in its preparation.

Methodology

The students will be sent to various industries and institutes where they will undergo short term training. After the completion of the training the students will be required to submit project report which shall then be evaluated by two internal examiners. The students will then have to appear for a Viva Voce examination to be conducted by an external evaluator at the end of the semester.

In general, the File should be comprehensive and include

- A short account of the activities that were undertaken as part of the project;
- A statement about the extent to which the project has achieved its stated goals.
- A statement about the outcomes of the evaluation and dissemination processes engaged in as part of the project;
- Any activities planned but not yet completed as part of the project, or as a future initiative directly resulting from the project;
- Any problems that have arisen that may be useful to document for future reference.

Report Layout

The report should contain the following components:

➤ Title or Cover Page

The title page should contain the following information: Project Title; Student's Name; Course; Year; Supervisor's Name.

➤ Acknowledgements (optional)

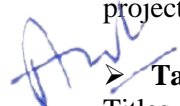
Acknowledgment to any advisory or financial assistance received in the course of work may be given.

➤ Abstract

A good "Abstract" should be straight to the point; not too descriptive but fully informative. First paragraph should state what was accomplished with regard to the objectives. The abstract does not have to be an entire summary of the project, but rather a concise summary of the scope and results of the project

➤ Table of Contents

Titles and subtitles are to correspond exactly with those in the text.


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➤ Introduction

Here a brief introduction to the problem that is central to the project and an outline of the structure of the rest of the report should be provided. The introduction should aim to catch the imagination of the reader, so excessive details should be avoided.

➤ Materials and Methods

This section should aim at experimental designs, materials used. Methodology should be mentioned in details including modifications if any.

➤ Results and Discussion

Present results, discuss and compare these with those from other workers, etc. In writing these section, emphasis should be given on what has been performed and achieved in the course of the work, rather than discuss in detail what is readily available in text books. Avoid abrupt changes in contents from section to section and maintain a lucid flow throughout the thesis. An opening and closing paragraph in every chapter could be included to aid in smooth flow.

Note that in writing the various sections, all figures and tables should as far as possible be next to the associated text, in the same orientation as the main text, numbered, and given appropriate titles or captions. All major equations should also be numbered and unless it is really necessary never write in “point” form.

➤ Conclusion

A conclusion should be the final section in which the outcome of the work is mentioned briefly.

➤ Future prospects

➤ Appendices

The Appendix contains material which is of interest to the reader but not an integral part of the thesis and any problem that have arisen that may be useful to document for future reference.

➤ References / Bibliography

This should include papers and books referred to in the body of the report. These should be ordered alphabetically on the author's surname. The titles of journals preferably should not be abbreviated; if they are, abbreviations must comply with an internationally recognised system.

Examples

For research article

Voravuthikunchai SP, Lortheeranuwat A, Ninrprom T, Popaya W, Pongpaichit S, Supawita T. (2002) Antibacterial activity of Thai medicinal plants against enterohaemorrhagic *Escherichia coli* O157: H7. *Clin Microbiol Infect*, **8** (suppl 1): 116–117.

For book

Kowalski, M. (1976) Transduction of effectiveness in *Rhizobium meliloti*. SYMBIOTIC NITROGEN FIXATION PLANTS (editor P.S. Nutman IBP), **7**: 63-67

ASSESSMENT OF THE PROJECT FILE

Essentially, marking will be based on the following criteria: the quality of the report, the technical merit of the project and the project execution.

Technical merit attempts to assess the quality and depth of the intellectual efforts put into the project.

Project execution is concerned with assessing how much work has been put in.

The File should fulfill the following *assessment objectives*:

Range of Research Methods used to obtain information

Execution of Research

Data Analysis

Analyse Quantitative/ Qualitative information
Control Quality

Draw Conclusions

Examination Scheme:

Project Report	50
Viva Voce	50
Total	100



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MOLECULAR MEDICINE AND DIAGNOSIS

Course Code: BTE2706

Credit Units: 02

Course Contents:

Module I

Human Health and Diseases

Module II

Human Diseases – morbidity, mortality, impact on social development

Module III

Mechanism of disease development, Genetic susceptibility, Identification of targets for diagnosis and therapy: Acquired diseases, cardiovascular diseases, Neurological diseases, Hematology, Cancer

Module IV

Epidemiology of disorders

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

- Diagnostic and Therapeutic Antibodies (Methods in Molecular Medicine by Andrew J.T. George (Editor), Catherine E. Urch (Editor) Publisher: Humana Press; edition (August 15, 2000) ISBN-10: 0896037983
- Molecular Diagnosis of Infectious Diseases (Methods in Molecular Medicine) by Jochen Decker, U. Reischl Amazon Sales Rank: #287831 in Books
- Human Molecular Genetics by T. Strachan, Andrew Read Amazon Sales Rank
- Principles of Biostatistics by Marcello Pagano , Kimberlee Gauvreau
- Essentials of Epidemiology in Public Health, Second Edition by Ann Aschengrau, George R., III Seage
- Designing Clinical Research: An Epidemiologic Approach, by Stephen B. Hulley, Steven R. Cummings
- Journal articles and reviews



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APPLICATIONS OF PLANT BIOTECHNOLOGY

Course Code: BTE2707

Credit Units: 02

Course Content:

Module I

Homozygous Plant Production through Ovule, Anther & Pollen Culture, Embryo Rescue & Embryo Culture, Endosperm Culture & Production of Seedless Plants, Apomixis & Experimental Polyembryony

Module II

AFLP – Variety Identification & Fingerprinting; Molecular Farming; Marker Assisted Technology; Use of Bioreactors in Plant Production & Scale-up; Basic Aspects of Application-case studies; Metabolic Engineering

Module III

Biotic & Abiotic Stress
Secondary Metabolites
Edible Vaccines and PHBV
Diagnostic Kits & Virus Indexing

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

- Experiments in Plant Tissue Culture, J.H. Dodds and L.K. Roberts, Cambridge University Press
- Plant Biotechnology and Transgenic Plants, K.M.O. Caldey, W.H. Barz and H.L. Wills, Marcel Dekker
- Plant Biotechnology, J. Hammond, P.McGarvy and V. Yusibov, Springer Verlag.
- Plant Cell & Tissue Culture for the Production of Food Ingredients, T-J Fu, G. Singh and W.R. Curtis, Kluwer Academic/Plenum Press
- Plant Tissue Culture: Theory & Practice, S.S. Bhojwani and M.K. Razdan, Elsevier Health Sciences
- Biotechnology: Theory and techniques of Plant Biotechnology, Animal cell culture and Immunobiotechnology vols 1 and 2 by Jack K Chirikjian
- Plant Biotechnology and its applications in Plant tissue culture by Ashwani Kumar and Shikha Roy
- Plant Biotechnology: The Genetic Manipulation of Plants. A. Slater, N. W. Scott and M. R. Fowler. 2008. Oxford University Press
- Recent Advances in Plant Biotechnology: Ara Kirakosyan and Peter B. Kaufan. 2009. Springer



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BIO-ENERGY ENGINEERING

Course Code: BTE2708

Credit Units: 02

Course Objective:

The goal is to introduce students to biotechnology and tools that enable engineers and process scientists to connect innovations in industrial microorganisms and bioprocess unit operations to the engineering fundamentals, fundamentals of systems biology, and biological tools for design, modeling and evaluation of manufacturing facilities for the production of biofuels, bioproducts and biotherapeutics using a case study approach combined with computer modeling.

Course Contents:

Module I: Biomass Sources, Characteristics & Preparation

Biomass Sources and Classification. – Chemical composition and properties of different biomass materials and bio-fuels – Sugar cane molasses and other sources for fermentation ethanol-Sources and processing of oils and fats for liquid fuels- Energy plantations
-Preparation of woody biomass: Size reduction, Briquetting of loose biomass, Drying, Storage and Handling of Biomass.

Module II: Biogas, Technology

Feedstock for biogas production, Aqueous wastes containing biodegradable organic matter, animal residues-. Microbial and biochemical aspects- Operating parameters for biogas production Kinetics and mechanism - Dry and wet fermentation. Digesters for rural application-High rate digesters for industrial waste water treatment.

Module III: Bio-Ethanol and Bio-Diesel Technology

Production of Fuel Ethanol by Fermentation of Sugars. Gasohol as a Substitute for Leaded Petrol. - Trans-Esterification of Oils to Produce Bio-Diesel.

Module IV: Pyrolysis and Gasification of Biomass

Thermo-chemical conversion of ligno-cellulose biomass – Biomass processing for liquid fuel production - Pyrolysis of biomass-Pyrolysis regime, effect of particle size, temperature, and products obtained.

Thermo-chemical gasification principles: Effect of pressure, temperature and of introducing steam and oxygen. Design and operation of Fixed and Fluidized Bed Gasifiers.

Module V: Combustion of Biomass and Cogeneration Systems

Combustion of Woody Biomass: Theory, Calculations and Design of Equipments. Cogeneration in Biomass Processing Industries. Case Studies: Combustion of Rice Husk, Use of Bagasse for Cogeneration.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70


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Text & References:

Text:

- Fuels from Biomass and Wastes by D.L. Klass and G.M. Emert, Ann Arbor Science pub. Inc. Michigan,
- Biotechnology and Alternative Technologies for Utilization of Biomass or Agricultural Wastes by A. Chakraverthy, Oxford & IBH publishing Co., New Delhi,

References:

- Biogas Systems: Principles and Applications by K.M. Mital, New Age International Publishers (p) Ltd.,
- Biomass Energy Systems, by P. Venkata Ramana and S.N. Srinivas, Tata Energy Research Institute, New Delhi, 1996.
- Bio-gas Technology by Khandelwal K.C. and Mahdi, Tata McGraw-Hill pub. Co. Ltd., New Delhi
- Advances in bio-gas Technology by O.P. Chawla, I.C.A.R., New Delhi. 1970.



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TERM PAPER

Course Code: BTE2731

Credit Units: 02

METHODOLOGY

A term (or research) paper is primarily a record of intelligent reading in several sources on a particular subject.

The students will choose the topic at the beginning of the session in consultation with the faculty assigned. The progress of the paper will be monitored regularly by the faculty. At the end of the semester the detailed paper on the topic will be submitted to the faculty assigned. The evaluation will be done by Board of examiners comprising of the faculties.

GUIDELINES FOR TERM PAPER

The procedure for writing a term paper may consists of the following steps:

- Choosing a subject
- Finding sources of materials
- Collecting the notes
- Outlining the paper
- Writing the first draft
- Editing & preparing the final paper

1. Choosing a Subject

The subject chosen should not be too general.

2. Finding Sources of materials

- m) The material sources should be not more than 10 years old unless the nature of the paper is such that it involves examining older writings from a historical point of view.
- n) Begin by making a list of subject-headings under which you might expect the subject to be listed.
- o) The sources could be books and magazines articles, news stories, periodicals, scientific journals etc.

3. Collecting the notes

Skim through sources, locating the useful material, then make good notes of it, including quotes and information for footnotes.

- m) Get facts, not just opinions. Compare the facts with author's conclusion.
- n) In research studies, notice the methods and procedures, results & conclusions.
- o) Check cross references.

4. Outlining the paper

- i) Review notes to find main sub-divisions of the subject.
- j) Sort the collected material again under each main division to find sub-sections for outline so that it begins to look more coherent and takes on a definite structure. If it does not, try going back and sorting again for main divisions, to see if another general pattern is possible.

5. Writing the first draft

Write the paper around the outline, being sure that you indicate in the first part of the paper what its purpose is. You may follow the following:

- a) statement of purpose
- b) main body of the paper
- c) statement of summary and conclusion

Avoid short, bumpy sentences and long straggling sentences with more than one main ideas.

6. Editing & Preparing the final Paper

- y) Before writing a term paper, you should ensure you have a question which you attempt to answer in your paper. This question should be kept in mind throughout the paper. Include only information/details/ analyses of relevance to the question at hand. Sometimes, the relevance of a particular section may be clear to you but not to your readers. To avoid this, ensure you briefly explain the relevance of every section.
- z) Read the paper to ensure that the language is not awkward, and that it "flows" properly.
- aa) Check for proper spelling, phrasing and sentence construction.
- bb) Check for proper form on footnotes, quotes, and punctuation.
- cc) Check to see that quotations serve one of the following purposes:
 - (xiii) Show evidence of what an author has said.
 - (xiv) Avoid misrepresentation through restatement.
 - (xv) Save unnecessary writing when ideas have been well expressed by the original author.
- dd) Check for proper form on tables and graphs. Be certain that any table or graph is self-explanatory.

Term papers should be composed of the following sections:

- Title page
- Table of contents
- Introduction
- Review
- Discussion & Conclusion
- References
- Appendix

Generally, the introduction, discussion, conclusion and bibliography part should account for a third of the paper and the review part should be two thirds of the paper.

Discussion

The discussion section either follows the results or may alternatively be integrated in the results section. The section should consist of a discussion of the results of the study focusing on the question posed in the research paper.

Conclusion

The conclusion is often thought of as the easiest part of the paper but should by no means be disregarded. There are a number of key components which should not be omitted. These include:

- q) summary of question posed
- r) summary of findings
- s) summary of main limitations of the study at hand
- t) details of possibilities for related future research

References

From the very beginning of a research project, you should be careful to note all details of articles gathered.

The bibliography should contain ALL references included in the paper. References not included in the text in any form should NOT be included in the bibliography.

The key to a good bibliography is consistency. Choose a particular convention and stick to this.

Bibliographical conventions

Monographs

Crystal, D. (2001), Language and the internet. Cambridge: Cambridge University Press.

Edited Volumes

Gass, S./Neu, J. (eds.) (1996), Speech acts across cultures. Challenges to communication in a second language. Berlin/ NY: Mouton de Gruyter.

[(eds.) is used when there is more than one editor; and (ed.) where there is only one editor. In German the abbreviation used is (Hrsg.) for Herausgeber].

Edited Articles

Schmidt, R./Shimura, A./Wang, Z./Jeong, H. (1996), Suggestions to buy: Television commercials from the U.S., Japan, China, and Korea. In: Gass, S./Neu, J. (eds.) (1996), Speech acts across cultures. Challenges to communication in a second language. Berlin/ NY: Mouton de Gruyter: 285-316.

Journal Articles

McQuarrie, E.F./Mick, D.G. (1992), On resonance: A critical pluralistic inquiry into advertising rhetoric. Journal of consumer research 19, 180-197.

Electronic Book

Chandler, D. (1994), Semiotics for beginners [HTML document]. Retrieved [5.10.'01] from the World Wide Web, <http://www.aber.ac.uk/media/Documents/S4B/>.

Electronic Journal Articles

Watts, S. (2000) Teaching talk: Should students learn 'real German'? [HTML document]. German as a Foreign Language Journal [online] 1. Retrieved [12.09.'00] from the World Wide Web, <http://www.gfl-journal.com/>.

Other Websites

Verterhus, S.A. (n.y.), Anglicisms in German car advertising. The problem of gender assignment [HTML document]. Retrieved [13.10.'01] from the World Wide Web, <http://olaf.hiof.no/~sverrev/eng.html>.

Unpublished Papers

Takahashi, S./DuFon, M.A. (1989), Cross-linguistic influence in indirectness: The case of English directives performed by native Japanese speakers. Unpublished paper, Department of English as a Second Language, University of Hawai'i at Manoa, Honolulu.

Unpublished Theses/ Dissertations

Möhl, S. (1996), Alltagssituationen im interkulturellen Vergleich: Realisierung von Kritik und Ablehnung im Deutschen und Englischen. Unpublished MA thesis, University of Hamburg.

Walsh, R. (1995), Language development and the year abroad: A study of oral grammatical accuracy amongst adult learners of German as a foreign language. Unpublished PhD dissertation, University College Dublin.

Appendix

The appendix should be used for data collected (e.g. questionnaires, transcripts,...) and for tables and graphs not included in the main text due to their subsidiary nature or to space constraints in the main text.

Assessment Scheme:

Continuous Evaluation:

40%

(Based on abstract writing, interim draft, general approach, research orientation, readings undertaken etc.)

Final Evaluation:

60%

(Based on the organization of the paper, objectives/ problem profile/ issue outlining, comprehensiveness of the research, flow of the idea/ ideas, relevance of material used/ presented, outcomes vs. objectives, presentation/ viva etc.)



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PROJECT

Course Code: BTE2732

Credit Units: 02

Objectives:

The aim of the project is to provide the students with an opportunity to further their intellectual and personal development in the chosen field by undertaking a significant practical unit of activity. The project can be defined as a scholarly inquiry into a problem or issues, involving a systematic approach to gathering and analysis of information / data, leading to production of a structured report.

Chapter Scheme and distribution of marks:

Chapter 1: Introduction – 10 marks

Chapter 2: Conceptual Framework/ National/International Scenario – 25 marks

Chapter 3: Presentation, Analysis & Findings -- 25 marks

Chapter 4: Conclusion & Recommendations -- 10 marks

Chapter 5: Bibliography -- 05 marks

Project Report	Power Point Presentation & Viva
75 marks	25 marks

Components of a Project Report

The outcome of Project Work is the Project Report. A project report should have the following components:

1) Cover Page: This should contain the title of the project proposal, to whom it is submitted, for which degree, the name of the author, name of the supervisor, year of submission of the project work, name of the University.

2) Acknowledgement: Various organizations and individuals who might have provided assistance /co-operation during the process of carrying out the study.

3) Table of Content: Page-wise listing of the main contents in the report, i.e., different Chapters and its main Sections along with their page numbers.

4) Body of the Report: The body of the report should have these four logical divisions

a) **Introduction:** This will cover the background, rationale/ need / justification, brief review of literature, objectives, methodology (the area of the study, sample, type of study, tools for data collection, and method of analysis), Limitations of the Study, and Chapter Planning.

b) **Conceptual Framework / National and International Scenario:** (relating to the topic of the Project).

c) **Presentation of Data, Analysis and Findings:** (using the tools and techniques mentioned in the methodology).

d) **Conclusion and Recommendations:** In this section, the concluding observations based on the main findings and suggestions are to be provided.

5) Bibliography or References: This section will include the list of books and articles which have been used in the project work, and in writing a project report.

6) Annexures: Questionnaires (if any), relevant reports, etc.

(The main text of the Project should normally be in the range of 5000 words. However, there may be annexure in addition to the main text)

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The Steps of a Project Report

Step I : Selection of the topic for the project by taking following points into consideration:

- Suitability of the topic.
- Relevance of the topic
- Time available at the disposal.
- Feasibility of data collection within the given time limit.
- Challenges involved in the data collection (time & cost involved in the data collection, possibility of getting responses, etc.)

Step II : Finalisation of the Topic and preparation of Project Proposal in consultation with the Supervisor.

Step III : Collection of information and data relating to the topic and analysis of the same.

Step IV: Writing the report dividing it into suitable chapters, viz.,

Chapter 1: Introduction,

Chapter 2: Conceptual Framework / National & International Scenario,

Chapter 3: Analysis & Findings

Chapter 4: Conclusion and Recommendations.

Step V: The following documents are to be attached with the Final Project Report.

1) Approval letter from the supervisor (Annexure-IA)

2) Student's declaration (Annexure-IB)

3) Certificate from the Competent Authority of the Organisation / Institution, if the student undertakes the Project Work in any Organisation / Institution.

Guidelines for Evaluation:

- Each of the students has to undertake a Project individually under the supervision of a teacher and to submit the same following the guidelines stated below.
- Language of Project Report and Viva-Voce Examination may be English. The Project Report must be typed and hard bound.
- Failure to submit the Project Report or failure to appear at the Viva-voce Examination will be treated as "Absent" in the Examination. He /she has to submit the Project Report and appear at the Viva-Voce Examination in the subsequent years (within the time period as per University Rules).
- No marks will be allotted on the Project Report unless a candidate appears at the Viva-Voce Examination. Similarly, no marks will be allotted on Viva-Voce Examination unless a candidate submits his/her Project Report.
- Evaluation of the Project Work to be done jointly by one internal expert and one external expert with equal weightage, i.e., average marks of the internal and external experts will be allotted to the candidate.



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WORKSHOP / CERTIFICATION

Course Code: BTE2733

Credit Units: 02

Objectives

A workshop is primarily an activity based academic event that is organized to provide the students a one to one and hands on experience on any aspect of their learning. The communication in a workshop has to be necessarily two way. The trainer has to make sure that the aspect covered are practically practiced by the participants. The student will choose the option of workshop from amongst their concentration electives. The evaluation will be done by Board of examiners comprising of the faculties.

Major Themes for Workshop

The workshop may be conducted on any of the following major themes:

Accounting

Finance

Human Resources

Marketing

Economics

Operations

Supply Chain Management

These themes are merely indicative and other recent and relevant topics of study may be included.

Guidelines for Workshop

The procedure for earning credits from workshop consists of the following steps:

Relevant study material and references will be provided by the trainer in advance.

The participants are expected to explore the topic in advance and take active part in the discussions held

Attending and Participating in all activities of the workshop

Group Activities have to be undertaken by students as guided by the trainer.

Evaluation of workshop activities would be done through test and quiz at the end of the workshop.

Submitting a write up of at least 500 words about the learning outcome from the workshop.

Methodology

The methodology followed at the workshop could be based on any one or more of the following methods:

Case Study

Business Game

Simulation

Group Activity

Role Play

Business Planning

Quiz

Evaluation Scheme:

Attendance	Active Participation	Multiple Choice Questions/ Quiz	Solving the case/ Assignment/ Write up	Total
10	30	30	30	100


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PROJECT/ DISSERTATION

Course Code: BTE2837

Credit Units: 17

Course Objective:

The students are expected to utilize their scheduled periods by undertaking the project that would be completed during the semester

Every student shall undertake a major Project. The major Project shall be undertaken in some biotechnology industry or laboratory of repute. Each student shall be assigned to a faculty who shall continuously monitor the progress of the Project in the concerned laboratory or industry. The faculty, in consultation with the concerned scientist of the industry/laboratory, shall decide the topic of the project. At the conclusion of the project the student shall submit a seminar and a dissertation. The dissertation shall be evaluated by the internal faculty/examiner. The student then shall have to appear for the viva voce examination.

GUIDELINES FOR PROJECT FILE

Research experience is as close to a professional problem-solving activity as anything in the curriculum. It provides exposure to research methodology and an opportunity to work closely with a faculty guide. It usually requires the use of advanced concepts, a variety of experimental techniques, and state-of-the-art instrumentation.

Research is genuine exploration of the unknown that leads to new knowledge which often warrants publication. But whether or not the results of a research project are publishable, the project should be communicated in the form of a research report written by the student.

Sufficient time should be allowed for satisfactory completion of reports, taking into account that initial drafts should be critiqued by the faculty guide and corrected by the student at each stage.

The File is the principal means by which the work carried out will be assessed and therefore great care should be taken in its preparation.

In general, the File should be comprehensive and include

- A short account of the activities that were undertaken as part of the project;
- A statement about the extent to which the project has achieved its stated goals.
- A statement about the outcomes of the evaluation and dissemination processes engaged in as part of the project;
- Any activities planned but not yet completed as part of the project, or as a future initiative directly resulting from the project;
- Any problems that have arisen that may be useful to document for future reference.

Report Layout

The report should contain the following components:

➤ Title or Cover Page

The title page should contain the following information: Project Title; Student's Name; Course; Year; Supervisor's Name.

➤ Acknowledgements (optional)

Acknowledgment to any advisory or financial assistance received in the course of work may be given.

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➤ **Abstract**

A good "Abstract" should be straight to the point; not too descriptive but fully informative. First paragraph should state what was accomplished with regard to the objectives. The abstract does not have to be an entire summary of the project, but rather a concise summary of the scope and results of the project

➤ **Table of Contents**

Titles and subtitles are to correspond exactly with those in the text.

➤ **Introduction**

Here a brief introduction to the problem that is central to the project and an outline of the structure of the rest of the report should be provided. The introduction should aim to catch the imagination of the reader, so excessive details should be avoided.

➤ **Materials and Methods**

This section should aim at experimental designs, materials used. Methodology should be mentioned in details including modifications if any.

➤ **Results and Discussion**

Present results, discuss and compare these with those from other workers, etc. In writing these section, emphasis should be given on what has been performed and achieved in the course of the work, rather than discuss in detail what is readily available in text books. Avoid abrupt changes in contents from section to section and maintain a lucid flow throughout the thesis. An opening and closing paragraph in every chapter could be included to aid in smooth flow.

➤ Note that in writing the various sections, all figures and tables should as far as possible be next to the associated text, in the same orientation as the main text, numbered, and given appropriate titles or captions. All major equations should also be numbered and unless it is really necessary never write in "point" form.

➤ **Conclusion**

A conclusion should be the final section in which the outcome of the work is mentioned briefly.

➤ **Future prospects**

➤ **Appendices**

The Appendix contains material which is of interest to the reader but not an integral part of the thesis and any problem that have arisen that may be useful to document for future reference.

➤ **References / Bibliography**

This should include papers and books referred to in the body of the report. These should be ordered alphabetically on the author's surname. The titles of journals preferably should not be abbreviated; if they are, abbreviations must comply with an internationally recognised system.

Examples

For research article

Voravuthikunchai SP, Lortheeranuwat A, Ninrprom T, Popaya W, Pongpaichit S, Supawita T. (2002) Antibacterial activity of Thai medicinal plants against enterohaemorrhagic *Escherichia coli* O157: H7. *Clin Microbiol Infect*, 8 (suppl 1): 116–117.

For book

Kowalski, M.(1976) Transduction of effectiveness in *Rhizobium meliloti*. SYMBIOTIC NITROGEN FIXATION PLANTS (editor P.S. Nutman IBP), 7: 63-67

ASSESSMENT OF THE PROJECT FILE

Essentially, marking will be based on the following criteria: the quality of the report, the technical merit of the project and the project execution.

Technical merit attempts to assess the quality and depth of the intellectual efforts put into the project.

Project execution is concerned with assessing how much work has been put in.

The File should fulfill the following *assessment objectives*:

Range of Research Methods used to obtain information

Execution of Research

Data Analysis

Analyse Quantitative/ Qualitative information

Control Quality

Draw Conclusions

Examination Scheme:

Dissertation: 100

Viva Voce: 100

Total: 200



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2022

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A handwritten signature in blue ink, appearing to read 'Anil'.

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A handwritten signature in blue ink, appearing to read 'Manesar'.

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MICROBIOLOGY LAB

Course Code: BTH4109

Credit Units: 02

Course Objectives

The objective of this laboratory course is to provide practical skills on basic microbiological techniques

Learning Outcomes

- Students should be able to:
- Isolate, characterize and identify common bacterial organisms;
- Determine bacterial load of different samples;
- Perform antimicrobial sensitivity tests;
- Preserve bacterial cultures

Course Contents:

Sterilization, disinfection and safety in microbiological laboratory.

Preparation of media for cultivation of bacteria.

Isolation of bacteria in pure culture by streak plate method.

Study of colony and growth characteristics of some common bacteria:

Bacillus, E. coli, Staphylococcus, Streptococcus, etc.

Preparation of bacterial smear and Gram's staining.

Enumeration of bacteria: standard plate count.

Antimicrobial sensitivity test and demonstration of drug resistance.

Maintenance of stock cultures: slants, stabs and glycerol stock cultures

Determination of phenol co-efficient of antimicrobial agents.

Determination of Minimum Inhibitory Concentration (MIC)

IA			EE			
Class Test (Practical Based)	Mid Term Viva	Attendance	Major Experiment	Minor Experiment/Spotting	Practical Record	Viva
15	10	05	35	15	10	10

Text & References:

1. Cappuccino, J. G., & Welsh, C. (2016). Microbiology: a Laboratory Manual. Benjamin-Cummings Publishing Company.
2. Collins, C. H., Lyne, P. M., Grange, J. M., & Falkinham III, J. (2004). Collins and Lyne's Microbiological Methods (8th ed.). Arnolds.
3. Tille, P. M., & Forbes, B. A. Bailey & Scott's Diagnostic Microbiology.



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BIOCHEMISTRY & ANALYTICAL TECHNIQUES LAB

Course Code: BTH4115

Credit Units: 04

Course Objectives

The objective of this laboratory course is to introduce students to experiments in biochemistry. The course is designed to teach students the utility of set of experimental methods in biochemistry in a problem oriented manner.

Learning Outcomes

On completion of this course, students should be able to:

To elaborate concepts of biochemistry with easy to run experiments;

To familiarize with basic laboratory instruments and understand the principle of measurements using those instruments with experiments in biochemistry.

Course Contents:

Preparing various stock solutions and working solutions that will be needed for the course.

To prepare an Acetic-Na Acetate Buffer and validate the Henderson-Hasselbach equation.

To determine an unknown protein concentration by plotting a standard graph of BSA using UV-Vis Spectrophotometer and validating the Beer- Lambert's Law.

Titration of Amino Acids and separation of aliphatic, aromatic and polar amino acids by thin layer chromatography.

Purification and characterization of an enzyme from a recombinant source (such as Alkaline Phosphatase or Lactate Dehydrogenase or any enzyme of the institution's choice).

Preparation of cell-free lysates

Ammonium Sulfate precipitation

Ion-exchange Chromatography

Gel Filtration

Affinity Chromatography

Dialysis of the purified protein solution against 60% glycerol as a demonstration of storage method
Generating a Purification Table (protein concentration, amount of total protein; Computing specific activity of the enzyme preparation at each stage of purification)

Assessing purity of samples from each step of purification by SDS-PAGE Gel Electrophoresis

Enzyme Kinetic Parameters: K_m , V_{max} and K_{cat}

Experimental verification that absorption at OD₂₆₀ is more for denatured DNAs compared to native double stranded DNA. reversal of the same following DNA renaturation. Kinetics of DNA renaturation as a function of DNA size.

Identification of an unknown sample as DNA, RNA or protein using available laboratory tools. (Optional Experiments)

Biophysical methods (Circular Dichroism Spectroscopy, Fluorescence Spectroscopy).

Determination of mass of small molecules and fragmentation patterns by Mass Spectrometry.

IA			EE			
Class Test (Practical Based)	Mid Term Viva	Attendance	Major Experiment	Minor Experiment/Spotting	Practical Record	Viva
15	10	05	35	15	10	10

PLANT AND ANIMAL BIOTECHNOLOGY LAB

Course Code: BTH4116

Credit Units: 04

Course Objectives

The objectives of this course are to provide hands-on training in basic experiments of plant and animal biotechnology.

Learning Outcomes

On completion of course, students should be able to gain basic skills in plant and animal biotechnology.

Course Contents:

Plant Biotechnology

Prepare culture media with various supplements for plant tissue culture.

Prepare explants of *Valleriana wallichii* for inoculation under aseptic conditions.

Attempt in vitro andro and gynogenesis in plants (*Datura stramonium*).

Isolate plant protoplast by enzymatic and mechanical methods and attempt fusion by PEG (available material).

Culture *Agrobacterium tumefaciens* and attempt transformation of any dicot species.

Generate an RAPD and ISSR profile of *Eremurus persicus* and *Valleriana wallichii*.

Prepare karyotypes and study the morphology of somatic chromosomes of *Allium cepa*, *A. sativum*, *A. tuberosum* and compare them on the basis of karyotypes.

Pollen mother cell meiosis and recombination index of select species

(one achiasmate, and the other chiasmate) and correlate with generation of variation.

Undertake plant genomic DNA isolation by CTAB method and its quantitation by visual as well as spectrophotometric methods.

Perform PCR amplification of 'n' number of genotypes of a species for studying the genetic variation among the individuals of a species using random primers.

Study genetic fingerprinting profiles of plants and calculate polymorphic information content.

Syllabus

Animal Biotechnology

Count cells of an animal tissue and check their viability.

Prepare culture media with various supplements for plant and animal tissue culture.

Prepare single cell suspension from spleen and thymus.

Monitor and measure doubling time of animal cells.

Chromosome preparations from cultured animal cells.

Isolate DNA from animal tissue by SDS method.

Attempt animal cell fusion using PEG

IA			EE			
Class Test (Practical Based)	Mid Term Viva	Attendance	Major Experiment	Minor Experiment/Spotting	Practical Record	Viva
15	10	05	35	15	10	10

RESEARCH METHODOLOGY AND SCIENTIFIC COMMUNICATION SKILLS

Course Code: BTH4214

Credit Units: 02

Course Objectives

The objectives of this course are to give background on history of science, emphasizing methodologies used to do research, use framework of these

Learning Outcomes

Students should be able to: Understand history and methodologies of scientific research, applying these to recent published papers; Understand and practice scientific reading, writing and presentations; Appreciate scientific ethics through case studies

Course Contents:

Module 1 History of science and science methodologies

Empirical science; scientific method; manipulative experiments and controls; deductive and inductive reasoning; descriptive science; reductionist vs holistic biology.

Module 2 Preparation for research

Choosing a mentor, lab and research question; maintaining a lab notebook

Module 3 Process of communication

Concept of effective communication- setting clear goals for communication; determining outcomes and results; initiating communication; avoiding breakdowns while communicating; creating value in conversation; barriers to effective communication; non-verbal communication- interpreting non-verbal cues; importance of body language, power of effective listening; recognizing cultural differences; Presentation skills- formal presentation skills; preparing and presenting using over-head projector, PowerPoint; defending interrogation; scientific poster preparation & presentation; participating in group discussions; Computing skills for scientific research - web browsing for information search; search engines and their mechanism of searching; hidden Web and its importance in scientific research; internet as a medium of interaction between scientists; effective email strategy using the right tone and conciseness.

Module 4 Scientific communication

Technical writing skills - types of reports; layout of a formal report; scientific writing skills - importance of communicating science; problems while writing a scientific document; plagiarism, software for plagiarism; scientific publication writing: elements of a scientific paper including abstract, introduction, materials & methods, results, discussion, references; drafting titles and framing abstracts; publishing scientific papers- peer review process and problems, recent developments such as open access and non-blind review; plagiarism; characteristics of effective technical communication; scientific presentations; ethical issues; scientific misconduct

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

- Valiela, I. (2001). *Doing Science: Design, Analysis, and Communication of Scientific Research*. Oxford: Oxford University Press.
- *On Being a Scientist: a Guide to Responsible Conduct in Research*. (2009). Washington, D.C.: National Academies Press.
- Gopen, G.D., & Smith, J.A. The Science of Scientific Writing. *American Scientist*, 78 (Nov-Dec 1990), 550-558.
- Mohan, K., & Singh, N.P. (2010). *Speaking English Effectively*. Delhi: Macmillan India.
- Movie: *Naturally Obsessed, The Making of a Scientist*.



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BIO-ENTREPRENEURSHIP, INTELLECTUAL PROPERTY RIGHTS, BIOSAFETY AND BIOETHICS

Course Code: BTH4306

Credit Units: 03

Course Objectives

Bio-entrepreneurship, an interdisciplinary course, revolves around the central theme of how to manage and develop life science companies and projects. The objectives of this course are to teach students about concepts of entrepreneurship including identifying a winning business opportunity, gathering funding and launching a business, growing and Nurturing the organization and harvesting the rewards.

The other objectives are To understand basic knowledge, policies, requirements, and laws of IPR, Biosafety, and Bio-ethics.

Learning Outcomes

Students should be able to gain entrepreneurial skills, understand the various operations involved in venture creation, identify scope for entrepreneurship in biosciences and utilize the schemes promoted through knowledge centres and various agencies. Understand the rationale for and against IPR and especially patents; Understand why India has adopted an IPR Policy and be familiar with broad outline of patent regulations; Understand different types of IPR.

Course Contents:

Module1 Innovation and entrepreneurship in bio-business

Introduction and scope in Bio-entrepreneurship, Types of bio-industries and competitive dynamics between the sub-industries of the bio sector (e.g. pharmaceuticals vs. Industrial biotech), Strategy and operations of bio-sector firms: Factors shaping opportunities for innovation and entrepreneurship in bio-sectors, and the business implications of those opportunities, Alternatives faced by emerging bio-firms and the relevant tools for strategic decision, Entrepreneurship development programs of public and private agencies (MSME, DBT, BIRAC, Make In India), strategic dimensions of patenting & commercialization strategies.

Module2 Bio markets - business strategy and marketing

Negotiating the road from lab to the market (strategies and processes of negotiation with financiers, government and regulatory authorities), Pricing strategy, Challenges in marketing in bio business (market conditions & segments; developing distribution channels, the nature, analysis and management of customer needs), Basic contract principles, different types of agreement and contract terms typically found in joint venture and development agreements, Dispute resolution skills.

Module3 Finance and accounting

Business plan preparation including statutory and legal requirements, Business feasibility study, financial management issues of procurement of capital and management of costs, Collaborations & partnership, Information technology.

Module4 Technology management

Technology—assessment, development & upgradation, Managing technology transfer, Quality control & transfer of foreign technologies, Knowledge centers and Technology transfer agencies, Understanding of regulatory compliances and procedures (CDSCO, NBA, GCP, GLA, GMP)



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Module 5

Introduction to IPR

Introduction to intellectual property; types of IP: patents, trademarks, copyright & related rights, industrial design, traditional knowledge, geographical indications, protection of new GMOs; International framework for the protection of IP; IP as a factor in R&D; IP of relevance to biotechnology and few case studies; introduction to history of GATT, WTO, WIPO and TRIPS; plant variety protection and farmers rights act; concept of 'prior art': invention in context of "prior art"; patent databases - country-wise patent searches (USPTO, EPO, India); analysis and report formation.

Module 6 Patenting

Basics of patents: types of patents; Indian Patent Act 1970; recent amendments; WIPO Treaties; Budapest Treaty; Patent Cooperation Treaty (PCT) and implications; procedure for filing a PCT application; role of a Country Patent Office; filing of a patent application; precautions before patenting - disclosure/non-disclosure - patent application-forms and guidelines including those of National Bio-diversity Authority (NBA) and other regulatory bodies, fee structure, time frames; types of patent applications: provisional and complete specifications; PCT and conventional patent applications; international patenting - requirement, procedures and costs; financial assistance for patenting - introduction to existing schemes; publication of patents - gazette of India, status in Europe and US; patent infringement - meaning, scope, litigation, case studies and examples; commercialization of patented innovations; licensing - outright sale, licensing, royalty; patenting by research students and scientists - university/organizational rules in India and abroad, collaborative research - backward and forward IP; benefit/credit sharing among parties/community, commercial (financial) and non-commercial incentives.

Module 7 Biosafety

Biosafety and Biosecurity - introduction; historical background; introduction to biological safety cabinets; primary containment for biohazards; biosafety levels; GRAS organisms, biosafety levels of specific microorganisms; recommended biosafety levels for infectious agents and infected animals; definition of GMOs & LMOs; principles of safety assessment of transgenic plants - sequential steps in risk assessment; concepts of familiarity and substantial equivalence; risk - environmental risk assessment and food and feed safety assessment; problem formulation - protection goals, compilation of relevant information, risk characterization and development of an analysis plan; risk assessment of transgenic crops vs cisgenic plants or products derived from RNAi, genome editing tools.

Module 8 National and international regulations

International regulations - Cartagena protocol, OECD consensus documents and Codex Alimentarius; Indian regulations - EPA act and rules, guidance documents, regulatory framework - RCGM, GEAC, IBSC and other regulatory bodies; Draft bill of Biotechnology Regulatory authority of India - containments - biosafety levels and category of rDNA experiments; field trials - biosafety research trials - standard operating procedures - guidelines of state governments; GM labeling - Food Safety and Standards Authority of India (FSSAI).

Module 9 Bioethics

Introduction, ethical conflicts in biological sciences - interference with nature, bioethics in health care - patient confidentiality, informed consent, euthanasia, artificial reproductive technologies, prenatal diagnosis, genetic screening, gene therapy, transplantation. Bioethics in research - cloning and stem cell research, Human and

animal experimentation, animal rights/welfare, Agricultural biotechnology - Genetically engineered food, environmental risk, labeling and public opinion. Sharing benefits and protecting future generations - Protection of environment and biodiversity – biopiracy.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

1. Ganguli, P. (2001). Intellectual Property Rights: Unleashing the Knowledge Economy. New Delhi: Tata McGraw-Hill Pub.
2. National IPR Policy, Department of Industrial Policy & Promotion, Ministry of Commerce, GoI
3. Complete Reference to Intellectual Property Rights Laws. (2007). Snow White Publication Oct.
4. Kuhse, H. (2010). Bioethics: an Anthology. Malden, MA: Blackwell.
5. Office of the Controller General of Patents, Design & Trademarks; Department of Industrial Policy & Promotion; Ministry of Commerce & Industry; Government of India. <http://www.ipindia.nic.in/>
6. Karen F. Greif and Jon F. Merz, Current Controversies in the Biological Sciences - Case Studies of Policy Challenges from New Technologies, MIT Press
7. World Trade Organisation. <http://www.wto.org>
8. World Intellectual Property Organisation. <http://www.wipo.int>
9. International Union for the Protection of New Varieties of Plants. <http://www.upov.int>
10. National Portal of India. <http://www.archive.india.gov.in>
11. National Biodiversity Authority. <http://www.nbaindia.org>
12. Recombinant DNA Safety Guidelines, 1990 Department of Biotechnology, Ministry of Science and Technology, Govt. of India. Retrieved from <http://www.envfor.nic.in/divisions/csurv/geac/annex-5.pdf>
13. Wolt, J. D., Keese, P., Raybould, A., Fitzpatrick, J. W., Burachik, M., Gray, A., Wu, F. (2009). Problem Formulation in the Environmental Risk Assessment for Genetically Modified Plants. Transgenic Research, 19(3), 425-436. doi: 10.1007/s11248-009-9321-9
14. Craig, W., Tepfer, M., Degrassi, G., & Ripandelli, D. (2008). An Overview of General Features of Risk Assessments of Genetically Modified Crops. Euphytica, 164(3), 853-880. doi: 10.1007/s10681-007-9643-8



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BIOPROCESS ENGINEERING & TECHNOLOGY LAB

Course Code: BTH4323

Credit Units: 03

Course Objectives

The objectives of this laboratory course are to provide hands-on training to students in upstream and downstream unit operations

Learning Outcomes

Students should be able to:

- Investigate, design and conduct experiments, analyze and interpret data, and apply the laboratory skills to solve complex bioprocess engineering problems; Apply skills and knowledge gained will be useful in solving problems typical of bio industries and research

Course Contents:

1. Basic Microbiology techniques
 - a) Scale up from frozen vial to agar plate to shake flask culture.
 - b) Instrumentation: Microplate reader, spectrophotometer, microscopy.
 - c) Isolation of microorganisms from soil samples.
2. Experimental set-up
 - a) Assembly of bioreactor and sterilization.
 - b) Growth kinetics.
 - c) Substrate and product inhibition.
 - d) Measurement of residual substrates.
3. Data Analysis
 - a) Introduction to Metabolic Flux Analysis (MFA).
4. Fermentation
 - a) Batch.
 - b) Fed-batch.
 - c) Continuous.
5. Unit operations
 - a) Micro filtration: Separation of cells from broth.
 - b) Bio separations: Various chromatographic techniques and extractions.
6. Bioanalytic
 - a) Analytical techniques like HPLC, FPLC, GC, GC-MS etc. for measurement of amounts of products/substrates.

Text & References:

1. Shuler, M.L., & Kargi, F. (2002). Bioprocess Engineering: Basic Concepts. Upper Saddle River, NJ: Prentice Hall.
2. Stanbury, P.F., & Whitaker, A. (2010). Principles of Fermentation Technology. Oxford: Pergamon Press.
3. Blanch, H. W., & Clark, D.S. (1997). Biochemical Engineering. New York: M. Dekker.
4. Bailey, J.E., & Ollis, D.F. (1986). Biochemical Engineering Fundamentals. New York: McGraw-Hill.
5. El Mansi, M., & Bryce, C.F. (2007). Fermentation Microbiology and Biotechnology. Boca Raton: CRC/Taylor & Francis.

BIOINFORMATICS LAB

Course Code: BTH4324

Credit Units: 03

Course Objectives

The aim of this course is to provide practical training in bioinformatic methods including accessing major public sequence databases, use of different computational tools to find sequences, analysis of protein and nucleic acid sequences by various software packages

Learning Outcomes

On completion of this course, students should be able to: Describe contents and properties of most important bioinformatics databases;

- Perform text- and sequence-based searches and analyze and discuss results in light of molecular biological knowledge;
- Explain major steps in pairwise and multiple sequence alignment, explain principle and execute pairwise sequence alignment by dynamic programming; Predict secondary and tertiary structures of protein sequences

Course Contents:

Using NCBI and Uniprot webresources.

Introduction and use of various genomedatabases.

Sequenceinformationresource:UsingNCBI,EMBL,Genbank,Entrez,Swissprot/ TrEMBL,UniProt.

SimilaritysearchesusingtoolslikeBLASTandinterpretationofresults.

Multiple sequence alignment usingClustalW.

Phylogenetic analysis of protein and nucleotidesequences.

Use of gene prediction methods (GRAIL, Genscan,Glimmer).

Using RNA structure predictiontools.

Use of various primer designing and restriction site predictiontools.

Use of different protein structure prediction databases (PDB,SCOP, CATH).

Construction and study of protein structures usingDeepview/PyMol.

Homology modelling ofproteins.

Useoftoolsformutationandanalysisoftheenergyminimizationof proteinstructures.

Use of miRNA prediction, designing and target predictiontools.



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ENVIRONMENTAL BIOTECHNOLOGY

Course Code: BTH4204

Credit Units: 02

Course Objectives

This course aims to introduce fundamentals of Environmental Biotechnology. The course will introduce major groups of micro organisms tools in biotechnology and their most important environmental applications. The environmental applications of biotechnology will be presented in detail and will be supported by examples from the national and international literature.

Student Learning Outcomes

On completion of course, students will be able to understand use of basic microbiological, molecular and analytical methods, which are extensively used in environmental biotechnology.

Course Contents:

Module I: Introduction to environment.

Introduction to environment; pollution and its control; pollution indicators; waste management: domestic, industrial, solid and hazardous wastes; strain improvement; Biodiversity and its conservation; Role of microorganisms in geochemical cycles; microbial energy metabolism, microbial growth kinetics and elementary chemostat theory, relevant microbiological processes, microbial ecology.

Module II: Bioremediation

Bioremediation: Fundamentals, methods and strategies of application (biostimulation, bioaugmentation)—examples, bioremediation of metals (Cr, As, Se, Hg), radionuclides (U, Te), organic pollutants (PAHs, PCBs, Pesticides, TNT etc.), technological aspects of bioremediation (*in situ*, *ex situ*).

Module III: Role of microorganisms in bioremediation

Application of bacteria and fungi in bioremediation: White rot fungi vs specialized degrading bacteria: examples, uses and advantages vs disadvantages; Phytoremediation: Fundamentals and description of major methods of application (phytoaccumulation, phytovolatilization, rhizofiltration, phyto-stabilization).

Module IV: Biotechnology and agriculture

Bioinsecticides: *Bacillus thuringiensis*, Baculoviruses, uses, genetic modifications and aspects of safety in their use; Biofungicides: Description of mode of actions and mechanisms (e.g. *Trichoderma*, *Pseudomonas fluorescens*); Biofertilizers: Symbiotic systems between plants – microorganisms (nitrogen fixing symbiosis, mycorrhiza fungi symbiosis), Plant growth promoting rhizobacteria (PGPR) – uses, practical aspects and problems in application.

Module V: Biofuels

Environmental Biotechnology and biofuels: biogas; bioethanol; biodiesel; biohydrogen; Description of the industrial processes involved, microorganisms and biotechnological interventions for optimization of production; Microbiologically enhanced oil recovery (MEOR); Bioleaching of metals; Production of bioplastics; Production of biosurfactants: bioemulsifiers; Paper production: use of xylanases and white rot fungi.


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Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

1. G. M. Evans and J. C. Furlong (2003), Environmental Biotechnology: Theory and Applications, Wiley Publishers.
2. B. Ritmann and P. L. McCarty, (2000), Environmental Biotechnology: Principle & Applications, 2nd Ed., McGraw Hill Science.
3. Scragg A., (2005) Environmental Biotechnology. Pearson Education Limited.
4. J. S. Devinny, M. A. Deshusses and T. S. Webster, (1998), Biofiltration for Air Pollution Control, CRC Press.
5. H. J. Rehm and G. Reed, (2001), Biotechnology – A Multi-volume Comprehensive Treatise, Vol. 11, 2nd Ed., VCH Publishers Inc.
6. H. S. Peavy, D. R. Rowe and G. Tchobanoglous, (2013), Environmental Engineering, McGraw-Hill Inc.



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VACCINES

Course Code: BTH4327

Credit Units: 02

Course Objectives

This course will provide students with an overview of current developments in different areas of vaccines.

Learning Outcomes

By the end of this course, students should be able to:

- Understand fundamental concepts of human immune system and basic immunology;
- Differentiate and understand immune responses in relation to infection and vaccination;
- Understand requirement and designing of different types of vaccines;
- Understand importance of conventional and new emerging vaccine technologies.

Course Contents:

Module 1 Fundamentals of immune system

Overview of Immune system; Human Immune system: Effectors of immune system; Innate & Adaptive Immunity; Activation of the Innate Immunity; Adaptive Immunity; T and B cells in adaptive immunity; Immune response in infection; Correlates of protection.

Module 2 Immune response to infection

Protective immune response in bacterial; viral and parasitic infections; Primary and Secondary immune responses during infection; Antigen presentation and Role of Antigen presenting cells: Dendritic cells in immune response; Innate immune response Humoral (antibody mediated) responses; Cell mediated responses: role of CD4+ and CD8+ T cells; Memory responses: Memory and effector T and B cells, Generation and Maintenance of memory T and B cells

Module 3 Immune response to vaccination

Vaccination and immune response; Adjuvants in Vaccination; Modulation of immune responses: Induction of Th1 and Th2 responses by using appropriate adjuvants and antigen delivery systems- Microbial adjuvants, Liposomal and Microparticles as delivery systems; Chemokines and cytokines; Role of soluble mediators in vaccination; Oral immunization and Mucosal Immunity.

Module 4 Vaccine types & Design

History of vaccines, Conventional vaccines; Bacterial vaccines; Viral Vaccines; Vaccines based on routes of administration: parenteral, oral, mucosal; Live attenuated and inactivated vaccine; Subunit Vaccines and Toxoids; Peptide Vaccine.

Module 5 Vaccine technologies

New Vaccine Technologies; Rationally designed Vaccines; DNA Vaccination; Mucosal vaccination; New approaches for vaccine delivery; Engineering virus vectors for vaccination; Vaccines for targeted delivery (Vaccine Delivery systems); Disease specific vaccine design: Tuberculosis Vaccine; Malaria Vaccine; HIV/AIDS vaccine; New emerging diseases and vaccine needs (Ebola, Zika).

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Textbooks and References:

- 1 Janeway, C.A., Travers, P., Walport, M., & Shlomchik, M.J. (2005). Immunobiology: the Immune System in Health and Disease. USA: Garland Science Pub.
- 2 Kindt, T.J., Osborne, B.A., Goldsby, R.A., & Kuby, J. (2013). Kuby Immunology. New York: W.H. Freeman.
- 3 Kaufmann, S.H. (2004). Novel Vaccination Strategies. Weinheim: Wiley-VCH.
- 4 Journal Articles (relevant issues) from: Annual Review of Immunology, Annual Review of Microbiology, Current Opinion in Immunology, Nature Immunology



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RNA BIOLOGY

Course Code: BTH4219

Credit Units: 02

Course Objectives

- A) Learn basic tenets of RNA Biology
- B) Explore emerging topics in RNA Biology including CRISPR/Cas9, differential RNA processing and stability, RNA Epi-transcriptomics, and functions of diverse classes of non-coding RNAs

Learning Outcomes

On successful completion of this course, students should be able to This course will focus on recent research in RNA biology: differential RNA processing and stability (splicing, polyadenylation, and turnover), the functional significance of various classes of non-coding RNAs (microRNAs, lncRNAs, cRNAs, ceRNAs, eRNAs, etc...), the CRISPR/Cas9 system, and RNA epi-transcriptomics (RNA methylation and terminal uridylation). Class lectures and discussions will be predominantly.

Course Contents:

Module1 Introduction to RNA biology

Introduction to RNA Biology and the Course Objectives, RNA Processing and Turnover, RNA and Translation, RNA Editing, Modifications and the Epi-transcriptome. The functions of Noncoding RNAs; the Long and the Short of it.

Module2 RNA therapeutics

RNA-based approaches to target identification and validation: Microarray, miRNAs; RNAi and CRISPR functional screens

- 2. RNA Therapeutic approaches: Gene therapy issues, Antisense, Ribozymes
- 3. RNA Therapeutic approaches: Aptamers, Riboswitches
- 4. RNA Therapeutic approaches: RNAi
- 5. RNA Therapeutic approaches: CRISPR, Combination therapies, Nano-formulations
- 6. RNA Therapeutic Efficacy considerations: Chemical modifications, Delivery challenges

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Textbooks and References:

- 1. Molecular Biology of RNA by David Elliot & Michael Lodomery, Oxford Press, second edition, ISBN 978-0-19-967139-7.



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CANCER BIOLOGY

Course Code: BTH4328

Credit Units: 02

Course Objectives

The Cancer Biology elective course will provide knowledge of critical aspects in human cancer biology for better understanding of its development, diagnostics methods as well as clinical/experimental therapeutics available for cancer therapy.

This course provides students with a broad overview of diverse fields of oncology, covering historical perspectives to cutting-edge approaches. The course will span several aspects of cancer research including its genetics, molecular and cellular biology, cancer micro-environment and its physiology, as well as classical vs experimental therapies available for tumor treatment. This course should specially be appealing to students who are interested in studying cancer research for their future career paths.

Learning outcomes:

On completion of this course, students should be able to:

- Describe tumor progression and important 'hallmarks' of cancer
- Understanding of the molecular and cellular origins of cancer
- Key signaling pathways in cancer development and progression
- knowledge of current perspectives about cancer research and current therapies.

Course Contents:

Module1 Introduction

Cancer hallmarks, Carcinogenesis, Oncogenes and tumor viruses, Tumor suppressor genes.

Module2 Cancer signaling

Signal transduction programs in cancer, De-regulation of the cell cycle/cell growth in cancer, Genomic instability and DNA repair in cancer, Apoptosis (p53), autophagy and cancer metabolism

Module3 Cell biology of cancer

The cancer microenvironment – hypoxia, inflammation, angiogenesis and stromal-cancer interactions, Invasion and Metastasis.

Module4 Diagnostics of cancer

Tumor immunology and immunotherapy, Cancer diagnostics – biomarkers, Cancer therapies, Translational research

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70



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MACHINE LEARNING-I

Course Code: DSC4102

Credit Units-03

Course Contents:

Module 1: An Introduction to Machine Learning:

Introduction to machine learning, What is ML, Types of ML, Applications used for ML, AI vs ML, Essential for ML and AI.

Module 2: Techniques of Machine Learning:

Introduction to Supervised, unsupervised, semi-supervised, and reinforced machine learning techniques

Module 3: Introduction to Supervised Learning:

Training, validation, test data, and Over fitting and complexity

Module 4: Managing and understanding data:

Data description, Data processing, Dimension Reduction.

Module 5: Data Preprocessing:

Comprehend the meaning, process, and importance of data preparation, feature engineering and scaling of datasets.

Module 6: Evaluating model performance:

Measures performance for the classification problem. Discuss different performance measures.

Module 7: Resampling methods:

Discuss different cross validation techniques. Leave-One-Out Cross-Validation, k-Fold Cross Validation

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

- Programming Collective Intelligence by Toby Segaran
- Machine Learning for Hackers by Drew Conway and John Myles
- Machine Learning by Tom M. Mitchell
- Pattern Recognition and Machine Learning by Christopher M. Bishop (Author)
- Machine Learning Yearning by Andrew NG
- The Elements of Statistical Learning by Trevor Hastie , Robert Tibshirani , Jerome Friedman



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STATISTICS & EXPLORATORY DATA ANALYSIS

Course Code: DSC4103

Credit Units-03

Course Contents:

Module 1: Descriptive Statistics

Statistics: Preliminary concepts; Measures of Central Tendency: Mean, Median, Mode

Measures of Dispersion: Range, Standard deviation, Variance, Covariance, Graphical Representation of Statistics: Histograms, Bar plots, Scatter plots etc.

Module 2: Probability

Random Experiments, Trial and Event, Sample Space, Mutually Exclusive or Disjoint Events, Mutually Exhaustive Events, Equally Probable Events, Complementary Event, Classical definition of Probability, Statistical definition of Probability, Axiomatic definition of Probability, Addition theorem, Multiplication theorem, Conditional Probability, Bayes' Theorem. Expectation.

Module 3: Continuous Distribution

Normal Distribution, Properties of Normal distribution

Module 4: Correlation

Bivariate distribution Correlation, Types of Correlation, Simple Correlation Coefficient for ungrouped data, Properties and Interpretation of Correlation Coefficient, Coefficient of determination, Scatter diagram, Standard Error, Probable error of Correlation Coefficient. Rank correlation, Some examples.

Module 5: Introduction to the Inferential Statistics

Parameter, Statistic, Null hypothesis, Alternative hypothesis, Critical region, Type1 Error, Type 11 Error, Level of significance, P-value and its applications.

Test of Significance for Small samples: One sample t-test, Paired t-test, Degrees of freedom for t-test, F test for equality of Population variances, Degrees of freedom for F-test.

Test of Significance for Large samples: Normal test for sample mean and population mean, Normal test for two sample means.

Chi-square Test: Test of goodness of fit, Test of Independence of attributes, Degrees of freedom for Chisquare test, Coefficient of contingency, Yates' correction for continuity.

Analysis of Variance: One way and Two way (only Examples)

Module 6: Introduction to Model Building:

Basics of Model building, Definition of a Model, Point estimation, Confidence intervals, Testing

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

- A first course in Probability, Sheldon Ross
- An introduction to Probability and Statistics, Vijay K. Rohatgi and A. K. Md. Ehsanes Saleh
- Biostatistics: A foundation for analysis in the Health Sciences, W.W Daniel. Publisher: John Wiley and Sons.
- Biostatistics, P.N Arora and P.K Malhan. Publisher: Himalaya Publishing House.

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DATABASE MANAGEMENT SYSTEM-I

Course Code: DSC4104

Credit Units-02

Course Contents:

- SQL (Structured Query Language)
- Data Definition Language (DDL): Create, Alter and Drop commands
- Data Manipulation Language (DML): Select, Insert, Update, and Delete commands, Basic SQL queries, Integrity constraints on tables,
- Data Control Language Commands(DCL): Grant and Revoke
- SQL Functions
- SQL querying to do operations such as identifying nulls, special characters, blank rows/columns, and run distributions, run data summaries, merge tables, get unique counts
- SQL Joins, Aggregate functions and GROUP BY, Nested queries and sub queries. GROUP BY CLAUSE along basic aggregations such as SUM, COUNT, AVG RANK(), ROWNUM() & DENSE_RANK. UNION and UNION ALL CASE statement
- Introduction to Advanced SQL concepts: Indexes, Sequence, Clusters, Views, Cursors and Triggers, Embedded SQL
- Introduction to SQLITE
- Introduction to NoSQL and its capabilities
- Contrast MySQL with NOSQL
- Introduction to SQLITE
- Introduction to POSTGRESQL

Examination Scheme:

IA			EE			
Class Test (Practical Based)	Mid Term Viva	Attendance	Major Experiment	Minor Experiment/Spotting	Practical Record	Viva
15	10	05	35	15	10	10

Text & References:

- Database System Concepts, Abraham Silberschatz, Henry F. Korth, and S. Sudarshan
- An Introduction to Database Systems, C J Date
- Fundamentals of Databases – Elmasri and Navathe.
- Database Management Systems – Raghu Ramakrishna, Johannes Gehrke



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PROGRAMMING TOOL BOX I-R

Course Code: DSC4105

Credit Units-01

Course Contents:

Module 1: An Introduction to R

Overview of R programming, applications, usage and comparative study with other softwares and introduction to R for Data Science

Module 2: Setting up R environment and packages

Setting up R environment and install packages and supporting libraries in R

Module 3: Basics of R

Manage your data and work-space, Save your work, How to use R, Data structure in R, Data creation and curation and special function using R

Module 4: File Handling

Reading different file format using R, file handling and processing, writing output file.

Module 5: Graphics using R

Graphics device, Basic plot function, scatter plot, 3-D scatter plot, pairplots, Lineplot, Matplot, Matpoints, Bar plot, Histogram plot, Density plot, Dot plot, Pie chart, Venn diagram, Grid graphics, Lattice, ggplot2, Interactive plotting, combine multiple plots in same graphics screen, save graphics to a file.

Module 6: Programming using R

Conditional Executions, Comparison Operators, Logical Operators, Control Structures, If statements, Ifelse statements, Loops, For loop, While loop, Apply loop family, Other loops,

Module 7: Functions

Define and Call functions, Syntax Rules for functions, Control utilities for functions, Writing own function

Module 8: Advance R

Advance R functions and Regular expressions, Object oriented programming, Building R package

Module 9: Case study

Examination Scheme:

IA			EE			
Class Test (Practical Based)	Mid Term Viva	Attendance	Major Experiment	Minor Experiment/Spotting	Practical Record	Viva
15	10	05	35	15	10	10


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Text & References:

- A Handbook of Statistical analysis using R, Brain Everitt and Torsten Hothorn
- The art of R programming, Norman Matloff
- Data Analysis and Graphics using R, W. John Braun
- R Graphics, Paul murrell
- R for Data Science, Garrett Golemund and Hadley Wickham
- Linear Models with R, Julian J. Faraway



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PROGRAMMING TOOL BOX II-PYTHON

Course Code: DSC4106

Credit Units-01

Course Contents:

Python Programming

Module 1: Introduction to Python :

Overview of Python, applications, usage and comparative study with other softwares.

Module 2: Basics of Python :

Syntax, Data Types, Variables, Operators, Input/output, Flow of Control (Modules, Branching)

Module 3: Basic Programming with Python :

If, If- else, Nested if-else, Looping, For, While, Nested loops, Control Structure, Break, Continue, Pass,

Module 4: Data Structures of Python :

Strings and Tuples, Accessing Strings, Basic Operations, String slices, Working with Lists, Introduction, Accessing list, Operations, Function and Methods, Files, Modules, Dictionaries, Functions and Functional Programming, Declaring and calling Functions, Declare, assign and retrieve values from Lists, Introducing Tuples, Accessing tuples

Module 5: Advanced Python :

Object Oriented, OOPs concept, Class and object, Attributes, Inheritance, Overloading, Overriding, Data hiding, Operations Exception, Exception Handling, Except clause, Try finally clause, User Defined Exceptions

Module 6: Python Libraries :

Introduction to Machine learning packages like NUMPY, SCIPY, PANDAS etc.

Examination Scheme:

IA			EE			
Class Test (Practical Based)	Mid Term Viva	Attendance	Major Experiment	Minor Experiment/Spotting	Practical Record	Viva
15	10	05	35	15	10	10

Text & References:

- Think Python by Allen B. Downey
- Introducing Python by Bill Lubanovic
- Hello World by Warner Sande and Carter Sande
- Learning Python , 5th Edition , Mark Lutz
- Python For Data Analysis by W Mckinney



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BIG DATA TOOLS & TECHNOLOGIES-I

Course Code: DSC4107

Credit Units-01

Course Contents:

Module 1: Introduction to Big Data

Big Data and its Importance, V's of Big Data, Drivers for Big Data, Introduction to Big Data Analytics, Big Data Analytics applications.

Module 2: Introduction to Hadoop

Hadoop Introduction, Hadoop key characteristics, Hadoop Core Components, Hadoop Ecosystem, Hadoop Services, Different Hadoop Modes, Hadoop's Parallel World – Data discovery

Module 3: Understanding Hadoop

Hadoop Installation, Hadoop Cluster Setup, Storing Data in Hadoop, HDFS Commands (Basics, Intermediate and Advanced), Processing your data with Map Reduce, Customizing Map Reduce Execution, Building Reliable MapReduce Apps, Run test example using Map reduce, Distributed Cache, Map side join vs Reduce Side Join, Running Hadoop applications

Module 4: Processing Big Data

Integrating disparate data stores, Mapping data to the programming framework, Connecting and extracting data from storage, Transforming data for processing, Subdividing data in preparation for Hadoop Map Reduce.

Module 5: Hadoop Map Reduce

Employing Hadoop Map Reduce, Creating the components of Hadoop Map Reduce jobs, Distributing data processing across server farms, Executing Hadoop Map Reduce jobs, Monitoring the progress of job flows, The Building Blocks of Hadoop Map Reduce, Distinguishing Hadoop daemons, Investigating the Hadoop Distributed File System Selecting appropriate execution modes: local, pseudo-distributed, fully distributed.

Examination Scheme:

IA			EE			
Class Test (Practical Based)	Mid Term Viva	Attendance	Major Experiment	Minor Experiment/Spotting	Practical Record	Viva
15	10	05	35	15	10	10

Text & References:

- Big Data and Analytics, Seema Acharya , Subhashini Chellappan
- Professional Hadoop Solution, Boris Lublinsky, Kevin T. Smith, Alexey Yakubovich



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INTRODUCTION TO LINUX

Course Code: DSC4108

Credit Units-01

Course Contents:

Module 1: Operating System:

Introduction: Windows and Unix/Linux, Definition; Concepts; Function of Operating System; Batch Processing; Multiprogrammed Batch System; Time Sharing System; Parallel System; Distributed System; Real Time System.

Module 2: Process & Memory Management:

Process; Process State(New, Running, Waiting, Ready, Termination); Process Control Block; Process Scheduling (Round Robin Scheduling, Priority Scheduling, Multiple Queues, Shortest Job Scheduling); Operations on Process; Basic Management of Memory; Swapping Virtual Memory; Paging.

Module 3: Input/Output Management:

I/O Devices; Device Controllers; I/O Software; Device Drivers; Deadlock; Resources; Principles of Dead Lock; Detection and Recovery; Deadlock Prevention; Deadlock Avoidance.

Module 4: UNIX/LINUX Operating Systems:

Introduction; Concepts; Layers of UNIX; Role of System Administrator and Ordinary User; Tree Structure of UNIX; Root File System; /bin Directory; /dev Directory; /etc Directory; /lib Directory; /proc Directory; /mnt Directory; /root Directory; /sbin Directory; /tmp Directory; /var Directory; Relative Path; Absolute Path; Creation of Directory; Creating file; removing file; Listing Files and Directories copying file; renaming file; Changing File Permission; Changing Director Permission; Changing Group; Changing Owner; Pipe; Filters; pwd command; date command; head command; tail command less command; more command; grep command; VI Editor (Creating a new File; Inserting Text in File; Deleting Text in File; Copy , Cut & Paste Text; Save File).

Module 5: Shell Programming:

Variables(Configuration Variable & Environmental Variable); Operators(Arithmetic Operator, Logical Operator, Relational Operator); Instruction(Sequence Control Instruction, Selection Control Instruction, Repetition or Loop Instruction); echo command; read command; outtput command.

Module 6: System Monitoring:

System monitoring, process information, log files, run level, system recovery, Memory management

Examination Scheme:

IA			EE			
Class Test (Practical Based)	Mid Term Viva	Attendance	Major Experiment	Minor Experiment/Spotting	Practical Record	Viva
15	10	05	35	15	10	10

Text & References:

- Ramesh Bangia. 2015. Learning Unix. BPB Publication.
- Peter Baer Galvin. 2016. Operating System Concepts. BPB Publication
- Stuart E. Madnick. 2001. Operating System. Tata Mac Graw Hill.
- Kenneth H. Roshan. 2007. The complete reference Unix Tata Mac Graw Hill..
- D. M. Dhamethire. , 2011. System Programming and Operating Systems. Tata Mac Graw Hill.
- Kirrgcox. 2001. Red Hat Linux by. Printice Hill India.
- Andrew S. Talenbaum. 2008. Modern Operating system. Printice Hill India.
- Sumetabha Das. 2013. Unix (Concept and Application). Tata Mac Graw Hill.



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MACHINE LEARNING-I LAB

Course Code: DSC4109

Credit Units-01

Course Contents:

Module 1: Supervised Learning:

Splitting the data into Training and test data, Understanding Overfitting and complexity with case studies

Module 2: Managing and understanding data:

Understanding Data description, Data processing, Dimension Reduction through case studies

Module 3: Data Preprocessing:

Understanding data preparation, feature engineering and scaling, datasets, dimensionality reduction through case studies

Module 4: Evaluating model performance: Calculation of Measures performance for the classification problem.

Module 5: Cross Validation techniques: Case studies of Leave-One-Out Cross-Validation, k-Fold Cross Validation and other cross validation techniques

Examination Scheme:

IA			EE			
Class Test (Practical Based)	Mid Term Viva	Attendance	Major Experiment	Minor Experiment/Spotting	Practical Record	Viva
15	10	05	35	15	10	10

Text & References:

- Programming Collective Intelligence by Toby Segaran
- Machine Learning for Hackers by Drew Conway and John Myles
- Machine Learning by Tom M. Mitchell
- Pattern Recognition and Machine Learning by Christopher M. Bishop (Author)
- Machine Learning Yearning by Andrew NG
- The Elements of Statistical Learning by Trevor Hastie, Robert Tibshirani , Jerome Friedman



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STATISTICS & EXPLORATORY DATA ANALYSIS LAB

Course Code: DSC4110

Credit Units-01

Course Contents:

Module 1: Descriptive Statistics

Calculation and interpretation of Descriptive Statistics

Module 2: Probability

Understanding the preliminary concepts of probability through case studies

Module 3: Continuous Distribution

Generation of statistical distributions

Module 4: Correlation

Calculation of correlation understanding and interpreting correlation through case studies

Module 5: Introduction to the Inferential Statistics

Understanding inferential statistics through case studies

Module 6: Introduction to Model Building:

Understanding Basics of Model building, Definition of a Model, Point estimation, Confidence intervals, Testing through case studies

Examination Scheme:

IA			EE			
Class Test (Practical Based)	Mid Term Viva	Attendance	Major Experiment	Minor Experiment/Spotting	Practical Record	Viva
15	10	05	35	15	10	10

Text & References:

- A first course in Probability, Sheldon Ross
- An introduction to Probability and Statistics, Vijay K. Rohatgi and A. K. Md. Ehsanes Saleh
- Biostatistics: A foundation for analysis in the Health Sciences, W.W Daniel. Publisher: John Wiley and Sons.
- Biostatistics, P.N Arora and P.K Malhan. Publisher: Himalaya Publishing House.


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MACHINE LEARNING-II

Course Code: DSC4201

Credit Units-03

Course Contents:

Module 1: Basic concepts to calculate distance and similarities

Discuss different methods to calculate distance and similarities including euclidean distance, squared euclidean distance, Manhattan distance, Cosine distance, Chebyshev distance, Canberra distance, Minikowski distance, correlation distance, partial correlation distance, mutual information and rank correlation coefficients

Module 2: Introduction to unsupervised learning

Discuss theory and concepts behind unsupervised learning

Module 3: Clustering:

Finding grouping of data. Hierarchical clustering, k-means and K-medoid clustering algorithm

Module 4: Application to Machine Learning:

Classification using Nearest Neighbors, Naive Bayes, Support Vector Machine, Market basket analysis using Association Rules

Module 5: Case study

Solve a case study on real world data and apply machine learning concepts.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

- Advanced Lectures on Machine Learning. Springer-Verlag. Bousquet, O.; von Luxburg, U.; Raetsch, G., eds.
- "Unsupervised Learning and Clustering". Pattern classification (2nd ed.). Wiley. Duda, Richard O.; Hart, Peter E.; Stork, David G.
- The Elements of Statistical Learning: Data mining, Inference, and Prediction. New York: Springer. Hastie, Trevor; Tibshirani, Robert.
- Unsupervised Learning: Foundations of Neural Computation. MIT Press. Hinton, Geoffrey; Sejnowski, Terrence J., eds.



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REGRESSION THEORY & ANALYSIS

Course Code: DSC4202

Credit Units-03

Course Contents:

Module 1: Simple linear regression: Estimation of the Parameters, Hypothesis Testing on the Slope and Intercept, Interval Estimation in Simple Linear Regression, Prediction of New Observations, Coefficient of Determination

Module 2: Multiple regression: Estimation of Parameters, Hypothesis Testing, Confidence Intervals, Prediction

Module 3: Model Adequacy testing: Residual Analysis, PRESS statistic, Lack of Fit

Module 4: Transformations: Variance stabilising transformations, Transformations to linearise the model, Methods to select a transformation, Weighted least squares, Regression and random effect

Module 5: Multicollinearity: Sources, Effects, Diagnostics, Methods of dealing with Multicollinearity

Module 6: Validation of regression models: Techniques for validation


Module 7: Introduction to non linear regression and GLM: Non linear least squares, Transformations, Parameter estimation, Logistic and poisson regression

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

- Introduction to Linear Regression Analysis, by Douglas C. Montgomery, Elizabeth A. Peck, G. Geoffrey Vining
- Introduction to Regression Analysis, M. Golberg and H.A Cho
- Applied Regression Analysis, Norman R. Draper and Harry Smith


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DATABASE MANAGEMENT SYSTEM-II

Course Code: DSC4204

Credit Units-02

Course Contents:

Module 1: MongoDB

A Database for the internet, MongoDB's key features, MongoDB's core server and tools, Why MongoDB? , History of MongoDB, Diving into the MongoDB shell, Creating and Querying with indexes, Basic Administration, Writing Program using MongoDB

Module 2: Application Development in MongoDB

Document oriented data, Constructing queries, Aggregation, Update ,atomic operations and deletes, E-commerce updates, Atomic document processing

Module 3: MongoDB Mastery

Indexing and query optimization, Text Search, Wired Tiger and pluggable storage, Replication, Scaling your system with Sharding, Deployment and Administration

Module 4: Apache Cassandra

Big Data and Apache Cassandra, Importance of Cassandra, Cassandra as a Distributed Database, Cassandra and High Availability, Cassandra and Replication Mechanism, Cassandra's Elastic Scalability, Tune able consistency (Strict Consistency , Casual Consistency , Weak Consistency , Brewer's CAP Theorem ,Cassandra as a Schema Free Database, Where should we use Cassandra , Who and why using the Cassandra

Examination Scheme:

IA			EE			
Class Test (Practical Based)	Mid Term Viva	Attendance	Major Experiment	Minor Experiment/Spotting	Practical Record	Viva
15	10	05	35	15	10	10

Text & References:

- MongoDB: The definitive guide by Kristina Chodorow, Michael Dirolf
- Cassandra: The Definitive Guide, Eben Hewitt
- MangoDB in Action, Kyle Banker, Peter Bakkum, Shaun Verch, Douglas Garrett, Tim Hawkins



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SPARK

Course Code: DSC4205

Credit Units-01

Course Contents:

Module 1: Introduction to Apache Spark

Introduction to Apache Spark, Features of Apache Spark, Apache Spark Stack, Introduction to RDD's, RDD's Transformation, What is good and Bad in Map Reduce , Why to use Apache Spark

Module 2: Spark: A Hadoop Replacement?

Java, Scala, or Python? , Scala, Packages, Data Types, Classes, Calling Functions, Operators, Control Structures

Module 3: A Quick Intro to Spark

Starting the shell, Data Sources, Testing Spark, Spark Monitor, Comparing Hadoop Map Reduce to Spark, Writing Standalone program with Spark

Module 4: Spark SQL

Basic Concepts, Using Spark SQL with RDDs

Module 5: Spark Streaming

Basic Concepts, Creating Your First Stream with Scala, Creating Your First Stream with Java

Examination Scheme:

IA			EE			
Class Test (Practical Based)	Mid Term Viva	Attendance	Major Experiment	Minor Experiment/Spotting	Practical Record	Viva
15	10	05	35	15	10	10

Text & References:

- Spark in Action, Marko Bonaci, Peter Zecevic
- Spark Cookbook, Rishi Yadav
- Machine Learning for Big Data , Jason Bell
- Spark : The Definitive Guide, Matei Zaharia, Bill Chambers

DATA VISUALIZATION

Course Code: DSC4206

Credit Units-01

Course Contents:

Module 1: Introduction to data visualization:

Introduction to data visualization. Explore and manipulate all graphical parameter. Drawing graphs such as scatterplot, stripchart, histogram, boxplot, violin chart, bar chart, dot plot, line graph, line plot, multiplot, stacked bar chart, pie diagram, venn diagram, pair plot. Explore 3d chart, motion chart, interactive charts. Discuss selecting appropriate chart for strategy presentation. Save graphs in various formats. Discuss different ways to combine multiple figures. Discuss margin and graph size.

Module 2: Introduction to Tableau:

Creating Visual Analytics with Tableau Desktop, Connecting to your data, Building your first visualization, Creating Calculations to enhance your data, using maps to improve insight, developing an Ad Hoc Analysis Environment, Tips Tricks and Time Savers, Bringing it all together with dashboards. Installing Tableau Server, Using Tableau server to facilitate fact based team collaboration, Automating Server with Tableau's command line tools, Use case for rapid fire visual analytics, other Tools. Explore various case studies to visualize the data.

Examination Scheme:

IA			EE			
Class Test (Practical Based)	Mid Term Viva	Attendance	Major Experiment	Minor Experiment/Spotting	Practical Record	Viva
15	10	05	35	15	10	10

Text & References:

- Tableau your data, Daniel G Murray
- Introduction to ggplot2, Babraham bioinformatics.



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BIG DATA TOOLS & TECHNOLOGIES-II

Course Code: DSC4207

Credit Units-01

Course Contents:

Module 1: Fundamental of Apache Pig

What is Pig?, Introduction to Pig Data Flow Engine, Pig and Map Reduce in Detail, When should Pig Used?, Pig and Hadoop Cluster, Pig Interpreter and Map Reduce, Pig Relations and Data Types, Pig example in Detail, Debugging and Generating Example in Apache Pig

Pig philosophy and architecture, Pig installation, Grunt shell, Loading data, Exploring Pig Latin commands, Pig Transformations functions, Joins in Pig, Hands on Exercises

Module 2: Fundamental of Apache Hive

What is Hive?, Architecture of Hive, Hive Services, Hive Clients, How Hive Differs from Traditional RDBMS, Introduction to HiveQL, Data Types and File Formats in Hive, File Encoding , Common problems while working with Hive

Hive architecture, Hive installation, Hive vs. RDBMS, HiveQL and the Hive shell, Data types and schemas, Creating tables (external vs. managed), Creating Partitions, Creating Views, UDF function in java in Hive, Using hive to create diff types of format

Examination Scheme:

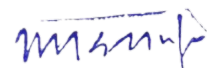
IA			EE			
Class Test (Practical Based)	Mid Term Viva	Attendance	Major Experiment	Minor Experiment/Spotting	Practical Record	Viva
15	10	05	35	15	10	10

Text & References:

- Programming PiG, Wiley Publication, Alan Gates
- Programming Hive, Wiley Publication, Jason Rutherglen, Dean Wampler & Edward Capriolo



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MACHINE LEARNING-II LAB

Course Code: DSC4208

Credit Units-01

Course Contents:

Module 1: Basic concepts to calculate distance and similarities

Discuss different methods to calculate distance and similarities including euclidean distance, squared euclidean distance, Manhattan distance, Cosine distance, Chebyshev distance, Canberra distance, Minikowski distance, correlation distance, partial correlation distance, mutual information and rank correlation coefficients

Module 2: Clustering:

Finding grouping of data. Hierarchical clustering, k-means and K-medoid clustering algorithm

Module 3: Application to Machine Learning:

Solve a case study on real world data and apply machine learning concepts. Classification using Nearest Neighbors, Naive Bayes, Support Vector Machine, Market basket analysis using Association Rules

Examination Scheme:

IA			EE			
Class Test (Practical Based)	Mid Term Viva	Attendance	Major Experiment	Minor Experiment/Spotting	Practical Record	Viva
15	10	05	35	15	10	10

Text & References:

- Advanced Lectures on Machine Learning. Springer-Verlag. Bousquet, O.; von Luxburg, U.; Raetsch, G., eds.
- "Unsupervised Learning and Clustering". Pattern classification (2nd ed.). Wiley. Duda, Richard O.; Hart, Peter E.; Stork, David G.
- The Elements of Statistical Learning: Data mining, Inference, and Prediction. New York: Springer. Hastie, Trevor; Tibshirani, Robert.
- Unsupervised Learning: Foundations of Neural Computation. MIT Press. Hinton, Geoffrey; Sejnowski, Terrence J., eds.



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REGRESSION THEORY & ANALYSIS LAB

Course Code: DSC4209

Credit Units-01

Course Contents:

Module 1: Simple linear regression:

Estimation of the Parameters, Hypothesis Testing on the Slope and Intercept, Interval Estimation in Simple Linear Regression, Prediction of New Observations, Coefficient of Determination through case studies

Module 2: Multiple regression:

Estimation of Parameters, Hypothesis Testing, Confidence Intervals, Prediction through case studies

Module 3: Model Adequacy testing:

Residual Analysis, PRESS statistic, Lack of Fit through case studies

Module 4: Multicollinearity:

Sources, Effects, Diagnostics, Methods of dealing with Multicollinearity through case studies

Examination Scheme:

IA			EE			
Class Test (Practical Based)	Mid Term Viva	Attendance	Major Experiment	Minor Experiment/Spotting	Practical Record	Viva
15	10	05	35	15	10	10

Text & References:

- Introduction to Linear Regression Analysis, by Douglas C. Montgomery, Elizabeth A. Peck, G. Geoffrey Vining
- Introduction to Regression Analysis, M. Golberg and H.A Cho
- Applied Regression Analysis, Norman R. Draper and Harry Smith



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DATA STRUCTURE & ALGORITHM DESIGN LAB

Course Code: DSC4210

Credit Units-01

Course Contents:

Module I

Stack implementation through arrays, link list

Module II

Programs for recursion functions

Module III

Implementation of queues and leap structures

Module IV

Application of binary trees in pre-order, post-order and in-order evaluation

Module V

A VL tree implementation

Module VI

Optimal matrix multiplication

Examination Scheme:

IA			EE			
Class Test (Practical Based)	Mid Term Viva	Attendance	Major Experiment	Minor Experiment/Spotting	Practical Record	Viva
15	10	05	35	15	10	10

Text & References:

Text:

- Data Structures and Algorithms, A.V. Aho, J.E. Hopcroft and J. Ullman, Addison-Wesley Publishing
- Database Design, Development and Deployment with Student CD, P. Rob and E. Semaan, McGraw-Hill/Irwin
- Schaum's Outline of Data Structures with C++, J.R. Hubbard, McGraw Hill Trade.

References:

- Database system concepts, A. Silberschatz, P.B. Galvin and G. Gagne, John Wiley and Sons Inc.
- Introduction to Data Structures and Application, J. Tremblay and P.G. Sorensen, McGraw Hill College Division



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PATTERN RECOGNITION

Course Code: DSC4211

Credit Units-01

Course Contents:

Statistical Pattern Recognition

Introduction, Gaussian model, discriminant functions, classifier performance, risk and errors; supervised learning using parametric and nonparametric approaches: ML estimation, Bayesian parameter estimation approach, Parzen Windows, k-nn estimation; Unsupervised learning and clustering: the clustering concept, c-means algorithm, learning vector quantization, clustering strategies, a hierarchical clustering procedure.

Examination Scheme:

IA			EE			
Class Test (Practical Based)	Mid Term Viva	Attendance	Major Experiment	Minor Experiment/Spotting	Practical Record	Viva
15	10	05	35	15	10	10

Text & References:

- R.Schalkoff, Pattern Recognition: Statistical, Structural and Neural Approaches, John Wiley & Sons, NY, 1992.
- Duda R O and P E Hart, Pattern classification and scene analysis, John Wiley & Sons, NY 1973
- K.S.Fu, Syntactic pattern recognition and applications, Prentice Hall, NJ, 1982
- T.Pavlidis, Structural pattern recognition, Springer-Verlag, NY, 1977
- D.H.Ballad and C.M.Brown, Algorithms for computer vision, Prentice Hall, 1982



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NEXT GENERATION SEQUENCING ANALYSIS

Course Code: DSC4212

Credit Units-01

Course Contents:

Module 1: Introduction to NGS and NGS Technologies

Introduction to sequencing technologies from a data analysts view, Concept, Applications of sequencing technologies in Whole genome assembly; Gene expression analysis; Genome annotation; Gene regulation analysis; Variation studies

Module 2: NGS data analysis: Preprocessing

Introduction to NGS data analysis, Raw sequence files (FASTQ format), Preprocessing of raw reads: quality control (FastQC), adapter clipping, quality trimming, Introduction to read mapping (Alignment methods, Mapping heuristics), Read alignment to a reference genome (BWA, Bowtie2, TopHat), Mapping output (SAM/BAM format), Usage of important NGS toolkits (samtools, BEDtools), Mapping statistics, Visualization of mapped reads (IGV, UCSC)

Module 3: NGS data analysis: Variant calling

DNA variant calling and Filtering DNA variants using GATK pipeline

Module 4: NGS data analysis: Gene Expression Analysis

Genomics and transcriptome assembly, Differential Expression analysis, Quantification of expression,

Examination Scheme:

IA			EE			
Class Test (Practical Based)	Mid Term Viva	Attendance	Major Experiment	Minor Experiment/Spotting	Practical Record	Viva
15	10	05	35	15	10	10

Text & References:

- Exploring Personal Genomics, 1st Edition, Joel T. Dudley, Konrad J. Karczewski, ISBN-13: 978-0199644490, Oxford University Press, 2013
- High-Throughput Next Generation Sequencing, Methods and Applications, Editors: Kwon, Young Min, Rieke, Steven C. (Eds.), ISBN 978-1-61779-089-8, Springer, 2011
- Next Generation Sequencing Technologies and Challenges in Sequence Assembly, El-Metwally, M.Sc, Sara, Ouda, Osama M., Helmy, Mohamed, ISBN 978-1-4939-0715-1, Springer 2014



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ASSOCIATION RULE MINING

Course Code: DSC4213

Credit Units-01

Course Contents:

Where Is Association Learning Used? , Web Usage Mining, Beer and Diapers, How Association Rules Learning Works, Support, Confidence, Lift, Conviction, Defining the process, Algorithms(Apriori, FP-Growth), Mining the Baskets- Market basket analysis

Examination Scheme:

IA			EE			
Class Test (Practical Based)	Mid Term Viva	Attendance	Major Experiment	Minor Experiment/Spotting	Practical Record	Viva
15	10	05	35	15	10	10

Text & References:

- Machine Learning for Big Data HANDS-ON FOR DEVELOPERS AND TECHNICAL PROFESSIONALS- Jason Bell



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GENERALIZED & LINEAR MODELING

Course Code: DSC4301

Credit Units-03

Course Contents:

Module 1: Introduction to Generalized Linear Models:

Linear model, Non linear model, GLM

Module 2: Linear Regression Models:

Multiple regression model, Parameter estimation, Maximum likelihood, Model adequacy checking, Weighted least squares

Module 3: Nonlinear Regression Models:

Linear and Non linear regression models, transforming a linear model, Parameter estimation

Module 4: Logistic and Poisson Regression Models:

Logistic regression, Poisson regression, Overdispersion

Module 5: The Generalized Linear Model: Exponential family, Likelihood equations, Quasi likelihood, Gamma family, The power function, Generalized Estimating Equation

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

- Generalised Linear Models: With Applications in Engineering and the Sciences by Raymond H. Myers, Douglas C. Montgomery, G. Geoffrey Vining, Timothy J. Robinson
- Data Analysis Using Regression and Multilevel/ Hierarchical Models, Andrew Gelman and Jennifer Hill
- Categorical data analysis, Ala Agresti



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DEEP LEARNING & NEURAL NETWORKS

Course Code: DSC4302

Credit Units-03

Course Contents:

Module 1: Introduction to deep learning:

Conceptual overview of neural network, Supervised Learning with Neural Networks, Deep neural network, Why is Deep Learning a Buzz word

Module 2: Neural Networks Basics:

Binary Classification, Logistic Regression Cost Function, Gradient Descent, Derivatives, More Derivative Examples, Computation graph, Derivatives with a Computation Graph, Logistic Regression Gradient Descent, Gradient Descent on m Examples, Vectorization, More Vectorization Examples, Vectorizing Logistic Regression, Vectorizing Logistic Regression's Gradient Output, Explanation of logistic regression cost function

Module 3: Shallow neural networks:

Neural Networks Overview, Neural Network Representation, Computing a Neural Network's Output, Vectorizing across multiple examples, Explanation for Vectorized Implementation, Activation functions, Why do you need non-linear activation functions?, Derivatives of activation functions, Gradient descent for Neural Networks, Backpropagation intuition, Random Initialization

Module 4: Deep Neural Networks:

Deep L-layer neural network, Forward Propagation in a Deep Network, Getting your matrix dimensions right, Why deep representations?, Building blocks of deep neural networks, Forward and Backward Propagation, Parameters vs Hyperparameters, What does this have to do with the brain?

Module 5: Case study using real world data.

Building a neural network model and generating predictions from the model.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

- Deep learning: adaptive computation and machine learning, Bengio, Yoshua, Courville, Aaron, Goodfellow, Ian J
- Deep Learning: A Practitioner's Approach, J. Patterson, A. Gibson
- Neural Networks and Deep Learning: A Textbook, Charu C. Aggarwal
- Neural Networks and Deep Learning, Michael Nielsen.



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TIME SERIES

Course Code: DSC4303

Credit Units-03

Course Contents:

Module 1: Autoregressive-moving average models ARIMA

Moving average models MA(q). Condition of invertability. Autoregressive models AR(p). Yull-Worker equations. Stationarity conditions. Autoregressive-moving average models ARMA (p,q).

Module 2: Coefficient estimation in ARIMA processes.

Coefficients estimation in autoregressive models. Coefficient estimation in ARMA (p) processes. Quality of adjustment of time series models. AIC information criterion. BIC information criterion. “Portmanto”-statistics.

Module 3: Forecasting in the framework of Box-Jenkins model

Forecasting, trend and seasonality in Box-Jenkins model.

Module 4: Non-stationary time series

Non-stationary time series. Time series with non-stationary variance. Non-stationary mean. ARIMA (p,d,q) models. The use of Box-Jenkins methodology to determination of order of integration.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

- Enders W. Applied Econometric Time Series. John Wiley & Sons, Inc., 1995
- Mills, T.C. The Econometric Modelling of Financial Time Series. Cambridge University Press, 1999
- Andrew C. Harvey. Time Series Models. Harvester wheatsheaf, 1993.



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GRAPH & SOCIAL NETWORK ANALYSIS

Course Code: DSC4304

Credit Units-03

Course Contents:

Module 1: Introduction to graph theory

Use of graph theory to construct different types of networks : Undirected, directed graphs, Cyclic, Directed acyclic graphs, trees, weighted graphs, bipartite graph, Study data structures of the graphs. Adjacency matrix, adjacency list.

Module 2: Study different network models

Small world phenomena, Scale free network, Erdős-Rényi model for random graphs, Watts and Strogatz model, Barabasi-Albert model

Module 3: Study network properties

Degree distribution, power law, graph density, graph isomorphism, path length, diameter, clique, shortest distance, clustering coefficient, network motifs, network centralities and node ranking, degree centrality, closeness centrality, betweenness centrality, eigenvector centrality, eccentricity centrality, subgraph centrality, matching index,

Module 4: Network randomization

Randomization with Erdős-Rényi model, Randomization with node degree conservation, Permutation of node labels

Module 5: Introduction to social network

Introduction to social network data, Different data format, Paths and Connectivity-Graphs to represent social relations. Working with network data- Network Datasets-Strong and weak ties - Closure, Structural Holes, and Social Capital.

Module 6: Data and Text Mining In Social Media

Data mining in nutshell, Social media, Motivations for data mining in social media, Data mining methods for social media. Social networking sites: illustrative examples. Text Mining: Keyword search, query semantics and answer ranking, Classification algorithms, Clustering algorithms.

Module 7: Community Detection in Social Networks

Introduction, Communities in context, core methods and algorithm for community detection, Quality functions, Agglomerative/Divisive algorithms, discuss different approaches for clustering.

Module 8: Case study using real world data.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

- Networks, Crowds and Markets by David Easley and Jon Kleinberg, Cambridge University Press, 2010
- Social and Economic Networks by Matthew O. Jackson, Princeton University Press, 2010.
- Easley and Kleinberg, “Networks, Crowds, and Markets: Reasoning about a highly connected world”, Cambridge Univ. Press, 2010.
- Charu C. Aggarwal, “Social Network Data Analytics”, Springer, 2011.
- Robert A. Hanneman and Mark Riddle, “Introduction to social network methods”, University of California, 2005.
- Jure Leskovec, AnandRajaraman, and Jeffrey D. Ullman, “Mining of Massive Datasets”, Cambridge University Press, 2 edition, 2014.
- Wasserman, S., & Faust, K, “Social Network Analysis: Methods and Applications”, Cambridge University Press; 1 edition, 1994.



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NATURAL LANGUAGE PROCESSING

Course Code: DSC4305

Credit Units-02

Course Contents:

Module 1: Introduction to text mining

Introduction, Challenges of Text Processing, Character-Set Dependence, Language Dependence, Corpus Dependence, Application Dependence

Module 2: Exploring Text Data For Preliminary Ideas

A case study for a brief introduction, Examine multiple document corpus of text, Creation of text corpus, Text pre-processing, Stemming, Word tokenisation, Word vectorisation, Word embedding

Module 3: Natural Language Processing:

Sentiment Analysis, Word Frequency in text data, Wordclouds for visualizing sentiments with a case study, Wordclouds for Visualizing text data, Tidy wordclouds, Topic modelling a document

Module 4: Text Data and Machine Learning

Clustering for text data, Clustering tweets, Regression on text data, Introduction to RTextTools, More on RTextTools, Word2Vec approach, The Doc2Vec approach, Doc2Vec approach for predicting a binary outcome, Doc2Vec approach for multi-class classification

Module 5: Sentiment Analysis

What is sentiment, What is sentiment analysis, Scope of sentiment analysis: Document level, Sentence level, Sub-sentence level, Types of sentiment analysis, Word embeddings, Word associations or Text similarities, Building dictionaries, Summarise text, Polarity calculation, Algorithms for sentiment analysis: Rule based, Automatic Hybrid

Module 6: Case study using real world data.

Identify Spam-ham Emails or sms classification.

Examination Scheme:

IA			EE			
Class Test (Practical Based)	Mid Term Viva	Attendance	Major Experiment	Minor Experiment/Spotting	Practical Record	Viva
15	10	05	35	15	10	10

Text & References:

- HANDBOOK OF NATURAL LANGUAGE PROCESSING Ralf Herbrich and Thore Graepel
- Text Mining with R by Julia Silge and David Robinson.
- Natural Language Processing with Python by Steven Bird, Ewan Klein and Edward Loper.
- Taming Text by Grant Ingersoll, Thomas Morton and Drew Farris.
- Foundations of Statistical Natural Language Processing by Christopher Manning and Hinrich Schütze.


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GRAPH & SOCIAL NETWORK ANALYSIS LAB

Course Code: DSC4306

Credit Units-01

Course Contents:

Module 1: Study Tools for graphs and network study :

Case studies will be implemented by using any programming language such as R or python. Learn other tools like Cytoscape and Gephi, and igraph

Module 2: Introduction to graph theory

Input graph data : Read different network format, load network data, Construct network from matrix, Adjacency matrix. Input different types of networks : Undirected, directed graphs, Cyclic, Directed acyclic graphs, trees, weighted graphs, bipartite graph. Study data structures of the graphs. Adjacency matrix, adjacency list.

Module 3: Study different network models

Small world phenomena, Scale free network, Erdős-Rényi model for random graphs, Watts and Strogatz model, Barabasi-Albert model

Module 4: Study network properties

Degree distribution, power law, graph density, graph isomorphism, path length, diameter, clique, shortest distance, clustering coefficient, network motifs, network centralities and node ranking, degree centrality, closeness centrality, betweenness centrality, eigenvector centrality, eccentricity centrality, subgraph centrality, matching index,

Module 5: Network randomization

Randomization with Erdős-Rényi model, Randomization with node degree conservation, Permutation of node labels

Module 6: Introduction to social network

Introduction to social network data, Different data format, Paths and Connectivity-Graphs to represent social relations. Working with network data- Network Datasets-Strong and weak ties - Closure, Structural Holes, and Social Capital.

Module 7: Data and Text Mining In Social Media

Data mining in nutshell, Social media, Motivations for data mining in social media, Data mining methods for social media. Social networking sites: illustrative examples. Text Mining: Keyword search, query semantics and answer ranking, Classification algorithms, Clustering algorithms.

Module 8: Community Detection in Social Networks

Introduction, Communities in context, core methods and algorithm for community detection, Quality functions, Agglomerative/Divisive algorithms, discuss different approaches for clustering.

Module 9: Case study using real world data.



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Examination Scheme:

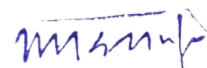
IA			EE			
Class Test (Practical Based)	Mid Term Viva	Attendance	Major Experiment	Minor Experiment/Spotting	Practical Record	Viva
15	10	05	35	15	10	10

Text & References:

- Networks, Crowds and Markets by David Easley and Jon Kleinberg, Cambridge University Press, 2010
- Social and Economic Networks by Matthew O. Jackson, Princeton University Press, 2010.
- Easley and Kleinberg, "Networks, Crowds, and Markets: Reasoning about a highly connected world", Cambridge Univ. Press, 2010.
- Charu C. Aggarwal, "Social Network Data Analytics", Springer, 2011.
- Robert A. Hanneman and Mark Riddle, "Introduction to social network methods", University of California, 2005.
- Jure Leskovec, AnandRajaraman, and Jeffrey D. Ullman, "Mining of Massive Datasets", Cambridge University Press, 2 edition, 2014.
- Wasserman, S., & Faust, K, "Social Network Analysis: Methods and Applications", Cambridge University Press; 1 edition, 1994.



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BIG DATA TOOLS & TECHNOLOGIES-III

Course Code: DSC4307

Credit Units-01

Course Contents:

Module 1: Apache Sqoop (SQL to Hadoop)

Sqoop Tutorial, How does Sqoop Work, Sqoop JDBC Driver and Connectors ,Sqoop Importing Data Various Options to Import Data (Table Import , Binary Data Import ,Speedup the Import ,Filtering Import, Full Database Import ,Introduction to Sqoop

Module 2: Apache Flume

Data Acquisition: Apache Flume Introduction, Apache Flume Components, POSIX and HDFS File Write, Flume Events, Interceptors, Channel Selectors, Sink Processor

Module 3: Advanced Apache Flume

Sample Twitter Feed Configuration, Flume Channel (Memory Channel, File Channel),Sinks and Sink Processors, Sources, Channel Selectors, Interceptors

Module 4: HBase Introduction

Fundamentals of HBase, Usage Scenario of HBase, Use of HBase in Search Engine, HBase Data Model (Table and Row, Column Family and Column Qualifier, Cell and its Versioning, Regions and Region Server), HBase Designing Tables, HBase Data Coordinates, Versions and HBase Operation (Get/Scan, Put, Delete)

Examination Scheme:

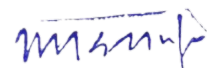
IA			EE			
Class Test (Practical Based)	Mid Term Viva	Attendance	Major Experiment	Minor Experiment/Spotting	Practical Record	Viva
15	10	05	35	15	10	10

Text & References:

- Apache Sqoop Cookbook, Kathleen Ting , Jarek Jarcec Cecho
- Using Flume: Flexible, Scalable and Reliable Data Streaming, Hari Shreedharan
- Hbase The Definitive Guide, Lars George
- Apache Hadoop Yarn, Arun Murthy



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GENERALIZED & LINEAR MODELING LAB

Course Code: DSC4308

Credit Units-01

Course Contents:

Module 1: Linear Regression Models:

Multiple regression model, Parameter estimation, Maximum likelihood, Model adequacy checking, Weighted least squares with case studies

Module 2: Nonlinear Regression Models:

Linear and Non linear regression models, transforming a linear model, Parameter estimation with case studies

Module 3: Logistic and Poisson Regression Models:

Logistic regression, Poisson regression, Overdispersion with case studies

Module 4: The Generalized Linear Model: Exponential family, Likelihood equations, Quasi likelihood, Gamma family, The power function, Generalized Estimating Equation with case studies

Examination Scheme:

IA			EE			
Class Test (Practical Based)	Mid Term Viva	Attendance	Major Experiment	Minor Experiment/Spotting	Practical Record	Viva
15	10	05	35	15	10	10

Text & References:

- Generalised Linear Models: With Applications in Engineering and the Sciences by Raymond H. Myers, Douglas C. Montgomery, G. Geoffrey Vining, Timothy J. Robinson
- Data Analysis Using Regression and Multilevel/ Hierarchical Models, Andrew Gelman and Jennifer Hill
- Categorical data analysis, Ala Agresti



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TIME SERIES LAB

Course Code: DSC4309

Credit Units-01

Course Contents:

Module 1: Autoregressive-moving average models ARMA

Moving average models MA(q). Condition of invertability. Autoregressive models AR. Yull-Worker equations. Stationarity conditions. Autoregressive-moving average models ARMA with case studies

Module 2: Coefficient estimation in ARMA processes. Box-Jenkins' approach

Coefficients estimation in autoregressive models. Coefficient estimation in ARMA processes. Quality of adjustment of time series models. AIC information criterion. BIC information criterion. "Portmanto"-statistics. Box-Jenkins methodology to identification of stationary time series models with case studies

Module 3: Forecasting in the framework of Box-Jenkins model

Forecasting, trend and seasonality in Box-Jenkins model with case studies

Examination Scheme:

IA			EE			
Class Test (Practical Based)	Mid Term Viva	Attendance	Major Experiment	Minor Experiment/Spotting	Practical Record	Viva
15	10	05	35	15	10	10

Text & References:

- Enders W. Applied Econometric Time Series. John Wiley & Sons, Inc., 1995
- Mills, T.C. The Econometric Modelling of Financial Time Series. Cambridge University Press, 1999
- Andrew C. Harvey. Time Series Models. Harvester wheatsheaf, 1993.
- Andrew C. Harvey. The Econometric Analysis of Time Series. Philip Allan, 1990. Machine Learning I



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DEEP LEARNING & NEURAL NETWORKS LAB

Course Code: DSC4310

Credit Units-01

Course Contents:

Module 1: Neural Networks Basics:

Calculation of Logistic Regression Cost Function, Implementation of Gradient Descent, Derivatives, More Derivative Examples, Computation graph, Derivatives with a Computation Graph, Logistic Regression Gradient Descent, Gradient Descent using case studies

Module 2: Shallow neural networks:

Neural Network Representation, Computing a Neural Network's Output, Vectorizing across multiple examples, Calculation of Activation functions, non-linear activation functions, Derivatives of activation functions, Gradient descent for Neural Networks, Backpropagation intuition, Random Initialization using case studies

Module 3: Deep Neural Networks:

Developing a Deep L-layer neural network, Forward Propagation in a Deep Network, Getting your matrix dimensions right, Understanding Building blocks of deep neural networks, Forward and Backward Propagation, Parameters vs Hyperparameters using case studies

Examination Scheme:

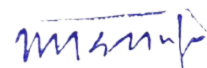
IA			EE			
Class Test (Practical Based)	Mid Term Viva	Attendance	Major Experiment	Minor Experiment/Spotting	Practical Record	Viva
15	10	05	35	15	10	10

Text & References:

- Deep learning: adaptive computation and machine learning by Bengio, Yoshua, Courville, Aaron, Goodfellow, Ian J
- Deep Learning: A Practitioner's Approach by J. Patterson, A. Gibson
- Neural Networks and Deep Learning: A Textbook by Charu C. Aggarwal
- Neural Networks and Deep Learning by Michael Nielsen



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WEATHER PREDICTION

Course Code: DSC4311

Credit Units-01

Course Contents:

Weather Analysis, Collect dataset, Make model, Apply Machine Learning algorithm to predict weather, Compare the output from the Weather forecasting model and the data from the observation station, Use data science tools to find out when the prediction model may not accurate, predict the extreme weather, Develop visualization program for easy understanding.

Examination Scheme:

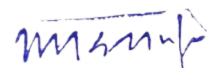
IA			EE			
Class Test (Practical Based)	Mid Term Viva	Attendance	Major Experiment	Minor Experiment/Spotting	Practical Record	Viva
15	10	05	35	15	10	10

Text & References:

- Weather Analysis and Forecasting, Patrick Santurette



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DISEASE CLASSIFICATION

Course Code: DSC4312

Credit Units-01

Course Contents:

Disease classification, Importance of disease classification, Datasets used for classification problem, Data processing steps, Disease classification using machine learning algorithm, Estimate prediction parameter for the classification schema

Examination Scheme:

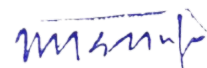
IA			EE			
Class Test (Practical Based)	Mid Term Viva	Attendance	Major Experiment	Minor Experiment/Spotting	Practical Record	Viva
15	10	05	35	15	10	10

Text & References:

- James, Gareth, Daniela Witten, Trevor Hastie, and Robert Tibshirani. 2013. An Introduction to Statistical Learning: With Applications in R. New York: Springer
- Lantz, B. 2013. Machine learning with R. Packt Publishing, Birmingham
- Maindonald J, Braun J. Data Analysis and Graphics Using R. Cambridge University Press: Cambridge, 2003
- Crawley MJ, (2005) Statistics: an introduction using R. Volume 1. 1st edition. New York: John Wiley & Sons.
- Seefeld, K. & Linder, E. (2007), Statistics Using R with Biological Examples . Department of Mathematics & Statistics, University of New Hampshire, Durham, NH, USA.
- Vinod, H.D. (Ed.) (2010). Advances in social science research using R, Springer, ISBN 978-1-4419-1763-8, New York



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CUSTOMER BEHAVIOR ANALYSIS

Course Code: DSC4313

Credit Units-01

Course Contents:

Introduction: What is "customer analytics" and why do we do it?, Specific Loyalty Matrix tools & biases.

Getting Started: A Brief review of what needs to be done before serious analysis can start, Sourcing business requirements, Sourcing raw data, Profiling raw data, Data quality control & remediation.

Explorative Data Analysis (EDA) and Basic Statistics

Mining, Modeling, Segmentation & Prediction: Decision Tree method, Clustering method and Association Model

Examination Scheme:

IA			EE			
Class Test (Practical Based)	Mid Term Viva	Attendance	Major Experiment	Minor Experiment/Spotting	Practical Record	Viva
15	10	05	35	15	10	10

Text & References:

- Behavioral Research Data Analysis with R- Yuelin Li, Jonathon Baron



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SUMMER INTERNSHIP EVALUATION

Course Code: DSC4335

Credit Units: 08

Guidelines:

There are certain phases of every Intern's professional development that cannot be effectively taught in the academic environment. These facets can only be learned through direct, on-the-job experience working with successful professionals and experts in the field. The internship program can best be described as an attempt to institutionalize efforts to bridge the gap between the professional world and the academic institutions. Entire effort in internship is in terms of extending the program of education and evaluation beyond the classroom of a university or institution. The educational process in the internship course seeks out and focuses attention on many latent attributes, which do not surface in the normal classroom situations. These attributes are intellectual ability, professional judgment and decision-making ability, inter-disciplinary approach, skills for data handling, ability in written and oral presentation, sense of responsibility etc.

In order to achieve these objectives:

- **Each student will be allotted a supervisor** for proper guidance.
- **Student will first submit synopsis in the format given by coordinator/supervisor.**
- Student will maintain a file (**Internship File/Project Report**). **Further, coordinator will provide NTCC project guidelines and sample to help in preparation of file.** The Internship File aims to encourage students to keep a personal record of their learning and achievement throughout the Programme. It can be used as the basis for lifelong learning and for job applications. Items can be drawn from activities completed in the course modules and from the workplace to demonstrate learning and personal development. The File will assess the student's analytical skills and ability to present supportive evidence, whilst demonstrating understanding of their organization, its needs and their own personal contribution to the organization.

The **layout guidelines** for the Project Report

1. File should be in the following specification

- A4 size paper
- **Font**

For normal text Font Type and Size must be- Times New Roman, 12 pt. The minimum font size of materials within a table or a figure can be 10 point.

- **Margins**

A margin of 3.75 cm (1½ inch) is to be given on the binding edge while on the other sides it is to be 2.5 cm (1 inch). The text of the report, including headings, figures, tables, and notes, but excluding page numbers, must be accommodated within the page area.

- **Line Spacing**

The line spacing in the main text must be between one-and-a-half (1.5). Single line spacing should be given for figure captions, table titles, figure legends, and footnotes. Equations, tables, figures, and quotations should be set off from the main text with adequate space (not less than the normal line spacing adopted for the main text). Two consecutive paragraphs should be separated by a spacing which must be larger than the line spacing adopted for the text.

- **Tables and Figures**

Each sketch, drawing, graph and photograph should have a figure number and title below the figure etc. Numbering should be sequential, chapter wise. For instance, if there are 24 figures chapter 3 spread

over all of its sections the figure numbers run from Figure 3.1 through Figure 3.24. In figures experimental data should typically be represented by centered symbols, and theoretical data by continuous curves.

Each table should have a table number and caption above the table. Numbering should be sequential, chapter wise, as in the case of Figure numbers. For instance, if there are 18 tables in chapter 3 the table numbers run from Figure 3.1 through Figure 3.18.

Make sure that figures and tables are complete in other respects such as legends, references (if any) and coordinate labels with units. Each figure and table must be explicitly referred to in the text and located where its first reference occurs, preferably after the reference.

- **Drawings**

All engineering drawings must conform to relevant Standards and should include a title block. If drawings are large they should be included at the back of the report in a separate pocket. In case drawings are made using CAD packages, a CD ROM should be included which contains all the files and details of the packages used.

- **Equations**

The numbering of equations should be sequential, chapter wise. Numbered equations must be explicitly referred to in the text.

2. Report Size: The maximum number of pages of the Report should be preferably between 50-80 pages.

3. Report Layout: The report should contain the following components

Front Page
Table of Content
Acknowledgement
Student Certificate
Company Profile (optional)
Introduction
Main Body
References / Bibliography

The File will include *five sections* in the order described below. The content and comprehensiveness of the main body and appendices of the report should include the following:

1. **The Title Page**--Title - An Internship Experience Report For (Your Name), name of internship organization, name of the Supervisor/Guide and his/her designation, date started and completed, and number of credits for which the report is submitted.

2. **Declaration by the Students**--This is page number (i), the beginning of the small case Roman numeral page numbers. The student has to give a declaration to the effect that the data used for the work, the work depicted in the report, and the written material contained in the report are not copied from others and that due permission has been taken from, and due credit has been given to, the sources whenever they are used.

3. **Certificate**--This is page number (ii). The certificate will be signed by the Faculty Supervisor(s) before the viva-voce after verifying the format and by the Head of the Department after review with the Supervisor(s).

4. **Acknowledgements**--This is page number (iii). Keep this brief and avoid using informal language. This page must be signed by the candidate.

5. **Abstract and Keywords**--This is page number (iv). The abstract (preferably one page) should contain the context/relevance of the problem at hand, a description of what was done and a gist of the significant observations/results.

The keywords (maximum 6) are a hint that what is contained in the report.

7. Contents--This is page number (v). The table of Contents should be titled just *Contents* (not Table of Contents). Try to fit it into one or two pages.

8. Introduction--short, but should include how and why you obtained the internship experience position and the relationship it has to your professional and career goals.

9. Main Body--should include but not be limited to daily tasks performed. Major projects contributed to, dates, hours on task, observations and feelings, meetings attended and their purposes, listing of tools and materials and their suppliers, and photographs if possible of projects, buildings and co-workers.

10. References / Bibliography --This should include papers and books referred to in the body of the report. These should be ordered alphabetically on the author's surname. The titles of journals preferably should not be abbreviated; if they are, abbreviations must comply with an internationally recognised system.

ASSESSMENT OF THE INTERNSHIP FILE

Continuous Internal Assessment	Final Assessment
40 Marks	60 Marks

Continuous Internal Assessment consists of topic relevance, progress report and synopsis marks. Final Assessment includes viva, presentation and report marks.

Examination Scheme:

Components	V	S	R	PR	FP
Weightage (%)	20	20	20	20	20

V – Viva, S – Synopsis, FP – Final Presentation, R – Report, PR-Progress Report



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DISSERTATION/ PROJECT REPORT/ PRESENTATION/ VIVA VOCE

Course Code: DSC4437

Credit Units: 20

GUIDELINES FOR DISSERTATION

Research experience is as close to a professional problem-solving activity as anything in the curriculum. It provides exposure to research methodology and an opportunity to work closely with a faculty guide. It usually requires the use of advanced concepts, a variety of experimental techniques, and state-of-the-art instrumentation.

Research is genuine exploration of the unknown that leads to new knowledge which often warrants publication. But whether or not the results of a research project are publishable, the project should be communicated in the form of a research report written by the student.

Sufficient time should be allowed for satisfactory completion of reports, taking into account that initial drafts should be critiqued by the faculty guide and corrected by the student at each stage.

The File is the principal means by which the work carried out will be assessed and therefore great care should be taken in its preparation.

In general, the File should be comprehensive and include

A short account of the activities that were undertaken as part of the project;

A statement about the extent to which the project has achieved its stated goals.

A statement about the outcomes of the evaluation and dissemination processes engaged in as part of the project;

Any activities planned but not yet completed as part of the DISSERTATION, or as a future initiative directly resulting from the project;

Any problems that have arisen that may be useful to document for future reference.

➤ Report Layout

The report should contain the following components:

➤ Title or Cover Page

The title page should contain the following information: Project Title; Student's Name; Course; Year; Supervisor's Name.

➤ Acknowledgements (optional)

Acknowledgment to any advisory or financial assistance received in the course of work may be given.

➤ Abstract

A good "Abstract" should be straight to the point; not too descriptive but fully informative. First paragraph should state what was accomplished with regard to the objectives. The abstract does not have to be an entire summary of the project, but rather a concise summary of the scope and results of the project

➤ Table of Contents

Titles and subtitles are to correspond exactly with those in the text.

➤ Introduction

Here a brief introduction to the problem that is central to the project and an outline of the structure of the rest of the report should be provided. The introduction should aim to catch the imagination of the reader, so excessive details should be avoided.

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➤ **Materials and Methods**

This section should aim at experimental designs, materials used. Methodology should be mentioned in details including modifications if any.

➤ **Results and Discussion**

Present results, discuss and compare these with those from other workers, etc. In writing these section, emphasis should be given on what has been performed and achieved in the course of the work, rather than discuss in detail what is readily available in text books. Avoid abrupt changes in contents from section to section and maintain a lucid flow throughout the thesis. An opening and closing paragraph in every chapter could be included to aid in smooth flow.

Note that in writing the various sections, all figures and tables should as far as possible be next to the associated text, in the same orientation as the main text, numbered, and given appropriate titles or captions. All major equations should also be numbered and unless it is really necessary never write in “point” form.

➤ **Conclusion**

A conclusion should be the final section in which the outcome of the work is mentioned briefly.

➤ **Future prospects**

➤ **Appendices**

The Appendix contains material which is of interest to the reader but not an integral part of the thesis and any problem that have arisen that may be useful to document for future reference.

➤ **References / Bibliography**

This should include papers and books referred to in the body of the report. These should be ordered alphabetically on the author's surname. The titles of journals preferably should not be abbreviated; if they are, abbreviations must comply with an internationally recognised system.

Examples

For research article

Voravuthikunchai SP, Lortheeranuwat A, Ninrprom T, Popaya W, Pongpaichit S, Supawita T. (2002) Antibacterial activity of Thai medicinal plants against enterohaemorrhagic *Escherichia coli* O157: H7. *Clin Microbiol Infect*, **8** (suppl 1): 116–117.

For book

Kowalski, M. (1976) Transduction of effectiveness in *Rhizobium meliloti*. SYMBIOTIC NITROGEN FIXATION PLANTS (editor P.S. Nutman IBP), **7**: 63–67

ASSESSMENT OF THE DISSERTATION FILE

Essentially, marking will be based on the following criteria: the quality of the report, the technical merit of the project and the project execution.

Technical merit attempts to assess the quality and depth of the intellectual efforts put into the project.

Project execution is concerned with assessing how much work has been put in.

The File should fulfill the following *assessment objectives*:

Range of Research Methods used to obtain information

Execution of Research

Data Analysis

Analyse Quantitative/ Qualitative information

Control Quality

Draw Conclusions

Examination Scheme:

Dissertation	50
Viva Voce	50
Total	100

Selecting the Dissertation Topic

It is usual to give you some discretion in the choice of topic for the dissertation and the approach to be adopted. You will need to ensure that your dissertation is related to your field of specialization.

Deciding this is often the most difficult part of the dissertation process, and perhaps, you have been thinking of a topic for some time.

It is important to distinguish here between ‘dissertation topic’ and ‘dissertation title’. The topic is the specific area that you wish to investigate. The title may not be decided until the dissertation has been written so as to reflect its content properly.

Few restrictions are placed on the choice of the topic. Normally we would expect it to be:

- relevant to business, defined broadly;
- related to one or more of the subjects or areas of study within the core program and specialisation stream;
- clearly focused so as to facilitate an in-depth approach, subject to the availability of adequate sources of information and to your own knowledge;
- of value and interest to you and your personal and professional development.

Planning the Dissertation

This will entail following:

- Selecting a topic for investigation.
- Establishing the precise focus of your study by deciding on the aims and objectives of the dissertation, or formulating questions to be investigated. Consider very carefully what is worth investigating and its feasibility.
- Drawing up initial dissertation outlines considering the aims and objectives of the dissertation. Workout various stages of dissertation
- Devising a timetable to ensure that all stages of dissertation are completed in time. The timetable should include writing of the dissertation and regular meetings with your dissertation guide.

The Dissertation plan or outline

It is recommended that you should have a dissertation plan to guide you right from the outset. Essentially, the dissertation plan is an outline of what you intend to do, chapter wise and therefore should reflect the aims and objectives of your dissertation.

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There are several reasons for having a dissertation plan

- It provides a focus to your thoughts.
- It provides your faculty-guide with an opportunity, at an early stage of your work, to make constructive comments and help guide the direction of your research.
- The writing of a plan is the first formal stage of the writing process, and therefore helps build up your confidence.
- In many ways, the plan encourages you to come to terms with the reading, thinking and writing in a systematic and integrated way, with plenty of time left for changes.
- Finally, the dissertation plan generally provides a revision point in the development of your dissertation report in order to allow appropriate changes in the scope and even direction of your work as it progresses.

Keeping records

This includes the following:

- Making a note of everything you read; including those discarded.
- Ensuring that when recording sources, author's name and initials, date of publication, title, place of publication and publisher are included. (You may consider starting a card index or database from the outset). Making an accurate note of all quotations at the time you read them.
- Make clear what is a direct quotation and what is your paraphrase.

Dissertation format

All students must follow the following rules in submitting their dissertation.

- Front page should provide title, author, Name of degree/diploma and the date of submission.
- Second page should be the table of contents giving page references for each chapter and section.
- The next page should be the table of appendices, graphs and tables giving titles and page references.
- Next to follow should be a synopsis or abstract of the dissertation (approximately 500 words)
- Next is the 'acknowledgements'.
- Chapter I should be a general introduction, giving the background to the dissertation, the objectives of the dissertation, the rationale for the dissertation, the plan, methodological issues and problems. The limitations of the dissertation should also be hinted in this chapter.
- Other chapters will constitute the body of the dissertation. The number of chapters and their sequence will usually vary depending on, among others, on a critical review of the previous relevant work relating to your major findings, a discussion of their implications, and conclusions, possibly with a suggestion of the direction of future research on the area.
- After this concluding chapter, you should give a list of all the references you have used. These should be cross - references with your text. For articles from journals, the following details are required e.g.

Draper P and Pandyal K. 1991, The Investment Trust Discount Revisited, Journal of Business Finance and Accounting, Vol18, No6, Nov, pp 791-832.

For books, the following details are required:

Levi, M. 1996, International Financial Management, Prentice Hall, New York, 3rd Ed, 1996

- Finally, you should give any appendices. These should only include relevant statistical data or material that cannot be fitted into the above categories.

The Layout Guidelines for the Dissertation

- A4 size Paper

- Font: Arial (10 points) or Times New Roman (12 points)
- Line spacing: 1.5
- Top and bottom margins: 1 inch/ 2.5 cm; left and right margins: 1.25 inches/ 3 cm

Guidelines for the assessment of the Dissertation

While evaluating the dissertation, faculty guide will consider the following aspects:

1. Has the student made a clear statement of the objective or objective(s).
2. If there is more than one objective, do these constitute parts of a whole?
3. Has the student developed an appropriate analytical framework for addressing the problem at hand.
4. Is this based on up-to-date developments in the topic area?
5. Has the student collected information / data suitable to the frameworks?
6. Are the techniques employed by the student to analyse the data / information appropriate and relevant?
7. Has the student succeeded in drawing conclusion form the analysis?
8. Do the conclusions relate well to the objectives of the project?
9. Has the student been regular in his work?
10. Layout of the written report.

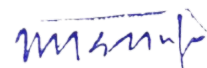
Assessment Scheme:

Continuous Evaluation: 40%
(Based on Abstract, Regularity,
Adherence to initial plan, Records etc.)

Final Evaluation: Based on, 60%
Contents & Layout of the Report, 20
Conceptual Framework, 05
Objectives & Methodology and 05
Implications & Conclusions 10
Viva & Presentation 20



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Bachelor of Science (Chemistry) (Honors)

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Curriculum & Scheme of Examination

2022

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Bachelor of Science (Chemistry) (Honors)

INORGANIC CHEMISTRY LAB-I

Course Code: CHY2103

Credit Units: 01

Course Contents:

[I] Titrimetric Analysis

- (i) Calibration and use of apparatus
- (i) Preparation of solutions of different Molarity/Normality of titrants

[II] Acid- Base Titrations

- (i) Estimation of carbonate and hydroxide present together in mixture.
- (ii) Estimation of carbonate and bicarbonate present together in a mixture.
- (ii) Estimation of free alkali present in different soaps/detergents

[III] Oxidation- Reduction Titrimetry

- (i) Estimation of Fe(II) and oxalic acid using standardized KMnO_4 solution.
- (ii) Estimation of oxalic acid and sodium oxalate in a given mixture.
- (iii) Estimation of Fe(II) with $\text{K}_2\text{Cr}_2\text{O}_7$ using internal (diphenylamine, anthranilic acid) and external indicator.

*MSDS – Compilation of MSDS of chemicals used by students in each experiments is compulsory.

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.



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ORGANIC CHEMISTRY LAB-I

Course Code: CHY2104

Credit Units: 01

Course Objective : This course will help the students to understand important fundamental concepts of Organic chemistry Lab at the undergraduate level. The main objective is to prepare students for the study of the basic Organic chemistry laboratory techniques.

Course Contents: (Minimum 8 experiments to be performed)

1. Calibration of the thermometer.
2. Recrystallization of organic compounds by using the following solvents: Water, Alcohol, Alcohol-Water & Charcoal.
3. Purification by Distillation, Decolouration (Charcoal treatment) and Sublimation.
4. Determination of the melting points of crude and crystalized compounds and unknown organic compounds (Kjeldahl method and electrically heated melting point apparatus)
5. Effect of impurities on the melting point – mixed melting point of two unknown organic compounds.
6. Determination of boiling point of liquid compounds. (Boiling point lower than and more than 100° C by distillation and capillary method)
7. Chromatography
 - a. Separation of a mixture of two amino acids by ascending and horizontal paper chromatography.
 - b. Separation of a mixture of two sugars by ascending paper chromatography.
 - c. Separation of a mixture of o- and p-nitrophenol or o- and p-aminophenol by thin layer chromatography (TLC)

***MSDS – Compilation of MSDS of chemicals used by students in each experiment is compulsory.**

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva, A - Attendance.

Suggested Readings:

- Ahluwalia, V. K., Aggarwal, R. *Comprehensive Practical Organic Chemistry*, Universities Press (2001) ISBN 8173712735.
- Pandey, O.P.; Bajpai, D. N.; Giri, S. *Practical Chemistry*, S. Chand & Co. Ltd., (2010) ISBN 9788121908122.
- Mann, F. G.; Saunders, B. C. *Practical Organic Chemistry*, Pearson Education, India, 4th edition (2009) ISBN 978-8131727102.
- Singh, J.; Singh, R. K. P.; Singh, J.; Yadav, L. D. S.; Siddiqui, I. R.; Srivastava, J. *Advanced Practical Chemistry*, Pragati Prakashan, 9th Edition (2019) ISBN 978-93-88925-70-9.

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PHYSICS LAB-I

Course Code: CHY2107

Credit Units: 01

Course Contents:

1. Young's modulus – non uniform bending – pin and microscope.
2. Rigidity modulus – Static Torsion Method Using Scale and Telescope.
3. Rigidity modulus – Torsional oscillation method (without symmetric masses).
4. Determination of Co-efficient of Viscosity – Graduated Burette.
5. Surface Tension and Interfacial Tension – By drop weight method.
6. Specific Heat Capacity of a liquid – by Newton's Law of Cooling.
7. Sonometer – Determining A.C. Frequency (Screw Gauge is given).
8. Sonometer – frequency of tuning fork.
9. Newton's Rings – Radius of Curvature.
10. Air Wedge – Determination of thickness of thin wire.

Any other experiment carried out in the class.

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.



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PHYSICAL CHEMISTRY-I

Course Code: CHY2201

Credit Units: 03

Course Objective: Objective of the course is to make students well aware of different states of matters and their properties along with some fundamentals of energy like average kinetic energy, law of equipartition of energy and heat capacity

Course Contents:

Module I: Gaseous state

Kinetic molecular model of a gas: postulates and derivation of the kinetic gas equation; collision frequency; collision diameter; mean free path and viscosity of gases, including their temperature and pressure dependence, relation between mean free path and coefficient of viscosity.

Deviations from ideal gas behaviour, compressibility factor Z , and its variation with pressure for different gases. Causes of deviation from ideal behaviour. van der Waals equation of state, its derivation and application in explaining real gas behaviour, virial equation of state; van der Waals equation expressed in virial form and calculation of Boyle temperature. Isotherms of real gases and their comparison with van der Waals isotherms, continuity of states, critical state, relation between critical constants and van der Waals constants, law of corresponding states.

Module II: Liquid state:

Qualitative treatment of the structure of the liquid state; physical properties of liquids; vapour pressure, surface tension and coefficient of viscosity, and their determination. Effect of addition of various solutes on surface tension and viscosity. Temperature variation of viscosity of liquids and comparison with that of gases.

Module III: Solid state:

Nature of the solid state, Miller indices, elementary ideas of symmetry, symmetry elements and symmetry operations, qualitative idea of point and space groups, seven crystal systems and fourteen Bravais lattices; X-ray diffraction, Bragg's law, a simple account of rotating crystal method and powder pattern method. Analysis of powder diffraction patterns of NaCl, CsCl and KCl. Defects in crystals.

Module IV: Velocities

Maxwell distribution and its use in evaluating molecular velocities (average, root mean square and most probable) and average kinetic energy, law of equipartition of energy, degrees of freedom and molecular basis of heat capacities.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

- Atkins, P. W. & Paula, J. de *Atkin's Physical Chemistry* 8th Ed., Oxford University Press (2006).
- Ball, D. W. *Physical Chemistry* Thomson Press, India (2007).
- Castellan, G. W. *Physical Chemistry* 4th Ed. Narosa (2004).
- Mortimer, R. G. *Physical Chemistry* 3rd Ed. Elsevier: NOIDA, UP (2009).


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PHYSICAL CHEMISTRY LAB-I

Course Code: CHY2203

Credit Units: 01

Course Contents:

(I) **Surface tension measurements** (use of organic solvents excluded).

- a) Determine the surface tension by (i) drop number (ii) drop weight method.
- b) Study the variation of surface tension of detergent solutions with concentration

(II) **Viscosity measurement using Ostwald's viscometer** (use of organic solvents excluded).

- (a) Study the effect of the addition of solutes such as (i) polymer (ii) ethanol (iii) sodium chloride on the viscosity of water at room temperature.
- (b) Study the effect of variation of viscosity of an aqueous solution with the concentration of solute.

(III) **pH measurements**

- (a) Measurement of pH of different solutions using pH-meter.
- (b) Preparation of buffer solutions
 - (i) Sodium acetate-acetic acid
 - (ii) Ammonium chloride-ammonium hydroxide
- (c) Measurement of the pH of buffer solutions and comparison of the values

***MSDS – Compilation of MSDS of chemicals used by students in each experiment is compulsory.**

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

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ANALYTICAL CHEMISTRY LAB

Course Code: CHY2204

Credit Units: 01

Course Contents:

Module I: Separation Techniques

- Chromatography: (a) Separation of mixtures
 - Paper chromatographic separation of Fe^{3+} , Al^{3+} , and Cr^{3+}
 - Separate and identify the monosaccharides present in the given mixture (glucose & fructose) by paper chromatography. Report the R_f values.
 - Separate a mixture of Sudan yellow and Sudan Red by TLC technique and identify them on the basis of their R_f values.
 - Chromatographic separation of the active ingredients of plants, flowers and juices by TLC
- Solvent Extractions:

To separate a mixture of Ni^{2+} & Fe^{3+} by complexing with DMG and extracting the Ni^{2+} DMG complex in chloroform, and determine its concentration with spectrophotometry.
- Determine the pH of given aerated drinks fruit juices, shampoos and soaps.
- Analysis of soil:
 - Determination of pH of soil.
 - Total soluble salt
 - Estimation of calcium, magnesium, phosphate, nitrate
- Ion exchange:
 - Determination of exchange capacity of cation exchange resins and anion exchange resins.
 - Separation of metal ions from their binary mixture.
 - Separation of amino acids from organic acids by ion exchange chromatography.
- Determination of pKa values of indicator using spectrophotometry.
- Determination of dissolved oxygen in water.
- Determination of chemical oxygen demand (COD).
- Determination of Biological oxygen demand (BOD).

*MSDS – Compilation of MSDS of chemicals used by students in each experiments is compulsory.

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.



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PHYSICS LAB-II

Course Code: CHY2207

Credit Units: 01

Course Contents:

1. Spectrometer Grating – Minimum Deviation – Mercury Lines.
2. Spectrometer – Refractive Index of a liquid – Hollow Prism.
3. Potentiometer – Calibration of High Range Ammeter.
4. Potentiometer – Calibration of Low Range Voltmeter.
5. Determination of M and BH using Deflection Magnetometer in Tan C position and vibration magnetometer.
6. Figure of merit and voltage sensitiveness of table galvanometer.
7. Construction of AND, OR gates using diodes and NOT by transistors.
8. Zener diode – Voltage Regulation.
9. NAND / NOR as universal gate.
10. Demorgan's theorem verification.

Any other experiments can be carried out in class.

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.



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INORGANIC CHEMISTRY LAB-II

Course Code: CHY2305

Credit Units: 01

Course Objective: To provide training and experience in practical aspects of inorganic chemistry including preparation of some important inorganic compounds and estimation of some ions like Cu(II) ion etc

Course Contents:

Module I: Iodo / Iodimetric Titrations

- (i) Estimation of Cu (II) and $K_2Cr_2O_7$ Using sodium thiosulphate solution (Iodimetrically).
- (ii) Estimation of (i) arsenite and (ii) antimony in tartar-emetic iodimetrically
- (iii) Estimation of available chlorine in bleaching powder iodometrically.

Module II: Inorganic preparations

- (i) Cuprous Chloride, Cu_2Cl_2
- (ii) Preparation of Manganese (III) phosphate, $MnPO_4 \cdot H_2O$
- (iii) Preparation of Aluminium Potassium sulphate $KAl(SO_4)_2 \cdot 12H_2O$ (Potash alum) or Chrome alum.

***MSDS – Compilation of MSDS of chemicals used by students in each experiments is compulsory.**

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

Recommended Texts:

- Vogel, A.I. A text book of quantitative Inorganic Analysis, ELBS. 1978.



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ORGANIC CHEMISTRY LAB-II

Course Code: CHY2306

Credit Units: 01

Course Objective: To provide experience in practical aspects of qualitative analysis of unknown organic compounds and detection of functional groups present.

Course Contents:

1. Systematic analysis of extra elements in the given unknown compounds
2. Tests for following functional groups and unsaturation.
3. Qualitative analysis of the following types of unknown organic compounds
 - a. Carboxylic acids
 - b. Phenols
 - c. Alcohols
 - d. Aldehydes
 - e. Ketones
 - f. Esters
 - a. Carbohydrates
 - b. Primary, secondary and tertiary amines
 - c. Nitro compounds
 - d. Amides
 - e. Aryl halides
 - f. Hydrocarbons

***MSDS – Compilation of MSDS of chemicals used by students in each experiment is compulsory.**

Examination Scheme:

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5	10	10	5	35	35

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PHYSICAL CHEMISTRY LAB-II

Course Code: CHY2307

Credit Units: 01

Course Objective: To provide training in practical aspects of physical chemistry including determination of heat capacity, enthalpy of ionization, enthalpy of hydration of given compound. The course also involves determination of basicity/proticity of a polyprotic acid by the thermochemical method.

Course Contents:

(I) Thermochemistry

- (a) Determination of heat capacity of a calorimeter for different volumes using change of enthalpy data of a known system (method of back calculation of heat capacity of calorimeter from known enthalpy of solution or enthalpy of neutralization).
- (b) Determination of heat capacity of the calorimeter and enthalpy of neutralization of hydrochloric acid with sodium hydroxide.
- (c) Calculation of the enthalpy of ionization of ethanoic acid.
- (d) Determination of heat capacity of the calorimeter and integral enthalpy (endothermic and exothermic) solution of salts.
- (e) Determination of basicity/proticity of a polyprotic acid by the thermochemical method in terms of the changes of temperatures observed in the graph of temperature versus time for different additions of a base. Also calculate the enthalpy of neutralization of the first step.
- (f) Determination of enthalpy of hydration of copper sulphate.
- (g) Study of the solubility of benzoic acid in water and determination of ΔH .

(II) Indexing of given powder diffraction pattern of a cubic crystalline system.

(III) To determine the enthalpy of neutralization of a weak acid/ weak base versus base/ strong acid and determine the enthalpy of ionization of the weak acid base.

(IV) Determination of critical solution temperature and composition of the phenol-water system and to study the effect of impurities on it.

(V) Phase equilibria: Construction of the phase diagram of (i) simple eutectic and (ii) congruently melting systems, using cooling curves and ignition tube methods.

***MSDS – Compilation of MSDS of chemicals used by students in each experiment is compulsory.**

Any other experiment carried out in the class.

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA – Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.



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INDUSTRIAL CHEMISTRY

Course Code: CHY2308

Credit Units: 03

Course Objective: To enable a student to understand the generation of energy from various types of fuels and various manufacturing methods and types of glass, sugar, cement and soap & detergent.

Course Contents:

Module I: Industrial fuels

Energy: Sources: non-renewable, classification of fuels: solid, liquid and gaseous, Calorific value of fuels and its determination.

Solid fuels: Coal: types – properties and uses – lignite, sub-bituminous coal, bituminous coal and anthracite Coking and non-coking coal.

Liquid fuels: Refining of crude petroleum and uses of fractions, Hydrodesulphurisation, Cracking: thermal and catalytic (fixed bed and fluidised bed catalysis), Octane number, Cetane number.

Gaseous fuels: Natural gas and gobar gas: production, composition and uses, Gobar electric cell.

Module II: Glass industry

Introduction, classification of glass, basic raw materials of glass, manufacturing processes including chemical reactions, some special glasses: optical glass, coloured glass, fibre glass, laminate glass, safety glass, photosensitive glass, photochromatic glass, lead glass, borosilicate glass and glass wool.

Module III: Cement industry

Types of cement, manufacture of Portland cement, composition, setting and hardening of cement, Mortars and concrete, gypsum, plaster of paris, estimation of silica, alumina, calcium oxide and sulphates in Portland cement.

Module IV: Soaps and synthetic detergents

Manufacture of detergent, types of detergents, anionic, cationic, nonionic and amphoteric detergents, manufacture of soap, Liquid soap.

Module V: Sugar industry

Double sulphitation process, Refining and grading of sugar, Saccharin: synthesis and uses as a sugar substitute – aspartame, Ethanol: manufacture from molasses by fermentation.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

- R. Norris Shreve and A. Joseph, *Chemical process industries*, 4th ed.; McGraw – Hill Kogakusha, Ltd: 1977.
- George t. Austin. *Shreve's chemical process industries*, 5th ed.; McGraw – Hill: 1984.
- P. C. Jain and M. Jain, *Engineering chemistry*, 10th ed.; Dhanpat Rai and sons, 1993.
- P. Kamaraj, R. Jeyalakshmi and V. Narayanan, *Chemistry in engineering and technology*; Sudhandhira publications, 2001.

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- J.C. Kuriakose and J. Rajaram, *Chemistry in engineering and technology. Vol 2.*; Mc Graw-hill: new delhi, 1988.
- Jugal Kishore Agrawal, *Practicals in Engineering Chemistry*; Oxford and IBH Publishing Co., New Delhi, 1976.
- Organic Chemistry Vol.2 IL Finar 5th Edn. Longmans 1975
- Industrial Chemistry by BK Sharma, Goel Publishing house Meerut.



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BIOINORGANIC CHEMISTRY

Course Code: CHY2309

Credit Units: 03

Course Objective: Course objective is to give students an understanding of which metals are found in biological systems and why. To enable students to learn about the structure and function of several enzymes that activates small molecules. To make students learn about the goals and methods of chemists that aim to mimic biological systems. Course also describes selected organometallic and inorganic complexes that do a good job of mimicking biological catalysis.

Course Contents:

Module I: Scope of Bioinorganic Chemistry

Inorganic elements in biological systems, cells, biologically important compounds amino acids, proteins, nucleotides, carbohydrates and lipids, basic bioenergetics, classification of enzymes. Biochemistry: Distribution, biological roles, active transport of cations across membranes, the sodium pump, biology of calcium carriers, role in muscle contraction, enzyme stabilization, blood clotting and biological calcification

Module II: Metalloporphyrins

Structure and optical spectra; heme proteins: magnetic susceptibility and electronic spectra; hemoglobin and myoglobin: molecular structures, thermodynamics and kinetics of oxygenation, electronic and spatial structures, synthetic oxygen carriers, model systems; iron enzymes, peroxidase, catalase and cytochrome P-450

Module III: Metalloenzymes

Copper enzymes, superoxide dismutase, cytochrome oxidase and ceruloplasmin; Coenzymes; Molybdenum enzyme: xanthine oxidase; Zinc enzymes: carbonic anhydrase, carboxy peptidase and interchangeability of zinc and cobalt in enzymes; Vitamin B12 and B12 coenzymes; Iron storage, transport, biomineralization and siderophores, ferritin and transferrins.

Module IV: Metals in Medicine

Metal deficiency and disease; toxicity of mercury, cadmium, lead, beryllium, selenium and arsenic; biological defence mechanisms; chelation therapy; metals used for diagnosis and chemotherapy, platinum complexes as anticancer drugs, Pt-DNA binding, complexes of gold, copper, zinc, mercury, arsenic and antimony as drugs.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

Text & References:

- S. J. Lippard & J. M. Berg. *Principles of Bioorganic Chemistry*, Panima Publ. Corpn. (2005).
- E.-I. Ochiai. *Bioinorganic Chemistry – An Introduction*, Allyn and Bacon Inc. (1977).
- M. N. Hughes. *The Inorganic Chemistry of Biological Processes*, Wiley (1981).
- R.P. Hanzlik. *Inorganic Aspects of Biological and Organic Chemistry*, Academic Press (1976)
- H. Kraatz & N. Metzler-Nolte (Eds.). *Concepts and Models in Bioinorganic Chemistry*, Wiley (2006).


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- I. Bertini, H. B. Gray, S. J. Dippard & J. S. Valentine, *Bioinorganic Chemistry*, Viva Books Pvt. Ltd. (2004).
- A.W. Addison, W.R. Cullen, D. Dolphin & B.R. James (eds.). *Biological Aspects of Inorganic Chemistry*, John Wiley (1977).
- R.J.P. Williams & J.R.R.F. Dasilva. *New Trends in Bioinorganic Chemistry*, Academic Press(1978).
- A. E. Martel. *Inorganic Chemistry in Biology and Medicine*, ACS Symp. Series, ACS (1980).
- S. J. Lippard. *Progress in Inorganic Chemistry: Bioinorganic Chemistry*, Vol. 38, John Wiley, (1990).
- N. Kaim & B. Schwederski. *Bioinorganic Chemistry: Inorganic Elements in the Chemistry of Life*, John Wiley (1994).



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POLYMER CHEMISTRY

Course Code: CHY2404

Credit Units: 03

Course Objective: To know about the types of polymers, polymerization techniques and commercial polymers.

Course Contents:

Module I:

Polymers: Basic Concept, classification of polymers on the basis of structures and applications. Distinction among plastics, elastomers, and fibers, Homo and hetero polymers, copolymers, properties of polymers, glass transition temp. (T_g) - definition, factors affecting T_g , Relationship between T_g and molecular weight.

Module II:

Molecular Weight of polymers, Number average, weight average, sedimentation and viscosity, average molecular weights, Molecular weights and degree of polymerization. Reactions - Hydrolysis, Hydrogenation, addition, substitution, cross linking - vulcanization and cyclisation.

Module III:

Polymerization techniques: Bulk, solution, suspension & emulsion polymerization, melt polycondensation, Polymer processing, calendaring, die casting, rotational casting.

Module IV:

Chemistry of commercial polymers- General methods of preparation, properties and uses of the following - Teflon, polyethylene, polystyrene, polyesters, poly amides, polycarbonates and PVC.

Module V:

Advances in polymers; Bio-Polymers, biomaterials, polymers in medical field, High temperature and fire resistant polymers – synthesis, structural aspects and applications of silicones and siloxanes. Borazines, silicates and phosphazenes and polysulphates.


Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

Text & References:

- Text Book of Polymer Science, Bill meyer F.W. Jr. John Wiley & Sons 1984.
- Polymer Science, Gowarikar. V.R. Viswanathan, N.V. Jayader Sreedhar.
- Wiley Eastern Ltd., New Delhi, 2005
- Polymer Chemistry, Sharma.B.K Goel Publishing House, Meerut- 1989.
- Polymer Chemistry. Arora M.G. Vadar M.S. - Anmol publications (p) Ltd., New Delhi 1989.
- Polymer Chemistry - An introduction - M.P. Stevens, oxford.


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INORGANIC CHEMISTRY LAB-III

Course Code: CHY2405

Credit Units: 01

Course Objective: To provide training and experience in practical aspects of inorganic chemistry including estimation of Ca/Mg by complexometric titration and Cl^- ion determination.

Course Contents:

(a) Complexometric Titrations:

- (i) Complexometric estimation of (i) Mg^{2+} (ii) Zn^{2+} using EDTA
- (ii) Estimation of total hardness of water samples
- (iii) Estimation of Ca^{2+} in solution by (substitution method) using Erio-chrome black-T as indicator.
- (ii) Estimation of Ca/Mg in drugs and Biological samples.

(b) Argentometry

Estimation of Cl^- (i) By Mohr's method, (ii) By Vohlard's method, (iii) By Fajan's method.

(c) Paper Chromatographic separation of Ni (II) and Co(II); Cu(II) and Cd (II)

***MSDS – Compilation of MSDS of chemicals used by students in each experiments is compulsory.**

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

Recommended Texts:

- Vogel, A.I. A text book of quantitative Inorganic Analysis, ELBS. 1978.



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ORGANIC CHEMISTRY LAB-III

Course Code: CHY2406

Credit Units: 01

Course Objective: To provide experience in separation techniques of mixture of organic compounds by means of thin layer chromatography and paper chromatography. Also it gives students a hands on experience involving preparation of synthetically important organic compounds.

Course Contents:

1. Thin Layer Chromatography:

Determination of R_f values and identification of organic compounds.

- Separation of green leaf pigments (spinach leaves may be used)
- Preparation and separation of 2,4 - dinitrophenylhydrazones of acetone, 2-butanone, hexane-2 and 3-one using toluene and light petroleum (40:60) as solvent system.
- Separation of a mixture of dyes using cyclohexane and ethylacetate (8.5:1.5) as solvent system.

2. Paper Chromatography: Ascending and Circular

- Determination of R_f values and identification of organic compounds.
- Separation of a mixture of phenylalanine and glycine. Alanine and aspartic acid. Leucine and glutamic acid. Spray reagent-ninhydrin.
- Separation of a mixture of D, L-alanine, glycine and L-Leucine using n-butanol:acetic acid : water (4:1:5) Spray reagent-ninhydrin.
- Separation of monosaccharides- A mixture of D-galactose and D-fructose using n-butanol:acetone:water (4:1:5) Spray reagent aniline hydrogen phthalate.

3. Organic preparations

- Acetylation of amines and phenols
- Benzoylation of amines and phenols by Schotten-Baumann reaction
- Hydrolysis of amides and esters to obtain benzoic acid.
- 2,4-DNP, semicarbazone and oxime derivative of carbonyl compound
- Nitration of nitrobenzene, chlorobenzene & bromobenzene
- Oxidation of the benzaldehyde, benzyl alcohol acetophenone to benzoic

*MSDS – Compilation of MSDS of chemicals used by students in each experiments is compulsory.

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.



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PHYSICAL CHEMISTRY LAB-III

Course Code: CHY2407

Credit Units: 01

Course Objective:

To provide training which involves determination of important property of fluids like surface tension, viscosity. It also enables student to compare strength of two acids and also to perform the potentiometric titration.

Course Contents:

1. To determine the velocity constant (specific reaction rate) of hydrolysis of methylacetate/ethyl acetate catalyzed by hydrogen ions at room temperature.
 2. To compare the strength of HCl and H₂ SO₄ by studying the kinetics of hydrolysis of ester.
 3. To study kinetically the reaction rate of decomposition of iodide by H₂O₂.
 4. Determination of surface tension/percentage composition of given organic mixture using surface tension method.
 5. Determination of viscosity/percentage composition of given organic mixture using viscosity method.
- (I) Study the equilibrium of at least one of the following reactions by the distribution method:
- (i) $I_2(aq) + I^- \rightarrow I_3^-(aq)$
 - (ii) $Cu^{2+}(aq) + nNH_3 \rightarrow Cu(NH_3)_n^{2+}$
- (II) Perform the following potentiometric titrations (at least two):
- (i) Strong acid with strong base (ii) weak acid with strong base and (iii) dibasic acid with strong base
- (III) Potentiometric titration of Mohr's salt with potassium dichromate.

*MSDS – Compilation of MSDS of chemicals used by students in each experiments is compulsory.

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

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GREEN CHEMISTRY

Course Code: CHY2408

Credit Units: 03

Course Objective: To know the basics of Green Chemistry and its developments.

Course Contents:

Module I: Introduction

Need for green chemistry – principles of green chemistry – atom economy – definition with example (ibuprofen synthesis) – green oxidant – hydrogen peroxide.

Microwave assisted organic synthesis – apparatus required – examples of MAOS (synthesis of fused anthraquinones, acetalization of a byproduct of sugar industry, 1, 3-dipolar cycloaddition of nitrones to fluorinated dipolarophiles, Leukart reductive amination of ketones) – advantages and disadvantages of MAOS.

Organic reactions by sonication method – apparatus required – examples of sonochemical reactions (Heck, Hunsdiecker and Wittig reactions).

Module II: Green Reactions

Acetylation of primary amine, base catalyzed aldol condensation (synthesis of dibenzalpropanone), halogen addition to C=C bond (bromination of trans-stilbene), [4+2] cycloaddition reaction (Diels-Alder reaction between furan and maleic acid).

Rearrangement reaction (benzyl-benzilic acid rearrangement), coenzyme catalyzed benzoin condensation (thiamine hydrochloride catalyzed synthesis of enzoin, Pechmann condensation for coumarin synthesis (clay catalyzed solid state synthesis of 7-hydroxy-4-methylcoumarin).

Electrophilic aromatic substitution reactions (nitration of phenol, bromination of acetanilide) – green oxidation reactions (synthesis of adipic acid, preparation of manganese (III) acetylacetonate) – zeolite catalyzed Friedel-Crafts acylation.

Module III: Green Solvents

Ionic liquids: simple preparation – types – properties and application – ionic liquids in organic reactions (Heck reaction, Suzuki reactions, epoxidation), industrial (battery) and analytical chemistry (matrices for MALDI-TOF MS, gas chromatography stationary phases – advantages and disadvantages).

Super critical CO₂ – preparation, properties and applications (decaffeination, dry cleaning) – environmental impact.

Diels-Alder reaction in water – catalysis in water (aerobic oxidation of alcohols catalyzed by Pd(II) / bathophenanthroline).

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;

Att: Attendance

Text & References:

- Green Chemistry: Environmental Friendly Alternatives, Rs. Sanghi and M.M.Srinivatava, Narosa Publishing House, New Delhi.
- Green Chemistry, V.K. Ahluwalia, Narosa, New Delhi (2011).
- Methods and Reagents for Green Chemistry, P. Tundo, A. Perosa and F. Zecchini, John Wiley & Sons Inc., New Jersey, (2007).

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AGRICULTURE CHEMISTRY

Course Code: CHY2409

Credit Units: 03

Course Objective: To give the students the importance of Agricultural chemistry and an exposure to find, analyse and find a suitable method to cultivate and promote agricultural methods.

Course Contents:

Module I: Soil Chemistry

Introduction: Formation of Soil. Classification of soil and properties of soil - soil Acidity - Causes of acidity - soil alkalinity - determination of soil pH - Buffering of soils - Amending the soil - Reclamation of acid soil - Liming agents.

Module II: Soil Fertility and Productivity

Organic Manures - Farmyard Manure - Compost - Oil cakes - Bone meal - Meat meal - Fish meal - Blood meal and green Manures - Fertilizers - Classification of fertilizers - Requisites of a good fertilizers - Nitrogenous fertilizers - Phosphatic fertilizers - super Phosphate of lime - Triple super phosphate - NPK fertilizers - ill effects of fertilizers - effect of mixed fertilizers on soil pH - Micronutrients - role of micronutrients sources - Need for nutrient balance - Soil management and Micronutrients needs.

Module III: Pesticides

Classification of Insecticides - Stomach poisons - Contact poisons and Fumigants - Insecticides - Organic Insecticides - DDT - Gammexane - Malathion - Parathion - Fungicides - Herbicides - Rodenticides - Pesticides in India - Adverse environmental effects of pesticides.

Module IV: Plant growth regulators

3-Indole acetic acid, Naphthalene Acetic Acid, Ethephon (2-chloroethyl phosphoric acid), Alar (succinin acid-2, 2-dimethylhydrazine) their function, Plant hormones: Gibberlin, Cyclocel, Phosphon, Defoliant

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

Text & References:

- Industrial Chemistry by B.K. Sharma. Goel Publishing House, Meerut.
- Applied Chemistry by K.Bagavathi - Sundari, MJP Publishers.
- Fundamental concept of Applied Chemistry by Jayashree Ghosh, S. Chand & Company Ltd.,
- Chemical treatment of hides a leather by J. Partridge Noyes, Park Ridge,N.J.
- Agricultural Chemistry Vol I & Vol II edited by B.A. Yagodin - New Century books (P) Ltd.,
- The nature and properties of soils - IX Edition - Nyle.C.Bready - S.Chand. and Company Ltd.,
- Soils and soil fertility - Louis M.Thompson - and Frederick. R.Troch - Tata Mc. Graw hill.
- Text book of Soil Science - T.D. Biswas and S.K. Mukerjee - II Edition.
- Soil Science - A.Sankara.
- Nature and properties of soils - Harry, O. Buckman.


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TERM PAPER

Course Code: CHY2431

Credit Units: 02

Objectives

The objective of this course is to judge the understanding as well as application of the knowledge gained by the students. The aim of the term paper is to provide the students with an opportunity to further enhance their knowledge in a sector of their choice by undertaking a significant practical unit of examining and analyzing various aspects of Chemistry & its application at a level commensurate with the learning outcomes of the various courses taken up them in the ongoing semester.

A term paper is primarily a record of intelligent reading in several sources on a particular subject. The students will choose the topic at the beginning of the session in consultation with the faculty assigned. At least one middle level or senior level person of a company from the chosen sector may be interviewed face to face

Guidelines:

1. The term paper will be related to the contemporary business issue and the topic will be given by the department.
2. The presentation of the term paper is scheduled to be held before the commencement of Semester examinations.
3. The paper will carry 100 marks that will be marked on the basis of understanding and organization of content based on the literature review. The Bibliography shall form an important part of the paper.
4. Examples of a few broad areas for term paper (List is indicative, not exhaustive)
 - Inorganic chemistry
 - Organic chemistry
 - Physical chemistry
 - Green chemistry
 - Agriculture chemistry

Evaluation Scheme

Organisation and relevance of content	Literature Review	Bibliography	Presentation	Total
30	30	20	20	100

WORKSHOP

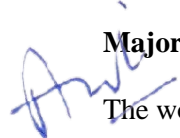
Objectives

A workshop is primarily an activity based academic event that is organized to provide the students a one to one and hands on experience on any aspect of their learning. The communication in a workshop has to be necessarily two way. The trainer has to make sure that the aspect covered are practically practiced by the participants. The student will choose the option of workshop from amongst their concentration electives. The evaluation will be done by Board of examiners comprising of the faculties.

Major Themes for Workshop

The workshop may be conducted on any of the following major themes:

- Nuclear Chemistry


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- Modern trend in Inorganic Chemistry
- Modern trend in Organic Chemistry
- Modern trend in Physical Chemistry
- Nanotechnology and its application
- Polymer Chemistry
- Pharmaceuticals
- Food Technology
- Agriculture Chemistry
- Computational Chemistry
- Green Chemistry

These themes are merely indicative and other recent and relevant topics of study may be included.

Guidelines for Workshop

The procedure for earning credits from workshop consists of the following steps:

1. Relevant study material and references will be provided by the trainer in advance.
2. The participants are expected to explore the topic in advance and take active part in the discussions held
3. Attending and Participating in all activities of the workshop
4. Group Activities have to be undertaken by students as guided by the trainer.
5. Evaluation of workshop activities would be done through test and quiz at the end of the workshop.
6. Submitting a write up of at least 500 words about the learning outcome from the workshop.

Methodology

The methodology followed at the workshop could be based on any one or more of the following methods:

- Case Study
- Simulation
- Quiz
- Quality analysis& characterization
- Identification and preparation of materials

Evaluation Scheme:

Attendance	Active Participation	Multiple Choice Questions/ Quiz	Solving the case/ Assignment/ Write up	Total
10	30	30	30	100



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PROJECT

Course Code: CHY2432

Credit Units: 03

Objectives:

The aim of the project is to provide the students with an opportunity to further their intellectual and personal development in the chosen field by undertaking a significant practical unit of activity. The project can be defined as a scholarly inquiry into a problem or issues, involving a systematic approach to gathering and analysis of information/data, leading to production of a structured report.

Chapter Scheme and distribution of marks:

Chapter 1: Introduction – 10 marks

Chapter 2: Conceptual Framework/National/International Scenario – 25 marks

Chapter 3: Presentation, Analysis & Findings -- 25 marks

Chapter 4: Conclusion & Recommendations -- 10 marks

Chapter 5: Bibliography -- 05 marks

Components of a Project Report

The outcome of Project Work is the Project Report. A project report should have the following components:

1) Cover Page: This should contain the title of the project proposal, to whom it is submitted, for which degree, the name of the author, name of the supervisor, year of submission of the project work, name of the University.

2) Acknowledgement: Various organizations and individuals who might have provided assistance /co-operation during the process of carrying out the study.

3) Table of Content: Page-wise listing of the main contents in the report, i.e., different Chapters and its main Sections along with their page numbers.

4) Body of the Report: The body of the report should have these four logical divisions

a) Introduction: This will cover the background, rationale/need/justification, brief review of literature, objectives, methodology (the area of the study, sample, type of study, tools for data collection, and method of analysis), Limitations of the Study, and Chapter Planning.

b) Conceptual Framework/National and International Scenario: (relating to the topic of the Project).

c) Presentation of Data, Analysis and Findings: (using the tools and techniques mentioned in the methodology).

d) Conclusion and Recommendations: In this section, the concluding observations based on the main findings and suggestions are to be provided.

5) Bibliography or References: This section will include the list of books and articles which have been used in the project work, and in writing a project report.

6) Annexures: Questionnaires (if any), relevant reports, etc.

(The main text of the Project should normally be in the range of 5000 words. However, there may be annexure in addition to the main text)

The Steps of a Project Report

STEP I : Selection of the topic for the project by taking following points into consideration:

- Suitability of the topic.
- Relevance of the topic

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- Time available at the disposal.
- Feasibility of data collection within the given time limit.
- Challenges involved in the data collection (time & cost involved in the data collection, possibility of getting responses, etc.)

STEP II : Finalisation of the Topic and preparation of Project Proposal in consultation with the Supervisor.

STEP III : Collection of information and data relating to the topic and analysis of the same.

STEP IV : Writing the report dividing it into suitable chapters, viz.,

Chapter 1: Introduction,

Chapter 2: Conceptual Framework / National & International Scenario,

Chapter 3: Analysis & Findings,

Chapter 4: Conclusion and Recommendations,

Chapter 5: Bibliography.

STEP V: The following documents are to be attached with the Final Project Report.

- Approval letter from the supervisor (Annexure-IA)
- Student's declaration (Annexure-IB)
- Certificate from the Competent Authority of the Organisation/Institution, if the student undertakes the Project Work in any Organisation/Institution.

Guidelines for evaluation:

- Each of the students has to undertake a Project individually under the supervision of a teacher and to submit the same following the guidelines stated below.
- Language of Project Report and Viva-Voce Examination may be English. The Project Report must be typed and hard bound.
- Failure to submit the Project Report or failure to appear at the Viva-voce Examination will be treated as "Absent" in the Examination. He/she has to submit the Project Report and appear at the Viva-Voce Examination in the subsequent years (within the time period as per University Rules).
- No marks will be allotted on the Project Report unless a candidate appears at the Viva-Voce Examination. Similarly, no marks will be allotted on Viva-Voce Examination unless a candidate submits his/her Project Report.
- Evaluation of the Project Work to be done jointly by one internal expert and one external expert with equal weightage, i.e., average marks of the internal and external experts will be allotted to the candidate. The evaluation scheme shall be as follows:

Project Report	Power Point Presentation & Viva
75 marks	25 marks



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Annexure-IB
Student's Declaration

Ihereby declare that the Project Work with the title (in block letters).....
submitted by me for the partial fulfilment of the degree of B.Sc. Honours in Chemistry is my original work and has not been submitted earlier to any other University /Institution for the fulfilment of the requirement for any course of study.

I also declare that no chapter of this manuscript in whole or in part has been incorporated in this report from any earlier work done by others or by me. However, extracts of any literature which has been used for this report has been duly acknowledged providing details of such literature in the references.

Signature of Supervisor:
Name

Signature of Student

Registration No.

Place:

Date:



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INORGANIC CHEMISTRY LAB-IV

Course Code: CHY2504

Credit Units: 01

Course Objective: To provide training and experience in practical aspects of **inorganic chemistry** including preparation of some important inorganic compounds and estimation of some ions like Cu (II) ion, Ni(II) ion etc

Course Contents:

(a) Quantitative Analysis: The following quantitative estimations are to be carried out.

(i) Estimation of nickel(II) using Dimethylglyoxime as the precipitant.

(ii) Estimation of copper as CuSCN

(iii) Estimation of iron as Fe_2O_3 by precipitating iron as $\text{Fe}(\text{OH})_3$ through (i) Heterogeneous and (ii) Homogeneous media.

(iv) Estimation of Al (III) by precipitating with oxine and weighing as $\text{Al}(\text{oxine})_3$ (aluminium oxinate).

(b) Inorganic Preparations

(i) Tetraammine copper (II) sulphate, $[\text{Cu}(\text{NH}_3)_4]\text{SO}_4\cdot\text{H}_2\text{O}$

(ii) Potassium trisoxalatochromate (III), $\text{K}_3[\text{Cr}(\text{C}_2\text{O}_4)_3]$

(iii) Cis and trans $\text{K}[\text{Cr}(\text{C}_2\text{O}_4)_2(\text{H}_2\text{O})_2]$ Potassium dioxalatodiaquachromate

(iv) Pentaammine carbonato Cobalt(III) ion

(c) Spectrophotometric estimation of Ferrous ions by using 1,10 phenanthroline

***MSDS – Compilation of MSDS of chemicals used by students in each experiment is compulsory.**

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

Recommended Texts:

- Vogel, A.I. A text book of Quantitative Analysis, ELBS 1986.



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ORGANIC CHEMISTRY LAB-IV

Course Code: CHY2505

Credit Units: 01

Course Objective:

To provide practical experience in organic preparation of azobenzene, benzopinacol and some other selected valuable organic compounds.

Course Contents:

Module 1: Organic Preparations

1. Diels-Alder reaction between anthracene and maleic anhydride
2. Reduction: nitrobenzene to azobenzene (TLC of the mixture), m-dinitrobenzene to m-nitroaniline
3. S-benzylisothiuronium salts of any one water soluble and one water insoluble acid: acetic acid, phenyl acetic acid, oxalic acid, benzoic acid, phthalic acid
4. Photochemical reduction of benzophenone to benzopinacol
5. Benzoin condensation of benzaldehyde (using thiamine hydrochloride)
6. Condensation of p-toluidine with benzaldehyde/salicylaldehyde/2-hydroxy-3-methoxy benzaldehyde to get Schiff's base (solventless condensation)

Estimation of:

1. Phenol and aniline by bromination with potassium bromate-potassium bromide method
2. Glycine by formylation method
3. Saponification value of an oil/fat

*MSDS – Compilation of MSDS of chemicals used by students in each experiment is compulsory.

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA – Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.



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PHYSICAL CHEMISTRY LAB-IV

Course Code: CHY2506

Credit Units: 01

(I) To study changes in conductance in the following systems

(i) strong acid-strong base

(ii) weak acid-strong base and

(iii) mixture of strong acid and weak acid-strong base

(II) Study the kinetics of the following reactions.

1. Initial rate method: Iodide-persulphate reaction

2. Integrated rate method:

(a) Acid hydrolysis of methyl acetate with hydrochloric acid, volumetrically or conductometrically.

(b) Iodide-persulphate reaction

(c) Saponification of ethyl acetate.

Any other experiment carried out in the class.

*MSDS – Compilation of MSDS of chemicals used by students in each experiments is compulsory.

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.



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FOOD & NUTRITION CHEMISTRY

Course Code: CHY2507

Credit Units: 03

Course Objective: To obtain knowledge about different foods, their nutritive values and food preservation.

Course Contents:

Module I:

Cereals definition - Classification, Processing - Structure of Cereals - Composition and nutritive value. Pulses definition - Classification - Processing - Structure of Pulses - Composition and nutritive value - Toxic Constituents in pulses - medicinal value of cereals and pulses. Sugar and related products. Sugar Structure and Properties. Nutritive value - Sugar composition in different food items. Sugar related product - Classification & nutritive value. Artificial sweeteners - example - advantages and disadvantages.

Module II:

Vegetables - classification - composition & nutritive values - Fruits- Classification - Composition & nutritive values. Fungi and algae as food - enzymatic browning and non enzymatic browning - Nutritive value of some common foods - milk, egg, soyabeans

Module III:

Beverages - definition and examples - Classification of beverages Fruit beverages - Milk based beverages - malted beverages - examples. Alcoholic and non alcoholic beverages - examples. Appetizers - definition - classification - examples - Water - functions and deficiency.

Module IV:

Food Preservatives - definition - classification - Food Spoilage - definition - Prevention. Methods of preservation - classification - Low and high temperature - preservatives examples - Dehydration - osmotic pressure - food irradiation.

Module V:

Food additives - Definition – classification - their functions - chemical substance. Packaging of foods - classification - Materials used for packaging.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

Text & References:

- o Food Science - III Edition - B. Sri Lakshmi, New Age International Publisher, 2005.
- o Food Chemistry - Lilian Hoagland Meyer CBS Publishers & Distributors, 2004.
- o Food Science, Nutrition and Health - Brian.A.Fox, Allan G.Cameron Edward Arnold, London.
- o Fundamentals of Foods and Nutrition - Mudambi. R.Sumathi, and Raja gopal, M.V. – Wiley Eastern Ltd., Madras.
- o Handbook of Food and Nutrition - M. Swaminathan - Bangalore Printing and Publishing Co. Ltd., Bangalore.

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QUANTUM CHEMISTRY

Course Code: CHY2508

Credit Units: 03

Course Objective: To obtain knowledge about quantum mechanics and LCAO-MO treatment of single electron system hydrogen.

Course Contents:

Module I:

Postulates of quantum mechanics, quantum mechanical operators, Schrodinger equation and its application to free particle and "particle-in-a-box" (rigorous treatment), quantization of energy levels, zero-point energy and Heisenberg Uncertainty principle; wave functions, probability distribution functions, nodal properties, Extension to two and three dimensional boxes, separation of variables, degeneracy.

Module II:

Angular momentum: Commutation rules, quantization of square of total angular momentum and z-component, Qualitative treatment of hydrogen atom and hydrogen-like ions: setting up of Schrodinger equation in spherical polar coordinates, radial part, quantization of energy (only final energy expression), radial distribution functions of $1s$, $2s$, $2p$, $3s$, $3p$ and $3d$ orbitals. Average and most probable distances of electron from nucleus.

Module III:

Covalent bonding, valence bond and molecular orbital approaches, LCAO-MO treatment of H_2^+ . Bonding and antibonding orbitals, Qualitative extension to H_2 .

Comparison of LCAO-MO and VB treatments of H_2 and their limitations. Refinements of the two approaches (Configuration Interaction for MO, ionic terms in VB). Qualitative description of LCAO-MO treatment of homonuclear and heteronuclear diatomic molecules (HF , LiH). Localised and non-localised molecular orbitals treatment of triatomic (BeH_2 , H_2O) molecules. Qualitative MO theory and its application to AH_2 type molecules. Simple Huckel Molecular Orbital (HMO) theory and its application to simple polyenes (ethene, butadiene).

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

Text & Reference:

- Banwell, C. N. & McCash, E. M. *Fundamentals of Molecular Spectroscopy* 4th Ed. Tata McGraw-Hill: New Delhi (2006).
- Chandra, A. K. *Introductory Quantum Chemistry* Tata McGraw-Hill (2001).
- House, J. E. *Fundamentals of Quantum Chemistry* 2nd Ed. Elsevier: USA (2004).
- Lowe, J. P. & Peterson, K. *Quantum Chemistry* Academic Press (2005).



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TECHNICAL WRITING IN SCIENCE-I

Course Code: CHY2509

Credit Units: 02

Course Objective:

Students will be introduced to learning the written and oral communication of technical information. Assignments include writing and presenting proposals, reports, and documentation. Emphasis on use of rhetorical analysis, computer applications, collaborative writing, and usability testing to complete technical communication tasks in the workplace.

Course Contents:

Module I:

Writing Skills; Selection of topic, thesis statement, developing the thesis; introductory, developmental, transitional and concluding paragraphs, linguistic unity, coherence and cohesion, descriptive, narrative, expository and argumentative writing.

Module II:

Technical Writing: Scientific and technical subjects; formal and informal writings; formal writings/reports, handbooks, manuals, letters, memorandum, notices, agenda, minutes; common errors to be avoided.

Module III: Documentation Process

Understanding Audience/Readers, Collecting and Organizing information, Drafting information verbally and visually, Producing Information.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;

Att: Attendance

Text & References:

- o M. Frank. Writing as thinking: *A guided process approach*, Englewood Cliffs, Prentice Hall/Reagents.
- o L. Hamp-Lyons and B. Heasley: Study Writing; *A course in written English*. For academic and professional purposes, Cambridge Univ. Press.
- o R. Quirk, S. Greenbaum, G. Leech and J. Svartik: *A comprehensive grammar of the English language*, Longman, London.
- o Daniel G. Riordan & Steven A. Panley: *“Technical Report Writing Today”* - Biztantra.
- o Daniel G. Riordan, Steven E. Pauley, Biztantra: *Technical Report Writing Today*, 8th Edition (2004).
- o *Contemporary Business Communication*, Scot Ober, Biztantra, 5th Edition (2004)



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TERM PAPER

Course Code: CHY2531

Credit Units: 02

Course Objectives:

The objective of this course is to judge the understanding as well as application of the knowledge gained by the students. The aim of the term paper is to provide the students with an opportunity to further enhance their knowledge in a sector of their choice by undertaking a significant practical unit of examining and analyzing various aspects of chemistry and applied chemistry at a level commensurate with the learning outcomes of the various courses taken up them in the ongoing semester.

A term paper is primarily a record of intelligent reading in several sources on a particular subject. The students will choose the topic at the beginning of the session in consultation with the faculty assigned. At least one middle level or senior level person of a company from the chosen sector may be interviewed face to face

Guidelines:

1. The term paper will be related to the contemporary business issue and the topic will be given by the department.
2. The presentation of the term paper is scheduled to be held before the commencement of Semester examinations.
3. The paper will carry 100 marks that will be marked on the basis of understanding and organization of content based on the literature review. The Bibliography shall form an important part of the paper.
4. Examples of a few broad areas for Term Paper (List is indicative, not exhaustive)
 - Inorganic chemistry
 - Organic chemistry
 - Physical chemistry
 - Green chemistry
 - Agriculture chemistry
 - Food and Nutrition Chemistry
 - Quantum Chemistry

Evaluation Scheme

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WORKSHOP

Course Code: CHY2533

Credit Units: 01

Course Objectives

A workshop is primarily an activity based academic event that is organized to provide the students a one to one and hands on experience on any aspect of their learning. The communication in a workshop has to be necessarily two way. The trainer has to make sure that the aspect covered are practically practiced by the participants. The student will choose the option of workshop from amongst their concentration electives. The evaluation will be done by Board of examiners comprising of the faculties.

Major Themes for Workshop

The workshop may be conducted on any of the following major themes:

- Nuclear Chemistry
- Modern trend in Inorganic Chemistry
- Modern trend in Organic Chemistry
- Modern trend in Physical Chemistry
- Nanotechnology and its application
- Polymer Chemistry
- Pharmaceuticals
- Food Technology
- Agriculture Chemistry
- Computational Chemistry
- Green Chemistry
- Environmental Chemistry

These themes are merely indicative and other recent and relevant topics of study may be included.

Guidelines for Workshop

The procedure for earning credits from workshop consists of the following steps:

- Relevant study material and references will be provided by the trainer in advance.
- The participants are expected to explore the topic in advance and take active part in the discussions held
- Attending and Participating in all activities of the workshop
- Group Activities have to be undertaken by students as guided by the trainer.
- Evaluation of workshop activities would be done through test and quiz at the end of the workshop.
- Submitting a write up of at least 500 words about the learning outcome from the workshop.

Methodology

The methodology followed at the workshop could be based on any one or more of the following methods:

- Case Study
- Simulation
- Quiz
- Quality analysis & characterization
- Identification and preparation of materials



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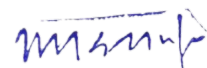
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Evaluation Scheme:

Attendance	Active Participation	Multiple Choice Questions/ Quiz	Solving the case/ Assignment/ Write up	Total
10	30	30	30	100



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SPECTROSCOPY

Course Code: CHY2604

Credit Units: 03

Course Objective: To impart knowledge about different spectroscopic techniques

Course Contents:

Module I:

Definition of spectrum - Electromagnetic radiation - quantization of different forms of energies in molecules (translational, rotational, vibrational and electronic).

Microwave Spectroscopy - theory of microwave spectroscopy - selection rule - Calculation of moment of inertia and bond length of diatomic molecules.

Module II: UV - Visible Spectroscopy

Absorption laws. Calculations involving Beer Lambert's law - instrumentation - photo colorimeter and spectrophotometer- block diagrams with description of components - theory - types of electronic transitions - chromophore and auxochromes - Absorption bands and intensity -factors governing absorption maximum and intensity.

Module III: I.R. Spectroscopy

Principle - modes of vibration of diatomic, triatomic linear (CO_2) and nonlinear triatomic molecules (H_2O) - stretching and bending vibrations - selection rules. Expression for vibrational frequency (derivation not needed), instrumentation - sampling techniques. Applications of IR Spectroscopy – interpretation of the spectra of alcohols, aldehydes, ketones and esters – aliphatic and aromatic. Hydrogen bonding.

Module IV: Raman Spectroscopy

Rayleigh and Raman scattering, Stokes and anti-Stokes lines. Differences between Raman and I.R. Spectroscopy. Rotational Raman spectra of Noncentrosymmetric molecules (HCl). Mutual exclusion principle (CO_2 and N_2O)

Module V: NMR Spectroscopy

Basic principles of Proton Magnetic Resonance, chemical shift and factors influencing it, equivalent and non equivalent protons.; Spin – Spin coupling and coupling constant; Anisotropic effects in alkene, alkyne, aldehydes and aromatics, Interpretation of NMR spectra of simple compounds. Applications of IR, UV and NMR for identification of simple organic molecules.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

Text & References:

- Elements of Analytical Chemistry - R. Gopalan, P.S. Subramanian, K. Rengarajan - S. Chand and sons (1997).
- Analytical Chemistry - S.M. Khopkar - New Age International.
- Instrumental Methods of Chemical Analysis - Chatwal - Anand -Himalaya Publishing House - (2000).

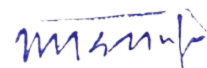
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- Analytical Chemistry S. .Usharani, Macmillan.
- Instrumental Methods of Analysis - Willard Merit Dean and Settle – Saunders College Publication.
- Physicochemical Techniques of Analysis - P.B. Janarthanam-Vol- I & II - Asian Publishing.
- Instrumental Methods of Chemical Analysis – B.K. Sharma - Goel Publications.
- Spectroscopy by P.S. Kalsi



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BASICS OF COMPUTER PROGRAMMING IN C AND ITS APPLICATIONS IN CHEMISTRY

Course Code: CHY2605

Credit Units: 02

Course Objective: To introduce the basics of computers and to learn C language and its applications in solving problems in Chemistry.

Course Contents:

Module I:

Basic computer organization, processor and memory – main memory, secondary storage devices and storage hierarchy. Software – relationship between hardware and software – types of software. Planning the computer program – algorithm and flowcharts. Basics of operating systems.

Module II:

Computer languages – machine language, assembly language, assembler, compiler, interpreter and programming languages - C language – introduction, C compiler, operating systems and preprocessor directives - variables, constants, operators, input and output functions.

Module III:

Applications in Chemistry – calculation of the radius of the first Bohr orbit for an electron, calculation of half-life time for an integral order reaction, calculation of molarity, molality and normality of a solution, calculation of pressure of ideal or Vanderwaal's gas, Calculation of electronegativity of an element using Pauling's relation.

Module IV:

Applications in Chemistry - Calculation of empirical formulae of hydro carbon, calculation of reduced mass of a few diatomic molecules, determination of the wave numbers of spectral lines of hydrogen atom, calculation of work of expansion in adiabatic process, calculation of pH, solubility product and bond energy using Born - Lande equation, calculation of standard deviation and correlation coefficient.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

Text & References:

1. K.V. Raman, Computers in Chemistry, 8th Edition, Tata McGraw Hill, 2005.
2. Venugopal and Prasad, Programming with C, 11th Edition, 1971.
3. E. Balaguruswamy, Programming in C, 2nd Edition, 1989



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INORGANIC CHEMISTRY LAB-V

Course Code: CHY2606

Credit Units: 01

Course Objective: To provide students an experience in qualitative analysis of various cations and anions in a given mixture.

Course Contents:

Qualitative analysis:

Using H₂S /PTC/ Thioacetamide or any other reagent. Identification of cations and simple anions in a mixture of salts containing not more than six ions (Three cations and three anions) interfering anions using semimicro scheme of analysis. If combination of cations or anions is given in the mixture, insoluble should be avoided. Spot tests should be carried out for final identifications wherever feasible.

Cation : Pb²⁺, Bi³⁺, Cu²⁺, Cd²⁺, As³⁺, Sb³⁺, Sn²⁺ or Sn⁴⁺, Fe²⁺ OR Fe³⁺, Al³⁺, Cr³⁺, Co²⁺, Ni²⁺, Zn²⁺, Mn²⁺, Ba²⁺, Sr²⁺, Ca²⁺, Mg²⁺, NH⁴⁺, K⁺

Anion : CO₃²⁻, SO₃²⁻, CO₃²⁻, SO₃²⁻, S²⁻, NO₂⁻, CH₃COO⁻, NO₃⁻, Cl⁻, Br⁻, I⁻, SO₄²⁻, PO₄³⁻, BO₃³⁻, F⁻, C₂O₄²⁻

*MSDS – Compilation of MSDS of chemicals used by students in each experiments is compulsory.

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

Recommended Texts:

- Vogel, A.I. A text book of Quantitative Analysis, ELBS 1986.



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ORGANIC CHEMISTRY LAB-V

Course Code: CHY2607

Credit Units: 01

Course Objective:

To provide experience in practical aspects of qualitative analysis of given organic mixture and detection of functional groups present.

Course Contents:

Qualitative analysis of organic mixture containing two solid component using water, NaOH, NaHCO₃ for separation, prepare suitable derivative.

Identification of the functional groups, C-C and C-N triple bonds, sp³, sp² and sp hybridized C-H bonds by IR spectroscopy, NMR spectroscopy (IR & NMR spectra to be provided).

***MSDS – Compilation of MSDS of chemicals used by students in each experiments is compulsory.**

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.



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PHYSICAL CHEMISTRY LAB-V

Course Code: CHY2608

Credit Units: 01

Course Objective:

To provide training in practical aspects of **physical chemistry** including determination of transition temperature of given compound, verification of Lambert- Beer law, Onsagar equation, Kaulraush law.

Course Contents:

(I) Transition Temperature

- Determination of the transition temperature of the given substance by thermometric method(e.g. $\text{MnCl}_2 \cdot 4\text{H}_2\text{O}/\text{SrBr}_2 \cdot \text{H}_2\text{O}$).

(II) Spectroscopy

- Verification of Lambert-Beer's Law
- Determination of pK (indicator) for phenolphthalein or methyl red
- Study the formation of a complex between ferric and thiocyanate (or salicylate) ions.
- Study the kinetics of interaction of crystal violet with sodium hydroxide colourimetrically.
- Record the UV spectrum of p-nitrophenol (in 1:4 ethanol:water mixture). Repeat after adding a small crystal of NaOH. Comment on the difference, if any.
- Record the U.V. spectrum of a given compound (acetone) in cyclohexane
- (a) Plot transmittance *versus* wavelength.
- (b) Plot absorbance *versus* wavelength.

(III) Potentiometric titration

- Find out base strength by titrating against with strong acid potentiometrically.

(IV) Electrochemistry

- Prove Debye Huckel Onsagar Equations
- Prove Kaulraush law, Calculate equivalent conductance of acetic acid at infinite dilution

Any other experiment carried out in the class can be included.

***MSDS – Compilation of MSDS of chemicals used by students in each experiments is compulsory.**

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.



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PROGRAMMING IN C LAB

Course Code: CHY2609

Credit Units: 01

Course Contents:

- DOS commands
- Creation of batch files
- C program involving problems like finding the nth value of cosine series, Fibonacci series. Etc.
- C programs including user defined function calls
- C programs involving pointers, and solving various problems with the help of those.
- File handling

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.



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MATERIAL CHEMISTRY

Course Code: CHY2610

Credit Units: 03

Course Objective: To introduce and give an insight into the fascinating area of solid state chemistry and material science. This will enable the students in pursuing higher studies.

Course Contents:

Module I: Structures of solids

Introduction to solids – crystalline and amorphous. Unit cell, Bravais lattices and X-ray structure determination (NaCl and KCl only) – powder and single crystal- methods and applications-identification of the cubic lattice and indexing of the X-ray diffraction lines.

Radius ratio rules – coordination number. Packing arrangement -different structure types in solids – rock salt, zinc blende, wurtzite, fluorite and antifluorite, spinel and inverse-spinel and perovskite structures.

Module II: Preparative methods and characterization

Solid state reactions – ceramic method, sol-gel, hydrothermal, high pressure, zone refining, CVD, Czochralski and Bridgman and Stockbarger methods.

Physical methods – thermogravimetric and differential thermal analysis and scanning electron microscopy (only introduction and application).

Module III: Electrical and optical properties

Defects in solid state – point defects – Frenkel and Schottky defects and non-stoichiometric defects.

Conductors – variation of conductivity with temperature – semiconductors – p and n types, pn- junction, photoconduction, photo voltaic cell and photogalvanic cell – solar energy conversion, organic semiconductors.

Piezoelectric, pyro-electric and ferroelectrics (introduction and application).Photoluminescence.

Module IV: Magnetic properties

Magnetic properties – classification - diamagnetic, paramagnetic, antiferromagnetic, ferro and ferri magnetic — magnetic susceptibility. Variation with temperature – Curie-Wiess law, Curie temperature and Neel temperature. Permanent and temporary magnets.

Module V: Special materials

Superconductivity – introduction, Meissner effect – mention of Bardeen, Cooper and Schrieffer theory and Cooper pairs – examples of superconducting oxides, Chevrel phases– applications of superconducting materials.

Ionic conductors – sodium- α -alumina, sodium-sulphur battery. Intercalation – layered compounds – graphitic compounds. Special applications of solid state materials. High energy battery, lithium cells.

Liquid crystals: nematic, cholesteric and smectic types and applications.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;

Att: Attendance


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Text & References:

- Solid State Chemistry-An Introduction by Lesley Smart and Elaine Moore, Chapman Hall,London, 1992.
- Solid State Chemistry by M. G. Arora, Anmol Publications, New Delhi, 2001.
- Materials Science by P. K. Palanisamy, Scitech Publications, Chennai, 2003.
- Modern Inorganic Chemistry by W. L. Jolly, Mc Graw Hill Book company, NY, 1989.
- Inorganic Chemistry by D. F. Shriver and P. W. Atkins, Longford, Oxford university press,1990.
- Introductory Solid State Physics by H. P. Meyers, Viva Books Private Limited, 1998.
- Solid State Chemistry and its applications by A. R. West, John-Wiley and sons,1987.
- Modern aspects of Inorganic Chemistry by H. J. Emelius and A. G. Sharpe, Universal Bookstall,1989.
- Ionic crystals, Lattice defects and nonstoichiometry, N. N. Greenwood, Butterworths,London, 1968.
- Solid State Physics by Charles Kittel, John-Wiley and sons



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NANOCHEMISTRY

Course Code: CHY2611

Credit Units: 03

Course Objective:

To introduce the basics of nanotechnology and to learn the instrumental techniques used in characterization of nano materials.

Course Contents:

Module I: Basics of Nanochemistry

Introduction – definition – length scales – importance of nanoscale and its technology – self assembly of materials – nanowires, nanorods and quantum dots.

Module II: Nano Particles

Techniques to synthesize nanoparticles – top down and bottom up approaches – common growth methods – characterization of nanoparticles – applications and toxic effects of nanomaterials.

Module III: Synthetic Techniques

Introduction – types of nanoparticles – preparation, properties and uses of gold, silicon, silver, zinc oxide, iron oxide, alumina and titania nanoparticles.

Module IV: Nano Materials

Preparation, properties and applications of carbon nanotubes, nanorods, nano fibre and nanoclay.

Module V: Instrumental Techniques

Basic principles of electron microscopes – scanning electron microscopes (SEM) – transmission electron microscopes (TEM) – scanning probe microscopy – atomic force microscopy (AFM) – scanning tunneling electron microscope (STEM), DLS, TGA, DSC.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;

Att: Attendance

Text & References:

- Nanotechnology, S. Shanmugam, MJP Publishers, Chennai (2010).
- A Handbook on Nanochemistry, Patrick Salomon, Dominant Publishers and Distributors, New Delhi.
- Nanobiotechnology, S. Balaji, MJP Publishers, Chennai (2010).
- The Chemistry of Nanomaterial: Synthesis, Properties and Applications, Vol. I and II, CNR Rao, Springer (2006).
- Nanotechnology: Basic Science and Emerging Technologies, Mick Wilson, Kamali Kannangara, Geoff Smith, Michelle Simmons, Burkhard Raguse, Overseas Press (2005).
- Nanochemistry, G. B. Segreev, Elsevier, Science, New York, (2006).
- Nanobiotechnology, S. Balaji, MJP Publishers, Chennai. (2010).
- Nano: The Essentials, T. Pradeep, Tata Mc-Graw Hill, New Delhi (2007).
- The Chemistry of Nanomaterial: Synthesis, Properties and Applications, Vol. I and II, CNR Rao, Springer (2006).
- Nanotechnology: Basic Science and Emerging Technologies, Mick Wilson, Kamali Kannangara, Geoff Smith, Michelle Simmons, Burkhard Raguse, Overseas Press (2005).
- Nanochemistry, G. B. Segreev, Elsevier, Science, New York, (2006).

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TECHNICAL WRITING IN SCIENCE-II

Course Code: CHY2612

Credit Units: 02

Course Objective:

Students will be introduced to learning the written and oral communication of technical information. Assignments include writing and presenting proposals, reports, and documentation. Emphasis on use of rhetorical analysis, computer applications, collaborative writing, and usability testing to complete technical communication tasks in the workplace.

Course Contents:

Module I: Technical Writing Process

Document development process, Estimating Technical Documentation, Documentation Planning, Selection of Tools, Information Architecture, Templates and Page design, Audience Profiling.

Module II:

Journal paper writing: Abstract for paper and poster, different kind of journal for chemistry, impact factors of journals, ISBN number, Citation, H-index.

Module III:

Analytical report, Project Management in Technical Communication, Project writing, project proposal writing.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

Text & References:

- M. Frank. Writing as thinking: *A guided process approach*, Englewood Cliffs, Prentice Hall Regents.
- L. Hamp-Lyons and B. Heasley: Study Writing; *A course in written English*. For academic and professional purposes, Cambridge Univ. Press.
- R. Quirk, S. Greenbaum, G. Leech and J. Svartik: *A comprehensive grammar of the English language*, Longman, London.
- Daniel G. Riordan & Steven A. Panley: "Technical Report Writing Today" - Biztantra.
- Daniel G. Riordan, Steven E. Pauley, Biztantra: *Technical Report Writing Today*, 8th Edition (2004).
- *Contemporary Business Communication*, Scot Ober, Biztantra, 5th Edition (2004).



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TERM PAPER

Course Code: CHY2631

Credit Units: 02

Course Objectives

The objective of this course is to judge the understanding as well as application of the knowledge gained by the students. The aim of the term paper is to provide the students with an opportunity to further enhance their knowledge in a sector of their choice by undertaking a significant practical unit of examining and analyzing various aspects of chemistry and its application at a level commensurate with the learning outcomes of the various courses taken up them in the ongoing semester.

A term paper is primarily a record of intelligent reading in several sources on a particular subject. The students will choose the topic at the beginning of the session in consultation with the faculty assigned. At least one middle level or senior level person of a company from the chosen sector may be interviewed face to face

Guidelines:

1. The term paper will be related to the contemporary issue and the topic will be given by the department.
2. The presentation of the term paper is scheduled to be held before the commencement of Semester examinations.
3. The paper will carry 100 marks that will be marked on the basis of understanding and organization of content based on the literature review. The Bibliography shall form an important part of the paper.
4. Examples of a few broad areas for Term Paper (List is indicative, not exhaustive)
 - Inorganic chemistry
 - Organic chemistry
 - Physical chemistry
 - Green chemistry
 - Agriculture chemistry
 - Nanochemistry

Evaluation Scheme

Organisation and relevance of content	Literature Review	Bibliography	Presentation	Total
30	30	20	20	100



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PROJECT

Course Code: CHY2632

Credit Units: 03

Course Objectives:

The aim of the project is to provide the students with an opportunity to further their intellectual and personal development in the chosen field by undertaking a significant practical unit of activity. The project can be defined as a scholarly inquiry into a problem or issues, involving a systematic approach to gathering and analysis of information / data, leading to production of a structured report.

Chapter Scheme and distribution of marks:

Chapter 1: Introduction – 10 marks

Chapter 2: Conceptual Framework/ National/International Scenario – 25 marks

Chapter 3: Presentation, Analysis & Findings -- 25 marks

Chapter 4: Conclusion & Recommendations -- 10 marks

Chapter 5: Bibliography -- 05 marks

Components of a Project Report

The outcome of Project Work is the Project Report. A project report should have the following components:

1) Cover Page: This should contain the title of the project proposal, to whom it is submitted, for which degree, the name of the author, name of the supervisor, year of submission of the project work, name of the University.

2) Acknowledgement: Various organizations and individuals who might have provided assistance /co-operation during the process of carrying out the study.

3) Table of Content: Page-wise listing of the main contents in the report, i.e., different Chapters and its main Sections along with their page numbers.

4) Body of the Report: The body of the report should have these four logical divisions

a) Introduction: This will cover the background, rationale/ need / justification, brief review of literature, objectives, methodology (the area of the study, sample, type of study, tools for data collection, and method of analysis), Limitations of the Study, and Chapter Planning.

b) Conceptual Framework / National and International Scenario: (relating to the topic of the Project).

c) Presentation of Data, Analysis and Findings: (using the tools and techniques mentioned in the methodology).

d) Conclusion and Recommendations: In this section, the concluding observations based on the main findings and suggestions are to be provided.

5) Bibliography or References: This section will include the list of books and articles which have been used in the project work, and in writing a project report.

6) Annexures: Questionnaires (if any), relevant reports, etc.

(The main text of the Project should normally be in the range of 5000 words. However, there may be annexure in addition to the main text)

The Steps of a Project Report

STEP I : Selection of the topic for the project by taking following points into consideration:

- Suitability of the topic.
- Relevance of the topic

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- Time available at the disposal.
- Feasibility of data collection within the given time limit.
- Challenges involved in the data collection (time & cost involved in the data collection, possibility of getting responses, etc.)

STEP II : Finalisation of the Topic and preparation of Project Proposal in consultation with the Supervisor.

STEP III : Collection of information and data relating to the topic and analysis of the same.

STEP IV : Writing the report dividing it into suitable chapters, viz.,

Chapter 1: Introduction,

Chapter 2: Conceptual Framework / National & International Scenario,

Chapter 3: Analysis & Findings

Chapter 4: Conclusion and Recommendations.

Chapter 5: Bibliography

STEP V : The following documents are to be attached with the Final Project Report.

- Approval letter from the supervisor (Annexure-IA)
- Student's declaration (Annexure-IB)
- Certificate from the Competent Authority of the Organisation / Institution, if the student undertakes the Project Work in any Organisation / Institution.

Guidelines for evaluation:

- Each of the students has to undertake a Project individually under the supervision of a teacher and to submit the same following the guidelines stated below.
- Language of Project Report and Viva-Voce Examination may be English. The Project Report must be typed and hard bound.
- Failure to submit the Project Report or failure to appear at the Viva-voce Examination will be treated as "Absent" in the Examination. He /she has to submit the Project Report and appear at the Viva-Voce Examination in the subsequent years (within the time period as per University Rules).
- No marks will be allotted on the Project Report unless a candidate appears at the Viva-Voce Examination. Similarly, no marks will be allotted on Viva-Voce Examination unless a candidate submits his/her Project Report.
- Evaluation of the Project Work to be done jointly by one internal expert and one external expert with equal weightage, i.e., average marks of the internal and external experts will be allotted to the candidate. The evaluation scheme shall be as follows:

Project Report	Power Point Presentation & Viva
75 marks	25 marks



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Annexure-IB
Student's Declaration

Ihereby declare that the Project Work with the title (in block letters).....
submitted by me for the partial fulfilment of the degree of B.Sc. Honours in Chemistry is my original work and has not been submitted earlier to any other University /Institution for the fulfilment of the requirement for any course of study.

I also declare that no chapter of this manuscript in whole or in part has been incorporated in this report from any earlier work done by others or by me. However, extracts of any literature which has been used for this report has been duly acknowledged providing details of such literature in the references.

Signature of Supervisor:
Name
Registration No.

Signature of Student

Place:
Date:



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WORKSHOP

Course Code: CHY2633

Credit Units: 01

Course Objectives

A workshop is primarily an activity based academic event that is organized to provide the students a one to one and hands on experience on any aspect of their learning. The communication in a workshop has to be necessarily two way. The trainer has to make sure that the aspects covered are practically practiced by the participants. The student will choose the option of workshop from amongst their concentration electives. The evaluation will be done by Board of examiners comprising of the faculties.

Major Themes for Workshop

The workshop may be conducted on any of the following major themes:

- Nuclear Chemistry• Modern trend in Inorganic Chemistry
- Modern trend in Physical Chemistry• Modern trend in Organic Chemistry
- Nanotechnology and its applications• Green Chemistry
- Polymer Chemistry• Environmental Chemistry
- Pharmaceuticals
- Food Technology
- Agriculture Chemistry
- Computational Chemistry

These themes are merely indicative and other recent and relevant topics of study may be included.

Guidelines for Workshop

The procedure for earning credits from workshop consists of the following steps:

1. Relevant study material and references will be provided by the trainer in advance.
2. The participants are expected to explore the topic in advance and take active part in the discussions held
3. Attending and Participating in all activities of the workshop
4. Group Activities have to be undertaken by students as guided by the trainer.
5. Evaluation of workshop activities would be done through test and quiz at the end of the workshop.
6. Submitting a write up of at least 500 words about the learning outcome from the workshop.

Methodology

The methodology followed at the workshop could be based on any one or more of the following methods:

- Case Study
- Simulation
- Business Planning
- Quiz
- Quality analysis & characterization
- Identification and preparation of materials

Evaluation Scheme:

Attendance	Active Participation	Multiple Choice Questions/ Quiz	Solving the case/ Assignment/ Write up	Total
10	30	30	30	100

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Registrar
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Manesar Gurgaon-122413

Bachelor of Science (Forensic Science) (Honors)

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Curriculum & Scheme of Examination

2022

AMITY UNIVERSITY HARYANA

GURUGRAM

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FCH2102	INTRODUCTION TO FORENSIC SCIENCE	L	T	P	C
Version	Date of Approval: December, 2021	2	0	0	2
Pre-requisites/Exposure	Nil				
Co-requisites					

Catalog Description

This course is designed to provide an insight on introduction to forensic science at the undergraduate level. The main objective is to impart essential theoretical knowledge on understanding of forensic fundamentals at laboratory and crime scene.

Course Objective:

The course focuses on the following objectives-

- Developing an understanding and appreciation for the scope of Forensic Sciences.
- Develop an understanding on historical development, Mobile Forensic Units and Expert's testimony.
- Develop brief knowledge of the functions and services provided by the Forensic Laboratories

Course Outcomes

On completion of this course, the students will be able to

CO1. Identify, describe, and recognize forensic science and its functioning.

CO2. Recognize, classify, and translate fundamental principles of forensic science.

CO3. Apply knowledge of physical evidence in solving crime cases.

Course Contents:

Modules	Blooms level*	Number of hours
Module I: Brief description of Forensic Science Definition, Description, Principles, Concept, Needs and scope. History of Forensic Science and Forensic Science Labs; Progressive development and transformation of Forensic Science Labs, Role of Directorate of Forensic Science Services.	L1	8
Module II: Forensic Science Laboratories Main Authority, Organizational structure of Forensic Science Laboratory – roles and responsibilities, Sections/ Divisions, Services provided, Process of report writing and submission to court. Mobile Forensic Science Laboratory – their distribution in India, functions, need and utility. Calibration of testing laboratories (ISO).	L1, L2	10
Module III: Evidence Applicability in Court Definition, Various types of evidence, Laws of evidence, Expert's testimony and admissibility of scientific evidence in Court of Law.	L1, L3	6

*Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Suggested Readings:

- Bodziak, W., Footwear Impression Evidence (2ndEdn.) CRC Press, Boca Raton, Florida, 2000.

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- DeForest, P., Gaensslen, R., and Lee, H., Forensic Science; an Introduction to Criminalistics, McGraw Hill, New York, 1983.
- Fisher, B., Techniques of Crime Scene Investigation (6thEdn.) CRC Press, Boca Raton, Florida, 2000.
- James, S. H. And Nordby, J. J. (Eds), Forensic Science - An Introduction to Scientific and Investigative Techniques, CRC Press, London, 2003.
- James, S., and Eskerc, W., Interpretation of Blood Stain Evidence at Crime Scenes, (2ndEdn) CRC Press, Boca Raton, Florida, 1999.
- Saferstein, Richard, Criminalistics, An Introduction to Forensic Science, 6th Ed. Prentice-Hall, New Jersey, 1998.
- Sharma, B. R., Forensic Science in Criminal Investigation and Trials (3rdEdn) Universal Law Publishing Co. Ltd. New Delhi, 2001.

Modes of Evaluation: Quiz/Assignment/Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

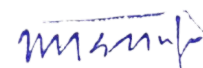
CO, PO and PSO Mapping:

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FCH2103	FUNDAMENTALS OF CRIME SCENE INVESTIGATION	L	T	P	C
Version	Date of Approval: December, 2021	2	0	0	2
Pre-requisites/Exposure	Nil				
Co-requisites					

Catalog Description

This course is intended to provide students an insight on fundamentals of crime scene investigation. The students will learn to reconstruct the various scenes of crimes and collect, preserve, package and report the evidence collected from crime scene.

Course Objective:

The course focuses on the following objectives-

- Developing an understanding and application of Crime scene Investigation.
- Develop an understanding on concepts of crime scene and its types.
- Give a brief description on various techniques used for recording of the crime scene.
- Develop comprehensive knowledge on Crime scene reconstruction and significance of physical evidence.

Course Outcomes

On completion of this course, the students will be able to

CO1. Identify and recognize physical evidence

CO2. Acquire skills in handling scientific instruments and evidence collection.

CO3. Examine and analyze evidence in laboratory experiments.

CO4. Reconstruct the scene of crime and form expert opinion.

Course Contents:

Modules	Blooms level*	Number of hours
Module I: Crime Scene and its Management Defining a crime and crime scene, Importance of crime scene, Problems associated with crime scenes (indoor and outdoor), Location and processing of Crime Scene. Introduction to Crime Scene Management, Handling clues and evidence.	L1, L2	6
Module II: Types of Crime Scenes Types of crime scenes, Primary, Secondary crime scene, Mobile, Indoor and Outdoor crime scenes; Difference between trace and physical evidence, searching techniques used for locating physical evidences at scene of crime.	L2, L3	6
Module III: Recording and Documentation of Crime scene Crime Scene documentation, Barrication of Crime Scene, Crime Scene Photography, Videography; Sketching; Notes making.	L3, L4	6
Module IV: Crime Scene Reconstruction Procedure and requirement for Crime Scene Reconstruction, Modus operandi, Expert team constitution for different crime scenes, Roles of Investigating Officer.	L4	6

*Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis,

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Suggested Readings:

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- DeForest, P., Gaensslen, R., and Lee, H., Forensic Science; An Introduction to Criminalistics, McGraw Hill, New York, 1983.
- Fisher, B., Techniques of Crime Scene Investigation (6thEdn.) CRC Press, Boca Raton, Florida, 2000.
- James, S. H. And Nordby, J. J. (Eds) Forensic Science - An Introduction to Scientific and Investigative Techniques, CRC Press, London, 2003.
- James, S., and Eskerc, W., Interpretation of Blood Stain Evidence at Crime Scenes, (2ndEdn) CRC Press.

Modes of Evaluation: Quiz/Assignment/Seminar/Written Examination**Examination Scheme:**

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

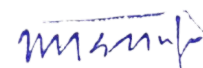
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FCH2108	CRIME SCENE INVESTIGATION LAB	L	T	P	C
Version 1.1	Date of Approval: December, 2021	0	0	4	2
Pre-requisites/Exposure	Nil				
Co-requisites					

Catalog Description

This course will give students the basic experimental knowledge of working in undergraduate lab i.e. investigation and sketching of indoor and outdoor crime scene, notes making, searching and packaging and forwarding of evidence.

Course Objective:

The students will understand & perform experiments relating to:

- Investigation of crime scene.
- Sketching of outdoor/ indoor scene of crime
- Packaging and forwarding of Evidence

Course Outcomes

On completion of this course, the students will be able to

CO: Investigate indoor crime scene.

CO2: Investigate outdoor crime scene.

CO3: Search, package and preserve the evidence from crime scene.

Course Contents:

Modules	Blooms level*	Number of hours
1. Investigation and sketching of indoor scene of crime.	L1, L3	6
2. Investigation and sketching of outdoor scene of crime.		
3. Crime Scene Photography: indoor, outdoor.	L1, L2, L3	6
4. Parts of camera.		
5. Searching of crime scene.	L2, L3	6
6. Notes making.		
7. Packaging and forwarding of physical evidences.	L3	6
8. Envelop making and Druggist fold method.		
9. To study the Sealing procedure of physical evidence.		

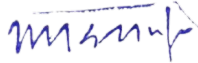
*Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Suggested Readings:

- 1. A Glencoe Program Physics principles and problems: Forensic Laboratory Manual Student edition.
- Thomas Kubic, Nicholas Petraco Forensic Science Laboratory Manual and Workbook, Third Edition 2009.
- Kathy Mirakovits, Gina Londino, The Basics of Investigating Forensic Science: A Laboratory Manual 2015.
- Washington state patrol Forensic Laboratory services: Crime Laboratory: Technical & Training Manuals.



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Modes of Evaluation: Quiz/Assignment/Seminar/Written Examination

Examination Scheme:

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5	10	10	5	35	35

Note: IA–Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva. A-Attendance.

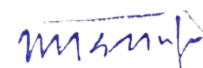
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FCH2107	HUMAN ANATOMY AND PHYSIOLOGY	L	T	P	C
Version	Date of Approval: December, 2021	2	1	0	3
Pre-requisites/Exposure	Nil				
Co-requisites					

Catalog Description

This course will help the students to understand important fundamental concepts of human anatomy and physiology at the undergraduate level. The main objective is to prepare students for the study of the basic tissues, respiratory system, cardiovascular system, excretory system, nervous system, endocrine system and fluid electrolytes etc.

Course Objective:

To Explore the Fundamental Concepts of Human anatomy and Physiology.

1. To provide students with basic understanding of tissues, cells, membranes etc.
2. To provide students with basics of respiratory, cardiovascular, excretory system.
3. To give students basic concepts of central nervous system, endocrine and digestive system.

Course Outcomes

On completion of this course, the students will be able to

CO1. Understand salient features about calibration, crystallization and distillation.

CO2. Determine Melting Points of Organic Molecules.

CO3. Determine boiling Points of Organic Molecules.

CO4. Understand the use of chromatographic techniques in purification of organic compounds.

Course Contents:

Modules	Blooms level*	Number of hours
Module I: Tissue Epithelial Tissue, Connective Tissue, Muscle Tissue (Skeleton, Smooth and Cardiac muscles: Anatomy and Physiology), Nervous tissue (Neuroglia, Neuron, Membrane potential, Synapse, Neurotransmitters and Receptors), Skeleton tissue (Bones and Cartilages, Ligament, Tendon, Joints), Covering and Lining Membranes Respiratory System Anatomy; Nose and Paranasal Sinuses, Pharynx, Larynx, Trachea, Bronchi and Subdivisions, Lungs and Pleurae: Mechanics of Breathing; Pressure Relationships in the Thoracic Cavity, Pulmonary Ventilation, Physical Factors Influencing Pulmonary Ventilation, Respiratory Volumes and Pulmonary Function: Gas Exchanges Between the Blood, Lungs, and Tissues; Basic Properties of Gases, Composition of Alveolar Gas, External Respiration, Internal Respiration: Transport of Respiratory Gases by Blood Oxygen Transport, Carbon Dioxide, Bohr effect, Haldane Effect, Chloride shift, Control of Respiration	L1, L2 and L3	10
Module II: Cardiovascular System Heart Anatomy; Coverings of the Heart, Auricles, Ventricles, Heart Valves;	L1, L2, L3	8

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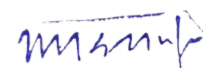
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<p>Pathway of Blood Through the Heart, Blood Pressure, Blood vessels and structure(Arterial System, Capillaries, Venous System), Systemic Arteries and Veins</p> <p>Excretory System Kidney Anatomy, Cortical nephrons, Juxtaglomerular, Juxtaglomerular Complex (JGC) Kidney Physiology: Mechanisms of Urine Formation (Glomerular Filtration, Tubular Reabsorption, Tubular Secretion, Counter current mechanism, Urine Transport, Storage, and Elimination</p>		
<p>Module III: Nervous System Central Nervous System; The Brain, Ventricles, Cerebral Hemispheres, Diencephalon Brain Stem, Cerebellum, Meninges, Cerebrospinal Fluid (CSF), Blood Brain Barrier The Spinal Cord</p> <p>Peripheral Nervous System and Reflex Activity; Sensory receptor and activity, transmission lines: Nerves and associated ganglia, Cranial nerves, Spinal nerves, Motor endings and activity</p> <p>Autonomic Nervous System; Parasympathetic, Sympathetic, Neurotransmitters and Receptor, The Effects of Drugs.</p>	L1, L2, L3	6
<p>Module IV: Digestive System Overview of the Digestive System, Peritoneum, Histology of the Alimentary Canal (Mucosa, Submucosa, Muscularis externa, Serosa), Enteric Nervous System of the Alimentary Canal: Mouth, Tongue, Salivary Glands, Teeth, Pharynx, Esophagus, Stomach, Small Intestine, Liver and Gallbladder, Pancreas, Regulation of Bile and Pancreatic Secretion and Entry into the Small Intestine, Large Intestine, Bacterial Flora: Physiology of digestion and absorption.</p>	L1, L2, L3	6
<p>Module V: Endocrine System Chemistry and Mechanism of Hormone, The Pituitary Gland and Hypothalamus and associated hormones, The Thyroid Gland and Parathyroid gland; Thyroid Hormone (TH), Calcitonin, Parathyroid hormone (PTH), The Adrenal Gland and associated hormones, Pineal gland, Pancreas</p> <p>Fluid, Electrolyte, and Acid-Base Balance Body Fluids, Water Balance and ECF osmolality, Electrolyte Balance, Acid-Base Balance.</p>	L1, L2	6

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation*



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Suggested Readings:

- Elaine N. Marieb, Katja Hoehn, Human Anatomy and Physiology, 9th edition
- M.A. Miller, L.C. Leavell, and KiberGrey's Stackpole's Anatomy and Physiology, 16th edition
- Arthur C. Guyton, John E. Hall, Textbook of Medical Physiology, 12th edition
- R. L. Dravce, K.L. Vogl, and AWM Mitchell Grey's Anatomy for students 2005, Elsevier. Inc.

Modes of Evaluation: Quiz/Assignment/Seminar/Written Examination**Examination Scheme:**

A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA–Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva. A-Attendance.

CO, PO and PSO Mapping:

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FCH2201	PHYSICAL EVIDENCE IN FORENSIC SCIENCE	L	T	P	C
Version 1.1	Date of Approval: December, 2021	2	0	0	2
Pre-requisites/Exposure	Nil				
Co-requisites					

Catalog Description

This course will help the students to learn the collection, packaging, preservation and analysis of physical evidence from indoor, outdoor and mobile crime scenes.

Course Objective: The course focuses on following objectives-

1. Developing an understanding and application of Forensic Science and significance of various physical evidence.
2. Develop an understanding on Expert's testimony.
3. Develop comprehensive knowledge on Procedure and examination in the Court of Law.

Course Outcomes

On completion of this course, the students will be able to

- CO1. Recognise and identify best methods of handling and processing of physical evidence.
- CO2. Distinguish between types of crime scenes and linking suspects to crime scene.
- CO3. Apply advanced knowledge and forensic concepts in crime solving.
- CO4. Examine and prepare report and expert opinion.

Course Contents:

Modules	Blooms level*	Number of hours
Module I: Introduction and Handling of Physical Evidence Definition, Types and significance of Physical Evidence, Collection, Packaging, Preservation and Forwarding of evidence: Biological (urine, blood, semen, saliva, hair), Chemicals, poisons, firearms, fingerprints and tool marks.	L1, L2, L3	6
Module II: Crime and Suspect Linking a Crime Scene with the suspect through field notes, witnesses and interrogation, Reconstruction of crime scene and associative/ corroborative evidence.	L2	6
Module III: Analysis of Physical evidence Examinations, report making, chain of custody, report closing. Search and seizure, privilege against self-incrimination, Subpoenas deposition, Miranda rights, Condemned of court, FIR, Types of cognizable and non-cognizable offences.	L1, L2	6
Module IV: Examination in the Court Direct examination, cross- examination and re-examination of Prosecution lawyer and Defence lawyer and Court presentation, Law of evidence: testimonial and real evidence.	L2, L3	6

*Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

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Suggested Reading:

- Bodziak, W., Footwear Impression Evidence (2nd Ed.) CRC Press, Boca Raton, Florida, 2000.
- DeForest, P., Gaensslen, R., and Lee, H., Forensic Science; An Introduction to Criminalistics, McGraw Hill, New York, 1983.
- Fisher, B., Techniques of Crime Scene Investigation (6thEdn.) CRC Press, Boca Raton, Florida, 2000.
- James, S. H. And Nordby, J. J. (Eds), Forensic Science - An Introduction to Scientific and Investigative Techniques, CRC Press, London, 2003.
- James, S., and Eskerc, W., Interpretation of Blood Stain Evidence at Crime Scenes, (2ndEdn) CRC Press, Boca Raton, Florida. 1999.

Modes of Evaluation: Quiz/Assignment/Seminar/Written Examination**Examination Scheme:**

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

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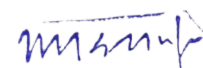
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FCH2202	FINGERPRINT SCIENCE	L	T	P	C
Version 1.1	Date of Approval: December, 2021	2	1	0	3
Pre-requisites/Exposure	Nil				
Co-requisites					

Catalog Description

This course will help the students to understand basic of fingerprint science and their systematic classification.

Course Objective: The course focuses on following objectives-

1. Developing an understanding and appreciation for the scope of Fingerprints Examination.
2. Develop an understanding on various methods of development of Fingerprints.
3. Develop comprehensive knowledge on fingerprint patterns, fingerprint classification, the various methods of fingerprint development- physical and chemical.

Course Outcomes

On completion of this course, the students will be able to

CO1. Identify and outline various types of fingerprints patterns

CO2. Distinguish and categorise characteristics of fingerprints for proper collection and preservation.

CO2. Classify fingerprints for case solving and matching of suspect prints with crime scene evidence.

CO3. Apply advanced knowledge of Automated fingerprints identification for forensic examination in court of law.

Course Contents:

Modules	Blooms level*	Number of hours
Module I: History and Development of Fingerprinting Origin & History of fingerprints, Principles of Fingerprint identification, Searching, location and significance of fingerprints in criminal investigation.	L1, L2	6
Module II: Introduction of Fingerprint and its characteristics Biological significance of skin pattern, Types of fingerprints, Description of Index Card; Rolled and plain prints, Fingerprint characteristics: class and individual, Collection, lifting and preservation of fingerprints, Photography of latent fingerprints and presentation of fingerprint evidence in court.	L2,L3	8
Module III: Classification of Fingerprints Henry's system of classification, Batley's Single Digit classification, Extension of Henry's system of classification. Primary, secondary, sub-secondary, major, Second sub-secondary, key and final classifications	L3,L4	8
Module IV: Fingerprint Developmental techniques Methods of lifting and developing latent fingerprints – Physical methods - Powder method (Black, silver, florescent, red, yellow), Iodine fuming etc. Chemical methods - Ninhydrin, Silver nitrate method.	L4,L5	8
Module V: AFIS Introduction, history, instrumentation, processing and applications, need and scopes of AFIS.	L3	6

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**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation*

Suggested Readings:

- Nath, S., Fingerprint Identification, CRC Press, 2nd edition, 2002.
- Champhod, C., Fingerprint and other ridge skin impressions, CRC Press, 2004.
- Bridges, B. C., Vollmar, A. Monir, M., Criminal Investigation, Practical Fingerprinting, Thumb Impression, Handwriting, Expert Testimony Opinion Evidence, The University Book Agency, Allahbad, 2000.
- James, S. H. and Nordby, J. J. (Eds), Forensic Science - An Introduction to Scientific and Investigation Techniques, CRC Press, London, 2003.
- Nanda, B. B., and Tewari, R. K., Forensic Science in India. Select Publishers, New Delhi, 2001.
- Saferstein, Richard, Criminalistics, An Introduction to Forensic Science, 6th Ed. Prentice-Hall, New Jersey, 1998.
- Sharma, B. R., Forensic Science in Criminal Investigation and Trials (3rdEdn) Universal Law Publishing Co. Ltd. New Delhi, 2001.

Modes of Evaluation: Quiz/Assignment/Seminar/Written Examination

Examination Scheme:

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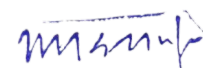
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FCH2203	METRIC SYSTEM & PHYSICAL PROPERTIES OF EVIDENCES	L	T	P	C
Version 1.1	Date of Approval: December, 2021	2	1	0	3
Pre-requisites/Exposure	Nil				
Co-requisites					

Catalog Description

This course introduces students to the characteristics and properties of different evidences like glass, soil, paint, hair and fibre, which are normally encountered at the scene of crime.

Course Objective: The course focuses on following objectives-

1. Develop an understanding on various methods of development of Fingerprints.
2. Develop comprehensive knowledge on fingerprint patterns, fingerprint classification, the various methods of fingerprint development- physical and chemical.

Course Outcomes

On completion of this course, the students will be able to

- CO1. Give appropriate handling and processing of physical evidence.
- CO2. Apply forensic aptitude in case solving and analyzing physical evidence.
- CO3. Use advanced knowledge and forensic concepts to propose examination in court of law.

Course Contents:

Modules	Bloom's level*	Number of hours
Module I: The Metric System Introduction to the metric system, Introduction to prevalent physical evidence (soil, glass, fibre, hair and liquids).	L1	6
Module II: Glass Examination Glass: Composition (organic and inorganic elements), Analytical and chemical examination, Comparing glass fragments, glass fractures.	L1, L2	8
Module III: Paint Examination Introduction to paint chemistry, types of paints and their composition, forensic examination of paints (household and automobile).	L1, L2	6
Module IV: Soil examination Composition of soil (organic and inorganic), Properties (Colour, density, size distribution of soil particles), Collection and preservations of soil, Mineral and chemical analysis of soil, Density gradient techniques. Definition, composition, types, physical and chemical analysis of concrete and cement.	L1, L2, L3	8
Module V: Introduction to various marks Definition, nature, types, significance and examination of tool marks, tyre marks, skid marks, tread marks. Definition, nature, types, significance and examination of foot and shoeprints, gait pattern and footprint casting.	L1, L2	8

*Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

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Suggested Readings:

- Heard, B. J., Handbook of Firearm and Ballistics, Wiley & Sons, Chichester, England, 1997.
- James, S. H., and Nordby, J. J., Forensic Science; an Introduction to Scientific and Investigative Techniques, CRC Press, London, 2003.
- Saferstein, Richard, Criminalistics, an Introduction of Forensic Science, 6th Ed. Prentice-Hall, New Jersey, 1998.
- Sharma, B.R., Forensic Science in Criminal Investigation and Trials (3rd Ed) Universal Law Publishing Co. Ltd., New Delhi, 2001.

Modes of Evaluation: Quiz/Assignment/Seminar/Written Examination**Examination Scheme:**

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

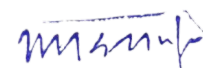
CO, PO and PSO Mapping:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PSO 1	PSO 2	PSO 3	PSO 4	PSO5
CO1	1	2	--	--	--	--	1	--	-	3	
CO2	1	2	--	-	--	--	1	-	-	3	
CO3	1	2	--	--	--	--	1	-	-	3	
CO4	1	2	--	--	--	--	1	-	-	3	

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FCH2207	FINGERPRINTING LAB	L	T	P	C
Version 1.1	Date of Approval: December, 2021	0	0	1	1
Pre-requisites/Exposure	Nil				
Co-requisites					

Catalog Description

This course introduces students to the experiments of chemical and physical methods of fingerprinting science.

Course Objective: - The students will understand & perform experiments relating to:

1. Packaging and forwarding of physical evidence.
2. Identifying fingerprints, their patterns, footprints and preparing fingerprint chart.

Course Outcomes

On completion of this course, the students will be able to

CO1. Identify various types of fingerprints patterns.

CO2. Distinguish and match the crime scene fingerprint with those of suspects.

CO3. Develop fingerprints using physical and chemical methods of fingerprints development.

CO4. Prepare the fingerprint and footprints chart.

Course Contents

Modules	Blooms level*	Number of hours
1. Prepare fingerprint card and identify the patterns.	L1, L2	2
2. Tape lifting of fingerprint.	L1, L2	2
3. Comparison of fingerprints.	L2	2
4. Ninhydrin method for fingerprint development. 5. Iodine fuming method for fingerprint development. 6. Silver nitrate method for fingerprint development. 7. Powder method of fingerprint development.	L2, L3, L4	6

*Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Suggested Readings:

- Thomas Kubic, Nicholas Petraco Forensic Science Laboratory Manual and Workbook, Third Edition 2009.
- Kathy Mirakovits, Gina Londino, The Basics of Investigating Forensic Science: A Laboratory Manual 2015.

Modes of Evaluation: Quiz/Assignment/Seminar/Written Examination

Examination Scheme:

A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA-Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva. A-Attendance.

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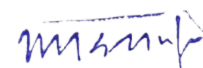
CO, PO and PSO Mapping:

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CO3	1	2	--	--	--	--	1	-	-	3	
CO4	1	2	--	--	--	--	1	-	-	3	

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FCH2208	METRIC SYSTEM LAB	L	T	P	C
Version 1.1	Date of Approval: December, 2021	0	0	1	1
Pre-requisites/Exposure	Nil				
Co-requisites					

Catalog Description

This course introduces students to the experiments of chemical and physical methods of physical evidence

Course Objective: - The students will understand & perform experiments relating to:

1. Analysis of physical evidence
2. Identifying different Physical evidence on the basis of their physical properties.
3. Determine pH, density and refractive index of various physical evidence

Course Outcomes

On completion of this course, the students will be able to

- CO1. Identify various types of physical evidence.
- CO2. Distinguish and match the crime scene exhibits.
- CO3. Examine chemical properties of evidence.
- CO4. Examine physical properties of evidence.

Course Contents

Modules	Blooms level*	Number of hours
1. Analysis of Glass on the basis of physical characteristics.	L1, L2	4
2. Comparison of Paint chips on the basis of physical characteristics using microscope.		
3. Comparison of Glass fragments using Density gradient method.	L1, L2	2
4. Comparison of soil samples using Density gradient method.	L2	2
1. Examination of cement and concrete samples.	L2, L3, L4	4
2. Comparison of fibers samples on the basic of physical and chemical properties.		

*Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Suggested Readings:

- Thomas Kubic, Nicholas Petraco Forensic Science Laboratory Manual and Workbook, Third Edition 2009.
- Kathy Mirakovits, Gina Londino, The Basics of Investigating Forensic Science: A Laboratory Manual 2015.

Modes of Evaluation: Quiz/Assignment/Seminar/Written Examination

Examination Scheme:

A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA-Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V –

Viva – Attendance.

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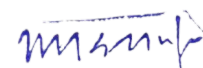
CO, PO and PSO Mapping:

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CO3	1	2	--	--	--	--	1	-	-	3	
CO4	1	2	--	--	--	--	1	-	-	3	

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FCH2302	FORENSIC SEROLOGY	L	T	P	C
Version 1.1	Date of Approval: December, 2021	2	1	0	3
Pre-requisites/Exposure	Nil				
Co-requisites					

Catalog Description

This course will help the students to learn the collection, packaging, preservation and analysis of serological evidence from crime scenes.

Course Objective: This course will cover:

1. Complete and thorough knowledge regarding the various aspects of forensic serology
2. Blood and its detailed study for identification
3. Importance of body fluids and their forensic significance

Course Outcomes

On completion of this course, the students will be able to

- CO1. Study and describe basic properties of blood and its methods of collection and packaging.
CO2. Perform and identify chemical and microscopic examinations.
CO3. Apply spectroscopic methods of analysis of serological evidence.
CO4. Explain and identify body fluids and their examination.

Course Contents:

Modules	Blooms level*	Number of hours
Module 1: Blood and its Properties The nature of blood, collection, preservation and packing of blood evidence, procedures and precautions. ABO system, Rh system and MN system; Techniques for the determination of blood groups.	L1, L2	9
Module 2: Chemical and microscopic Tests used in Blood Analysis Identification of bloodstains by microscopic methods, Catalytic tests, crystal tests.	L1, L2	9
Module 3: Species of Origin & Grouping of Bloodstains Application of Spectrophotometric method, chromatographic and immunological methods (Ring, Precipitin, Ouchterlony, reverse agglutination, normal/mixed agglutination).	L1, L2	9
Module 4: Introduction and analysis of Body Fluids Introduction to various body fluids, their nature and characteristics and Forensic analysis of Semen, Saliva, Urine, Sweat etc.	L1, L2, L3	9

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation*



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Suggested Reading:

- 1. Eckert, W.G., & James S.H., Interpretation of bloodstain evidence at crime scene, CRC Press, Florida, 1989.
- James, S.H. and Nordby, J.J. (Eds.), Forensic Science - An introduction to Scientific and investigative Techniques, CRC Press, London, 2003.
- Saferstein, R. (1998). Criminalistics, An Introduction to Forensic Science, 6th Ed. 6th Ed. Prentice –Hall
- Kirk, P.L., Introduction in crime investigation (2nd), John Willey and, New York, 1974.

Modes of Evaluation: Quiz/Assignment/Seminar/Written Examination**Examination Scheme:**

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

CO, PO and PSO Mapping:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	1	2	--	--	--	--	1	--	-	3	
CO2	1	2	--	-	--	--	1	-	-	3	
CO3	1	2	--	--	--	--	1	-	-	3	
CO4	1	2	--	--	--	--	1	-	-	3	

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FCH2312	QUESTIONED DOCUMENTS-1	L	T	P	C
Version 1.1	Date of Approval: December, 2021	2	1	0	3
Pre-requisites/Exposure	Nil				
Co-requisites					

Catalog Description

This course will help the students to learn operating various equipments used in questioned document examinations such as video spectral comparator, ESDA etc. and study the basic fundamentals of differentiating handwritings and forgery detection.

Course Objective: The course focuses on the following objectives-

1. Developing an understanding and appreciation for the scope of Handwriting Identification and Examination.
2. Develop an understanding of handwriting and their characteristics, principles of identification.
3. Give a brief description on various methods of their detection and examination.
4. Develop comprehensive knowledge on typewritten documents, common styles and their examination.

Course Outcomes

On completion of this course, the students will be able to

- CO1. Identify and describe fundamentals of handwriting and signatures.
- CO2. Translate and comprehend various equipments for document examination.
- CO3. Apply methods of analysis signature forgery.
- CO4. Examine and distinguish between typewritten and computer generated documents.

Course Contents:

Modules	Blooms level*	Number of hours
Module I: Introduction to Questioned Documents Definition: Documents, questioned documents and its classification and the type of cases encountered; Importance, nature and problems of documents, Location, collection, handling and presentation of documents, adequacy of exemplars and standards.	L1, L2	8
Module II: General Equipment for Examination Hand lens, Camera, Compound Microscope, Stereo microscope, TLC, Transmitted light source, UV-IR radiation chamber and Oblique Light source, ESDA, VSC.	L1, L2, L3	6
Module III: Handwriting Characteristics Identification – principle, class and individual handwriting characteristics, external, factors affecting handwriting characteristics, principles of handwriting identification.	L1, L2, L3	8
Module IV: Signatures Authentic Signatures, Simulated signatures, disguised signatures, traced signatures, and their characteristics	L1, L2, L3	6
Module V: Typewritten and Computer-generated documents Examination and Comparison of typewritten documents. Working of photocopiers printers and scanners, examination of	L1, L2	8

photocopied/ printed and scanned documents.

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation*

Suggested Reading:

- Albert, S. Osborn, Questioned Documents, Second Ed., Universal Law Publishing, Delhi, 1998.
- Charles, C. Thomas, I.S.Q.D. Identification System for Questioned Documents, Billy Prior Bates, Springfield, Illinois, USA, 1971.
- James, S. H. And Nordby, J. J. (Eds), Forensic Science; An Introduction to Scientific and Investigative Techniques, CRC Press, London, 2003.
- Saferstein, Richard, Criminalistics - An Introduction to Forensic Science, 6th Ed. Prentice-Hall, New Jersey, 1998.

Modes of Evaluation: Quiz/Assignment/Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

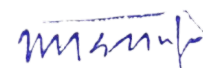
CO, PO and PSO Mapping:

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CO2	1	2	--	-	--	--	1	-	-	3	
CO3	1	2	--	--	--	--	1	-	-	3	
CO4	1	2	--	--	--	--	1	-	-	3	

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FCH2313	RESEARCH METHODOLOGY & STATISTICS	L	T	P	C
Version 1.1	Date of Approval: December, 2021	2	1	0	3
Pre-requisites/Exposure	Nil				
Co-requisites					

Catalog Description

This course will help the students to learn operating various research methodology and use of statistics which would enable students to compute their project work data etc.

Course Objective: This course objective is to introduce the student with the:

1. The research process: conceiving, designing, conducting and analyzing.
2. Methods of statistical description and analysis.
3. Ethical issues about research.
4. Graphical presentation of data.

Course Outcomes

On completion of this course, the students will be able to

- CO1. Identify and describe fundamentals of handwriting and signatures.
- CO2. Translate and comprehend various equipments for document examination.
- CO3. Apply methods of analysis signature forgery.
- CO4. Examine and distinguish between typewritten and computer-generated documents.

Course Contents:

Modules	Blooms level*	Number of hours
Module I: Introduction Definition, concept and research in science and forensic science.	L1, L2	9
Module II: Methods of Research Introduction to Research Methodology; Experimental research and non – experimental research design. Data collection method: Observation, questionnaires, interview, schedules, case study methods, types of data, graphical representation of data, parts of statistical table.	L1, L2, L3	9
Module III: Statistics-I Measures of central tendency: Mean, Mode, Median. Measures of dispersion: Range, Quartiles, Percentiles, Deciles, Standard deviation, Variance, Skewness, Kurtosis. Simple correlation method (Karl Pearson method) and regression on two lines.	L1, L2, L3	9
Module IV: Statistics-II Test of significance, one tailed test, two tailed test, parametric (f-test, z-test, t-test, chi square test) and non-parametric statistics (sign test, rank test).	L1, L2, L3	9

*Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

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Suggested Reading:

- Broota, K.D., Experimental designs in psychological research, Wiley eastern, New York, 1992.
- Guilford, Statistics in Psychology and Education, McGraw hill, New York, 1986.
- Katz and Kahn, Research in Behavioural Sciences, Methuen, USA, 1979.
- Kerlinger, F., Foundations of Behavioural Research, Surjeet Publications, Delhi, 1983.
- Rajamanickam, M., Statistical Methods in Psychological and Educational Research, Concept Publishing Co. New Delhi, India, 1983.

Modes of Evaluation: Quiz/Assignment/Seminar/Written Examination**Examination Scheme:**

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

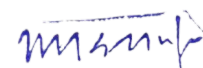
CO, PO and PSO Mapping:

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CO3	1	2	--	--	--	--	1	-	-	3	
CO4	1	2	--	--	--	--	1	-	-	3	

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FCH2311	FORENSIC SEROLOGY LAB	L	T	P	C
Version 1.1	Date of Approval: December, 2021	0	0	4	2
Pre-requisites/Exposure	Nil				
Co-requisites					

Catalog Description

This course will help the students to perform various chemical tests on serological evidences such as blood, saliva, urine etc. and presence of toxicological evidences such as poisons and alcohol.

Course Objective: The students will understand & perform experiments relating to:

1. Analysis of blood, biological fluids and alcohol.
2. Thin layer chromatography for poisons.

Course Outcomes

On completion of this course, the students will be able to

- CO1. Perform tests on blood
CO2. Perform tests on saliva and urine.
CO3. Perform tests on alcohol and poisons.

Course Contents:

Modules	Blooms level*	Number of hours
1. Analyse different blood groups from the blood found at crime scene. 2. Perform catalytic test for blood 3. Perform crystal tests for blood.	L2, L3, L4	4
4. Analyse biological fluid (saliva). 5. Analyse biological fluid (urine).	L3, L4	4
6. Analyse alcohol, acetone, chloroform 7. Separate metallic poison by thin layer chromatography (Arsenic, mercury, bismuth, Antimony).	L3, L4	4

*Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Suggested Reading:

- Laboratory Protocols CIMMYT Applied Molecular Genetics Laboratory Third Edition
- Vogel Textbook of Practical organic Chemistry including Qualitative organic analysis By
- Kathy Mirakovits, Gina Londino, The Basics of Investigating Forensic Science: A Laboratory Manual 2015

Modes of Evaluation: Quiz/Assignment/Seminar/Written Examination

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

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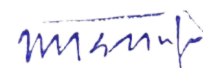
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CO3	1	2	--	--	--	--	1	-	-	3	

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FCH2315	CYBER FORENSICS	L	T	P	C
Version 1.1	Date of Approval: December, 2021	2	1	0	3
Pre-requisites/Exposure	Nil				
Co-requisites					

Catalog Description

This course will help the students to understand basic of computational forensics and its application in cyber-crime case solving.

Course Objective: In recent years, digital forensics has emerged as an essential source of tools and approaches for facilitating digital preservation and curation, specifically for protecting and investigating evidence from the past. Institutional repositories and professionals with responsibilities for personal archives can benefit from forensics in addressing digital authenticity, accountability and accessibility.

Course Outcomes

On completion of this course, the students will be able to

- CO1. Identify and outline the hierarchy and types of digital storage media.
- CO2. Describe logic gates and data representation.
- CO2. Describe operating system and its usage for forensic evaluation.
- CO3. Apply advanced knowledge of digital forensics for collection and examination of case exhibits.

Course Contents:

Modules	Blooms level*	Number of hours
Module I: Basics of Digital Forensic Basics of digital forensic, computer forensic, introduction to cyber forensic Computer organization, Components of computers – Input & Output devices, CPU Memory Hierarchy and types of Memory (RAM and ROM and their types) external storage devices. Application Software and System Software, Introduction to IT act, ethical hacking	L1, L2, L3	9
Module II: Data Representations Integers, real, binary, octal, hexadecimal & their conversions Logic gates – Negation, OR, AND, XOR etc. and their combinations	L2, L3	9
Module III: Introduction to Operating System Basics of Operating System, memory structure, concurrency, scheduling, synchronization & memory management, process description and control Introduction to Operating System (Batch Operating System, Distributed operating system, etc.) Introduction to Windows and Linux operating System	L3, L4	9
Module IV: Introduction to Digital evidences Collection, preservation of evidences, forensic imaging, data retrieval, mobile forensic, techniques in digital forensic.	L4	9

*Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

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Suggested Reading:

- Compute Crime and Computer Forensic by Dr. R.K. Tiwari
- Introduction to Forensic Science in Crime Investigation By Dr.(Mrs.) Rukmani Krishnamurthy
- Cyber Law in India by Farooq Ahmad- Pioneer Books
- Information Technology Law and Practice by Vakul Sharma- Universal Law Publishing Co. Pvt. Ltd.
- The Indian Cyber Law by Suresh T. Vishwanathan- Bharat Law House New Delhi
- Guide to Cyber and E- Commerce Laws by P.M. Bukshi and R.K. Suri- Bharat Law House, New Delhi
- Guide to Cyber Laws by Rodney D. Ryder- Wadhwa and Company, Nagpur
- The Information technology Act, 2000- Bare Act- Professional Book Publishers, New Delhi.

Modes of Evaluation: Quiz/Assignment/Seminar/Written Examination**Examination Scheme:**

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

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CO3	1	2	--	--	--	--	1	-	-	3	
CO4	1	2	--	--	--	--	1	-	-	3	

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FCH2412	QUESTIONED DOCUMENTS-II	L	T	P	C
Version 1.1	Date of Approval: December, 2021	2	1	0	3
Pre-requisites/Exposure	Nil				
Co-requisites					

Catalog Description

This course will help the students to understand the importance of questioned documents and their examination. Students will also learn examination of questioned documents.

Course Objective: The objective of this course is-

1. To develop an understanding and appreciation for the scope of Questioned Documents.
2. To develop an understanding on different types of questioned documents, the types of forgeries and disguise generally encountered.
3. To provide brief description on general equipment used in examination of Questioned Documents

Course Outcomes: On completion of this course, the students will be able to

CO1 Learn the basic concept and classification of questioned documents.

CO2 Learn the methods to detect alterations and examine paper and ink.

CO3 Learn the procedure to present the case in court of law.

CO4 Learn the basic concept and classification of security documents.

Course Contents:

Modules	Blooms level ³	Number of hours
Module I: Alteration in Questioned Documents Forgery and its characteristics, erasures, obliteration, alteration and addition. Detection and deciphering of indented writing, charred documents, invisible and secret writings	L1, L2	9
Module II: Ink and Paper Examination Composition of major classes of inks (carbon ink, fountain ink etc.), analysis of writing inks and ink dating, pencil lead examination and age of documents. Physical characteristics of paper, watermark examination, fibre analysis, chemical and trace elements analysis.	L3, L4	9
Module III: Report Writing and Case Presentation Comparison with standards: admitted and specimen samples, report writing, Components of report, Presentation of report in questioned document examination cases in Court of Law.	L1, L2	6
Module VI: Security Documents and Their Examinations Introduction of security documents, Types of security documents, Examination of Passports and fake currency notes, Latest introduced security features for identification of genuine bank notes (new series) of 50, 100, 200, 500, 2000 rupees.	L2, L3, L4	9

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**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation*

Suggested Readings:

- Albert, S. Osborn, Questioned Documents, Second Ed., Universal Law Publishing, Delhi, 1998.
- Charles, C. Thomas, I.S.Q.D. Identification System for Questioned Documents, Billy Prior Bates, Springfield, Illinois, USA, 1971.
- Kelly, J. S. Lindblom, B. S. (2006). *Science, Handwriting Examination and the Courts. Scientific Examinations of Questioned Documents*, 2nd edition, CRC Press, Taylor and Francis group.
- Huber, A. R. Headrick, A. M. (1999). *The Discrimination and Identification of writing. Handwriting Identification Facts and Fundamentals*, CRC Press, Boca Raton London.
- James, S. H. And Nordby, J. J. (Eds), *Forensic Science - An Introduction to Scientific and Investigative Techniques*, CRC Press, London, 2003.

Modes of Evaluation: Quiz/Assignment/Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester, A: Attendance

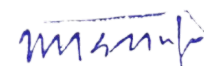
CO, PO and PSO Mapping:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	1	2	--	--	--	--	1	--	-	3	
CO2	1	2	--	-	--	--	1	-	-	3	
CO3	1	2	--	--	--	--	1	-	-	3	
CO4	1	2	--	--	--	--	1	-	-	3	

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FCH2402	FUNDAMENTALS OF FORENSIC PHOTOGRAPHY	L	T	P	C
Version 1.1	Date of Approval: December, 2021	2	1	0	3
Pre-requisites/Exposure	NIL				
Co-requisites					

Catalog Description

This course will help the students to understand the fundamentals of photography. Students will also learn methods to develop photographs and their importance in forensic science.

Course Objective: This course is designed to:

1. Provide foundation knowledge of photography
2. Develop an understanding and application of Photography in Forensic Science and CSI

Course Outcomes: On completion of this course, the students will be able to:

CO1 Describe the importance of photography in forensic science.

CO2 Classify different kinds of photography used at crime scene.

CO3 Distinguish between various light sources used in forensic photography at crime scene.

CO4 Apply methods of photography at crime scene.

Course Contents:

Modules	Blooms level*	Number of hours
Module I: Introduction Introduction to forensic photography, required equipment for photography, Importance of Forensic photography in a crime scene investigation, indoor and outdoor crime scenes photography.	L1, L2	8
Module II: Types of Photography Surveillance photography – Cameras, Type and accessions for surveillance photography, Aerial photography, Underwater photography, Videography.	L1, L2	6
Module III: Photo Prints Various methods for developing photographs, chemical processing, negative development, Films- introduction and types.	L1, L2	6
Module IV: Photography and Crime Scene Photographic aspects of physical injuries, Use of photography in reconstruction the scene of crime (Indoor and outdoor) and its presentation in the Court of Law.	L2, L3	8
Module V: Guidance Documentation and High-tech Photography for Crime Scene Image magnification, UV and IR illumination in Photography, Photography of Art factual evidence (Bloodstain, fingerprint, imprints, and micro evidence), High-speed photography, legal aspects of visual evidence.	L3, L4	8

*Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

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Suggested Readings:

- Redsicker, D. R., The Practical methodology of Forensic Photography, CRC Press, London, 1994.
- Henry Horeustein; Colour Photography -A working Manual, Little Brown Co. Boston (1995)
- B.H.E. Jacobson, Ray GG Attridge; The Manual of Photography, Focal Press, London (1988)
- Jahne B; Digital Image Processing, Heidelberg Springer (1996)
- H.L. Blitzler and J. Jacobia; Forensic Digital Imaging and Photography, Academic Press (2002)
- David R. Redsicker; The Practical Methodology of Forensic Photography- 2nd Ed. CRC Press LLC (2001)
- R.E. Jacobson, S.F. Ray, G.G. Attridge, N.R. Oxford; The Manual of Photography- Photographic and Digital Imaging, 9th Ed., Focal Press (2000)

Modes of Evaluation: Quiz/Assignment/Seminar/Written Examination**Examination Scheme:**

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester, A: Attendance

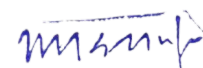
CO, PO and PSO Mapping:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	1	2	--	--	--	--	1	--	-	3	
CO2	1	2	--	-	--	--	1	-	-	3	
CO3	1	2	--	--	--	--	1	-	-	3	
CO4	1	2	--	--	--	--	1	-	-	3	

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FCH2403	FORENSIC ANTHROPOLOGY	L	T	P	C
Version 1.1	Date of Approval: December, 2021	2	1	0	3
Pre-requisites/Exposure	NIL				
Co-requisites					

Catalog Description

This course will help the students to understand the basic meaning of forensic anthropology and its utility in investigation of medico-legal cases. This course will also describe the methods to examine the human skeleton.

Course Objective:

The given course is designed to:

1. Provide the knowledge about the basics about physical anthropology
2. Develop comprehensive understanding of different techniques of determining the identity of unknown remains.
3. Provide the understanding of process of forensic facial reconstruction and its utilization in personal identification

Course Outcomes

On completion of this course, the students will be able to:

CO1 Describe the basic concepts of anthropology.

CO2 Learn the methods to identify the bones.

CO3 Learn the methods to determine height and race from human skeleton.

CO4 Learn the methods to identify the bones and human skeleton.

Course Contents:

Modules	Blooms level*	Number of hours
Module I: Introduction to Forensic Anthropology Definition, scope and application of Forensic Anthropology and related sciences, importance and need, issues related to personal identification.	L1	9
Module II: Identification from Bones Attribution of Sex, Estimation of Age (humerus, radius, ulna, fibula, tibia, femur, pelvic bone, foot and hand).	L1, L2	9
Module III: Height and Race Determination Race and height determination from long bones and their medico legal implication. Establishment of Partial and Complete identity of skeletal material and dead bodies.	L1, L2	9
Module IV: Identification from Human Skull Morphology of human skull, determining the age, race and sex of the skull and its medicolegal implications.	L1	9

*Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Suggested Readings:

- Krogman, W. M. and M. Y. Iscan: Human Skeleton in Forensic Medicine.
- Modi: A Text Book of Medical Jurisprudence and Toxicology.
- Nath, S.: Forensic Anthropology
- Stewart, T. D.: Essentials of Forensic Anthropology.

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Modes of Evaluation: Quiz/Assignment/Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance


CO, PO and PSO Mapping:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	1	2	--	--	--	--	1	--	-	3	
CO2	1	2	--	-	--	--	1	-	-	3	
CO3	1	2	--	--	--	--	1	-	-	3	
CO4	1	2	--	--	--	--	1	-	-	3	

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FCH2410	FORENSIC ANTHROPOLOGY LAB	L	T	P	C
Version 1.1	Date of Approval: December, 2021	0	0	2	1
Pre-requisites/Exposure	NIL				
Co-requisites					

Catalog Description

This course will help the students to understand the concepts of forensic anthropology and its application in estimating age, sex and race from long bones and human skeleton.

Course Objective: - The students will understand and perform experiments related to:

1. Determination of age, sex and stature from skull.
2. Determination of age, sex and stature from long bones of human body.

Course Outcomes

The main outcomes of the course are given below:

CO1. Students will learn the methods to identify human skeleton.

CO2. Students will learn the methods to identify human skeleton

CO3. Students will learn the methods to estimate height from long bones.

CO4. Students will learn the methods to determine sex and age from skull, pelvis and mandibular bone.

Course Contents:

Modules	Blooms level*	Number of hours
1. Identification of human skeleton system. 2. Identification of various bones (Pelvic and Skull bones). 3. Estimation of height using long bones. 4. Determination of sex from skull, pelvis and mandibular bone. 5. Determination of age using skull.	L1, L2, L3	24

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation*

Suggested Reading:

- Thomas Kubic, Nicholas Petraco Forensic Science Laboratory Manual and Workbook, Third Edition 2009
- Laboratory Protocols CIMMYT Applied Molecular Genetics Laboratory Third Edition
- A. I. Vogel Textbook of Practical organic Chemistry including Qualitative organic analysis
- Kathy Mirakovits, Gina Londino, The Basics of Investigating Forensic Science: A Laboratory Manual 2015
- Washington state patrol Forensic Laboratory services: Crime Laboratory: Technical and Training Manuals Isolation and identification of Drugs by E.G.C. Clark

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

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Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

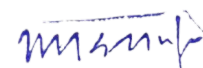
CO, PO and PSO Mapping:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	1	2	--	--	--	--	1	--	-	3	
CO2	1	2	--	-	--	--	1	-	-	3	
CO3	1	2	--	--	--	--	1	-	-	3	
CO4	1	2	--	--	--	--	1	-	-	3	

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FCH2414	QUESTIONED DOCUMENTS LAB	L	T	P	C
Version 1.1	Date of Approval: December, 2021	0	0	2	1
Pre-requisites/Exposure	NIL				
Co-requisites					

Catalog Description

This course will help the students to understand the methods to examine questioned documents. Students will understand the methods to examine currency notes and security documents.

Course Objective: - The students will understand and perform experiments related to:

1. Examination of handwriting
2. Examination of security documents
3. Comparison of bite marks and will visit mortuary

Course Outcomes

The main outcomes of the course are given below:

CO1. Students will learn the methods to identify class and individual characteristics of handwriting.

CO2. Students will learn the methods to examine questioned and security documents using optical methods.

CO3. Students will learn the methods to examine currency notes and security documents.

CO4. Students will learn the methods to identify bite marks.

Course Contents:

Modules	Blooms level*	Number of hours
1. Handwriting analysis based on class and individual characteristics. 2. Examination of documents under different light sources transmitted, oblique, UV. 3. Identification of genuine and fake currencies 4. Identification features of security documents 5. TLC of inks 6. Visit for autopsy	L1, L2, L3	24

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation*

Suggested Reading:

- A Glencoe Program Physics principles and problems: Forensic Laboratory Manual Student edition
- Thomas Kubic, Nicholas Petraco Forensic Science Laboratory Manual and Workbook, Third Edition 2009
- Kathy Mirakovits, Gina Londino, The Basics of Investigating Forensic Science: A Laboratory Manual 2015.

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Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

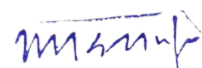
CO, PO and PSO Mapping:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	1	2	--	--	--	--	1	--	-	3	
CO2	1	2	--	-	--	--	1	-	-	3	
CO3	1	2	--	--	--	--	1	-	-	3	
CO4	1	2	--	--	--	--	1	-	-	3	

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FCH2415	WILDLIFE FORENSICS	L	T	P	C
Version 1.1	Date of Approval: December, 2021	2	1	0	3
Pre-requisites/Exposure	NIL				
Co-requisites					

Catalog Description

This course will help the students in understanding the concept of wildlife forensics. Students will also learn the risk management standards.

Course Objective: During the course the students will be able to

1. Learn the fundamentals of wildlife forensics
2. Explain the diversity and utility of variety of animal evidence
3. Explain the benefits of risk management and the structure of ISO 31000:2009 standard

Course Outcomes

The main outcomes of the course are given below:

CO1 To describe fundamental knowledge of wildlife forensics and its basic concepts.

CO2 To describe methods to examine evidence recovered in case of wild life forensic cases.

CO3 Understand the concept of risk management and its benefits.

CO4 Understand the components of the Risk framework.

Course Contents:

Modules	Blooms level*	Number of hours
Module I: Introduction to Wildlife Forensics Introduction to Wildlife Forensics, basic elements of wildlife forensics, application of forensics in wildlife crimes, basic analytical techniques in wildlife forensics.	L1	9
Module II: Evidence Examination Identification of some endangered species of plants and animals, Wildlife life protection Act, examination of pug marks, horn, skin, fur and hair, nail and teeth, wood etc. Important case studies, ethical issues in wildlife forensics.	L1, L2	9
Module III: Introduction to Risk Management and its benefits Introduction Risk Management, Risk Management in organizations and risk ownership, Risk Management standards – Benefits of Risk Management.	L1, L2	9
Module IV: ISO 31000 - Elements of Risk Management ISO 31000 overview, PDCA cycle - Elements and Purpose, Principles of Risk Management, Relationship between Principles, Framework and Process, Understanding the components of the Risk framework, Designing the Framework with Mandate and Commitment.	L3	9

*Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

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Suggested Readings:

- Simple Tools and Techniques for Enterprise Risk Management Author: Robert J. Chapman. Publisher: John Wiley and Sons (2011) India Risk Report - 2013 - FICCI + Pinkerton
- Risk Management: A Driver of Enterprise Value in the Emerging Environment -2011- KPMG ISO 31000 - Risk management— Principles and guidelines
- A corporate governance, risk management and compliance (GRC) handbook -Authors: Richard M Steinberg Publishers: John Wiley and Sons
- Richard Saferstein; Forensic Science Hand Book; Ed.; Prentice – Hall, Englewood Cliff, New jersey; (1982) Biology Methods manual.

Modes of Evaluation: Quiz/Assignment/Seminar/Written Examination**Examination Scheme:**

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

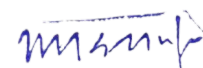
CO, PO and PSO Mapping:

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CO2	1	2	--	-	--	--	1	-	-	3	
CO3	1	2	--	--	--	--	1	-	-	3	
CO4	1	2	--	--	--	--	1	-	-	3	

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FCH2431	TERM PAPER	L	T	P	C
Version 1.1	Date of Approval: December, 2021	2	1	0	3
Pre-requisites/Exposure	NIL				
Co-requisites					

Catalog Description

The motive of this course is to understanding as well as application of the knowledge gained by the students. The aim of the term paper is to provide the students with an opportunity to further enhance their knowledge in a sector of their choice by undertaking a significant practical unit of examining and analyzing various aspects of Forensic Science & its application at a level commensurate with the learning outcomes of the various courses taken up them in the ongoing semester

Course Objectives

The objective of this course is to

1. To judge the understanding as well as application of the knowledge gained by the students.
2. Provide the students with an opportunity to further enhance their knowledge in a sector of their choice by undertaking a significant practical unit of examining and analyzing various aspects of Forensic science & its application at a level commensurate with the learning outcomes of the various courses taken up them in the ongoing semester.
3. A term paper is primarily a record of intelligent reading in several sources on a particular subject. The students will choose the topic at the beginning of the session in consultation with the faculty assigned.

Course Outcomes

Through this course,

CO1 Students with get an opportunity to further enhance their knowledge in a field of forensic of their choice by practical/ hands-on training.

CO2 Students will analyze various aspects of core forensic science courses like toxicology, chemistry, fingerprints, forensic physics, questioned documents, serology and applied forensic science courses at a level commensurate with the learning outcomes of the various courses taken up them in the ongoing semester.

CO3. Students will enhance their knowledge by extensive literature survey.

Course Contents:

Modules	Blooms level*	Number of hours
<ol style="list-style-type: none"> 1. The term paper will be related to the contemporary industrial issue and the topic will be given by the department. 2. The presentation of the term paper is scheduled to be held before the commencement of Semester examinations. 3. The paper will carry 100 marks that will be marked on the basis of understanding and organization of content based on the literature review. The Bibliography shall form an important part of the paper. 4. Examples of a few broad areas for term paper (List is indicative, not exhaustive) <ol style="list-style-type: none"> a. Forensic Toxicology b. Forensic Anthropology c. Physical chemistry d. Handwriting and Typewriting Analysis 	L1, L2 and L3	

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e.	Crime Scene Investigation		
f.	Criminology, Criminal Law and Police Administration		

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation*

Guidelines:

1. The term paper will be related to the forensic science and the topic will be given by the faculty of department.
2. The presentation of the term paper is scheduled to be held before the commencement of semester examinations.
3. The paper will carry 100 marks that will be marked on the basis of understanding and organization of content based on the literature review. The Bibliography shall form an important part of the paper.
4. Examples of a few broad areas for Term Paper (List is indicative, not exhaustive)
 - Forensic Toxicology
 - Forensic Anthropology
 - Physical chemistry
 - Handwriting and Typewriting Analysis
 - Crime Scene Investigation
 - Criminology, Criminal Law and Police Administration

Modes of Evaluation:

Evaluation Scheme:

Organisation and relevance of content	Literature Review	Bibliography	Presentation	Total
30	30	20	20	100

CO, PO and PSO Mapping:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	1	2	--	--	--	--	1	--	-	3	
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FCH2432	PROJECT	L	T	P	C
Version 1.1	Date of Approval: December, 2021				3
Pre-requisites/Exposure	NIL				
Co-requisites					

Catalog Description

The motive of this course is to understand the meaning of research in which they will learn many things related to research. They will know the handling and working principle of many instruments whichever they will use during research.

Course Objectives

The aim of the project is to:

Provide the students with an opportunity to further enhance their intellectual and personal development in the chosen field by undertaking a significant practical experience.

Scholarly inquiry into a problem or issues, involving a systematic approach to gathering and analysis of information/data, leading to production of a structured report.

Course Outcomes

CO1 Through this course, Promotes the development of a coherent learning programme

CO2 Helps to guide students through the programme

CO3 Enables an institution to demonstrate how a particular lecture course or paper contributes to the overall aims of its teaching.

Course Contents:

Modules	Blooms level*	Number of hours
Components of a Project Report The outcome of Project Work is the Project Report. A project report should have the following components: 1) Cover Page: This should contain the title of the project proposal, to whom it is submitted, for which degree, the name of the author, name of the supervisor, year of submission of the project work, name of the University. 2) Acknowledgement: Various organizations and individuals who might have provided assistance /co-operation during the process of carrying out the study. 3) Table of Content: Page-wise listing of the main contents in the report, i.e., different Chapters and its main Sections along with their page numbers. 4) Body of the Report: The body of the report should have these four logical divisions a) Introduction: This will cover the background, rationale/need/justification, brief review of literature, objectives, methodology (the area of the study, sample, type of study, tools for data collection, and method of analysis), Limitations of the Study, and Chapter Planning. b) Conceptual Framework/National and International Scenario: (relating to the topic of the Project).	L1, L2 and L3	-

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<p>c) Presentation of Data, Analysis and Findings:(using the tools and techniques mentioned in the methodology).</p> <p>d)Conclusion and Recommendations: In this section, the concluding observations based on the main findings and suggestions are to be provided.</p> <p>5) Bibliography or References: This section will include the list of books and articles which have been used in the project work, and in writing a project report.</p> <p>6) Annexures: Questionnaires (if any), relevant reports, etc. (The main text of the Project should normally be in the range of 5000 words. However, there may be annexure in addition to the main text)</p> <p>The Steps of a Project Report</p> <p>STEP I : Selection of the topic for the project by taking following points into consideration:</p> <ul style="list-style-type: none"> • Suitability of the topic. • Relevance of the topic • Time available at the disposal. • Feasibility of data collection within the given time limit. • Challenges involved in the data collection (time & cost involved in the data collection, possibility of getting responses, etc.) <p>STEP II :Finalisation of the Topic and preparation of Project Proposal in consultation with the Supervisor.</p> <p>STEP III : Collection of information and data relating to the topic and analysis of the same.</p> <p>STEP IV : Writing the report dividing it into suitable chapters, viz.,</p> <p>Chapter 1: Introduction,</p> <p>Chapter 2: Conceptual Framework / National & International Scenario,</p> <p>Chapter 3: Analysis & Findings,</p> <p>Chapter 4: Conclusion and Recommendations,</p> <p>Chapter 5: Bibliography.</p> <p>STEP V: The following documents are to be attached with the Final Project Report.</p> <ul style="list-style-type: none"> • Approval letter from the supervisor (Annexure-IA) • Student's declaration (Annexure-IB) • Certificate from the Competent Authority of the Organisation/Institution, if the student undertakes the Project Work in any Organisation/Institution. 		
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**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation*

Chapter Scheme:

Chapter 1: Introduction

Chapter 2: Conceptual Framework/ National/International Scenario

Chapter 3: Presentation, Analysis and Findings

Chapter 4: Conclusion and Recommendations

Chapter 5: Bibliography

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Modes of Evaluation:

- Each of the students has to undertake a Project individually under the supervision of a teacher and to submit the same following the guidelines stated below.
- Language of Project Report and Viva-Voce Examination may be English. The Project Report must be typed and hard bound.
- Failure to submit the Project Report or failure to appear at the Viva-voce Examination will be treated as “Absent” in the Examination. He /she has to submit the Project Report and appear at the Viva-Voce Examination in the subsequent years (within the time period as per University Rules).
- No marks will be allotted on the Project Report unless a candidate appears at the Viva-Voce Examination. Similarly, no marks will be allotted on Viva-Voce Examination unless a candidate submits his/her Project Report.
- Evaluation of the Project Work to be done jointly by one internal expert and one external expert with equal weightage, i.e., average marks of the internal and external experts will be allotted to the candidate. The evaluation scheme shall be as follows:

Examination Scheme:

Project Report	Power Point Presentation and Viva
75 marks	25 marks

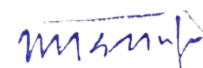
CO, PO and PSO Mapping:

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CO1	1	2	--	--	--	--	1	--	-	3		
CO2	1	2	--	-	--	--	1	-	-	3		
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Annexure-I B

Student's Declaration

Ihereby declare that the Project Work with the title (in block letters).....

Submitted by me for the partial fulfilment of the degree of B.Sc. in Forensic science is my original work and has not been submitted earlier to any other University /Institution for the fulfilment of the requirement for any course of study.

I also declare that no chapter of this manuscript in whole or in part has been incorporated in this report from any earlier work done by others or by me. However, extracts of any literature which has been used for this report has been duly acknowledged providing details of such literature in the references.

Signature of Supervisor:

Signature of Student

Name

Registration No.

Place:

Date:



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WORKSHOP/ CERTIFICATION

Course Code: FCH2433

Credit Units: 01

Objectives

A workshop is primarily an activity based academic event that is organized to provide the students a one to one and hands on experience on any aspect of their learning. The communication in a workshop has to be necessarily two ways. The trainer has to make sure that the aspect covered is practically practiced by the participants. The student will choose the option of workshop from amongst their concentration electives. The evaluation will be done by Board of examiners comprising of the faculties.

Major Themes for Workshop

The workshop may be conducted on any of the following major themes:

1. Crime Scene Investigation
2. Forensic Toxicology
3. Forensic Anthropology
4. Handwriting and Typewriting Analysis
5. Crime Scene Investigation
6. Criminology, Criminal Law and Police Administration
7. Fingerprint Science
8. Forensic Serology
9. DNA Fingerprinting
10. Wounds and its Medico-Legal Aspects

These themes are merely indicative and other recent and relevant topics of study may be included.

Guidelines for Workshop

The procedure for earning credits from workshop consists of the following steps:

1. Relevant study material and references will be provided by the trainer in advance.
2. The participants are expected to explore the topic in advance and take active part in the discussions held
3. Attending and Participating in all activities of the workshop
4. Group Activities have to be undertaken by students as guided by the trainer.
5. Evaluation of workshop activities would be done through test and quiz at the end of the workshop.
6. Submitting a write up of at least 500 words about the learning outcome from the workshop.

Methodology

The methodology followed at the workshop could be based on any one or more of the following methods:

1. Case Study
2. Simulation
3. Quiz
4. Quality analysis and characterization
5. Identification and preparation of materials

Evaluation Scheme:

Attendance	Active Participation	Multiple Choice Questions/ Quiz	Solving the case/ Assignment/ Write up	Total
10	30	30	30	100

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FCH2502	DNA FINGERPRINTING	L	T	P	C
Version	Date of Approval: December, 2021	2	1	0	3
Pre-requisites/Exposure	Nil				
Co-requisites					

Catalog Description

This course is designed to provide an insight on introduction to DNA fingerprinting in forensic science at undergraduate level. The main objective of this course is to impart essential theoretical knowledge of chromosomes, its structure, functions, DNA and its application in the field of forensic science.

Course Objective: The objectives of the course are to:

1. Provide basic understanding of genetics in forensic science
2. Provide students with technical skills and competencies in DNA fingerprinting techniques

Course Outcomes

On completion of this course, the students will be able to

CO1. Explain various biological phenomena associated with Forensic Science and the utility of various biological changes in forensic science.

CO2. Describe the principle, types and applications of the centrifugation in forensic science.

CO3. Understand the various types of electrophoresis for the analysis of biological and toxicological samples

CO4. Analyse the biological samples by immunoelectrophoretic.

Course Contents:

Modules	Blooms level*	Number of hours
Module I: Introduction to DNA Fingerprinting Definition, Importance of DNA Fingerprinting in Forensic Science, Structure of DNA, RNA, Chromosome, Nuclear DNA and Mitochondria DNA.	L1	7
Module II: DNA Isolation Techniques Collection and types of evidence for DNA fingerprinting. Different types of DNA Isolation techniques (Organic, Inorganic and Mechanical), FTA cards for isolation of DNA, DNA isolation from different evidence (tissue, hair, bone, blood and seminal stains).	L1, L2	7
Module III: Techniques for DNA Fingerprinting Electrophoresis, Northern and Southern blotting. Polymerase Chain Reaction (Denaturation, annealing and extension, Detection of PCR products).	L3, L4	8
Module IV: Types of DNA Fingerprinting Techniques Mini satellites and Micro-satellites., VNTR and RFLP, AFLP, STRs, SNP and Genotyping.	L3	7

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Module V: Practical application of DNA Fingerprinting Paternity testing and Personal identification. DNA databank, Limitations of DNA Fingerprinting. Legality of DNA Fingerprinting in India. Next generation sequencing.	L4	7
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**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation*

Suggested Readings:

- Norah Rudin and Keith Inman (2nd Edition) An Introduction to Forensic DNA Analysis, CRC Press, New York, 2002.
- Sharma, B. R. (3rd Edition) Forensic Science in Criminal Investigation and Trials, Universal Law Publishing Co. Ltd. New Delhi, 2001.
- John M. Butler (1st Edition) Fundamentals of Forensic DNA Typing, Academic Press, 2005.

Modes of Evaluation: Quiz/Assignment/Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

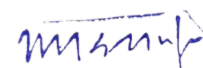
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FCH2505	INSTRUMENTATION – BIOLOGICAL	L	T	P	C
Version	Date of Approval: December, 2021	2	1	0	3
Pre-requisites/Exposure	Nil				
Co-requisites					

Catalog Description

This course is intended to provide the basic knowledge about the instruments which can be used for the analysis of biological samples.

Course Objective: The objective of the course is to provide students with practical understanding of working and applications of various instrumentation techniques used in the forensic science laboratory for the analysis of biological evidence.

Course Outcomes

On completion of this course, the students will be able to

CO1. Explain various biological phenomena and utility of various biological changes in forensic science.

CO2. Describe the principle, types and applications of the electrophoresis.

CO3. To understand the various types of immunoelectrophoretic techniques.

CO4: Provide the knowledge about the basics about microscopy

CO5. To develop comprehensive understanding of different microscopes and their uses in examination of forensic exhibits.

Course Contents:

Modules	Blooms level*	Number of hours
Module I: Centrifugation Techniques Basic principles of sedimentation, various types of centrifuges, Density gradient centrifugation, Preparative centrifugation, Analysis of sub-cellular fractions, Ultracentrifuge- Refrigerated Centrifuges	L1	7
Module II: Electrophoretic Techniques General principles, Factors affecting electrophoresis, Types of electrophoresis, Agrose, Polyacrylamide gel electrophoresis, Isoelectric focusing (IEF), Isoelectrophoresis, Preparative electrophoresis, Horizontal and Vertical Electrophoresis	L1, L2	7
Module III: Immuno-chemical Technique Gel 52mmune-diffusion, Immuno-electrophoresis, Radio Immuno Assay (RIA), ELISA, Fluorescence Immuno assay.	L3, L4	7
Module IV: Optical Microscopes Basic working principle, components and forensic applications of Simple microscope, Compound microscope, Comparison microscope and Stereomicroscope.	L2, L3	8
Module IV: Electron Microscopes Basic working principle, instrumentation and forensic applications of Scanning Electron Microscope and Transmission Electron Microscope.	L2, L3	7

*Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis,

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Suggested Readings:

- Baker, D.R., Capillary – Electrophoresis, New York, 1995.
- Chapmen, J.R., Practical Organic Mass spectrometry, A Guide for Chemical and Biochemical Analysis, Wiley, New York, 1993.
- D.R Lide, Handbook of Chemistry & Physics C.R.C. 75th ed. CRC Press Washington D.C., 1994.
- Dollisth, F.R., W.G. Fateley & F.F. Bentley, Characteristic Roman frequencies of organic compounds, Wiley, New York 1974.
- Friebolin, H. Berik, One & Two Dimensional NMR spectroscopy, Weinheim Germany, VCH 1991.
- G.H. Stout & L.H. Jensten, X-ray Structure Determination – A practical Guide; 2ndEdn. Wiley, New York, 1989.

Modes of Evaluation: Quiz/Assignment/Seminar/Written Examination**Examination Scheme:**

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

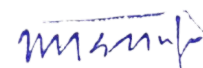
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CO2	1	2	--	-	--	--	1	2	-	3	
CO3	1	2	--	--	--	--	1	2	-	3	
CO4	1	2					1	2		4	
CO5	1	2					1	2		4	

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FCH2511	DNA FINGERPRINTING LAB	L	T	P	C
Version	Date of Approval: December, 2021	0	0	2	1
Pre-requisites/Exposure	Nil				
Co-requisites					

Catalog Description

This course is intended for students to understand various aspects of toxicological evidence in related field.

Course Objective: - The students will understand & perform experiments relating to:

1. DNA properties, extraction and quantification
2. DNA Isolation techniques

Course outcome: On completion of this course, the students will be able to

CO1. Describe the mechanism DNA extraction.

CO2. Explain the centrifugation technique.

CO3. Discuss the difference between electrophoresis and spectroscopy.

Course Contents:

Modules	Blooms level*	Number of hours
1. DNA extraction (plants/ blood) 2. Centrifugation technique 3. Agrose gel electrophoresis. 4. Immunodiffusion. 5. Spectrophotometry.	L1, L2, L3	24

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation*

Suggested Readings:

- A Glencoe Program Physics principles and problems: Forensic Laboratory Manual Student edition
- Thomas Kubic, Nicholas Petraco Forensic Science Laboratory Manual and Workbook, Third Edition 2009
- G.H. Stout & L.H. Jensten, X-ray Structure Determination – A practical Guide; 2ndEdn. Wiley, New York, 1989

Modes of Evaluation: Quiz/Assignment/Seminar/Written Examination

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.



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CO, PO and PSO Mapping:

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CO1	1	2	--	--	--	--	1	2	-	3	
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FCH2515	FORENSIC TOXICOLOGY LAB	L	T	P	C
Version	Date of Approval: December, 2021	0	0	2	1
Pre-requisites/Exposure	Nil				
Co-requisites					

Catalog Description

This course is intended for students to perform various practical in the field of Forensic Chemistry & Toxicology, to isolate different toxic substance, perform thin layer chromatography of several drugs and cations and anions analyses.

Course Objective: - The students will understand & perform experiments relating to:

1. Analysis of various metallic, vegetable, volatile and non-volatile poisons.
2. Perform TLC of poisons, drugs, and inks.

Course outcome: On completion of this course, the students will be able to

- CO1. Demonstrate the isolation techniques of different toxic substances.
CO2. Perform the TLC and analysis of various drugs and poisons.
CO3. Perform various tests to analyze cations and anions.

Course Contents:

Modules	Blooms level*	Number of hours
1. Analysis of metallic poisons. 2. Analysis of volatile poisons (Acetone, Alcohol). 3. Analysis of corrosive poisons (acids, Alkali). 4. TLC of common drugs. 5. TLC of pesticides & insecticides samples 6. Spot test & color test for insecticides and pesticides. 7.	L1, L2, L3	24

*Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Suggested Readings:

- Thomas Kubic, Nicholas Petraco Forensic Science Laboratory Manual and Workbook, Third Edition 2009
- A. I. Vogel Textbook of Practical organic Chemistry including Qualitative organic analysis
- Kathy Mirakovits, Gina Londino, The Basics of Investigating Forensic Science: A Laboratory Manual 2015
- Washington state patrol Forensic Laboratory services: Crime Laboratory: Technical & Training Manuals
- Isolation and identification of Drugs by E.G.C. Clark.

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V –

Viva

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CO3	1	2	--	--	--	--	1	2	-	3	

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FCH2516	ARSON AND EXPLOSIVES	L	T	P	C
Version	Date of Approval: December, 2021	2	1	0	3
Pre-requisites/Exposure	Nil				
Co-requisites					

Catalog Description

This course is intended for students to understand the basics of fire, arson and explosives, its classification, composition and analysis in the field of forensic science.

Course Objective: The objectives of the course are to:

- Provide the scientific knowledge and understanding needed in Fire and Explosion
- Provide illustrations of fire investigation through a wide range of fire and explosion investigation case studies.

Course Outcomes

On completion of this course, the students will be able to

- CO1. Explain Fire chemistry and its forensic significance
CO2. Describe Arson, its types and analysis methods.
CO3. Classify Petroleum products, and their forensic analysis.
CO4. Explain and analyse explosives.

Course Contents:

Modules	Blooms level*	Number of hours
Module I: Arson Introduction, laws related to arson, Forensic importance and prerequisites for the cause of Arson cases; The Arson scene investigation - Collection and preservation of Arson evidence.	L1, L2	7
Module II: Laboratory Examination of Arson Evidence Analysis and identification of flammable liquids, Extraction of ignitable liquid residue from debris, interferences in debris, analysis, and interpretation.	L2, L3	7
Module III: Explosives Introduction to explosives, definition, IED'S, high explosives and low explosives, difference and classification.	L1, L2	7
Module IV: Laboratory examination of bomb and explosive evidence Identifying the explosives, Black and smokeless powder identification, dynamite identification, identifying RDX, PETN, TATP	L3, L4	8

*Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Suggested Readings:

- James, S. H. and Nordby, J. J. (Eds), Forensic Science - An Introduction to Scientific and Investigation Techniques, CRC Press, London, 2003.
- Saferstein, R., Forensic Science Handbook, Prentice Hall, New Jersey, 1982.
- Saferstein, Richard, Criminalistics - An Introduction to Forensic Science, 6th Ed. Prentice-Hall, New Jersey, 1998.

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- Sharma, B. R., Forensic Science in Criminal Investigation and Trials (3rd Ed) Universal Law Publishing Co. Ltd. New Delhi, 2001.

Modes of Evaluation: Quiz/Assignment/Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

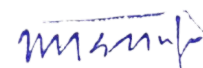
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FCH2517	QUALITY MANAGEMENT AND ETHICS	L	T	P	C
Version	Date of Approval: December, 2021	2	1	0	3
Pre-requisites/Exposure	Nil				
Co-requisites					

Catalog Description

This course is intended for the students who have never learned about the quality management and technical requirement in forensic laboratories. A knowledge of the process of accreditation and basic requirements for a testing and calibration laboratory to be accredited is must for the student of forensic science.

Course Objective: The objectives of the course:

- To focus on building a conceptual understanding of quality management in forensic science laboratories.
- To understand the concept and value of ethics in forensic science.

Course Outcomes

On completion of this course, the students will be able to

CO1. Apply the quality management in forensic laboratories.

CO2. Summarize the technical requirements for a forensic laboratory to be accredited.

CO3. Perform sampling, handling of test and calibration items, as well as assuring the quality of test and calibration results and reporting the results in forensic cases.

CO4. Setup the forensic laboratory information management system.

Course Contents:

Modules	Blooms level	Number of hours
Module I: Quality Management System Quality, Total Quality, Quality assurance, Quality control, Quality Planning, Quality Audit: Internal and External Audit, Accreditation, NABL, ISO, IEC, BIS. Quality Management of Laboratories: General requirements for the competence of testing and calibration laboratories – Introduction, Scope, Management requirements: Organization, Quality System, Document Control.	L1, L2	12
Module II: Quality Control Process Management Requirements: Organizational, document control, subcontracting of tests and calibrations control of Non-conforming testing / calibration work, corrective and preventive actions, Management Review. Technical Requirements: Test and calibration methods and their validation, measurements, standards and reference material, traceability, sampling. Good Laboratory Practices (GLP): Fundamental principles of GLP, Organizational Setup, Resources, Raw data and data collection, SOPs, Archives.	L1, L2, L3	12
Module III: Ethics Ethics: Definition, concept of ethics, Ethics in science, Development of a Code of Ethics for Forensic Science.	L1, L2, L3	12

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Ethics in Forensic Science: Duties of Forensic Scientist, Qualification of Forensic Scientist. Ethical duties of attorney and experts. Ethics in testimony. Criminal investigation ethics. Ethics in laboratory and in crime scene investigation.		
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**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation*

Text & References:

- International standard on General requirements for the competence of testing and calibration laboratories, First Edn., 1999-12-15, ISO/IEC 1702:1999(E)
- Mario Deva RGAS, The Total Quality Management, NCC Blackwell Publication, (1995).
- Willard Merritt, Dean & settle; Instrumental Methods of Analysis, CBS Publishers & Distributors, 7th Edn. New Delhi, (1986)

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
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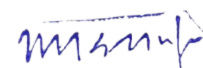
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CO3	2	-	--	--	2	--	3			1	3
CO4	2	-	--	--	2	--	3			1	3

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FCH2509	TECHNICAL WRITING IN SCIENCE-1	L	T	P	C
Version	Date of Approval: December, 2021	2	0	0	2
Pre-requisites/Exposure	Nil				
Co-requisites					

Course Objective:

Students will be introduced to learning the written and oral communication of technical information. Assignments include writing and presenting proposals, reports, and documentation. Emphasis on use of rhetorical analysis, computer applications, collaborative writing, and usability testing to complete technical communication tasks in the workplace.

Course Contents:

Modules	Blooms level	Number of hours
Module I: Writing Skills; Selection of topic, thesis statement, developing the thesis; introductory, developmental, transitional, and concluding paragraphs, linguistic unity, coherence and cohesion, descriptive, narrative, expository and argumentative writing.	L1, L2	12
Module II: Technical Writing: Scientific and technical subjects; formal and informal writings; formal writings/reports, handbooks, manuals, letters, memorandum, notices, agenda, minutes; common errors to be avoided.	L1, L2, L3	12
Module III: Documentation Process Understanding Audience/Readers, Collecting and Organizing information, drafting information verbally and visually, Producing Information.	L1, L2, L3	12

Text & References:

- M. Frank. Writing as thinking: *A guided process approach*, Englewood Cliffs, Prentice Hall Regents.
- L. Hamp-Lyons and B. Heasley: Study Writing; *A course in written English*. For academic and professional purposes, Cambridge Univ. Press.
- R. Quirk, S. Greenbaum, G. Leech and J. Svartik: *A comprehensive grammar of the English language*, Longman, London.
- Daniel G. Riordan & Steven A. Panley: *“Technical Report Writing Today”* - Biztantra.
- Daniel G. Riordan, Steven E. Pauley, Biztantra: *Technical Report Writing Today*, 8th Edition (2004).
- *Contemporary Business Communication*, Scot Ober, Biztantra, 5th Edition (2004)

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

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FCH2531	TERM PAPER	L	T	P	C
Version	Date of Approval: December, 2021	2	1	0	3
Pre-requisites/Exposure	Nil				
Co-requisites					

Catalog Description

The motive of this course is to understand as well as application of the knowledge gained by the students. The aim of the term paper is to provide the students with an opportunity to further enhance their knowledge in a sector of their choice by undertaking a significant practical unit of examining and analyzing various aspects of Chemistry & its application at a level commensurate with the learning outcomes of the various courses taken up them in the ongoing semester

Course Objectives

The objective of this course is to

- To judge the understanding as well as application of the knowledge gained by the students.
- Provide the students with an opportunity to further enhance their knowledge in a sector of their choice by undertaking a significant practical unit of examining and analyzing various aspects of Chemistry & its application at a level commensurate with the learning outcomes of the various courses taken up them in the ongoing semester.

Course Outcomes

Through this course,

CO1 Students will get an opportunity to further enhance their knowledge in a sector of their choice by undertaking a significant practical unit of examining.

CO2 Students will analyze various aspects of chemistry and applied chemistry at a level commensurate with the learning outcomes of the various courses taken up them in the ongoing semester.

CO3. Students will enhance their knowledge by extensive literature survey.

Course Contents:

Modules	Blooms level*	Number of hours
<ol style="list-style-type: none"> The term paper will be related to the contemporary business issue and the topic will be given by the department. The presentation of the term paper is scheduled to be held before the commencement of Semester examinations. The paper will carry 100 marks that will be marked on the basis of understanding and organization of content based on the literature review. The Bibliography shall form an important part of the paper. Examples of a few broad areas for Term Paper (List is indicative, not exhaustive) <ol style="list-style-type: none"> Crime Scene Investigation Forensic Toxicology Forensic Anthropology Handwriting & Typewriting Analysis Crime Scene Investigation Criminology, Criminal Law & Police Administration 	L1, L2 and L3	-

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7.	Fingerprint Science		
8.	Forensic Serology		
9.	DNA Fingerprinting		
10.	Wounds & its Medico-Legal Aspects		

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation*

Modes of Evaluation:

Examination Scheme:

Organisation and relevance of content	Literature Review	Bibliography	Presentation	Total
30	30	20	20	100

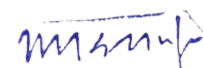
CO, PO and PSO Mapping:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO1	1	2	--	--	--	--	1	--	-	3		
CO2	1	2	--	-	--	--	1	-	-	3		
CO3	1	2	--	--	--	--	1	-	-	3		
CO4	1	2	--	--	--	--	1	-	-	3		

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FCH2533	WORKSHOP	L	T	P	C
Version	Date of Approval: December, 2021	1	0	0	1
Pre-requisites/Exposure	Nil				
Co-requisites					

Catalog Description

This course will help the students to have hands on experience and deep learning of different aspects of chemistry. This will also improve quick learning and communication skills.

Course Objectives

A workshop is primarily an activity based academic event that is organized to provide the students a one to one and hands on experience on any aspect of their learning. The communication in a workshop has to be necessarily two ways. The trainer has to make sure that the aspects covered are practically practiced by the participants. The student will choose the option of workshop from amongst their concentration electives. The evaluation will be done by Board of examiners comprising of the faculties.

Course Outcomes

On completion of this course, the students will be able to

- CO1. Promotes the development of a coherent learning programme.
- CO2. Helps to guide students through the programme.
- CO3. Enables an institution to demonstrate how a particular lecture course or paper contributes to the overall aims of its teaching.
- CO4. Use research findings to advance education theory and practice.

Guidelines for Workshop

The procedure for earning credits from workshop consists of the following steps:

1. Relevant study material and references will be provided by the trainer in advance.
2. The participants are expected to explore the topic in advance and take active part in the discussions held
3. Attending and Participating in all activities of the workshop
4. Group Activities have to be undertaken by students as guided by the trainer.
5. Evaluation of workshop activities would be done through test and quiz at the end of the workshop.
6. Submitting a write up of at least 500 words about the learning outcome from the workshop.

Methodology

The methodology followed at the workshop could be based on any one or more of the following methods:

1. Case Study
2. Simulation
3. Quiz
4. Quality analysis & characterization
5. Identification and preparation of materials

Course Contents:

Modules	Blooms level*	Number of hours
The workshop may be conducted on any of the following major themes:	L1, L2 and L3	12
1. Forensic Science Crime Scene Investigation		

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3. Microscopy		
4. Forensic Toxicology		
5. Forensic Anthropology		
6. Handwriting & Typewriting Analysis		
7. Crime Scene Investigation		
8. Criminology, Criminal Law & Police Administration		
9. Fingerprint Science		
10. Forensic Photography		
11. Forensic Serology		
12. DNA Fingerprinting		
13. Wounds & its Medico-Legal Aspects		
<p>These themes are merely indicative and other recent and relevant topics of study may be included.</p> <p>These themes are merely indicative and other recent and relevant topics of study may be included.</p>		

L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Evaluation Scheme:

Attendance	Active Participation	Multiple Choice Questions/ Quiz	Solving the case/ Assignment/ Write up	Total
10	30	30	30	100

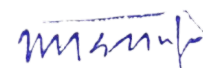
CO, PO and PSO Mapping:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO1	1	2	--	--	--	--	1	--	-	3		
CO2	1	2	--	-	--	--	1	-	-	3		
CO3	1	2	--	--	--	--	1	-	-	3		
CO4	1	2	--	--	--	--	1	-	-	3		

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FCH2616	FORENSIC MEDICINE	L	T	P	C
Version 1.1	Date of Approval: December, 2021	2	1	0	3
Pre-requisites/Exposure	Nil				
Co-requisites					

Catalog Description

This course will help the students to learn Post-mortem examinations; external examination; internal examination; collection, preservation and packaging of viscera and nature and causes of injuries.

Course Objectives: The student will understand

1. About the scope of different types of injuries, causes and manner of death and their medico legal significance
2. About the utility of the injury assessment in medico legal cases.

Course Outcomes

On completion of this course, the students will be able to

- CO1. Describe various physiological and chemical changes after death and will be able to estimate time since death.
- CO2. Identify the type of wound and its causes, also they can estimate the age of injury.
- CO3. Identify type of dentition and can estimate the age, sex and race of individual by analyzing the given teeth.
- CO4. Analyse the types of bite marks and their significance in identification of culprit and type of crime.
- CO5. Explain different types of injuries and their causes and medico-legal significance.

Course Contents:

Modules	Blooms level*	Number of hours
Module I: Autopsy Ante and Post-mortem examinations; external examination; internal examination; collection, preservation and packaging of viscera Assessing and determining the time and cause of death, Study of burned bones and bone fragments.	L1, L2	7
Module II: Introduction to wounds Introduction to wounds; definition, Mechanism of wound production & healing, Determining the age of the injury, and its medico - legal aspects.	L1, L2	7
Module III: Injuries due to Blunt and sharp forces Abrasions, Bruises, Lacerations ; causes, dimensions, ante – mortem & post – mortem injuries and its medico - legal aspects, Incised, Stab, Punctured wounds - causes, dimensions, ante – mortem& post – mortem injuries ante – mortem& post – mortem injuries.	L1, L2	8
Module IV: Miscellaneous injuries Injuries due to heat, cold, chemicals and radiation and their medicolegal significance.	L1, L2, L3	7
Module V: Bite Marks Types of bite marks; collection and preservation of DNA samples, forensic importance of bite marks; identification.	L1, L2	7

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**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation*

Suggested Reading:

- Modi's Medical Jurisprudence and Toxicology, 23rd Edition, by K. Mathiharan & Amrit K. Patnaik, Third reprint, 2009, LexisNexis, Butterworth, New Delhi
- Essentials of forensic medicine, Dr. K. S. Narayan Reddy.
- Forensic Medicine and toxicology, JB Mukherjee, Vol I & II.
- Keith Simpson's, Forensic Medicine
- Gleister's Medical Jurisprudence and Toxicology, Churchill Livingstone Dental Anatomy Atlas, Whitaker

Modes of Evaluation: Quiz/Assignment/Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

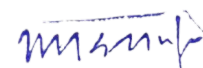
CO, PO and PSO Mapping:

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CO1	1	2	--	--	--	--	1	--	-	3	
CO2	1	2	--	-	--	--	1	-	-	3	
CO3	1	2	--	--	--	--	1	-	-	3	
CO4	1	2	--	--	--	--	1	-	-	3	

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FCH2617	BALLISTICS	L	T	P	C
Version 1.1	Date of Approval: December, 2021	2	1	0	3
Pre-requisites/Exposure	Nil				
Co-requisites					

Catalog Description

The course is designed to provide basic and analytical knowledge of the firearms, types, firing range and the analysis of the GSR components.

Course Objective: - The objectives of the course:

1. To understand the role of ballistics in Forensic Science
2. Classification of firearms, determination of the range of firing, methods of laboratory examination of fired cartridges and firearms.
3. The students will also learn to reconstruct the sequence of events in cases involving firearms.

Course Outcomes: On completion of this course, the students will be able to

CO1. Explain the history and types of Firearms

CO2. Describe various types of ammunition

CO3. Explain about the Internal and External ballistics.

CO4. Restate the concept of linkage of bullets and Cartridge Cases.

CO5. Describe the Gun Shot Residue and determination of range of firing.

Course Contents:

Modules	Blooms level*	Number of hours
Module I: Ballistics Definition, Indian Arms Act, Forensic Importance; Nature of firearms, parts of a firearm, classification of firearm.	L1, L2	7
Module II: Ammunition Types, Bullet comparisons, cartridge case examination, class and individual characteristics of identification.	L1, L2, L3, L4	7
Module III: Range of Fire Muzzle pattern, scorching, blackening, tattooing, wad distribution, pellet patterns, GSR analysis, and primer residues.	L1, L2, L3, L4	7
Module IV: Analysis and Reconstruction Reconstruction of the sequence of events in a shooting case. Presentation of evidence in the court. accidental firing	L1, L2, L4	8
Module V: Firearm injuries Entrance wound, exit wound and internal wound, evaluation of firearm injuries.	L1, L3, L4	7

*Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

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Suggested Readings:

- Brain J. Heard; Handbook of Firearms and Ballistics; John Willey, England, 1997.
- D.A. Skoog, D.M. West and F.J. Holler; Analytical Chemistry: An Introduction; Saunders College Publishing, Philadelphia, USA, (1994)
- Detlean, J D; Kirk's Fire Investigation, 5th ed, Prentice Hall, Eaglewood Cliffs, N.J (2002)
- Working Procedure Manual: Chemistry, Explosives and Narcotics, BPR&D Pub (2000)
- Hatcher Jury & Weller, 1987: Firearm Investigation Identification and Evidence, The University Book Agency, Allahabad.
- Gunther & Gunther, 1935 : The Identification of Firearms, Woldies, New York
- Jauhri, M. 1980: Monograph on Forensic Ballistics, Govt. of India Publication, New Delhi.
- Burrad, 1951: The Identification of Firearms and Forensic Ballistics.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	15	5	5	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

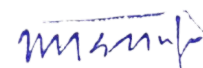
CO, PO and PSO Mapping:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	1	--	--	--	--	--	1	--	-		
CO2	1	--	--	-	--	--	1	-	-		
CO3	1	3	--	--	--	--	1	-	-	3	
CO4	1	3	--	--	--	--	1	-	-	3	

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FCH2619	BALLISTICS LAB	L	T	P	C
Version 1.1	Date of Approval: December, 2021	0	0	2	1
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

The course is designed to provide basic and analytical knowledge of the firearms, types, firing range and the analysis of the GSR components.

Course Objective: - The students will understand & perform experiments relating to:

1. GSR analysis
2. Identifying parts of firearm, explosives

Course Outcomes: On completion of this course, the students will be able to

CO1. Perform spot tests for GSR (Gun Shot Residue)

CO2. Identify types of firearms

CO3. Perform filter tests for petroleum products in cases of arson.

CO4. Perform TLC for flammable liquids like kerosene and diesel.

Course Contents: Lab/Practical	Blooms level	Number of hours
1. Spot test for GSR (Nitrate test, sulphate and chlorate test) 2. Identification of parts of firearm (Shotgun, rifle and pistol) 3. Filter test for petroleum products 4. TLC for flammable liquids (Kerosene and diesel).	L1, L3, L4	12

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation*

Suggested Readings:

- A Glencoe Program Physics principles and problems: Forensic Laboratory Manual Student edition
- Thomas Kubic, Nicholas Petraco Forensic Science Laboratory Manual and Workbook, Third Edition 2009
- Laboratory Protocols CIMMYT Applied Molecular Genetics Laboratory Third Edition
- Kathy Mirakovits, Gina Londino, The Basics of Investigating Forensic Science: A Laboratory Manual 2015
- Washington state patrol Forensic Laboratory services: Crime Laboratory: Technical & Training Manuals
- G.H. Stout & L.H. Jensten, X-ray Structure Determination – A practical Guide; 2ndEdn. Wiley, New York, 1989

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V –

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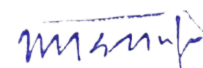
CO, PO and PSO Mapping:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	1	1	--	3	--	--	3	3	1		
CO2	1	1	--	3	--	--	3	3	1		
CO3	1	1	--	3	--	--	3	3	1		
CO4	1	1	--	3	--	--	3	3	1		

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FCH2610	FORENSIC PSYCHOLOGY	L	T	P	C
Version 1.1	Date of Approval: December, 2021	2	1	0	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

This course is intended to give insight of providing the basic knowledge about the human behavior, and its impact on social environment. The students will be able to explain cognitive neuroscience and associated disorders. The course will help the students to understand the concept of intelligence and forensic psychological impact.

Course Objectives:

1. To facilitate the learning of traditional and emergent fields of cognitive neuropsychology.
2. To understand-brain-behaviour relationship in day-to-day life
3. To explore the practical implications of cognitive processes in human performance.

Course Outcomes

On completion of this course, the students will be able to

CO1. Explain the concepts of emergent fields of cognitive neuropsychology.

CO2. Describe brain-behaviour relationship in day-to-day life

CO3. Apply practical implications of cognitive processes in human performance.

CO4. Analyse impact of intelligence and decision making and language on personal behaviour

Course Contents:

Modules	Blooms level	Number of hours
Module I: The Science of Psychology Concepts of psychology - Definition of psychology, goals of psychology Different perspectives in Psychology - Modern perspectives, Humanistic, behaviouristic, cognitive, psychodynamic.	L1, L2	8
Module II: – Consciousness Consciousness - Definition of consciousness, states of consciousness Altered state of consciousness - Dreams, awake states including daydreaming Rhythms of consciousness (Circadian rhythms) Sleep – stages of sleep, Dreams – Content, REM sleep and non-REM sleep	L1, L2, L3	7
Module III: Theories of Personality & Perception Understanding personality: Definition- mainly all port's definition, stressing uniqueness, enduring characteristics, temperament. Approaches – Psychodynamic (Freud, Jung & Adler), Humanistic (Rogers & Maslow) Dispositional approaches – Type (Jung. Type A& B, Rotter and Big – 5 and Trait (Catelli) Behavioral Approaches - Locus of control and Social learning theory. Assessment of personality – Questionnaires, Rating Scales and Projective tests, biological model assessment of personality Basic concepts in perception, Gestalt Principles, assessment attention and perception .	L1, L2, L3, L4	9
Module IV: Psychological disorders	L1, L2, L3	8

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Psychological disorders (Alcohol/Substance Abuse, Anxiety Disorders, adult Attention Deficit, Bipolar Disorder, and Depression). Altered states – Hypnosis, Meaning, Hypnotic Phenomena, Hypnotic stages Attention and awareness - Attention: Definition, characteristics, selective attention and divided attention.		
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**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation*

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

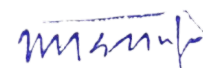
CO, PO and PSO Mapping:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	1	--	--	--	--	--	3	--	-	2	1
CO2	1	--	--	-	--	--	3	-	-	2	1
CO3	1	--	--	--	--	--	3	-	-	2	1
CO4	1	--	--	--	--	--	3	-	-	2	1

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FCH2612	TECHNICAL WRITING IN SCIENCE-II & Workshop	L	T	P	C
Version 1.1	Date of Approval: December, 2021	1	1	0	2
Pre-requisites/Exposure	Nil				
Co-requisites					

Catalog Description

The students will learn to write and analyze the technical. They will also be able to write scientific research article and projects.

Course Objective:

Students will be introduced to learning the written and oral communication of technical information. Assignments include writing and presenting proposals, reports, and documentation. Emphasis on use of rhetorical analysis, computer applications, collaborative writing, and usability testing to complete technical communication tasks in the workplace.

Course Outcomes

Students will learn about

- CO1. Technical report writing
- CO2. Journal paper writing process
- CO3. Project Management in Technical Communication
- CO4. Project writing & project proposal writing

Course Contents:

Modules	Blooms level*	Number of hours
Module I: Technical Writing Process Document development process, Estimating Technical Documentation, Documentation Planning, Selection of Tools, Information Architecture, Templates and Page design, Audience Profiling.	L1, L2 and L3	10
Module II: Journal paper writing: Abstract for paper and poster, different kind of journal for chemistry, impact factors of journals, ISBN number, Citation, H-index.	L1, L2, L3	07
Module III: Analytical report, Project Management in Technical Communication, Project writing, project proposal writing.	L1, L2, L3	07

*Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Suggested Reading:

- M. Frank. Writing as thinking: *A guided process approach*, Englewood Cliffs, Prentice Hall Regents.
- L. Hamp-Lyons and B. Heasley: *Study Writing; A course in written English*. For academic and professional purposes, Cambridge Univ. Press.
- R. Quirk, S. Greenbaum, G. Leech and J. Svartik: *A comprehensive grammar of the English language*, Longman, London.
- Daniel G. Riordan & Steven A. Panley: *"Technical Report Writing Today"* - Biztaantra.

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- Daniel G. Riordan, Steven E. Pauley, Biztantra: *Technical Report Writing Today*, 8th Edition (2004).
- *Contemporary Business Communication*, Scot Ober, Biztantra, 5th Edition (2004).

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

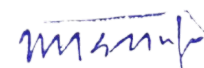
CO, PO and PSO Mapping:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO1	1	2	--	--	--	--	1	--	-	3		
CO2	1	2	--	-	--	--	1	-	-	3		
CO3	1	2	--	--	--	--	1	-	-	3		
CO4	1	2	--	--	--	--	1	-	-	3		

1: strongly related, 2: moderately related and 3: weakly related



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FCH2631	TERM PAPER	L	T	P	C
Version 1.1	Date of Approval: December, 2021	0	2	0	2
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

This course will help the students to further enhance their knowledge in a particular area of their choice. This will offer a deep understanding in that particular field and prepare students to take over challenges in following semester.

Course Objective: The objective of this course is to:

1. Judge the understanding as well as application of the knowledge gained by the students.
2. The aim of the term paper is to provide the students with an opportunity to further enhance their knowledge in a sector of their choice by undertaking a significant practical unit of examining and analyzing various aspects of chemistry and its application at a level commensurate with the learning outcomes of the various courses taken up them in the ongoing semester.

A term paper is primarily a record of intelligent reading in several sources on a particular subject. The students will choose the topic at the beginning of the session in consultation with the faculty assigned. At least one middle level or senior level person of a company from the chosen sector may be interviewed face to face.

Course Outcomes

On completion of this course,

- CO1. The students will be able to get an opportunity to further enhance their knowledge in a sector of their choice.
- CO2. The students will undertake a significant practical unit of examining and analyzing various aspects of chemistry and its application at a level commensurate with the learning outcomes of the various courses taken up them in the ongoing semester.

Course Contents:

Modules	Blooms level*	Number of hours
<ol style="list-style-type: none"> 1. The term paper will be related to the contemporary issue and the topic will be given by the department. 2. The presentation of the term paper is scheduled to be held before the commencement of Semester examinations. 3. The paper will carry 100 marks that will be marked on the basis of understanding and organization of content based on the literature review. The Bibliography shall form an important part of the paper. 4. Examples of a few broad areas for Term Paper (List is indicative, not exhaustive) <ol style="list-style-type: none"> 1. Forensic Toxicology 2. Forensic Biochemistry 3. Forensic Anthropology 4. Handwriting & Typewriting Analysis 5. Forensic Taphonomy 6. Crime Scene Investigation 7. Criminology, Criminal Law & Police Administration 8. Fingerprint Science 9. Forensic Serology 10. DNA Fingerprinting 	L1, L2 and L3	24
Wounds & its Medico-Legal Aspects		

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**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation*

Evaluation Scheme

Organisation and relevance of content	Literature Review	Bibliography	Presentation	Total
30	30	20	20	100

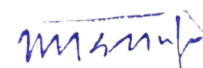
CO, PO and PSO Mapping:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO1	1	2	--	--	--	--	1	--	-	3		
CO2	1	2	--	-	--	--	1	-	-	3		

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FCH2632	MINOR PROJECT	L	T	P	C
Version 1.1	Date of Approval: December, 2021	0	0	0	3
Pre-requisites/Exposure	Nil				
Co-requisites					

Catalog Description

Project will help the students to shape their intellectual and personal skills in the chosen field. This will also help them to develop their understanding for critical analysis of data and techniques and addressing the issues of related problems.

Course Objectives

The aim of the project is to provide the students with an opportunity to further their intellectual and personal development in the chosen field by undertaking a significant practical unit of activity. The project can be defined as a scholarly inquiry into a problem or issues, involving a systematic approach to gathering and analysis of information / data, leading to production of a structured report.

Course Outcomes

On completion of this course, the students will be able to

- CO1. Carry out a substantial research-based project
- CO2. Demonstrate capacity to improve student achievement, engagement and retention
- CO3. Demonstrate capacity to lead and manage change through collaboration with others
- CO4. Demonstrate an understanding of the ethical issues associated with practitioner research
- CO5. Analyse data and synthesize research findings
- CO6. Report research findings in written and verbal forms

Course Contents:

Modules	Blooms level*	Number of hours
Chapter Scheme and distribution: Chapter 1: Introduction – 10 marks Chapter 2: Conceptual Framework/National/International Scenario Chapter 3: Presentation, Analysis & Findings Chapter 4: Conclusion & Recommendations Chapter 5: Bibliography	L1, L2 and L3	36

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation*

Suggested Reading:

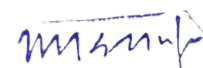
- Singh H., Hemne P. S. Practical Physics, S. Chand.
- Sasikumar P. R. Practical Physics, Prentice Hall India.

Modes of Evaluation:

Project Report	Power Point Presentation & Viva
75 marks	25 marks



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CO, PO and PSO Mapping:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO1	1	2	--	--	--	--	1	--	-	3		
CO2	1	2	--	-	--	--	1	-	-	3		
CO3	1	2	--	--	--	--	1	-	-	3		
CO4	1	2	--	--	--	--	1	-	-	3		
CO5	1	2	--	--	--	--	1	-	-	3		
CO6	1	2	--	--	--	--	1	-	-	3		

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Annexure-IB**Student's Declaration**

Ihereby declare that the Project Work with the title (in block letters)..... submitted by me for the partial fulfilment of the degree of B.Sc. Honours in Forensic science is my original work and has not been submitted earlier to any other University /Institution for the fulfilment of the requirement for any course of study.

I also declare that no chapter of this manuscript in whole or in part has been incorporated in this report from any earlier work done by others or by me. However, extracts of any literature which has been used for this report has been duly acknowledged providing details of such literature in the references.

Signature of Supervisor:

Signature of Student
Name

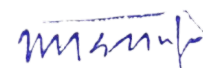
Registration No.

Place:

Date:



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Curriculum & Scheme of Examination

2022

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GURUGRAM

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COMPUTER FUNDAMENTALS

Course Code: MTH2214

Credit Units: 02

Course Objective:

This course is aimed to provide a fundamental understanding of computer science for the students in their early stages of academic career. The syllabus includes the basic concepts of memory, processing units, input and output devices, primary arithmetic and number conversions. At the end of the program the students will be able to understand the fundamentals of WORD, Power Point and Excel.

Course Contents:

Module I

Introduction to computer, history, Characteristics of computers, Basic Computer Organization, Computer Hardware Components Input, Output, Storage units, Central Processing Unit and memory, Input Devices (Keyboard, Mouse, Joystick), Output devices (Monitors, Printers, Multimedia projectors). Number System-Binary, Hexadecimal, Octal, and Decimal. Conversion from one number system to another.

Module II

Introduction to WORD Processor: Typing text, Closing and saving the text, Text editing, Spell Check, Common formatting functions-Working with Alignment, Working with Indentation, Working with Highlight, Working with Font. FIND & REPLACE, formatting the paragraph, special symbols, Bullets & Numbering, Tables, INSERTING CLIPART & WORDART, Picture & Drawing Tool Bar, HEADER & FOOTER

Module III

Introduction-Opening new presentation, Parts of PowerPoint window, Opening saving and closing presentations, Features of PowerPoint, Background design, Word art, Clip art, Drawings, 3D settings. Inserting and deleting slides, arranging slides, slides show, Animations, Sound, Views, types of views. Creating custom presentations

Module IV

Introduction to Excel: parts of EXCEL window, opening closing of workbooks, editing data, Copying the Data, Moving the Data, Formatting the Data, Formatting Tool bar, Drawing in Excel, Drawing Tool bar, Formatting and editing the Worksheet., Format cells window, Inserting Row and Column, Deleting Row and Column, Inserting Worksheet, Deleting Worksheet, Renaming Worksheet, Formulas in Excel, Creating simple formulas, Functions, Date Arithmetic, Working with Charts, Types of Charts, Inserting Charts, Formatting the Charts.

List of Practical:

- 1) Type a Leave Letter in Word Using format/style/ modify format/text, set text to reasonably large such as 18-pt.
- 2) Set up one table, with shading and a minimum of 3 rows and 3 columns. List your at least 10 favorite holiday destinations in the table.
- 3) Create a Small advertisement by inserting some pictures
- 4) Create a document with header and footer. Insert your institute name as header.
- 5) Create a document having two columns with page number.
- 6) Create a Power point presentation of your college (Minimum 10 Slides)
- 7) Insert college pictures in the slides (Minimum 5 slides)
- 8) Apply different transitions to all slides
- 9) Create a Power point presentation with animation and audio sounds
- 10) A demo presentation either on WORD or Power Point
- 11) Formatting the Date cell
- 12) Create an Excel sheet for students mark sheet of 5 subjects. Calculate the average, total, pass/fail using functions and formulas
- 13) Create a bar chart in Excel for year wise students enroll in your course.

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

Text & References:**Text:**

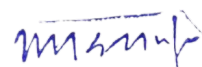
- Fundamentals of IT, Satish Jain, BPB Publication
- Fundamentals of Computer Science, V. Rajaraman, PHI.
- Fundamentals of Information Technology, D S Yadav, New Age Publication
- Computer Fundamentals, V Raja Raman

References:

- Computer Today, S. K. Basandra, Galgotia Publications



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INTRODUCTION TO C PROGRAMMING

Course Code: MTH2318

Credit Units – 02

Course Objective:

The objective of this course is to acquaint the students with the basics of computers system, its components, data representation inside computer and to get them familiar with various important features of C programming.

Course Contents:

Module-I: Computers fundamentals:- definition, block diagram, diagram with components and characteristics, classification of computers History of C: Introduction of C, Basic structure of C program, Concept of problem solving, program design, debugging, Types of errors in programming, Number systems, Binary, octal, hexadecimal and their inter conversions.

Module-II: Element used in C, Header file, key words, identifiers, concept of variables, constants and data types in C, Input/output function, arithmetic, relational and bitwise operator, increment and decrement operator, unary operator, type casting, operator hierarchy, Conditional operator

Module-III: Decision making with if statement, else statement, if-else statement, nesting if, switch and break, go to statement. Decision making statement concepts of loops like while loop, do while loop, for loop, nested for loops, jumps in loop.

Module-IV: Functions: - use of inbuilt function, user defined functions, arrays:- one dimensional and n dimensional array, initialization of array, iterative programs using arrays, uses of array with combination of decision making operator, Function prototype, Return values and their types, function argument, recursion, Strings, array of strings.


Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	15	5	5	70

A-Attendance; CT-Class Test; S/V/Q-Seminar/Quiz/Viva; HA-Home Assignment; EE-End Semester Examination

References:

- E Balagurusamy, ANSI C, McGraw Hill Education India Private Limited; Seventh edition (2017).
- Yashwant Kanetkar, Let us C, BPB Publications, 2nd Edition, 2001.
- Herbert Schildt, C: The complete reference, Osbourne Mcgraw Hill, 4th Edition, 2002.
- V. RajaRaman, Computer Programming in C, Prentice Hall of India, 1995.
- Kernighan & Ritchie, C Programming Language, The (Ansi C Version), PHI, 2nd Edition.


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INTRODUCTION TO C PROGRAMMING LAB

Course Code: MTH2319

Credit Units: 02

Software Required: Turbo C

Course Contents:

- 1 Basic programming to understand the working of C
- 2 Programs using if, else if statements
- 3 Programs using nested if-else statements
- 4 Programs using switch case
- 5 Programs using loops like while and do while
- 6 Pattern programs using loops and multiple loops
- 7 Simple programs with the help of function
- 8 Simple programs involving array and strings

Examination Scheme:

Internal Assessment

Components	Attendance	Performance	Lab Record	Viva
Weightage (%)	5	10	10	5

End –Term Exam

Components	Performance	Viva
Weightage (%)	35	35

References:

- E Balagurusamy, ANSI C, McGraw Hill Education India Private Limited; Seventh edition (2017).
- Yashwant Kanetkar, Let us C, BPB Publications, 2nd Edition, 2001.
- Herbert Schildt, C: The complete reference, Osbourne Mcgraw Hill, 4th Edition, 2002.
- V. RajaRaman, Computer Programming in C, Prentice Hall of India, 1995.
- Kernighan & Ritchie, C Programming Language, The (Ansi C Version), PHI, 2nd Edition



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MECHANICS

Course Code: MTH2503

Credit Units: 04

Course Objective:

Mechanics is the study of forces that act on bodies and the resultant motion that those bodies experience. The course is devoted to introduce physical principles and techniques to solve mechanics problems through the integrated application of mathematical, scientific tools.

Course Contents:

Module-I: Basic Concept of Mechanics: Fundamental laws of Newtonian mechanics, Motion of particle, Components of velocity and acceleration (cartesian, radial and transverse, tangential and normal). Projectile motion, Conservative and non conservative forces, Work and Energy, Conservative field and potential energy, Principle of conservation of linear momentum, Angular momentum and energy for a particle. D' Alembert's principle.

Module-II: Moments, Moment of a force about a point and a line, Parallel forces, Couple, theorem of Varignon, Necessary conditions for equilibrium (moment), Coplanar forces, Reduction of a general plane force system, Parallel force system in two and three dimensions, Forces acting at a point, Triangle law of forces and Polygon law of forces, Lami's theorem.

Module-III: Motion under the inverse square law, Newton's law of gravitation and planetary orbits. Kepler's laws of motion deduced from Newton's laws of gravitation and vice-versa. Motion of the mass centre and motion relative to mass centre. Classification of orbits, Motion of artificial satellites, Orbits and their eccentricity.

Module IV: Simple Harmonic motion, Differential equation of S.H.M. Phase relationship between velocity, displacement, acceleration & energy. Derivation of differential equation of motion for SHM starting from Hooke's law; Damped oscillations. Derivation of decaying amplitude: over damping, Critical damping and under damping, Forced and coupled oscillations.


Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	15	5	5	70

A-Attendance; CT-Class Test; S/V/Q-Seminar/Quiz/Viva; HA-Home Assignment; EE-End Semester Examination

References:

- I.H. Shames and G. Krishna Mohan Rao, Engineering Mechanics: Statics and Dynamics (4th Edition), Dorling Kindersley (India) Pvt. Ltd. (Pearson Education), Delhi, 2013.
- R.C. Hibbeler and Ashok Gupta, Engineering Mechanics: Statics and Dynamics (11th Edition), Dorling Kindersley (India) Pvt. Ltd. (Pearson Education), Delhi.
- D.S. Kumar Engineering Mechanics: Statics and Dynamics, S. K. Kataria Publishers of Engineering and Computer books, 2018.
- D.S. Mathur Revised by P.S. Hemne Mechanics, S. Chand & Company Pvt.. Ltd. 2017


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OPERATIONS RESEARCH

Course Code: MTH2504

Credit Units: 04

Course Objective:

Operations research has many applications in science, engineering, economics, and industry. The goal of the course is to teach how to formulate, analyze, and solve mathematical models using appropriate optimization tools.

Course Contents:

Module-I: Basic Definition, Nature and Significance of OR, feature of OR Approach Application and Scope of OR, Linear Programming problems, mathematical formulation of LPP, case studies, Advantages and Limitations of Linear Programming, Application Areas of Linear Programming, definition of feasible, Infeasible Solution, Basic feasible solution. Solution of LPP by Graphical methods, unbounded, alternative and no feasible solution, convex set, convex hull, examples on convex sets, fundamental theorem of LPP.

Module-II: Standard form of LPP, slack & surplus variable, Simplex methods, Big M Method, Two phase method, solved problems on unbounded, alternative and no feasible solution, degeneracy. Duality in Linear Programming Problem, importance of duality, formulation of dual problems, theorems on Duality, Sensitivity Analysis.

Module-III: Assignment Problems, Hungarian method for optimal solution, solving unbalance problems, travelling salesman problems. Transportation Problem, formulation, finding basic feasible solution by- Northwest Corner Method, Least Cost Method and by Vogels Approximation Method, Optimality test: MODI method, Unbalanced Supply and Demand, Degeneracy Problem, Alternative Optional Solution, Maximization Transportation Problem.

Module-IV Sequencing problem, solution of sequencing problems, processing n jobs through 2 machines, processing n-jobs through 3 machines, processing 2-jobs through m-machine, Game theory: Competitive game, rectangular game, saddle points, minimax (maximin) method of optimal solution, value of game, Solution of game with saddle point. Rectangular games without saddle point, mixed strategy for 2 x 2 games.


Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	15	5	5	70

A-Attendance; CT-Class Test; S/V/Q-Seminar/Quiz/Viva; HA-Home Assignment; EE-End Semester Examination

Reference :

- 1 Taha, H.A., Operations Research: An Introduction", MacMillan Pub Co., NY, 9th Ed. (Reprint), 2013.
- 2 Mohan, C. and Deep, K., Optimization Techniques", New Age India Pvt. Ltd, New Delhi, 2009.
- 3 Ravindran, A., Phillips, D.T. and Solberg, J.J., \Operations Research: Principles and Practice", John Wiley and Sons, NY, 2nd Ed. (Reprint), 2012.
- 4 Hillier, F. S., and G. J. Lieberman, \Introduction to Operations Research", 2nd ed., Holden-Day, San Francisco, 1974.
- 5 Kanthi Swarup, P.K.Gupta and Man Mohan, \Operations Research". Sultan Chand and Sons New Delhi, Fourteenth Edition -2008


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SCIENTIFIC COMPUTING

Course Code: MTH2520

Credit Units: 2

Course Objective:

MATLAB is a scientific computing tool which covers almost all area of science and engineering. Students will be using MATLAB environment to solve various types of mathematical problems.

Course Contents:

Fundamentals of Linear Algebra, Numerical Analysis, Differential Equations and their application using MATLAB

1. Generating arrays and matrices and their manipulations
2. Introduction on few builtin functions
3. 2D and 3D plots, multiple plots using figure and subplot commands
4. Annotation of plots
5. Simple script files and editing them
6. Introduction of function files
7. Introducing notion of sub-functions and nested functions
8. Solving IVPs using ode45 and other solvers
9. Solving system of linear equations using builtin functions

Internal Assessment


Components	A	Performance	Lab Record	Viva
Weightage (%)	5	10	10	5

Endterm Exam

Components	Performance	Viva
Weightage (%)	35	35

References:

- Applied Numerical Methods with Matlab for Engineers and Scientists by Steven Chapra, McGraw Hill, 2008.
- MATLAB: An introduction with applications: Amos Gilat, 5th Edition, Wiley India, 2014.
- Getting Started with MATLAB: A Quick Introduction for Scientists and Engineers by Rudra Pratap, Oxford University Press, 2016


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SUMMER WORKSHOP

Course Code: MTH2535

Credit Units: 06

Workshop will be conducted for Two-week (six hours per day). The course will be intended to provide appropriate exposure aimed at developing key skills for enhancing employability and preparedness for higher education. The focus will be on the following:

- Technical softwares/ tools related to scientific computing and statistics. (first week).
- Report writing, Presentation etc. (first week).
- Reinforce fundamental concepts of core subjects like algebra/analysis/differential equations through intensive sessions. (second week)

Evaluation scheme:

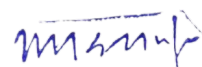
1. The students will have to appear for class-test(s) during the workshop.
2. During summer break, students have to work on the assignment(s) given to them.
3. The assignment(s) will have to be submitted within two weeks of commencement of new semester followed by viva-voce.
4. The evaluation will be done by the committee comprising of faculty members who served as resource persons in the workshop.

Components	Attendance	Assignment(s)	Class test(s)	Viva-voce
Weightage (%)	5	35	30	30

*Evaluation scheme for SAP will be provided by office of International Affairs of the University.



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FUZZY SETS & FUZZY LOGIC

Course Code: MTH2518

Credit Units: 03

Course Objective:

The course covers the study of fuzzy description logics as formalism for representing and reasoning with-vague or imprecise knowledge. We will study several variants of fuzzy DLs that differentiate from each other by their expressivity and their fuzzy semantics.

Course Contents:

Module I: Background of Fuzzy sets, Crisp sets - operations on crisp sets to functions, Fuzzy sets, fuzzy set operations, Properties of fuzzy sets, Expansion of Fuzzy set; Interval value Fuzzy set, Type-2 Fuzzy set, L-Fuzzy set, Level-2 Fuzzy set. Membership functions, Features of the membership function.

Module II: Alpha cut set, additional properties of alpha cut, Support, Core and height of alpha cut set, Cardinality of fuzzy set, First and second decomposition theorem, Functions of fuzzy sets-extension principle, Cartesian product, Extension principle on Cartesian product.

Module III: Crisp relations-cardinality of crisp relations, Operations on crisp relations, Properties of crisp relations, Compositions, Fuzzy relations-cardinality of fuzzy relations, Operations on fuzzy relations, Properties of fuzzy relations, max-min composition, fuzzy equivalence relations, transitive max-min closure, Projections and Cylindrical Extensions, Fuzzy Relation Equations.

Module IV: Classical Logic and fuzzy logic: Classical predicate logic-tautologies, Contradictions, Equivalence, Exclusive or an exclusive nor, Logical proofs, Deductive Inferences, Fuzzy logic, Fuzzy proposition and its types, Fuzzy quantifiers, Equivalence and logical proofs, Modifiers, inference from conditional and qualified fuzzy proposition.


Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	15	5	5	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE:End Semester Exam, A: Attendance

References

- T. J. Ross, Fuzzy Logic with Engineering Applications, McGraw-Hill, Hightstown, NJ, 1995.
- A. Kaufmann and M. M. Gupta, Introduction to Fuzzy Arithmetic Theory and Application, Van Nostrand Reinhold, New York, 1991.
- G. J. Klir and Bo Yuan, Fuzzy Sets and Fuzzy Logic: Theory and Applications, Prentice Hall, Upper Saddle River, NJ, 1995.


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R PROGRAMMING AND SAS

Course Code: MTH2519

Credit Units: 04

Course Objective:

To introduce programming concepts of R-programming, and how to use R for effective data analysis. Students will also get an exposure to SAS, a software commonly used by statisticians.

Course Contents:

Module I: Overview of R, R data types and objects, reading and writing data, accessing R packages, writing R functions, debugging, profiling R code, and commenting R code.

Module II: Control structures, functions, scoping rules, dates and times, Loop functions, organizing R code.

Module III: SAS: Introduction to SAS System & Architecture, import and export raw data files, manipulate and transform data, combine SAS data sets, create basic detail and summary reports using SAS procedures identify and correct data.

Module IV: Leave and Continue Statements, Where Statement, If “ Then Else statement; Goto, Stop and Error statements; Output statement, Put statement; Do Loops; modifying and combining data sets; updating master data set; display manager commands; SAS functions; an introduction to arrays and array processing; overview of methods for combining SAS data sets.


Examination Scheme

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	15	5	5	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE:End Semester Exam, A: Attendance

References

- Grolemond, Garrett, Hands-On Programming with R, Shroff Publishers & Distributors Private Limited - Mumbai (2014)
- Mark Gardener, Beginning R: The Statistical Programming Language, Wiley (2013).
- Andrie de Vries, Joris Meys, R Programming For Dummies, Wiley Second edition (2016)
- Lora D. Delwiche, Susan J. Slaughter, The Little SAS Book: A Primer, SAS Institute; 4th edition, 2008.
- Ron P. Cody, Jeffrey K. Smith, Applied Statistics and the SAS Programming Language, Pearson; 5 edition, 2005.


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DIGITAL ELECTRONICS

Course Code: MTH2521

Credit Units: 03

Course Objective:

This course is an introduction to the basic principles of digital electronics. At the conclusion of this course, the student will be able to quantitatively identify the fundamentals of Digital signals and circuits, including number systems, logic gates, logic and arithmetic subsystems, and integrated circuits. The student will construct, analyze combinational logic circuits & sequential circuits; create a truth table for standard digital logic gates. Student will also be able to understand about digital to analog conversion with logic gates, adders- sub tractors etc. The student will be able to analyze and design simple logic circuits using tools such as Karnaugh Mapping minimization, and will be able to draw logic diagrams.

Course Contents:

Module I: Number System and Logic gates

Representation of Numbers: Decimal, Binary, Octal, Hexadecimal Number Systems and Conversion of the bases. Logical Operators: NOT, AND, OR, NAND, NOR, EX-OR, EX- NOR, Truth tables of Logical Operations, Duality Principle, De Morgan's theorems Simplification of logical Function using laws.

Module II: Circuits and Expressions

Standard forms for Logical Expressions - Sum of Products, Product of Sums, Standard SOPs, Standard POSs, Conversion SOPs to POSs, and POSs to SOPs. Combinational Circuits: Series Combination, Parallel Combination, Logical Circuits, Applications: Combinational Circuits, and Switching Circuits.

Module III: Digital Circuits

Analog & Digital Signals, Logical Functions: Min-terms and Max-terms, Algebraic Methods and Laws, Karnaugh Maps. Simplification of Arithmetic Circuits Expressions; Half- Adders and Full - Adders, Half –Subtractor and Full- Subtractor.

Examination Scheme:

Components	CT1	A/C/Q	Attd	EE
Weightage (%)	15	10	5	70


Text & References:

Text:

- R.P Jain, Modern Digital Electronics

References:

- Malvino & Leach, Digital Electronics
- Floyd, Digital Fundamentals
- M.M Mano, Digital Logic and Computer Design
- Gothman ,Digital Electronics


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SPECIAL FUNCTIONS AND INTEGRAL TRANSFORMS

Course Code: MTH2615

Credit Units: 4

Course Objective:

The main objective of this course is to familiarize students with a range of mathematical methods which includes series solution and transforms to solve various types of ordinary differential equations.

Course Contents:

Module I: Series solution of differential equations – Power series method, Definitions of Beta and Gamma functions. Bessel equation and its solution: Bessel functions and their properties- Convergence, recurrence, Relations and generating functions, Orthogonality of Bessel functions.

Module II: Legendre and Hermite differentials equations and their solutions: Legendre and Hermite functions and their properties-Recurrence Relations and generating functions. Orthogonality of Legendre and Hermite polynomials. Rodrigues' Formula for Legendre & Hermite Polynomials, Laplace Integral Representation of Legendre polynomial.

Module III: Laplace Transforms – Existence theorem for Laplace transforms, Linearity of the Laplace transforms, Shifting theorems, Laplace transforms of derivatives and integrals, Differentiation and integration of Laplace transforms, Convolution theorem, Inverse Laplace transforms, convolution theorem, Inverse Laplace transforms of derivatives and integrals, solution of ordinary differential equations using Laplace transform.

Module IV: Fourier transforms: Linearity property, Shifting, Modulation, Convolution Theorem, Fourier Transform of Derivatives, Relations between Fourier transform and Laplace transform, Parseval's identity for Fourier transforms, solution of differential Equations using Fourier Transforms.


Examination Scheme

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	15	5	5	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE:End Semester Exam, A: Attendance

Recommended Books:

- Erwin Kreyszing, Advanced Engineering Mathematics, John Wiley & Sons, Inc., New York, 1999
- Lokenath Debnath, Integral Transforms and Their Applications, CRC Press, 1995.
- W.W. Bell, Special Functions for Scientists and Engineers, (Dover Books on Mathematics) Paperback, 2004.
- I.N. Sneddon, The use of integral transform, McGraw Hill, 1972.
- Murray R. Spiegel, Laplace transform, Schaum's Series, 1965.


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Bachelor of Science (Physics) (Honors)

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Curriculum & Scheme of Examination

2022

AMITY UNIVERSITY HARYANA

GURUGRAM

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MECHANICS

Course Code: PHY2101

Credit Units: 03

Course Objective:

This course has been so framed that the students are exposed to the topics of conservation laws, dynamics of rigid bodies and inverse-square law of forces in the framework of Newtonian Mechanics. Special theory of relativity is also included here.

Course Contents:

Module I: Conservation Laws

Lectures: 11

Coordinate systems and motion of a particle: Volume, velocity and acceleration in Cartesian and Spherical co-ordinate systems, Solid angle. Space Time Symmetry and Conservation Laws: Relationship of conservation laws and symmetries of space and time.

Module II: Elastic and Inelastic Scattering

Lectures: 11

Types of scattering and conservation laws, Laboratory and centre of mass systems, collision of particles which stick together, General elastic collision of particles of different masses.

Module III: Inverse-Square-Law of Forces

Lectures: 11

Newton's Law of Gravitation, Various forces in nature (qualitative). Central and non-central forces, Inverse square force, Centre of mass. Two-body problem – reduced mass, angular momentum in central force field. Equation of motion under a force law, Orbits and their eccentricity, Kepler's laws., Basic idea of global positioning system (GPS)

Module IV: Galilean transformations and Einstein's special theory of relativity Lectures: 12

Frames of reference, Inertial and non-inertial frames, Galilean transformation and Galilean relativity Basic postulates of special relativity, Lorentz transformations, Simultaneity and causality in relativity. Length contraction, Time dilation, Twin paradox, Velocity Transformation. Relativistic momentum, Relativistic Energy, Transformation of Momentum and Energy, Equivalence of Mass and Energy.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
A: Attendance

Text & References:

- Mathematical Methods for Physics and Engineering: K.F. Riley, M.P. Hobson and S.J. Bence (Cambridge University Press)(1998).
- Mechanics (Berkeley) Physics Course I : Charles Kittel, Walter D. Knight, M. Alvin and A. Ruderman (Tata McGraw Hill)(1981).
- Mechanics : H.S. Hans and S.P. Puri (Tata McGraw Hill)(2003).
- Introduction to Classical Mechanics : R.G. Takwale & P.S. Puranik (Tata-McGraw-Hill) (2000)
- Introduction to Special Theory of Relativity - R. Resnick (Wiley Eastern).
- The Feynman Lectures on Physics, Vol I (Addison –Wesley).


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WAVES & OSCILLATIONS

Course Code: PHY2102

Credit Units: 03

Course Objective:

This course aims at exposing the students to Harmonics Oscillations and applications in our everyday life.

Course Contents:

Module I: Simple Harmonic Free Vibrations

Simple harmonic motion, energy of a SHO, Compound pendulum, Electrical Oscillations, Plasma Vibrations, Lattice Vibrations, Transverse Vibrations of a mass on a string, composition of two perpendicular SHMs of same period and of periods in ratio 1:2, Anharmonic Oscillations.

Module II: Damped Simple Harmonic Vibrations

Decay of free Vibrations due to damping, types of damping, Determination of damping coefficients – Logarithmic decrement, relaxation time and Q-factor. Electromagnetic damping, collision damping – Ionosphere and metals.

Module III: Forced Vibrations and Resonance

A forced oscillator, Transient and Steady State Oscillations, velocity versus driving force frequency, Resonance, power supplied to forced oscillator by the driving force. Q-factor of a forced oscillator, Electrical, nuclear and nuclear-magnetic resonances.

Module IV: Coupled Oscillations

Stiffness coupled oscillators, Normal coordinates and modes of vibrations. Normal frequencies, Forced vibrations and resonance for coupled oscillators, Masses on string-coupled oscillators.

Module V: Waves in Physical Media

Wave motion in one dimension, Transverse and longitudinal waves, progressive harmonic waves and their energy, Transverse waves on a string, longitudinal waves on a rod, Electrical transmission lines, characteristic impedance of a string and a transmission line, waves in an absorbing medium, spherical waves.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
A: Attendance

Text & References:

- Text Book of Vibrations and Waves : S.P. Puri (Macmillan India)(2004)
- The Physics of Vibrations and Waves : H.J. Pain (Wiley and ELBS,1976)
- Waves and Oscillations - Rathin N. Chaudhury (New AgePubl.).
- Waves- J R Crawford (Tata McGrawHill)


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APPLIED CHEMISTRY LAB-I

Course Code: PHY2107

Credit Units:01

Course Contents:

[I] Titrimetric Analysis

- (i) Calibration and use of apparatus
- (ii) Preparation of solutions of different Molarity/Normality of titrant

[II] Acid- Base Titrations

- (i) Estimation of carbonate and hydroxide present together in mixture.
- (ii) Estimation of carbonate and bicarbonate present together in mixture.
- (iii) Estimation of free alkali present in different soaps/detergents

[III] Oxidation- Reduction Titrimetry

- (i) Estimation of Fe(II) and oxalic acid using standardized KMnO_4 solution.
- (ii) Estimation of oxalic acid and sodium oxalate in a given mixture.
- (iii) Estimation of Fe (II) with $\text{K}_2\text{Cr}_2\text{O}_7$ using internal (diphenylamine, anthranilic acid) and external indicator.

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

PHYSICS LAB-I

Course Code: PHY2104

Credit Units:02

Course Contents:

- To determine the Moment of Inertia of a Flywheel.
- To determine the Modulus of Rigidity of a Wire by Maxwell's needle.
- To determine the Coefficient of Viscosity of water by Capillary Flow Method (Poiseuille's method).
- Determination of moment of inertia of metallic cylinder / rectangular bar about an axis passing through its C.G. and to determine the rigidity modulus of the material of the suspension wire.
- To determine the wavelength of a monochromatic light by Newton's ring method.
- Measurement of the slit width and the separation between the slits of a double slit by observing the diffraction and interference fringes.
- To calibrate a polarimeter and hence to determine the concentration of sugar solution.
- To determine the refractive index of material of Prism using Spectrometer.
- To determine the wavelength of spectral lines of Mercury lamp using diffraction grating.

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.


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OPTICS

Course Code: PHY2202

Credit Units:03

Course Objective: This course aims at exposing the students to basic laws of optics and its applications in real world.

Course Contents:

Module I: Geometric Optics and its applications:

Ray optics, Plane and spherical Mirrors, Lens, image formation, Lens formula. Microscope and Telescope.

Module II: Interference

Young's experiment, coherent sources, phase and path differences, Theory of interference fringes, Fresnel's biprism, sheet thickness determination, interference in thin films due to reflected and transmitted lights, Maxima and minima in intensities, Colours of thin films, Newton's rings and its various aspects, Non-reflecting films.

Module III: Diffraction

Introduction, rectilinear propagation, Fresnel and Fraunhofer diffraction, Diffraction at circular aperture and straight edge and their discussion. Fraunhofer diffraction at a single slit and a double slit. Fraunhofer diffraction at N slits and its discussion. Plane diffraction grating and its theory, Dispersive power of grating, Resolving power of optical instruments, Rayleigh criterion, Resolving power telescope, microscope, prism and diffraction grating. Phase contrast microscope.

Module IV: Polarization:

Introduction, Polarization by reflection, Brewster's law, Polarization by refraction, Malus's law, Double refraction, Nicol Prism and its use, elliptically and Circularly polarized light, quarter and half-wave plates, production and detection of plane, circularly and elliptically polarized light, optical activity, specific rotation, Half-shade polarimeter.


Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
A: Attendance

Text & References:

- A Textbook of Optics: N. Subrahmanyam and B. Lal (S. Chand & Co., N. Delhi, 1987).
- Physical Optics: B. K. Mathur and T. P. Pandya.
- Geometrical and Physical Optics: Longhurst.
- Introduction to Modern Optics: G. R. Fowles.
- Optics: P. K. Srivastava.


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APPLIED CHEMISTRY LAB-II

Course Code: PHY2207

Credit Units:01

Course Contents:

1. Checking the calibration of the thermometer.
2. Purification of organic compounds by crystallization using the following solvents: Water, Alcohol, Alcohol-Water & Charcoal
3. Purification by Distillation, Decolouration and Sublimation.
4. Determination of the melting points of above compounds and unknown organic compounds (Kjeldahl method and electrically heated melting point apparatus)
5. Effect of impurities on the melting point – mixed melting point of two unknown organic compounds.
6. Chromatography
 - a. Separation of a mixture of two amino acids by ascending and horizontal paper chromatography.
 - b. Separation of a mixture of two sugars by ascending paper chromatography.
 - c. Separation of a mixture of o- and p-nitrophenol or o- and p-aminophenol by thin layer chromatography (TLC)

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

PHYSICS LAB-II

Course Code: PHY2204

Credit Units:02

Course Contents:

1. To determine the Coefficient of Thermal Conductivity of Copper by Searle's apparatus.
2. To determine the Coefficient of Thermal Conductivity of Copper by Angstrom's Method.
3. To determine the Coefficient of Thermal Conductivity of a bad conductor by Lee and Charlton's disc method.
4. To investigate the Motion of Coupled Oscillators.
5. To determine the Frequency of an Electrically Maintained Tuning Fork by Melde's Experiment.
6. To verify $\lambda^2 - T$ Law by Melde's Experiment.
7. To study the variation of Thermo-Emf of a Thermocouple with Difference of temperature of its Two Junctions.
8. To determine the value of acceleration (g) due to gravity.
9. To determine the frequency of tuning fork using sonometer.

Any other experiment carried out in the class.

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

ELECTRICITY & MAGNETISM

Course Code: PHY2301

Credit Units:03

Course Objective:

The aim of this course is to teach the students basics of electronics and electric current after making them comfortable with the mathematical tools involved in the study of electricity and magnetism.

Course Contents:

Module-I: Electric Charges, Fields and Potential

Basics of vector calculus (Gradient, divergence, curl and their physical significance; Gauss and Stokes theorem); Electric Charge, Quantization and Conservation of Electric Charge, Coulomb's Law, Electric Field, Principle of Superposition, Electric Flux, Gauss's law, Electric Field for Spherical, Plane and Cylindrical Distribution of Charges (applications of Gauss law), Differential form of Gauss's Law; Electric Potential; Line Integral of the Electric Field, Potential Difference and Potential Function, Electric Field from the Potential, Electric Field and Potential of Dipole; Potential for Charge Distributions: Equipotential Surfaces, Potential due to Charged Wire and Charged Disc, Energy Associated with Electric Field; Conservative Nature of Electric Force.

Module-II: Electric Fields in Materials:

Review of capacitors, Dielectric Material in an Electric Field, Polarisation, Gauss's Law in Dielectric Medium, Displacement Vector, Boundary Conditions on **D** and **E**; Dielectric Material between Capacitor Plates, Energy stored in a capacitor having dielectric medium.

Module-III: Electric current and its magnetic effects:

Electric Currents: Charge Transport and Current Density, Equation of Continuity, Ohm's Law in vector form.

Magnetic Field: Definition, Divergence of Magnetic Field, Ampere's Law and its Applications to Straight Wire, Solenoid and Toroid; Force on a Charged Particle Moving in Electric and Magnetic Fields, Current Loop and Magnetic Dipoles, Magnetic Dipole Moment.

Module-IV: Electromagnetic induction:

Electromagnetic Induction: Faraday's Laws of Electromagnetic Induction, Lenz's Law, Motional E.M.F., Self and Mutual Inductance, Self Inductance for Solenoid, Mutual Inductance of Coupled Solenoids, Energy Stored in the Magnetic Field; Transformer as an application of EMI.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester

Examination; A: Attendance

Text & References:

- Electricity and Magnetism (Berkley, Phys. Course 2): E.M. Purcell (Tata McGraw Hill) (1981).
- Elements of Electromagnetics :M.N.O.sadiku (Oxford University Press) (2001).
- Electricity and Magnetism: A.S. Mahajan& A.A. Rangwala (Tata- McGraw Hill)(1988).
- Electricity and Magnetism: A.N. Matveev(Mir)

CLASSICAL MECHANICS

Course Code: PHY2309

Credit Units: 03

Course Objective:

This course aims at exposing the students to let them understand the basics of Classical and Quantum Mechanics

Course Contents:

Module I: Lagrangian formulation of classical mechanics

Mechanics of a system of particles; constraints & degrees of freedom, Generalised coordinates, momentum, force & energy. D' Alembert's principle; variational technique; Hamilton's variational principle; Lagrange's equation for conservative systems and its application to simple cases: simple and spherical pendulum, one dimensional and isotropic oscillator etc.

Module II: Hamiltonian formulation of classical mechanics and old quantum theory

Hamilton's canonical equations of motion; Idea of cyclic coordinates, its relation with conservation principles, applications of Hamiltonian formulation to simple cases, Variational principle and least action; contact transformations; poisson bracket; Hamilton Jacoby theory.

Module III: Mechanics problems using Lagrangian formulation

Central force problem: Two body problem; reduced mass; motion under central force; constants of motion; Virial theorem; Kepler's laws of planetary motion.

Rigid body dynamics: moment of inertia, Angular momentum and kinetic energy of motion about a point; introduction about tensors

Module IV: Limitations of Classical Mechanics

Blackbody radiation, the photoelectric effect, the Franck-Hertz experiment, Compton effect, De Broglie hypothesis, Wave particle duality, Group and Particle velocity, Wave packets, Experiments supporting wave particle duality.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

Text & References:

- Classical Mechanics – J. Goldstein (Narosa Publ. House).
- Introduction to Classical Mechanics - R. G. Takwale and P. S. Puranik (Tata McGraw-Hill).
- Classical Mechanics – N. C. Rana and P. S. Joag (Tata McGraw-Hill).
- Introductory Quantum Mechanics - S. N. Ghoshal (Calcutta Book House).
- A Textbook of Quantum Mechanics – P. M. Mathews and K. Venkatesan.

ANALOG ELECTRONICS

Course Code: PHY2303

Credit Units:03

Course Objective:

This course aims at exposing the students to Semiconductors, Circuits and Transistors and its applications.

Course Contents:

Module I: Junction Diodes and their Applications

Formation of PN junction, Depletion region, Junction capacitance (Transition and diffusion capacitance), Energy level diagrams and built in potential, diffusion and drift velocity of carriers, Diode equation, V-I characteristics, temperature dependence, Applications Half-wave Rectifiers & Full-wave Rectifiers, Calculation of Ripple Factor and Rectification Efficiency. Low pass filter and High pass filter, Qualitative idea of C, L and π - Filters. Zener Diode and Voltage Regulation. Photo Diode, Tunnel Diode, LED, Varactor Diode, Tunnel diodes AC and DC Power Supplies

Module II: Circuit Analysis

Kirchhoff's Laws (KCL and KVL), Mesh and Node analysis of dc and ac Circuits, Superposition theorem, Thevenin's and Norton's theorem, reciprocity theorem, Linear resistive 2- ports and interconnections, Z, Y, L, S, T, H' and H'' representations/Parameters, Wheatstone Bridge and its Applications to Wein Bridge and Anderson Bridge

Module III: Transistors

PNP and NPN junction transistors, transistor current components, CB, CC and CE Configurations, transfer characteristics, Transistor as switch and applications, Transistor biasing, fixed bias, emitter-stabilised biasing, Voltage-divider biasing, FET and BJT Junction Field Effect Transistor (JFET), JFET V-I Characteristics, Application of FET as voltage variable resistor. Advantages of FET over BJT. MOSFET: construction, working & Application

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
A: Attendance

Text & References:

- Semiconductor Electronics by A. K. Sharma, New Age International Publisher(1996)
- Semiconductor Device- Physics and Technology by S. M. Sze, Wiley(1985)
- Introduction to Semiconductor Devices by M. S.Tyagi
- Integrated Electronics : J. Millman and C.C.Halkias (Tata McgrawHill)
- Linear and Non-linear Circuits: Chua, Desoer andKuh.
- Electronic Devices and Circuits : A. Mottershead (Prentice Hall)

PHYSICS LAB-III

Course Code: PHY2304

Credit Units:02

Course Contents:

1. To determine a Low Resistance by Carey Foster's Bridge.
2. To determine a Low Resistance by a Potentiometer.
3. To determine High Resistance by Leakage of a Capacitor.
4. To investigate the Motion of Coupled Oscillators.
4. To study the response curve of a Series LCR circuit and determine its (a) Resonant Frequency, (b) Impedance at Resonance and (c) Quality Factor Q, and (d) Band Width.
6. To study the response curve of a Parallel LCR circuit and determine its (a) Anti-Resonant Frequency and (b) Quality Factor Q.
8. To study (a) Half-wave Rectifier and (b) Full-wave Bridge Rectifier.
9. To study the Forward and Reverse characteristics of a Zener Diode and to study its use as a Voltage Regulator.
10. To study the CE Characteristics of a PNP Transistor.
11. To study the characteristics curves of PN junction diode in forward and reverse bias.
12. To study the Frequency Response of Voltage Gain of a RC-Coupled Amplifier.

Any other experiment carried out in the class.

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva

COMPUTER PROGRAMMING IN C

Course Code: PHY2306

Credit Units: 03

Course Objective:

The objective of this course module is to acquaint the students with the basics of computers system, its components, data representation inside computer and to get them familiar with various important features of procedure oriented programming language i.e. C.

Course Contents:

Module I: Introduction

Introduction to computer, history, von-Neumann architecture, memory system (hierarchy, characteristics and types), H/W concepts (I/O Devices), S/W concepts (System S/W & Application S/W, utilities). Data Representation: Number systems, character representation codes, Binary, octal, hexadecimal and their interconversions. Binary arithmetic, floating point arithmetic, signed and unsigned numbers, Memory storage unit.

Module II: Programming in C

History of C, Introduction of C, Basic structure of C program, Concept of variables, constants and data types in C, Operators and expressions: Introduction, arithmetic, relational, Logical, Assignment, Increment and decrement operator, Conditional, bitwise operators, Expressions, Operator precedence and associativity. Managing Input and output Operation, formatting I/O.

Module III: Fundamental Features in C

C Statements, conditional executing using if, else, nesting of if, switch and break Concepts of loops, example of loops in C using for, while and do-while, continue and break. Storage types (automatic, register etc.), predefined processor, Command Line Argument.

Module IV: Arrays and Functions

One dimensional arrays and example of iterative programs using arrays, 2-D arrays Use in matrix computations .Concept of Sub-programming, functions Example of user defined functions. Function prototype, Return values and their types, calling function, function argument, function with variable number of argument, recursion.

Module V: Advanced features in C

Pointers, relationship between arrays and pointers Argument passing using pointers, Array of pointers. Passing arrays as arguments. Strings and C string library. Structure and Union. Defining C structures, Giving values to members, Array of structure, Nested structure, passing strings as arguments. File Handling.

Examination Scheme:

Components	A	CT	C	H	EE
Weightage (%)	5	15	5	5	70

References:

- “ANSI C” by EBalagurusamy
- YashwantKanetkar, “Let us C”, BPB Publications, 2nd Edition, 2001.
- Herbert Schildt, “C: The complete reference”, OsbourneMcgraw Hill, 4th Edition, 2002.
- V. Raja Raman, “Computer Programming in C”, Prentice Hall of India, 1995.
- Kernighan & Ritchie, “C Programming Language”, The (Ansi C Version), PHI, 2nd Edition.
- J.BDixit, “Fundamentals of Computers and Programming in C”.
- P.K. Sinha and Priti Sinha, “Computer Fundamentals”, BPB publication.

TERM PAPER & WORKSHOP

Course Code: PHY2331

Credit Units:03

This course will comprise of two components viz Term Paper Workshop.

Component I: Term Paper

A term (or research) paper is primarily a record of intelligent reading in several sources on a particular subject.

The students will choose the topic at the beginning of the session in consultation with the faculty assigned. The progress of the paper will be monitored regularly by the faculty. At the end of the semester the detailed paper on the topic will be submitted to the faculty assigned. The evaluation will be done by Board of examiners comprising of the faculties.

GUIDELINES FOR TERM PAPER

The procedure for writing a term paper may consists of the following steps:

- Choosing a subject
- Finding sources of materials
- Collecting the notes
- Outlining the paper
- Writing the first draft
- Editing & preparing the final paper

1. Choosing a Subject

The subject chosen should not be too general.

2. Finding Sources of materials

- d) The material sources should be not more than 10 years old unless the nature of the paper is such that it involves examining older writings from a historical point of view.
- e) Begin by making a list of subject-headings under which you might expect the subject to be listed.
- f) The sources could be books and magazines articles, news stories, periodicals, scientific journals etc.

3. Collecting the notes

Skim through sources, locating the useful material, then make good notes of it, including quotes and information for footnotes.

- d) Get facts, not just opinions. Compare the facts with author's conclusion.
- e) In research studies, notice the methods and procedures, results & conclusions.
- f) Check cross references.

4. Outlining the paper

- c) Review notes to find main sub-divisions of the subject.
- d) Sort the collected material again under each main division to find sub-sections for outline so that it begins to look more coherent and takes on a definite structure. If it does not, try going back and sorting again for main divisions, to see if another general pattern is possible.

5. Writing the first draft

Write the paper around the outline, being sure that you indicate in the first part of the paper what its purpose is. You may follow the following:

- a) statement of purpose
- b) main body of the paper
- c) statement of summary and conclusion

Avoid short, bumpy sentences and long straggling sentences with more than one main ideas.

6. Editing & Preparing the final Paper

- j) Before writing a term paper, you should ensure you have a question which you attempt to answer in your paper. This question should be kept in mind throughout the paper. Include only information/ details/ analyses of relevance to the question at hand. Sometimes, the relevance of a particular section may be clear to you but not to your readers. To avoid this, ensure you briefly explain the relevance of every section.
- k) Read the paper to ensure that the language is not awkward, and that it "flows" properly.

- l) Check for proper spelling, phrasing and sentence construction.
- m) Check for proper form on footnotes, quotes, and punctuation.
- n) Check to see that quotations serve one of the following purposes:
- o) Show evidence of what an author has said.
- p) Avoid misrepresentation through restatement.
- q) Save unnecessary writing when ideas have been well expressed by the original author.
- r) Check for proper form on tables and graphs. Be certain that any table or graph is self-explanatory.

Term papers should be composed of the following sections:

- Titlepage
- Table of contents
- Introduction
- Review
- Discussion & Conclusion
- References
- Appendix

Generally, the introduction, discussion, conclusion and bibliography part should account for a third of the paper and the review part should be two thirds of the paper.

Discussion

The discussion section either follows the results or may alternatively be integrated in the results section. The section should consist of a discussion of the results of the study focusing on the question posed in the research paper.

Conclusion

The conclusion is often thought of as the easiest part of the paper but should by no means be disregarded. There are a number of key components which should not be omitted. These include:

- summary of questionposed
- summary offindings
- summary of main limitations of the study at hand
- details of possibilities for related future research

References

From the very beginning of a research project, you should be careful to note all details of articles gathered.

The bibliography should contain ALL references included in the paper. References not included in the text in any form should NOT be included in the bibliography.

The key to a good bibliography is consistency. Choose a particular convention and stick to this.

Conventions

Monographs

Crystal, D. (2001), Language and the internet. Cambridge: Cambridge University Press.

Edited Volumes

Gass, S./Neu, J. (eds.) (1996), Speech acts across cultures. Challenges to communication in a second language. Berlin/ NY: Mouton de Gruyter.

[(eds.) is used when there is more than one editor; and (ed.) where there is only one editor. In German the abbreviation used is (Hrsg.) for Herausgeber].

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Schmidt, R./Shimura, A./Wang, Z./Jeong, H. (1996), Suggestions to buy: Television commercials from the U.S., Japan, China, and Korea. In: Gass, S./Neu, J. (eds.) (1996), Speech acts across cultures.

Challenges to communication in a second language. Berlin/ NY: Mouton de Gruyter: 285-316.

Journal Articles

McQuarrie, E.F./Mick, D.G. (1992), On resonance: A critical pluralistic inquiry into advertising

rhetoric. Journal of consumer research 19, 180-197.

Electronic Book

Chandler, D. (1994), Semiotics for beginners [HTML document]. Retrieved [5.10.'01] from the World Wide Web, <http://www.aber.ac.uk/media/Documents/S4B/>.

Electronic Journal Articles

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Other Websites

Verterhus, S.A. (n.y.), Anglicisms in German car advertising. The problem of gender assignment [HTML document]. Retrieved [13.10.'01] from the World Wide Web, <http://olaf.hiof.no/~sverrev/eng.html>.

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Unpublished Theses/ Dissertations

Möhl, S. (1996), All tagssituationen im interkulturellen Vergleich: Realisierung von Kritik und Ablehnung im Deutschen und Englischen. Unpublished MA thesis, University of Hamburg.

Walsh, R. (1995), Language development and the year abroad: A study of oral grammatical accuracy amongst adult learners of German as a foreign language. Unpublished PhD dissertation, University College Dublin.

Appendix

The appendix should be used for data collected (e.g. questionnaires, transcripts) and for tables and graphs not included in the main text due to their subsidiary nature or to space constraints in the main text.

Component II: Workshop

A workshop is primarily an activity based academic event that is organized to provide the students a one to one and hands on experience on any aspect of their learning. The communication in a workshop has to be necessarily two ways. The trainer has to make sure that the aspect covered is practically practiced by the participants. The student will choose the option of workshop from amongst their concentration electives. The evaluation will be done by Board of examiners comprising of the faculties.

Major Themes for Workshop

The workshop may be conducted on any of the following major themes:

- Nanotechnology
- Renewable Energy
- Data Analytics
- Spintronics
- Superconductivity
- Bio-fuels
- Biophysics
- Quantum Computation
- Plasma Physics
- Cryogenics
- Clean Energy

Guidelines for Workshop

- The procedure for earning credits from workshop consists of the following steps:
- Relevant study material and references will be provided by the trainer in advance.
- The participants are expected to explore the topic in advance and take active part in the discussions held
- Attending and Participating in all activities of the workshop
- Group Activities have to be undertaken by students as guided by the trainer.
- Evaluation of workshop activities would be done through test and quiz at the end of the workshop.
- Submitting a write up of atleast 500 words about the learning outcome from the workshop.

Examination Scheme:

Term Paper (70)			Workshop (30)		
Organization & Relevance	Literature Review & Bibliography	Comprehensive Viva	Attendance	Active Participation	Seminar / Quiz
25	25	20	5	10	15



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QUANTUM MECHANICS

Course Code: PHY2410

Credit Units:03

Course Objective:

This course aims at exposing the students to Quantum Mechanics and its applications in Physics.

Course Contents:

Module I: Origin of Quantum Mechanics

Limitations of Classical Physics, Particle properties of waves: Black Body Radiation and Planck's Quantum hypothesis, Photoelectric effect, Compton Effect, Wave properties of particles: De-Broglie waves, physically acceptable wave functions, Probabilistic interpretation, Wave equation, phase and group velocity, Particle diffraction, Davisson and Germer experiment, Heisenberg uncertainty principle, Applications of uncertainty principle.

Module II: Schrodinger equation and general formalism of Quantum Mechanics

Schrodinger's time dependent equation, Linearity and superposition, Expectation values, Schrodinger's time independent equation, Stationary states, Hilbert space, normalization and orthonormality, Eigen functions and eigen values, quantum mechanical Operators, Hermitian Operators, Angular momentum operators and their commutation relations, eigenvalues and eigenfunctions of L^2 and L_z , Introduction to Bra and ket notation

Module III: Simple applications of Quantum Mechanics

Free particle, Particle in one dimensional and three dimensional box, Potential step. boundary conditions, bound and unbound states, Reflection and transmission coefficients for a rectangular barrier in one dimension, Tunnel effect, alpha decay, Linear harmonic oscillator (qualitative), The hydrogen atom problem (qualitative).

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
A: Attendance

Text & References:

- Quantum Mechanics: J.L. Powell, B. Crasemann (Narosa Publishing House).
- Introduction to Quantum Mechanics, 2nd edition, D.J. Griffiths(Pearson)
- Modern quantum mechanics; J. J.Sakurai.
- Quantum Mechanics – A. K. Ghatak and S. Lokenathan (Macmillan, Delhi).
- A Textbook of Quantum Mechanics – P. M. Mathews and K. Venkatesan (Tata McGraw Hill).
- Concepts of Modern Physics: Arthur Beiser (Tata McGrawHill)

DIGITAL ELECTRONICS

Course Code: PHY2411

Credit Units: 03

Course Objective:

This course aims at exposing the students to Digital Electronics and Communication.

Course Contents:

Module I: Digital Circuits & Combinational Logic

Difference Between Analog and Digital Circuits. Binary Numbers. Octal and Hexadecimal Numbers, Conversion of Decimal to Binary and other numbers and Vice Versa, Logic systems, Circuits for OR, AND, NOT gates, transistor switching times, Exclusive OR gate, Verification and design of AND, OR NOT and XOR gates using NAND gates & NOR gates, Boolean algebra: De Morgan's Theorems. Simplification of Logic Circuit using Boolean Algebra. Conversion of a Truth Table into an Equivalent Logic Circuit by (1) Sum of Products Method and (2) Karnaugh Map. Arithmetic Circuits: Binary Addition. Binary Subtraction using 2's Complement Method, Half Adders, Full Adders and Subtractors

Module II:

Flip-Flops, Counters, Shift Registers and Converters:

TTL ICs (binary decoder, 7segment decoder, Schmitt trigger), 7-segment display driver.

Memories: RAM and ROM Sequential Circuits: RS, D, and JK Flip-Flops. Level Clocked and Edge Triggered Flip-Flops. Preset and Clear Operations. Race-around Conditions in JK Flip-Flops. Master-Slave JK Flip-Flop Shift registers: Serial and parallel shifting of data, A/D converter, D/A converter.

Module III: Analog Circuits

Integrated Circuits (Qualitative Treatment only) Active and Passive components. Advantages and Drawbacks of ICs. Scale of integration: SSI, MSI, LSI and VLSI (Basic Idea and Definitions Only). Examples of Linear and Digital ICs. Operational Amplifiers (Use Black Box approach): Revision of basic characteristics of Op-Amps. Characteristics of an Ideal Op-Amp. Feedback in Amplifiers. Open-loop and Closed-loop Gain. Frequency Response. CMRR. Virtual ground and its Application

Module IV: Communication

Modulation: Need for modulation- Types of modulation- Amplitude, Frequency, Phase and Pulse code modulation. Radio wave propagation, Ionosphere, Effect of Ionosphere on Radio waves, Skip distance and Maximum Usable Frequency, Radio transmitter and receiver, TV receiver, Satellite communication, Modem, Demodulation. Introduction to Microprocessor.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester

Examination; A: Attendance

Text & References:

- Pulse, Digital and Switching Waveforms : J. Millman and H. Taub (Tata Mcgraw Hill)
- Electronic Devices and Circuits: A. Mottershead (Prentice Hall).
- Digital principles and applications By Donald P. Leach & Albert Paul Malvino, (Glencoe)
- Digital Fundamentals, 3rd Edition by Thomas L. Floyd (Universal Book Stall, India).
- Op-Amps and Linear Integrated Circuits by R. A. Gayakwad (Pearson Education Asia)
- Electronics Fundamental and Application: D. Chattopadhyay and P.C.Rakshit.

PHYSICS LAB-IV

Course Code: PHY2404

Credit Units:02

Course Contents:

1. To investigate the use of an op-amp as an Integrator.
2. To investigate the use of an op-amp as a Differentiator.
3. To study Amplitude Modulation using Transistor.
4. To study Pulse Width / Pulse Position and Pulse Amplitude Modulation using ICs.
5. To verify the basic logic gates using logic gate trainer kit.
6. To design and verify the following digital circuits using basic gates:
i) S-R flip-flops , ii) J-Kflip-flops.
7. To execute half adders and full adders with basic gates and hence to verify addition of binary numbers.
8. To determine the value of e/m by Thomson's method.

Any other experiment carried out in the class.

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

LASER PHYSICS

Course Code: PHY2406

Credit Units:03

Course Objective:

This course aims at students to give them basic understanding of Laser and its applications.

Course Contents:

Module I: Introduction

Introduction, mono chromaticity, temporal and spatial coherence, Einstein's coefficients, momentum transfer, possibility of light amplification, kinetics of optical absorption, shape and width of spectral lines, line broadening mechanism, natural, collision and Doppler broadening.

Module II: Laser Pumping and Resonators

Resonators, modes of a resonator, number of modes per unit volume, open resonators, confocal resonator (qualitative), quality factor, losses inside the cavity, threshold condition, Quantum yield.

Module III: Dynamics of the Laser Processes

Rate equations for two, three and four level systems, production of a giant pulse – Q switching, giant pulse dynamics, laser amplifiers, mode-locking, hole burning, distributed feedback lasers.

Module IV: Types of Lasers

He-Ne laser, Nitrogen Laser, CO₂ laser, Ruby laser, features of semiconductor lasers, intrinsic semiconductor lasers, doped semiconductors, condition for laser action, Advances in semiconductor lasers, injection lasers, dye lasers.

Module V: Applications

Holography, non-linear optics: harmonic generation, second harmonic generation, phase matching and optical mixing, brief qualitative description of some experiments of fundamental importance.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
A: Attendance

Text & References:

- Lasers and Non-linear Optics: B.B. Laud. (Wiley Eastern).
- Principles of Lasers: O. Svelto (Plenum Press).
- An Introduction to Lasers and their applications: D.C.O'Shea, W. Russell and W.T. Rhodes (Addison-Wesley).
- Laser Theory and Applications :Thyagarajan and A. Ghatak(MacMillan)

TERM PAPER & WORKSHOP

Course Code: PHY2431

Credit Units:03

This course will comprise of two components viz Term Paper Workshop.

Component I: Term Paper

A term (or research) paper is primarily a record of intelligent reading in several sources on a particular subject.

The students will choose the topic at the beginning of the session in consultation with the faculty assigned. The progress of the paper will be monitored regularly by the faculty. At the end of the semester the detailed paper on the topic will be submitted to the faculty assigned. The evaluation will be done by Board of examiners comprising of the faculties.

GUIDELINES FOR TERM PAPER

The procedure for writing a term paper may consists of the following steps:

- Choosing a subject
- Finding sources of materials
- Collecting the notes
- Outlining the paper
- Writing the first draft
- Editing & preparing the final paper

7. Choosing a Subject

The subject chosen should not be too general.

8. Finding Sources of materials

- g) The material sources should be not more than 10 years old unless the nature of the paper is such that it involves examining older writings from a historical point of view.
- h) Begin by making a list of subject-headings under which you might expect the subject to be listed.
- i) The sources could be books and magazines articles, news stories, periodicals, scientific journals etc.

9. Collecting the notes

Skim through sources, locating the useful material, then make good notes of it, including quotes and information for footnotes.

- g) Get facts, not just opinions. Compare the facts with author's conclusion.
- h) In research studies, notice the methods and procedures, results & conclusions.
- i) Check cross references.

10. Outlining the paper

- e) Review notes to find main sub-divisions of the subject.
- f) Sort the collected material again under each main division to find sub-sections for outline so that it begins to look more coherent and takes on a definite structure. If it does not, try going back and sorting again for main divisions, to see if another general pattern is possible.

11. Writing the first draft

Write the paper around the outline, being sure that you indicate in the first part of the paper what its purpose is. You may follow the following:

- d) statement of purpose
- e) main body of the paper
- f) statement of summary and conclusion

Avoid short, bumpy sentences and long straggling sentences with more than one main ideas.

12. Editing & Preparing the final Paper

- s) Before writing a term paper, you should ensure you have a question which you attempt to answer in your paper. This question should be kept in mind throughout the paper. Include only information/ details/ analyses of relevance to the question at hand. Sometimes, the relevance of a particular section may be clear to you but not to your readers. To avoid this, ensure you briefly explain the relevance of every section.
- t) Read the paper to ensure that the language is not awkward, and that it "flows" properly.
- u) Check for proper spelling, phrasing and sentence construction.

- v) Check for proper form on footnotes, quotes, and punctuation.
- w) Check to see that quotations serve one of the following purposes:
- x) Show evidence of what an author has said.
- y) Avoid misrepresentation through restatement.
- z) Save unnecessary writing when ideas have been well expressed by the original author.
- aa) Check for proper form on tables and graphs. Be certain that any table or graph is self-explanatory.

Term papers should be composed of the following sections:

- Titlepage
- Table of contents
- Introduction
- Review
- Discussion & Conclusion
- References
- Appendix

Generally, the introduction, discussion, conclusion and bibliography part should account for a third of the paper and the review part should be two thirds of the paper.

Discussion

The discussion section either follows the results or may alternatively be integrated in the results section. The section should consist of a discussion of the results of the study focusing on the question posed in the research paper.

Conclusion

The conclusion is often thought of as the easiest part of the paper but should by no means be disregarded. There are a number of key components which should not be omitted. These include:

- summary of question posed
- summary of findings
- summary of main limitations of the study at hand
- details of possibilities for related future research

References

From the very beginning of a research project, you should be careful to note all details of articles gathered.

The bibliography should contain ALL references included in the paper. References not included in the text in any form should NOT be included in the bibliography.

The key to a good bibliography is consistency. Choose a particular convention and stick to this.

Conventions

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Journal Articles

McQuarrie, E.F./Mick, D.G. (1992), *On resonance: A critical pluralistic inquiry into advertising rhetoric*. *Journal of consumer research* 19, 180-197.

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Appendix

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Component II: Workshop

A workshop is primarily an activity based academic event that is organized to provide the students a one to one and hands on experience on any aspect of their learning. The communication in a workshop has to be necessarily two ways. The trainer has to make sure that the aspect covered is practically practiced by the participants. The student will choose the option of workshop from amongst their concentration electives. The evaluation will be done by Board of examiners comprising of the faculties.

Major Themes for Workshop

The workshop may be conducted on any of the following major themes:

- Nanotechnology
- Renewable Energy
- Data Analytics
- Spintronics
- Superconductivity
- Bio-fuels
- Biophysics
- Quantum Computation
- Plasma Physics
- Cryogenics
- Clean Energy

These themes are merely indicative and other recent and relevant topics of study may be included.

Guidelines for Workshop

The procedure for earning credits from workshop consists of the following steps:

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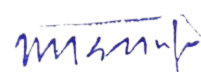
- Relevant study material and references will be provided by the trainer in advance.
- The participants are expected to explore the topic in advance and take active part in the discussions held
- Attending and Participating in all activities of the workshop
- Group Activities have to be undertaken by students as guided by the trainer.
- Evaluation of workshop activities would be done through test and quiz at the end of the workshop.
- Submitting a write up of atleast 500 words about the learning outcome from the workshop.

Examination Scheme:

Term Paper (70)			Workshop (30)		
Organization & Relevance	Literature Review & Bibliography	Comprehensive Viva	Attendance	Active Participation	Seminar / Quiz
25	25	20	5	10	15



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NUCLEAR & PARTICLE PHYSICS

Course Code: PHY2503

Credit Units:03

Course Objective: The course aims to introduce students to the fundamental concepts of nuclear and sub-nuclear physics and introduction to the physics behind particle detectors.

Course Contents:

Module I: Nuclear Properties

Constituents of nucleus, Non-existence of electrons in nucleus, Nuclear mass and binding energy, features of binding energy versus mass number curve, nuclear radius, angular momentum and parity, qualitative discussion of two-body nuclear forces, nuclear moments, magnetic dipole moment and electric quadrupole moment,

Module II: Radioactive Decays

Modes of decay of radioactive nuclides and decay Laws, Beta decays: β^- , β^+ and electron capture decays, , Parity violation in β decay. Alpha decay: Stability of heavy nuclei against break up, Geiger-Nuttall law, barrier penetration as applied to alpha decay, Gamma transitions: Excited levels, Radio carbon dating, Nuclear Power generation (Fission& Fusion Process) & Nuclear Reactor (if time permits)

Module III Nuclear Reactions and Nuclear Models

Types of nuclear reactions, reactions cross section, conservation laws, Kinematics of nuclear reaction, Q-value and its physical significance, compound nucleus. Liquid drop model, semi-empirical mass formula, condition of stability, evidence for nuclear magic numbers, Shell model, energy level scheme (Introductory).

Module IV: Elementary Particles, their Properties and reactions

Historical introduction, Cosmology, fermions and bosons, particles and antiparticles, Classification of elementary particles, types of interactions, electromagnetic, weak, strong interactions, gravitational interactions, Quantum numbers and conservation laws, isospin, charge conjugation, Yukawa theory, Introduction to quarks and qualitative discussion of the quark model and 3 generation of Quarks qualitatively).


Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	15	5	5	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
A: Attendance

Text & References:

- Basic ideas and Concepts in Nuclear Physics by K.Hyde
- Introduction to Nuclear Physics : H.A.Enge
- Nuclear Physics : I. Kaplan (AddisonWesley)
- Nuclei and Particles by E.Segre
- Introduction to High energy Physics by D.H.Perkins
- Elementary Particles by I.S.Hughe



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SOLID STATE PHYSICS

Course Code: PHY2506

Credit Units:03

Course Objective:

The aim of this course is to increase understanding of Physics principles as applied to solid state materials and to enhance problem solving and critical thinking skills.

Course Contents:

Module I: Crystal Structure

Crystalline and amorphous solids, Translational symmetry. Elementary ideas about crystal structure, lattice and bases, unit cell, Reciprocal lattice, fundamental types of lattices, Miller indices, lattice planes, simple cubic, f.c.c. and b.c.c. lattices. Laue and Bragg equations. Determination of crystal structure with X-rays. Bragg diffraction. Crystal Structures: sc, fcc, bcc, hcp, diamond, NaCl, CsCl & ZnS.

Module II: Bonding of solids

Different types of bonding- ionic, covalent, metallic, Van der Waals and hydrogen bond, their properties.

Module III: Band theory of solids

Elementary Band theory of solids, Periodic potential and Bloch theorem, Kronig-Penny model, energy band structure. Band structure in conductors, direct and indirect semiconductors and insulators (qualitative discussions), Free electron theory of metals, effective mass, drift current, mobility and conductivity, Weidman-Franz law, Heavy fermions, Hall Effect in metals and Semiconductors: Phenomenology and implication (Qualitative Discussion Only)

Module IV: Dielectric properties of materials and Lattice Vibrations

Polarization. Local Electric Field at an Atom. Depolarization Field. Dielectric Constant. Electric Susceptibility. Polarizability. Classical Theory of Electric Polarizability. Clausius Mosotti Equation. Normal and Anomalous Dispersion.

Lattice Vibrations and Phonons: Linear Monoatomic and Diatomic Chains. Acoustical and Optical Phonons. Qualitative Description of the Phonon Spectrum in Solids. Einstein and Debye Theories of Specific Heat of Solids. T^3 Law.

Module V: Magnetic properties of materials

Dia, para and ferro-magnetic properties of solids. Langevin's theory of diamagnetism and paramagnetism. Quantum theory of paramagnetism, Curie's law. Ferromagnetism, Spontaneous magnetization and domain structure; temperature dependence of spontaneous magnetization; Curie-Weiss law, Explanation of hysteresis.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
A: Attendance

Text & References:

- Introduction to Solid State Physics: C. Kittel (Wiley, VIIed.)
- Introduction to Solids : L.V. Azaroff (Tata Mc GrawHill)
- Solid State Physics : A.J. Dekker(Prentice-Hall)
- Elements of Materials Science and Engineering: L.H. Van Vlack(Addison-Wesley)

ATOMIC & MOLECULAR PHYSICS

Course Code: PHY2510

Credit Units: 03

Course Objective:

The aim of the course is to provide theoretical and practical knowledge on the many powerful methods provided by modern atomic- and molecular spectroscopy regarding basic studies as well as practical applications.

Course Contents:

Module I: Atomic Spectrum

Atomic structure, Hydrogen spectra, Bohr's model of one electron atom, Bohr-Sommerfeld model, Good quantum numbers, Stern-Gerlach experiment and spin as an intrinsic quantum number. Incompatibility of spin with classical ideas. Fine structure. Study of fine structure by Michelson interferometer.

Module II: Vector atom model and many electron atoms

Magnetic moment of the electron, Landau's g factor. Vector model – space quantization. L-S and j-j coupling scheme, Spectroscopic terms of many electron atoms in the ground state, Zeeman effect and its explanation using vector atom model. Stark effect, selection rules for Zeeman and Stark effect. L-S and j-j coupling- Interaction with electromagnetic radiation and with static fields.

Module III: Molecular Structure and Spectroscopy

Types of molecular spectra (Basics ideas), experimental study, Theory of pure rotational spectra, theory of rotational vibrational spectra, the Born-Oppenheimer approximation, Molecular rotations and vibrations, Molecular electronic transitions, Diatomic molecules–rotational and vibrational energy levels. Raman effect and its application to molecular spectroscopy (qualitative discussion). Molecular orbital theory.

Module IV: X-rays:

Production of X-rays, characteristic and continuous spectrum of X-rays, Mosley's law and its applications, difference between optical and X-ray spectra.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
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Text & References:

- Physics of Atoms and Molecules – B. H. Bransden and C. J. Joachain (Pearson Education).
- Atomic and Nuclear Physics – S. K. Sharma (Pearson Education).
- Optics and Atomic Physics – B. P. Khandelwal (Sibal Agarwala).

PHYSICS LAB-V

Course Code: PHY2504

Credit Units:02

Course Contents:

1. To measure the Resistivity of a Ge Crystal with Temperature by Four-Probe Method
(from room temperature to 200⁰ C) and to determine the Band Gap Eg for it.
2. To determine the Hall Coefficient a Semiconductor.
3. To study the Hysteresis loop (B-H) of ferromagnetic material.
4. To measure the Magnetic susceptibility of Solids and Liquids.
5. To determine the band gap energy of a given semiconductor by four-probe method.
6. To study the characteristics of Photovoltaic cell.
7. To measure the dielectric constant of a ferroelectric material as a function of temperature.
8. To measure magnetic susceptibility of a solution of a paramagnetic salt in water for 3 different concentrations by using Quincke's method.

Any other experiment carried out in the class.

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

SUMMER PROJECT EVALUATION

Course Code: PHY2535

Credit Units:03

Objectives:

Practical training is based on the theoretical subjects studied by subjects. It can be arranged within the college or any in any related industrial unit. The students are to learn various industrial, technical and administrative processes followed in the industry. In case of on campus training the students will be given specific tasks of synthesizing / testing / analysis / characterization. On completion of the practical training the students are to present a report covering various aspects learnt by them and give a presentation of the same.

Chapter Scheme and distribution of marks Report (Probable):

Chapter 1: Introduction –5 marks

Chapter 2: Conceptual Framework/ National/International Scenario – 10 marks

Chapter 3: Presentation, Analysis & Findings -- 15 marks

Chapter 4: Conclusion & Recommendations -- 5 marks

Chapter 5: Bibliography -- 05 marks

Evaluation Scheme:

Continuous Evaluation (Feedback from Industry/ Faculty in charge)	Report	Presentation and Viva	Total
25	40	35	100

Components of a Project Report

The outcome of Project Work is the Project Report. A project report should have the following components:

- 1) Cover Page:** This should contain the title of the project proposal, to whom it is submitted, for which degree, the name of the author, name of the supervisor, year of submission of the project work, name of the University.
- 2) Acknowledgement:** Various organizations and individuals who might have provided assistance /co-operation during the process of carrying out the study.
- 3) Table of Content:** Page-wise listing of the main contents in the report, i.e., different Chapters and its main Sections along with their page numbers.
- 4) Body of the Report:** The body of the report should have these four logical divisions
 - a) Introduction:** This will cover the background, rationale/ need / justification, brief review of literature, objectives, methodology (the area of the study, sample, type of study, tools for data collection, and method of analysis), Limitations of the Study, and Chapter Planning.
 - b) Conceptual Framework / National and International Scenario:** (relating to the topic of the Project).
 - c) Presentation of Data, Analysis and Findings:** (using the tools and techniques mentioned in the methodology).
 - d) Conclusion and Recommendations:** In this section, the concluding observations based on the main findings and suggestions are to be provided.
- 5) Bibliography or References:** This section will include the list of books and articles which have been used in the project work, and in writing a project report.
- 6) Annexures:** Questionnaires (if any), relevant reports, etc.
(The main text of the Project should normally be in the range of 5000 words. However, there may be annexure in addition to the main text)

The Steps of a Project Report

Step I : Selection of the topic for the project by taking following points into consideration:

- Suitability of the topic.
- Relevance of the topic

- Time available at the disposal.
- Feasibility of data collection within the given time limit.
- Challenges involved in the data collection (time & cost involved in the data collection, possibility of getting responses, etc.)

Step II :Finalisation of the Topic and preparation of Project Proposal in consultation with the Supervisor.

Step III : Collection of information and data relating to the topic and analysis of the same.

Step IV : Writing the report dividing it into suitable chapters, viz.,

Chapter 1:Introduction,

Chapter 2: Conceptual Framework / National & International Scenario,

Chapter 3: Analysis & Findings

Chapter 4: Conclusion and Recommendations.

StepV: The following documents are to be attached with the Final Project Report.


1) Approval letter from the supervisor(Annexure-IA)

2) Student's declaration(Annexure-IB)

3) Certificate from the Competent Authority of the Organisation / Institution, if the student undertakes the Project Work in any Organisation /Institution.

Guidelines for Evaluation:

- Each of the students has to undertake a Project individually under the supervision of a teacher and to submit the same following the guidelines statedbelow.
- Language of Project Report and Viva-Voce Examination may be English. The Project Report must be typed and hardbound.
- Failure to submit the Project Report or failure to appear at the Viva-voce Examination will be treated as "Absent" in the Examination. He /she has to submit the Project Report and appear at the Viva-Voce Examination in the subsequent years (within the time period as per UniversityRules).
- No marks will be allotted on the Project Report unless a candidate appears at the Viva-Voce Examination. Similarly, no marks will be allotted on Viva-Voce Examination unless a candidate submits his/her ProjectReport.
- Evaluation of the Project Work to be done jointly by one internal expert and one external expert with equal weightage, i.e., average marks of the internal and external experts will be allotted to thecandidate.


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INTRODUCTION TO MATLAB

Course Code: PHY2512

Credit Units:03

Course Objective: MATLAB is a scientific computing tool which can be used to solve many real life problems coming from various areas of science and engineering. The course introduces the basics of MATLAB; how to effectively use few commonly used built in functions; hands on experience on MATLAB programming and its applications to various practical problems.

Course Contents:

Module-I: Introduction to MATLAB: vector and matrix generation, subscripting and the colon notation, matrix and array operations and their manipulations, introduction to some inbuilt functions. m-files: scripts and functions, editing, saving m-files.

Module-II: Two & three-dimensional graphics: basic plots, change in axes and annotation in a figure, multiple plots in a figure, saving and printing figures, mesh plots, surface plots and their variants.

Module-III: Relational and logical operators: flow control using various statements and loops including If-End statement, If-Else-End statement, nested If-Else-End statement, For-End and While-End loops with Break commands.

Module-IV: Applications of MATLAB: Solving a linear system of equations, calculus of polynomials using inbuilt functions, solving equations in one variable, solving ordinary differential equations using inbuilt functions.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	10	5	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
A: Attendance

Reference Books:

- Applied Numerical Methods with Matlab for Engineers and Scientists by Steven Chapra, McGraw Hill, 2008.
- MATLAB: An introduction with applications: Amos Gilat, 5th Edition, Wiley India, 2014
- Getting Started with MATLAB: A Quick Introduction for Scientists and Engineers by RudraPratap, Oxford University Press, 2016.

SEMICONDUCTOR PHYSICS

Course Code: PHY2513

Credit Units:03

Course Objective:

Course Description: This course illustrates the basics of semiconductor theory with emphasis on the formation of energy bands in semiconductors. Applications in terms of studying the device structure and working principle of LEDs, photodiodes and tunnel diodes. Also, the basic structure and working principle of MOS devices is given in addition to the energy band diagram in a metal-semiconductor contact.

Course Content:

Module I: Formation of Energy bands

Formation of Energy bands, Electron effective mass, concept of holes, Density of states function, Fermi-Dirac probability function and distribution, Equilibrium distribution of electrons and holes in intrinsic semiconductors, the n_0 and p_0 equations, intrinsic Fermi level position, dopant energy levels, Equilibrium distribution of electrons and holes in extrinsic semiconductors, Degenerated/Non-degenerated semiconductors.

Module II: Semiconductor Physics

Drift current density, Mobility Effect, Conductivity, Diffusion Current Density, Total Current Density, the Einstein relation, The Hall Effect, Carrier Generation and Recombination, Continuity Equations, time dependent diffusion equation, Basics of ambipolar effect and its transport equation, Haynes-Shockley Experiment.

Module III: Diodes

Visible and Infrared LEDs (Device structure and Working principle), photoconductor and photodiode (device structure and working principle), PN junction solar cells, Tunnel diodes, Impatt diodes and its static and dynamic characteristics, negative differential resistance, Transferred Electron devices (TED): TED device operation; Quantum effect devices (QED): Resonance tunnel diode.

Module IV: Metal-semiconductor contact

MOSFET structure and principle of operation, current-voltage characteristics, MOS structure and its energy band diagram, Depletion layer thickness, work function differences, Flat band voltage - charge distribution, capacitance-voltage characteristics and frequency effects

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
A: Attendance

Reference Books:

- Semiconductor Physics and Devices (Third Edition) by Donald A. Neamen (the McGraw-Hill companies)
- Semiconductor devices Physics and Technology (2nd Edition) by S. M. Sze (Wiley Student Edition)
- Integrated Electronics: Analog and Digital Circuits and Systems, Jacob Millman and Christos C. Halkias, Tata McGraw-Hill.
- Hand Book of Electronics, Gupta & Kumar, Pragati Prakashan.

TERM PAPER & WORKSHOP

Course Code: PHY2531

Credit Units:03

This course will comprise of two components viz Term Paper Workshop.

Component I: Term Paper

A term (or research) paper is primarily a record of intelligent reading in several sources on a particular subject.

The students will choose the topic at the beginning of the session in consultation with the faculty assigned. The progress of the paper will be monitored regularly by the faculty. At the end of the semester the detailed paper on the topic will be submitted to the faculty assigned. The evaluation will be done by Board of examiners comprising of the faculties.

GUIDELINES FOR TERM PAPER

The procedure for writing a term paper may consists of the following steps:

- Choosing a subject
- Finding sources of materials
- Collecting the notes
- Outlining the paper
- Writing the first draft
- Editing & preparing the final paper

1 Choosing a Subject

The subject chosen should not be too general.

2. Finding Sources of materials

- j) The material sources should be not more than 10 years old unless the nature of the paper is such that it involves examining older writings from a historical point of view.
- k) Begin by making a list of subject-headings under which you might expect the subject to be listed.
- l) The sources could be books and magazines articles, news stories, periodicals, scientific journals etc.

3. Collecting the notes

Skim through sources, locating the useful material, then make good notes of it, including quotes and information for footnotes.

- j) Get facts, not just opinions. Compare the facts with author's conclusion.
- k) In research studies, notice the methods and procedures, results & conclusions.
- l) Check cross references.

4. Outlining the paper

- g) Review notes to find main sub-divisions of the subject.
- h) Sort the collected material again under each main division to find sub-sections for outline so that it begins to look more coherent and takes on a definite structure. If it does not, try going back and sorting again for main divisions, to see if another general pattern is possible.

5. Writing the first draft

Write the paper around the outline, being sure that you indicate in the first part of the paper what its purpose is. You may follow the following:

- g) statement of purpose
- h) main body of the paper
- i) statement of summary and conclusion

Avoid short, bumpy sentences and long straggling sentences with more than one main ideas.

6. Editing & Preparing the final Paper

Before writing a term paper, you should ensure you have a question which you attempt to

answer in your paper. This question should be kept in mind throughout the paper. Include only information/ details/ analyses of relevance to the question at hand. Sometimes, the relevance of a particular section may be clear to you but not to your readers. To avoid this, ensure you briefly explain the relevance of every section.

- cc) Read the paper to ensure that the language is not awkward, and that it "flows" properly.
- dd) Check for proper spelling, phrasing and sentence construction.
- ee) Check for proper form on footnotes, quotes, and punctuation.
- ff) Check to see that quotations serve one of the following purposes:
- gg) Show evidence of what an author has said.
- hh) Avoid misrepresentation through restatement.
- ii) Save unnecessary writing when ideas have been well expressed by the original author.
- jj) Check for proper form on tables and graphs. Be certain that any table or graph is self-explanatory.

Term papers should be composed of the following sections:

- Titlepage
- Table of contents
- Introduction
- Review
- Discussion & Conclusion
- References
- Appendix

Generally, the introduction, discussion, conclusion and bibliography part should account for a third of the paper and the review part should be two thirds of the paper.

Discussion

The discussion section either follows the results or may alternatively be integrated in the results section. The section should consist of a discussion of the results of the study focusing on the question posed in the research paper.

Conclusion

The conclusion is often thought of as the easiest part of the paper but should by no means be disregarded. There are a number of key components which should not be omitted. These include:

- summary of question posed
- summary of findings
- summary of main limitations of the study at hand
- details of possibilities for related future research

References

From the very beginning of a research project, you should be careful to note all details of articles gathered.

The bibliography should contain ALL references included in the paper. References not included in the text in any form should NOT be included in the bibliography.

The key to a good bibliography is consistency. Choose a particular convention and stick to this.

Conventions

Monographs

Crystal, D. (2001), Language and the internet. Cambridge: Cambridge University Press.

Edited Volumes

Gass, S./Neu, J. (eds.) (1996), Speech acts across cultures. Challenges to communication in a second language. Berlin/ NY: Mouton de Gruyter.

[(eds.) is used when there is more than one editor; and (ed.) where there is only one editor. In German the abbreviation used is (Hrsg.) for Herausgeber].

Edited Articles

Schmidt, R./Shimura, A./Wang, Z./Jeong, H. (1996), Suggestions to buy: Television commercials

from the U.S., Japan, China, and Korea. In: Gass, S./Neu, J. (eds.) (1996), Speech acts across cultures. Challenges to communication in a second language. Berlin/ NY: Mouton de Gruyter: 285-316.

Journal Articles

McQuarrie, E.F./Mick, D.G. (1992), On resonance: A critical pluralistic inquiry into advertising rhetoric. Journal of consumer research 19, 180-197.

Electronic Book

Chandler, D. (1994), Semiotics for beginners [HTML document]. Retrieved [5.10.'01] from the World Wide Web, <http://www.aber.ac.uk/media/Documents/S4B/>.

Electronic Journal Articles

Watts, S. (2000) Teaching talk: Should students learn 'real German'? [HTML document]. German as a Foreign Language Journal [online] 1. Retrieved [12.09.'00] from the World Wide Web, <http://www.gfl-journal.com/>.

Other Websites

Verterhus, S.A. (n.y.), Anglicisms in German car advertising. The problem of gender assignment [HTML document]. Retrieved [13.10.'01] from the World Wide Web, <http://olaf.hiof.no/~sverrev/eng.html>.

Unpublished Papers

Takahashi, S./DuFon, M.A. (1989), Cross-linguistic influence in indirectness: The case of English directives performed by native Japanese speakers. Unpublished paper, Department of English as a Second Language, University of Hawai'i at Manoa, Honolulu.

Unpublished Theses/ Dissertations

Möhl, S. (1996), All tagssituationen im interkulturellen Vergleich: Realisierung von Kritik und Ablehnung im Deutschen und Englischen. Unpublished MA thesis, University of Hamburg.

Walsh, R. (1995), Language development and the year abroad: A study of oral grammatical accuracy amongst adult learners of German as a foreign language. Unpublished PhD dissertation, University College Dublin.

Appendix

The appendix should be used for data collected (e.g. questionnaires, transcripts) and for tables and graphs not included in the main text due to their subsidiary nature or to space constraints in the main text.

Component II: Workshop

A workshop is primarily an activity based academic event that is organized to provide the students a one to one and hands on experience on any aspect of their learning. The communication in a workshop has to be necessarily two ways. The trainer has to make sure that the aspect covered is practically practiced by the participants. The student will choose the option of workshop from amongst their concentration electives. The evaluation will be done by Board of examiners comprising of the faculties.

Major Themes for Workshop

The workshop may be conducted on any of the following major themes:

- Nanotechnology
- Renewable Energy
- Data Analytics
- Spintronics
- Superconductivity
- Bio-fuels
- Biophysics
- Quantum Computation
- Plasma Physics

- Cryogenics
- Clean Energy

These themes are merely indicative and other recent and relevant topics of study may be included.

Guidelines for Workshop

- The procedure for earning credits from workshop consists of the following steps:
- Relevant study material and references will be provided by the trainer in advance.
- The participants are expected to explore the topic in advance and take active part in the discussions held
- Attending and Participating in all activities of the workshop
- Group Activities have to be undertaken by students as guided by the trainer.
- Evaluation of workshop activities would be done through test and quiz at the end of the workshop.
- Submitting a write up of atleast 500 words about the learning outcome from the workshop.

Examination Scheme:

Term Paper (70)			Workshop (30)		
Organization & Relevance	Literature Review & Bibliography	Comprehensive Viva	Attendance	Active Participation	Seminar / Quiz
25	25	20	5	10	15



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INTRODUCTION TO NANOTECHNOLOGY

Course Code: PHY2606

Credit Units:03

Course Objective:

This course aims at students to get acquainted with introductory knowledge of Nanotechnology.

Course Contents:

Module I: Introduction

Nanoscience and Nanotechnology, Classification of nanostructured materials, Nanoparticles, Quantum wire, Quantum well, Quantum dots, Carbon nanotubes, Graphene, Nanowires, Ultra thin films-multilayered materials, Length scales involved and effect on properties: Mechanical, Electronic, Optical, Magnetic and Thermal properties. Technological advantages of Nanomaterials

Module II: Preparation Methods

Bottom-up synthesis, Top-down approach: Mechanical milling, Sputtering, Evaporation. Material processing by Sol – Gel method, Chemical Vapour deposition and Physical Vapour deposition, Microwave Synthesis of materials, Principles of SEM, TEM and AFM.

Module III: Characterization Techniques

X-ray diffraction technique, Scanning Electron Microscopy, Tunneling Electron Microscopy, Surface Analysis Techniques- AFM, SPM STM, ESCA.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
A: Attendance

Text & References:

- T. Pradeep, NANO The Essential, understanding Nanoscience and Nanotechnology, Tata McGraw-Hil Publishing Company Limited, 2007.
- Charles P. Poole Jr., Introduction to Nanotechnology, John Wiley & Sons, 2003.
- Nanotechnology by Mark Ratner and Daniel Ratner, Pearson Education.
- Nanomaterials by A.K. Bandyopadhyay; New Age International Publishers.

INSTRUMENTATION TECHNIQUES

Course Code: PHY2610

Credit Units: 03

Course Objective:

This course aims at exposing the students to the instrumentation of the some of the main experimental techniques used in Physics

Course Contents:

Module I: Error analysis and Vacuum technology

Description of error analysis, reporting and usage of uncertainties, Propagation of uncertainties, Error analysis: Instrumental and statistical uncertainties, propagation of errors, Estimation of Mean and Errors, Least Square Fitting, Calibration.

Introduction to Vacuum Systems, Kinetic Theory of Gases, Production of Vacuums, Vacuum Pumps – Rotary, Diffusion, Terbo-molecular, Pressure Measurement, Leak Detection, Specimen handling.

Module II: Instrumentation of Diffraction and Microscopic Techniques

X-ray Sources – Crookes Tubes, Coolidge Tubes, Filters, mono-chromator crystals, Multi-layered monochromators and mirrors, Detectors-Photographic film, Gas detectors, Solid detectors, Diffractometers-The Debye-Scherrer and Hull diffractometer, Bragg-Brentano diffractometers, An introduction to surface diffractometry.

Scanning Electron Microscope Instrumentation- Electron Beam Parameters, Electron. Optical Parameters- Beam Energy, Beam Diameter, Beam Current, Beam Solid Angle. SEM Imaging Modes- High Current Mode, Resolution Mode, Low Voltage Modes.

Module III: Instrumentation of Spectroscopic Techniques

Gas Discharge Lamps, Spectral Lamps and Shapes of Spectral Lines-Low Pressure Spectral Lamps, Shape of Spectral Lines.

Optical Filters, Polarizers and Phase Plates. Monochromators – Prism Monochromator, Grating Monochromators


Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Exam; A: Atten

Text & References:

- John R. Taylor, An introduction to error analysis: a study of uncertainties in physical measurements, University Science Books California). 1997.
- P E J Flewitt, RK Wild, Physical Methods for Materials Characterization, IOP Publishing 2003.
- R. Guinebretière, X-ray Diffraction by Polycrystalline Materials, LAVOISIER 2006.
- Joseph I Goldstein, Scanning Electron Microscopy and X-ray Microanalysis, Springer 2018.
- Hans Kuzmany, Solid- State Spectroscopy an Introduction, Springer 2009.


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LOW TEMPERATURE PHYSICS AND SUPERCONDUCTIVITY

Course Code: PHY2605

Credit Units:03

Course Objective:

The aim of this course is to get acquainted the students with physics of ultra low temperatures, physics of materials at zero resistance and their applications in our real world.

Course Contents:

Module I: Superconductivity

Basic properties of superconductors, thermodynamics, superconductors in magnetic fields The London equations, electromagnetic properties, penetration depth, Ginzburg-Landau theory, coherence length, type I and type II superconductors, BCS theory, second quantization, Cooper- pairing, energy gap Tunneling, Josephson effects and SIS tunneling, High Tc superconductors, structure, d-wave symmetry, phase diagrams, Coexistence of superconductivity and Magnetism Overview of applications, squids, microwave devices, power applications.

Module II: Superfluidity

Two – Fluid Model, Bose – Einstein Condensation, Macroscopic Quantum State, Properties of liquid helium-4, Phenomena near The Lambda Point, phase diagrams, Superfluidity, Superfluid phenomena, rollin film, fountain effect, second sound Excitations and vortices in superfluids, Properties of liquid helium-3, the phase diagram, Symmetry properties of superfluid helium-3, Macroscopic Quantum Interference – Josephson Effect, Normal Fluid Density – Quasiparticle Scattering , Collective Excitations, Sound Propagation.

Module III: Cryogenics

Thermal and electrical properties for different materials at low temperature, Thermodynamic Properties, Liquefaction of gases. Regenerative principle Cooling methods above 1K, Joule-Thompson, Gifford-McMahon, evaporation cooling, Cooling methods below 1K, dilution & refrigeration, Methods of liquefaction of gases (Laser Cooling, Cascade process, Linde's process, and adiabatic demagnetization process) – Measurement of cryogenic temperatures.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70


CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

Text & References:

- Basic Superfluid's by Tony Guenault
- Superfluidity and Superconductivity: David R. Tilley, John Tilley (Ph.D.)
- Amorphous solids: low-temperature properties: William Andrew Phillips
- An introduction to liquid helium: John Wilks, David Sheridan Betts.



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INTRODUCTION TO ASTRONOMY

Course Code: PHY2611

Credit Units:03

Course Objective: This course aims at students to get acquainted with big bang picture, dark energy and cosmology.

Course Contents:

Module I: Distance measurement and overview:

Spectrum of EM radiation, Atmospheric absorption, various types of telescopes, Overview of Astronomy, magnitude, distances, various methods to measure distances.

Module II: Sun and the Stars

Sun as a star, Structure of the Sun, types of stars, Color magnitude diagram, main sequence stars, evolution of stars. White dwarf, neutron star and black holes.

Module III: Galaxies and Extragalactic Astronomy

Milky way galaxy, dynamics of stars, types of galaxies, Hubble classification, the local group, clusters of galaxies.

Module IV: Cosmology

The big bang picture, cosmic microwave background, early universe, basic ideas and observations behind dark matter and dark energy, Structure formation in the universe.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
A: Attendance

Text & References:

- The Physical Universe: An introduction to Astronomy by Frank H.Shu
- Astrophysical concepts by Harwit Martin
- Astrophysics for Physicists by Arnab Rai Choudhuri



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TERM PAPER & WORKSHOP

Course Code: PHY2631

Credit Units:03

This course will comprise of two components viz Term Paper Workshop.

Component I: Term Paper

A term (or research) paper is primarily a record of intelligent reading in several sources on a particular subject.

The students will choose the topic at the beginning of the session in consultation with the faculty assigned. The progress of the paper will be monitored regularly by the faculty. At the end of the semester the detailed paper on the topic will be submitted to the faculty assigned. The evaluation will be done by Board of examiners comprising of the faculties.

GUIDELINES FOR TERM PAPER

The procedure for writing a term paper may consists of the following steps:

- Choosing a subject
- Finding sources of materials
- Collecting the notes
- Outlining the paper
- Writing the first draft
- Editing & preparing the final paper

1. Choosing a Subject

The subject chosen should not be too general.

2. Finding Sources of materials

- m) The material sources should be not more than 10 years old unless the nature of the paper is such that it involves examining older writings from a historical point of view.
- n) Begin by making a list of subject-headings under which you might expect the subject to be listed.
- o) The sources could be books and magazines articles, news stories, periodicals, scientific journals etc.

3. Collecting the notes

Skim through sources, locating the useful material, then make good notes of it, including quotes and information for footnotes.

- m) Get facts, not just opinions. Compare the facts with author's conclusion.
- n) In research studies, notice the methods and procedures, results & conclusions.
- o) Check cross references.

4. Outlining the paper

- i) Review notes to find main sub-divisions of the subject.
- j) Sort the collected material again under each main division to find sub-sections for outline so that it begins to look more coherent and takes on a definite structure. If it does not, try going back and sorting again for main divisions, to see if another general pattern is possible.

5. Writing the first draft

Write the paper around the outline, being sure that you indicate in the first part of the paper what its purpose is. You may follow the following:

- j) statement of purpose
- k) main body of the paper
- l) statement of summary and conclusion

Avoid short, bumpy sentences and long straggling sentences with more than one main ideas.

6. Editing & Preparing the final Paper

- kk) Before writing a term paper, you should ensure you have a question which you attempt to

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answer in your paper. This question should be kept in mind throughout the paper. Include only information/ details/ analyses of relevance to the question at hand. Sometimes, the relevance of a particular section may be clear to you but not to your readers. To avoid this, ensure you briefly explain the relevance of every section.

- ll) Read the paper to ensure that the language is not awkward, and that it "flows" properly.
- mm) Check for proper spelling, phrasing and sentence construction.
- nn) Check for proper form on footnotes, quotes, and punctuation.
- oo) Check to see that quotations serve one of the following purposes:
- pp) Show evidence of what an author has said.
- qq) Avoid misrepresentation through restatement.
- rr) Save unnecessary writing when ideas have been well expressed by the original author.
- ss) Check for proper form on tables and graphs. Be certain that any table or graph is self-explanatory.

Term papers should be composed of the following sections:

- Titlepage
- Table of contents
- Introduction
- Review
- Discussion & Conclusion
- References
- Appendix

Generally, the introduction, discussion, conclusion and bibliography part should account for a third of the paper and the review part should be two thirds of the paper.

Discussion

The discussion section either follows the results or may alternatively be integrated in the results section. The section should consist of a discussion of the results of the study focusing on the question posed in the research paper.

Conclusion

The conclusion is often thought of as the easiest part of the paper but should by no means be disregarded. There are a number of key components which should not be omitted. These include:

- summary of question posed
- summary of findings
- summary of main limitations of the study at hand
- details of possibilities for related future research

References

From the very beginning of a research project, you should be careful to note all details of articles gathered.

The bibliography should contain ALL references included in the paper. References not included in the text in any form should NOT be included in the bibliography.

The key to a good bibliography is consistency. Choose a particular convention and stick to this.

Conventions

Monographs

Crystal, D. (2001), Language and the internet. Cambridge: Cambridge University Press.

Edited Volumes

Gass, S./Neu, J. (eds.) (1996), Speech acts across cultures. Challenges to communication in a second

language. Berlin/ NY: Mouton de Gruyter.

[(eds.) is used when there is more than one editor; and (ed.) where there is only one editor. In German the abbreviation used is (Hrsg.) for Herausgeber].

Edited Articles

Schmidt, R./Shimura, A./Wang, Z./Jeong, H. (1996), Suggestions to buy: Television commercials from the U.S., Japan, China, and Korea. In: Gass, S./Neu, J. (eds.) (1996), Speech acts across cultures. Challenges to communication in a second language. Berlin/ NY: Mouton de Gruyter: 285-316.

Journal Articles

McQuarrie, E.F./Mick, D.G. (1992), On resonance: A critical pluralistic inquiry into advertising rhetoric. Journal of consumer research 19, 180-197.

Electronic Book

Chandler, D. (1994), Semiotics for beginners [HTML document]. Retrieved [5.10.'01] from the World Wide Web, <http://www.aber.ac.uk/media/Documents/S4B/>.

Electronic Journal Articles

Watts, S. (2000) Teaching talk: Should students learn 'real German'? [HTML document]. German as a Foreign Language Journal [online] 1. Retrieved [12.09.'00] from the World Wide Web, <http://www.gfl-journal.com/>.

Other Websites

Verterhus, S.A. (n.y.), Anglicisms in German car advertising. The problem of gender assignment [HTML document]. Retrieved [13.10.'01] from the World Wide Web, <http://olaf.hiof.no/~sverrev/eng.html>.

Unpublished Papers

Takahashi, S./DuFon, M.A. (1989), Cross-linguistic influence in indirectness: The case of English directives performed by native Japanese speakers. Unpublished paper, Department of English as a Second Language, University of Hawai'i at Manoa, Honolulu.

Unpublished Theses/ Dissertations

Möhl, S. (1996), All tagssituationen im interkulturellen Vergleich: Realisierung von Kritik und Ablehnung im Deutschen und Englischen. Unpublished MA thesis, University of Hamburg.


Walsh, R. (1995), Language development and the year abroad: A study of oral grammatical accuracy amongst adult learners of German as a foreign language. Unpublished PhD dissertation, University College Dublin.

Appendix

The appendix should be used for data collected (e.g. questionnaires, transcripts) and for tables and graphs not included in the main text due to their subsidiary nature or to space constraints in the main text.

Component II: Workshop

A workshop is primarily an activity based academic event that is organized to provide the students a one to one and hands on experience on any aspect of their learning. The communication in a workshop has to be necessarily two ways. The trainer has to make sure that the aspect covered is practically practiced by the participants. The student will choose the option of workshop from amongst their concentration electives. The evaluation will be done by Board of examiners comprising of the faculties.


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Major Themes for Workshop

The workshop may be conducted on any of the following major themes:

- Nanotechnology
- Renewable Energy
- Data Analytics
- Spintronics
- Superconductivity
- Bio-fuels
- Biophysics
- Quantum Computation
- Plasma Physics
- Cryogenics
- Clean Energy

These themes are merely indicative and other recent and relevant topics of study may be included.

Guidelines for Workshop

- The procedure for earning credits from workshop consists of the following steps:
- Relevant study material and references will be provided by the trainer in advance.
- The participants are expected to explore the topic in advance and take active part in the discussions held
- Attending and Participating in all activities of the workshop
- Group Activities have to be undertaken by students as guided by the trainer.
- Evaluation of workshop activities would be done through test and quiz at the end of the workshop.
- Submitting a write up of at least 500 words about the learning outcome from the workshop.

Examination Scheme:

Term Paper (70)			Workshop (30)		
Organization & Relevance	Literature Review & Bibliography	Comprehensive Viva	Attendance	Active Participation	Seminar/ Quiz
25	25	20	5	10	15



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COMPUTER FORENSICS & CYBER SECURITY

Programme Structure-2022

Course Code	Course Title	Lectures (L) Hours per week	Tutorial (T) Hours per week	Practical (P) Hours per week	Total Credits
FCH2151	Computer Forensics	2	-	2	3
FCH2251	Ethics, Policies and the IT Act	2	1	-	3
FCH2352	Biometric Technology	2	1	-	3
FCH2451	Implementation Practical on MATLAB	-	-	6	3
FCH2551	Cyber Security	2	-	2	3
FCH2651	Incident Response Management	2	1	-	3
	TOTAL				18



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Syllabus - Semester First

COMPUTER FORENSICS

Course Code: FCH2151

Credit Units: 3

Course Objectives:

- To correctly define and cite appropriate instances for the application of computer forensics. Correctly collect and analyze computer forensic evidence
- Identify the essential and up-to-date concepts, algorithms, protocols, tools, and methodology of Computer Forensics

Course Contents:

Module 1: Cyber Crime

Introduction to Digital Forensics, Definition and types of cybercrimes, electronic evidence and handling, electronic media, collection, searching and storage of electronic media, introduction to internet crimes, hacking and cracking, credit card and ATM frauds, web technology, cryptography, emerging digital crimes and modules.

Module 2: Digital Forensics

Forensics Investigation Process: Pre-search consideration, Collection of Evidences from crime scene, Acquisition, Duplication and Preservation of evidences, Examination and Analysis of evidences, Storing of Evidences, Documentation and Reporting, Maintaining the Chain of Custody. Hashing and its importance. Understanding Storage Formats for Digital Evidences – Raw Format, Proprietary Formats, Advanced Forensic Formats. Data Acquisition of live system, Shutdown Systems and Remote systems. Digital Forensics Standard Operating Procedures. Software and Hardware Tools used in Forensic Analysis – Open Source and Proprietary tools. Challenges and issues in Cyber-crime investigations and Digital forensics, Legal and privacy issues.

Module 3: Computer Forensics

Definition and Cardinal Rules, Data Acquisition and Authentication Process, Windows Forensic Analysis of File Systems-FAT12, FAT16, FAT32 and NTFS, UNIX file Systems, Mac file systems, Embedded System Analysis, Network Forensic Analysis Overview, Cloud Computing-an introduction.

Module 4: Forensic Tools and Processing of Electronic Evidence

Introduction to Forensic Tools, Usage of Slack space, tools for Disk Imaging, Data Recovery, Vulnerability Assessment Tools, Encase and FTK tools, Anti Forensics and probable counters, retrieving information, process of computer forensics and digital investigations, processing of digital evidence, digital images, damaged SIM and data recovery, multimedia evidence, retrieving deleted data: desktops, laptops and mobiles, retrieving data from slack space, renamed file, ghosting, compressed files.

Examination Scheme:

Components	CT	HA	S/V/Q	A	EE
Weightage (%)	10	7	8	5	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, ATTD: Attendance EE: End Semester Examination

References:

- C. Altheide and H. Carvey Digital Forensics with Open Source Tools, Syngress, 2011.ISBN: 9781597495868.

Selected readings from various sources as assigned

Online Course management System:<https://esu.desire2learn.com/>

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COMPUTER FORENSIC PRACTICAL

List of Exercises

- Live Case Studies
- Open Source Forensic Tools
- Disk Forensics and Data Recovery
- Cryptography: Algorithm Implementation
- Anti-forensic techniques
- Steganography
- Keyloggers
- Networkmonitors
- Flowchart management
- Algorithm designs
- UML diagrams
- e-Commerce on websites



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Syllabus - Semester Second

ETHICS, POLICIES AND THE IT ACT

Course Code: FCH2251

Credit Units: 3

Course Objectives:

To understand the ethics and laws by which cyberspace is governed in our country and worldwide.

Course Contents:

Module 1: Introduction

Basics of Law and Technology, Introduction to Indian Laws, Scope and Jurisprudence, Digital Signatures, E Commerce: Introduction, possible crime scenarios, law coverage, data interchange, mobile communication development, smart card and expert systems.

Module 2: Indian and International Laws

Indian Laws, Information Technology Act 2000, Indian Evidence Act, India Technology Amendment Act 2008, Introduction to Indian Penal Code, Computer Security Act 1987, National Information Infrastructure Protection Act 1996, Fraud Act 1997, Children Online Protection Act 1998, Computer Fraud and Abuse Act 2001. Introduction to International Laws, International Cyber Laws, Policy and Compliance, Corporate IT Policy Formulations.

Module 3: Intellectual Property Rights

Intellectual Property, IP Theft, Copyright, Trademark, Privacy and Censorship, Introduction to Cyber Ethics, rights over intellectual property, Compliance Auditing, Ethical hacking.

Examination Scheme:

Components	CT	HA	S/V/Q	A	EE
Weightage (%)	10	7	8	5	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, ATTD: Attendance EE: End Semester Examination

References:

- CYBER LAW-The Indian Perspective, Pawan Duggal(2009).
- 7 Years of Indian Cyber Laws, Rohas Nagpal(2008).
- Doctrine of IT Act of India, Government of India Publication(2000).


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Syllabus - Semester Third

BIOMETRIC TECHNOLOGY

Course Code: FCH2352

Credit Units: 3

Course Objectives:

- To understand fundamentals of biometric system and its performance metrics
- To understand the components, issues and approaches for physiological biometrics.
- To learn the technology behind behavioral biometric systems like voice scan, signature scan and gait analysis along with their challenges.
- Know the applicability and privacy concerns in biometrics.

Course Contents:

Module 1: Biometric Fundamentals

Introduction: Biometric fundamentals – Biometric technologies – Biometrics Vs traditional techniques – Characteristics of a good biometric system – Benefits of biometrics, Components and steps of a biometric system, Key biometric processes: verification, identification and biometric matching – Performance measures in biometric systems, FAR, FRR, FTE rate, EER and ATV rate, Layered biometric solutions, Types of biometrics and commonly used biometrics.

Applications of a Biometric System

Applications of Biometric Systems: industry, Government, offices, banks, defense and forensics, Security and Privacy Issues.

Module 2: Physiological Biometrics: Leading technologies : Finger-scan – Facial-scan – Iris-scan – components, working principles, competing technologies, strengths and weaknesses – Other physiological biometrics : Hand-scan, Retina-scan – components, working principles, competing technologies, strengths and weaknesses – Automated fingerprint identification systems.

Module 3: Leading Behavioral Biometrics technologies: Voice scan – Signature scan– Gait scan– components, working principles, strengths and weaknesses, challenges and scope of behavioral biometrics.

Voice Recognition: Voice scan, speaker features, short term spectral feature extraction, speaker matching, Gaussian mixture model, NIST speaker Recognition Evaluation Program.

Speech recognition: Introduction-Regular Expressions and automata-Words and transducers-N-grams Part of speech tagging-Hidden Markov and Entropy models, Speech-Phonetics-Speech synthesis-Automatic speech recognition, speech recognition versus voice recognition.

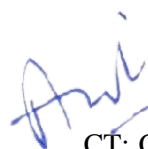
Module 4: Gait Pattern Analysis

Fundamentals of Gait Analysis, Gait Analysis: Considerations and Terminology, Motion Analysis Systems, Ground Reaction Forces, Introduction to EMG, Motion Analysis, Gait Cycle, Abnormalities in Gait, Challenges in gait recognition

Examination Scheme:

Components	CT	HA	S/V/Q	ATTD	EE
Weightage (%)	10	7	8	5	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, ATTD: Attendance EE: End Semester

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References:

- Daniel Jurafsky and James Martin “Speech and Language Processing”, 2nd edition, Prentice- Hall, 2008.
- Xuedong Huang, Alex Acero and Hsiao-Wuen Hon, “Spoken Language Processing”, Prentice- Hall, May 2001.
- Paul Taylor, “Text-to-Speech Synthesis”, Cambridge University Press, February 2009.
- Samir Nanavati, Michael Thieme, Raj Nanavati “Biometrics – Identity Verification in a Networked World”, WILEY- Dream Tech Edition 2009. (UNIT 1, 2, 3, 4,).
- Paul Reid “Biometrics for Network Security”, Pearson Education.2009. (UNIT – V).
- John D. Woodward, Jr. Wiley Dreamtech Biometrics- The UI.
- Perry J. Gait analysis. Normal and Pathological Function. SLACK Incorporated, 1992.



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Syllabus - Semester Fourth

IMPLEMENTATION PRACTICAL ON MATLAB

Course Code: FCH2451

Credit Units: 3

Experiments based on following concepts:

- Introduction to MATLAB
- Basic MATLAB programming (matrices, plots, multiple plots)
- Acquisition
- Noise filtering
- Image Enhancement
- Region of interest extraction
- Feature Extraction
- Classification

Examination Scheme:

Components	TA	LR	V	A	EE
Weightage (%)	10	7	8	5	70

Note: TA-Teacher's Assessment, LR-Lab Record, V-Viva

References:

- Samir Nanavati, Michael Thieme, Raj Nanavati "Biometrics – Identity Verification in a Networked World", WILEY- Dream Tech Edition 2009.(UNIT1,2,3,4,)
- Paul Reid "Biometrics for Network Security", Pearson Education.2009. (UNIT –V)
- Daniel Jurafsky and James Martin "Speech and Language Processing", 2nd edition, Prentice- Hall, 2008.
- Xuedong Huang, Alex Acero and Hsiao-Wuen Hon, "Spoken Language Processing", Prentice- Hall, May2001.
- Paul Taylor,"Text-to-Speech Synthesis", Cambridge University Press, February2009.



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Syllabus - Semester Fifth

CYBER SECURITY

Course Code: FCH2551

Credit Units: 3

Course Objectives:

- Understand the threats in networks and security concepts.
- Apply authentication applications in different networks.
- Understand security services for email.
- Awareness of firewall and its applications.

Course Contents:

Module 1: Cyberspace

Ethical hacking, Attack Vectors, Cyberspace and Criminal Behaviour, Clarification of Terms, Traditional Problems associated with Computer Crimes, Computer language, Network Language, Realms of Cyber world, brief history of the internet, contaminants and destruction of data, unauthorized access, computer intrusions, white-collar crimes, viruses and malicious code, virus attacks, pornography, software piracy, mail bombs, exploitation, stalking and obscenity in internet.

Module 2: Network Forensics

Network Forensics: Networking, Overview of OSI Model and TCP/IP Protocol. IP Addressing and NAT. Types of IP addresses, Digital and Analog Signaling Methods, Network Types (LAN, MAN and WAN) and Topologies, Network Hardware devices (hubs, switches, bridges, repeaters, routers etc.) and Client/Server Computing, Routers and Routing Protocols.

Monitoring of computer network and activities, Live Packet Capturing and Analysis. Searching and collection of evidences from the network. Network Intrusion Detection and Analysis. SQL Injection, Event Log Aggregation – role of logs in forensic analysis, tools and techniques. Investigating network attacks. Evidence collection from Routers and CCTV DVRs.

Module 3: Network Security

Investigation Tools, e-discovery, EDRM Models, digital evidence collection and preservation, email investigation, email tracking, IP tracking, email recovery, search and seizure of computer systems, password cracking.

Module 4: Operating Systems

Operating System: Introduction, Objectives and Functions of Operating System. Types of Operating system- Windows, Linux, Mac, Booting process of computers.

Windows artifact analysis, Internet Artifacts, OS Artifacts, File System Artifacts, Registry Artifacts, Application Artifacts, Report Writing.

Examination Scheme:

Components	CT	HA	S/V/Q	A	EE
Weightage (%)	10	7	8	5	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, ATTD: Attendance EE: End Semester

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References:

- Charles P. Fleeger, "Security in Computing", Prentice Hall, New Delhi, 2009.
- Beerhouse A. Frozen, —Cryptography and Network Security, Tata McGraw Hill, India, New Delhi, 2009.
- William Stallings, —Cryptography and Network Security, Prentice Hall, New Delhi, 2006
- Chalice Kaufman, Radii Perlman, Mike Spicier, —Network Security: Private Communication in a Public Network, Pearson Education, New Delhi, 2004.
- NealKraetzer,—IntroductiontoNetworkSecurity, Thomson Learning, Boston, 2007.
- BruceSchneider,—AppliedCryptography, JohnWileyandSons, New York, 2004.

CYBER SECURITY PRACTICAL**List of Exercises**

- File System Analysis
- Log Analysis
- Network Devices: Modem, Router, Switch, Hub, Repeater
- SQL Injection
- Cross Site Scripting
- Click Jacking
- TCP/ IP Attacks
- Bitnet analysis
- Malware Analysis
- IR Objectives and Team Building
- Email Tracking
- IP Tracking
- Cyber psychology and Social Engineering Test Profiling



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Syllabus - Semester Sixth

INCIDENT RESPONSE MANAGEMENT

Course Code: FCH2651

Credit Units: 3

Course Objectives:

- Defining an incident relating to cyber security.
- Recognizing an Incident
- Protocols for first on crime scene investigations.
- Government approved handling of computer crime scenarios.

Course Contents:

Module 1: Introduction

Cyber Incident Statistics, Computer Security Incident, Information as Business Asset, Data Classification, Information Warfare, Key Concepts of Information Security, Vulnerability, Threat and Attacks, Types of Computer Security Incidents, Examples of Incidents, Incidents Categorization, Low Level Incident, Mid Level Incident, High Level Incident.

Module 2: Incident Response Management

Introduction to Incident Response Process, Preparing for Incident Response, detection of an Incident, IRM life cycle-preparation, Identification, Detection, Containment, Eradication, Recovery, lessons learnt, Investigations of Cyber Crime cases as per IRM cycles, opinion formatting for cyber crime cases, court testimonies, case studies.

Module 3: Investigation of Incidents

Incident Prioritization, Incident Response and Handling process, Disaster Recovery, Technologies and Impacts, Virtualization and Impacts, Estimated Cost of an Incident, Incident Reporting Organizations, Vulnerability Reports, Incident Identification, Need and Goals of Incident Response.

Module 4: Incident Response Team

Incident Response Team development, Security Awareness and Training Checklist, Incident Management, Purpose of Incident management, Incident management process, Incident management team, Incident Response Team and Members, Member Goals and Responsibilities, Developing Skills in Incident Response Personnel, Incident Response Team Structure, Team Dependencies and Services.


Examination Scheme:

Components	CT	HA	S/V/Q	A	EE
Weightage (%)	10	7	8	5	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, ATTD: Attendance EE: End Semester Examination

References:

- CERT-In Guidelines.


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DATA ANALYTICS

Programme Structure

Course Code	Course Title	Lecture (L) Hours Per Week	Tutorial (T) Hours Per Week	Practical (P) Hours Per Week	Total Credits
MTH2151	Optimization Techniques	3	-	-	3
MTH2251	Statistics	3	-	-	3
MTH2351	Data Mining	3	-	-	3
MTH2451	Database Management System	3	-	-	3
MTH2551	Introduction to Financial Modelling	3	-	-	3
MTH2651	Statistical Quality Control	3	-	-	3
	TOTAL				18



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DATA ANALYTICS

Syllabus - Semester First

OPTIMIZATION TECHNIQUES

Course Code: MTH2151

Credit Units: 03

Course Objective:

The problems in optimization are the most common applications of mathematics. The main aim of this course is to present different methods of solving optimization problems in the areas of linear programming.

Course Contents:

Module I: Introduction to OR

Historical Development of OR, OR models and Advantages, Methodology of OR, Advantages of OR, Features of OR solution, Applications and Scope of OR

Module II: Linear Programming Problems (LPP)

Definition of LPP, General Structure of Linear Programming, Formulation of LPP, Advantages and Limitations of Linear Programming, Graphical Solutions of Linear Programming Problems. Simplex Method, Degeneracy, Duality.

Module III: Transportation Problems

Introduction to Transportation Model, Degeneracy in TP, Solution Techniques of TP, Different Methods for Obtaining Initial Basic Feasible Solutions viz. Matrix Minima Method, Row Minima Method, Column Minima Methods, Vogel's Approximation Method, Techniques for Obtaining Optimal Basic Feasible Solution – Stepping Stone and MODI Method. **Assignment Problems:** Definition, Types of Assignment Problems, Hungarian Method for AP.

Module IV: Game Theory

Concept of Game problem. Rectangular games. Pure strategy and Mixed strategy. Saddle point and its existence. Optimal strategy and value of the game. Algebraic method, Graphical method and Dominance method of solving Rectangular games. Inter-relation between the theory of Games and L.P.P

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

References:

- Operations Research, S D Sharma, KNRN Publication
- Operations Research, P.K. Gupta and D. S. Hira, Sultan Chand Ltd.
- Introduction to Operations Research, Hamdy A Taha, PHI Limited, New Delhi.
- Operations Research, J K Sharma, Macmillan Publication


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Syllabus - Semester Second

STATISTICS

Course Code: MTH2251

Credit Units: 03

Course Objective:

Statistics plays an important role in data analytics. The main aim of this course is to help the students to read, classify and then interpret the data given to them and draw conclusions.

Module I: Data and Representation

Introduction to Statistics, Collection of data, classification and tabulation of data, Types of data: Primary data, Secondary data, Presentation of data Diagrammatic and Graphical Representation: Histogram, frequency curve, frequency polygon, Ogive curves, stem and leaf chart.

Module II: Measures of Central Tendency and Dispersion

Arithmetic Mean (A.M.) Definition, Mode, Median, Partition Values : Quartiles, Deciles and Percentiles, Box Plot, Percentile ranks. Means of transformed data, Geometric Mean (G.M.) Definition, Harmonic Mean (H.M.), Weighted Mean : Weighted A.M., G.M. and H.M.

Range, Mean deviation Mean square deviation, Variance and Standard Deviation, Combined variance (derivation for 2 groups), Combined standard deviation.

Module III: Correlation and Regression

Bivariate normal distribution, types, importance, methods of measuring correlation-scatter diagram, Karl Pearson's Coefficient of Correlation and Spearman's rank Correlation. Regression lines, Difference between regression and correlation, uses of Regression.

Module IV : Sampling theory and tests of significance

Methods of sampling (Description only): Simple random sampling with and without replacement (SRSWR and SRWOR) stratified random sampling, systematic sampling.

Tests of significance – z, t, chi-square and F.

Examination Scheme:

Components	CD	CT1	SA	A	EE
Weightage	5	10	10	5	70

CD= Class Discussion, CT 1= Class Test, SA= Short Assignments, A= Attendance. EE= External Examination

References:

- Mood, A. M., Graybill, F. A. And Boes, D.C. : Introduction to the Theory of Statistics, McGraw Hill.
- Biswas and Srivastava – A textbook, mathematical Statistics, Ist Edition, Narosa Publishing House, New Delhi.
- Gupta, S.C. and V. K. Kapoor – Mathematical Statistics, Sultan Chand and sons.
- Hogg, R.V. and Craig, A.T: Introduction to Mathematical Statistics, McMillan.
- S. C. Gupta – Fundamentals of Statistics, Himalaya Publishing House.


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Syllabus - Semester Third

DATA MINING

Course Code: MTH2351

Credit Units: 03

Module 1: DATA WAREHOUSING

Data warehousing Components –Building a Data warehouse — Mapping the Data Warehouse to a Multiprocessor Architecture – DBMS Schemas for Decision Support – Data Extraction, Cleanup, and Transformation Tools –Metadata.

Module 2: BUSINESS ANALYSIS

Reporting and Query tools and Applications – Tool Categories – The Need for Applications – Cognos Impromptu – Online Analytical Processing (OLAP) – Need – Multidimensional Data Model – OLAP Guidelines – Multidimensional versus Multirelational OLAP – Categories of Tools – OLAP Tools and the Internet.

Module 3 : DATA MINING , CLUSTERING AND APPLICATIONS AND TRENDS IN DATA MINING

Introduction – Data – Types of Data – Data Mining Functionalities – Interestingness of Patterns – Classification of Data Mining Systems – Data Mining Task Primitives – Integration of a Data Mining System with a Data Warehouse – Issues –Data Preprocessing, Cluster Analysis - Types of Data – Categorization of Major Clustering Methods – Kmeans – Partitioning Methods – Hierarchical Methods - Density-Based Methods –Grid Based Methods – Model-Based Clustering Methods – Clustering High Dimensional Data - Constraint – Based Cluster Analysis – Outlier Analysis – Data Mining Applications.

Module 4 : ASSOCIATION RULE MINING AND CLASSIFICATION

Mining Frequent Patterns, Associations and Correlations – Mining Methods – Mining Various Kinds of Association Rules – Correlation Analysis – Constraint Based Association Mining – Classification and Prediction - Basic Concepts - Decision Tree Induction - Bayesian Classification – Rule Based Classification – Classification by Backpropagation – Support Vector Machines – Associative Classification – Lazy Learners – Other Classification Methods – Prediction

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

TEXT BOOKS:

1. Alex Berson and Stephen J. Smith, “Data Warehousing, Data Mining & OLAP”, Tata McGraw – Hill Edition, Tenth Reprint 2007.
2. Jiawei Han and Micheline Kamber, “Data Mining Concepts and Techniques”, Second Edition, Elsevier, 2007.

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REFERENCES:

1. Pang-Ning Tan, Michael Steinbach and Vipin Kumar, “ Introduction To Data Mining”, Person Education, 2007.
2. K.P. Soman, Shyam Diwakar and V. Ajay “, Insight into Data mining Theory and Practice”, Easter Economy Edition, Prentice Hall of India, 2006.
3. G. K. Gupta, “ Introduction to Data Mining with Case Studies”, Easter Economy Edition, Prentice Hall of India, 2006.
4. Daniel T.Larose, “Data Mining Methods and Models”, Wile-Interscience, 2006.



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Registrar
Amity University Haryana
Manesar Gurgaon-122413

Syllabus - Semester Fourth

DATABASE MANAGEMENT SYSTEM

Course Code: MTH2451

Credit Units: 03

Module-I

INTRODUCTION: Introduction; An example; Characteristics of Database approach; Actors on the screen; Workers behind the scene; Advantages of using DBMS approach; A brief history of database applications; when not to use a DBMS. Data models, schemas and instances; Three-schema architecture and data independence; Database languages and interfaces; The database system environment; Centralized and client-server architectures; Classification of Database Management systems.

Module-II

ENTITY-RELATIONSHIP MODEL: Using High-Level Conceptual Data Models for Database Design; An Example Database Application; Entity Types, Entity Sets, Attributes and Keys; Relationship types, Relationship Sets, Roles and Structural Constraints; Weak Entity Types; Refining the ER Design; ER Diagrams, Naming Conventions and Design Issues; Relationship types of degree higher than two.

Module-III

RELATIONAL MODEL AND RELATIONAL ALGEBRA: Relational Model Concepts; Relational Model Constraints and Relational Database Schemas; Update Operations, Transactions and dealing with constraint violations; Unary Relational Operations: SELECT and PROJECT; Relational Algebra Operations from Set Theory; Binary Relational Operations : JOIN and DIVISION; Additional Relational Operations; Examples of Queries in Relational Algebra; Relational Database Design Using ER- to-Relational Mapping.

Module-IV

TRANSACTION MANAGEMENT: The ACID Properties; Transactions and Schedules; Concurrent Execution of Transactions; Lock - Based Concurrency Control; Performance of locking; Transaction support in SQL; Introduction to crash recovery; 2PL, Serializability and Recoverability; Lock Management; Introduction to ARIES; The log; Other recovery-related structures; The write-ahead log protocol; Checkpointing; Recovering from a System Crash; Media Recovery; Other approaches and interaction with concurrency control.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

TEXT BOOKS:

1. **Fundamentals of Database Systems** – Elmasri and Navathe, 5th Edition, Addison-Wesley, 2007
2. **Database Management Systems** – Raghu Ramakrishnan and Johannes Gehrke – 3rd Edition, McGraw-Hill, 2003.

REFERENCE BOOKS:

1. **Data Base System Concepts** – Silberschatz, Korth and Sudharshan, 5th Edition, Mc-GrawHill, 2006.
2. **An Introduction to Database Systems** – C.J. Date, A. Kannan, S. Swamynatham, 8th Edition, Pearson Education, 2006.

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Syllabus - Semester Fifth

INTRODUCTION TO FINANCIAL MODELLING

Course Code: MTH2551

Credit Units: 03

Prerequisites: Introduction to Probability Theory

Basic notions %G-%@ Cash flow, present value of a cash flow, securities, fixed income securities, types of markets.

Forward and futures contracts, options, properties of stock option prices, trading strategies involving options, option pricing using Binomial trees, Black %G-%@ Scholes model, Black %G-%@ Scholes formula, Risk-Neutral measure, Delta %G-%@ hedging, options on stock indices, currency options.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Texts / References

- D.G. Luenberger, Investment Science, Oxford University Press, Oxford, 1998.
- J.C. Hull, Options, Futures and Other Derivatives, 4th ed., Prentice-Hall, New York, 2000.
- J.C. Cox and M. Rubinstein, Options Market, Englewood Cliffs, N.J.: Prentice Hall, 1985.
- C.P Jones, Investments, Analysis and Measurement, 5th ed., John Wiley and Sons, New York, 1996.



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Syllabus - Semester Sixth

STATISTICAL QUALITY CONTROL

Course Code: MTH2651

Credit Units: 03

Total quality control in an industry. Quality planning, quality conformance, quality ad-herence. Quality assurance and quality management functions.

Control charts and allied techniques. Concept of quality and meaning of control. Concept of inevitability of variation-chance and assign-able causes. Pattern of variation. Principles of rational sub-grouping.

Different types of control charts. Concept of process capability and its comparison with design specifications, CUSUM charts.

Acceptance sampling. Sampling inspection versus 100 percent inspection. Basic concepts of attributes and variables inspection. OC curve, Single, double, multiple and sequential sampling plans, Management and organisation of quality control.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Texts / References :

- A.J. Duncan, Quality Control and Industrial Statistics, 5th ed., Richard D. Irwin, 1986.
- E.L. Grant and R. Levenworth, Statistical Quality Control, 6th ed., McGraw-Hill, 1988.
- J.M. Juran and F. M. Grayna, Quality Planning and Analysis, Tata McGraw-Hill, 1970.
- D.C. Montgomery, Introduction to Statistical Quality Control, Wiley, 1985.
- T.P. Ryan, Statistical Methods for Quality Improvement, Wiley, New York, 2000.



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Master of Science (Physics)

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Curriculum & Scheme of Examination

2022

AMITY UNIVERSITY HARYANA

GURUGRAM

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CLASSICAL MECHANICS

Course Code: PHY4102

Credit Units: 04

Course Objective:

A detailed exposition of classical mechanics for the students, opting for physics is vitally important for a clear understanding of recent intricate theories of quantum mechanics, Modern Physics and research to build a well developed and conceptualized foundation.

Course Contents:

Module I: Symmetries and Conservation Laws

Mechanics of a system of particles, constraints, D'Alembert's principle, Variational calculus and its applications, Hamilton's variational Principle, Lagrangian equations, applications of Lagrangian formulation, conservation theorems and symmetry properties.

Module II: Hamiltonian Formulation

Hamiltonian equation of motion, applications of hamiltonian formulation, Principle of least action, the equations of canonical transformations, cyclic coordinates, phase space and Liouville's theorem, Poisson bracket, Jacobi's Identity .

Module III: Central Force Problem

Reduction to one body problem, equation of motion and first integral, one dimensional problem and classification of orbits, Differential equation for the orbit, Kepler problem and planetary motion, Rutherford formula, scattering in central force field, transformation to laboratory frames.

Module IV: Rigid Body and Vibrating System

Euler angles, tensor of inertia, kinetic energy of a rotating body, symmetric top and applications. Vibrating string, solution wave equation, normal vibrations, dispersion, coupled vibrating system.

Examination Scheme:

Components	CT	HA	S/V/Q	Attendance	EE
Weightage (%)	10	8	7	5	70

CT – Class Test, S/V/Q – Seminar/Viva/Quiz, HA – Home Assignment, EE – End Semester Examination

Text & References:

- H. Goldstein, Classical Mechanics, 2nd edition, Narosa Publishing House (1994).
- W. Greiner, Classical Mechanics, Springer-Verlag (2003).
- Classical mechanics – S.L.Gupta, Meenakshi Prakashan, 1970, New Delhi.
- Introduction to classical mechanics – R.G.Takwall and P.S.Puranik, Tata – McGraw Hill, 1980, New Delhi.
- Classical mechanics – N.C.Rana and P.S.Joag, Tata McGraw Hill, 1991, New Delhi.

ELECTRONICS

Course Code: PHY4103

Credit Units: 04

Course Objectives

The objective of this course is to

- To provide an overview of basic combinational circuits-logic gates, flip-flops, registers, operational amplifier, modulation techniques and integrated circuit fabrication.
- To serve as the foundation for practical lab experiments.

Course Outcomes

On completion of this course, the students will be able to

- CO1 Clearly understand the basics of digital electronics.
- CO2 Understand the Integrated Circuit Fabrication and Technology.
- CO3 Clearly define the characteristics of an operational amplifier.
- CO4 Clearly understand the concept of modulation and demodulation

Catalog Description

This course gives a comprehensive view of the digital electronics, integrated circuit fabrication and technology, operational amplifiers, modulation and demodulation techniques. It covers the basic operation and some common applications.

Course Content

Module I: Combinational Circuits

12 Lectures

Truth tables Logic gates: OR, AND, Inverter gates, The Universal NOR and NAND gates, XOR and XNOR gates, De-Morgan's Theorem, Reduction Technique Karnaugh map simplification. Parity check. The half adder, the Full adder, half and full subtractor. Sequential Logic: Latches, R.S. Flip/Flop, The D.Flip/Flop, T.Flip/Flop, J.K. Flip/flop, Master/slave flip/flop, Race Problem. Universal Shift Register, shift counter, Ring Counter.

Module II: Operational Amplifiers

16 Lectures

The ideal Op-Amp-inverting, non-inverting and differential amplifiers-CMRR; Op-Amp IC building blocks-emitter coupled differential amplifier, active load, level shifting and output stage; Op-Amp characteristics-open-loop input output characteristics, frequency response and slew rate; Op-Amp applications-adder, subtractor, integrator, differentiator, comparator, voltage-to-current converter, current-to-voltage converter and logarithmic amplifier.

Module III: Modulation Techniques

12 Lectures

Definition, Amplitude modulation, Methods of Amplitude Modulation, Frequency Modulation, Phase Modulation, Pulse Modulation Systems- PAM, PWM, PPM, PCM, Delta Modulation, Principle of AM Detection. Digital modulation schemes: amplitude, phase and frequency shift keying schemes (ASK, PSK, FSK). Multiplexing - time division and frequency division. Applications of Modulation.

Module IV: Integrated Circuit Fabrication

8 Lectures

Integrated-Circuit Technology, Advantages and limitations of Integrated Circuits, Basic Monolithic Integrated Circuits, Epitaxial Growth, Masking and Etching, Diffusion of Impurities, Integrated Capacitors and Inductors, Large-Scale and Medium-Scale Integration, Metal-Semiconductor Contact

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination
Examination Scheme:

Components	CT	HA	S/V/Q	A	EE
Weightage (%)	15	5	5	5	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, A: Attendance; EE: End Semester Examination;

Text & References:

- Hand Book of Electronics, Gupta & Kumar, Pragati Prakashan.
- Integrated Electronics: Analog and Digital Circuits and Systems, Jacob Millman and Christos C. Halkias, Tata McGraw-Hill.
- Digital Principles and Applications by A.P. Malvino and D.P. Leach, Tata McGraw-Hill, Publishing Co., New Delhi.
- Text Book of Electronics by S. Chattopadhyay, New Central Book Agency P.Ltd., Kolkata, 2006.
- Electronics Principles by Malvino, 6th Edition, Tata McGraw-Hill Publishing Co., New Delhi, 2001.
- Electronics Principles and Applications by A.B. Bhattacharya, New Central Book Agency P.Ltd., Kolkata, 2007.

QUANTUM MECHANICS-I

Course Code: PHY4109

Credit Units: 04

Course Objective:

Course Contents:

Module I: Introductory concepts

A quick review of failure of classical Physics, Wave particle duality, Wave-packet, Uncertainty principle and its applications

Schrodinger's time dependent equation; Statistical interpretation of wave function, normalization, probability current density, expectation values, Ehrenfest's theorem, Time independent Schrodinger equation, stationary states, orthogonality, Energy, linear momentum and angular momentum operators.

Module II: General Formalism

Linear vector space, linear operators, eigenfunction and eigenvalues, Hermitian operator, Postulates of Quantum Mechanics, Simultaneous measurability of observables, General Uncertainty relation, Dirac's notation (bra & ket), Schrodinger and Heisenberg representation.

Module III: Applications

Quick review of particle in 1D and its extension to 3D box, degeneracy of energy states. Square potential barrier, quantum tunneling and alpha emission. Harmonic Oscillator using operator method, creation and annihilation operators.

Module IV: Hydrogen atom and angular momentum

Schrodinger equation in three dimension (spherical coordinates), separation of variables, radial equation, angular equation, spherical harmonics, angular momentum and their commutation relation, L^2 and L_z operators, Ladder operator.

Examination Scheme:

Components	TA	CT	Attendance	EE
Weightage (%)	10	15	5	70

TA: Teacher Assessment, CT: Class Test EE: External Examination

Text:

- Introduction to Quantum Mechanics by David J Griffiths
- Feynmann Lectures in Physics, vol. 3

References

- Modern Quantum Mechanics by J.J. Sakurai and San Fu Tuan (Addison Wesley)
- Quantum Mechanics by L.I. Schiff (Mc Graw Hill)
- Quantum Physics by S. Gasiorowics (John Wiley)
- Advanced Quantum Mechanics by Paul Roman (Addison Wesley)
- Quantum Mechanics by J. L. Powell, B. Crasemann

COMPUTATIONAL PHYSICS

Course Code: PHY4110

Credit Units: 04

Course Objective:

This course aims at exposing the students to basic Computational Physics which will be useful for them to solve the problems of Physics.

Course Contents:

Module I Introduction to MATLAB and Plotting: vector and matrix generation, subscripting and the colon notation, matrix and array operations and their manipulations, introduction to some inbuilt functions. Two & three-dimensional graphics: basic plots, change in axes and annotation in a figure, multiple plots in a figure, saving and printing figures, mesh plots, surface plots and their variants.

Module II m-files: scripts and user defined functions, calling functions into a script file, subfunctions, and nested functions, concept of local and global variable, few examples of in-built functions, editing, saving m-files.

Module III Loops and Conditional statements: Flow control using various statements and loops including For-End and While-End loops with Break commands. Conditional Statements: If-End statement, If-Else-End statement, nested If-Else-End statements.

Module IV Applications of MATLAB: Introduction to builtin functions: related to matrix inversion, eigenvalues, eigenvectors, condition number; for data representation: bar charts, histograms, pie chart, stem plots etc; for solving various type of differential equations; for specialized plotting e.g., contour plots, sphere, and animations.

Examination Scheme:

Components	A	CT	HA	EE
Weightage (%)	5	15	10	70

CT: Class Test, HA: Home Assignment, EE:End Semester Exam, A: Attendance

Reference Books:

- Applied Numerical Methods with Matlab for Engineers and Scientists by Steven Chapra, McGraw Hill, 2008.
- MATLAB: An introduction with applications: Amos Gilat, 5th Edition, Wiley India, 2014.
- Getting Started with MATLAB: A Quick Introduction for Scientists and Engineers by Rudra Pratap, Oxford University Press, 2016

INTEGRATED PHYSICS LAB-I

Course Code: PHY4111

Credit Units: 03

List of Experiment (Any Eight)

1. Data and error analysis.
2. Plotting and curve fitting software
3. Use of the instruments CRO, multimeter.
4. To design and study various aspects of frequency modulation and demodulation. PAM, PWM and PPM Modulation and demodulation.
5. To study the frequency response of an operational amplifier & to use operational amplifier for different mathematical operations.
6. To design and study the characteristics of a regulated power supply and voltage multiplier circuits.
7. To design a rectangular/triangular waveform generator using Comparators and IC8038.
8. To design (i) Low pass filter (ii) High pass filter; (iii) All-pass filter; (iv) Band pass filter (v) Band-reject passive filter.
9. To design and study logic gates and flip flop circuits.
10. Use of timer IC 555 in astable and monostable modes and applications involving relays, LDR.
11. The Torsional Pendulum and Moment of Inertia
12. Study of the Coriolis effect.
13. Determination of Lande's factor using ESR spectrometer.
14. To plot the polar curve of a filament lamp and to determine its mean spherical intensity.
15. Raman effect in liquids.
16. Rydberg's constant using constant deviation prism.

Examination Scheme:

Components	TA	V	LR	Attendance	EE
Weightage (%)	7	10	8	5	70

TA : Teacher Assessment, V: Viva, LR: Lab Record EE: External Examination

Text & References:

- J. Milman and C.C. Halkias, Electronic Devices and Circuits, McGraw-Hill (1981).
- A.P. Malvino, Electronics: Principles and Applications, Tata McGraw-Hill (1991).
- G.B. Calyton, Operation Amplifiers, ELBS (1980).
- J. Millman and C.C. Halkias, Integrated Electronics, Tata McGraw Hill (2001).
- R. A. Gayakwad, op-Amps and Linear IC'S, Pearson Education (2003)
- R. P. Singh and S. D. Sapre, Communication Systems: Analog and Digital, Tata McGraw Hill (2007)

STATISTICAL MECHANICS

Course Code: PHY4202

Credit Units: 04

Course Objective: The aim of the course is to introduce the concept of statistical mechanics and applications to various problems in applied Physics.

Course Contents:

Module-I:

Kinetic theory of gas, Probability concepts in statistical mechanics, Random walk problem, General Aspects of Probability Distributions

The Statistical Basis of Thermodynamics, The macroscopic and the microscopic states, Contact between statistics and thermodynamics, Entropy on microscopic scale, physical significance of the number $\Omega(N,V,E)$, Thermodynamic equilibrium, Mechanical equilibrium, Chemical equilibrium, Review of phase space, Liouville's theorem, basic postulates of statistical mechanics, The classical ideal gas, The entropy of mixing and Gibb's paradox, Sackur tetrode equation of entropy, Correct Boltzmann counting

Module II Elements of ensemble theory, microcanonical, canonical, grand canonical ensemble, quantum states and the phase space, equilibrium between system and a heat reservoir, partition function, physical significance of the various statistical quantities in the canonical ensemble, The classical systems, energy fluctuations in the canonical ensemble, statistics of paramagnetism, Boltzmann's equation, Maxwell & Boltzmann statistics, Equipartition theorem and its Simple applications, Virial theorem, Maxwell velocity distribution, related distributions and mean values.

Module III Equilibrium between a system and a particle- energy reservoir, density and energy fluctuations in Grand canonical ensemble, formulation of quantum statistics, Fermi-Dirac and Bose-Einstein statistics. Applications of the formalism to: (a) Ideal Bose gas, The field of sound waves, Einstein and Debye theory of specific heat, properties of black-body radiation, Bose- Einstein condensation, experiments on atomic BEC, (b) Ideal Fermi gas, properties of simple metals, Pauli paramagnetism, electronic specific heat, Compressibility of Fermi gas, A relativistic degenerate electron gas.

Module IV Phase transition, non-equilibrium statistical mechanics, Ising model, fluctuation-dissipation

Examination Scheme:

Components	CT	HA	S/V/Q	Attendance	EE
Weightage (%)	10	8	7	5	70

CT – Class Test, S/V/Q – Seminar/Viva/Quiz, HA – Home Assignment, EE – End Semester Examination

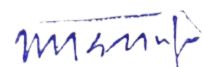
Reference books:

- Huang, Kerson. *Statistical Mechanics*. 2nd ed. Wiley, 1987. ISBN: 9780471815181.
- Pathria, R. K. *Statistical Mechanics*. Pergamon Press, 1972. ISBN: 9780080189949.
- Pippard, A. B. *The Elements of Classical Thermodynamics for Advanced Students of Physics*. University Press, 1966.
- Ma, Shang-keng. *Statistical Mechanics*. Translated by M. K. Fung. World Scientific Publishing Company, 1985. ISBN: 9789971966065.
- Landau, L. D., and E. M. Lifshitz. *Statistical Physics, Part I*. 3rd ed. Pergamon Press, 1980. ISBN: 9780080230382.

- Reif, Frederick, ed. *Fundamentals of Statistical and Thermal Physics*. McGraw-Hill, 1988.
- Feynman, Richard Phillips. *Statistical Mechanics: A Set of Lectures*. Westview Press, 1998. ISBN: 9780201360769.]
- Kardar, Mehran. *Statistical Physics of Particles*. Cambridge University Press, 2007. ISBN 9780521873420.



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QUANTUM MECHANICS-II

Course Code: PHY4208

Credit Units: 04

Course Objective:

The course is intended to introduce the concept of quantum mechanics to students at the advanced level so that they can solve problem of various branches of Physical Sciences.

Course Contents:

Module I: Spin & Identical Particles

Spin, Stern-Gerlach experiment, Pauli spin matrices, eigenvalues of J^2 and J_z , addition of angular momenta, Clebsch-Gordan coefficients.

Identical particles, particle exchange operator, symmetric and anti-symmetric wave functions, Pauli principle and Slater determinant, spin functions for system with more than one electron.

Module II: Perturbation theory

Time-independent perturbation theory: Basic concepts, Non-degenerate energy levels, degenerate perturbation theory, fine structure of Hydrogen, Spin-orbit coupling, Zeeman effect.

Time-dependent perturbation theory: 1st order perturbation, Fermi's Golden rule, absorption and emission of radiation, Einstein A and B coefficient.

Module III: Variational principle and WKB approximation

Theory of Variational principle; Ground state energy for 1D harmonic oscillator, Delta function potential, and He.

WKB approximation, classical region, tunneling, Gamow's theory of alpha decay, connection formula.

Module IV: Scattering theory and relativistic wave equation:

Scattering cross section, scattering amplitude, Centre of Mass frame, Laboratory frame, partial wave, scattering by a central potential (partial wave analysis), phase shift, Born approximation, Validity of Born Approx.

Klien-Gordon equation and its interpretation, Dirac equation for a free particle.

Examination Scheme:

Components	CT	HA	S/V/Q	ATTD	EE
Weightage(%)	10	7	8	5	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, ATTD: Attendance

EE: End Semester Examination

Text & References:

- Quantum Mechanics: L.I. Schiff.
- Modern Quantum Mechanics: J.J. Sakurai.
- Introduction to Quantum Mechanics : C.J. Joachain and B.H. Bransden.
- Introduction of Quantum Mechanics: D.J. Griffiths
- Principles of Quantum Mechanics: P.A.M. Dirac.
- A text book of quantum mechanics – P.M Mathews and K.Venkatesan, Mc Graw Hill,
- Principles of Quantum Mechanic: R. Shankar.
- Quantum mechanics – J.P.Dicke and R.H.Wittke, Addison Wiley
- Quantum mechanics A. K. Ghatak and Lokanathan, Mc Millan

ELECTRODYNAMICS

Course Code: PHY4215

Credit Units: 04

Course objective:

The course is suitable as core course for Master of Science Applied Physics students. The course is designed to familiarize and train the student with the tools and techniques used to assess the various problems of electrodynamics. The course provides the in-depth knowledge of electrostatics, magnetostatics, the cases of non-static current and charge densities and related changes. The course also aims at developing an ability to analyse the situation and to apply appropriate techniques to reach to solutions of a particular problem of electrodynamics.

Course Contents:

Module I-Electromagnetic (EM) Fields and Potentials

Dirac-delta function. Green's Theorem, Electrostatics: Laplace and Poisson equations; Dirichlet and Neumann boundary conditions; Method of images (point charge near a conducting plane and a sphere); Separation of variables in Cartesian and spherical coordinates. Magnetostatics: Curl and divergence of magnetic field; vector potential; Divergence of vector potential, Magnetic Scalar potential. Correction in the Ampere's law and Maxwell's equation.

Module II: Electromagnetic Waves and Propagation

EM waves in vacuum: Wave equation of E & B; Energy density of Fields and Poynting's theorem; conservation of momentum and Maxwell's stress tensor. Boundary conditions on field vectors D, E, B and H; Gauge transformations: Lorentz and Coulomb gauges. energy & momentum of EM waves; Propagation of EM waves in matter: propagation in linear media, reflection and transmission, Fresnel equation; Polarisation of Electromagnetic waves, Brewster's angle, EM waves in conducting media, skin depth, reflection and transmission in conducting media.

Module III: Guided Waves and Radiation Guided Waves: Electromagnetic waves in ionosphere, Wave guides; TE, TM and TEM modes; Rectangular wave guide; Dispersion of EM waves and Cauchy's formula, resonant cavity Radiation: Retarded Potentials, Lienard-Wiechert potentials; fields of a moving point charge; electric dipole radiation magnetic dipole radiation.

Module IV: Relativistic Electrodynamics Four vector formalism: Four vectors; Covariant and contravariant vectors; Transformation of Four vectors; Velocity, Current, Momentum and Potentials as four vectors. Lorentz transformation in four vector notation Covariance of Electrodynamics:

Examination Scheme:

Components	A	CT	S/V/Q	HA	E
Weightage (%)	5	10	10	5	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

Text & References:

- Classical Electrodynamics by Jackson JD
- Introduction to electrodynamics, D. J. Griffith, Benjamin-Cummins(1999)
- Feynman Lectures in Physics, Vol.2
- Fields and Waves in Communication Electronics by S. Ramo, J.R. Whinnery and T.V.Duzer
- Electromagnetics – Kraus & Carver, TMH, 1973

ATOMIC AND MOLECULAR PHYSICS

Course Code: PHY4216

Credit Units: 04

Course Objective: The aim of this course is to give the basic ideas about the structure of atoms and molecules, electronic structure, interaction of radiation and external fields with atoms and molecules.

Course Contents:

Module I

Quantum states of one electron atoms, Hydrogen spectrum, Larmor's theorem, Magnetic moment and Bohr magneton, Spin orbit interaction, hydrogen fine structure, Vector atom model, two electron systems, LS and jj Coupling schemes, spectroscopic terms, equivalent and non equivalent atoms, Helium atom spectrum, spectra of alkali atoms, Nuclear spin, magnetic moment, isotopic effect and Hyperfine structure, Normal and anomalous Zeeman effect, Paschen Back effect, Stark effect.

Module II

Rotational spectra of diatomic molecules as a rigid rotor and non rigid rotor, intensity of rotational lines, Diatomic molecule as a simple harmonic oscillator, vibrational energy of diatomic molecule, Anharmonicity, Vibrational-rotational spectra, Raman effect, quantum theory of Raman effect, rotational Raman spectra, vibrational Raman spectra .

Module III

Electronic band spectra, electronic energy and total energy, vibrational structure of electronic transitions, rotational structure of electronic bands, The branches(P,Q,R) of band, Band head formation. Intensities in electronic bands, Frank-Condon principle, Fortrat diagram.

Module IV

Interaction of atoms in the formation of molecules, covalent, ionic bonding and vander Waal's interactions, concept of molecular potential, Born-oppenheimer approximation, Electronic states of diatomic molecules, Electronic angular momenta, The LCAO approach, states for hydrogen molecular ion, Coulomb, exchange, overlap integral, symmetries of electronic wave functions. Term symbols for simple molecules.

Examination Scheme:

Components	A	CT	S/V/Q	HA	E
Weightage (%)	5	10	10	5	7

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

Text & Reference Books:

- Arthur Beiser, Concepts of Modern Physics, 6th edition, Tata McGraw-Hill, New Delhi (2003).
- G. Aruldas, Molecular Structure and Spectroscopy, Prientice Hall of India, NewDelhi (2002).
- I, Chapmen B.P. Straughan & S. Walker, Spectroscopy: Vol. and Hall (1976).
- G.M Barrow, Introduction to Molecular Spectroscopy, McGraw Hill Ltd., Singapore (1986).
- Introduction to Atomic Spectra, H. E. White, McGraw-Hill

INTEGRATED PHYSICS LAB-II

Course Code: PHY4212

Credit Units: 03

List of Experiment (Any Eight)

1. Measurement of vacuum using the Pirani/thermocouple gauge.
2. Measurement of lattice parameters and indexing of powder patterns.
3. Determination grain size of the alloy by optical microscope.
4. Calculation of the optical band gap of the semiconductor by absorption spectroscopy.
5. Calculation of the grain size and strain in the samples from the XRD pattern data.
6. Production and measurement of high pressure.
7. To study temperature-dependence of conductivity of a given semiconductor crystal using four probe method.
8. To determine the Hall coefficient for a given semi-conductor.
9. To determine dipole moment of an organic molecule.
10. To study the lattice dynamics using LC analog kit.
11. To study the characteristic of J-H curve using ferromagnetic standards.
12. To determine the velocity of ultrasonic waves using interferometer as a function of temperature.
13. Temperature dependence of a ceramic capacitor - Verification of Curie-Weiss law for the electrical susceptibility of a ferroelectric material.
14. Tracking of the Ferromagnetic-paramagnetic transition in Nickel through electrical resistivity.
15. To study the characteristics of a PN junction with varying temperature & the capacitance of the junction.
16. (i) Study of the characteristics of klystron tube and to determine its electronic tuning range;(ii) To determine the standing wave ratio and reflection coefficient; (iii) To determine the frequency & wavelength in a rectangular waveguide working on TE₁₀ mode; (iv) To study the square law behavior of a microwave crystal detector.
17. To determine the specific charge (e/m) of an electron.
18. To determine the charge of an electron using Millikan oil drop experiment.
19. To determine the emission spectra of hydrogen atom.
20. To study the Kerr effect using Nitrobenzene

Examination Scheme:

Components	TA	V	LR	Attendance	EE
Weightage (%)	7	10	8	5	70

TA: Teacher Assessment V: Viva LR: Lab Record EE: External Examination

Text & References:

- Charles Kittel, Introduction to Solid State Physics, Wiley Eastern, 5th edition.
- A.J. Dekker, Solid State Physics, Prentice Hall of India (1971).
- N.W. Ashcroft and N.D. Mermin, Solid State Physics, Saunders College Publishing (1976).
- Ali Omar, Elementary Solid State Physics, Narosa Publishing House.
- J.S. Blakemore, Solid State Physics, 2nd edition, Cambridge University Press (1974).

NUCLEAR AND PARTICLE PHYSICS

Course Code: PHY4321

Credit Units: 04

Course Objective: The aim of the course is to introduce the concept of nuclear structure, nuclear forces and nuclear reactions for a clear understanding of recent intricate theories of nuclear physics. Course Contents:

Course Contents:

Module-I:

Nuclear Properties and Radioactivity Nuclear radii and measurements, nuclear binding energy (review), Radioactive decays : Review of barrier penetration of alpha decay & Geiger-Nuttall law. Beta decays, Fermi theory, Kurie plots and comparative half-lives, Allowed and forbidden transitions, Experimental evidence for Parity-violation in beta decay, Electron capture probabilities, Double beta decay, Neutrino, detection of neutrinos, measurement of the neutrino helicity. Multipolarity of gamma transitions, internal conversion process, transition rates, Production of nuclear orientation, angular distribution of gamma rays from oriented nuclei.

Module-II:

Two-Body Problems and Nuclear Forces Properties of deuteron, Schrödinger equation for the deuteron and the ground state; rms radius, spin dependence of nuclear forces, electromagnetic moment of deuteron and the necessity of tensor forces. Nucleon-nucleon scattering, experimental n-p scattering data, partial wave analysis of n-p scattering, phase shifts, singlet and triplet potentials, effective range theory, low energy p-p scattering, meson theory of nuclear forces, Charge independence and charge symmetry; spin dependence, S-wave effective range theory; central and tensor forces, dipole and quadruple moments of deuteron.

Module-III:

Nuclear Reactions Compound nucleus and Direct reactions (elastic, inelastic, transfer, break-up), Nuclear fusion, Laser induced fusion, Quantum mechanical theory, Resonance scattering and reactions, Dispersion relation, Nuclear fission: experimental features, spontaneous fission, barrier penetration, statistical model.

Module-IV: Nuclear Structure and Elementary Particle Physics 15 Liquid drop model, Shell model (extreme single particle), magnetic moment, quadruple moment; Collective models; concept of unified model Elementary particles, Various quantum numbers and their conservation, Gellmann Nishijima formula, C, P and T invariance, applications of symmetry arguments to particle reactions.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	10	5	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

Text & Reference Books:

- J. M Blatt and V.E. Weisskopf: Theoretical Nuclear Physics
- B.K. Agrawal : Nuclear Physics, Lokbharti Pub, Allahabad. 1989
- RR Roy and B.P.Nigam, Nuclear Physics, Willey-Easter, 1979
- RD. Evans-The Atomic Nucleus(McGraw-Hills, 1955)
- B.L. Cohen - Concept of Nuclear Physics Tata Mc-Graw Hills, 1988
- Kenneth S. Krane, Introductory Nuclear Physics, Willey-Easter

LASER PHYSICS

Course Code: PHY4322

Credit Units: 03

Catalog Description

This course is intended to give knowledge of basic principle of working of lasers, types of lasers and applications.

Course Objective:

1. To develop understanding of construction and operation of different Laser systems.
2. To understand advances in laser physics and its applications

Course outcome

Through this course students will learn following:

- 1) Fundamental principles of stimulated emission and how to convert it into coherent light emission, types of lasers
- 2) The manipulation of light e.g. mode selection, non linear optics.
- 3) Applications of various lasers in various fields including scientific research.

Course Contents:

Module I: Basics of Lasers

Stimulated Absorption, Stimulated Emission and spontaneous Emission, Einstein Coefficients, Light Amplification and Threshold condition, Widths and Profiles of Spectral Lines: Homogeneous and Inhomogeneous Broadening. Natural Linewidth. Doppler Width. Collision Broadening of Spectral Lines.

Module II

Basic principles of LASERS Laser Amplification. Laser Oscillation. Optical and Electrical Pumping. Optical Resonators. Losses in Resonators. Resonance Frequencies of Optical Resonators. Laser Modes. Rate Equations for Three-Level and Four- Level Lasers, Single-Mode Operation: Q-Switching, Mode Locking, Basic ideas of chirped pulse amplification

Module III

Types of Lasers. Solid State lasers (Ruby laser, Semiconductor laser, Nd: YAG laser), Gas lasers (He-Ne laser, Excimer laser), Liquid (organic dye) lasers.

Module IV

Nonlinear Optics, Harmonic Generation, Phase matching, Third Harmonic generation, Parametric oscillator, Applications of lasers: Holography, Basic idea of Mach-Zehnder Interferometer and Laser induced Fluorescence

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	10	5	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester

Examination; A: Attendance

Text & Reference Books:

- Ajoy Ghatak, Optics 5th Ed., McGraw Hill
- K. Shimoda : Introduction to Laser Physics;(Springer-Verlag)

INTEGRATED PHYSICS LAB-III

Course Code: PHY4316

Credit Units: 03

Course Contents:

1. Fabrication of thermocouple and calibration of the same for the temperature measurement.
2. Production and characterization of plasma.
3. Determination of the transition temperature of the materials undergoing phase transition and calculation of the transition enthalpy.
4. Determination of Young's modulus of steel by flexural vibrations of a bar.
5. To measure numerical aperture and propagation loss and bending losses for optical fibre as function of bending angle and at various wavelengths.
6. To determine wavelength of a given laser source.
7. To determine the Diameter, Divergence and Focus Spot Size of a Laser Beam.
8. To measure the degree of polarization using laser.
9. To study Propagation loss & bending loss using Optical Fiber
10. To study the characteristics of LED & Detector using Fiber Optic.
11. To determine the numerical aperture of a given optical fiber.
12. To study the frequency modulation & demodulation by using Fiber Optic Link.
13. To determine the Planck's constant using photocell
14. To determine the mean wavelength of sodium light and to measure the wavelength difference ($\Delta\lambda$) using Michelson interferometer
15. To study the spectral characteristics of the incident beam using Fabry Perot Interferometer
16. To find the intensity distribution of single, double and multiple slit by using Fraunhofer diffraction pattern
17. To measure the grating element of grating by Fraunhofer diffraction pattern.
18. To determine the thickness of a thin transparent sheet using Michelson Interferometer.
19. To verify the Fresnel's formula for reflection and refraction by using a plane refracting surface using Spectrometer.
20. To determine the effect of magnetic field on the polarization state in dispersive medium (Faraday Experiment).

Examination Scheme:

Components	TA	V	LR	Attendance	EE
Weightage (%)	7	10	8	5	70

TA : Teacher Assessment, V: Viva, LR: Lab Record EE: External Examination

Text & References:

- J. Milman and C.C. Halkias, Electronic Devices and Circuits, McGraw-Hill (1981).
- A.P. Malvino, Electronics: Principles and Applications, Tata McGraw-Hill (1991).
- G.B. Calyton, Operation Amplifiers, ELBS (1980).
- J. Millman and C.C. Halkias, Integrated Electronics, Tata McGraw Hill (2001).
- R. A. Gayakwad, op-Amps and Linear IC'S, Pearson Education (2003).
- R. P. Singh and S. D. Sapre, Communication Systems: Analog and Digital, Tata McGraw Hill

SUMMER INTERNSHIP EVALUATION

Course Code: PHY4335

Credit Units: 03

Methodology:

Practical training is based on the theoretical subjects studied by students. It can be arranged within the college or any in any related industrial unit or in any research lab. The students are to learn various industrial, technical and administrative processes followed in the industry/research. In case of on campus training the students will be given specific tasks of synthesizing /testing/analysis/characterization. On completion of the practical training the students are to present a report covering various aspects learnt by them and give a presentation of the same.

Examination Scheme

Feedback from Industry:	20
Training Report:	40
Viva:	15
Presentation:	25
Total	100

DIGITAL ELECTRONICS AND MICROPROCESSORS

Course Code: PHY4306

Credit Units: 03

Course Objectives

The objective of this course is to

- To provide a detailed description of registers and counters, A/D and D/A converters, microprocessors and antenna action.
- To serve as the foundation for practical lab experiments.

Course Outcomes

On completion of this course, the students will be able to

CO1 Develop an understanding of the basic concepts of digital electronics- Boolean algebra and applications of logic gates.

CO2 Clearly define and explain different types of the flip-flops, registers and counters

CO3 Enumerate and explain the Analog-to-digital and Digital-to Analog Converters.

CO4 Explain the basics of the Microprocessor 8085 and 8086

Catalog Description

This course gives a comprehensive view of the digital electronics and its applications. It covers the basic idea of a microprocessor. The working principle and operation of the different types of logic gates, flip-flops, registers and counters, A/D and D/A converters will be studied in detail.

Course Contents:

Module I: Shift Registers and Counters

10 Lectures

Universal Shift Register, shift counter, Ring Counter, D/A converter and A/D converter. Simultaneous and Counter method of A/D converter, Successive Approximation method, Seven segment LED display, BCD to seven segment decoder.

Logic Families: Transistor as a Switch, TTL integrated circuits, CMOS integrated circuit. Logic families and their characteristics, comparing Logic families, Interfacing. Introduction to VHDL and Programming techniques.

Module II: Introduction to Microprocessor

6 Lectures

Microprocessor 8085: PIN Out and Signals, Internal architecture, Flags, Program counter. Introduction to 8085 Instruction Set: Data Transfer, Arithmetic & Logical Instruction, Branch and machine Code, OP-Code Format, Addressing Mode Timing Diagram. Machine Cycle.

Module III: Microprocessor: - Programming and Interfacing

10 Lectures

Subroutine and Sub programming, CALL and RETURN, STACK, PUSH & POP, 8085 Interrupts, RST Code; SID, SOD, RIM and SIM; Delay Program Calculation, Memory Organization. (RAM, EPROM, ROM, PROM, DRAM.) Introduction to 8086 and registers. Addressing and Interfacing, Basic Interfacing Concept, Introduction to I/O and Memory Mapped Techniques, Handshaking, Interfacing I/O devices, Display, Keyboard, Generating Control Signals, De Multiplexing of address Bus, Programming Technique, Interfacing 8155, Programmable I/O Ports and Timer IC, Programmable Peripheral Interface 8255 with 8085. Interfacing of A/D and D/A converters, Study of 8279, 8253.

Module IV: Antennas

10 Lectures

Antenna Action, Short Electric Doublet, Radiation from a Current Element, Thin Linear Antenna, Effect of Ground: Image Antenna, Short Vertical Grounded Antenna, Total Effective resistance and Efficiency of an Antenna, Yagi Antenna, Loop Antenna, Parabolic Reflectors, Antenna measurements, Broadband antenna principles, Practical Transmitting Antennas, Receiving Antennas, Difference in Receiving and Transmitting Antennas.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination
Examination Scheme:

Components	CT	HA	S/V/Q	A	EE
Weightage (%)	15	5	5	5	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, A: Attendance; EE: End Semester Examination;

Text & References:

- Hand Book of Electronics, Gupta & Kumar, Pragati Prakashan.
- Integrated Electronics: Analog and Digital Circuits and Systems, Jacob Millman and Christos C. Halkias, Tata McGraw-Hill.
- Digital Principles and Applications by A.P. Malvino and D.P. Leach, Tata McGraw-Hill, Publishing Co., New Delhi.
- D. V. Hall, Microprocessors and Interfacing- Programming and Hardware, Tata McGraw Hill (1999)
- Microprocessor Architecture Programming and applications by R.S Gaonkar
- The Intel Microprocessors- Architecture, Programming and Interfacing, Pearson Education (2003)

RENEWABLE ENERGY RESOURCES

Course Code: PHY4317

Credit Units: 03

Course Objective:

This is an introductory course to renewable energy technologies and potentials to the Science students aiming to explain basic concepts of Renewable Energy resources.

Course Contents:

Module I: Energy & Thermodynamics & Environmental impact

Heat Transfer in Renewable Energy Systems - conduction, convection and radiation, thermal aspects of energy generation Work, heat, and the first law of thermodynamics. Heat engines and the second law of thermodynamics. The Carnot cycle. Applications of the second law to various energy transformation processes: heat pumps and refrigerators; different engine cycles. Use of fossil fuel, Energy crisis, Global Warming, Carbon emission and climate change. Need for sustainable development and Renewable Energy

Module II: Solar Energy (Thermal and Photovoltaic)

Solar energy option, Environmental impact of solar power, physics of the sun, Thermonuclear reactions, Black body radiation, Spectral distribution, the solar constant, radiation on tilted surface / earth, Solar thermal Energy, Application of solar energy in Solar thermal and solar photovoltaic system, Brief introduction to 3 generation of Solar cells,

Module III: Ocean, tidal, wave energy

Principle of ocean thermal energy conversion (OTEC), setting of OTEC plants, thermodynamic cycles. Tidal and wave energy: Fundamentals of tidal power, Potential and conversion techniques, mini-hydel power plants. Use of tidal energy, Limitations of tidal energy conversion systems.

Module IV: Geothermal and Wind Energy

Structure of earth's interior, earthquakes & volcanoes, Geothermal resources, Hot springs, Steam ejection, Principal of working, Types of geothermal station with schematic representation, Applications.

Properties of wind, Availability of wind energy in India, wind velocity, Wind machine fundamentals; types of wind machines and their characteristics, Horizontal and Vertical axis wind mills, Elementary design principles, Coefficient of performance of a wind mill rotor, Aerodynamic considerations in wind mill design, Recent development and applications

Module V: Hydrogen Energy and Bio-Gas

Properties of hydrogen in respect of its use as source of renewable energy, Sources of hydrogen, Production of hydrogen; electrolysis of water, thermal decomposition of water, thermo chemical production bio-chemical production. Storage Issues of Hydrogen, Applications of hydrogen energy.

Biomass: Raw materials, Properties/ characteristics of bio gas, Principles of Bio-Conversion; Photosynthesis, Anaerobic/aerobic digestion, types of Bio-gas digesters, gas yield, combustion, Transportation of bio gas, bio gas plant technology & status, Biomass cogeneration Energy recovery from urban waste, Power generation from liquid waste, Bio gas applications.

Examination Scheme:

Components	CT	HA	S/V/Q	Attendance	EE
Weightage (%)	15	5	5	5	70

CT – Class Test, S/V/Q – Seminar/Viva/Quiz, HA – Home Assignment, EE – End

Semester Examination

Text &References:

- Aldo V. da Rosa, —Fundamentals of Renewable Energy Processes, 2005, Academic Press
- Bansal Keemann, Meliss," Renewable energy sources and conversion technology", Tata Mc Graw Hill.
- Kothari D.P., —Renewable energy resources and emerging technologies, Prentice Hall of India Pvt. Ltd.
- Rai G.D, "Non-Conventional energy Sources", Khanna Publishers.
- Ashok V. Desai, "Nonconventional Energy", New Age International Publishers Ltd.
- Tiwari and Ghosal, —Renewable energy resources, Narosa Publication.
- K Mittal —Non-Conventional Energy Systems, Wheeler Publication
- Twidell & Weir, —Renewable Energy Sources
- Ramesh & Kumar, —Renewable Energy Technologies, Narosa Publications.

INTRODUCTION TO ASTROPHYSICS

Course Code: PHY4318

Credit Units: 03

Course Objective: To develop an understanding and appreciation of the laws of the Universe. A survey of modern astronomy covering topics about the solar system, galaxies, evolution of stars and methods used to explore the Universe.

Course Contents:

Module-I: Spectrum of EM radiation, and observation in different wavelength bands, atmospheric window. Different types of telescope, Limit of Resolution and resolving power. Overview of major contents of universe, Black body radiation, specific intensity, flux density, luminosity, Apparent and absolute magnitudes, Bolometric magnitude, Basics of radiative transfer (Emission/absorption coefficients, source functions).

Module-II: Sun as a star: Basic parameters e.g. Solar constant, luminosity, effective temperature, mass, density etc.; Hydrostatic equilibrium, central temperature and pressure at centre of the Sun. Source of energy in the stars: Kelvin-Helmholtz timescale; possibility of thermonuclear reactions.

Module-III: Solar System: Various components of the solar system, Planets, their satellites, atmosphere at different planets, formation of the solar system. The Galaxy: Size and shape of the Milky Way; interstellar extinction and reddening (qualitative); different types of Nebulae; orbits of stars and epicycle theory; stellar populations.

Module-IV: Morphological classification of galaxies; rotation curve and idea of dark matter; Active galaxies (basic understanding); clusters of galaxies and large scale distribution. Expansion of the universe; Hubble law and Hubble constant; Big-bang picture and Cosmic microwave background radiation (qualitative discussion).

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

Text & References:

- The Physical Universe: An introduction to Astronomy by Frank H. Shu
- Astrophysical concepts by Harwit Martin
- Astrophysics for Physicists by Arnab Rai Choudhuri
- An Introduction to modern Astrophysics by Bradley W. Carroll and Dale Ostlie, Pearson Addison-Wesley
- <http://www.iucaa.ernet.in/~dipankar/ph217/>
- <http://nptel.iitm.ac.in/courses/115105046>

EXPERIMENTAL TECHNIQUES

Course Code: PHY4410

Credit Units: 04

Course Objective: The objective of the present course is to introduce some advanced measurement, characterization and analytical methods commonly used in experimental physics research to the post graduate students.

Course Contents:

Module I: Vacuum Techniques: Basics: Introduction to vacuum technique, units, ranges, review of Kinetic theory of gases, Physical parameters at low pressures, Throughput, different vacuum pumps for production of low, medium, high and ultra- high vacuum. Vacuum gauges (McLeod, Knudsen, Pirani, Penning and Ionization gauges), Leak detection, Industrial & Scientific applications.

Module II: Diffraction and Microscopic Techniques: X-Ray diffraction, Electron diffraction, neutron diffraction, Transmission electron microscope (TEM), Scanning electron microscope (SEM), Energy dispersive X-ray analysis techniques (EDX). Atomic Force microscope (AFM), Surface Tunnelling microscopy (STM).

Module III: Spectroscopy & Thermal Techniques UV-VIS spectroscopy, photoluminescence, Infra-red spectroscopy, Raman spectroscopy, Photoelectron spectroscopy (XPS, UPS, AES). Thermal Techniques: TG, DTA, DSC. Scanning Thermal Microscopy (SThM)

Module IV: Accelerators & Detectors Van deGraff Accelerator, Tandem Accelerator, Linear Accelerator (LINAC), Cyclotron, Betatron, Synchrocyclotron, Synchrotron. Detailed study of Ionization chamber; Proportional counter, GM counter, Scintillation detector, photomultiplier tubes, photodiode, semiconductor diode detector.

Examination Scheme:

Components	CT	HA	S/V/Q	Attendance	EE
Weightage(%)	10	8	7	5	70

CT – Class Test, S/V/Q – Seminar/Viva/Quiz, HA – Home Assignment, EE – End Semester Examination

Text & Reference:

- Basic Vacuum Technology, A. Chambers, R.K. Fitch and B.S. Halliday. Taylor & Francis 1998.
- A Users Guide to Vacuum Technology, O'Hanlon. John Wiley & Sons.
- Measurement & Detection of Radiation, Nicholas Tsoulfanidis, S Landsberger, CRC Press.
- Radiation Detection and Measurement, G F Knoll, John Wiley & Sons.
- Students solutions manual to Radiation Detection and Measurement, David K Wehe
- Measurement & Detection of Radiation, Nicholas Tsoulfanidis, S Landsberger, CRC Press.
- Radiation Detection and Measurement, G F Knoll, John Wiley & Sons.
- Atomic Radiation Detection and Measurement, Harold S Renne, Lloyd J Austin, Literary Licensing.
- Nuclear Radiation Detectors, S. S. Kapoor, V S Ramamurthy, New Age International Publishers.

NANO-SCIENCE AND TECHNOLOGY

Course Code: PHY4404

Credit Units: 03

Course Objective:

The objective of the present course is to introduce Nanoscience and nanotechnology. The course also provides the fundamentals of Nanoscience & nanotechnology and some of its applications. The course further provides the introduction of some of the Synthesis and characterization techniques.

Course Contents:

Module-I: Physics of Low-dimensional Materials -

Nano-materials and their types, Top down and bottom up approach. 1D, 2D and 0D confinement and Concept of quantum dots, quantum wires and quantum wells; Density of states for bulk materials, quantum wells, wires and dots; Importance of size distribution control, size measurement and size selection .

Module-II: Synthesis of Nanomaterials

Chemical methods: Sol-gel/Combustion method, Solvothermal, Chemical bath deposition Chemical vapour deposition, Homo- and hetero-nucleation growth methods, Co-precipitation method, Citrate precursor method. Sputtering and types: RF sputtering, DC sputtering and Magnetron sputtering. Thermal Evaporation, e-beam evaporation, Pulse Laser Ablation (PLD)

Module-III: Properties and Applications of Nanomaterials Physical and Mechanical properties of nanomaterials, Optical Properties, Electronic properties, Magnetic Properties, Electro-magnetic properties

Module-IV: Applications of Nanomaterials

Applications of carbon based nanostructured materials: CNT, Graphene and Fullerenes, Defense application, Medical Application, Mechanical Applications. Applications in communication, Water purification and Agriculture applications.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	15	5	5	70

A-Attendance; CT-Class Test; S/V/Q-Seminar/Quiz/Viva; HA-Home Assignment; EE-End Semester Examination

Suggested Books:

- Edelstein A. A. and Cammarata R.C., "Nanomaterials-Synthesis Properties and Applications", Institute of Physics Publishing, London, 1998.
- Poole, Jr. CP and Owens, FJ, "Introduction to Nanotechnology", Wiley India, 2006.
- Shik, A, "Quantum Wells: Physics and Electronics of two-dimensional systems", World Scientific, 1999.
- Benedek et al G., "Nanostructured Carbon for advanced Applications", Kluwer Academic Publishers, 2001.
- Harrison, P, "Quantum Wells, Wires, and Dots: Theoretical and Computational Physics", John Wiley, 2000.

ATMOSPHERIC PHYSICS

Course Code: PHY4405

Credit Units: 03

Course Objectives:

Several fundamental aspects related to Physics, Thermodynamics and Chemistry of the Atmosphere and Oceans will be introduced to the students in order to make them understand, and apply the knowledge to the physico-chemical processes that influence the weather and climate.

Course Contents:

Module-I: Thermodynamics

Thermodynamics of dry and moist air, atmospheric stability and dry adiabatic lapse rate, moist processes in the atmosphere, saturated and unsaturated ascent, moist adiabatic and saturated adiabatic processes in the atmosphere, saturated adiabatic lapse rate, pseudo adiabatic processes and equivalent potential temperature, conditional instability second kind, moist convection, aerosols, condensation processes, formation of cloud droplets, precipitation.

Module-II: Ocean Morphology

Ocean physics, thermodynamics of sea water, observed temperature, salinity, and density in the ocean, density stratification, water mass distribution, coastal currents and upwelling, thermohaline circulation. Oceans currents, coupling of surface and deep ocean waters, basic foundation of turbulence, turbulent flows, turbulent vorticity, turbulence pressure, eddy diffusivity, coherent structures, surface fluxes, air-sea interaction, mixing processes in the ocean.

Module-III: Earth-Atmosphere Radiation Balance

Radiative transfer in atmosphere and ocean: Sun and climate, Planck function, black-body radiation, local thermodynamic equilibrium, radiometric quantities, absorption and emission, Schwarzschild's equation, radiative equilibrium in a grey atmosphere, balance between incoming solar and outgoing

thermal radiation, role of aerosols, absorption by atmospheric gases, heating rates, net radiative heating, Radiative transfer in atmosphere-ocean system.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	15	5	5	70

A-Attendance; CT-Class Test; S/V/Q-Seminar/Quiz/Viva; HA-Home Assignment; EE-End Semester Examination

References

- The Solid Earth: An Introduction to Global Geophysics [Paperback] C. M. R. Fowler, Cambridge University Press, 1990.
- Climate and the Oceans, Ed. Geoffrey K. Vallies, Princeton University Press, 2012.
- Ocean Circulation: Wind-Driven and Thermohaline Processes, Ed. RuiZin Huang, Cambridge University Press, 2009.

GENERAL RELATIVITY & COSMOLOGY

Course Code: PHY4406

Credit Units: 03

Course Objective:

This subject aims to provide an introduction to cosmology, including the physics of the early Universe, dark matter and dark energy, and the evolution of the observed large-scale structure.

Course Contents:

Module-I

Newtonian Cosmology, Einstein's universe, Cosmological Principle, Olbers' paradox, Hubble's observations and Expansion of the Universe, Cosmological redshift, Einstein equation for cosmology, Friedman models.

Module-II

Angular diameter distance and luminosity distance as cosmological tools, cosmological models with \ddot{a} term, Radiation dominated and matter dominated solutions. Thermal history of the Universe, radiation dominated universe, Big-bang nucleosynthesis, recombination, decoupling of matter and radiation, Horizon problem, flatness problem, introduction to inflation.

Module-III

Formation of large scale structures: Density fluctuations, Jeans mass in expanding universe, evidence of dark matter, growth of fluctuations, Dark matter candidates. Alternative to Friedman cosmology, Mach's principle, introduction to Brans-Dicke theory

Module-IV

Measurement of Hubble constant, various methods (e.g. Cepheid stars, Tully-Fisher relation, SNIa, Surface brightness fluctuations, Fundamental Plane relation) and recent results. Cosmic microwave background, spectrum and anisotropy, power spectrum of fluctuations, Sunyaev-Zel'dovich effect in galaxy clusters. Latest observations of SNe Ia and evidence of dark energy, Matter-energy of the Universe.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
A: Attendance

Books Recommended:

- S. Weinberg- Gravitation and Cosmology: Principles and Applications of the General Theory of Relativity (Wiley, 1972).
- Peebles- Principles of Physical Cosmology
- Peacock- Cosmological Physics
- S. Banerji and A. Banerjee – General Relativity and Cosmology (Elsevier, 2007)
- J. V. Narlikar- Introduction to Cosmology (Cambridge Universe Press)

OPTICAL FIBERS AND COMMUNICATION

Course Code: PHY4407

Credit Units: 03

Course Objective:

The objective of the present course is to introduce fundamentals of optical fibers, detectors and amplifiers and their applications in Physics.

Course Contents:

Module-I: Optical Fiber Fundamentals

Light propagation in optical fiber, Acceptance angle and numerical aperture, Losses in optical fiber: absorption loss scattering loss, bending loss, and splice loss. Pulse propagation in dispersive medium, pulse broadening, Intermodal and intramodal dispersion, group velocity dispersion (material and waveguide).

Module-II: Modal Analysis of step index multimode and graded index fiber

Characteristics equation of step index multimode fiber, Transverse Electric (TE), Transverse magnetic (TM) and Hybrid modes, linearly polarized modes, V parameter, mode cutoff, Mode field diameter, Modal analysis of graded index fiber.

Module-III: Optical Sources, Detectors and Amplifiers

Types of Optical Sources, Light emitting diodes (LED), Edge emitting LEDs, Coupling of LEDs with fibers, Semiconductor Lasers; Detectors: Photoconductors, Photodiodes, Avalanche Photodiodes and Phototransistors, Amplifiers: Semiconductor Laser Amplifiers, characteristics, advantages and drawback, Erbium Doped Fiber Amplifier (EDFA), gain and noise in EDFA and noise figure.

Module-IV: Fiber Optical Communication Components and System

Coupling Components- couplers, connectors and splices, Modulators and Modulation methods, Transmitters, Receivers, Repeaters and switches; Transmitter, Receiver and link design, Line codes for optical fiber links, wavelength division multiplexing (WDM) and Optical Division Multiplexing.

Examination Scheme:

Components	CT	HA	S/V/Q	Attendance	EE
Weightage (%)	10	8	7	5	70

CT – Class Test, S/V/Q – Seminar/Viva/Quiz, HA – Home Assignment, EE – End

Semester Examination

Text & References:

- John. M. Senior, Optical fiber communications: principles and practice, Prentice Hall of India.
- Gerd Keiser, Optical fiber communications, McGraw Hill, 3rd edition.
- D. K. Mynbaev, L. L. Scheiner, Fiber optic communication technology, Pearson Technology.
- Introduction to fiber optics, Ajoy Ghatak and K. Tyagrajan.
- R. P. Khare, Fiber optic and optoelectronics, Oxford University press.
- Light wave Communication Systems: A practical prospective: R Papannareddy, Penrum International Publishing
- Fundamental of photonics, Saleh and Teich, Wiley Interscience, 2nd Edition, 2007.

PHYSICS OF SOLAR PHOTOVOLTAICS

Course Code: PHY4408

Credit Units: 03

Course Objective:

In this course, one would learn about the fundamentals of photoelectric conversion: charge excitation, conduction, separation, and collection. You will become familiar with commercial and emerging photovoltaic (PV) technologies and various cross-cutting themes in PV: conversion efficiencies, loss mechanisms, characterization, manufacturing, systems, reliability, life-cycle analysis, and risk analysis

Course Contents:

Module I: Solar Cells and Sunlight

Outline of solar cell development, physical source of sunlight, review of solar intensity at the Earth's surface, solar insolation data

Module II: Review of Semiconductor Properties

Crystal structures and orientations, forbidden energy gaps, dynamics of electrons and holes, carrier density, carrier transport, generation and recombination of carriers due to light, direct and indirect band gap semiconductors, basic device physics, p-n junction diode,

Module III: Standard Silicon Solar Cell Technology (1st generation solar cells)

Photovoltaic effect, solar cell output parameters, characteristic lifetime, diffusion length, diffusion coefficient, absorption coefficient, efficiency limits, losses, and measurements. Review of fabrication technology, polysilicon and single crystal silicon cell technologies. Design of Solar Cells, Solar cells to solar module

Module IV: Thin Film Solar cells (2nd – Generation)

Polysilicon silicon, amorphous silicon, gallium arsenide solar cells, copper sulfide and cadmium sulfide solar cells, potential & drawbacks of currently manufactured technologies (single- and multicrystalline silicon, CdTe, CIGS, CPV)

Module V: Emerging Solar Cells technologies and concepts (3rd –Generation)

Organic solar cells, Dye-sensitized solar cells, Perovskite solar cells, GaAs solar cells, Thermo-photovoltaic approaches to overcome single junction efficiency limits, spectrum modification approaches, hot carrier solar cells, Quantum Dot solar cells

Examination Scheme:

Components	CT	Assignment	Attendance	EE(1)
Weightage (%)	15	10	05	70

Text & References:

- Solar Photovoltaics (Fundamentals, Technologies and Application) by Chetan Singh Solanki
- Martin A. Green, Solar Cells-Operating Principles, Technology, and System Applications
- M. S. Tyagi, Introduction to Semiconductor Materials and Devices
- Third Generation Photovoltaics (Advanced Solar Energy Conversion) By Martin A. Green; Lecture Notes

BIOPHYSICS

Course Code: PHY4409

Credit Units: 03

Course Objective:

This course aims at exposing the students to basic Biophysics concepts which will be useful for them to solve the integrated problems of Biology and Physics.

Course Contents:

Module I: General Biophysics and Techniques in Biophysics

Fundamentals of Biophysics, Surface tension, Adsorption, Osmosis, Osmotic pressure, Dialysis, Colloids, Colloidal systems of life, Buffer, Buffer capacity, Buffers in life system, pH, its importance, Basics of spectroscopy, X-ray crystallography, NMR, UV etc

Module II: Molecular Biophysics

Different levels of protein structure, Primary, secondary, tertiary and quaternary structure. Main chain and side chain torsion angles, Alpha helix, beta sheet, turns. Ramachandran plot, Allowed conformations for a pair of linked peptide units, Motifs and domains.

Module III: Thermodynamics

Laws of thermodynamics, concept of free energy, unavailable energy and entropy, heat content of food, bomb calorimetry, chemical kinetics – rate, order, molecularity of reactions and energy of activation

Module IV: Simulations, Data Analysis and Visualization

Advantages and challenges in simulations of Biophysics, Basics of simulation software such as NAMD and/or GROMACS, Data Analysis of simulation generated data, Visualization software such as PyMol and VMD

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

Text & References:

- Biophysics by W Hoope Edtr., Springer – Verlag New York .
- Molecular Biophysics by R B Setlaw & EC Pollard, Addison Wesley Reading MA
- Essentials of Biophysics by P Narayanan, New Age International Publishers.

RADIATION PHYSICS

Course Code: PHY4411

Credit Units: 03

Course Objective:

The objective of the course on Radiation Physics is to expose the students to the concepts of different kinds of radiations, their interaction with matter, radiation detection and radiation dosimetry. The course will enable students to understand that interaction of matter with different kinds of radiations such as charged particles, electrons, neutrons, EM waves etc. and further their technological applications primarily as radiological applications.

Course Contents:

Module I: Radiation Sources

Basic units and definitions, Fast electron sources: beta decay, internal conversion & Auger electrons; Heavy charged particle sources: Alpha decay & spontaneous fission; Sources of electromagnetic radiation: Gamma rays following beta decay, Annihilation radiation, Bremsstrahlung, Characteristic X-rays & Synchrotron radiations; Neutron sources: Radioisotope sources & photoneutron sources

Module II: Radiation Interaction

Interaction of heavy charged particles: Nature of interaction, stopping power, energy loss characteristics, The Bragg curve, Energy straggling, Range & Range straggling, Energy loss in thin absorbers; Interaction of fast electrons: Specific energy loss, Electron range and transmission curves, Interaction of gamma rays: Photoelectric absorption, Compton scattering, Pair production; Interaction of neutrons: Slow neutron & fast neutron interaction; Radiation exposure and dose: Gamma ray exposures, Absorbed Dose, Dose equivalent,

Module III: Radiation Detectors and Spectroscopy:

General characteristics of detectors: Detector model, Modes of detector operation, Energy resolution, Detector efficiency; Gas filled detectors, Organic and inorganic scintillation detectors, Semiconductor detectors [Si(Li), Ge(Li) HPGe]. Photomultiplier tubes, Gamma ray spectrometers, Gamma ray spectrometry with NaI(Tl) scintillation and semiconductor detectors; Background and detector shielding.

Module IV: Radiation Dosimetry

Radiation dosimetry, its types and applications: Environmental, space, personal and medical dosimetry; General properties of dosimeter; Thermoluminescence (TL) and its mechanism; TL dosimetry: TL glow curve and TL spectra; Concept of trapping parameters: activation energy, order of kinetics & frequency factor; TLD protocols, optically stimulated luminescence (OSL) based dosimetry

Examination Scheme:

Components	A	CT	S/V/Q	H	E
Weightage (%)	5	10	10	5	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance


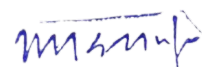
Text Books

- Nuclear Radiation Detectors: S. S. Kapoor and V. S. Ramamurthy, New Age, International, New Delhi.
- Introduction to Radiological Physics and Radiation Dosimetry: Frank Herbert Attix, Wiley-VCH

- The Atomic Nucleus: R.D. Evans, Tata Mc Graw Hill, New Delhi
- Thermoluminescence of Solids, S. W. S. Mckeever, Cambridge University Press

Reference Books

- Radiation Detection and Measurements: G. F. Knoll, Wiley & Sons, New Delhi.
- Introductory Nuclear Physics: K. S. Krane, Wiley & Sons, New Delhi.
- An Introduction to X-ray Spectrometry: Ron Jenkin, Wiley.
- Techniques for Nuclear and Particle Physics Experiments: W. R. Leo, Narosa Publishing House, New Delhi.
- Thermally and Optically Stimulated Luminescence: R Chen, V. Pagonis, John Wiley & Sons.

HIGH ENERGY PHYSICS

Course Code: PHY4413

Credit Units: 03

Course Objective:

The aim of the course is to introduce the basic concepts of elementary particle physics and quantum field theory for a clear understanding of the universe at very fundamental level. Further, the students will be able to gain knowledge of the important concepts which are used in modern day particle physics experiments.

Course Contents:

Module I: Basic Concepts

Natural units, Cosmological origin of universe, Fundamental building blocks and interactions, Historical introduction to particle zoo, Cross section, Decay rate, Pseudo-rapidity, Discrete and Continuous Symmetries, Isospin, Strangeness, Hypercharge, Parity, Meson and Baryon Octet, Baryon Decuplet, Eight-fold way, Charge Conjugation, Time Reversal, CP symmetry, CPT theorem, Feynman diagrams, Collider physics, Integrated Luminosity, Hybrid detectors.

Module II: Standard Model of Particle Physics

Gauge theory, Local and global symmetry, Spontaneous breaking of symmetry, Abelian and Non-Abelian gauge fields, Goldstone theorem, Higgs mechanism, Higgs field and coupling to three generations of matter, Gauge boson and fermion mass generation via spontaneous symmetry breaking, Elementary idea of CKM matrix, Basic introduction of Glashow-Weinberg-Salam theory.

Module III: QCD and Quark Model

Deep inelastic scattering, Quark model, Asymptotic freedom, Color confinement, Hadron formation, Flavor symmetry.

Module IV: Basic Idea of Beyond Standard Model Physics

Neutrino – types, oscillation and mass, Elementary idea of Supersymmetry & String theory, Dark matter & Dark Energy, New Physics.

Examination Scheme:

Components	CT	HA	S/V/Q	Attendance	EE
Weightage (%)	10	8	7	5	70

CT – Class Test, S/V/Q – Seminar/Viva/Quiz, HA – Home Assignment, EE – End Semester Examination

Text & References:

- Introduction to Elementary Particles, D. Griffiths (2nd Ed., Wiley-VCH, 2008)
- Quarks & Leptons, F. Halzen and A. D. Martin (John Wiley, 1984)
- An Introductory Course of Particle Physics, Palash B. Pal (CRC Press, 2015)
- Gauge Theory of Elementary Particle Physics: Problems and Solutions, T. P. Cheng and Ling-Fong Li (Oxford, 2000)
- Elementary Particles and the Laws of Physics, R. P. Feynman and S. Weinberg (Cambridge University Press, 1999)
- Introduction to High Energy Physics, D. H. Perkins (Cambridge University Press, 2000)

Amity School of Applied Sciences

Master of Science (Biochemistry)

FLEXILEARN

-Freedom to design your degree



Curriculum & Scheme of Examination

2022

AMITY UNIVERSITY HARYANA

GURUGRAM

A handwritten signature in blue ink, appearing to read 'Anil'.

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A handwritten signature in blue ink, appearing to read 'Manesar'.

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BCH4102	BIOSTATISTICS	L	T	P	C
Version 1.1	Date of Approval: 7 th December, 2021	1	1	0	2
Pre-requisites/Exposure	Basic concept of Biostatistics				
Co-requisites					

Course Description

This course will make use of case studies to discuss problems and applications of biostatistics. It also includes statistical methods and principles necessary for understanding and interpreting data used in Biochemistry research. Topics include descriptive statistics, graphical data summary, sampling, statistical comparison of groups, correlation, and regression

Course Objectives

The objective of this course is to

1. Provide the students basic understanding of statistical methods
2. Provide the students basic introductory concepts of bioinformatics.

Course Outcomes

On completion of this course, the students will be able to

CO1. Identify the basics and application of biostatistics and bioinformatics in biochemical research.

CO2. Analyze the significances of Q Test, F Test and T Test

CO3. Describe the Concept of measures of central Tendency.

CO4. Review the basics of Regression Analysis

Course Content

Modules	Blooms level*	Number of hours
Module-I: Biostatistics I Principles and practice of statistical methods in biological research, samples and populations, measures of central tendency; mean, median mode; standard deviations and standard error, measures of dispersion: correlation and regression, sampling theory, Coefficient of variation, standard deviation; Range and interquartile range; Grouped mean and grouped variance; Frequency distributions; One way ANOVA; Two-way ANOVA; AMOVA; student's t test, Q Test, FTest	L1, L2, L3	9
Module-II: Biostatistics II Pearsonian chi square Basic idea of probability, probability distributions, binomial, Poisson, normal Statistical quality control, Chi Square Test – Observed and expected frequencies, Calculating p values, assumptions of a chi square goodness of fit Correlation –Two-way scatter plot, Pearson's correlation coefficient; Regression – regression concepts, simple linear regression; Calculation of R ² and p.	L2, L3, L4	9

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Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	CT	HA	S/V/Q	ATTD	EE
Weightage(%)	15	5	5	5	70

Texts /References

- Rosner, Bernard. *Fundamentals of Biostatistics*, Thomson-Brooks/Cole (2006) ISBN 1473737680.
- Sharma, A.K. *Textbook of Biostatistics I*, Discovery Publishing House (2005) ISBN 10818356030.
- Mount, David W. *Bioinformatics: Sequence and genome analysis*, CSHL Press (2004) ISBN 9780879697129.
- Alphey, Luke. *DNA Sequencing: From Experimental Methods to Bioinformatics*, BIOS Scientific Publishers (1997) ISBN 9789813083455.
- Parry-Smith, David, Teresa Attwood. *Introduction to Bioinformatics*, Pearson Education India (1999) ISBN 0582327881.

CO, PO, PSO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	1	1	-	1	-	-	-	-		-	1	1	
CO2	1	1	-	2	-	-	-	-		-	1	1	
CO3	1	1		-	-	-	1	-		1	-	1	
CO4	1	1					1			1		1	

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BCH4106	INSTRUMENTATION TECHNIQUES	L	T	P	C
Version 1.1	Date of Approval: 7 th December, 2021	2	1	0	3
Pre-requisites/Exposure	Basic concepts of Basic instrumentation techniques				
Co-requisites					

Course Description

Biochemical studies rely on the availability of appropriate analytical techniques and their applications. This course deals with the different biochemical techniques such as spectrophotometry, Mass spectrometry, Microscopy and chromatography to gain knowledge on the biomolecule such as proteins, lipids, carbohydrates, nucleic acids and their function.

Course Objectives

The objective of this course is to

1. Provide students with an insight into the basic instrumentation techniques used in biochemical research
2. Make them familiarize with cutting edge experimental techniques.

Course Outcomes

On completion of this course, the students will be able to

- CO1. Identify the range and theories of instrumental methods available in analytical chemistry.
CO2. Describe the appropriate selection of instruments for the successful analysis of complex mixtures.
CO3. Predict the role of a biochemist in measurement and problem solving in biochemical analysis.
CO4. Analyze the requirements for advanced methods of separation and analysis.

Course Contents:

Modules	Blooms level*	Number of hours
MODULE-I: Microscopy Principle of light microscopy, phase contrast microscopy, fluorescence microscopy, scanning electron microscopy, transmission electron microscopy, Confocal microscopy, Cryo-electron microscopy Chromatographic techniques	L1, L2, L3	8
MODULE-II: Chromatography and Centrifugation Preparation of sample, different methods of cell lysis, salting out, dialysis. Introduction to chromatography. Different modes of chromatography: paper, thin layer and column. Preparative and analytical applications. Principles and applications of: Paper Chromatography, Thin Layer Chromatography, Ion Exchange Chromatography, Hydrophobic interaction chromatography Molecular Sieve Chromatography, Affinity Chromatography, reverse phase chromatography. Principle of centrifugation, basic rules of sedimentation, sedimentation coefficient. Various types of centrifuges, low speed centrifuge, high speed centrifuge and ultracentrifuge, types of rotors. Application of centrifugation, differential centrifugation, density gradient centrifugation- zonal and isopycnic.	L2, L3	8

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MODULE-III: Spectroscopy Electromagnetic radiation, interaction of radiation with biomolecules, principle of UV-visible absorption spectrophotometry, Lambert's Law, Beer's Law, working of a spectrophotometer. Applications of UV-visible absorption spectrophotometry in biochemistry. Fluorescence spectrophotometry: Phenomena of fluorescence, intrinsic and extrinsic fluorescence, applications of fluorescence in biochemistry. Circular Dichroism, FTIR, ITC, TGA, DSC.	L2, L3, L4	8
MODULE-IV: Mass spectrometry & advanced fluorescence techniques Mass spectrometry; m/z ratio, McLafferty rearrangement, characteristic spectra of some simple organic molecules, Time of Flight (TOF), MS-MS, ESI-MS, MALDI, GCMS and LCMS. Fluorescence correlation spectroscopy (FCS), FRAP, FACS, FRET Techniques.	L2, L3, L4	8

*Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	CT	HA	S/V/Q	ATTD	EE
Weightage(%)	15	5	5	5	70

A: Attendance, CT: Class Test, S/V/Q: Seminar/Viva/Quiz, HA: Home Assignment, EE: End Semester Examination

Text / References

- A. Skoog, Douglas, M. West, Donald, Holler, F. James, Stanley, R. Crouch. *Fundamentals of Analytical Chemistry (with CD-ROM and Infotrac)*, Brooks Cole (1969) ISBN 9780030148286.
- Patnaik, Pradyot. *Dean's Analytical Chemistry Handbook*, McGraw-Hill Professional (2004) ISBN 9780071410601.
- C. Harris, Daniel. *Quantitative Chemical Analysis*, 6th Edition, W. H. Freeman Company (2003) ISBN 9781429275033.
- D. Christian, Gary. *Analytical Chemistry*, Wiley, 6th edition (2007) ISBN 978-0-470-88757-8.
- Pergamon, Elsevier. *Comprehensive Medicinal Chemistry*, Hansh C, Vol. 4th (2017) ISBN 0080370578.
- T. Nogrady. *Medicinal Chemistry-A Biochemical Approach*, Oxford University Press New York (2005) ISBN 0195104560.

CO, PO, PSO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	1	1	-	-	-	-	1	1	1	1	1	1	
CO2	1	1	-	-	-	-	2	3	1	1	1	1	1
CO3	1	1		-	1	-	-	-	1	1		1	1
CO4	1	1		1	-	-	-	1	1	1		1	1

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BCH4105	BIOCHEMISTRY LAB	L	T	P	C
Version 1.1	Date of Approval: 7th December, 2021	0	0	4	2
Pre-requisites/Exposure	Basic Concepts of Biochemistry lab				
Co-requisites					

Course Description

This course deals with organic preparation and biomolecules quantification. This curriculum provides students with practical knowledge and hands-on experience with some of the most common experimental methods used in biochemical and molecular biological research. The main objectives of this course are: To make students familiar with methods and instruments used in biochemistry laboratories, relate these basic biochemistry skills to a chosen field of interest, learn how to collect, record and analyze experimental data, present results clearly in graphic, tabular, and written formats, and perform experiments.

Course Objectives

The objective of this course is to

1. Help students learn bioorganic preparations and analysis.
2. Make students learn basic biochemistry experiments.

Course Outcomes

On completion of this course, the students will be able to

- CO1. Describe and perform bioorganic analysis.
 CO2. Demonstrate the theory and experiments of analytical biochemistry.
 CO3. Analyze use of fractionation and quantification of proteins.
 CO4. Outline isolation of proteins from different sources.

Course Content

(A minimum number of 10 experiments must be performed)

Modules	Blooms level*	Number of hours
Bioorganic Preparations and Analytical Biochemistry <ol style="list-style-type: none"> 1. Safety measures in laboratories. 2. Preparation of normal and molar solutions. 3. Preparation of buffers, phosphate and acetate buffers. 4. Titration of a weak acid using a pHmeter 5. Qualitative test for lipids. 6. Qualitative test for nucleic acids. 	L1, L2, L3	16
<ol style="list-style-type: none"> 7. Determination of pKa and titration of Amino acids using pHmeter 8. Separation of amino acids/ sugars/ bases by thin layer chromatography/paper chromatography. 9. Organic Preparations -Dinitrophenyl hydrazone of ascorbic acid or any other ketone 10. Qualitative and Quantitative Analysis of- 	L2, L3	16

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a. Carbohydrates b. Free and bound phosphate c. Vitamin C		
11. Fats: Acid number, saponification, and iodine values 12. Fractionation of egg proteins and its quantification 13. Isolation of lipids from egg yolk and separation by TLC 14. Cholesterol estimation.	L2, L3, L4	16

*Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	CT	HA	S/V/Q	ATTD	EE
Weightage(%)	15	5	5	5	70

A: Attendance, CT: Class Test, S/V/Q: Seminar/Viva/Quiz, HA: Home Assignment, EE: End Semester Examination

Text/ References

- Switzer, R.W & Garrity, L.F. *Experimental Biochemistry*, W.H. Freeman & Co, ISBN 0716701790.
- Boyer, R. *Modern Experimental Biochemistry*, Pearson Education ISBN 978080533110.
- Wilson, K. & Walker, J. *Practical Biochemistry*, Cambridge Univ. Press, ISBN 0-521-65873-X.
- Jayaraman, J. *Laboratory Manual in Biochemistry*. Narosa Publishing House, ISBN 978-81-8487-337-5.
- Plummer, D.T. *Practical Biochemistry*. TATA McGraw-Hill, ISBN 9780070941625.
- Gupta, R.C. & Bhargava, S. *Practical Biochemistry*, ISBN 8123901240.
- Chadha, P.V. *Experimental Physiology and Biochemistry* ISBN 9788171791415.
- Rao, B.S. & Deshpande, V. *Experimental Biochemistry – A Student Companion*, ISBN 9788188237418.
- I.K. International Pvt. Ltd. N. Delhi, Mumbai, Bangalore (2005).

CO, PO, PSO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	1	1	-	2	-	-	-	-	1	-	1	1	1
CO2	1	1	-	-	-	-	-	-	1	-	1	1	1
CO3	1	1		-	-	-	1	1	1	-	1	1	1
CO4	1	1		-	-	-	1	1	1	-	1	1	1

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BCH4107	BIOCHEMICAL ENGINEERING LAB	L	T	P	C
Version 1.1	Date of Approval: 7th December, 2021	0	0	4	2
Pre-requisites/Exposure	Basic concepts of fundamental Chemistry and Biology				
Co-requisites					

Course Description

Biochemical Engineering laboratory provide learning with research and many opportunities for innovative, practical training. Our state-of-the-art labs give our students the resources to conduct research in areas including fermentation, distillation, process engineering, biomedical engineering, quantification of production, enzyme purification, immobilization and biotechnology.

Course Objectives

The objective of this course is to

1. Help students learn bioorganic preparations and analysis.
2. Make students learn basic biochemistry experiments.

Course Outcomes

On completion of this course, the students will be able to

- CO1.Describethe techniques used in food, feed, and pharmaceutical industries.
CO2.Analyze requirements of some of the modern biotechnology experiments.
CO3. Outline the requirements of industry requirements.

Course Contents

(A minimum number of 10 experiments must be performed)

Modules	Blooms level*	Number of hours
Expt. 1: Cheese Production from Milk Expt. 2: Digestion of Protein into Amino Acid Expt. 3: Cellulose Degradation assay by salivary amylase method	L1, L2, L3	16
Expt. 4: Starch Hydrolysis by Amylase Expt. 5: Enzyme Immobilization by Gel Entrapment- Entrapment in Polyacrylamide Gel, Entrapment In Alginate Gel, Enzyme Entrapment In Gelatin Gel Expt. 6: Aseptic Culture Techniques --- Use of a Steam Autoclave and Petri Dish Preparation	L2, L3	16
Expt. 7: Batch Submerged Fermentation of Baker Yeast in a Shaker Flask, Expt. 8: Wine Fermentation	L2, L3, L4	16

*Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

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Examination Scheme:

Components	CT	HA	S/V/Q	ATTD	EE
Weightage(%)	15	5	5	5	70

A: Attendance, CT: Class Test, S/V/Q: Seminar/Viva/Quiz, HA: Home Assignment, EE: End Semester Examination

Text/ References

- Switzer, R.W. & Garrity, L.F. *Experimental Biochemistry*, W.H. Freeman & Co (1977) ISBN 0716701790.
- Boyer, R. *Modern Experimental Biochemistry*. Pearson Education (1999) ISBN 978080533110.
- Wilson, K. & Walker, J. *Principles and Techniques of Biochemistry and Molecular Biology*, Cambridge Univ. Press (1994) ISBN 0-521-65873-X.
- Jayaraman, J. *Laboratory Manual in Biochemistry*, Narosa Publishing House (1981) ISBN 978-81-8487-337-5.
- Plummer, D.T. *Practical Biochemistry*, TATA McGraw-Hill (1971) ISBN 9780070941625.
- Gupta, R.C. & Bhargava, S. *Practical Biochemistry*, CBS (1992) ISBN 8123901240.
- Chadha, P.V. *Experimental Physiology and Biochemistry*, Jaypee Brothers (1986) ISBN 9788171791415.
- Kleyn, Gilstrap. Holt, Nester. *Experiments in Microbiology*, Rinehart and Winston (1978) ISBN 0030393361.
- Rao, B.S. & Deshpande, V. *Experimental Biochemistry– A Student Companion*, I.K. International Publishing House Pvt. Limited (2013) ISBN 9788188237418.

CO, PO, PSO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	1	1	-	2	-	-	-	-		1	1	1	1
CO2	1	1	-	-	-	-	-	-	1	1	1	1	1
CO3	1	1		-	-	-	1	1	1	1	1	1	1
CO4	1	1		-	-	-	1	1	1	1	1	1	1

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BCH4108	RESEARCH SEMINAR	L	T	P	C
Version 1.1	Date of Approval: 7 th December, 2021	0	0	0	1
Pre-requisites/Exposure	Graduate standing in chemistry/ biochemistry/ Forensic Sciences on consent of instructor				
Co-requisites					

Course Description

This course is for first-year students and is a one-credit seminar to introduce students to the major research aspects of Biochemistry. They can learn about planning their courses and doing research, find out what other majors are doing, meet some of the faculty, and learn strategies for being successful.

Course Objectives

1. To help students get accustomed to requirements of scientific presentation.
2. To improve student's confidence of demonstration power.

Course Outcomes

On completion of this course, the students will be able to

CO1. Recognizes a one to one and hands on experience on any aspect of their learning for research based activity.

CO2. Describe details of departmental research (This one will be running through out first semesters on every Monday any Lecture, where normally Ph.D. students /internal Faculties /external speakers will give talk on their research or other topic of their specialization).

CO3. Outline the basics of scientific presentation.

Course Contents

Modules	Blooms level*	Number of hours
SEMINAR Guidelines for Seminar <ol style="list-style-type: none"> a) Choosing the topic b) Finding relevant materials c) Presentation d) Response to queries e) Submission of the write up <p>Presentation of the seminar will be of 30 min maximum (25 min presentation and rest question answer session)</p>	L2,,L4,L5	NTCC



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Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	CT	PP	RQ	WU
Weightage(%)	30	40	20	10

CT- Content, **PP-** Presentation, **RQ-** Response to the queries **WU-** Write up

CO, PO, PSO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	1	1	1	2	-	-	-	-		-		1	1
CO2	1	1	-	-	-	-	1	-	1	-		1	1
CO3	1	1	1	3	-	-	1	1	1	-		1	1

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BCH4109	BIOCHEMISTRY OF PROTEINS AND ENZYMES	L	T	P	C
Version 1.1	Date of Approval: 7 th December, 2021	0	0	0	1
Pre-requisites/Exposure	Graduate standing in chemistry/ biochemistry/ Forensic Sciences on consent of instructor				
Co-requisites					

Course Description:

The course deals with the basic concepts of Protein and enzyme biochemistry. This course will provide students with knowledge of the fundamentals of enzyme kinetics and conceptual understanding of proteins.

Course Objectives

The objective of this course is to

1. Help students learn basics of proteins and enzymes.
2. Make students understand the basics of protein biochemistry

On completion of this course, the students will be able to

- CO1. Analyze the concepts of enzyme kinetics.
 CO2. Explain the basic aspects related to protein biochemistry.
 CO2. Predict the basics of protein folding concepts
 CO4. Assess the requirements of protein purification.

Course Content

Modules	Blooms level*	Number of hours
Module-I: Introduction to amino acids, peptides and proteins Amino acids and their properties - hydrophobic, polar and charged. Physical properties, optical properties (Stereoisomerism); Chemical properties (acid base properties, titration curve) of amino acids; Uncommon amino acids and their functions. Multimeric proteins, Conjugated proteins and Metallo-proteins. Diversity of peptide and protein function and their applications. Solid phase peptide synthesis. Organization of protein structure into primary, secondary, tertiary and quaternary structures. alpha-helix beta- structure, beta- helix, super secondary structure. Tertiary Structure: Forces stabilizing, unfolding/ refolding expt. Prediction of tertiary Structure. Quaternary structure – hemoglobin. Ramachandran plot. Helix coil transitions, Vander Walls, electrostatic, Hydrogen bonding, and hydrophobic interactions. Protein motif; zinc finger, leucine zipper, Solid phase peptide synthesis. N-terminal and C-terminal amino acid analysis. Sequencing techniques - Edman degradation. Generation of overlap peptides using different enzymes and chemical reagents. Disulfide bonds and their location. Forces stabilizing the protein structure - covalent and non-covalent. Importance of primary structure in protein folding. The peptide bond, dihedral angles psi and phi, helices, sheets and turns, Ramachandran map. Motifs and domains. Structures of myoglobin and hemoglobin, alpha-keratin, silk fibroin, collagen	L1, L2, L3	8
Module II: Protein folding, Conformational Diseases and Specialized proteins Denaturation and renaturation of Ribonuclease A – discovery of protein	L2, L3	6

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<p>folding. Introduction to thermodynamics of folding and molten globule. Assisted folding by molecular chaperones, chaperonins and PDI. Defects in protein folding. Diseases associated with misfolding – Alzheimer's and Prion based. Transport protein: Hemoglobin - Oxygen binding curves, influence of 2,3-BPG, CO₂ and H⁺, Hill plot, Cooperativity between subunits and models to explain the phenomena - concerted and sequential models. Hemoglobin disorders-sickle cell anemia, thalassemia's. Motor proteins- Actin and myosin. Defense proteins- Antibodies, Membrane proteins Integral and membrane associated proteins. Hydropathy plots to predict transmembrane domains</p>		
<p>Module-III: Extraction, purification and characterization of proteins Solubilization of proteins from their cellular and extracellular locations. Use of mechanical and chemical methods, homogenization, ultrasonication, French press and centrifugation. Ammonium sulphate fractionation, solvent fractionation, dialysis and lyophilization Ion exchange chromatography, molecular sieve chromatography, hydrophobic interaction/reverse phase chromatography, affinity chromatography, HPLC and FPLC. Determination of purity, molecular weight, extinction coefficient and sedimentation coefficient. IEF, SDS-PAGE and 2-D electrophoresis.</p>	L2, L3, L4	6
<p>Module-IV: Enzyme Kinetics Nature of enzymes - protein and non-protein (ribozyme, abzymes). Cofactor and prosthetic group, apo- and holo-enzymes. Features of enzyme catalysis. Classification of enzymes and nomenclature. Fischer's lock & key and Koshland's induced fit hypothesis. Enzyme specificity. Enzyme kinetics- Michaelis-Menten equation, Lineweaver-Burk plot. Determination of K_m, V_{max}, K_{cat}. Factors affecting enzyme activity. Enzyme inhibition-Reversible (competitive, uncompetitive, non-competitive) and irreversible inhibition.</p>	L2,L3,L4	8
<p>Module-V Mechanism of enzyme action, enzyme regulation and Bioluminescence General mechanisms of action. Acid-base and covalent catalysis (chymotrypsin, lysozyme). Metal activated enzymes and metalloenzymes. Allosteric regulation and feedback inhibition (ATCase). Reversible covalent modification (glycogen phosphorylase). Proteolytic cleavage zymogen. Multienzyme complex. Coenzymes. Isoenzymes. Applications of enzymes in research. Application of enzymes in diagnostics (SGPT, SGOT, creatine kinase), Enzyme immunoassay (HRP), Enzyme therapy Pancreatic enzymes; Trypsin, Chymotrypsin, Elastase, Protease and Protease inhibitors. Multienzyme complex: Pyruvate Dehydrogenase system, (<i>E. coli</i> and mammalian), Tryptophan synthetase, fatty acid synthetase. Clogged gutter mechanism of enzyme inhibition. Bioluminescence; History, Source of Bioluminescence material, examples of bioluminescence organism Mechanism of Bio- luminescence in specific organisms, Evolution and Bioluminescence. Use and applications of bioluminescence Unusual Bio-molecules; Prions, Fullerenes, Small Nuclear Riboproteins (SNURPNs), Lectins, Antifreeze proteins, Stress Proteins, Chaperons, Ionophores (Crown ethers, Cryptans) Biomimetic Chemistry- Mimicking of Ion Channels, Enzyme receptor carriers, antibodies, Vesicles and Sensors, Enzyme mimicking-Cram's Protease Model, Rebok's allosteric Model and Flavinophores for NAD Host-guest Chem</p>	L2,L3,L4	8

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*Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	CT	HA	S/V/Q	A	EE
Weightage(%)	15	5	5	5	70

A: Attendance, CT: Class Test, S/V/Q: Seminar/Viva/Quiz, HA: Home Assignment, EE: End Semester Examination

Text/References:

- L. Nelson, David and M. Cox, Michael. *Lehninger Principles of Biochemistry*, W.H. Freeman and Company, 4th Edition, New York (2006) ISBN 101464109621.
- Voet, Donald, G. Voet, Judith. *Biochemistry*, John Wiley & Sons, 4th Edition, (2010) ISBN 978-0-470-57095-1.

CO, PO, PSO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	1	1	-	-	-	-	-	-	1	-	-	-	
CO2	1	1	-	-	-	-	-	-	1	-	-	-	
CO3	1	1	3	-	-	-	-	-	1	-	-	-	
CO4	1	1	3	-	-	-	-	-	1	-	-	-	

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BCH4111	BIOINFORMATICS LAB	L	T	P	C
Version 1.1	Date of Approval: 7 th December, 2021	3	1	0	4
Pre-requisites/Exposure	Basic concept of Bioinformatics analysis				
Co-requisites					

Course Description

This course is designed with preliminary idea of biological data analysis which will help students learn applications of Bioinformatics.

Course Objectives

The objective of this course is to

1. Prepare students with a clear concept of basic bioinformatics applications.
2. Help them understand fundamental concepts database and big data analysis.

Course Outcomes

On completion of this course, the students will be able to

- CO1. Describe the fundamental concepts of biological databases.
CO2. Identify the different methods of docking and modelling.
CO3. Apply the concept basic bioinformatics search for solving biological problems.
CO4. Outline the concept of structural repository of biological macromolecules.

Course Contents

(A minimum number of 10 experiments must be performed)

Modules	Blooms level*	Number of hours
<ol style="list-style-type: none"> 1. Sequence retrieval (protein and gene) from NCBI and Molecular file formats FASTA, GenBank/Genpept/DDBJ/PDB/SwissProt. 2. Structure download (protein and DNA) from PDB and Molecular viewer by visualization software (Pymol / Rasmol/Jmol/Chimera/DiscoveryStudio) 3. BLAST suite of tools for pairwise alignment 4. Multiple sequence alignment (CLUSTALW/TCoffee) and construction of guidetrees 	L1, L2, L3	4
<ol style="list-style-type: none"> 5. Domain Analysis (pfam/CDART/ CDD/ SMART/ProDom) 6. Gene prediction using GENSCAN/GLIMMER 7. Primary sequence analyses (Protparam) and Secondary structure prediction (GOR, nnPredict). Homology Modeling: Tertiary structure prediction (SWISSMODEL) and Protein structure evaluation - Ramachandran map (PROCHECK) 	L2, L3	4

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8. Homology Modeling: Tertiary structure prediction (SWISSMODEL) and Protein structure evaluation - Ramachandran map(PROCHECK) 9. Abintiomodeling 10. Molecular docking and simulation 11. Phylogeneticanalysis 12. Drug discovery projects and introduction ofSchrodinger 13. Structural alignment and introduction of Structure databases (CATH, SCOP, andPDBsum).	L2, L3, L4	4
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*Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	CT	HA	S/V/Q	ATTD	EE
Weightage(%)	15	5	5	5	70

A: Attendance, CT: Class Test, S/V/Q: Seminar/Viva/Quiz, HA: Home Assignment, EE: End Semester Examination

Text/References

- Ghosh, Z.andMallick,B. *Bioinformatics – Principles and Applications*, Oxford University Press (India), 1st ed. (2008) ISBN:9780195692303.
- Gromiha, M. Michael. *Protein Bioinformatics: From Sequence to Function*,Academic Press(2010) ISBN 9780123884244.
- W. Mount, David. *Bioinformatics: Sequence and Genome Analysis*, Cold Spring Harbor Laborator Press (New York),1st ed.(2001) ISBN: 0-87969-608-7137.
- Baxevanis, A.D. and Ouellette, B.F. *Bioinformatics: A Practical Guide to the Analysis of Genes and Proteins*, John Wiley & Sons Inc. (New Jersey), 3rdedition(2005) ISBN: 0-47147878-4.
- Krane, D.E. andRaymer, M.L. *Fundamental concepts of bioinformatics*,Pearson Education Inc. (2006) ISBN 9788177587579.
- Pevsner, J. *Bioinformatics and Functional Genomics*, John Wiley& Sons Inc. (New Jersey),1st edition (2003) ISBN0-47121004-8.

CO, PO, PSO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	1	1	-	2	-	-	-	-		1	1	1	1
CO2	1	1	-	-	-	-	-	-	1	1	1	1	1
CO3	1	1		-	-	-	1	1	1	1	1	1	1
CO4	1	1		-	-	-	1	1	1	1	1	1	1

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BCH4206	ADVANCED BIOCHEMISTRY LAB	L	T	P	C
Version 1.1	Date of Approval: 7 th December, 2021	0	0	4	2
Pre-requisites/Exposure	Basic concepts of Chromatography, Spectroscopy and Electrophoresis				
Co-requisites					

Course Description

This course is designed to provide a broad spectrum of modern techniques and their underlying physical, chemical and biological principles. Experiments include buffer preparation, pH measurements, absorption coefficients determination, chromatography and electrophoresis.

Course Objectives

The objective of this course is to

1. Provide students hands-on training in the major instrumentation techniques common to biochemistry.
2. Make students learn regular biochemistry experiments.

Course Outcomes

On completion of this course, the students will be able to

- CO1. Explain major instrumentation techniques common in biochemistry.
 CO2. Demonstrate separation techniques like chromatography and electrophoresis
 CO3. Prepare themselves with experiments involving spectroscopy.

Course Contents:

(A minimum number of 10 experiments must be performed)

Modules	Blooms level*	Number of hours
1. Verification of Beer-Lambert's law and determination of absorption coefficients 2. Paper chromatography – Separation of amino acids and carbohydrates in a mixture 3. Thin layer chromatography of fatty acids 4. DNA Gel Electrophoresis Isoelectric pH of casein	L1, L2, L3	12
5. Amino Acid Assay by Ninhydrin Colorimetric Method 6. Determination of pKa of acetic acid and glycine. 7. Digestion of Protein into Amino Acid	L2, L3	12
8. Isolation of chloroplast from spinach leaves and estimation of Chlorophyll content. 9. Separation of photosynthetic pigments by TLC 10. Isolation of mitochondria from liver and assay of marker enzyme SDH. 11. Isolation of mitochondria from liver and assay of marker enzyme SDH 12. Determination of CMC of detergents.	L3, L4	24

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13.Preparation of RBC ghostcell.		
14.Study the photosynthetic O ₂ evolution in Hydrilla plant.		
15.Isolation of Cytochrome C from Goat heart		

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	15	5	5	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester

Text/References

- Switzer, R.W. & Garrrity, L.F. *Experimental Biochemistry*, W.H. Freeman & Co. (1977) ISBN 0716733005.
- Boyer, R. *Modern Experimental Biochemistry*, Pearson Education (1999) ISBN 8177588842.
- Wilson, K. & Walker, J. *Practical Biochemistry*, Cambridge Univ. Press (2010) ISBN 9780521651042.
- J. Jayaraman *Laboratory Manual in Biochemistry*, Narosa Publishing House (1981) ISBN 812243049.
- Plummer, D.T. *Practical Biochemistry*, TATA Mc-Graw Hill (1971) ISBN 9780070841659.
- Gupta, R.C. & Bhargava, S. *Practical Biochemistry*, CBS (1992) ISBN 8123901240.
- Chadha, P.V. *Experimental Physiology and Biochemistry*, Jaypee Brothers (1986) ISBN 9788171791415.
- Kleyn, Gilstrap, Holt, Nester. *Experiments in Microbiology*, Rinehart and Winston (1978) ISBN 9780134605203.
- Rao, B.S. & Deshpande, V. *Experimental Biochemistry A Student Companion* -
- I.K. Interational Pvt. Ltd. N. Delhi, Mumbai, Bangalore (2005) ISBN 9788188237418.



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BCH4207	CELL BIOLOGY AND GENETICS LAB	L	T	P	C
Version 1.1	Date of Approval: 7th December, 2021	0	0	2	1
Pre-requisites/Exposure	Fundamental concepts of chromosome and gene				
Co-requisites					

Course Description

This course deals with the study of Chromosomes and provides the cytological explanation of different genetic disease. Chromosome studies are an important laboratory diagnostic procedure in prenatal diagnosis, in certain patients with mental retardation and multiple birth defects, in patients with abnormal sexual development, and in some cases of infertility or multiple miscarriages. Cytogenetic analysis is also useful in the study and treatment of patients with malignancies and hematologic disorder, the course also deals with experiments related to cellular proteins.

Course Objectives

The objective of this course is to

1. Help students learn fundamental concepts of cell division in lab
2. Make students learn structural details of chromosome.

Course Outcomes

On completion of this course, the students will be able to

- CO1. Identify the basic cell division processes of cells.
CO2. Predict the structural details and functions of chromosomes.
CO3. Analyze enzyme polymorphism.

Course content:

(A minimum number of 10 experiments must be performed)

Modules	Blooms level*	Number of hours
A) Cell Biology <ol style="list-style-type: none"> 1. Isolation & visualization of cellular proteins. 2. Quantification of cells by Trypan blue exclusion dye. 3. Calculation of nucleolar frequency following hematoxylin staining 4. Understanding principles of cell culture and aseptic. Techniques. 5. Preparation of adhesion and suspension cell cultures. 6. Assessment of proliferation in cultured cells by MTT. assay. 7. Observation of DNA fragmentation in apoptotic cells 	L1, L2, L3	12
A) Genetics Plant/Animal/Human Cytogenetics: <ol style="list-style-type: none"> 1. Squash preparation from root tips of Allium cepa, analyzing metaphase chromosomes and preparation of karyotype. 2. Squash preparation from root tips of Allium sativum, analyzing metaphase chromosomes and preparation of karyotype. 3. Squash preparation from root tips/shoot tips of Nigella sativa/ Aloe 	L2, L3	6

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<p>vera, analyzing metaphase chromosomes and preparation of karyotype.</p> <ol style="list-style-type: none"> Squash preparation of salivary glands of Dipteran larva to observe polytene chromosomes. Induction of polyploidy in onion roots. Estimation of mitotic index from root tips of <i>Allium cepa</i> Estimation of mitotic index from root tips of <i>Allium sativum</i>. Karyotype identification (from photographs) and explaining aspects of chromosome structure / behaviour crucial for interpreting results of chromosome analysis. Study of different human pedigrees (from photographs) Study different stages of meiosis by temporary preparation in flower buds (<i>Sagittaria</i> sp./<i>Rhoeo</i> sp./<i>Setcreasea</i> sp./ <i>Allium cepa</i>) / grasshopper testes. Identification of mitotic and meiotic chromosomes of humans from permanent slides. Smear technique to demonstrate sex chromatin in buccal epithelial cells. 		
<p>Molecular Genetics:</p> <ol style="list-style-type: none"> Demonstrate familiarity with databases of information pertaining to genes, markers, maps and diseases such as Online Mendelian Inheritance in Man (OMIM) and Medline; Understanding the principles of designing oligonucleotide primers for PCR and utilization of relevant software; <p>Biochemical / Pharmacogenetics:</p> <p>Electrophoretic screening for enzyme polymorphisms; estimation of enzyme deficiency / drug sensitivity.</p>	L2, L3, L4	6

Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	15	5	5	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text/References

- Switzer, R.W. & Garritty, L.F. *Experimental Biochemistry*, W.H. Freeman & Co. (1977) ISBN 0716733005.
- Boyer, R. *Modern Experimental Biochemistry*, Pearson Education (1999) ISBN 9780805305463.
- Wilson, K. & Walker, J. *Practical Biochemistry*, Cambridge Univ. Press (2010) ISBN 0521417694.
- Jayaraman, J. *Laboratory Manual in Biochemistry*, Narosa Publishing House (1981) ISBN 9780471639060.
- Plummer, D.T. *Practical Biochemistry*, TATA Mc-Graw Hill (1971) ISBN 9788185790466.
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- Chadha, P.V .*Experimental Physiology and Biochemistry*, JaypeeBrothers (1986) ISBN 9788171791415 .
- Kleyn, Gilstrap, NesterHolt..*Experiments in Microbiology*, Rinehart and Winston(1978) ISBN 9780030620577.
- Rao, B.S. & Deshpande, V. *Experimental BiochemistryA Student Companion*, I.K. International Pvt. Ltd. N. Delhi, Mumbai, Bangalore (2005) ISBN 9788188237418 .

CO, PO, PSO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	1	1		1	-	-	-	1		-		1	1
CO2	1	1	-		-	-	-	2		1		1	1
CO3	1	1		-	-		-			-		1	1

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BCH4208	CLINICAL BIOCHEMISTRY LAB	L	T	P	C
Version 1.1	Date of Approval: 7 th December, 2021	0	0	4	2
Pre-requisites/Exposure	Basic concepts of biomolecules, blood and urine				
Co-requisites					

Course Description

This course is designed to provide students with knowledge of techniques used in the Clinical Biochemistry laboratory for measurement of amino acids, proteins, carbohydrates, and lipids in body fluids. Our main focus is to develop the ability to recognize levels of these biochemical components in both normal and pathophysiological states.

Course Objectives

The objective of this course is to

1. Provide students with hands-on-training in isolation of cell organelles, DNA and RNA from various tissues, serum cholesterol.
2. Provide students learn estimation of the same, qualitative and quantitative analysis of saliva, urea and experiments on blood.

Course Outcomes

On completion of this course, the students will be able to

CO1. Apply experimental procedures biochemical tests to isolate organelles and bio-molecules.

CO2. Identify and describe the biochemical tests to health problems and explain their clinical significance in the assessment of lipid, and carbohydrate metabolism.

CO3. Identify and describe the biochemical tests used in the estimation, qualitative and quantitative analysis various bio-molecules.

Course Contents:

(A minimum number of 10 experiments must be performed)

Modules	Blooms level*	Number of hours
Clinical Biochemistry Lab <ul style="list-style-type: none"> • Absorption spectrum of hemoglobin isolated from wholeblood. • Qualitative and quantitative analysis.of: Urine (urea, uric acid, glucose, proteins, Bence-Jones proteins, Cl⁻, PO₃-3, Ca⁺² Estimation of creatinine) • Experiments onblood: <ul style="list-style-type: none"> A. Identification and count of blood.corpuscles B. Estimation of.haemoglobin C. Determination of A/G ratio in.serum <ul style="list-style-type: none"> • Blood pressure.measurement • Glucose tolerance.test • Estimation of serumT4 • HCG based pregnancy.test • Estimation of serumelectrolytes • Isolation and estimation of serumcholesterol • Lipid Profile: Triglyceride,Cholesterol Ratio, Mid Arm Muscle Area • Bloodgrouping • Anthropometric measurements: 	L1, L2, L3	24

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<p>BMI, Waist/Hip</p> <p>(MAMA), Mid Arm Area (MAA).</p> <ul style="list-style-type: none"> • Case studies: Renal clearance, ECG, LFT, EEG • Separation of isoenzymes of LDH by electrophoresis. • Assay of serum transaminases – SGOT and SGPT. • Estimation of serum urea. • Estimation of serum uric acid. • Estimation of serum creatinine. • Estimation of bilirubin • Assay of glutamate dehydrogenase 		
<ul style="list-style-type: none"> • Isolation and estimation of RNA and DNA from yeast, liver, and plants • Extraction, separation and determination of absorption spectra of plant pigments • Isolation and estimation of serum cholesterol 	L2, L3	
<ul style="list-style-type: none"> • Estimation of proteins by Biuret / Lowry / Bradford method and UV absorbance measurements. • Ammonium sulphate fractionation of crude homogenate from germinated mung beans • Enzyme activity assay • Assay to determine enzyme activity and specific activity • Progress curve plot for an enzyme • Effect of pH/temperature on enzyme activity • Determination of K_m and V_{max} using Lineweaver-Burk plot. • Calculation of inhibitory constant (K_i) for an enzyme • SDS-PAGE analysis of proteins • Desalting Chromatography 	L1, L2, L3	24

Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	15	5	5	70

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CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination, Att: Attendance

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Text/References

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- Boyer, R. *Modern Experimental Biochemistry*, Pearson Education (1999) ISBN 9780805331110.
- Wilson, K. & Walker, J. *Practical Biochemistry*, Cambridge Univ. Press (2010) ISBN 0521417694.
- Jayaraman, J. *Laboratory Manual in Biochemistry*, Narosa Publishing House (1981) ISBN 9780852264287.
- Plummer, D.T. *Practical Biochemistry*, TATA Mc-Graw Hill (1971) ISBN 0070994870.
- Gupta, R.C. Bhargava, S. *Practical Biochemistry*, CBS (1992) ISBN 9788123901244.
- Chadha, P.V. *Experimental Physiology and Biochemistry*, Jaypee Brothers (1986) ISBN 9788171791415.
- Kleyn, Gilstrap, Holt, Nester. *Experiments in Microbiology*, Rinehart and Winston (1978) ISBN 9780030393365.
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- I.K. International Pvt. Ltd. N. Delhi, Mumbai, Bangalore (2005) ISBN 9788188237418.

CO, PO, PSO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	1	1		1	-	-	1	1		-	1	1	1
CO2	1	1			-	-	1	2		1	1	1	1
CO3	1	1		-	-		-	1		1	1	1	1

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BCH4209	IMMUNOLOGY	L	T	P	C
Version 1.1	Date of Approval: 7 th December 2021	2	1	0	3
Pre-requisites/Exposure	Basic concepts of innate, acquired immunity and vaccination				
Co-requisites					

Course Description

This course will help the students to understand fundamentals of immune system. They will be able to know about specialized cells and biomolecules involved in our immune system. Student will get an exposure to understand the antigen-antibody interactions and development of diversified population of antibodies and T cell receptors. Students will be able to know the concepts of MHC restriction and graft rejection. This course will provide them an exposure for cutting edge research of immunology.

Course Objectives

The objective of this course is to

1. Familiarize students about the structural features of the components of the immune system as well as their functions.
2. Provide an overview of clinical immunology will help students to understand the utmost importance of this particular branch of science.

Course Outcomes

On completion of this course, the students will be able to

CO1. Identify the fundamental features of immune system.

CO2. Describe structural features of antigen, antibody and the techniques involved in antigen antibody interactions.

CO3. Determine diversity of antibody, T cell receptors, complement system, hypersensitivity, concepts graft acceptance, rejection and MHC restriction. etc

CO4. Compare diseases arising due to immunodeficiency and fundamentals of vaccine development.

Course Content

Modules	Blooms level*	Number of hours
MODULE-I: Cellular basis of Immunity Historical Perspective, Innate and Adaptive Immunity, Hematopoiesis, cells of the immune system, primary and secondary lymphoid organs and tissues. Anatomical barriers, cell types of innate immunity, soluble molecules and membrane associated receptors (PRR), connections between innate and adaptive immunity, localized and systemic response. Complement activation by classical, alternate and MB lectin pathway, biological consequences of complement activation, regulation and complement deficiencies	L1, L2, L3	9
MODULE-II: Antigens and Antibody Antigens, carriers, adjuvants and haptens, factors responsible for immunogenicity, B and T cell epitopes. Structure, classes and subclasses of immunoglobulins, effector functions of antibody, antigenic determinants on Ig, Ig super family. Clonal selection theory of antibody production, monoclonal and polyclonal antibodies, poly reactive antibodies, catalytic antibodies, abzymes. Monoclonal antibodies production and applications	L2, L3	9
MODULE-III: Biology of the B Lymphocyte & T Lymphocyte Dreyer-Bennett hypothesis, Clonal selection theory of antibody production,	L2, L3, L4	9

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multigene organization of Ig locus, mechanism of V region DNA rearrangement, mechanisms of antibody diversity. Antigen independent phase of B cell maturation and selection, humoral response – T-dependent and T-independent response, anatomical distribution of B cell populations. General organization and inheritance of MHC, structure, distribution and role of MHC class I and class II proteins, pathways of antigen processing and presentation. Structure and role of T cell receptor (TCR) and co-receptor, T cell development, generation of receptor diversity, selection and differentiation. General properties of effector T cells, cytotoxic T cells (Tc), natural killer cells; NK - T cells and antibody dependent cellular cytotoxicity(ADCC).		
MODULE-IV: Autoimmunity and Hypersensitivity Self-tolerance and autoimmunity, Organ specific and systemic autoimmune diseases, Gell and Coombs classification, IgE mediated (Type I) hypersensitivity, antibody mediated cytotoxic (Type II) hypersensitivity, immune complex mediated (type III) hypersensitivity and delayed type (Type IV) hypersensitivity	L2, L3, L4	5
MODULE-V: Transplantation Immunology and Vaccines Immunological basis of graft rejection, clinical manifestations, immunosuppressive therapy and privileged sites. Vaccines - active and passive immunization, types of vaccines	L2, L3, L4	4

*Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	15	5	5	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text /References:

- Alberts, Bruce. *Molecular biology of the Cell*, Garland publishing Inc.(2002) ISBN 0815332181.
- Kuby, Janis. *Immunology*, Macmillan Higher Education, 3rd ed. (1998) ISBN 9780716728689.
- Roit. *Essentials of immunology*, Blackwell scientific publishing, London, 5th ed. (1971) ISBN 978-1-118-41577-1.
- Abbas. *Cellular and Molecular Immunology*, Saunders, 3rd ed. (2005) ISBN 9780323316149.

CO, PO, PSO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	1	1	-	-	-	-	-	-		1	1	1	1
CO2	1	1	-	-	-	-	-	-		1	1	1	1
CO3	1	1		-	-	-	-	2		-	-	1	1
CO4		1		-	-	-	-	-		-	-	1	1

1: strongly related, 2: moderately related and 3: weakly related

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BCH4231	TERM PAPER	L	T	P	C
Version 1.1	Date of Approval: 7th December, 2021	0	0	0	2
Pre-requisites/Exposure					
Co-requisites					

Course Description

The aim of the term paper is to provide the students with an opportunity to further enhance their knowledge in a sector of their choice by undertaking a significant practical unit of examining and analyzing various aspects of Chemistry & its application at a level commensurate with the learning outcomes of the various courses taken up them in the ongoing semester.

Course Objectives

The objective of this course is to

1. Judge the understanding as well as application of the knowledge gained by the students.
2. Provide the students with an opportunity to further enhance their knowledge in a sector of their choice by undertaking a significant practical unit of examining and analyzing various aspects of Chemistry & its application at a level commensurate with the learning outcomes of the various courses taken up them in the ongoing semester.

Course Outcomes

On completion of this course, the students will be able to

- CO1 Enhance their knowledge in a sector of their choice by undertaking a significant practical unit of examining.
- CO2 Analyze various aspects of chemistry and applied chemistry at a level commensurate with the learning outcomes of the various courses taken up by them in the ongoing semester.
- CO3. Enhance their knowledge by extensive literature survey.

Course Contents:

Modules	Blooms level*	Number of hours
<ol style="list-style-type: none"> 1. The term paper will be related to the contemporary business issue and the topic will be given by the department. 2. The presentation of the term paper is scheduled to be held before the commencement of Semester examinations. 3. The paper will carry 100 marks that will be marked on the basis of understanding and organization of content based on the literature review. The Bibliography shall form an important part of the paper. 4. Examples of a few broad areas for term paper (List is indicative, not exhaustive) <ul style="list-style-type: none"> • Inorganic chemistry • Organic chemistry • Physical chemistry • Green chemistry • Agriculture chemistry 	L1, L2 L3, L4, L6	-

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Bloom's Level:

L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Modes of Evaluation:

Examination Scheme:

Organisation and relevance of content	Literature Review	Bibliography	Presentation	Total
30	30	20	20	100

CO, PO, PSO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	1	1	1	2	-	-	-	-		-		1	1
CO2	1	1	-	-	-	-	1	-	1	-		1	1
CO3	1	1	1	3	-	-	1	1	1	-		1	1

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BCH4301	RECOMBINANT DNA TECHNOLOGY	L	T	P	C
Version 1.1	Date of Approval: 7th December, 2021	2	1	0	3
Pre-requisites/Exposure	Basic concepts of Genetic engineering				
Co-requisites					

Course Description

This course will help the students to understand current aspects of gene cloning techniques, genomic and DNA library construction, expression of recombinant proteins etc. Other than gene cloning students will be able to know the plant and tissue culture techniques which are primary requisites of gene transformation, protein over expression, tagged based fluorescence microscopy etc. Animal tissue culture will be beneficial during various experimental setups of cell biology, cancer biology and immunology. Learning of plant tissue culture techniques will be highly beneficial to understand fundamentals of transgenic plants.

Course Objectives

The objective of this course is to

1. Help students in understanding the tools used in gene exploration, creation of genomic library, cloning and expression of proteins.
2. Give the students fundamental concepts of tissue culture and an idea about transgenic plants and animals.

Course Outcomes

On completion of this course, the students will be able to

- CO1. Describe the basic concepts of gene cloning.
- CO2. Identify and describe the multiple types of polymerase chain reactions and vector maps
- CO3. Apply various plant and tissue culture techniques.
- CO4. Outline fundamentals of hybridoma technology, *invitro* fertilization and transgenic animals and plants.

Course Content



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Modules	Blooms level*	Number of hours
MODULE-I: Fundamentals of Gene Cloning Restriction and modification systems, restriction endonucleases and other enzymes used in manipulating DNA molecules. sticky ends, blunt ends, linkers and adapters, homopolymer tailing, Synthetic oligonucleotides. Ligation of DNAmolecules.	L1, L2, L3	6
MODULE-II: Cloning Vectors Plasmids and bacteriophages as vectors for gene cloning. Cloning vectors based on <i>E. coli</i> plasmids, pBR322, pUC8, pGEM3Z. Cloning vectors based on M13 and λ bacteriophage, and in vitro packaging. Vectors for yeast, Ti-plasmid, and retroviral vectors, high capacity vectors BAC and YAC.	L2, L3	6
MODULE-III: Transformation, Transfection and Gene Libraries Uptake of DNA by cells. Selection and identification for transformed cells, insertional inactivation, blue- white selection. Transfection. Chemical and physical methods of DNA introduction into cells. The problem of selection, direct selection, marker rescue. Identification of recombinant phages, cDNA and Genomic libraries, identification of a clone from gene library, colony and plaque hybridization probing, Southern and Northern hybridization, methods based on detection of the translation product of the cloned gene.	L2, L3, L4	8
Module-IV: PCR, DNA Sequencing and Fundamentals of polymerase chain reaction, Types of PCR; hot start, multiplex, two step, reverse transcriptase PCR and Nested PCR, quantitative PCR, Primer designing for PCR. Cloning PCR products. DNA sequencing by Sanger's method including Automated Sanger's DNA sequencing. Introduction to Next Generation Sequencing.	L2, L3, L4	8

*Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination
Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	15	5	5	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

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Text/ References:

- R.Glick, Bernard and J.Pasternak, Jack. *Molecular Biotechnology*, Wiley (2010) ISBN 9789746521772.
- Gamborg, O. N, Verlag, Springer. *Plant cell, tissue and organ culture*, Berlin Heidelberg(1995) ISBN 9783662586709.
- Jogdanad, S.N. *Gene. Biotechnology*, Himalaya Publishing House(2009) ISBN 9789352620876.
- Gupta, P.K. *Biotechnology and Genomics*, Rastogi Publications (2004) ISBN 9788171338450.
- Ramawat, K.G. *Biotechnology: Secondary Metabolites*, CRC Press (2007) ISBN 9781578084289.
- Singh, B.D.. *Biotechnology*, Kalyani Publishers (2010) ISBN 9783718658893.

CO, PO, PSO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	1	1	-	-	-	-	-	-		1	1	1	1
CO2	1	1	-	-	-	-	-	-		1	1	1	1
CO3	1	1		-	-	-	-	2		-	-	1	1
CO4	1	1		-	-	-	-	-		-	-	1	1

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BCH4303	MOLECULAR BIOLOGY	L	T	P	C
Version 1.1	Date of Approval: 7th December, 2021	2	1	0	3
Pre-requisites/Exposure	Basic concepts of replication, transcription, translation and viruses				
Co-requisites					

Course Description

This course covers a comprehensive study of the biochemical mechanisms that control the maintenance, expression, and evolution of prokaryotic and eukaryotic genomes. The topics include gene regulation, DNA replication, genetic recombination, and mRNA translation. The course also includes the virology in context of animal and plant viruses and their affect on genetic materials.

Course Objectives

The objective of this course is to

1. Give an insight into the processes of DNA replication, transposable genetic elements.
2. Provide indepth knowledge of protein synthesis, targeting, folding and destruction of proteins.
3. Provide fundaments of pathogenic viral infections and mechanism of their multiplication.

Course Outcomes

On completion of this course, the students will be able to

CO1. Describe the structure, biosynthesis and function of DNA and RNA at the molecular level

CO2. Identify interactions of DNA, RNA and Proteins within the cell that lead to proper growth, division, and development.

CO3. Describe the fundamental mechanism of protein processing inside the cells.

CO4. Analyze various types of pathogenic plant and animal viruses and their effect at molecular level.

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Modules	Blooms level*	Number of hours
Module-I: Replication General features of replication, the chemistry of DNA synthesis, DNA polymerase, the replication fork, enzymes and proteins in DNA replication, E coli DNA polymerases, topoisomerases and their classification. Linking numbers, Topoisomerase inhibitors and their clinical importance. Stages of replication-initiation, elongation and termination, origin of replication, relationship between replication and cell division, replication in eukaryotes, end replication problem, telomerase, various modes of replication. Comparison of replication in prokaryotes and eukaryotes. Inhibitors of DNA replication and applications in medicine	L1, L2	9
Module-II: Transcription and RNA Splicing Transcription in prokaryotes; Comparison between transcription and DNA replication, RNA polymerases, transcription cycle in bacteria, sigma factor, bacterial promoters, various stages of RNA synthesis, initiation, elongation and termination, rho-dependent and rho-independent termination. Inhibitors of transcription and applications as antimicrobial drugs. Comparison between prokaryotic and eukaryotic transcription. Transcription in eukaryotes; The three classes of eukaryotic RNA polymerases, transcription by RNA polymerase II, RNA polymerase II core promoters, general transcription factors, transcription by RNA polymerase I and III. Transcription control. Inhibitors of eukaryotic transcription and their applications. RNA Processing; Various types of RNA processing- polyadenylation and capping, processing of rRNA and tRNA. Chemistry of RNA splicing, the spliceosome machinery, splicing pathways, group I and group II introns, alternative splicing, exon shuffling and RNA editing.	L2	9
Module III: Translation Salient features of the genetic code, triplet nature, degenerate, wobble in the anticodon. Experimental approaches used to decipher the genetic code. Suppressor tRNAs. Exceptions to the nearly universal genetic code. Messenger RNA, transfer RNA, charging of tRNA. The structure of ribosome. Three stages of translation-initiation, elongation and termination. Translation in eukaryotes. Regulation of translation. Comparison of prokaryotic and eukaryotic protein synthesis. Inhibitors of translation and their clinical importance.	L2, L4	9
MODULE- IV: Eukaryotic Gene expression & Molecular Virology Gene Expression: Regulating expression of eukaryotic genes. Role of chromatin in gene expression and silencing, enhancers and insulators, activators and repressors, Regulatory RNAs in eukaryotes: synthesis and mechanism of siRNA and miRNA. Molecular Virology: Nature and classification: The viral particles: capsid, envelope, other Virion components, Prion, complex viruses. Isolation and cultivation of viruses. Virus purification, Assay of animal, bacterial and plant viruses. Multiplication of bacteriophages from infection to maturation and release. Abortive infection. Viral interference and interferon. Viral diseases. General outline with specific examples of common plant pathogenic viruses	L2, L4	9

*Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	15	5	5	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text/References:

- Stryer, L. *Biochemistry*, W.H. Freeman and Co., 3rd /4th/5th edition(2002) ISBN 9788985243186.
- Watson, J.D. *Molecular biology of the gene: Vol. I and II*, Benjamin/Cummings publ. Co Inc., 4th edition (1987) ISBN 9780321762436 .
- Darnell, J. and Baltimore, D. *Molecular cell biology*, W.H. Freeman and Co. (1988) ISBN 9780716723806.
- Alberts, B. *Molecular biology of the Cell*, Garland Pub. In., NY (2002) ISBN 9780815340836.
- Lewin, B. *Genes*, John Wiley and sons, NY. 2nd edition(1987) ISBN 9780471852278.

CO, PO, PSO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	1	1	-	-	-	-	-	-	1	1	1	-	
CO2	1	1	-	-	-	-	-	1	1	1	1	1	
CO3	1	1		-	-	-	-	1	1	1	1	1	
CO4	1	1		2	-	-	-	-	1	-	-	1	1

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BCH4306	MOLECULAR BIOLOGY AND MICROBIOLOGY LAB	L	T	P	C
Version 1.1	Date of Approval: 7th December, 2021	-	-	4	2
Pre-requisites/Exposure	Fundamental concepts of microbiology and molecular biology				
Co-requisites					

Modules	Blooms level*	Number of hours
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Course Description

A Laboratory course providing hands-on experience and covering conceptual background and fundamental techniques in molecular biology including plasmid as well as genomic DNA isolation, protein and DNA estimation, gel electrophoresis etc. The curriculum also covers microbiological techniques like pure culture preparation on a variety of media, how various media being used in routine lab work practice account for differential and selective influences on microbial growth rates.

Course Objectives

The objective of this course is to

1. Provide training and experience in DNA, RNA and protein molecular biology techniques.
2. Provide experimental training of bacterial, fungal culture and various staining processes.

Course Outcomes

On completion of this course, the students will be able to

- CO1. Prepare and identify genomic and plasmid DNA from different sources.
- CO2. Prepare and describe bacterial, fungal culture and serial dilution for calculating CFU
- CO3. Identify various microbial populations through staining process.
- CO4. Analyze the growth curve and to perform antibiotic sensitivity test.

Course Content

(A minimum number of 10 experiments must be performed)

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MICROBIOLOGY PRACTICALS: <ol style="list-style-type: none"> 1. Preparation of glassware for microbiological work, cotton plugs, medium and their sterilization 2. Sterilization of heat sensitive material by filtration. 3. Preparation and sterilization of medium, preparation of slants and stabs, pouring of medium into plates. 4. Serial dilution, plating for counting colonies. 5. To perform various culture transfer techniques: Streaking, Spreading, Pouring, sub-culturing. 6. Isolation of microorganisms from soil and water collected from different places. 7. Single colony isolation techniques and it's preservation. 8. Examination of microorganisms: Simple staining, Gram staining, Acid Fast Staining 9. To prepare temporary mount of algae (spirogyra) 10. To prepare temporary mount of fungi (Penicillium) 11. Endospore staining 12. Staining of flagella 13. Staining of capsule 14. Localization of root nodule bacteria by staining. 15. Study of different shapes of bacteria, fungi, algae, protozoa using permanent slides/pictographs 16. Study the morphological structures of viruses (DNA and RNA) and their important characters using electron micrographs. 17. Bacterial growth studies: Bacterial number counting by haemocytometer, colony counting, bacterial growth curve, determination of generation time. 18. Antibiotic sensitivity tests, antibiotic assay by paper disc / cup method, MIC determination. Purification of α-amylase from <i>Bacillus aminolucifecius</i> 	L1, L3	L2, 24
MOLECULAR BIOLOGY PRACTICALS: <ol style="list-style-type: none"> 1. Isolation of chromosomal DNA from <i>E. coli</i> cells 2. To hydrolyze DNA and separate nucleotide bases by paper chromatography 3. To plot ultraviolet absorption spectrum of DNA 4. Determination of DNA concentration by A₂₆₀nm 5. Determination of the melting temperature 6. Estimation of DNA by diphenylamine 7. Separation, identification and estimation of free amino acids. 8. Study of Immune-electrophoresis 9. Estimation of RNA by Orcinol Method 10. Extraction of total nucleic acids from plant tissue 11. To study growth curve and diauxic growth curve effect in <i>E. coli</i> 12. Isolation of total RNA from bacteria/yeast 		24

*Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	15	5	5	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination, Att: Attendance

References/Texts

- Kleyn, Gilstrap, Holt, Nester. *Experiments in Microbiology*, Rinehart and Winston (1978) ISBN 9780030393365.
- F. Burton, Zachary and M, Jon. *Experiments in Molecular Biology, Biochemical Applications*, Kagani. Academic Press (1997) ISBN 9780121473709.
- Li, Yongming, Zhao, Yugi. *Practical Protocols in Molecular Biology*, IOS Press, US (1996) ISBN 9781880132142.
- Brown, Terence Austen. *Essential Molecular Biology: A practical Approach, Vol. II*, Oxford University Press (2001) ISBN 9780199631155.

CO, PO, PSO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	1	1	-	-	-	-	-	-	1		1	1	1
CO2	1	1	-	-	-	-	-	1	1	1	1	1	
CO3	1	1		-	-	-	-	1	1	1	1	1	
CO4	1	1		1	-	-	-	1	1	-	-	1	1

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BCH4307	INSTRUMENTATION AND GENETIC ENGINEERING LAB	L	T	P	C
Version 1.1	Date of Approval: 7th December, 2021			4	2
Pre-requisites/Exposure	Handling , measurement and analysis of instrumental data experiments related to genetics				
Co-requisites					

Course Description

This practical course curriculum includes spectroscopy, SDS-PAGE analysis, PCR etc. Using above mentioned instruments basic protein folding unfolding studies for biochemistry students included in the course curriculum.

Course Objectives

The objective of this course is to

1. Provide training to students in handling of some important instruments in laboratory for performing some biological experiment.

Course Outcomes

On completion of this course, the students will be able to

- CO1. Prepare themselves for quantitative titrations.
- CO2. Describe methods of SDS-PAGE analysis.
- CO3. Differentiate between different types of PCR.
- CO4. Illustrate different physical experiments.

Course Content

(A minimum number of 10 experiments must be performed)

Modules	Blooms level*	Number of hours
1. Conductometry: Estimation of Cl ⁻ or SO ₄ by conductometric precipitation titration. 2. Viscometric study of DNA and protein denaturation 3. Size exclusion chromatography for separation of a mixture proteins 4. Separation of amino acid acids by TLC/paper chromatography 5. To perform agarose gelelectrophoresis 6. Separation of protein by ion-exchange chromatography 7. Separation of protein by SDS-PAGE	L1, L2, L3	12
8. EMSA (virtuallab) 9. Virtual lab on Microarray profiling or 2D-DIGE 10. Virtual Lab of Primer designing 11. Virtual lab on extraction of sequence from genomic and DNA libraries. 12. Virtual lab of PCR, Restriction digestion and Cloning and Vector analysis. 13. DNA estimation by UV spectrophotometry. 14. Transformation, Competent cell preparation and Isolation of plasmid DNA from <i>E.coli</i> amplification of a DNA fragment by PCR	L2, L3	12

Modes of Evaluation

Examination Scheme:

Components	CT	HA	S/V/Q	ATTD	EE
Weightage(%)	15	5	5	5	70

Text/References

- R.W., Switzer & L.F., Garritty. *Experimental Biochemistry*, W. H. Freeman ; Basingstoke : Macmillan, New

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York (1999) ISBN 0716733005.

- Boyer, R. *Modern Experimental Biochemistry*, Pearson Education (2001) ISBN 978080533110.
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CO, PO, PSO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	1	1	-	-	-	-	-	1		1		1	1
CO2	1	1	-	-	-	-	-	1		1		1	
CO3	1	1		-	-	-	-	1		1	1	1	
CO4	1	1		1	-	-	-	1		1	1	1	1

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BCH4308	MICROBIOLOGY	L	T	P	C
Version 1.1	Date of Approval: 7th December, 2021	2	1	0	3
Pre-requisites/Exposure	Basic concept of microbes and microbial genetics				
Co-requisites					

Course Description

This course curriculum covers structure and physiology of free-living and pathogenic bacteria. The diversity of their metabolic activities, the interaction of microbes with their environment, symbiotic relationships are also included in this course. It curriculum also include industrial role of microbial population and genetic recombination mechanism of microbes.

Course Objectives

The objective of this course is to

1. Provide fundamental knowledge different microbial pathogens.
2. Understand outstanding importance of microbes in versatile applications.

Course Outcomes

On completion of this course, the students will be able to

- CO1. Describe and identify different types of microorganisms.
 CO2. Describe the relevance of microorganisms in industry.
 CO3. Determine the plant-microbe and animal-microbe interaction.
 CO4. Analyze the fundamental microbial culture techniques and genetic material exchange mechanism.

Course Content

Modules	Blooms level*	Number of hours
MODULE-I: Introduction to microbiology Overview of Microbial world & development Microbiology as a science Isolation, characterization & growth of microorganisms & control of microbial growth (disinfection & sterilization) Gross and time structure of bacteria, viruses and eukaryotic Microbes, Microbial nutrition and physiology, microbial taxonomy	L1, L2, L3	9
MODULE-II: Microbial technology Brief overview of use of microbiology in industries, pasteurization, fermentation, use of microbes in agriculture, microbial diseases of plants & nitrogen fixation	L2, L3	9
MODULE-III: Microbial pathogens Microbes in health & disease & host parasite relationship, selected organisms: (E.coli, vibrio cholerae M.tuberculosis, S. cerevisiae, Cyanobacteria, Plasmodium, Pox Virus, Influenza virus & λ phage), genetically modified organisms	L2, L3, L4	9
MODULE-IV: Microbial Genetics Culture of microorganisms; Methods for isolating pure cultures; types of culture media; enrichment culture techniques; maintenance and preservation of pure cultures. Control of microorganisms; physical and chemical methods. Bacterial growth: definition, growth parameters measurement of growth synchronous growth growth kinetics factors	L2, L3, L4	9

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affecting growth. Batch and continuous culture Differentiation: endospore formation – cytological physiological and genetic aspects, germination. Outlines of biosynthesis of peptidoglycan major aminoacids and proteins. Regulatory mechanisms in bacteria induction repression, feedback inhibition, catabolite repression and attenuation. Manipulation of biochemical regulatory mechanisms for over production of metabolites. Genetic recombination in Bacteria; Identification and selection of mutants, transformation, natural transformation systems, mechanism, gene mapping by transformation; chemical-mediated and electrotransformation. Conjugation- discovery, nature of donor strains and compatibility, interrupted mating and temporal mapping, Hfr, F12 heteroduplex analysis, chromosome transfer in other bacteria, molecular pathway of recombination.		
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**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation*

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	15	5	5	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text /References:

- M. Madigan, Michael, Martinko, John, Parker, Jack. *"Brock Biology of Micro-organisms 10e"* Prentice Hall PTR(2003) ISBN 013-144329-1.
- J. Gardner, Eldon, D. Snustad, Peter(Editor), Michael Simmons(Editor). (Author). *Principles of Genetics*, John Wiley & Son (2015) ISBN 978-1-119-14228-7.
- G. Shlegel, Hans. *General Microbiology*, Cambridge University Press, 7th edition(1993) ISBN 9780521498500.
- Willey, Joanne, Sherwood, Linda and Woolverton, Chris. Prescott's Microbiology, Mcraw-Hill(2011) ISBN 978-0-07-337526-7.
- Pelczar *Microbiology*, Tata McGraw-Hill Education(1998) ISBN 9780074623206.

CO, PO, PSO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	1	1	-	-	-	-	-	1			1	1	1
CO2	1	1	-	-	-	-	-	1		1	1	1	
CO3	1	1		-	-	-	-			1	1	1	
CO4	1	1		1	-	-	-			1	1	1	1

1: strongly related, 2: moderately related and 3: weakly related

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BCH4310	ECOLOGY AND EVOLUTION	L	T	P	C
Version 1.1	Date of Approval: 7th December, 2021	2	1	0	3
Pre-requisites/Exposure	Basic concept of ecology				
Co-requisites					

Course Description

This course aims to lead the students through different levels of the living world starting from ecological principals, parameters and analytics to organisms, continuing through populations and introducing finally communities and ecological succession. Structure, function and process of ecological sciences are main components of this course followed by detailed understanding of biodiversity and its conservation. The last module also helps the students to understand the effect on ecosystem due to reckless use of resources and increasing pollution due to anthropogenic activities. Additionally this course deals with evolutionary traits and behavioral effect

Course Objectives

The objective of this course is to

1. Provide students with a detailed in-sight into the basics of ecological sciences
2. Understand processes of population distribution.

Course Outcomes

On completion of this course, the students will be able to

- CO1. Describe different ecological aspects.
- CO2. Identify concepts of population distribution.
- CO3. Apply the requirements of field experiments.
- CO4. Assess the short term and long term effects of pollution.

Course Content



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Modules	Blooms level*	Number of hours
Module-I: Ecology –I The Environment: Physical environment; biotic environment; biotic and abiotic interactions. Habitat and Niche: Concept of habitat and niche; niche width and overlap; fundamental and realized niche; resource partitioning; character displacement. Population Ecology: Characteristics of a population; population growth curves; population regulation; life history strategies (r and K selection); concept of metapopulation – demes and dispersal, interdemec extinctions, age structured populations. Species Interactions: Types of interactions, interspecific competition, herbivory, carnivory, pollination, symbiosis. Community Ecology: Nature of communities; community structure and attributes; levels of species diversity and its measurement; edges and ecotones. Ecological Succession: Types; mechanisms; changes involved in succession; concept of climax. Ecosystem Ecology: Ecosystem structure; ecosystem function; energy flow and mineral cycling (C,N,P); primary production and decomposition; structure and function of some Indian ecosystems: terrestrial (forest, grassland) and aquatic (fresh water, marine, estuarine).	L1, L2, L3	9
Module-II: Ecology-II Biogeography: Major terrestrial biomes; theory of island biogeography; biogeographical zones of India. Applied Ecology: Environmental pollution; global environmental change; biodiversity: status, monitoring and documentation; major drivers of biodiversity change; biodiversity management approaches. Conservation Biology: Principles of conservation, major approaches to management, Indian case studies on conservation/management strategy (Project Tiger, Biosphere reserves)	L2, L3	9
Module-III: Evolution and Behavior-I Emergence of evolutionary thoughts Lamarck; Darwin–concepts of variation, adaptation, struggle, fitness and natural selection; Mendelism; Spontaneity of mutations; The evolutionary synthesis. Origin of cells and unicellular evolution: Origin of basic biological molecules; Abiotic synthesis of organic monomers and polymers; Concept of Oparin and Haldane; Experiment of Miller (1953); The first cell; Evolution of prokaryotes; Origin of eukaryotic cells; Evolution of unicellular eukaryotes; Anaerobic metabolism, photosynthesis and aerobic metabolism. C. Paleontology and Evolutionary History: The evolutionary time scale; Eras, periods and epoch; Major events in the evolutionary time scale; Origins of unicellular and multi cellular organisms; Major groups of plants and animals; Stages in primate evolution including Homo.	L2, L3	9
Module-IV: Evolution and Behavior-II Molecular Evolution: Concepts of neutral evolution, molecular divergence and molecular clocks; Molecular tools in phylogeny, classification and identification; Protein and nucleotide sequence analysis; origin of new genes and proteins; Gene duplication and divergence. The Mechanisms: Population genetics – Populations, Gene pool, Gene frequency; Hardy-Weinberg Law; concepts and rate of change in gene frequency through natural selection, migration and random genetic drift; Adaptive radiation; Isolating mechanisms; Speciation; Allopatricity and Sympatricity; Convergent evolution; Sexual selection; Co-evolution. Brain, Behavior and Evolution: Approaches and methods in study of behavior; Proximate and ultimate causation;	L2, L3	9

Altruism and evolution-Group selection, Kin selection, Reciprocal altruism; Neural basis of learning, memory, cognition		
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*Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	15	5	5	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

Text/References:

- Sharma, P.D. *Ecology and Environment*, ISBN 9350780682.
- P. Odum, Eugene and W., Gary. *Fundamentals of ecology*, Barrett Thomson Books (2010), ISBN 0534420664 .
- Primack, B., Richard. *Essentials of Conservation Biology*, Sinauer Associates, Sunderland, Ma.USA, 5th edition (2010) ISBN 9781605352893 .
- Begon, J. L., Townsend, M. *Ecology from Individuals to Ecosystems*, C. R. and Harper
- Wiley-Blackwell, USA (2005) ISBN 978-1-4051-1117-1.

CO, PO, PSO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	1	1	-	-	-	-	-	1			1	1	1
CO2	1	1	-	-	-	-	-	1		1	1	1	
CO3	1	1		-	-	-	-			1	1	1	
CO4	1	1		1	-	-	-			1	1	1	1



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BCH4311	MICROBIOLOGY LAB	L	T	P	C
Version 1.1	Date of Approval: 7th December, 2021	0	0	4	2
Pre-requisites/Exposure	Fundamental concepts of microbes and culture techniques				
Co-requisites					

Course Description

Curriculum includes standard techniques for isolation, culture, and identification of microorganisms. Investigations in this laboratory consist of extensive use of microscopes and bacterial culture reagents to emphasize phenotypical differences in bacteria to facilitate understanding of microbial life and microbial metabolism.

Course Objectives

The objective of this course is to

1. Teach microbiological techniques and to show students the impact of microbes on our daily lives and their central roles in nature.
2. Transfer living microbes using aseptic technique.

Course Outcomes

On completion of this course, the students will be able to

- CO1. Prepare them for maintaining an aseptic environment.
- CO2. Demonstrate, describe and identify specimen preparation and staining.
- CO3. Relate their competency in bacterial sampling and culturing techniques
- CO4. Identify appropriate methods to estimate the number of microorganisms in a sample (using, for example, viable plate count, and spectrophotometric methods).

Course Content

(A minimum number of 10 experiments must be performed)

Modules	Blooms level*	Number of hours
1. Observation of microorganisms using bright field microscope - Bacteria, Protozoa, Moulds and Yeasts, Algae – from natural habitat 2. Observation of microorganisms using staining techniques: a. Monochrome staining b. Negative /Relief staining (Capsule staining) c. Gram staining of bacteria d. Spore staining 3. Observation of motility in bacteria using: a. Hanging drop method and Cragie's tube method b. Swarming growth methods 4. Enumeration of yeast cells using a counting chamber 5. Cultivation of microorganisms: a. Preparation of simple laboratory nutrient media (solid and liquid) and using them to cultivate bacteria. Observation of the growth of cultures and reporting of colony and cultural characteristics (Nutrient and MacConkey's agar)	L1, L2, L3	8
6. Isolation of bacteria by streak plate technique 7. Enumeration of bacteria from fermented food / soil / water by: a. Spread plate method b. Pour plate method 8. Aseptic transfer techniques (slant to slant, broth to broth, broth to agar and Agar to Agar)	L2, L3	8

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9. Preservation of cultures on slants, soil and on grain surfaces; Revival of these cultures and lyophilized cultures. 10. Checking sterilization efficiency of autoclave using a biological Indicator (<i>B. stearothermophilus</i>)		
11. Demonstration of checking of efficacy of chemical disinfectant: Phenol Coefficient Rideal Walker method) 12. Preparation of Winogradsky column and observation of different types of microorganisms using bright field microscope. 13. Study of normal flora of skin: Cultivating and observing different morphoforms of bacteria from skin Study of effect of washing skin with soap and disinfectant on its microflora 14. To study the effect of different parameters on growth of <i>E. coli</i> : pH, temperature, sodium chloride concentration Study of Oligodynamic action of heavy metal	L2, L3, L4	8

Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Modes of Evaluation

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	15	5	5	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

References/Texts

1. Kleyn, Gilstrap, Holt, Nester. *Experiments in Microbiology*, Rinehart and Winston (1978) ISBN 0030393361.
2. Wilson, K. and Walker, J.M.. *Principles and Techniques of Bio-chemistry and Molecular Biology*, Cambridge University Press, 6th Edition (2005) ISBN 9780511813412.
3. Plummer, T., David. *An Introduction to Practical Biochemistry*, Tata McGraw-Hill Publishing Company Limited, 3rd Edition (1993) ISBN 0-7-084165-9.

CO, PO, PSO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	1	1	-	-	-	-	-	1				1	1
CO2	1	1	-	-	-	-	-	1				1	1
CO3	1	1		-	-	-	-					1	1
CO4	1	1		1	-	-	-			1	1	1	1



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BCH4313	ECOLOGY AND EVOLUTION LAB	L	T	P	C
Version 1.1	Date of Approval: 7th December, 2021	0	0	4	2
Pre-requisites/Exposure	Fundamental concepts of Ecosystem				
Co-requisites					

Course Description

Curriculum includes Introduction to ecological sampling techniques and data analysis. Experience in field sampling, laboratory and computer modeling of sampling approaches, and scientific writing is also included.

Course Objectives

The objective of this course is to

1. Describe behavioral and physiological mechanisms by which organisms interact with other organisms and with their physical environment.
2. Field and lab investigations of both terrestrial and aquatic ecosystems on a quantitative basis.

Course Outcomes

On completion of this course, the students will be able to

- CO1. Apply the skills in the basic ecological investigative techniques.
- CO2. Analyze, and present ecological data using appropriate sampling methods and instrumentation and quantitative statistical and graphical analyses.
- CO3. Interpret organism environment relationships.
- CO4. Describe, identify and make observations, generate hypotheses, and carry out simple experiments and/or collect field data to answer questions from different sub-disciplines in ecology.

Course Content

(A minimum number of 10 experiments must be performed)

Modules	Blooms level*	Number of hours
1. Assessment of density, frequency and abundance of plants/animal in a community using various techniques i.e. transect, quadrat etc. 2. Determination of physical and chemical characteristics of soil. 3. Assessing influence of light, temperature and moisture on plant germination and growth. 4. Assessing influence of soil nutrient status on plant germination and growth. 5. Spatial variations of dissolved oxygen concentration in water and percentage saturation. 6. Dissolved free carbon dioxide dynamics in relation to pH and alkalinity of water. 7. Estimation of total hardness, total alkalinity and Salinity of water. 8. Estimation of Primary productivity and assessment of nutrient status of waterbodies. 9. Microbial analysis of soil and water. 10. Study of insect diversity in soil. 11. Productivity determination of different ecosystems-Lindeman's efficiency. 12. Microbial analysis of soil and water. 13. Evolutionary studies on adaptive characters 14. Phylogenetic analysis	L1, L2, L3	32

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Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis; L6-Evaluation

Modes of Evaluation**Examination Scheme:**

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	15	5	5	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

References/ Texts:

- Jr. Conklin, A.R. *Field Sampling: Principles and Practices in Environmental Analysis*, CRC Press(2004) ISBN 0824754719.
- Henderson, P.A. *Practical Methods in Ecology*, John Wiley & Sons (2009) ISBN 978-1-444-31227-0.
- T.J., Fahey and Knapp, A.K. *Principles and Standards for Measuring Primary Production*, Oxford University Press, UK (2007) ISBN 9780195168662.
- Grant, W.E., and Swannack, T.M. *Ecological Modeling*, Elsevier (2008) ISBN 9780444535672 .
- Wilkinson, D.M. *Fundamental Processes in Ecology: An Earth system Approach*, Oxford University Press, UK(2007) ISBN 9780198568469.

CO, PO, PSO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	1	1	-	-	-	-	-	1				1	1
CO2	1	1	-	-	-	-	-	1				1	1
CO3	1	1		-	-	-	-					1	1
CO4	1	1		1	-	-	-			1	1	1	1



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BCH4335	SUMMER INTERNSHIP EVALUATION	L	T	P	C
Version 1.1	Date of Approval: 7th December, 2021	0	0	0	6
Pre-requisites/Exposure	Fundamental of basic biochemistry experiments				
Co-requisites					

Course Description

This is experiential education opportunities for students in the form of internships, and defines an internship as a supervised, credit-bearing, career-related learning experience in the workplace that allows students to apply knowledge acquired through their classes and studies to practical situations and problems. Such experiences promote engaged learning by helping students find connections between theory and practice, between learning in the classroom and learning outside the classroom, and between their academic interests and potential career possibilities.

Course Objectives

The objective of this course is to

1. Working as a summer intern gives hands-on practical training experience.
2. One of the main objectives of an internship is to expose students to a particular research area that give him/her experience before entering research lab or industry.

Course Outcomes

On completion of this course, the students will be able to

- CO1. Demonstrate his/her mastery of the principle disciplines of Biochemistry.
 CO2. Create and identify excellent critical thinking and problem solving abilities.
 CO3. Prepare and describe technical mastery of fundamental wet laboratory skills, use proper laboratory safety protocols, and demonstrate proficiency in using computers to solve chemical problems.
 CO4. Recognize effective scientific communication skills – both written and oral. Students will be able to write reports and present the results of their own scientific works.

Course Content

Modules	Blooms level*	Number of hours
Methodology: Practical training is based on the theoretical subjects studied by students. It can be arranged within the college or any in any related industrial unit or in any research lab. The students are to learn various industrial, technical and administrative processes followed in the industry/research. In case of on campus training the students will be given specific tasks of synthesizing /testing/analysis/characterization. On completion of the practical training the students are to present a report covering various aspects learnt by them and give a presentation of the same.	L3,L4,L5,L6	NTCC

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Examination Scheme:

Components	A	FS	PR	PP
Weightage (%)	5	50	20	25

FS: Feedback from Supervisor A: attendance, PR : Project Report PP: ppt presentation

CO, PO, PSO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	1	1	1	1	-	-	-	1				1	1
CO2	1	1	1	1	-	-	-	1				1	1
CO3	1	1	1	1	-	-	-					1	1
CO4	1	1	1	1	-	-	-	1		1	1	1	1



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BCH4407	GOOD LABORATORY PRACTICES SEMINAR	L	T	P	C
Version 1.1	Date of Approval: 7th December, 2021				1
Pre-requisites/Exposure	Workshop on Good Laboratory Practice				
Co-requisites					

Course Description

The objective of this course is to judge the understanding as well as application of the knowledge gained by the students. The aim of the this course is to provide the students with an opportunity to further enhance their knowledge in a sector of their choice by undertaking a significant practical unit of examining and analyzing various aspects of Biochemistry & its application at a level commensurate with the learning outcomes of the various courses taken up them in the ongoing semester.

Course Objectives

The objective of this course is

1. To judge the understanding as well as application of the knowledge gained by the students.
2. To provide the students with an opportunity to further enhance their knowledge in a sector of their choice by undertaking a significant practical unit of examining and analyzing various aspects

Course Outcomes

On completion of this course, the students will be able to

CO1. Outline salient features of ideal practices in research labs.

CO2. Identify the contemporary research ethics and the topics with fundamental research infrastructure.

CO3. Compile the patterns of research etiquettes in various sectors.

CO4. Review and understand the interdisciplinary research areas of Biochemistry

Course Contents

Modules	Blooms level*	Number of hours
<p>Objectives</p> <p>The objective of this course is to judge the understanding as well as application of the knowledge gained by the students. The aim of the term paper is to provide the students with an opportunity to further enhance their knowledge in a sector of their choice by undertaking a significant practical unit of examining and analyzing various aspects of Chemistry & its application at a level commensurate with the learning outcomes of the various courses taken up them in the ongoing semester.</p> <p>A research paper is primarily a record of intelligent reading in several sources on a particular subject. The students will choose the topic at the beginning of the session in consultation with the faculty assigned.</p> <p>Guidelines:</p> <ol style="list-style-type: none"> 1. The research paper will be related to the contemporary research issue and the topic will be given by the supervisors of the department. 2. The research paper has to prepared/communicated before the commencement of Semester examinations. 	L2, L3,L4,L6	NTCC

<p>3. The paper will carry 100 marks that will be marked on the basis of understanding and organization of content based on the literature review. The Bibliography shall form an important part of the paper.</p> <p>4. Examples of a few broad areas for research paper (List is indicative, not exhaustive)</p> <ul style="list-style-type: none"> • Inorganic chemistry • Organic chemistry • Physical chemistry • Green chemistry • Agriculture chemistry 		
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**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation*

Evaluation Scheme:

Organisation and relevance of content	Literature Review	Bibliography	Publication	Total
30	30	20	20	100

CO, PO, PSO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	1	1	-	-	-	-	-	-				1	1
CO2	1	1	-	-	-	-	-	-			1	1	1
CO3	1	1	3	-	-	-	-	-		1	1	1	1
CO4	1	1	3	-	-	-	-	-	1	1	1	1	1

1: strongly related, 2: moderately related and 3: weakly related



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BCH4437	MAJOR PROJECT	L	T	P	C
Version 1.1	Date of Approval: 7th December, 2021				8
Pre-requisites/Exposure	Basic biochemical practical, presentation and writing skills				
Co-requisites					

Course Description

This course deals with both the theoretical and practical aspects of designing dissertation research and successfully defending the design in a proposal hearing. The purpose of the course is to assist students through the proposal and dissertation writing processes.

Course Objectives

The objective of this course is to

1. Training of students as an independent researcher before entering academics or industries.
2. Develop interest for genuine exploration of the unknown that leads to new knowledge which often warrants publication.
3. Provide exposure of advanced concepts, a variety of experimental techniques, and state-of-the-art instrumentation.

Course Outcomes

On completion of this course, the students will be able to

CO1. Recognize independent skills of critical investigation

CO2. Criticize the problem systematically. They will be able to relate problem with available methodologies and evidence.

CO3. Analyze appropriate techniques and draw concluding remarks.

CO4. Describe and communicate research concepts and contexts clearly and effectively both in writing and orally

Course Content

Modules	Blooms level*	Number of hours
<p>GUIDELINES FOR PROJECT FILE AND PROJECT REPORT</p> <p>Research experience is as close to a professional problem-solving activity as anything in the curriculum. It provides exposure to research methodology and an opportunity to work closely with a faculty guide. It usually requires the use of advanced concepts, a variety of experimental techniques, and state-of-the-art instrumentation.</p> <p>Research is genuine exploration of the unknown that leads to new knowledge which often warrants publication. But whether or not the results of a research project are publishable, the project should be communicated in the form of a research report written by the student.</p> <p>Sufficient time should be allowed for satisfactory completion of reports, taking into account that initial drafts should be critically analyzed by the faculty guide and corrected by the student at each stage.</p>	L2,L4,L5,L6	NTCC

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PROJECT FILE

The Project File may be a very useful tool for undertaking an assignment along-with a normal semester, an exploratory study, sponsored projects, a project undertaken during summer period or any other period as per curriculum where the researcher is working with a company/organization. The project/ assignment may also be a part of the bigger research agenda being pursued by a faculty/ institution/ department. The Project File is the principal means by which the work carried out will be assessed and therefore great care should be taken in its preparation. This file may be considered in continuous assessment.

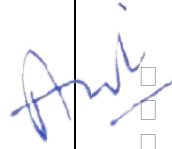
In general, the File should be comprehensive and include:

- ☐ A short account of the activities that were undertaken as part of the project;
- ☐ A statement about the extent to which the project has achieved its stated objectives;
- ☐ A statement about the outcomes of the evaluation and dissemination processes engaged in as part of the project;
- ☐ Any activities planned but not yet completed as part of the project, or as a future initiative directly resulting from the project;
- ☐ Any problems that have arisen and may be useful to document for future reference.

PROJECT REPORT

The Project Report is the final research report that the student prepares on the project assigned to him. In case of sponsored project the layout of the project could be as prescribed by the sponsoring organization. However, in other cases the following components should be included in the project report:

- ☐ **Title or Cover page**
The title page should contain Project Title; Students Name; Program; Year and Semester and Name of the Faculty Guide.
- ☐ **Acknowledgement(s)**
Acknowledgment to any advisory or financial assistance received in the course of work may be given. It is incomplete without student's signature.
- ☐ **Abstract**
A good "Abstract" should be straight to the point; not too descriptive but fully informative. First paragraph should state what was accomplished with regard to the objectives. The abstract does not have to be an entire summary of the project, but rather a concise summary of the scope and results of the project. It should not exceed more than 1000 words.
- ☐ **Table of Contents**
- ☐ **Titles and subtitles are to correspond exactly with those in the text.**
- ☐ **Introduction**
Here a brief introduction to the problem that is central to the project


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and an outline of the structure of the rest of the report should be provided. The introduction should aim to catch the imagination of the reader, so excessive details should be avoided.

☐ **Materials and Methods**

This section should aim at experimental designs, materials used (wherever applicable). Methodology should be mentioned in details including modifications undertaken, if any. It includes organization site(s), sample, instruments used with its validation, procedures followed and precautions.

☐ **Results and Discussion**

Present results, discuss and compare these with those from other workers, etc. In writing this section, emphasis should be laid on what has been performed and achieved in the course of the work, rather than discuss in detail what is readily available in text books. Avoid abrupt changes in contents from section to section and maintain a lucid flow throughout the thesis. An opening and closing paragraph in every chapter could be included to aid in smooth flow.

Note that in writing the various sections, all figures and tables should as far as possible be next to the associated text, in the same orientation as the main text, numbered, and given appropriate titles or captions. All major equations should also be numbered and unless it is really necessary, do not write in “point” form.

While presenting the results, write at length about the various statistical tools used in the data interpretation. The result interpretation should be simple but full of data and statistical analysis. This data interpretation should be in congruence with the written objectives and the inferences should be drawn on data and not on impression. Avoid writing straight forward conclusion rather, it should lead to generalization of data on the chosen sample.

Results and its discussion should be supporting/contradicting with the previous research work in the given area. Usually one should not use more than two researches in either case of supporting or contradicting the present case of research.

☐ **Conclusion(s) & Recommendations**

A conclusion should be the final section in which the outcome of the work is mentioned briefly. Check that your work answers the following questions:

- ☐ Did the research project meet its aims (check back to introduction for stated aims)?
- ☐ What are the main findings of the research?
- ☐ Are there any recommendations?
- ☐ Do you have any conclusion on the research process itself?

☐ **Implications for Future Research**

This should bring out further prospects for the study either thrown open by the present work or with the purpose of making it more

<p>comprehensive.</p> <p><input type="checkbox"/> Appendices The Appendices contain material which is of interest to the reader but not an integral part of the thesis and any problem that have arisen that may be useful to document for future reference.</p> <p><input type="checkbox"/> References References should include papers, books etc. referred to in the body of the report. These should be written in the alphabetical order of the author's surname. The titles of journals preferably should not be abbreviated; if they are, abbreviations must comply with an internationally recognized</p> <p>The Layout Guidelines for the Project File & Project Report:</p> <p><input type="checkbox"/> A4 size Paper</p> <p><input type="checkbox"/> Font: Arial (10 points) or Times New Roman (12points)</p> <p><input type="checkbox"/> Line spacing: 1.5</p> <p><input type="checkbox"/> Top and bottom margins: 1 inch/ 2.5 cm; left and right margins: 1.25 inches/ 3cm</p> <p>ASSESSMENT OF THE PROJECT FILE AND THE PROJECT REPORT Essentially, the assessment will be based on the quality of the report, the technical merit of the project and the project execution. Technical merit attempts to assess the quality and depth of the intellectual efforts put into the project. Project execution is concerned with assessing how much work has been put in. The Project should fulfill the following <i>assessment objectives</i>:</p> <p><input type="checkbox"/> Range of Research Methods used to obtain information</p> <p><input type="checkbox"/> Execution of Research</p> <p><input type="checkbox"/> Data Analysis (Analyze Quantitative/ Qualitative information)</p> <p><input type="checkbox"/> Quality Control</p> <p><input type="checkbox"/> Conclusions</p>		
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**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation*

Evaluation Scheme:

Continuous Evaluation	Final Report	Final Presentation	Supervisor Assessment	Total
30	20	20	30	100

CO, PO, PSO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	1	1	-	-	-	-	-	-				1	1
CO2	1	1	-	-	-	-	-	-			1	1	1
CO3	1	1	3	-	-	-	-	-		1	1	1	1
CO4	1	1	3	-	-	-	-	-	1	1	1	1	1

1: strongly related, 2: moderately related and 3: weakly related

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Curriculum & Scheme of Examination

2022

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PHYSICAL CHEMISTRY LAB

Course code: CHY4105

Credit Units 02

(Minimum 10 Experiments to be performed)

Phase Equilibria:

1. Determination of mutual solubility curve of phenol and water and find consolute point.
2. To determine the distribution coefficient of I_2 between two immiscible solvents(CCl_4 and H_2O).

Chemical Kinetics:

3. To study kinetically the alkaline hydrolysis of ethyl acetate.
4. To study the kinetics of reaction between $K_2S_2O_8$ and KI :
 - a. Determination of the rate constant and order of reaction.
 - b. To study the influence of ionic strength on the rate constant.
5. Determination of the effects of change of temperature, concentration of reactant and ionic strength of the media on the velocity constant of hydrolysis of an ester

Electrochemistry:

6. Determination of the velocity constant, order of the reaction and energy of activation for saponification of ethyl acetate by sodium hydroxide conductometrically.
7. Determine the equivalent conductance of weak electrolyte at infinite dilution by Kohlrausch law.
8. Determination of solubility and solubility product of sparingly soluble salts (e.g., $PbSO_4$, $BaSO_4$) conductometrically.
9. Determination of the strength of strong and weak acids in a given mixture conductometrically.

Potentiometry:

10. Measurement of pH of buffer solution
11. Determination of the strength of strong and weak acids in a given mixture using a potentiometer/pH meter.
12. Acid base titration in a non-aqueous media using a pH meter.

Colligative Properties

13. Determination of depression in Freezing point of solutions.

Adsorption

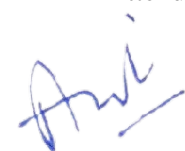
14. Determine the adsorption isotherms of acetic acid from aqueous solutions by charcoal and verify Freundlich adsorption isotherm.

***MSDS -Compilation of MSDS of chemicals used by students in each experiment is compulsory**

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva, A: Attendance.



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Suggested Readings:

- A.Finlay and J.A.Kitchener, "Practical Physical Chemistry, Longman
- F.Daniels and J.H.Mathews, "Experimental Physical Chemistry", Longman
- H.H.Willard, L.L.Merritt and J.A.Dean, "Instrumental Methods of Analysis", Affiliated East-West Press
- D.P.Shoemaker and C.W.Garland, "Experimental Physical Chemistry", McGraw-Hill
- A.I.Vogel, "A Textbook of Quantitative Inorganic Chemistry", Longman
- J.B.Yadav, "Advanced Practical Chemistry", Goel Publishing House
- J.J.Lingane, "Electroanalytical Chemistry", Interscience
- L.Meites, H.C.Thomas and R.P.Bauman, "Advanced Analytical Chemistry McGraw Hill.



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ORGANIC CHEMISTRY LAB

Course Code: CHY4106

Credit Units: 02

(Minimum 10 Experiments to be performed)

Qualitative Analysis:

1. Separation, purification and identification of compounds of binary mixture, derivative preparation and confirmatory tests.

Organic Synthesis:

2. Oxidation reaction
3. Reduction: Transfer hydrogenation reaction
4. Aldol condensation: Dibenzal acetone from benzaldehyde.
5. Friedel Craft's reaction
6. Preparation of p-amino azobenzene from aniline via diazoaminobenzene.
7. Preparation of m-phenylene diamine from Nitrobenzene via m-dinitrobenzene and m-nitroaniline.
8. Preparation of benzidine from benzene involving benzidine rearrangement.

Quantitative Analysis:

9. Determination of the percentage of sulphur in the given organic compounds by Messenger's method.
10. Estimation of Glucose using Fehling's solution.
11. Determination of equivalent weight of the given carboxylic acid using Silver-salt method.
12. Determine percentage purity of the given carbonyl compound using hydroxylamine hydrochloride.
13. Determination of strength of known aniline solution by bromination using KBr-KBrO₃ mixture.

Extraction of Natural products:

14. Extraction of caffeine from tea leaves.
15. Extraction of Eugenol from Cloves Oil

***MSDS -Compilation of MSDS of chemicals used by students in each experiment is compulsory**

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, A: Attendance, V – Viva.

Suggested Readings:

- Jeffery, G.H.; Bassett, J.; Mendham, J.; Denney, R.C. *Vogel's Textbook of Quantitative Chemical Analysis*, Longman Scientific & Technical, 5th Edition (1989) ISBN 0-582-44693-7.
- Singh, J.; Singh, R. K. P.; Singh, J.; Yadav, L. D. S.; Siddiqui, I. R.; Srivastava, J. *Advanced Practical Chemistry*, Pragati Prakashan, 9th Edition (2019) ISBN: 978-93-88925-70-9.
- Ahluwalia, V. K., Aggarwal, R. *Comprehensive Practical Organic Chemistry*, Universities Press (2001) ISBN 8173712735.
- Pandey, O.P.; Bajpai, D. N.; Giri, S. *Practical Chemistry*, S. Chand & Co. Ltd., (2010) ISBN 9788121908122.
- Mann, F. G.; Saunders, B. C. *Practical Organic Chemistry*, Pearson Education, India, 4th edition (2009) ISBN 978-8131727102.
- Pandey, O.P.; Bajpai, D. N.; Giri, S. *Practical Chemistry*, S. Chand & Co. Ltd., (2010) ISBN 9788121908122.

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CHEMINFORMATICS & BIOINFORMATICS LAB

Course Code: CHY4112

Credit Units: 01

Minimum 10 Experiments to be performed

1. Representation of chemical structures through various tools
2. Homology modeling
3. *Ab initio* modeling
4. Validation of structures
5. Visualization of PDB file
6. Protein Sequence alignment
7. Genome database retrieval
8. Molecular docking and Simulation

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, A-Attendance, V – Viva.

Suggested Readings:

- M. Karthikeyan and Renu Vyas, *Practical Cheminformatics*, Springer (2014) ISBN: 8132217802



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RESEARCH SEMINAR

Course Code: CHY4108

Credit Units: 01

Objectives

A seminar is primarily an activity based academic event that is organized to provide the students a one to one and hands on experience on any aspect of their learning for research based activity. Prereq., graduate standing in chemistry/ biochemistry/ Forensic Sciences on consent of instructor. Seminar to acquaint new graduate students with departmental research (This one will be running through out first semesters on every Monday any Lecture, where normally Ph.D students /internal Faculties /external speakers will give talk on their research or other topic of their specialization).

The trainer has to make sure that the aspect covered is practically practiced by the participants. The evaluation will be done by Board of examiners comprising of the faculties.

Major Themes for Seminar

The seminar may be conducted on any of the following major themes:

- Nuclear Chemistry
- Modern trend in Inorganic Chemistry
- Modern trend in Organic Chemistry
- Modern trend in Physical Chemistry
- Nanotechnology and its application
- Polymer Chemistry
- Pharmaceuticals
- Food Technology
- Agriculture Chemistry
- Computational Chemistry
- Green Chemistry
- Any other relevant topics

These themes are merely indicative and other recent and relevant topics of study may be included.

Evaluation Scheme:

Attendance	Active Participation	Multiple Choice Questions/ Quiz	Solving the case/ Assignment/ Write up	Total
10	30	30	30	100



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ANALYTICAL CHEMISTRY

Course Code: CHY4201

Credit Units: 03

Course Contents:

MODULE I: WET CHEMICAL METHODS OF ANALYSIS

Volumetric analysis –neutralization, precipitation, complexometric and redox titrations- theoretical titrations curves - theory of indicators; Gravimetric analysis, volatilization and precipitation methods- homogeneous precipitation; Colorimetric analysis - principles and applications- estimation of iron and nickel.

MODULE II: ELECTROANALYTICAL TECHNIQUES

Conductometry, and high frequency titrations; Potentiometry, pH-metry, Ion selective electrodes; Electrogravimetry and coulometry; Voltammetry –polarography, amperometric titrations and anodic stripping voltammetry; principles, practice and applications.

MODULE III: SEPARATION TECHNIQUES

Solvent extraction and Ion exchange techniques – principles and applications; Chromatographic techniques – adsorption chromatography, thin layer chromatography, gas chromatography, high performance chromatography, size exclusion chromatography; Supercritical fluid chromatography.

MODULE IV: RESEARCH BASED ANALYTICAL TECHNIQUE

Preparations of solutions of different strength and scales (molarity, molality, normality, formality, w/w, v/v ratio calculation exercises) buffers, gel apparatuses, native and SDS -PAGE gels, Isoelectric point

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	15	5	5	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

Suggested Readings:

- D.A.Skoog, D.M.West, F.J. Holler and S.R.Crouch, “ Fundamentals of Analytical Chemistry”, 8th Edn., - Thomson Brooks/Cole Pub. (2005).
- J.Mendham, R.C.Denney, J.D. Barnes and M.J.K.Thomas, “ Vogel’s Text book of quantitative chemical analysis”, 6th Edn., Pearson Education (2008).
- F.W. Fifield and D.Kealey, “ Principles and Practice of Analytical Chemistry, 1st Indian Reprint, Blackwell Pub. (2004).
- H.H Willard, L.L Merritt, J.A Dean, and F.A Settle, “ Instrumental Methods of Analysis”, 7th Edn., - CBS Pub (2004).
- G. D.Christian, “Analytical Chemistry”, 6th Edn., John Wiley Press (2006).
- K.A. Rubison and J.F. Rubison, “ Contemporary Instrumental Analysis, Printice Hall, Inc. (2000).
- A.K.Srivastva& P.C. Jain,” Instrument approach to chemical analysis” 4th edition,S.Chand & Company(2012)
- C.L.Wilson and D.W.Wilson, “Comprehensive Analytical Chemistry”, Dan van Nostrand 9. J.G.Dick, “Analytical Chemistry, McGraw Hill


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INDUSTRIAL CHEMISTRY

Course Code: CHY4202

Credit Units: 03

Course Objective:

This course is intended to give the students the knowledge of various aspects of industrial chemistry with the focus on preparation of different types of glass, cement, soaps and detergent. A student taking up this course should be able to understand the logic and chemistry behind the different types of catalytic process and catalyst.

Course Contents:

MODULE I: GLASS INDUSTRY

Introduction, classification of glass, basic raw materials of glass, manufacturing processes including chemical reactions, some special glasses: optical glass, coloured glass, fibre glass, laminate glass, safety glass, photosensitive glass, photochromatic glass, lead glass, borosilicate glass and glass wool.

MODULE II: CEMENT INDUSTRY

Types of cement, manufacture of Portland cement, composition, setting and hardening of cement, Mortars and concrete, gypsum, plaster of paris, estimation of silica, alumina, calcium oxide and sulphates in Portland cement.

MODULE III: SOAPS AND SYNTHETIC DETERGENTS

Manufacture of detergent, types of detergents, anionic, cationic, nonionic and amphoteric detergents, manufacture of soap, Liquid soap.

MODULE IV: HOMOGENEOUS AND HETEROGENEOUS CATALYSIS and CATALYTIC PROCESSES

Conversion, selectivity, contact time, time on stream, Kinetics of heterogeneous catalysis, adsorption, phase transfer catalysis, super acid catalysis, intramolecular catalysis, enzyme catalysis, semi-conductor catalysis and photocatalysis. Promoters, stabilizers, catalyst deactivation by poisoning, fouling and sintering, Cracking, reforming, alkylation, isomerization, hydrogenation/dehydrogenation, dehydrocyclisation, dehydrosulphurization, hydrocracking, oxidation, metathesis, carbonylation, polymerization, synthetic fuels, hydrogen generation.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	15	5	5	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

Suggested Readings:

- Jens Hagen, Industrial catalysis, 2nd Edition, Wiley-VCH Verlag GmbH & Co., (2006).
- Herman Pines, The chemistry of catalytic hydrocarbon conversions, Academic Press, New York (1981).
- R. Pearce and W.R. Patterson, Catalysis and chemical processes, Leonard Hill, London (1981).
- Charles, N. Satterfield, Heterogeneous catalysis in industrial practice, 2nd Edn. Mc.Graw Hill, International Edition, Singapore (1993).
- Catalytic Chemistry, Bruce-gates, John Wiley & Sons
- Organic Chemistry Vol.2 I.L. Finar 5th Edn. Longmans 1975


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- Dryden's outlines of Chemical Technology 2nd Edn., edited and revised by M.Gopala Rao, Marshall sitting – EastWest Press, 1973.
- Chemical Process Industries 3 Edn., R Norries Shreve, Mc Graw Hill 1967.
- Chemistry of Engg Materials by CV Agarwal.
- Applied Chemistry for Engineer's by Diamont
- Industrial Chemistry by BK Sharma, Goel Publishing house Meerut.



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ORGANOMETALLIC CHEMISTRY

Course Code: CHY4211

Credit Units:04

Course Objective:

The main idea of this course is to give students a brief idea about Bioinorganic chemistry that examines the role of metals in biology. It includes the study of both natural phenomena such as the behaviour of metalloproteins as well artificially introduced metals, including those that are non-essential, in medicine and toxicology. Many biological processes such as respiration depend upon molecules that fall within the realm of inorganic chemistry. The discipline also includes the study of inorganic models or mimics that imitate the behaviour of metalloproteins. It also covers organometallic chemistry which is the study of chemical compounds containing bonds between carbon and a metal. Since many compounds without such bonds are chemically similar, an alternative may be compounds containing metal-element bonds of a largely covalent character. Organometallic chemistry combines aspects of inorganic chemistry and organic chemistry.

Course Content:

MODULE I: ROLE OF METAL IONS IN BIOLOGICAL SYSTEM

Elements of life: essential major, trace and ultratrace elements. Basic chemical reactions in the biological systems and the role of metal ions (specially Na^+ , K^+ , Mg^{2+} , Ca^{2+} , $\text{Fe}^{3+/2+}$, $\text{Cu}^{2+/+}$, and Zn^{2+}). Metal ion transport across biological membrane Na^+/K^+ ion pump, ionophores. Toxic metal ions and their effects, chelation therapy (examples only), Pt and Au complexes as drugs (examples only), metal dependent diseases.

Module-II: Biological functions of haemoglobin, myoglobin and hemocynin, cytochromes and ferredoxins, carbonate bicarbonate buffering system and carbonicanhydrase. Biological nitrogen fixation, Photosynthesis: (Photosystem-I and Photosystem-II), chlorophyll and related elementary ideas

MODULE III: METALLOCENE

Metallocenes, Structure and synthesis of cyclopentadienyl complexes, Covalent vs Ionic bonding in metallocenes, Arene complexes

MODULE IV: REACTIONS IN ORGANOMETALLIC CHEMISTRY

Substitution reactions in carbonyl complexes, Oxidative addition and reductive elimination, Insertion and elimination, Nucleophilic and electrophilic attack of coordinated ligands, Synthesis of ferrocenes derivatives, carbonylate anion as nucleophile. Introduction to carbenes, types of carbenes (Fischer type and Schrock type carbene complexes, synthesis, structure, bonding and reactions of carbenes.

MODULE V: APPLICATIONS OF ORGANOMETALLICS IN CATALYSIS

(b) In Catalysis: Asymmetric hydrogenation; synthesis of acetic acid (Monsanto) Cativa process; Arylation/vinylation of olefins (Heck reaction); Wacker process (olefin oxidation); Asymmetric epoxidation.

MODULE- VI: METAL π -COMPLEXES

Metal carbonyl, structure and bonding, 18 electron rule, vibrational spectra of metal carbonyls for bonding and structural elucidation, important reactions of metal carbonyls; preparation, bonding structure and important reaction of transition metal nitrosyl, dinitrogen and dioxygen complexes; tertiary phosphine as ligand.


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Examination Scheme:

Components	CT	HA	S/V/Q	A	EE
Weightage(%)	15	5	5	5	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, A: Attendance EE: End Semester Examination

Suggested Readings:

- C. Elschenbroich. Organometallics (3rd edn.), Wiley-VCH Publication (2006).
- C. Elschenbroich & A. Salzer. Organometallics – A Concise Introduction (2nd edn.), VCH Publication (1992).
- F. Mathey & A. Sevin. Molecular Chemistry of the Transition Elements, John Wiley (1996).
- F. A. Cotton & G. Wilkinson. Advanced Inorganic Chemistry (5th edn.), John Wiley (1988).
- R. C. Mehrotra & A. Singh. Organometallic Chemistry: A Unified Approach (2nd edn.), New Age International (2000).
- Yamamoto, Organo Transition Metal Chemistry,



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INTRODUCTION TO LABORATORY SAFETY

Course Code: CHY4212

Credit Units: 01

Course Objective :

The basic goal of this course is to make sure students know about potential work hazards, how to recognize them, and how to protect themselves. This course is designed to help reduce possible accidents arising out of negligence. This introductory course in laboratory chemical safety is required for all entering chemistry graduate students. Topics to be covered include laboratory emergencies, chemical hazards, lab inspections and compliance, managing and working with chemicals, waste handling, case studies of university accidents.

Course Contents:

MODULE I: INTRODUCTION TO LABORATORY SAFETY

Risks in a Research Laboratory, Health Effects Due to “Hazardous” Chemical Exposure (How Does One Determine the Hazards Associated with Specific Chemicals, Exposure Routes, Toxicity Risk Assessment), Personal Protective Equipment (PPE) Proper Attire (Eye/Face Protection, Lab Coats, Gloves, Respirators, Disposal/Removal of PPE), Emergency Equipment Safety Showers/Eye Washes, Key Campus and Department Chemical Safety Contacts, Case Study: Dartmouth Chemical Poisoning (Key Lessons learnt).

MODULE II: LABORATORY EMERGENCIES: SPILLS AND FIRES

Handling the Accidental Release of Hazardous Materials, Notifications, Spill Containment and Clean-up, Leaking Gas Cylinders, Fires Classification, Fire Extinguishers (how they work, types), Risk Assessment, Flammable Hazards, Flammability Characteristics, Flammability Classes, Causes of Ignition, Reactive Hazards, Explosives, Case Study: University of Texas Austin Sodium Fire (Key Lessons learnt).

MODULE III: CHEMICAL HAZARDS

Chemical Hygiene Plan, The New Safety Data Sheets (SDS) versus the Old Material Safety Data Sheets (MSDS), Assessment of Chemical Toxicity, Toxic Hazards (Dose, Risk Assessment, Types of Toxins, Working with Highly Toxic Compounds (General Considerations, Planning, Precautions for Minimizing Exposure – Handling, In the Event of a Spill), General Considerations (Chemical Segregation, Transfer and Transport, Chemical Fume Hoods (Safety, Types, Operation), Other Types of Ventilation) Case Study: University of Wisconsin – LiAlH_4 Explosion (Key Lessons learnt).

MODULE IV: MANAGING AND WORKING WITH CHEMICALS

Working with Flammable Substances (Standard Operating Procedures), Working with Highly Reactive or Explosive Substances, Working with Compressed Gases (Parts of the Cylinder, Cylinder Pressure Regulator, Storage Guidelines, Transporting Cylinders, Handling Compressed Gas Cylinders) Working with Cryogenics (Health Hazards, Liquid N_2), Waste Handling. Characterization of Waste. Collection and Storage (Lids, Leaks, Labels, Location, Containers), Consequences of Mixing Incompatibles, Solid Wastes (Chemicals, Broken Glass, Sharps, Cylinders). Waste Handling, Characterization of Waste, Collection and Storage (Lids, Leaks, Labels, Location, Containers), Consequences of Mixing Incompatibles Solid Wastes (Chemicals, Broken Glass, Sharps, Cylinders, Pick-up), Special Cases, Hazardous Waste Minimization, Case Study: the “UCLA Incident”.

MODULE V: WORKING ON LABORATORY EQUIPMENTS

Working with Water (liquid)-dependent Equipment (Hazards, Proper Use, Heating Baths), Working with High Pressure Vacuum Pumps, Working with Stirring and Mixing Devices, Working with Heating Devices (Variacs, Oil, Salt, Sand Baths, Microwave Ovens), Ultrasonicators, Centrifuges and HPLCs. Laser classifications, Effects of lasers on skin and eyes, Protective eyewear, Enclosing laser beams, Examples of common mistakes and ways to avoid them, Non-beam hazards, Risk Assessment: when is it okay to violate

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specific safety rules? The importance of understanding, how things work, Case Study: Laboratory Equipment.

MODULE VI: BIOSAFETY, RADIATION, AND ANIMALS

Chemicals such as acrylamide & ethidium bromide, Pathogens, Biological waste handling, Recombinant DNA, Mammalian cell culture, Case Study.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

Suggested Readings:

- CRC Handbook of lab safety, 4th Edition, A. K. Furr
- Laboratory Safety for Chemistry Students, 2nd Edition, David C. Finster and Robert H. Hill, Jr.
- Complete Guide to Laboratory Safety, 4th Edition, Dan Scungio and Terry Jo Gile



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SPECTROSCOPY

Course Code: CHY4213

Credit Units: 03

Course Objective:

The course is designed to give students the basis of organic compound characterization. The student will be able to analyse and interpret spectroscopic data collected by the methods discussed in the course. They will be able to solve problems related to the structure, purity and concentration of chemicals and to study molecular interactions by choosing suitable spectroscopic methods and interpreting corresponding data.

Course Contents:

MODULE I: Ultra-violet and Visible Spectroscopy:

Principles of electronic spectroscopy, Absorption Law's, Type of electronic transitions, Effect of solvent on electronic transitions, Chromophores & Auxochromes, Ultraviolet bands of carbonyl compounds, unsaturated carbonyl compounds, dienes, conjugated polyenes. Fieser-Woodward rules for conjugated dienes and carbonyl compounds. Qualitative applications of UV-Vis spectroscopy.

MODULE II: INFRARED SPECTROSCOPY

Principle of IR spectroscopy, Modes of vibrations, Hook's law and calculation of frequency for different bonds. Fundamental vibrations and selection rule. Characteristic vibrational frequencies of common organic compounds. Effect of hydrogen bonding and solvent effect on vibrational frequencies, overtones, combination bands and Fermi resonance. Fingerprint region. Introduction to Raman spectroscopy. Applications of IR and Raman Spectroscopy in organic chemistry.

MODULE III: Nuclear Magnetic Resonance (NMR) Spectroscopy:

General introduction, chemical shift and factors effecting it, spin-spin coupling, shielding – deshielding mechanism, chemical and magnetic equivalence or non-equivalence chemical shift values and correlation of protons present in different groups in organic compounds. Proton exchange (proton on N, O and S atom), Karplus-relationship of coupling constant with dihedral angle. Simplification of complex spectra-by double resonance, contact shift reagents, D₂O shake. Nuclear Overhauser Effect (NOE). Determination of impurity by NMR, Principle and introduction to C-13 NMR, F-19, P-31, DEPT and 2-D NMR, Strcutrue determination by NMR.

MODULE IV: MASS SPECTROMETRY

Introduction, ion production—Electron ionization (EI), Chemical Ionization (CI), Fast atom bombardment (FAB) and Matrix Assisted Laser Desorption Ionization (MALDI), factors affecting fragmentation, ion analysis, and ion abundance. Mass spectral fragmentation of organic compounds, common functional groups, Molecular ion peak, Base peak, Isotopic peaks, Meta-stable peak, McLafferty rearrangement, ortho effect, Determination of molecular weight and molecular formula: Nitrogen Rule, hydrogen deficiency index. Introduction to GCMS, LCMS and HRMS. Combined structural elucidation problems based on IR, UV, NMR and mass spectral data.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	15	5	5	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance


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Suggested Readings:

- Subramanian, P.S.; Gopalan, R.; Rangarajan, K. *Elements of Analytical Chemistry*, Sultan Chand and Sons, New Delhi (2004) ISBN 978-8180547652.
- Khopkar, S. M. *Basic Concepts of Analytical Chemistry*, New Age International Pvt. Ltd. Publishers (2008) ISBN 978-8122420920.
- Chatwal, G.R.; Anand, S. *Instrumental Methods of Chemical Analysis*, Himalaya Publishing House (2011) ISBN 978-9350248362.
- Usharani, S. *Analytical Chemistry*, Macmillan India Limited (2008) ISBN 9780333933893.
- Willard, H. H.; Merritt, Jr, L. L.; Dean, J A; Settle, Jr, F. A. *Instrumental Methods of Analysis*, Saunders College Publication 7th Edition (1988).
- Janarthnam, P.B. *Physicochemical Techniques of Analysis Vol I & II*, Asia Publishing House (1973) ISBN 978-0210225301.
- Instrumental Methods of Chemical Analysis, Krishna Prakashan Media p Ltd; 1/e Edition (2011) ISBN 978-8182830998.
- Kalsi, P. S. *Spectroscopy of Organic Compounds*, New Age International Publishers, 8th Edition, 2020, ISBN 978-81-943696-8-4.



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ANALYTICAL CHEMISTRY LAB

Course Code: CHY4206

Credit Units: 02

Minimum 10 Experiments to be performed

Chromatography

1. Estimation of zinc and magnesium in the given mixture solution against EDTA (Disodium salt) solution
2. Thin-layer chromatography-separation of nickel, manganese, cobalt and zinc.
3. Separation and identification of the sugars present in the given mixture of glucose, fructose and sucrose by paper chromatography and determination of R_f values.
4. Separation of artificial colorants in confectionary using TLC.
5. Extraction and Determination of caffeine from tea leaves

Colorimetry

6. To verify Beer-Lambert's Law for potassium permanganate solution and hence to determine the molar extinction coefficient and unknown concentration of given sample colorimetrically
7. To verify the Beer-Lambert's Law and determine the concentration of given dye solution colorimetrically.
8. To estimate the amount of D-glucose in given solution colorimetrically.

Quantitative Analysis

9. Estimation of amines/phenols using bromate bromide solution/or acetylation method.
10. Determination of Iodine and Saponification values of an oil sample.
11. To determine the acid value of given oil
12. Determination of protein content of wheat flour.

***MSDS -Compilation of MSDS of chemicals used by students in each experiment is compulsory**

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, A: Attendance, V – Viva.

Suggested Readings:

- Wilson L. and Wilson D.W., Comprehensive Analytical Chemistry, New York: Elsevier, 1959 (1990) ISBN: 0444417354.
- Dick J.G., Analytical Chemistry, McGraw Hill (1973) ISBN 13: 9780882755809
- Jeffery, G.H.; Bassett, J.; Mendham, J.; Denney, R.C. Vogel's Textbook of Quantitative Chemical Analysis, Longman Scientific & Technical, 5th Edition (1989) ISBN 0-582-44693-



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INDUSTRIAL CHEMISTRY LAB

Course Code: CHY4207

Credit Units: 01

Minimum 10 Experiments to be performed

Analysis of Cement

1. Determination of silica content from given sample

Analysis of polymers

2. Determination of Acid Values of plastic material.
3. Determination of Saponification value of plastic material.
4. Determination Iodine value of a plastic material.
5. Determination of hydroxyl Value of plastic material.
6. Determination of Carbonyl Value of plastic material.
7. Determination of Molecular Weight of a polymer.
8. Determination of Capacity of cation exchange resin.
9. Determination Capacity of an anion exchange resin.
10. Determination of glass transition temperature of plastic.

Preparation of polymers

11. Preparation of Urea Formaldehyde resin and Phenol Formaldehyde resin.
12. To synthesize and hydrolyse Nylon 6:6/polyacrylic acid/polyamide

Water Analysis

13. Determination of Total dissolved solids
14. Determination of Carbonate and non-carbonate hardness by EDTA
15. Determination of Dissolved oxygen, BOD, COD
16. Determination of Turbidity

Preparation of Dyes (methyl orange, bismark brown)

Preparation of Cosmetics (shampoo, lipstick, detergent)

Preparation of Drugs (Paracetamol and Aspirin)

***MSDS -Compilation of MSDS of chemicals used by students in each experiment is compulsory**

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, A: Attendance, V – Viva.

Suggested Readings:

- A Textbook of quantitative chemical analysis, VIth Edition Vogel, Pearson Education Limited.
- Practical Organic Chemistry, Mann and Saunders, IV Edition, ELBS and Longman Publication
- Comprehensive Experimental Chemistry, V. K. Ahluwalia, New Age Publication, Delhi
- Practical Manual of Organic Chemistry, R. K. Bansal
- A Textbook of quantitative inorganic analysis including elementary instrumental analysis, IVth Edition Vogel, ELBS and Longman Publication
- Advanced Practical Inorganic Chemistry, Gurdeep Raj, Goel Publishing House, Meeru


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TERM PAPER

Course Code: CHY4231

Credit Units: 01

Objectives

The objective of this course is to judge the understanding as well as application of the knowledge gained by the students. The aim of the term paper is to provide the students with an opportunity to further enhance their knowledge in a sector of their choice by undertaking a significant practical unit of examining and analyzing various aspects of Chemistry & its application at a level commensurate with the learning outcomes of the various courses taken up them in the ongoing semester.

A term paper is primarily a record of intelligent reading in several sources on a particular subject. The students will choose the topic at the beginning of the session in consultation with the faculty assigned.

Guidelines:

1. The term paper will be related to the contemporary research issue and the topic will be given by the department.
2. The presentation of the term paper is scheduled to be held before the commencement of Semester examinations.
3. The paper will carry 100 marks that will be marked on the basis of understanding and organization of content based on the literature review. The Bibliography shall form an important part of the paper.
4. Examples of a few broad areas for term paper (List is indicative, not exhaustive)
 - Inorganic chemistry
 - Organic chemistry
 - Physical chemistry
 - Green chemistry
 - Agriculture chemistry

Evaluation Scheme

Organisation and relevance of content	Literature Review	Bibliography	Presentation	Total
30	30	20	20	100



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NATURAL PRODUCTS AND HETEROCYCLIC CHEMISTRY

Course Code: CHY4325

Credit Units: 03

Course objective: The course provides an understanding of important natural products. Using selected examples, this course describes the process of identification and isolation of natural products from natural sources, their chemical synthesis and structure elucidation. The course gives a broad introduction to heterocyclic chemistry. Emphasis is given on the most important heterocyclic systems, such as coumarines, indoles, pyrimidines, imidazoles, aziridines and oxiranes etc. For each group, ring synthesis, chemical properties and characteristic reactions will be discussed.

Course Contents:

MODULE I: TERPENOIDS AND CAROTENOIDS

Classification, nomenclature, occurrence, isolation, general methods of structure determination, isoprene rule. Structure determination, stereochemistry and synthesis of the following representative molecules: Citral, α -Terpeneol and β -Carotene

MODULE II: ALKALOIDS

Definition, nomenclature and physiological action, occurrence, isolation, general methods of structure elucidation, degradation, classification based on nitrogen heterocyclic ring, role of alkaloids in plants. Structure, stereochemistry and synthesis of the following: Coniine, Nicotine, Atropine, and Quinine.

MODULE III: HETEROCYCLIC - I

Introduction, classification, nomenclature of three, four, five and six-membered rings. Methods of synthesis and chemical reactions of aziridines, oxiranes, thiiranes, azetidines, oxetanes. Methods of Synthesis and chemical reactions with emphasis on the mechanism of electrophilic substitution of pyrrol, thiophene and furan. Synthesis and reactions of pyridine with emphasis on nucleophilic substitution reactions.

MODULE IV: HETEROCYCLIC – II

Introduction to condensed five and six membered heterocycles; preparation and reactions of indole, quinoline and isoquinoline with special reference to Fischer-indole synthesis, Skraup synthesis and Bischler-Napieralski synthesis. Synthesis and chemical reactions of five membered ring with two heteroatoms; pyrazole, imidazole, oxazole, thiazole, isothiazole, and benzofused analogue like coumarins, thiocoumarins, phenazine, phenothiazines, 1,4 and 1,5-benzodiazepines.



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Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	15	5	5	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

Suggested Readings:

- Heterocyclic Chemistry, Vol 1-3, A. A. Gupta. M. Kumar and V. Gupta, 35 Springer Verlag
- The Chemistry of Heterocycles, T. Eicher and S. Hauptmann, Thieme
- Heterocyclic Chemistry, J. A. Joule, K. Mills and G.F. Smith, Chapman and Hall
- Heterocyclic Chemistry, T.L Gilchrist, Longman Scientific Technical
- Contemporary Heterocyclic Chemistry, G. A. Newkome and W. W. Paudler, Wiley-Inter Science
- Organic Chemistry, Vol 2, I. L. Finar, ELBS
- Natural Products- Chemistry and Biological Significance, J. Mann, R.S. Davidson, J. B.
- Hobbs, D.V. Banthorpe and J. B. Harborne, Longman, Essex.



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DRUGS AND DYES

Course Code: CHY4304

Credit Units: 04

Course Objective: At the end of this course students must acquire a good knowledge about the various drugs their active constituents, their pharmacological actions and therapeutic uses. Beside drugs they will learn about various dyes used in day to day life, their properties and applications.

Course Content:

MODULE I: INTRODUCTION TO DRUGS

Definition of drug (WHO), classification of drugs, nomenclature of drugs, stereochemical aspects of drugs, definitions of terms commonly used in the chemistry of drugs, routes of drug administration and different dosage forms and applications

MODULE II: MECHANISM OF ACTION, STRUCTURE AND SYNTHESIS OF DRUGS

Sulphonamides : Sulphathiazole, Sulphadiazine (any two)
Antiseptics : Iodoform, Dettol
Antileprotic drugs : Dapsone (DDS), Acedapsone (DADDS)
Anticancer agents : Alkylating agents
Cardiovascular Drugs : Amyl nitrate, Methyldopa
Antipyretics & Analgesics: Novalgin, Paracetamol
Antimalarials : Chloroquine, Primaquine, Mepacrine
Anti diabetic : Tolbutamide
Antitubercular : p-amino salicylic acid, Ethambutol

MODULE III: INTRODUCTION TO DYES

Historical development of synthetic Dyes - Introduction, Nomenclature, classification based on structure & mode of applications of fibres. Structural features of a dye (chromophores and auxochromes), bathochromic and hypsochromic effects, diazotisation and coupling, colour and chemical constitution (Witt's theory, Armstrong theory and Modern theory). Dye intermediates- unit, batch & continuous process in the preparation of dye intermediates,

MODULE IV: STRUCTURE AND PREPARATION OF DYES

Nitro Dyes : Picric acid, Martius yellow, Naphthol yellow S
Nitroso Dyes : Fast green O, Naphthol green Y
Azo Dyes : Methyl orange, Methyl red, Congo Red
Phthaleins : Phenolphthalein
Phthalocyanines: Copper phthalocyanine
Xanthenes : Fluorescein, Eosin, Mercurochrome
Rhodamines : Rhodamine B
Thiazine Dyes : Methylene blue
Cyanine Dyes : Quinoline blue
Antraquinone Dyes: Alizarin
Indigoids : Indigo (Indigotin)
Thioindigos : Thioindigo
Azine Dyes : Safranin T

Action of light on dyes and dyed fibres, Factors affecting fastness of dyed fibres General consideration, fluorescence, phototropy, mechanism of fading.

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Examination Scheme:

Components	CT	HA	S/V/Q	A	EE
Weightage(%)	15	5	5	5	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, A: Attendance EE: End Semester Examination

Books Suggested:

- The Organic Chemistry of Drug Synthesis, Vol. 1,2,3,4 by Lednicer Daniel, 1st edition, John Wiley & Sons INC.
- Exploring QSAR Vol; I Fundamentals and Applications in Chemistry and Biology by CHansh and A Leo Vol. II: hydrophobic, Electronic and Steric Constants by C Hansh, A Leoand D Hockman ACS Book Catalog.
- Foye' s Principles of Medicinal Chemistry by Foye, 6th edition, Lippincott William Wilkins.
- Comprehensive Medicinal Chemistry by Hansh C, Vol IV, Elsevier Pergamon.
- Quantitative Drug Design- A Critical Introduction by Martin YC, Marcel Dekker Inc. NewYork.
- Medicinal Chemistry-A Biochemical Approach by Nogrady T, Oxford University Press NewYork, Oxford.
- Computer Aided Drug Design, by Pops and Perruns, Academic Press, NY
- Burger' s Medicinal Chemistry by Wolff ME, John Wiley & Sons, New York.
- Introduction to Medicinal Chemistry' – How Drugs Act and Why by Alex Gringauz, Willey-VCH Publication 1997.
- Drug Design by Bothara KG &Kulkarni VM, 3rd edition, NiraliPrakashan.
- An Introduction to Drug Design by SN Pandeya& IR Dimmock, 1st edition, New AgeInternational Publishers.
- Structure based Drug Design by Veerapandian, 1st edition, Taylor & Francis New York,London.
- Holtje. Sippl.,Rognan and Folkers, Molecular Modeling.
- P.K. Larsen, Tommy and U.Madsen, textbook of Drug Design and Discovery.



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ADVANCED NATURAL PRODUCTS CHEMISTRY

Course Code: CHY4305

Credit Units:03

Course Objective: The main idea of this course is to give the students details of natural product chemistry, which includes the study of Vitamins, alkaloids, terpenes and steroids etc. These play a key role in our day to day life. The course covers the importance of these naturally occurring materials and their applications in chemistry, biology and medicine. The course will also include the invited lectures on recent advances in natural product chemistry and it gives a reasonable good overview of the naturally occurring chemicals and their important reactions, their applications etc.

Course Content:

MODULE I: NATURAL PRODUCTS AND THEIR BIOSYNTHETIC PATHWAYS

General classification of natural products, their isolation and characterisation and biosynthesis of common plant products; Biosynthesis pathways for natural products using co-enzymes and enzymes; Synthesis of selected natural products based on genetic classification – fatty acid derivatives and related compounds, general biogenesis and synthesis of cis jasmone, methyl jasmonate, prostaglandins, exaltone and muscone.

MODULE II: VITAMINS

Vitamins: Classification, occurrence, chemistry of Vitamins A, C and E, structure elucidation and synthesis, deficiency syndromes,

MODULE III: ALKALOIDS

Alkaloids, definition, Isolation, Classification (define different categories of alkaloids with specific examples, their medicinal uses, synthesis). Drugs (cocaine, opiates, quinine, vincristine, curare, mescaline, etc.) and toxins (nicotine, lupinines, strychnine, tetrodotoxin, etc.). Introduction, 2. Simple Alkaloids I: Pyrrole Derivatives 3. Simple Alkaloids II: Piperidine Derivatives 4. Aromatic Alkaloids I: Simple Derivatives 5. Aromatic Alkaloids II: More Complex Derivatives 6. The Indole Alkaloids 7. Miscellaneous Alkaloids with Interesting Bioactivities.

MODULE IV: TERPENES AND STEROIDS

Classification and biosynthesis of mono-, sesqui-, di- and triterpenoids and steroids. Acetyl CoA, Mevalonic acid, acetoacetyl CoA, squalene to lanosterol, Cholesterol to estradiol, diosgenin and its utility in hormone synthesis.

MODULE V: GENERAL CHEMISTRY OF THE FOLLOWING COMPOUNDS

Cholesterol, Artemisinin, Gibberellin A₃, Azadirachtin.

Examination Scheme:

Components	CT	HA	S/V/Q	A	EE
Weightage(%)	15	5	5	5	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, A: Attendance EE: End Semester Examination

Suggested Readings:

- K. Nakanishi. Natural Products Chemistry, Vols. I and II, Academic Press, New York and London (1974).
- M. Harmata. Strategies and Tactics in Organic Synthesis 4 & 5, Academic Press (2004)
- T. L. Gilchrist. Heterocyclic Chemistry (2nd edn.), Longman Scientific & Technical Publications. (1992).
- R. K. Bansal. Heterocyclic Chemistry: Synthesis, Reactions and Mechanisms, Wiley Eastern (1991).

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ADVANCED NANOCHEMISTRY

Course Code: CHY4308

Credit Units:03

Course Objective: This course is intended to give the students' knowledge of advances in nanochemistry and introduction to ionic liquids. This course will help the student understand superplasticity and its industrial Applications. A knowledge of introductory level nanochemistry is required.

Course Content:

MODULE-I: SIZE EFFECTS ON STRUCTURE AND MORPHOLOGY OF NANOPARTICLES

Fundamental Properties - Size Effects on Structure and Morphology of Free or Supported Nanoparticles - Size and Confinement Effects - Fraction of Surface Atoms - Specific Surface Energy and Surface Stress - Effect on the Lattice Parameter - Effect on the Phonon Density of States - Nanoparticle Morphology - Equilibrium Shape of a Macroscopic Crystal - Equilibrium Shape of Nanometric Crystals - Morphology of Supported Particles.

MODULE-II: SUPERPLASTICITY AND REACTIVITY OF METAL NANOPARTICLE

Superplasticity – Introduction – Mechanism - Superplastic Nanostructured Materials - Industrial Applications. Reactivity of Metal Nanoparticles - Size Effects-Structural Properties - Electronic Properties - Reactivity in Chemisorption and Catalysis of Monometallic Nanoparticles - Support Effects - Alloying Effects - Effect of Surface Segregation - Geometric Effects -Electronic Effects - Preparation and Implementation in the Laboratory and in Industry.

MODULE-III: SUPERCRITICAL FLUIDS

Supercritical Fluids –Introduction – Physicochemical Properties - Solubility - Viscosity - Diffusion - Thermal Conductivity - Applications - Purification and Extraction - Synthesis.

MODULE-IV: FEATURES OF NANOSCALE GROWTH

Specific Features of Nanoscale Growth – Introduction - Thermodynamics of Phase Transitions -Dynamics of Phase Transitions - Thermodynamics of Spinodal Decomposition - Thermodynamics of Nucleation – Growth - Size Control - Triggering the Phase Transition- Application to Solid Nanoparticles - Controlling Nucleation - Controlling Growth - Controlling Aggregation. Stability of Colloidal Dispersions - Breaking Matter into Pieces.


Examination Scheme:

Components	CT	HA	S/V/Q	A	EE
Weightage(%)	15	5	5	5	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, A: Attendance EE: End Semester Examination

Suggested Readings:

- C. Brechignac, P. Houdy, M. Lahmani, —*Nanomaterials and Nanochemistry*ll, Springer publication (2007).
- Kenneth J. Klabunde, —*Nanscale materials in chemistry*ll, Wiley Interscience Publications (2001).
- C. N. Rao, A. Muller, A. K. Cheetham ,—*Nanomaterials chemistry*ll, Wiley-VCH (2007).


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MEDICINAL CHEMISTRY

Course Code: CHY4310

Credit Units: 03

Course objective: This course is intended to provide students with chemical principles that are required to understand the action and behavior of drug compounds and hence the relationship between the structure and stereochemistry of a compound and its chemical and therapeutic properties, and thus the chemical considerations in drug design: size, physico-chemical properties and ADME (absorption, distribution, metabolism, and excretion).

Course Contents:

MODULE I: DRUG DEVELOPMENT

Drug development: Lead modification. (a) Identification of active part -Pharmacophore (b) Fundamental group modification (c) Structure-activity relationship (d) Structure modification to increase potency and therapeutic index (i) Homologation ii) Chain branching (iii) Ring chain transformations (iv) Bioisosterism. Drug development process: (a) Pre-formulation, product development (b) Preclinical studies; Acute toxicity, sub acute toxicity, chronic toxicity, LD₅₀, ED₅₀, pharmacodynamics, mutagenicity and reproductive studies.

MODULE II: PHARMACOKINETICS

Basic principles of pharmacokinetics including absorption, distribution, metabolism and excretion of drugs and metabolites in the human body, important pharmacokinetic parameters in defining drug therapeutics, mathematical approach to pharmacokinetic modeling.

MODULE III: PHARMACODYNAMICS

Introduction, elementary treatment of enzyme stimulation, enzyme inhibition, sulphonamides, membrane active drugs, drug metabolism, biotransformation, significance of drug metabolism in medicinal chemistry. Therapeutic index, explanation of quantal dose, graded dose, dose-effect curves, efficacy, potency, margin of safety

MODULE IV: ANTIBIOTICS

Definition, characteristics, classification, synthesis and therapeutic uses of Penicillin, Ampicillin, Amoxicillin, Chloramphenicol, Cephalosporin, Tetracycline and Streptomycin

Examination Scheme:

Components	CT	HA	S/V/Q	A	EE
Weightage(%)	15	5	5	5	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, A: Attendance EE: End Semester Examination

Suggested Readings:

- Principles of Medicinal Chemistry, W. C. Foye, Philadelphia, USA
- An introduction to Medicinal chemistry, G. L. Patrick, Oxford University Press
- Burger's Medicinal Chemistry and Drug Discovery, Vol. 1-5, John Wiley
- The Organic Chemistry of Drug Design and Drug Action, Richard B. Silvermann, Academic Press
- Medicinal Chemistry, Ashutosh kar, New Age International Ltd
- Essentials of Medical Pharmacology, K. D. Tripathi, Jaypee Brothers
- A textbook of medicinal chemistry, P. Primo, CBS Publishers & Distributors
- Text book of pharmaceutical organic chemistry, Md. Ali, CBS Publishers


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ENVIRONMENTAL CHEMISTRY

Course Code: CHY4321

Credit Units: 03

Course Objective: This course is intended to provide students with knowledge of key themes, theories and problems and describe important chemical reactions in the atmosphere and in water, including important chemistry in connection with air pollution, water pollution, and case studies of many environmental disasters.

Course Contents:

MODULE I: CHEMISTRY AND THE ENVIRONMENT

Chemistry and the environment - environmental pollution - causes - pollutants – air pollution - effects of air pollution: Environmental fate of pollutants – transformation process - bioconcentration - fate of air, water and soil pollutants

MODULE II: WATER POLLUTION

Water pollution - water quality parameters - turbidity, colour, pH, acidity, alkalinity, solids, hardness, chlorides, residual chlorine, sulphates, fluorides, phosphates, iron and manganese, DO, BOD, COD, nitrogen, grease, volatile acids, gas analysis.

MODULE III: INDUSTRIAL POLLUTION

Cement, sugar, distillery, drug, paper and pulp, thermal power plants, nuclear power plants, metallurgy. Polymers, drugs etc.

Environmental disasters – Chernobyl, Three Mile Island, Seveso and minamata disasters, Japan tsunami

MODULE IV: BIOLOGICAL ACTIVITY

Biological activity - biodegradation of carbohydrates, proteins, fats and oil, detergents, pesticides; Metabolic fate of pollutants - adsorption – distribution - metabolism - excretion.

MODULE V: ENVIRONMENTAL TOXICOLOGY

Toxic heavy metals: Mercury, lead, arsenic and cadmium, Causes of toxicity. Bioaccumulation, sources of heavy metals, Chemical speciation of Hg, Pb, As, and Cd. Biochemical and damaging effects. Toxic Organic Compound: Pesticides, classification, properties and uses of organochlorine and ionospheres pesticides detection and damaging effects.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	15	5	5	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Suggested Readings:

- Environmental Chemistry, S.E. Mahan, Lewis Publishers.
- Environmental Chemistry, Sharma & Kaur, Krishna Publishers.
- Environmental Chemistry, A.K. De, Wiley Eastern
- Environmental Pollution Analysis, S.M. Khopkar, Wiley Eastern
- Standard Method of Chemical Analysis, F.J. Welcher Vol. III, Van Nostrand Reinhold Co.
- Environmental Toxicology, Ed. S. Landsberger and M. Creatchman, Gordon and Breach Science Publication.
- Environmental Chemistry, C. Baird, W.H. Freeman.

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POLYMER TECHNOLOGY

Course Code: CHY4311

Credit Units:03

Course objective: This course is designed to familiarize students with the various polymer characterization and manufacturing techniques for converting polymer feed stocks into plastic end products. It involves a study of various plastics processing techniques. Students will become familiar with specialty polymers and their industrial uses, and design factors to create materials with desirable end-use properties

Course Contents:

MODULE I: POLYMER PROCESSING

Plastic Technology: Extrusion, injection molding, blow molding, compression molding, thermoforming, rotational molding, casting. Fiber Technology- Textile and fabric properties, spinning, fiber after-treatments. Elastomer Technology- Vulcanization, reinforcement, elastomer properties and compounding. Recycling of polymers Classification of polymer recycling processes. Waste polymer recovery, sortation, microsortation, polymer reprocessing and Polymer incineration

MODULE II: POLYMER BLENDS AND ALLOYS

Definition, Polymer Blends, compatibilisation, Polymer Blends, Industrial applications of polymer blends.

MODULE III: SPECIALTY POLYMERS

Liquid Crystal Polymers (LCP): Smectic, nematic, cholestric crystals, thermotropic main chain LCP, side chain LCP, chiral nematic LCP, properties of commercial LCP's. Electroactive polymers: Filled polymers, conducting polymers- doping, conducting mechanism, EMI shielding, applications- rechargeable batteries, sensors, photoconductive polymers. Ionic Polymers: Ionic crosslinking, ion exchange, hydrophilicity, ionomers, polyelectrolytes, applications, Synthetic Polymeric membranes- membrane preparation, membrane modules, applications, High temperature and fire resistant polymers, Hydrogels, smart polymers, Dendritic polymers- their applications. Biomedical polymers: Contact Lens, Dental Polymers, Artificial heart, Kidney and skin cells Biobased polymers: PLA, PCL

Examination Scheme:

Components	CT	HA	S/V/Q	A	EE
Weightage(%)	15	5	5	5	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, A: Attendance EE: End Semester Examination

Suggested Readings:

- Principles of Polymerization by G. Odian, (Wiley Interscience, New Delhi)
- Polymer Science by Gowarikar
- Thermal Characterization of Polymeric Materials- E. Turi (Academic Press)
- Polymer Characterization- Physical Techniques by D. Campbell and J.R.White (Chapman and Hall)
- Text Book of Polymer Science, F.W.Billmeyer (Wiley Eastern)
- Applied Rheology in Polymer Processing by B. R. Gupta, (Asian Books, Pvt. Ltd. New Delhi)
- Polymer Blends and Alloys by R.P. Singh, C.K. Das and S. K. Mustafi, (Asian Books Pvt. Ltd.)
- Principles of Polymer Science by Bahadur and Shastry
- Plastics Technology Handbook by Manas Chanda and S.K.Roy (4th Edition, CRC Press, New York)
- Analysis of polymers- an introduction, by Crompton T.R., pergaman press 1989.
- Thermal characterization of polymeric materials, by Turi E.A., Academic press Inc.

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NON-CONVENTIONAL ENERGY SOURCES

Course Code: CHY4312

Credit Units:03

Course Objective: A detailed exposition of the course for the student, opting for Applied Chemistry is so vitally important for a clear understanding of recent intricate theories of non-conventional sources of energy.

Course Contents:

MODULE I: SOLAR ENERGY

Heat Transfer in Renewable Energy Systems - conduction, convection and radiation, Heat transfer and engineering concepts to the renewable energy systems, Role and potential of new and renewable source, the solar energy option, Environmental impact of solar power, physics of the sun, Spectral distribution, the solar constant, radiation on tilted surface/earth, instruments for measuring solar radiation. Application of solar energy and solar photovoltaic system

MODULE II: BIO-GAS

Raw materials, Properties/characteristics of bio gas, Principles of Bio-Conversion; Photosynthesis, Anaerobic/aerobic digestion, types of Bio-gas digesters, gas yield, combustion, Transportation of bio gas, bio gas plant technology & status, Biomass cogeneration Energy recovery from urban waste, Power generation from liquid waste, Bio gas applications.

MODULE III: GEOTHERMAL AND WIND ENERGY

Structure of earth's interior, earthquakes & volcanoes, Geothermal resources, Hot springs, Steam ejection, Principal of working, Types of geothermal station with schematic representation, Applications. Properties of wind, Availability of wind energy in India, wind velocity, Wind machine fundamentals; types of wind machines and their characteristics, Horizontal and Vertical axis wind mills, Elementary design principles, Coefficient of performance of a wind mill rotor, Aerodynamic considerations in wind mill design, Recent development and applications.


MODULE IV: OCEAN AND HYDROGEN ENERGY

Principle of ocean thermal energy conversion (OTEC), setting of OTEC plants, thermodynamic cycles. Tidal and wave energy: Fundamentals of tidal power, Potential and conversion techniques, mini-hydel power plants. Use of tidal energy, Limitations of tidal energy conversion systems. Properties of hydrogen in respect of it's use as source of renewable energy, Sources of hydrogen, Production of hydrogen; electrolysis of water, thermal decomposition of water, thermo chemical production bio-chemical production. Applications of hydrogen energy.

Examination Scheme:

Components	CT	HA	S/V/Q	A	EE
Weightage(%)	15	5	5	5	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, A: Attendance EE: End Semester Examination


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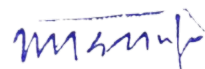

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Suggested Readings:

- Bansal Keemann, Meliss," Renewable energy sources and conversion technology", Tata Mc Graw Hill.
- Kothari D.P., "Renewable energy resources and emerging technologies", Prentice Hall of India Pvt. Ltd.
- Rai G.D, "Non-Conventional energy Sources", Khanna Publishers.
- Ashok V. Desai, "Nonconventional Energy", New Age International Publishers Ltd.
- Tiwari and Ghosal, "Renewable energy resources" Narosa Publication.
- Twidell & Weir, "Renewable Energy Sources"
- K Mittal "Non-Conventional Energy Systems" , Wheeler Publication
- Ramesh & Kumar, "Renewable Energy Technologies", Narosa Publications.



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INDUSTRIAL WASTE AND WATER TREATMENT

Course Code: CHY4313

Credit Units:03

Course Objectives: This course will give the basic understanding of the chemical principles involved in water and wastewater treatment. It presents the basic chemistry and treatment methodologies used in drinking water and wastewater operations. The students would be able to characteristics and treatment of industrial waste, advanced methods of treatment waste and disposal, reuse and recovery of waster from various industries. A brief introduction to environmental Impact assessment has also been added to create general awareness.

Course Contents:

MODULE I: AN INTRODUCTION TO SOURCE, CHARACTERISTICS AND TREATMENT OF INDUSTRIAL WASTE

Undesirable waste characteristics, sources and characteristics of waste water, industrial waste survey, waste characteristics - estimation of organic content, water reuse and in-plant waste control, idea of different technologies for the treatment of industrial waste water and the basis for the selection of treatment technology.

MODULE II: TREATMENT OF INDUSTRIAL WASTES

Different steps in the treatment of industrial waste (equalization, neutralization, sedimentation, oil separation, flotation, coagulation), sources and removal of heavy metals e.g. As, Ba, Cd, Cu, F, Fe, Rb, Mn, Hg, Ni, Se, Ag & Zn)

MODULE III: ADVANCE WATER TREATMENT OF INDUSTRIAL WASTE

Aeration, air stripping of volatile organics (VOC), biological oxidation - removal of organics (sorption, stripping, biodegradation), nitrification and de-nitrification. Lagoons and stabilization basins, membrane processes, trickling filtration, adsorption, ion exchange, chemical oxidation, sludge dewatering and disposal.

MODULE IV: WASTE WATER REUSE AND RECOVERY

Treatment, disposal, reuse and recovery of trade waste from (1) Textile Manufacture (2) Distilleries (3) Sugar (4) Paper and Pulp mills (4) Tanneries (5) Food Processing industries (6) Fertilizer Industry.

MODULE V: ENVIRONMENTAL IMPACT ASSESSMENT

Introduction to EIA, impact assessment methodologies, environmental inventory, environmental impact assessment (planning and management), environmental indices and indicators for describing the affected environment, EIA guidelines, introduction to environmental impact statement.

Examination Scheme:

Components	CT	HA	S/V/Q	A	EE
Weightage(%)	15	5	5	5	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, A: Attendance EE: End Semester Examination


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Suggested Readings:

- Thomous S. Spiro and William M. Stiglicini, Chemistry of The Environment, Prentice Hall of India Pvt. Ltd. (2002)
- Nicholas P. Cherimisinoff, Biotechnology for Waste and Waste Water Treatment, Prentice Hall of India Pvt. Ltd. (2001).
- Jarry A. Nathanson, Basic Environmental Technology, 4th ed ,Prentice Hall of India Pvt. Ltd. (2003).
- W.Wesley Eckenfelder, Indusrtrial Water Pollution Control, 2nd ed., Tata Mc-Graw Hill Book Company (1989).
- Larry W. Canter. , Environmental Impact Assessment, 2nd ed, Tata Mc Graw Hill (1996).



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NUCLEAR CHEMISTRY

Course Code: CHY4314

Credit Units: 03

Course Objective: This course is designed to provide basic information of Radiation and Nuclear chemistry; requirements, methods of preparation, uses of Radioelements. This should improve a student's knowledge of types of radioactive decay, natural decay series, nuclear models, nuclear properties, instrumentation and Introduction to health

Course Contents:

MODULE I: INTRODUCTION TO RADIOACTIVITY

Discovery of radioactivity, α , β and γ radiations, the radioactive series, radioactive decay, modes of decay, the n/p ratio, odd even rule, artificial radioactivity, transmutation of elements, the G.M counter

MODULE II: CHEMISTRY OF RADIOACTIVE ELEMENTS

Positions of radioactive elements in periodic table, trans-uranides and trans-actinides, super heavy elements; nomenclature & predicted chemistry, the Seaborg model, radiation dosimetry, radiolysis of aqueous solutions

MODULE III: USES OF NUCLEAR ISOTOPES

Introduction to nuclear medicine, positron emission tomography (PET), radiocarbon dating and its uses, nuclear reactors, uses of heavy water in nuclear reactors, Trace analysis of elements and compounds - neutron activation analysis, isotope dilution analysis. Nuclear waste and its environmental effect

MODULE IV: NUCLEAR MODELS

Liquid-drop model, electron shell model, nuclear reactions, fission and fusion, cold fusion, idea about nuclear spin and its application in NMR, nuclear splitting, Zeeman effect and Stark effect (only definition and qualitative explanation)


Examination Scheme:

Components	CT	HA	S/V/Q	A	EE
Weightage(%)	15	5	5	5	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, A: Attendance EE: End Semester Examination

Suggested Readings:

- Essentials of Nuclear Chemistry, H. J. Arnikar, 4th Edition Wiley Eastern (1987).
- Chemical Applications of Radioisotopes, H. J. M. Bowen. Buttler and Tanner (1969).
- Introduction of Nuclear and Radiochemistry, G Friedlander, T. W. Kennedy, E. S.
- Macias and J. M. Miller, 3rd Edition, John Wiley (1981).


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FOOD TECHNOLOGY

Course Code: CHY4315

Credit Units:03

Course objective: The contents have been drawn-up to accommodate the widening horizons of the discipline of Food Technology. They reflect the current changing needs of the students. This will create awareness among the students about the fundamentals of food and nutrition science involved in our everyday life

Course Contents:

MODULE I: INTRODUCTION TO FOOD

Carbohydrates: Structure and functional properties of mono- oligo-polysaccharides including starch, cellulose, pectic substances and dietary fibre; Proteins: Classification and structure of proteins in food; Lipids: Classification and structure of lipids, Rancidity of fats, Polymerization and polymorphism; Pigments: Carotenoids, chlorophylls, anthocyanins, tannins and myoglobin; Food flavours: Terpenes, esters, ketones and quinones; Enzymes: Specificity, Kinetics and inhibition, Coenzymes, Enzymatic and non-enzymatic browning; Nutrition: Balanced diet, Essential amino acids and fatty acids, PER, Water soluble and fat soluble vitamins, Role of minerals in nutrition, Antinutrients, Nutrition deficiency diseases.

MODULE II: FOOD MICROBIOLOGY

Characteristics of microorganisms; Microbial growth in food: Intrinsic and extrinsic factors, Growth and death kinetics, serial dilution method for quantification; Food spoilage: Contributing factors, Microbial spoilage of milk and milk products, meat and meat products; Foodborne disease: Toxins; Fermented food: Buttermilk, yoghurt, cheese, sausage, alcoholic beverage, vinegar, sauerkraut and soya sauce.

MODULE III: FOOD PRODUCTS TECHNOLOGY

Processing principles: Canning, chilling, freezing, dehydration, control of water activity, CA and MA storage, fermentation, hurdle technology, addition of preservatives and food additives, Food packaging, cleaning in place and food laws; Grain products processing: Milling of rice, wheat, and maize, production of bread, biscuits and breakfast cereals, Solvent extraction, refining and hydrogenation of oil; Milk and milk products processing: pasteurized and sterilized milk, cream, butter, ghee, ice-cream, cheese and milk powder; Animal products processing

MODULE IV: FOOD CHEMICAL ENGINEERING

Mass and energy balance; Momentum transfer: Flow rate and pressure drop relationships for Newtonian fluids flowing through pipe, Characteristics of non Newtonian fluids - generalized viscosity coefficient and Reynolds number, Flow of compressible fluid, Flow measurement, Pumps and compressors; Heat transfer: Heat transfer by conduction, convection, radiation, boiling and condensation, heat exchangers; Mass transfer: Molecular diffusion and Fick's Law, Steady state mass transfer, Convective mass transfer;

MODULE V: FOOD MECHANICAL ENGINEERING

Mechanical operations: size reduction of solids, high pressure homogenization, filtration, centrifugation, settling, sieving, flow through porous bed, agitation of liquid, solid-solid mixing, and single screw extrusion; Thermal operations: Energy requirement and rate of operations involved in process time evaluation in batch and continuous sterilization, evaporation of liquid foods, hot air drying of solids, spray and freeze-drying, freezing and crystallization.



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Examination Scheme:

Components	CT	HA	S/V/Q	A	EE
Weightage(%)	15	5	5	5	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, A: Attendance EE: End Semester Examination

Suggested Readings:

- Handbook of Food Rheology and Technology by Bernhard Senge (Editor), Joachim Kaldasch (Editor)
- Formulation Engineering of Foods by Ian T. Norton, Peter Fryer, J. Norton
- Guide to Foodborne Pathogens, 2nd Edition by Ronald G. Labbé, Santos García
- The Molecular Biology and Biochemistry of Fruit Ripening by Graham Seymour, Gregory A. Tucker, Mervin Poole, James Giovannoni



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RENEWABLE ENERGY CONVERSION SYSTEMS

Course Code: CHY4322

Credit Units: 03

Course Objective:

Course provides an introduction to different renewable energy sources. It analyses the full range of renewable energy supplies needed for modern economies. The course includes power from sun, wind, bio, tidal, ocean, geo and hydro.

Course Contents:

Module I: Introduction to Renewable Energy

Renewable and Non-Renewable Energy, World energy scenario; Fossil fuel resources - estimates and duration; India's energy scenario; Synergy between energy and environment, global environment issues, greenhouse gas emission, global warming, green energy solutions, technical and social implications of renewable energy

Module II: Solar Concepts

Introduction, Sun as the source of radiation, Earth and Solar constant, Extra-terrestrial solar radiation, components of radiation, effects of earth's atmosphere, Introduction to solar PV, Introduction to solar Thermal.

Module III: Biofuels, Wind Energy

Biofuels- Definition, generations and types

Wind-Characteristics, Sources of wind, components of wind turbines, advantages and environmental aspects of wind energy

Module IV: Hydro Energy, Tidal Energy

Hydro- Principles, hydro-turbines, social and environmental aspects

Tidal- The nature of the resource, physics, power generation, technical factors, environmental factors, tidal energy potential, tidal barrage, tidal stream, tidal current turbines.

Module V: Geothermal, OTEC

Geothermal- Principles, suitable sites and criteria, Advantages and disadvantages,

OTEC- Principles, Open and closed systems.

Examination Scheme:

Components	CT	Assignment	V/Q	Attendance	EE
Weightage (%)	15	5	5	5	70

Suggested Readings:

- Renewable energy resources – J. W. Twidell
- Renewable energy engineering and technology-edited by V. V.N. Kishore
- Wind Energy Comes of Age, Paul Gipe, John Wiley & Sons Inc.
- Directory, Indian Windpower 2004, CECL, Bhopal.
- Solar Energy: Fundamentals, design, modeling and applications, Authored by G. N. Tiwari


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INORGANIC CHEMISTRY LAB

Course Code: CHY4324

Credit Units:02

(Minimum 10 experiments to be performed)

Quantitative and Qualitative Analysis of following:

1. Ores analysis (oxides and carbonate ores)
2. Nickel/Copper

Estimation of following:

3. Active CaO in lime
4. Chlorine in bleaching powder
5. Lead content in red lead

Preparation and Characterizations/study by spectral methods

6. Trialkoxyboanes.
7. Tin (IV) chloride
8. Sodium tetrathionate
9. Cr (III) complexes. $[\text{Cr}(\text{H}_2\text{O})_6]\text{NO}_3 \cdot 3\text{H}_2\text{O}$, $[\text{Cr}(\text{H}_2\text{O})_4\text{Cl}_2]\text{Cl} \cdot 2\text{H}_2\text{O}$, $[\text{Cr}(\text{en})_3]\text{Cl}_3$, $[\text{Cr}(\text{acac})_3]$.
10. Fe(II) chloride and its application as catalyst in Friedel-Craft reaction
11. Ferrocene
12. Kinetic study of Cr(III) with a multidentate ligand (EDTA)

Qualitative Inorganic Semi-micro Analysis

13. Detection of atleast four cations and anion in a mixture of salts.

*MSDS -Compilation of MSDS of chemicals used by students in each experiment is compulsory

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, A-Attendance, V – Viva.

Suggested Readings:

- G.H.Jeffery, J.Bassett, J.Mendham and R.C.Denney Vogel's Text book of quantitative chemical analysis, ELBS 5th Edn. Longman, Singapore Publishers, Singapore, 1996.
- R. Mukhopadhyay, P.Chatterjee, "Advanced practical Chemistry"
- Dinesh Sharma, "A hand book of Analytical Inorganic chemistry", First Published(2004)
- I.M.Kolthoff, E.B.Sandell et.al. Quantitative chemical analysis, CHYmillan, Madras 1980.
- A Text book of quantitative Inorganic Analysis – A. I. Vogel
- Standard methods of Chemical Analysis F.J.Welcher
- Experimental Inorganic Chemistry – W. G. Palmer.
- Manual on Water and Waste Water Analysis, NEERI- Nagpur D.S. Ramteke and C. A. Moghe
- Inorganic synthesis- King.
- Synthetic Inorganic Chemistry-W .L. Jolly
- EDTA Titrations –F Laschka


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SUMMER INTERNSHIP / STUDY ABROAD PROGRAMME

Course Code: CHY4335

Credit Units: 6

Objectives

The objective of this course is to judge the understanding as well as application of the knowledge gained by the students. The aim of the internship is to provide the students with an opportunity to further enhance their knowledge in a sector of their choice by undertaking a significant practical unit of examining and analyzing various aspects of Chemistry & its application at a level commensurate with the learning outcomes of the various courses taken up them in the ongoing semester.

A summer internship is primarily a record of intelligent reading and research on a particular subject. The students will choose the topic at the beginning of the session in consultation with the faculty assigned.

Guidelines:

1. The internship will be related to the contemporary research issue and the topic will be given by the department.
2. The presentation of the term paper is scheduled to be held before the commencement of Semester examinations.
3. The paper will carry 100 marks that will be marked on the basis of understanding and organization of content based on the literature review. The Bibliography shall form an important part of the paper.
4. Examples of a few broad areas for term paper (List is indicative, not exhaustive)
 - Inorganic chemistry
 - Organic chemistry
 - Physical chemistry
 - Green chemistry
 - Agriculture chemistry

Marking Scheme:

Committee (50)			Supervisor's Assessment: Regularity and Quality of Work (50)	Total (100)
Presentation: Contents + Delivery (20)	Viva: (Q & A) (20)	Dissertation: Content + Formatting (10)		

Evaluation component of the Supervisor is 50% and the remaining 50% by committee



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MAJOR PROJECT

Course Code: CHY4437

CreditUnits: 10

GUIDELINES FOR PROJECT FILE AND PROJECT REPORT

Research experience is as close to a professional problem-solving activity as anything in the curriculum. It provides exposure to research methodology and an opportunity to work closely with a faculty guide. It usually requires the use of advanced concepts, a variety of experimental techniques, and state-of-the-art instrumentation.

Research is genuine exploration of the unknown that leads to new knowledge which often warrants publication. But whether or not the results of a research project are publishable, the project should be communicated in the form of a research report written by the student.

Sufficient time should be allowed for satisfactory completion of reports, taking into account that initial drafts should be critically analyzed by the faculty guide and corrected by the student at each stage.

PROJECT FILE

The Project File may be a very useful tool for undertaking an assignment along-with a normal semester, an exploratory study, sponsored projects, a project undertaken during summer period or any other period as per curriculae where the researcher is working with a company/organization. The project/ assignment may also be a part of the bigger research agenda being pursued by a faculty/ institution/ department. The Project File is the principal means by which the work carried out will be assessed and therefore great care should be taken in its preparation. This file may be considered in continuous assessment.

In general, the File should be comprehensive and include:

- A short account of the activities that were undertaken as part of the project;
- A statement about the extent to which the project has achieved its stated objectives;
- A statement about the outcomes of the evaluation and dissemination processes engaged in as part of the project;
- Any activities planned but not yet completed as part of the project, or as a future initiative directly resulting from the project;
- Any problems that have arisen and may be useful to document for future reference.

PROJECT REPORT

The Project Report is the final research report that the student prepares on the project assigned to him. In case of sponsored project the lay out of the project could be as prescribed by the sponsoring organization. However, in other cases the following components should be included in the project report:

➤ Title or Cover Page

The title page should contain Project Title; Student's Name; Programme; Year and Semester and Name of the Faculty Guide.

➤ Acknowledgement(s)

Acknowledgment to any advisory or financial assistance received in the course of work may be given. It is incomplete without student's signature.

➤ Abstract

A good "Abstract" should be straight to the point; not too descriptive but fully informative. First paragraph should state what was accomplished with regard to the objectives. The abstract does not have to be an entire summary of the project, but rather a concise summary of the scope and results of the project. It should not exceed more than 1000 words.

➤ Table of Contents

Titles and subtitles are to correspond exactly with those in the text.

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➤ **Introduction**

Here a brief introduction to the problem that is central to the project and an outline of the structure of the rest of the report should be provided. The introduction should aim to catch the imagination of the reader, so excessive details should be avoided.

➤ **Materials and Methods**

This section should aim at experimental designs, materials used (wherever applicable). Methodology should be mentioned in details including modifications undertaken, if any. It includes organization site(s), sample, instruments used with its validation, procedures followed and precautions.

➤ **Results and Discussion**

Present results, discuss and compare these with those from other workers, etc. In writing this section, emphasis should be laid on what has been performed and achieved in the course of the work, rather than discuss in detail what is readily available in text books. Avoid abrupt changes in contents from section to section and maintain a lucid flow throughout the thesis. An opening and closing paragraph in every chapter could be included to aid in smooth flow.

Note that in writing the various sections, all figures and tables should as far as possible be next to the associated text, in the same orientation as the main text, numbered, and given appropriate titles or captions. All major equations should also be numbered and unless it is really necessary, do not write in “point” form.

While presenting the results, write at length about the the various statistical tools used in the data interpretation. The result interpretation should be simple but full of data and statistical analysis. This data interpretation should be in congruence with the written objectives and the inferences should be drawn on data and not on impression. Avoid writing straight forward conclusion rather, it should lead to generalization of data on the chosen sample.

Results and its discussion should be supporting/contradicting with the previous research work in the given area. Usually one should not use more than two researches in either case of supporting or contradicting the present case of research.

➤ **Conclusion(s) & Recommendations**

A conclusion should be the final section in which the outcome of the work is mentioned briefly. Check that your work answers the following questions:

- Did the research project meet its aims (check back to introduction for stated aims)?
- What are the main findings of the research?
- Are there any recommendations?
- Do you have any conclusion on the research process itself?

➤ **Implications for Future Research**

This should bring out further prospects for the study either thrown open by the present work or with the purpose of making it more comprehensive.

➤ **Appendices**

The Appendices contain material which is of interest to the reader but not an integral part of the thesis and any problem that have arisen that may be useful to document for future reference.

➤ **Suggested Readings:**

Suggested Readings: should include papers, books etc. referred to in the body of the report. These should be written in the alphabetical order of the author's surname. The titles of journals preferably should not be abbreviated; if they are, abbreviations must comply with an internationally recognised

Examples:

For research article:

Voravuthikunchai SP, Lortheeranuwat A, Ninrprom T, Popaya W, Pongpaichit S, Supawita T. (2002) Antibacterial activity of Thai medicinal plants against enterohaemorrhagic *Escherichia coli* O157: H7. *Clin Microbiol Infect*, **8** (suppl 1): 116–117.

For book:

Kowalski, M. (1976) Transduction of effectiveness in *Rhizobium meliloti*. SYMBIOTIC NITROGEN FIXATION PLANTS (editor P.S. Nutman IBP), **7**: 63-67

The Layout Guidelines for the Project File & Project Report:

- A4 size Paper
- Font: Arial (10 points) or Times New Roman (12 points)
- Line spacing: 1.5
- Top and bottom margins: 1 inch/ 2.5 cm; left and right margins: 1.25 inches/ 3 cm

ASSESSMENT OF THE PROJECT FILE AND THE PROJECT REPORT

Essentially, the assessment will be based on the quality of the report, the technical merit of the project and the project execution. Technical merit attempts to assess the quality and depth of the intellectual efforts put into the project. Project execution is concerned with assessing how much work has been put in.

The Project should fulfill the following *assessment objectives*:

- Range of Research Methods used to obtain information
- Execution of Research
- Data Analysis (Analyze Quantitative/ Qualitative information)
- Quality Control
- Conclusions

Assessment Scheme:**Continuous Evaluation:**

40% (Based on punctuality, regularity of work, adherence to plan and methodology, refinements/mid-course corrections etc. as reflected in the Project File.)

Final Evaluation:

60% (Based on the Documentation in the file, Final report layout, analysis and results, achievement of objectives, presentation/ viva)

It is recommended that the Final evaluation should be carried out by a panel of evaluators.



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GOOD LABORATORY PRACTICES SEMINAR

Course Code: CHY4408

Credit Units: 01

Objectives

The aim of the term paper is to provide the students with an opportunity to further enhance their knowledge of good laboratory practices. Undertaking this very significant practical unit of examining and analyzing various aspects of Chemistry. Good laboratory practice or GLP is a set of principles intended to assure the quality and integrity of non-clinical laboratory studies that are intended to support research or marketing permits for products regulated by government agencies. The term GLP is most commonly associated with the pharmaceutical industry and the required non-clinical animal testing that must be performed prior to approval of new drug products. However, GLP applies to many other non-pharmaceutical agents such as color additives, food additives, food contamination limits, food packaging, and medical devices.

GLP is a quality management system, not a scientific management system. Or, in other words, GLP defines a set of quality standards for study conduct, data collection, and results reporting. GLP does not define scientific standards. If a study follows GLP, then you can be reasonably sure that the reported results were collected as outlined in the study protocol; however, you cannot be sure that the study actually addresses the scientific hypothesis. In the world of cooking, GLP would ensure that someone follows the recipe exactly as written; however, it does not assure you that the recipe was good or that the resulting item will be tasty!

The student is expected to attend the Good Laboratory Practices Seminar's diligently. The student will be tested on the basis of understanding and organization of content based on the seminar.

Evaluation Scheme

Attendance	Active Participation/ Write up	Multiple Choice Questions/ Quiz	Solving the case/ Assignment	Total
10	30	35	25	100



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CHEMISTRY OF NANOMATERIALS

Course Code: CHY4407

Credit Units: 02

Course objective: Material science plays a vital role in this modern age of science and technology. The rapid development in the field of nanomaterials and composite science has opened vast opportunities for better understanding and utilization of various materials. The course curriculum is designed to give students an idea of the detailed aspects of important topics of material science like composites, nanomaterials, their synthesis, characterization, and application.

Course Contents:

MODULE I: INTRODUCTION TO CHEMISTRY OF MATERIALS & NANOMATERIALS

Materials & their classification; Classifications of nanostructured materials; Fundamental differences between bulk materials and nanomaterials; Role of chemistry in material design, Nanoscale Science and Technology-Implications for Physics, Chemistry, Biology and Engineering; Length Scales involved and effect on properties: Mechanical, Electronic, Optical, Magnetic, and Thermal properties.

MODULE II: SYNTHESIS TECHNIQUES FOR NANOMATERIALS AND THEIR CHARACTERIZATION

Bottom-UP Approach: Self-Assembly, Sol-Gel Synthesis, Hydrothermal growth, Thin Film Growth – Physical Vapour Deposition, Chemical Vapour Deposition

Top-Down Approach: Emulsification-Diffusion Solvent Diffusion/Evaporation Method, Ball Milling, Microfabrication, Lithography

Characterization techniques: X-ray diffraction technique, Scanning Electron Microscopy, Transmission Electron Microscopy, Atomic Force Microscopy, particle size analyzer.

MODULE III: APPLICATION OF MATERIAL CHEMISTRY & NANO CHEMISTRY

Application of organic and inorganic nanoparticles; biomedical applications: design of nanoparticles for oral delivery of peptide drugs, development of nanoscaffolds for tissue engineering and regenerative medicine, bioimaging with quantum dots.

Industrial applications: Nanotechnology in packaging industries, textiles, solar cells, space exploration, computing and information technology; electrical conductive carbon nanotube (CNT) dispersed Si_3N_4 ceramics.



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Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	15	5	5	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance.

Suggested Readings:

- Introduction to Nanoscience by Gabor L. Hornyak, Joydeep Dutta, Harry F. Tibbals, Anil K. Rao. CRC Press, 2008.
- Nanotechnology: Importance and Application by M.H. Fulekar, IK International, 2010.
- Environanotechnology by Mao Hong fan, Chin-pao Huang, Alan E Bland, Z Honglin Wang, RachidSliman, Ian Wright. Elsevier, 2010.
- Nanotechnologies, Hazards and Resource efficiency by M. Steinfeldt, Avon Gleich, U. Petschow, R. Haum. Springer, 2007.
- Nanotechnology: Health and Environmental risk by Jo Anne Shatkin. CRC press, 2008.
- Nanotechnology in Biology and Medicine: Methods, Devices and Application by Tuan Vo-Dinh. CRC press, 2007.
- Nanomaterials for Biosensors by Challa Kumar. Wiley-VCH, 2007.
- Nanosystem characterization tools in the life sciences by Challa Kumar. Wiley-VCH, 2006.



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INTRODUCTION TO POLYMERIC MATERIALS

Course Code: CHY4405

Credit Units:03

Course Objective: The curriculum is developed to help the students to understand the importance of polymeric materials and their usefulness in day to day life. The Polymeric materials course aims to provide students with an understanding of the different kinds of polymers, their preparation, polymerization and chemical bonding between them. It also covers the applications of these polymeric materials in plastics, elastomers

Course Content:

MODULE I: INTRODUCTION TO POLYMER

History and Concept of macromolecules, monomers with specific example viz. acrylonitrile, vinyl, chloride, methyl methacrylate, isobutylene, isoprene, styrene, hexamethylene diamine and adipic acid, caprolactum, ethylene oxide and sebacic acid, ethylene glycol and terephthalic acid, functionality, Degree of polymerization, Classification of polymers depending on – (a) The origin (natural, Semisynthetic, synthetic etc. (b) The structure (linear, branched, network, hyperbranched, dendrimer (c) The formation (condensation, addition)(d) Homopolymers, copolymers(e) The behaviour on application of heat and pressure (thermoplastic and Thermosetting)(f) The form and application (plastics, fiber. elastomers and resin(g) Stereoisomers: Isotactic, Syndiotactic, Atactic, Organic and Inorganic polymers. Concept of molecular mass, polydispersity, number average and weight average, molecular weight distribution in linear polymers.

MODULE II- CHEMISTRY OF POLYMERIZATION (MECHANISM)

chain polymerization- Free radical, Ionic and coordination mechanism, Common features of two types of Mechanism of cationic polymerization and anionic polymerization, Mechanism of coordination polymerization – Ziegler-Natta catalysts, Ring opening polymerization-mechanism of polymerization of cyclic ethers, cyclic amides and cyclosiloxanes.

MODULE III- METHODS OF POLYMERISATION

Methods of polymerization. Bulk polymerization, Solution polymerization, Emulsion polymerization, Suspension polymerization, Melt polycondensation. Controlled polymerization methods, viz, Nitroxide mediated polymerization (NMP), Atom Transfer Radical Polymerization (ATRP), Reversible Addition Fragmentation Termination (RAFT).

MODULE IV-SPECIAL POLYMERS AND THEIR APPLICATIONS

Polyethylene (LLDP, HDP, LLDPE and HDPE), PVC, polyvinyl alcohol, polyvinylacetate, polybutadiene, polychloroprene, polystyrene, polyacrylate, PMMA, and acrylonitrile copolymers. polyamides (Nylon 6, Nylon 6,6, Nylon 6,10), polyesters (poly ethylene terephthalate (PET), polybutylene, terphthalate (PBT), aromatic polyesters), polycarbonate, polyurethanes – Flexible and rigid polyurethane, polyurethane elastomers, coatings, adhesives, sulphur, containing polymers, polyimides, polyethersulphones, polyetherketones. Thermosetting resins – phenolic resins, amino resins, epoxy resins, silicone polymers, and cyanate ester resins.

MODULE V- POLYMER DEGRADATION

Introduction, Types of degradation-Thermal, mechanical, Photodegradation, oxidative degradation, Hydrolytic degradation, Degradation by ultrasonic waves and high energy radiation.


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Examination Scheme:

Components	CT	HA	S/V/Q	A	EE
Weightage(%)	15	5	5	5	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, A: Attendance EE: End Semester Examination

Suggested Readings:

- F.W. Billmeyer, Jr. Textbook of polymer science, Wiley- Interscience, N.Y.(1971)
- Introduction to polymer chemistry, R. Seymour, Wiley –Interscience (1981)
- Physical chemistry of CHYromolecules, by D.D. Deshpande, Vishal publications, (1985)
- principles of polymerization, G.Odian, Wiley – Interscience (1981)
- Organic polymer chemistry, K. J. Saunders, Chapman and Hall, London (1973).
- Principles of polymer chemistry by P.J. Flory.
- Polymer Science –V R Gowarikar.



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FCH4103	FORENSIC PHYSICS	L	T	P	C
Version 1.1	Date of Approval: Dec, 2021	2	0	0	2
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

This course is intended to give insight of providing the basic knowledge about the physical evidence and its forensic applications. The students will be able to correlate the speed of vehicle in hit-n-run cases with skid marks analysis and paint examination. The course will help the students to differentiate between different fractures of glass.

Course Objective:

This course will cover:

1. Important physical evidences found at crime scene.
2. General characteristics and identification of physical evidences.
3. Examination and evidential value of important physical evidences.

Course Outcomes

On completion of this course, the students will be able to

- CO1. Analyse the soil as evidence and to define the significance of its types, particle size and density in crime cases.
- CO2. Identify and differentiate between various types of glasses and fractures.
- CO3. Explain the importance of paint as evidence and its significance in hit-n-run cases.
- CO4. Analyse the types of Tool marks and restoration of erased/ obliterated marks and their lifting and comparison.
- CO5. Apply the analysis techniques like chromatography and spectroscopy for physical evidences.

Course Contents	Blooms level*	Number of hours
Module I: Soil Formation and types of soil, composition of soil, particle size distribution, composition and analysis of concrete, cement, and its types.	L1, L2	7
Module II: Glass Types of glass and their composition, Forensic examination of glass fractures, determination of direction of impact: cone fracture, rib marks, hackle marks, concentric and radial fractures.	L1, L2, L3, L4	7
Module III: Paint Types of paint and their composition, macroscopic and microscopic studies, pigment distribution, micro-chemical analysis. Importance of paint evidence in hit and run cases; Importance of fiber evidence; Forensic gemology	L1, L2, L3, L4	7
Module IV: Tool Marks & Restoration of Erased / Obliterated Marks Types of tool marks: compression marks, striated marks, combination of compression and striated marks, repeated marks, class characteristics and individual characteristics, tracing and lifting of marks.	L1, L2, L4	7

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Module V: Analysis Techniques Soil: microscopic examination, density gradient analysis, interpretation of soil evidence Glass: colour and fluorescence, physical matching, refractive index, and interpretation of glass evidence. Paint: Pyrolysis Chromatographic techniques, IR spectroscopy and Raman spectroscopy, interpretation of paint evidence, solubility test, Thin layer chromatography Tool Marks: Photographic examination of tool marks. Method of making-cast, punch, engrave; methods of obliteration, method of restoration.	L1, L3, L4	8
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**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation*

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	15	5	5	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

Suggested Readings

- B. Caddy, Forensic Examination of glass and paints analysis and interpretation, ISBN 078405749 2001.
- Bengold and Nelson Morgan, Speech and Audio Signal Processing, John Wiley and Sons, USA, 1999.
- C.E. OHara and J.W. Osterburg, An Introduction to Criminalistic, Indiana University Press, Blomington, 1972.
- Denis Shaw, Physics in the Prevention and Detection of Crime, Contem Phys. Vol.17, 1976.
- F.W. Sears, M.W Zemansky, and H.D. Young, University Physics, Sixth Ed., Narosa, 1995.
- Nickolls, L.C., Scientific Investigation of Crime, Bulterwest, London, 1956.
- R. Saferstein, Forensic Science Handbook, Vols. I, II, (Ed), Prentice Hall, Eaglewood Cliffs, NJ; 1988.

CO, PO, PSO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	1	3							1	2	3		3
CO2	1	3							1		3		
CO3	1	3							1		3		
CO4	1	3							1		3		

1: strongly related, 2: moderately related and 3: weakly related

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FCH4106	FORENSIC BALLISTICS	L	T	P	C
Version 1.1	Date of Approval: Dec, 2021	2	1	0	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

The course is designed to provide basic and analytical knowledge of the firearms, types, firing range and the analysis of the GSR components.

Course Objective: - The objectives of the course:

1. To understand the basics of the projectile motion, ballistics, and role of ballistics in Forensic Science
2. Classification of different types of firearms and explosives.

Course Outcomes

On completion of this course, the students will be able to

- CO1. Explain the history and types of Firearms
- CO2. Describe various types of ammunition
- CO3. Explain about the Internal and External ballistics.
- CO4. Restate the concept of linkage of bullets and Cartridge Cases.
- CO5. Describe the Gun Shot Residue and determination of range of firing.

Course Contents	Blooms level*	Number of hours
Module I: Introduction to Ballistics: Definition and scope, Firearms, Indian Arms Act, Types of evidences associated, History and mechanism of Muzzleloaders (Match lock, Wheel lock, Flint lock firearms), Briefs of Pinfire, Rimfire and Centrefire systems of cartridge, Characteristic features of the firearms, various types of modern firearms, classification of firearms on different basis, bore characteristics Different parameters of classification of firearms, Introduction to Shotgun, Revolver, Pistol, Rifle and Country Made/ Improvised Firearms. Proof marks of weapons.	L1, L2	7
Module II: Firearm Ammunition: Ammunition Components of Shotgun and Rifled firearm cartridges, Headstamp markings on ammunition. Various types of bullets and their compositional aspects, latest trends in their manufacturing and design, smooth bore, and improvised ammunition.	L1, L2, L3, L4	7
Module III: Internal and external Ballistics: Internal Ballistics: Definition, shapes and manner of Propellant burning, Muzzle velocity and Factors affecting muzzle velocity, ballistic coefficient, phenomenon of ricochet External Ballistics: Definition- Bullet Trajectory and factors affecting bullet flight. Wound Ballistics: Definition of wound ballistics, Ballistic aspect of firearm injuries, significance of studying cavitations in body, Bullet Entry/Exit Hole Identification, Evaluation of accident, suicide, homicide	L1, L2, L3, L4	7

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firearm injuries.		
Module IV: Bullet linkage: Different types of marks produced during firing process on bullet-number/direction of lands and grooves, width of lands and depth of grooves, angle and pitch of rifling, striation marks on lands and grooves, techniques for obtaining test material from various types of weapons and their linkage with fired ammunition, class, and individual characteristics.	L1, L2, L4	8
Module V: Range of Firing determination: Introduction and methods of estimation. Gunshot Residue: Introduction and methods of analysis. Bullet and Cartridges matching: Ejecta, burning, scorching, blackening, tattooing and metal fouling, shots dispersion and GSR distribution, time of firing – different methods employed, and their limitations, stereo & comparison microscopy, automatic bullet, and cartridge comparison.	L1, L3, L4	7

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation*

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	15	5	5	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
A: Attendance

Suggested Readings:

- Brain J. Heard; Handbook of Firearms and Ballistics; John Willey, England, 1997.
- D.A. Skoog, D.M. West and F.J. Holler; Analytical Chemistry: An Introduction; Saunders College Publishing, Philadelphia, USA, (1994)
- Detlean, J D; Kirk's Fire Investigation, 5th ed, Prentice Hall, Eaglewood Cliffs, N.J (2002)
- Working Procedure Manual: Chemistry, Explosives and Narcotics, BPR&D Pub (2000)
- Hatcher Jury & Weller, 1987: Firearm Investigation Identification and Evidence, The University Book Agency, Allahabad.
- Gunther & Gunther, 1935 : The Identification of Firearms, Woldies, New York
- Jauhri, M. 1980: Monograph on Forensic Ballistics, Govt. of India Publication, New Delhi.
- Burrad, 1951: The Identification of Firearms and Forensic Ballistics.

CO, PO, PSO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	1								1				
CO2	1								1				
CO3	1	3							1		3		
CO4	1	3							1		3		

1: strongly related, 2: moderately related and 3: weakly related

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FCH4107	FORENSIC PHYSICS – LAB	L	T	P	C
Version 1.1	Date of Approval: Dec, 2021	0	0	4	2
Pre-requisites/Exposure					
Co-requisites					

Catalog Description:

The course includes the analytical techniques for physical evidences like soil, glass, paints etc. The course has practical of casting of tyre marks and shoeprints, comparison of bangles and fibres.

Course Objective: The students will understand & perform experiments relating to:
Examination of physical properties of physical evidences commonly encountered at the crime scene.

Course Outcomes

On completion of this course, the students will be able to


- CO1. Examine physical evidences (soil) by different analytical methods
- CO2. Examine physical evidences (Glass) by different analytical methods
- CO3. Perform comparative analysis of paints by TLC
- CO4. Cast of different marks and analyse fibres and bangles.

Course Contents: Lab/ Practical	Blooms level	Number of hours
1. Examination of physical properties of Soil by microscopy 2. Solubility test for paints and soil 3. Size distribution analysis of soil particles. 4. Mineral test for soil	L1, L3, L4	12
5. Examination of physical properties of Glass by microscopy 6. Comparative analysis of Glass fragments/ examination of glass fractures	L1, L3, L4	8
7. Comparative analysis of paints by TLC	L1, L3, L4	6
8. Casting of tyre marks 9. Casting of shoeprints	L1, L3, L4	10
10. Comparison of bangles	L1, L3, L4	4
11. Examination of fibres	L1, L3, L4	8

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation*



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Examination Scheme:

	IA			EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

IA –Internal Assessment, EE- External Exam, A: Attendance, PR- Performance, LR – Lab Record, V – Viva.

Suggested Readings:

- A Glencoe Program Physics principles and problems: Forensic Laboratory Manual Student edition
- Thomas Kubic, Nicholas Petraco Forensic Science Laboratory Manual and Workbook, Third Edition 2009
- Kathy Mirakovits, Gina Londino, The Basics of Investigating Forensic Science: A Laboratory Manual 2015
- Washington state patrol Forensic Laboratory services: Crime Laboratory: Technical & Training Manuals.
- G.H. Stout & L.H. Jensten, X-ray Structure Determination – A practical Guide; 2ndEdn. Wiley, New York, 1989

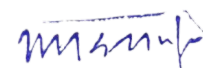
CO, PO, PSO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	1	1		3					3	3	1		
CO2	1	1		3					3	3	1		
CO3	1	1		3					3	3	1		
CO4	1	1		3					3	3	1		

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FCH4108	CRIME SCENE INVESTIGATION (CSI) – LAB	L	T	P	C
Version 1.1	Date of Approval: Dec, 2021	0	0	4	2
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

This course is intended to provide basic knowledge of practical aspects of analysis and reconstruction of crime scene to the students. The students will understand the basic requirements for the crime scene investigation. They will understand the significance of crime scene sketching and photography. The course will help the student to understand proper collection and preservation of the evidence and their presentation in court of law.

Course Objective: The course focuses on following objectives-

- Developing an understanding and application of Crime Scene Investigation.
- Develop an understanding on processing of crime scene (searching, sketching and photography of Crime scene (Indoor and Outdoor).
- Brief description on procedure adopted for collection, preservation, and packaging of Physical evidences.

Course Outcomes

On completion of this course, the students will be able to

CO1. Practically do the sketching and searching of all types of crime scenes.

CO2. Perform photography with efficiency in different types of crimes.

CO3. Analyze different types of evidence and their proper collection and preservation techniques.

CO4. Justify by proper Presentation of the evidences in the court of law and significance of chain of custody.

Course Contents: Lab/Practical	Blooms level	Number of hours
1. Camera and its parts	L1, L2	6
2. Sketching of the indoor crime scene 3. Sketching of the outdoor crime scene	L1, L3, L4	12
4. Photography of the indoor crime scene 5. Photography of the outdoor crime scene	L1, L3, L4	12
6. Collection, packaging and forwarding of trace evidences by Druggist fold method. 7. Collection and preservation of various physical evidences (Fingerprint, blood, saliva, fibre, hair etc.)	L1, L3, L4	12
8. Forwarding of physical evidences	L1, L2, L3	6

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation*

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Examination Scheme:

	IA			EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

IA –Internal Assessment, EE- External Exam, A: Attendance, PR- Performance, LR – Lab Record, V – Viva.

Suggested Readings:

- A Glencoe Program Physics principles and problems: Forensic Laboratory Manual Student edition
- Thomas Kubic, Nicholas Petraco Forensic Science Laboratory Manual and Workbook, Third Edition 2009
- Kathy Mirakovits, Gina Londino, The Basics of Investigating Forensic Science: A Laboratory Manual 2015
- Virginia Department of Forensic Science, Practical and Manuals

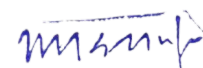
CO, PO, PSO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	1								3		1		
CO2	1	2							3	3	1		
CO3	1	2		3					3	3	1		
CO4	1	2						3	3		1		3

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FCH4111	FORENSIC AND CRIMINAL INVESTIGATIONS	L	T	P	C
Version 1.1	Date of Approval: Dec, 2021	2	1	0	3
Pre-requisites/Expos					
Co-requisites					

Catalog Description

This course is intended to provide basic knowledge of the crime scene, type of evidence and their significance in forensic investigations. It will be helpful in providing the students a basic connection between crime and the sequence of events that will help them to reconstruct the crime scene. The course will help the student to understand the significance of evidence in expert testimony and presentation of the evidence in court.

Course Objective: The course focuses on following objectives-

- Developing an understanding and appreciation of the scope of Crime Scene Investigation and Management.
- Develop an understanding on handling of different physical evidences found at the crime scene
- Develop comprehensive knowledge on various investigative techniques used in processing the crime scene.

Course Outcomes

On completion of this course, the students will be able to

- CO1. Communicate the concept of crime scene, its types and significance in forensic science.
- CO2. Investigate crime scene Investigation and do crime scene processing along with knowledge of various techniques used for recording of a crime scene
- CO3. Apply his/her comprehensive knowledge on Physical evidence, testimonial and real evidences and the crime scene reconstruction and significance of crime scene reconstruction along with their admissibility in court.
- CO4. Apply investigative and interrogative methods in order to obtain information from criminals and to familiarize students with Expert testimony, its role and acceptance of evidence in the court.

Course Contents:	Bloom s level	Number of hours
Module I: Introduction to Forensic Science Introduction and history of Forensic Science, Basic principles and significance, Utilization of Forensic Science, Forensic scientist at the scene of crime, Structure of Forensic labs, ethics in forensic science, Forensic Science in International perspectives, including set up of INTERPOL and FBI	L1,L2	7
Module II: Crime Scene Management Definition and causation of crime, Types of crime scene, Crime scene survey, protection of crime scene, searching of physical evidences, Recording, documentation and presentation in the court, processing, and reconstruction of the crime scene.	L1, L2, L3	8
Module III: Physical Evidences Physical evidences and its types (fingerprints, glass, fibre, blood, saliva,	L1,L2	11

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weapon of crime etc.), Blood spatter analysis, Characteristic blood patterns, testimonial and real evidence, admissibility of scientific evidence and importance of physical evidences, Collection, preservation, packing and forwarding of different types of evidences to the laboratories.		
Module IV: Investigation and Interrogation techniques Interviewing of the criminals; methods used by the police in getting information from the criminal; the ethical issues related to the same. Criminal profiling, Portrait Parley, Polygraphy, Narcoanalysis, Brain Fingerprinting, Modus operandi, Speech signal processing and pattern recognition – basic factors of sound in speech, acoustic characteristics of speech signal	L1, L2,	10

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation*

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	15	5	5	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

Suggested Readings:

- Nabar, B. S., Forensic Science in Crime Investigation, Asian Law House, 2001.
- Allison, R., Investigation of Crime Scene, Global vision Publishing House, 2008.
- Bodziak, W., Footwear Impression Evidence (2nd Edn.) CRC Press, Boca Raton, Florida, 2000.
- DeForest, P., Gaensslen, R., and Lee, H., Forensic Science - An Introduction to Criminalistics, McGraw Hill, New York, 1983.
- Fisher, B., Techniques of Crime Scene Investigation (6thEdn.) CRC Press, Boca Raton, Florida, 2000.
- James, S.H., and Nordby, J.J., (Eds), Forensic Science; An Introduction to Scientific and Investigative Techniques, CRC Press, London, 2003.

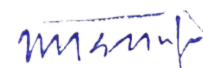
CO, PO, PSO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	1								1				
CO2	1	3							1				
CO3	1	3							1				
CO4	1	3	3					3	1				3

1: strongly related, 2: moderately related and 3: weakly related



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FCH4112	INSTRUMENTATION (CHEMICAL)	L	T	P	C
Version 1.1	Date of Approval: Dec, 2021	2	1	0	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

Instrumental Analysis provides a sound knowledge of the various analytical techniques used to examine different kinds of evidence recovered from scene of crime in forensic cases. It develops the ability to analyze different kinds of physical evidence of forensic importance.

Course Objective The objective of the course is to provide student with practical understanding of working and applications of various instrumentation techniques used in the forensic science laboratory for the chemical analysis of evidences.

Course Outcomes

On completion of this course, the students will be able to

CO1: Communicate the concept, basic principle, and instrumentation of various chromatographic techniques.

CO2: Describe the concept, basic principle, and instrumentation of mass spectrometry.

CO3: Explain the potential utility of computers in instrumentation.

CO4: Analyse the signal and will be able to do measurement and data analysis.

Course Contents:	Blooms level	Number of hours
Module I: Chromatographic Techniques Basic principle, instrumentation, and forensic applications of Paper chromatography, Column chromatography, TLC, High pressure thin layer chromatography.	L1, L2, L3	9
Module II: Advanced Chromatographic Techniques Gas chromatography, Ion-exchange chromatography, Exclusion (permeation) chromatography, Affinity chromatography, HPLC, High pressure liquid chromatography, Interfacing GC with IR spectrometry	L1, L2, L3, L4	9
Module III: Mass Spectrometry Sample flow, Ionization methods, Mass analyzers, Vacuum systems, Signal processors, Detectors, Data handling, Correlation of mass spectra and molecular structure, Tandem mass spectrometry, GC-MS, LC-MS, Forensic applications of mass spectrometric methods.	L1, L2, L3, L4	9
Module IV: Measurements, Signals and Data Introduction, Noise, Signal-to-noise ratio, Sensitivity and detection limit, Sources of noise, Signal-to-noise enhancement, Evaluation and measurement, precision, Accuracy and instrument calibration, Data representation, The Automated Laboratory, Molarity, Molality, Mole fraction, Normality	L1, L2, L3, L4	9

*Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

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Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	15	5	5	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
A: Attendance

Suggested Readings:

- Lindsay S; High Performance Liquid Chromatography, Wiley & Sons NY (1992)
- Handbook of TLC, 2nd Ed, Marcel Dekker; NY (1995)
- Jarris, KE, A.L. Gray et al, Handbook of Inductively Coupled Plasma Mass Spectrometry, Glasgow Blockie, (1992)
- MacLaffrty F.W. & F. Turecek; Interpretation of Mass spectra, 4th Ed., Mill Valley, CA Univ Science Books, (1993)
- Chapmen J R; Practical Organic Mass Spectrometry - A Guide for Chemical and Biochemical Analysis, Wiley & Sons, NY (1993)
- H.H Willard et al; Instrumental Methods of Analysis CBS Pub. and Distributors, Delhi (1986).
- Skoog, Holler, Crouch, principles of instrumental analysis, 6th edition, 2007.
- Mendham et al., Vogel's Quantitative Chemical Analysis, Pearson Education Ltd., 2009.
- N. Gray, Instrumental Methods of Analysis, 1st Edition, CBS Publisher, 2011.

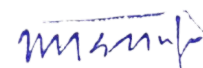
CO, PO, PSO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	3	1							3		1		
CO2	3	1							3		1		
CO3	3	1							3		1		
CO4	3	1							3		1		

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FCH4110	RESEARCH SEMINAR	L	T	P	C
Version 1.1	Date of Approval: Dec, 2021	0	0	0	1
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

Seminar is a lecture series to acquaint new graduate students with departmental research (This one will be running through out first semesters on every Monday any Lecture, where normally Ph.D. students /internal Faculties /external speakers will give talks on their research or other topic of their specialization). The trainer must make sure that the aspects covered are practically practiced by the participants. The evaluation will be done by Board of examiners comprising of the faculties.

Course Objectives

A seminar is primarily an academic event that is organized to provide the students a one-to-one hands-on experience on any aspect of their learning for research-based activity. Prerequisite, graduate studying in Chemistry/ Biochemistry/ Forensic Sciences on consent of instructor. Seminar to acquaint new graduate students with departmental research (This one will be running through out first semesters on every Monday any Lecture, where normally Ph.D. students /internal Faculties /external speakers will give talk on their research or other topic of their specialization).

The trainer must make sure that the aspects covered are practically practiced by the participants. The evaluation will be done by Board of Examiners comprising of the faculties.

Course Outcomes

On completion of this course, the students will be able to

CO1: Explain significance of research and will get an idea of current research trends in Forensic and allied sciences.

CO2: Acquaint with departmental research.

CO3: Perform in the potential seminar-based evaluations.

Major Themes for Seminar

The seminar may be conducted on any of the following major themes:

- Forensic Science & its related laws
- Criminal Investigations & its proceedings
- Forensic Chemistry
- Forensic Physics
- Forensic Ballistics
- Forensic Fraud Investigations
- Forensic Document Examinations
- Investigative Techniques
- Forensic Analytical Techniques
- Forensic Medicine & Odontology
- Forensic Anthropology Examinations
- Cyber & Digital Forensics
- Any other relevant topics

These themes are merely indicative and other recent and relevant topics of study may be included.

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-*

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Evaluation Scheme:

Attendance	Active Participation	Multiple Choice Questions/ Quiz	Solving the case/ Assignment/ Write up	Total
10	30	30	30	100

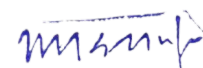
CO, PO, PSO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	1											1	
CO2	1											1	
CO3	2			1								1	
CO4	2		1				1	3				1	2

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FCH4201	FORENSIC PHOTOGRAPHY	L	T	P	C
Version 1.1	Date of Approval: Dec, 2021	2	0	0	2
Pre-requisites/Exposure					
Co-requisites					

Course Objective: This course is designed to:

- Provide foundation knowledge of photography
- Develop an understanding and application of Photography in Forensic Science and CSI

Course Outcomes

On completion of this course, the students will be able to

CO1. Understand the basic principles of photography.

CO2. Learn about the history and development of photography, developing techniques and methods of photography.

CO3. Learn about the indoor and outdoor crime scene photography and use of photography in the reconstruction of crime scene.

CO4 Understand about the I.R and U.V illumination in Photography.

CO5. Learn about the working principles of digital Photography and Videography

Course Contents	Blooms Level	Number of hours
Module I: Introduction Introduction to forensic photography; required equipments for photography – Camera, lens, shutter, depth of field, film; Importance of Forensic photography in a crime scene investigation	L1, L2	4
Module II: Types of Photography and Photo Prints History and development of photography. Basic principles and techniques of Black & white and colour photography. Developing techniques and methods of photography, Different kinds of developers and fixers, modern developments in photography, linkage of cameras and film negatives.	L1, L2,	5
Module III: Photography of various crime scenes Photography in indoor and outdoor scene of crime. Aerial photography. Surveillance photography – Cameras and accessories for surveillance photography, moving surveillance on foot, 2-person foot surveillance, surveillance with vehicles, fixed surveillance. Use of photography in reconstructing the scene of crime and its presentation in the court of law.	L1, L2, L3	5
Module IV: Guidance Documentation Image magnification, U.V. and I.R. illumination in Photography. Photography of Artefactual evidences (Bloodstain, fingerprint, imprints, and micro evidence).	L1, L2, L3	5
Module V: High-tech Photography for Crime Scene Digital photography, working principle of digital camera works and basics of digital imaging. videography/ high speed videography, High-speed photography, legal aspects of visual evidence.	L1, L2, L3	5

*Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

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Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	15	5	5	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

Suggested Readings:

- Redsicker, D. R., The Practical methodology of Forensic Photography, CRC Press, London, 1994.
- Henry Horeustein; Colour Photography -A working Manual, Little Brown Co. Boston (1995)
- B.H.E. Jacobson, Ray GG Attridge; The Manual of Photography, Focal Press, London (1988)
- Jahne B; Digital Image Processing, Heidelberg Springer (1990) Photography- 2nd Ed. CRC Press LLC (2001)
- R.E. Jacobson, S.F. Ray, G.G. Attridge, N.R. Oxford; The Manual of Photography- Photographic and Digital Imaging, 9th Ed., Focal Press (2000)

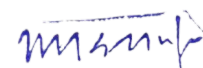
CO, PO, PSO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	1	2							1				
CO2	1	2							1				
CO3	1	2							1				
CO4	1	2							1				
CO5	1	2							1				

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FCH4202	ELEMENTS OF FORENSIC MEDICINE AND ODONTOLOGY	L	T	P	C
Version 1.1	Date of Approval: Dec, 2021	2	1	0	3
Pre-requisites/Exposure					
Co-requisites					

Course Objectives:

During the course the student will

- Understand and appreciate the scope of forensic medicine.
- Know about different types of injuries, causes and manner of death and their medico legal significance
- Learn about the utility of the odontological studies in identification and other medico legal purposes like age, sex, and population Determinations.

Course Outcomes

On completion of this course, the students will be able to

CO1. Describe various physiological and chemical changes after death and will be able to estimate time since death

CO2. Identify the type of wound and its causes, also they can estimate the age of injury.

CO3. Identify type of dentition and can estimate the age, sex, and race of individual by analyzing the given teeth.

CO4. Analyse the types of bite marks and their significance in identification of culprit and type of crime.

CO5. Explain different types of injuries and their causes and medico-legal significance.

Course Contents	Blooms level	Number of hours
Module I: Introduction to Forensic Medicine Definition of forensic medicine, cause, manner and characteristics of death. Autopsy, Post- mortem changes, Importance of canvass form; Handling buried body cases	L1, L2, L3	6
Module II: Wounds and its medico legal significance Basic injury production and healing mechanisms, Mechanical injuries (Abrasions, Bruises, Lacerations, Incised and stab wounds) and their medico legal significance, Importance of hesitation marks.	L1, L2, L3	8
Module III: Causes and manner of death Deaths due to Asphyxia, Fire, Electrocution. Various sexual offences.	L1, L2, L3	8
Module IV: Forensic Odontology - I Introduction to Forensic Odontology, Types of dentitions, Basic structure of human teeth, types of teeth & their morphology, Determination of age from teeth using various methods, Dental anomalies and their role in personal identification.	L1, L2, L3, L4	9
Module V: Forensic Odontology - II Bite marks: Types & forensic importance, Collection, preservation and examination of Bite marks, Admissibility of bite mark evidences in Court of Law. Role of Forensic odontology in mass disaster victim identification.	L1, L2, L3, L6	5

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**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation*

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	15	5	5	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

Suggested Readings:

- Modi's Medical Jurisprudence and Toxicology, 23rd Edition, by K. Mathiharan & Amrit K. Patnaik, Third reprint, 2009, LexisNexis, Butterworth, New Delhi
- Essentials of forensic medicine, Dr. K. S. Narayan Reddy.
- Forensic Medicine and toxicology, JB Mukherjee, Vol I & II.
- Forensic Dentistry, Paul. G. Stimson & Curtis. A. Mertz, CRC
- Forensic Odontology, Pramod.K. Dayal
- Keith Simpson's, Forensic Medicine
- Glister's Medical Jurisprudence and Toxicology, Churchill Livingstone Dental Anatomy Atlas, Whitaker

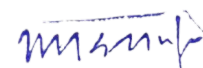
CO, PO, PSO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	1	1							1		3		
CO2	1	1							1		3		
CO3	1	1							1		3		
CO4	1	1							1		3		
CO5	1	1							1		3		

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FCH4205	QUESTIONED DOCUMENTS	L	T	P	C
Version 1.1	Date of Approval: Dec, 2021	2	1	0	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

Questioned Documents deals with the examination of different kinds of questioned documents encountered in forensic cases. It provides a sound knowledge of the various aspects of questioned document examination. It develops the ability to analyze and resolve the crime mysteries involving forensic documents.

Course Objective: The course focuses on following objectives-

- Developing an understanding and appreciation for the scope of Questioned Documents.
- Develop an understanding on different types of questioned documents, the types of forgeries and disguise generally encountered.
- Give brief description on various methods of their detection and examination.

Course Outcomes

On completion of this course, the students will be able to

CO1: Understand the concept of questioned documents and its examination.

CO2: Learn various types of forgeries and examination of charred documents, sequence of strokes.

CO3: Learn different methods to determine age of questioned documents and examination of printed and photocopy documents.

CO4: Learn different instruments used to examine questioned documents.

CO5: Understand the concept of forensic report including its format and preparation.

Course Contents:	Blooms level	Number of hours
Module I: Questioned Documents Definition, Importance, Classification and preliminary examination of questioned documents. Handwriting: definition, development, Instruments and Appliances of handwriting expert. Handwriting Characteristics: General Characteristics, Individual Characteristics, Development of Individuality in Handwriting, digital questioned documents and their examination.	L1, L2	9
Module II: Forgeries Forgery and its types and characteristics, identification, and examination of forgeries. Decipherment of secret indented and charred documents, Preservation of documents, Examination of seal and other mechanical impressions, examination of sequence of intersecting of strokes, Standards for Comparison and Disguise etc. Advantages and disadvantages of exemplar and non-exemplar samples	L1, L2, L3	7
Module III: Age of Document & Alterations Determination of Age of Document- Absolute/relative age, Alterations in the document: erasures, additions, overwriting and obliterations. Classification and working of typewriters alterations in typed text, , Comparison of Printed matter- Various printing processes.	L1, L2, L3, L4	10
Module IV : Instrumentation and Photography of Documents Basic principles and techniques Visible and Florescence (UV and IR),	L1, L3, L4	6

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Photomicrography & Microphotography, Stereo-zoom microscopy, Video Spectral Comparator (VSC) and Electrostatic Detection Apparatus (ESDA).		
Module V: Security Documents Brief description of security documents, security and verification features of passports, credit cards, cheques etc. Types of security documents, Salient features for identifications, Instrumentation used for their examination.	L1, L2, L3	4

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation*

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	15	5	5	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

Suggested Readings:

- Osborn, A. S. (1998). Classes of Questioned Documents. Questioned Documents, 2nd edition, First Indian reprint, Universal law publishing co. Pvt. Ltd., New Delhi.
- Huber, A. R. Headrick, A. M. (1999). The Discrimination and Identification of writing. Handwriting Identification Facts and Fundamentals, CRC Press, Boca Raton London.
- Saferstein, Richard, Criminalistics, An Introduction to Forensic Science, 6th Ed. Prentice-Hall, New Jersey, 1998.
- Sharma, B. R., Forensic Science in Criminal Investigation and Trials (3rdEdn) Universal Law Publishing Co. Ltd. New Delhi, 2001.
- Charles, C. Thomas, I.S.Q.D. Identification System for Questioned Documents, Billy Prior Bates, Springfield, Illinois, USA, 1971.
- Charles C. Thomas, Typewriting Identification I.S.Q.D.; Billy Prior Bates; Springfield, Illinois, USA, 1971.
- Hard less, H.R., Disputed Documents, handwriting and thumbs – print identification: profusely illustrated, Low Book Co., Allahabad, 1988.
- Lerinson, Jay, Questioned Documents, Acad Press, London, 2001.
- Ordway Hilton, Scientific Examination of Questioned Documents, Rev. ED., Elsevier, New York, 1982.
- Wilson, R., Harrison, Suspect Documents – Their Scientific Examination; Universal Law Publishing, Delhi, 1997.

CO, PO, PSO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	1	2							1				
CO2	1	2							1				
CO3	1	2							1		3		
CO4	1	2							1		3		
CO5	1	2							1		3		

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FCH4206	FORENSIC MEDICINE AND ODONTOLOGY -LAB	L	T	P	C
Version 1.1	Date of Approval: Dec, 2021	0	0	4	2
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

This course is intended to provide basic knowledge of practical aspects of Forensic medicine to the students. It will be helpful in providing the students a practical knowledge of dentition, bite marks and their investigations and the basic connection between forensic science and law. The course will help the student to understand the physiological and chemical changes in various types of death and will be able in solving the crime.

Course Objective:

- Identification of individual teeth, dental charting.
- To identify individual by using dentition.
- Age estimation by dental evidences.

Course Outcomes

On completion of this course, the students will be able to

CO1. Describe the types of dentitions, characteristics of individual teeth that will help in criminal investigations and species identification.

CO2. Estimate age of person by teeth and x rays.

CO3. Correlate bite marks with species and individuals and type of crime and present in court of law.

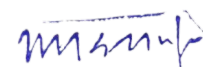
CO4. Interpret the results of autopsy and its correlation with type of crime and type of evidences.

Course Contents: - Lab/Practical	Blooms level	Number of hours
1. Types of Dentitions a. Temporary b. Mixed c. Permanent	L1, L3, L4	16
2. Identification of individual teeth based on the morphological features.	L1, L3, L4	12
3. Estimation of age from the teeth. a. Living subject b. Maxilla & mandible c. From X-Rays	L1, L3, L4	10
4. Comparison and Identification of Individuals from bite marks a. Direct comparison b. By casting c. By photography	L1, L3, L4	8
5. Autopsy observation through visits and recording the files		2

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation*



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Examination Scheme:

	IA			EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

IA –Internal Assessment, EE- External Exam, A: Attendance, PR- Performance, LR – Lab Record, V – Viva.

Suggested Readings:

- Laboratory Protocols CIMMYT Applied Molecular Genetics Laboratory Third Edition
- Kathy Mirakovits, Gina Londino, The Basics of Investigating Forensic Science: A Laboratory Manual 2015
- Washington state patrol Forensic Laboratory services: Crime Laboratory: Technical & Training Manuals
- G.H. Stout & L.H. Jensten, X-ray Structure Determination – A practical Guide; 2ndEdn. Wiley, New York, 1989
- Redsicker, D. R., The Practical methodology of Forensic Photography, CRC Press, London, 1994.

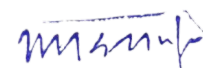
CO, PO, PSO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	2	1									1		
CO2	2	1									1		
CO3	2	1									1		
CO4	2	1	3			3					1		3

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FCH4208	QUESTIONED DOCUMENTS AND FINGERPRINTS – LAB	L	T	P	C
Version 1.1	Date of Approval: Dec, 2021	0	0	4	2
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

This course is intended to provide the basic knowledge about the instruments which can be used for the analysis of biological samples. The students will understand the basic principle of the instruments and will be able to apply different techniques as per the requirement of the investigations in medicolegal cases.

Course Objective: - The course focuses on following objectives-

- Developing an understanding and application on practical aspects of Questioned Documents and Fingerprints.
- Develop an understanding on procedure adopted for examination of different types of questioned documents, the types of forgeries, disguise and their examination along with giving appropriate conclusion on the basis of findings.
- Brief description on identification, analysis and examinations of various kinds of fingerprints and other impressions that are encountered on crime scenes.

Course Outcomes

On completion of this course, the students will be able to

CO1. Examine and comparison of security documents, fake currency and stamp papers.

CO2. Explain the procedure adopted for examination of different types of questioned documents, the types of forgeries, disguise and their examination along with giving appropriate conclusion on the basis of findings.

CO3. Develop different types of fingerprints and interpret the results.

CO4. Perform fingerprint development by different methods for the forensic investigations.

Course Contents: - Lab/Practical		Blooms level	Number of hours
1. Examination and comparison of security documents, fake currency and stamp papers.	2. Examination and comparison of disputed anonymous letter with specimen of suspect/suspects. 3. Identification of altered/added/obliterated/erased/handwriting on cheques and deeds.	L1, L2, L3, L4	12
4. Comparison of forged (disputed) signature with the specimen signatures.			
5. Comparison of disguised (disputed) signature with specimen signatures			
6. Development of latent fingerprints by chemical methods and photography.	7. Development of latent fingerprints by physical methods and photography. 8. Comparison of fingerprints, palm prints based on ridge	L1, L2, L3, L4	14

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	characteristics and ridge details.		
9.	Ridge counting and ridge tracing.	L1, L2, L3, L4	12
10.	Recording of prints on fingerprint chart.		
11.	Examination of other impressions and photography.		

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation*

Examination Scheme:

	IA			EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, A: Attendance, PR- Performance, LR – Lab Record, V – Viva.

Text and references:

- A Glencoe Program Physics principles and problems: Forensic Laboratory Manual Student edition
- Thomas Kubic, Nicholas Petraco Forensic Science Laboratory Manual and Workbook, Third Edition 2009
- Kathy Mirakovits, Gina Londino, The Basics of Investigating Forensic Science: A Laboratory Manual 2015
- Washington state patrol Forensic Laboratory services: Crime Laboratory: Technical & Training Manuals
- Bridges, B. C., Vollmar, A. Monir, M., Criminal Investigation, Practical Fingerprinting, Thumb Impression, Handwriting, Expert Testimony Opinion Evidence, The University Book Agency, Allahbad, 2000.

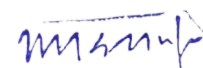
CO, PO, PSO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	2	1	3								3		
CO2	2	1	3								3		
CO3	2	1	3								3		
CO4	2	1	3								3		

1: strongly related, 2: moderately related and 3: weakly related



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FCH4209	INSTRUMENTATION (BIOLOGICAL)	L	T	P	C
Version 1.1	Date of Approval: Dec, 2021	2	1	0	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

This course is intended to provide the basic knowledge about the instruments which can be used for the analysis of biological samples. The students will understand the basic principle of the instruments and will be able to apply different techniques as per the requirement of the investigations in medicolegal cases.

Course Objective: The objective of the course is to provide student with practical understanding of working and applications of various instrumentation techniques used in the forensic science laboratory for the analysis of biological evidences.

Course Outcomes

On completion of this course, the students will be able to

CO1. Explain various biological phenomena associated with Forensic Science and the utility of various biological changes in forensic science.

CO2. Describe the principle, types, and applications of the centrifugation in forensic science.

CO3. To understand the various types of electrophoresis for the analysis of biological and toxicological samples

CO4. Analyse the biological samples by immuno-electrophoresis.

CO5. Apply various types of microscopes for the forensic investigations

Course Contents:	Blooms level	Number of hours
Module I: General Principles of Biological/ Bio-chemical Analysis pH and buffers, Physiological solution, Cell fractionation. Genetic Manipulations, Enzymes used in genetic manipulation, Cloning procedures, Isolation of specific nucleic acid sequences – complementary DNA, Gene libraries, Colony hybridisation, Expression of genes	L1, L2, L3	11
Module II: Centrifugation Techniques Basic principles of sedimentation, Various types of centrifuges, Density gradient centrifugation, Preparative centrifugation, Analysis of sub-cellular fractions, Ultra-centrifuge- Refrigerated Centrifuges.	L1, L2, L3, L4	10
Module III: Electrophoretic Technique General principles, Factors affecting electrophoresis, Types of Electrophoresis- Agarose gel electrophoresis, Polyacrylamide gel electrophoresis, its types, Isoelectric focusing (IEF), Iso-electrophoresis.	L1, L2, L3, L4	9
Module IV: Immuno-chemical Techniques General principles, Production of antibodies, Precipitin reaction, Gel immuno-diffusion, Immuno-electrophoresis, Radio Immuno-assay (RIA), ELISA, Fluorescence Immuno-assay.	L1, L2, L3, L4	8

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Module V: Microscopy Basic principles, Simple and Compound Microscope, Comparison Microscope, Phase Contrast Microscope, Stereoscopic Microscope, Polarizing Microscope, Fluorescent Microscopy, Scanning Electron Microscope (SEM) and Transmission Electron Microscope (TEM).	L1, L2, L3, L4	10
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**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation*

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	15	5	5	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

Suggested Readings:

- H.H Willard et al; Instrumental Methods of Analysis CBS Pub. And Distributors, Delhi (1986)
- Bryan L. William & Keith Wilson; Principles & Techniques of Practical Biochemistry, Edward Arnold Pub. (1975)
- Keith Wilson & John Walker; Practical Biochemistry- Principles & Techniques, 5th Ed., Cambridge University Press (2000)
- David. L. Nelson & Michael M, Cox Lenninges; Principles of Biochemistry, 4th Ed., Freeman Pub. (2005).
- Watson Gillman, Witkowski, Zolles; Recombinant DNA, 2nd Ed., Scientific American Books, (1998)
- Gardnes & Snustd; Principles of Genetics 6th Ed., John Wiley & Sons (1981)
- D.M. Weir; Hand Book of Experimental Immunology, 2nd Ed., Blackwell Pub. (1973)

CO, PO, PSO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	1	2							3		1		
CO2	1	2							3		1		
CO3	1	2							3		1		
CO4	1	2							3		1		
CO5	1	2							3		1		

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FCH4210	FINGERPRINT SCIENCE	L	T	P	C
Version 1.2	Date of Approval: Dec, 2021	2	1	0	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

This course will help the students to understand basic of fingerprint science and their systematic classification.

Course Objective: The course focuses on following objectives-

- Developing an understanding and appreciation for the scope of Fingerprints Examination.
- Develop an understanding on various methods of development of Fingerprints.
- Develop comprehensive knowledge on fingerprint patterns, fingerprint classification, the various methods of fingerprint development- physical and chemical.

Course Outcomes

On completion of this course, the students will be able to

CO1. Identify and outline various types of fingerprints patterns

CO2. Distinguish and categorise characteristics of fingerprints for proper collection and preservation.

CO3. Classify fingerprints for case solving and matching of suspect prints with crime scene evidences.

CO4. Apply advanced knowledge of Automated fingerprints identification for forensic examination in court of law.

Course content:	Blooms level	Number of hours
Module I: Introduction to Fingerprints Dactylography, Dermatoglyphics and Dactyloscopy, Basis concepts of Fingerprint Science, Friction ridge skin, Morphogenesis of friction ridge skin, Primary dermal ridge development, Definition of fingerprint, History of fingerprint identification, Fingerprint as forensic evidence, Visible finger-marks, Latent finger-marks.	L1, L2	7
Module II: Classification of Fingerprints for Comparison purposes Pattern area, Core, Delta, Type lines, ridge characteristics, Fingerprint Pattern types: Essentials and its types: Loop, Arch, Whorl, Composites, Accidental patterns etc., Ten Digit and Single Digit fingerprint classification.	L1, L2, L3	8
Module III: Methods of Taking Fingerprints From living and dead persons, preserving and lifting of fingerprints. Comparison protocols: Class and individual characteristics (Galton's details), different ridge characteristics, Standards of proof, Automatic Fingerprint Identification System (AFIS), Poroscopy and Edgescopy. Multimetal deposition technique; Physical developer technique; Importance of light sources in fingerprint science	L1, L2, L3, L4	7
Module IV: Fingerprint Developing Methods Chemistry of latent fingerprint residue, factor contributing to latent fingerprints, Methods of development of latent fingerprints using conventional methods-	L1, L2, L3, L4	7

Powder (Black and grey, fluorescent, and magnetic), Fuming method, Vacuum metal deposition (VMD) method, Chemical method, Reagent chemistry and formulations, Photography of fingerprints.		
Module V: Report Writing and Court Room Testimony Evidence and testimony in court, Information required by the Forensic expert, Components of forensic reports, Preparation of report, Presenting findings in a report, Expert and the rules of evidences, Daubert's challenges to fingerprints.	L1, L2, L3	7

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation*

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	15	5	5	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

Suggested Readings:

- Nath, S., Fingerprint Identification, CRC Press, 2nd edition, 2002.
- Champhod, C., Fingerprint and other ridge skin impressions, CRC Press, 2004.
- Bridges, B. C., Vollmar, A. Monir, M., Criminal Investigation, Practical Fingerprinting, Thumb Impression, Handwriting, Expert Testimony Opinion Evidence, The University Book Agency, Allahabad, 2000.
- James, S. H. and Nordby, J. J. (Eds), Forensic Science - An Introduction to Scientific and Investigation Techniques, CRC Press, London, 2003.
- Nanda, B. B., and Tiwari, R. K., Forensic Science in India. Select Publishers, New Delhi, 2001.
- Saferstein, Richard, Criminalistics, An Introduction to Forensic Science, 6th Ed. Prentice-Hall, New Jersey, 1998.
- Sharma, B. R., Forensic Science in Criminal Investigation and Trials (3rdEdn) Universal Law Publishing Co. Ltd. New Delhi, 2001.

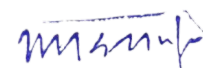
CO, PO, PSO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	1								1				
CO2	1	3							1				
CO3	1	3							1		3		
CO4	1			3					1				2

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FCH4231	TERM PAPER	L	T	P	C
Version 1.1	Date of Approval: Dec, 2021	0	0	0	1
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

Seminar is a lecture series to acquaint new graduate students with departmental research (This one will be running through out first semesters on every Monday any Lecture, where normally Ph.D. students /internal Faculties /external speakers will give talks on their research or other topic of their specialization). The trainer must make sure that the aspects covered are practically practiced by the participants. The evaluation will be done by Board of examiners comprising of the faculties.

Course Objectives

A seminar is primarily an activity based academic event that is organized to provide the students a one-to-one hands-on experience on any aspect of their learning for research-based activity. Prerequisite, graduate studying in Chemistry/ Biochemistry/ Forensic Sciences on consent of instructor. Seminar to acquaint new graduate students with departmental research (This one was for second semester students to attained and fourth semester students had to present on one selected topic of their choice or Ph.D. students/internal faculties /external speaker will give talk).

The trainer must make sure that the aspects covered are practically practiced by the participants. The evaluation will be done by Board of examiners comprising of the faculties. This one will be one time event in one semester.

On completion of this course, the students will be able to

CO1: Explain significance of research and will get an idea of current research trends in Forensic and allied sciences.

CO2: Acquaint with departmental research

CO3: Discuss the potential seminar-based evaluations

Major Themes for Seminar

The seminar may be conducted on any of the following major themes:

- Forensic Science & its related laws
- Criminal Investigations & its proceedings
- Forensic Chemistry
- Forensic Physics
- Forensic Ballistics
- Forensic Fraud Investigations
- Forensic Document Examinations
- Investigative Techniques
- Forensic Analytical Techniques
- Forensic Medicine & Odontology
- Forensic Anthropology Examinations
- Cyber & Digital Forensics
- Any other relevant topics

These themes are merely indicative and other recent and relevant topics of study may be included.

*Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Evaluation Scheme:

Attendance	Active Participation	Multiple Choice Questions/ Quiz	Solving the case/ Assignment/ Write up	Total
10	30	30	30	100


CO, PO, PSO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1				1								1	
CO2				1								1	
CO3				1								1	3

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FCH4301	FORENSIC CHEMISTRY, TOXICOLOGY AND PHARMACOLOGY	L	T	P	C
Version 1.1	Date of Approval: Dec, 2021	2	1	0	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

This course is intended for students to understand about Forensic chemistry and its various aspects in related field. The syllabus contains the various analytical methods to examine alcoholic beverages along with its toxicity. It also contains the drug abuse in sports and doping, classification and routes of administration of poisons and extraction and isolation techniques of various drugs from biological viscera.

Course Objectives:

During the course the student will:

- Understand the scope of forensic chemistry, toxicology, and pharmacology
- Understand and appreciate the scope, diversity, and utility of a variety of chemical analysis
- Learn the principles of primary techniques used for forensic identification of various chemicals, drugs, and poisons

Course outcome

On completion of this course, the students will be able to

CO1. Explain the need and scope of Forensic chemistry & Toxicology.

CO2. Apply the analytical procedure of alcohol & their examination.

CO3. Differentiate between use and abuse of drugs and their laboratory analytical methods.

CO4. Classify the poison and identify them in forensic science laboratory.

Course Contents	Blooms level	Number of hours
Module I: Introduction to Forensic Chemistry Forensic Chemistry: Introduction, types of cases/exhibits, preliminary screening, presumptive test (colour and spot test), inorganic analysis, micro – chemical methods of analysis, Analysis of petroleum products.	L1, L2, L3	6
Module II: Toxicology of alcohol and Examination of Alcoholic Beverages Fate of alcohol in body, alcohol in the circulatory system, Breath test instruments, Field Sobriety testing, Examination of alcoholic beverages; Country made liquor, Illicit liquor. Analysis of blood for alcohol.	L1, L2, L3, L4	6
Module III: Drugs of Abuse Introduction, classification of drugs of abuse, drugs of abuse in sports and doping, narcotics drugs and psychotropic substances, designer drugs and their forensic examination, Drugs and Cosmetic Act, Excise Act, NDPS Act. Dose-response relationship; Importance of Lethal dose 50	L1, L2, L3, L4	6
Module IV: Introduction to Toxicology Definition, Law relating to poison, Classification of poisons. Action of poisons and factors modifying its action, routes of administration of poisons, Role of Toxicologist	L1, L2, L3, L4	6

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Module V: Forensic Pharmacology Pharmacology and Toxicology of Psychotropic Drugs: Sedatives, Stimulants, Opiates. Extraction, Isolation of drugs from viscera, tissues and body fluids.	L1, L2, L3, L4	6
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**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation*

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	15	5	5	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

Suggested Readings:

- A Burger; Medicinal Chemistry, Vol. II, Wiley Interscience, New York; (1970)
- A.I Vogel; Textbook of Practical Organic Chemistry including Qualitative Organic Analysis; ELBS, Essex (1971)
- Boudreau, JE et al – Arson & Arson Investigation, Survey & Assessment National Institute of Law Enforcement, U.S Dept. of Justice, US Govt. Printing Press (1977)
- Clark, E.G.C., Isolation and identification of Drugs, Vol. I and Vol. II, Academic Press, 1986.
- Cravey, R.H., Baselt, R.C., Introduction to Forensic Toxicology, Biochemical publications, Davis C A, 1981.
- Gleason, M.N. et.al, Clinical Toxicology of Commercial products, Williams and Williams, Baltimore

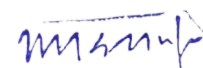
CO, PO, PSO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	1	1								1			
CO2	1	1								1	3		
CO3	1	1			3					1	3		
CO4	1	1			3					1			

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FCH4302	FORENSIC BIOLOGY AND SEROLOGY	L	T	P	C
Version 1.1	Date of Approval: Dec, 2021	2	1	0	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

This course is intended to give insight of providing the basic knowledge about the anatomy and physiological changes in odontology. The students will be able to correlate the bite marks with type of crime. The course will help the students to differentiate between wound and their medicolegal studies.

Course Objective: This course will cover:

- The important biological evidences commonly found at crime scene
- Significance of forensic anthropology, and forensic botany.
- Importance of serology and DNA analysis in interpretation of crime.

Course Outcomes

On completion of this course, the students will be able to

CO1. Explain the significance of biological evidences in the forensic science.

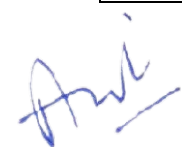
CO2. Identify and differentiate different types of fibres and racial difference in the fibres.

CO3. Demonstrate features of skeleton system, explain peculiar features of the human skeleton and its significance in age, sex and race determination

CO4. Utilize various biological fluids for the crime investigation and individual identification.

CO5. Summarize significance and applicability of DNA fingerprinting in the forensic investigations

Course Contents	Blooms level	Number of hours
Module I: Hair and Fibre Structure of hair and its biochemical properties, Phases of hair growth, types of hair. Differences between animal and human hair, Forensic examination of different types of hair. Different types of fibres and their identification.	L1, L2, L3	7
Module II: Botanical Evidences and Diatoms Different botanical evidences of forensic significance: seeds, pollens etc. Diatoms: Classification, basic structure and morphology, forensic significance of diatoms, extraction methods, examination of wood	L1, L2, L3,	6
Module III: Forensic Anthropology Definition and scope of forensic anthropology, Human skeletal system, and types of bones. Estimation of age from skull and long bones, site, and side determination. Estimation of stature from skeletal remains. Determination of sex from skull, mandible, and pelvis.	L1, L2, L3, L4	7



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Module IV: Forensic Serology Definition and scope of forensic serology. Nature, composition and functions of blood and other fluids. Collection, preservation and packing of biological fluids. Introduction to ABO, Rh, MN systems, Lectins – their forensic significance, Determination of secretor/ non secretor status.	L1, L2, L3, L4	8
Module V: DNA Profiling DNA Profiling: Introduction, molecular biology of DNA, polymorphism, DNA Extraction methods (Organic and Inorganic extraction, FTA cards), DNA typing systems- RFLP analysis, sequence polymorphism. Evaluation of results, analysis of STR, SNP and Mitochondrial DNA markers, Y-STRs, PCR amplifications, Forensic applications of DNA profiling, limitations of DNA profiling	L1, L2, L3	8

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation*

Examination Scheme:					
Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	15	5	5	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

Suggested Readings:

- Pandey, B. P., Plant Anatomy; S. Chand, New Delhi, 1998.
- Biology Methods manual, Metropolitan Police Forensic Science Laboratory, London, 1978.
- Byrd, J. H. & Castner, J. L., Forensic Entomology, The Utility of Arthropods in legal Investigation, CRC Press, USA, 2000.
- Catts, E.P & Haskell N.H., Entomology and death: A procedural guide, Joyce's Print Shop, 1990.
- Mauersberger, Herbert R., & Mathews, Textile Fibres – Their physical, Microscopic and chemical properties, John Wiley, New York, 1954.
- Richard Saferstein; Forensic Science Handbook; Ed.; Prentice – Hall, Englewood Cliff, New jersey; (1982)
- Smith; DGV; A manual of Forensic Entomology Ithaca New York Camstock Univ. Press, USA, (1986)
- Fisher, B., Techniques of Crime Scene Investigation (6thEdn.) CRC Press, Boca Raton, Florida, 2000.
- Butler, John M. (John Marshall), Advanced topics in forensic DNA typing : methodology ISBN 978-0-12-374513-2 (2011)

CO, PO, PSO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	1	3								1			
CO2	1	3		2						1	3		
CO3	1	3		2						1	3		
CO4	1	3								1			
CO5	1	3		2						1	3		

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FCH4304	FORENSIC BIOLOGY AND SEROLOGY-LAB	L	T	P	C
Version 1.2	Date of Approval: Dec, 2021	0	0	4	2
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

This course is intended to provide basic knowledge of practical aspects of Forensic serology, anthropology, and botany to the students. It will be helpful in providing the students a practical knowledge of various biological and botanical evidence and their analysis and significance in forensic investigations to establish connection between crime and suspect.

Course Objective: This course will cover:

- The practical aspects of forensic biology, anthropology, and serology
- To collect, pack and analyse biological, anthropological, & serological evidences
- To document chain of custody, write laboratory reports pertaining to the examinations conduct presumptive and confirmatory tests for evidence

Course Outcomes

On completion of this course, the students will be able to

- CO1.** Perform various tests for the species and personal identification that can help criminal investigations.
- CO2.** Estimate age of person by anthropological examination.
- CO3.** Correlate the time, site and cause of the crime by the identification of the diatoms and its presentation in court of law.
- CO4.** Understand the types of fibres, their identification and utility in forensic identification of the person.

Course Contents: Lab/ Practical	Blooms level	Number of hours
1. Determination of species of origin from blood and other biological evidences using precipitin test 2. Presumptive and confirmatory tests for blood 3. Examination and identification body fluids 4. Gel Immuno-diffusion tests for species origin 5. Blood grouping from dried stains by Absorption Inhibition or Absorption Elution	L1,L2,L3,L4	12
6. Microscopic examination of hair for the determination of different types of medulla and scale 7. Microscopic examination of hair for the determination of species	L1, L2, L3, L4	12
8. Extraction /Isolation of Diatoms from water/soil and tissues	L1, L2, L3, L4	6

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9. Identification of bones based on its morphology and anatomical planes 10. Sex determination from skull, mandible, pelvis and long bones 11. Age estimation from skull and long bones	L1, L2, L3, L4	12
12. Sexing from Barr Bodies	L1, L2, L3, L4	6

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation*

Examination Scheme:

	IA			EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, A: Attendance, PR- Performance, LR – Lab Record, V – Viva.

Suggested Readings:

- Lab Procedures by V Veeraraghavan, S Lukose
- Laboratory Protocols CIMMYT Applied Molecular Genetics Laboratory, Third Edition
- Kathy Mirakovits, Gina Londino, The Basics of Investigating Forensic Science: A Laboratory Manual 2015
- Washington state patrol Forensic Laboratory services: Crime Laboratory: Technical & Training Manuals
- G.H. Stout & L.H. Jensten, X-ray Structure Determination – A practical Guide; 2ndEdn. Wiley, New York, 1989
- Redsicker, D. R., The Practical methodology of Forensic Photography, CRC Press, London, 1994.

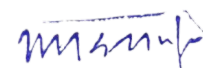
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CO3		1		3							1		3
CO4		1		3							1		3

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FCH4305	FORENSIC CHEMISTRY AND TOXICOLOGY - LAB	L	T	P	C
Version 1.1	Date of Approval: July, 2019	2	0	0	2
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

This course is intended for students to perform various practical in the field of Forensic Chemistry & Toxicology, to isolate different toxic substance, perform thin layer chromatography of several drugs and cations and anions analyses.

Course Objective:

The students will understand & perform experiments related to:-

- Isolation techniques for different poisons
- Analysis of different poisons
- Spot tests for different cations and Anions

Course Outcome

On completion of this course, the students will be able to

CO1. Demonstrate the isolation techniques of different toxic substances.

CO2. Perform the TLC and analysis of various drugs and poisons.

CO3. Perform various tests to analyze cations and anions.

Course Contents: - Lab/Practical		Blooms level	Number of hours
1.	Isolation techniques of different toxic substances	L1, L2, L3, L4	16
2.	TLC of insecticides, Barbiturates and other drugs		
3.	Spot test of mercury, iron, copper, aluminium, cadmium, zinc and other metallic poisons		
4.	Analysis of volatile and non-volatile poisons	L1, L2,	16
5.	Analysis of vegetable poisons		
6.	Spot test of nitrates, nitrites, carbonates, sulphates, sulphites, chlorates	L1, L2, L3, L4	16

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation*

Examination Scheme:

	IA			EE	
A	PR	V	LR	PR	V
5	10	5	10	35	35

Note: IA –Internal Assessment, EE- External Exam, A: Attendance, PR- Performance, LR – Lab Record, V – Viva.

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Suggested Readings:

- A Glencoe Program Physics principles and problems: Forensic Laboratory Manual Student edition
- Thomas Kubic, Nicholas Petraco Forensic Science Laboratory Manual and Workbook, Third Edition 2009
- A. I. Vogel Textbook of Practical organic Chemistry including Qualitative organic analysis
- Isolation and identification of Drugs by E.G.C. Clark
- Bryan L. William & Keith Wilson; Principles & Techniques of Practical Biochemistry, Edward Arnold Pub. (1975).
- K. Nakanishi, Infrared absorption spectroscopy - practical, Holden-Day, Inc., San Francisco and Nankodo Company Ltd., Tokyo, 1962.

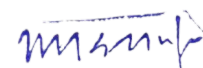
CO, PO, PSO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	1	1		2							1		3
CO2	1	1		2							1		3
CO3	1	1		2							1		3

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FCH4315	STATISTICS AND RESEARCH METHODOLOGY	L	T	P	C
Version 1.1	Date of Approval: Dec, 2021	2	1	0	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

Research Methodology and Statistics provide the detailed knowledge about the concept of research methods and its utility in forensic science. It develops the ability to carry research in different fields of forensic science.

Course Objective: This course is designed to:

- Provide foundation knowledge of quantitative and qualitative research methods used in Forensic Sciences.
- Provide understanding of the use of survey, field, and qualitative research techniques to develop practice knowledge.
- Describe distributions in terms of shape, centre, and spread including the ability to construct visual displays of data (charting, graphing).
- Provide an understanding of and ability to use the basic principles of statistical inference.

Course Outcomes

On completion of this course, the students will be able to

CO1: Explain the types of research, methods of sampling used in statistics.

CO2: Apply different methods of data collection and statistical methods useful in forensic science.

CO3: Define the concept and types of parametric and non-parametric tests.

Course Contents:	Blooms level	Number of hours
Module I: Introduction to Research Research: Definition, motives and objectives, Types of Research, Research process, Defining the research problem, Research design.	L1, L2	7
Module II: Sampling Principles, methods: census and sample survey, sample design. Types of sampling, rationale for using a particular sampling procedure.	L1, L2, L3	7
Module III: Tools of Data Collection Observation, interview schedule, questionnaire, survey, case study methods	L1, L2, L3	5
Module IV: Statistics Introduction, Frequency distribution, class intervals, graphical presentation: Line graphs, bar diagram, histogram, pie chart; Measures of Central Tendency: mean, median, mode; Measures of dispersion: Range, Mean deviation, Quartiles, Percentiles, Variance and standard deviation. Skewness and Kurtosis, Pearson and Spearman correlation methods, Regression equations.	L1, L2, L3	10
Module V: Statistics II Tests of Significance, Normal distribution, Confidence level. Level of Significance, Parametric and non-parametric tests, F-test, t-test, Z-test, Chi square test, ANOVA.	L1, L2, L3, L4	7

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**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation*

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	15	5	5	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

Suggested Readings:

- Broota, K.D., Experimental designs in psychological research, Wiley eastern, New York, 1992.
- Guilford, Statistics in Psychology and Education, McGraw hill, New York, 1986.
- Katz and Kahn, Research in Behavioural Sciences, Methuen, USA, 1979.
- Kerlinger, F., Foundations of Behavioural Research, Surjeet Publications, Delhi, 1983.
- Rajamanickam, M., Statistical Methods in Psychological and Educational Research, Concept Publishing Co. New Delhi, India, 1983.
- Smith, Jonathan, A. (Ed.), Qualitative Psychology: A Practical Guide to Research Methods, Sage Publications, 2003.
- Woodworth and Schlosberg, Experimental Psychology, Methuen and co. ltd, London, 1971.

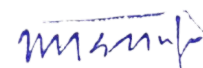
CO, PO, PSO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	1	1		2					2		1		
CO2	1	1		2					2		1		
CO3	1	1		2					2		1		

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FCH4316	INSTRUMENTATION (PHYSICAL)	L	T	P	C
Version 1.1	Date of Approval: Dec, 2021	2	1	0	3
Pre-requisites/Exposure					
Co-requisites					

Course Objective: The objective of the course is to provide student with practical understanding of working and applications of various instrumentation techniques used in the forensic science laboratory for the analysis of evidences.

Course Outcome

On completion of this course, the students will be able to

CO1: Explain the principle and application of Spectroscopy.

CO2: Describe types of Molecular spectroscopy, their principle and instrumentation and application in forensic science.

CO3: Describe types of Atomic spectroscopy, their principle and instrumentation and application in forensic science

Course Contents:	Blooms level	Number of hours
Module I: Basic Concepts - Atomic & Molecular Spectroscopy Introduction to Atomic orbitals, spectra, Bohr Model. Quantum Theory, molecular orbital, types of molecular energies, vibrational and electronic spectra. Classification of spectroscopic methods.	L1, L2, L3	10
Module II: Molecular Spectroscopy Ultra-violet and visible spectrophotometry: Types of sources and stability, wavelength selection, filters, reference cells and sampling devices, detectors, resolution, qualitative and quantitative methods for detection (Single beam and double beam). Infrared spectrophotometry: Basic principle, Dispersive and non-dispersive instruments, FTIR, instrumentation, Forensic applications, correlation of infra-red spectra with molecular structure. Raman spectrophotometry: Basic principle, theory, instrumentation, forensic applications. Fluorescence spectrophotometry: Types of sources, structural factors, instrumentation, comparison of luminescence and UV-visible absorption methods.	L1, L2, L3, L4	13
Module III: Atomic Spectroscopy Atomic absorption spectrometry: Instrumentation and techniques, interference in AAS, background correction methods, quantitative analysis, Applications in Forensic Science. Atomic emission spectrometry: Instrumentation and techniques, arc/spark emission, comparison of ICP vs AAS methods, quantitative analysis, applications in forensic science. X-ray spectroscopy: X-ray absorption and fluorescence methods, X-ray diffraction, Applications in Forensic Science. Neutron Activation Analysis: Introduction, principle, theory, instrumentation, and forensic applications.	L1, L2, L3, L4	13

*Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

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Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	15	5	5	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
A: Attendance

Suggested Readings:

- James W. Robinson; Atomic Spectroscopy, 2nd Edn. Revised & Expanded, Marcel Dekkar, Inc, NY. (1996)
- Gurdeep R. Chatwal & Sham K. Anand; Instrumental Methods of Chemical Analysis, Himalaya Pub. House (2004).
- R.S. Khandpur; Handbook of Analytical Instruments, Tata McGraw Hill Pub.Co. New Delhi (2004)
- John C. Lindon, George E. Tranter & John L. Holmes; Encyclopaedia of Spectroscopy & Spectrometry, Academic Press (2000)
- Kamlesh Bansal; Analytical Spectroscopy Campus, Books International (2000)
- D.R. Khanna & H.R. Gulati; Fundamentals of Optics Geometrical Physical & Quantum, 20th Edn., R. Chand & Co. (2002)
- K. Thyagarajan; Lasers Theory & Applications, Macmilan, India Delhi (2004)
- H.D.Bist; Lasers and their applications in the Indian Context, Tata McGraw Hill Pub. Co, New Delhi (1985)
- John D.Cutnell & Kenneth W Johnson; Physics 5th Edn., John Wiley & Sons Inc., NY. (2002)
- E.R.Mengel; Laser Spectroscopy Techniques & applications, Marcel Dekker NY (1995)
- E.R.Mengel; Fluorescence in Forensic Science in Encyclopedia of Analytical Chemistry, Wiley & sons (2000)
- G.R. Chatwal; Analytical Spectroscopy 2nd Edn, Himalaya Pub. House (2002)

CO, PO, PSO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
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CO2	1	1		3							1		
CO3	1	1		3							1		

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FCH4318	INSTRUMENTATION WORKSHOP	L	T	P	C
Version 1.1	Date of Approval: Dec, 2021	0	0	0	1
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

Instrumentation Workshop is a lecture series along with instrumental demo to acquaint new graduate students with departmental research (This one will be running through out first semesters on every Monday any Lecture, where normally Ph.D. students /internal Faculties /external speakers will give talks on their research or other topic of their specialization). The trainer must make sure that the aspects covered are practically practiced by the participants. The evaluation will be done by Board of examiners comprising of the faculties.

Course Objectives

A workshop/seminar is primarily an activity based academic event that is organized to provide the students a one to one and hands on experience on any aspect of their learning. The communication in a workshop must be necessarily two ways. The trainer must make sure that the aspect covered is practically practiced by the participants. The student will choose the option of workshop from amongst their concentration electives. The evaluation will be done by Board of examiners comprising of the faculties.

Course Outcomes

On completion of this course, the students will be able to

CO1: Explain the principle and application of instruments in forensic research and will get an idea of application of the recent instruments in Forensic and allied sciences.

CO2: Acquaint with departmental research.

CO3: Learn the potential seminar-based evaluations.

Major Themes for Workshop

The workshop may be conducted on any of the following major themes:

- Crime Scene Investigation
- Forensic Toxicology
- Forensic Anthropology
- Handwriting & Typewriting Analysis
- Crime Scene Investigation
- Criminology, Criminal Law & Police Administration
- Fingerprint Science
- Forensic Serology
- DNA Fingerprinting
- Wounds & its Medico-Legal Aspects

These themes are merely indicative and other recent and relevant topics of study may be included.

Guidelines for Workshop

The procedure for earning credits from workshop consists of the following steps:

- i. Relevant study material and references will be provided by the trainer in advance.
- ii. The participants are expected to explore the topic in advance and take active part in the discussions held
- iii. Attending and Participating in all activities of the workshop

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- iv. Group Activities must be undertaken by students as guided by the trainer.
- v. Evaluation of workshop activities would be done through test and quiz at the end of the workshop.
- vi. Submitting a write up of at least 500 words about the learning outcome from the workshop.

Methodology

The methodology followed at the workshop could be based on any one or more of the following methods:

- i. Case Study
- ii. Simulation
- iii. Quiz
- iv. Quality analysis & characterization
- v. Identification and preparation of materials

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation*

Evaluation Scheme:

Attendance	Active Participation	Multiple Choice Questions/ Quiz	Solving the case/ Assignment/ Write up	Total
10	30	30	30	100

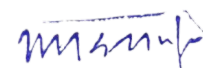
CO, PO, PSO Mapping

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CO1	1			1			3	2	2			1	
CO2	1			1			3	2	2			1	
CO3	1			1			3	2	2			1	

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FCH4306	ADVANCED FORENSIC BIOLOGY AND ANTHROPOLOGY	L	T	P	C
Version 1.1	Date of Approval: Dec, 2021	2	1	0	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

This course is intended to provide advanced of the forensic biology and anthropology. The students will understand the advanced analytical techniques. It will be helpful in providing knowledge of the various branches of biology and their direct applications in the criminal investigation.

Course Outcomes

On completion of this course, the students will be able to

CO1. Explain wildlife forensics, Wildlife life protection Act and significance of wildlife evidences for criminal investigations and species identification.

CO2. Describe various concepts of entomology and its forensic relevance

CO3. Apply various instruments for individual identification from skeletal remains and presentation of these evidence in court of law.

CO4. Develop comprehensive knowledge of Superimposition techniques, Facial reconstruction for Personal Identification

Course Objectives:

During the course the student will

- Understand and appreciate the scope of forensic biology and Forensic Anthropology
- Understand and appreciate the scope, diversity, and utility of a variety of Human, Animal and plant evidences and their examination
- Learn the primary technique used for identification of various biological evidences
- Acquire the knowledge on techniques presently being used in the forensic examination of biological evidences and skeletal remains

Course Contents	Blooms level	Number of hours
Module I: Introduction to Wildlife Forensics Introduction to wildlife forensics, Examination of pug marks, horn, skin, fur, hair, nail, and teeth. Identification of some endangered species of plants and animals. Wildlife life protection Act.	L1, L2	6
Module II: Forensic Entomology and Forensic Microbiology Collection of insects, Shipment of collected insects, Identification of insect and its stage of growth. Determination of the post-mortem interval or "time since death" in homicide investigations, Forensic Entomotoxicology. Introduction to Forensic microbiology	L1, L2, L3	8
Module III: Forensic Anthropology Somatometry, Osteometry and Craniometry. Identification of individuals from skeletal remains, Collection, Handling, preservation of skeletal remains of forensic science and report writing.	L1, L2	7

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Module IV: Forensic Taphonomy and Radiology Forensic Taphonomy. Fire modification of bones, Assessment of ante mortem and post-mortem skeletal trauma. Artefacts in the skeletal remains. Application of radiology in forensic anthropology	L1, L2, L3	7
Module V: Superimposition and Facial Reconstruction Superimposition techniques. Facial reconstruction: three dimensional and computer assisted facial reconstruction	L1, L2, L3, L4	7

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation*

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	15	5	5	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

Suggested Readings:

- Richard Saferstein; Forensic Science Handbook; Ed.; Prentice – Hall, Englewood Cliff, New jersey; (1982)
- Biology Methods manual, Metropolitan Police Forensic Science Laboratory, London, 1978.
- Byrd, J. H. & Castner, J. L., Forensic Entomology, The Utility of Arthropods in legal Investigation, CRC Press, USA, 2000.
- Encyclopaedia of Forensic Sciences, Volume, I, II, III & IV, Edited By Jay A. Siegel, Geoffrey
- Advances in Forensic Taphonomy: Method, Theory, and Archaeological Perspectives, William D. Haglund, Marcella H. Sorg, CRC Press; 1 edition, 2001
- Brogdon's Forensic Radiology, Second Edition, Edited by Michael J. Thali, Mark D. Viner, B.G. Brogdon, Published November 22nd 2010 by CRC Press – 654 pages

CO, PO, PSO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	1				3			3	3	1			
CO2	1							3	3	1			
CO3	1				3					1		3	
CO4	1							3		1			3

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FCH4319	FORENSIC GENETICS	L	T	P	C
Version 1.1	Date of Approval: Dec, 2021	2	1	0	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

This course is intended to give insight of providing the basic knowledge about the DNA, genes, and chromosomes. The students will be able to identify the genic origin of the sample and will be able to match the samples with relatives. The course will help the students to understand the concept of allele transfer and its forensic application.

Course Objective: This course is designed to:

- Provide foundation knowledge of genetics
- Provide understanding of the inheritance laws and gene interactions
- Provide understanding of mutation and genetic diseases

Course Outcomes

On completion of this course, the students will be able to

CO1. Explain the significance of biological evidences in the forensic science.

CO2. Describe concept of gene and chromosome and how these are transferred to next generation.

CO3. Describe concept of mutation and genetic variations and their utility in crime investigation.

CO4. Utilize their knowledge of DNA for establishing identity, species differentiation and Forensic genetic research.

Course Contents:	Blooms level	Number of hours
Module I: Introduction to Genetics Mendel's work and Laws of heredity, Test cross, Backcross, Incomplete dominance and simple problems, Structure of DNA and RNA, Structural organization of chromosome, Special types of chromosomes (Salivary gland and Lamp-brush chromosomes)	L1, L2	6
Module II: Cell Division and Linkage Cell cycle, Mitosis and Meiosis, Coupling and repulsion hypothesis, Mechanism of linkage and its importance, Linkage in Maize and Drosophila, Mechanism of crossing over and its importance	L1, L2	8
Module III: Interaction of Genes Supplementary genes, Complementary genes, Pleiotrophy, Lethal genes, Epistasis, Multiple Allelism	L1, L2	7
Module IV: Mutations Mutagens and their types (Physical, chemical, biological), Mutation: Definition and types, Spontaneous and induced mutation, Chromosomal and Gene Mutation, Mutations in plants, animals, and microbes for economic benefit of man	L1, L2, L3	7

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Module V: Inherited Diseases Karyotype, Inherited disorders, Allosomal (Klinefelter syndrome and Turner's syndrome), Autosomal (Down's syndrome and Cri-Du-Chat syndrome)	L1, L2, L3	7
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**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation*

Examination Scheme:

Components	A	CT		S/V/Q	HA	EE
Weightage (%)	5	15		5	5	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

Suggested Readings:

- Basic Human Genetics by E.J. Manage and A.P. Manage (1997 India Reprint) Rastogi Publications, Meerut.
- Snustad & Simmons, Principles of Genetics, 4th Edition, Wiley, 2005
- M.W. Thompson et al, Genetics in Medicine by, 5th Edition, W.B. Saunders Company, London
- Lewin, Genes IX, 9th Edition, Jones & Bartlett, 2007
- Gustavo Maroni, Molecular and Genetic Analysis of Human Traits, 1st Edition, Wiley-Blackwell, 2001.

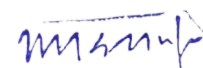
CO, PO, PSO Mapping

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CO1	1	1								1			
CO2	1	1								1			
CO3	1	1								1	3		
CO4	1	1								1	3		

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FCH4317	CYBER FORENSIC AND COMPUTER APPLICATIONS	L	T	P	C
Version 1.1	Date of Approval: Dec, 2021	2	1	0	3
Pre-requisites/Exposure					
Co-requisites					

Course Objective: The objectives of the course are to:

- Provide students with a technical skills and competencies in the field of forensic computing thus producing competent and confident graduates.
- Produce students who will have a hands-on knowledge and able to perform technical role in forensic computing field.
- Equip students with the right skills thus enabling them to adapt real working environment, while contributing positively to the society at large.

Course Outcomes

On completion of this course, the students will be able to

- CO1. Describe the basis concept of computer.
CO2. Explain about the fundamentals of programming language and internet concept
CO3. Describe the basics of operating system and data storage devices.
CO4. Illustrate the biometric system and their pattern recognition.
CO5. Explain the cybercrime and their tools for analysis.

Course Contents:	Blooms level	Number of hours
Module I: Computer Fundamentals - I Computer characteristics and classifications, Concept of Computer Hardware, Concept of Computer Software	L1, L2	8
Module II: Computer Fundamentals - II Fundamentals of programming languages, Concept of Algorithm and Flow Chart, Networking, and Internet Concepts	L1, L2	6
Module III: Data Storage Fundamentals Data storage devices, Storage fundamentals (Sector, Cluster, FAT etc.), File System Concepts, Data Storage and recovery, Basics of Operating System Software, Understanding Storage Formats for Digital Evidences – Raw Format, Proprietary Formats, Advanced Forensic Formats. Data Acquisition of live system, Shutdown Systems and Remote systems. Digital Forensics Standard Operating Procedures. Software and Hardware Tools used in Forensic Analysis – Open Source and Proprietary tools.	L1, L2, L3	7
Module IV: Pattern Recognition and Biometrics Pattern Recognition and Biometrics – Face, Iris and retinal imaging, Speech recognition, finger and palm print, gait pattern, signatures, Pattern comparison, Image processing – Proactive Forensic science	L1, L2, L3, L4	7
Module V: Cyber Crimes, Search and Seizures of Evidence Cyber Crimes – definition, Types, IT laws – introduction, internet, hacking, virus, obscenity, pornography, programme manipulation, software piracy, intellectual property, and computer security etc., Encryption and Decryption methods, Investigation of cyber-crimes and tools for analysis Types of evidence present in mobile phones and SIM cards, Evidence collection from Mobile	L1, L2, L3, L4	7

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Phones and SIM Cards, Recovery and preservation of undeleted and deleted Data (call records, phone books, messages, multimedia files i.e. image, video etc.) from Mobile Phones and SIM Cards		
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**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation*

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	15	5	5	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

Suggested Readings:

- James, S.H. and Nordby, J.J. Eds., Forensic Science: An Introduction to Scientific and Investigative Techniques, CRC Press, London, 2003.
- Leshin, C.B., Internet Investigation in Criminalistics, Prentice Hall, New Jersey, 1997.
- Tessarolo, A.A. and Marignani, A., Forensic Science and the Internet. The Canadian Society of Forensic Science Journal, Vol. 29, 1996.
- Bernad Jahne: Digital Image processing, Springer Verlag (1993)

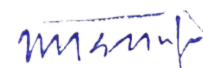
CO, PO, PSO Mapping

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CO2	1	1							1				
CO3	1	1		3					1				
CO4	1	1		3					1				3
CO5	1	1				3			1				3

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FCH4310	ADVANCED QUESTIONED DOCUMENTS AND FINGERPRINTS EXAMINATION	L	T	P	C
Version 1.1	Date of Approval: Dec, 2021	2	1	0	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

Advanced Questioned Document Examination deals with the examination of different kinds of questioned documents encountered in forensic cases. It provides a sound knowledge of the various aspects of questioned document examination. It develops the ability to analyze and resolve the crime mysteries involving forensic documents

Course Objective: The course focuses on following objectives-

- Developing an understanding and appreciation for the scope of Questioned Documents Examination.
- Develop an understanding on different types of cases in questioned documents and different writing conditions.
- Brief description on case presentation and report writing.
- Develop comprehensive knowledge on advanced Instrumentation techniques used for examination.

Course Outcomes

On completion of this course, the students will be able to

CO1: Explain the concept of poroscopy and edgescopy.

CO2: Explain advanced Methods of Development of Latent Fingerprints

CO3: Perform evaluation and development of handwriting including forensic report including its format and preparation.

CO4: Explain different types of security documents and different instruments used to examine questioned documents.

Course Contents:	Blooms level	Number of hours
Module I: Introduction to Poroscopy and Edgescopy Introduction: Poroscopy and edgescopy, Fingerprints examination on the basis of poroscopy and its significance, evaluation of fingerprints on the basis of edgescopy and its significance in fingerprint field.	L1, L2	8
Module II: Advanced Methods of Development of Latent Fingerprints Automatic fingerprint identification system, application of radiations to examine latent fingerprints on various surfaces including skin, SPR, Phase transfer catalyst, DFO, Indanedione, Oil RedO, Factors affecting fingerprints.	L1, L2, L3	10
Module III: Personality assessment and Different Writing Condition Evaluation of personality and psychological traits from handwriting, Evolutionary phases in handwriting, effect of age factor in handwriting and variations in handwriting characteristics, effect of alcohol and drugs on handwriting characteristics/ signatures.	L1, L2, L3	8

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Module IV: Report Writing and Case Representation Expert's opinion, Examination in chief, Cross examination, Re-examination, Oath taking, Summons for evidences, Report writing and Case representation in Court of Law as Moot court.	L1, L2, L3	10
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**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation*

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	15	5	5	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

Suggested Readings:

- Kelly, J. S. Lindblom, B. S. (2006). Science, Handwriting Examination and the Courts. Scientific Examinations of Questioned Documents, 2nd edition, CRC Press, Taylor & Francis group.
- Huber, A. R. Headrick, A. M. (1999). The Discrimination and Identification of writing. Handwriting Identification Facts and Fundamentals, CRC Press, Boca Raton London.
- Ordway Hilton, Scientific Examination of Questioned Documents, Rev. ED., Elsevier, New York, 1982.
- Wilson, R., Harrison, Suspect Documents – Their Scientific Examination; Universal Law Publishing, Delhi, 1997.
- Charles C. Thomas, Typewriting Identification I.S.Q.D.; Billy Prior Bates; Springfield, Illinois, USA, 1971.
- Hard less, H.R., Disputed Documents, handwriting and thumbs – print identification: profusely illustrated, Low Book Co., Allahabad, 1988.
- Kurtz, Sheila, Graphotypes a new plant on handwriting analysis, Crown Publishers Inc., USA, 1983.
- Lerinson, Jay, Questioned Documents, Acad Press, London, 2001.
- Morris, Ron, N., Forensic handwriting identification, Acad Press, London, 2001.

CO, PO, PSO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	1	1	-							1			
CO2	1	1	2							1			
CO3	1	1	3							1	3		
CO4	1	1	-							1			

1: strongly related, 2: moderately related and 3: weakly related

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FCH4320	ADVANCED FORENSIC CHEMISTRY AND TOXICOLOGY	L	T	P	C
Version 1.1	Date of Approval: Dec, 2021	2	1	0	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

This course is intended for students to understand about Forensic chemistry and its various aspects in related field. The syllabus contains the various analytical methods to examine alcoholic beverages along with its toxicity. It also contains the drug abuse in sports and doping, classification and routes of administration of poisons and extraction and isolation techniques of various drugs from biological viscera.

Course Objective: - The objectives of the course:

- The student understands the basic pharmacodynamics, pharmacokinetic and toxicological principles underlying the actions of the various poisons encountered in forensic toxicology.
- To ensure that the student understand nature of the toxicological investigations undertaken in forensic laboratories.

Course outcome

On completion of this course, the students will be able to

- CO1. Describe the mechanism of drug action and interactions in body.
CO2. Explain the drug movement and distribution in body & their examination.
CO3. Discuss the difference between use and abuse of drugs and their laboratory analytical methods.
CO4. Classify the poison and identify them in forensic science laboratory.

Course Contents:	Blooms level	Number of hours
Module I: Pharmacology-I Sites and mechanisms of action of drugs, Dose-effect relationships; agonists, partial agonists, and antagonists. Factor modifying drug actions; side effects, overdose, idiosyncratic and allergic reactions; teratogenesis and foetal toxicity. Drug interactions.	L1, L2	6
Module II: Pharmacology-II Movement of drug molecules across cell membranes, Blood-brain barrier and Placental filter. Routes of administration and drug adsorption. Binding to plasma proteins. Drug distribution, metabolism and elimination. Drug bioavailability and half-life.	L1, L2, L3	7
Module III: Toxicology and Isolation techniques of toxins Definition of Toxicology, Principle of toxicology, Isolation of toxic substances from viscera and other relevant materials. Role of drug recognition expert.	L1, L2, L3	8
Module IV: Different Toxins-I Nature, administration, sign and symptoms, Fatal dose, post-mortem findings, Detection, and medicolegal aspects of- a) Metallic poisons Arsenic, Mercury b) Vegetable poisons Abrus Precatorius, Calotropis Gigantia, Castor, Oleander, Aconite	L1, L2, L3	7

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Module V: Different Toxins-II a) Insecticides Organo-phosphorous compounds, Organo-chloro Compounds and Carbamates b) Volatile Poisons Methyl alcohol, Chloroform, c) Asphyxiants Cyanide, Carbon monoxide d) Animal Poisons Snake venom, Cantharide, Insect bite.	L1, L2, L3	8
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**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation*

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	15	5	5	70

Suggested Readings:

- Textbook of pharmacology, Lawrence
- A. Stolemen, Progress in Chemical Toxicology: Acad. Press, New York, 1963.
- Clark, E.G.C., Isolation and identification of Drugs, Vol. I and Vol. II, Academic Press, 1986.
- Cravey, R.H., Baselt, R.C., Introduction to Forensic Toxicology, Biochemical publications, Davis C A, 1981.
- Gleason, M.N. et.al, Clinical Toxicology of Commercial products, Williams and Williams, Baltimore, USA, 1969.
- Modi, Jaishing P, Textbook of Medical Jurisprudence & Toxicology, M.M. Tripathi Pub.2001.
- Working Procedure Manual – Toxicology, BPR&D Publication, 2000.

CO, PO, PSO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	1	1		3						1	3		
CO2	1	1		3						1	3		
CO3	1	1			3					1	3	3	
CO4	1	1			3					1	3	3	

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FCH4321	FORENSIC WILDLIFE AND ENTOMOLOGY	L	T	P	C
Version 1.1	Date of Approval: Dec, 2021	2	1	0	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

This course is intended to provide advanced knowledge of the forensic wildlife and entomology. The students will understand the advanced analytical techniques to detect poaching. It will be helpful in providing knowledge of the various branches of biology and their direct applications in the criminal investigation.

Course Objective: During the course the students will be able to

- Understand the scope of wildlife forensics
- Understand and appreciate the diversity and utility of variety of animal evidences
- Elaborate concepts of entomology
- Estimate the time since death by life cycle of different insects

Course Outcomes

On completion of this course, the students will be able to

- CO1. Describe entomology, time since death by insects, collection and preservation of the evidences
- CO2. Explain role of insects in toxicological analysis
- CO3. Explain significance of botanical evidences such as wood, leaves, pollens etc in forensic investigations
- CO4. Analyse diatoms for forensic examination of drowning deaths and role of microbes in these investigations
- CO5. Explain and analyse wildlife forensics, Wildlife life protection Act and significance of wildlife evidences for criminal investigations and species identification.

Course Contents	Blooms level	Number of hours
Module I: Forensic Entomology History, significance, determination of time since death- Dipterans larval development- life cycle of blowfly, housefly. Succession colonization of body, determining whether the body has been moved, body disturbance, presence and position wounds, linking suspect to the scene, collection and preservation of entomological evidence.	L1, L2	7
Module II: Entomo-toxicology Insects as toxicological indicators, Impact of drugs & toxins on insect development and Identification of drugs and toxins from the insects and larvae feeding on the body, entomology as an evidentiary tool in abuse cases.	L1, L2, L3	8
Module III: Botanical evidences Introduction, types, location, collection evaluation and forensic significance. Wood: Type of wood and their identification and comparison. Leaves: Identification of various types of leaves and their anatomy, methods of comparison. Pollens: Structure, function, methods of identification and comparison.	L1, L2, L3	6

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Module IV: Diatoms and Microbes Diatoms: Nature, location, structure, extraction from various body tissues, including bone marrow, preparation of slides, methods of identification and comparison, forensic significance. Microbes: Types and identification of microbial organisms of forensic significance.	L1, L2, L3	7
Module V: Wildlife Forensics Introduction, importance, protected and endangered species of Animals and Plants. Identification of wildlife materials such as skin, fur, bones, nails, horn, teeth, flowers, and plants, by conventional and modern methods, Identification of Pug marks of various animals. Different methods of poaching of wildlife animals. Types of wildlife crimes. Wildlife (Protection) Act, 1972.	L1, L2, L3	8

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation*

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

Suggested Readings:

- Jason H. Byrd and James L. Castner; Forensic entomology, CRC Press LLC, 2001.
- Forensic Science Hand book by Richard saferstein Vol (II); Prentice Hall, Publications.
- Richard saferstein; Forensic Science Hand book, Vol (I); Prentice Hall, Publications.
- Curry, A. S. (1965) Methods of Forensic Science, Vol. IV, Interscience, New Youk.
- Chowdhuri, S. (1971) : Forensic Biology, B P R & D Govt. of India.
- Linarce, Adrian; "Forensic Science in Wildlife Investigation", CRC Press, Taylor & Francis, 2009.
- Baalu, T.R.; "The Wildlife Protection Act, 1972", Nataraj Publication, 2001.
- G. Erdtman; "Pollen Morphology & Plant Taxonomy: Angiosperms (an introduction to Palynology), Hafner Publishing Co., 1971.
- Esau Katherine; "Plant Anatomy", Wiley Eastern Ltd., 1965.

CO, PO, PSO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	1	1		3				3		1			3
CO2	1	1		3				3		1			3
CO3	1	1		3				3		1			3
CO4	1	1		3				3		1			3
CO5	1	1		3				3		1			3

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FCH4409	GOOD LABORATORY PRACTICES SEMINAR	L	T	P	C
Version 1.1	Date of Approval: Dec, 2021	0	0	0	1
Pre-requisites/Exposure					
Co-requisites					

Course Objective:

Students will be introducing to learning the written and oral communication of technical information. Assignments include writing and presenting proposals, reports, and documentation. Emphasis on use of rhetorical analysis, computer applications, collaborative writing, and usability testing to complete technical communication tasks in the workplace.

Course outcome:

The students will be able to

CO1. Explain the technical requirements for lab setup

CO2. Summarize the protocols for the lab setups and procedures.

CO3. Describe the significance of GLP in accreditations of laboratories

Course Contents:	Blooms level	Number of hours
Module I: Technical Writing Process Technical Writing: Scientific and technical subjects; formal and informal writings; formal writings/reports, handbooks, manuals, letters, memorandum, notices, agenda, minutes; common errors to be avoided.	L1, L2	
Module II: Journal Paper Writing Journal paper writing: Abstract for paper and poster, different kind of journal for forensic Sciences, impact factors of journals, ISBN number, Citation, H-index.	L1, L3	
Module III: Documentation Process Writing Skills, Selection of topic, thesis statement, developing the thesis; introductory, developmental, transitional and concluding paragraphs, linguistic unity, coherence and cohesion, descriptive, narrative, expository and argumentative writing. Analytical report, Project management in technical communication, Project writing, project proposal writing.	L1, L3	

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation*

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;

A: Attendance

Suggestive readings:

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- M. Frank. Writing as thinking: *A guided process approach*, Englewood Cliffs, Prentice Hall Regents.
- L. Hamp-Lyons and B. Heasley: Study Writing; *A course in written English*. For academic and professional purposes, Cambridge Univ. Press.
- R. Quirk, S. Greenbaum, G. Leech and J. Svartik: *A comprehensive grammar of the English language*, Longman, London.
- Daniel G. Riordan & Steven A. Panley: “*Technical Report Writing Today*” - Biztantra.
- Daniel G. Riordan, Steven E. Pauley, Biztantra: *Technical Report Writing Today*, 8th Edition (2004).
- Contemporary Business Communication, Scot Ober, Biztantra, 5th Edition (2004).

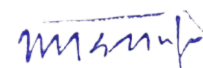
CO, PO, PSO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	1								3			1	2
CO2	1								3			1	2
CO3	1								3			1	2
CO4	1								3			1	2

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FCH4405	QUALITY MANAGEMENT AND ACCREDITATION IN FORENSIC SCIENCE LABORATORIES	L	T	P	C
Version 1.1	Date of Approval: Dec, 2021	2	0	0	2
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

This course is intended for the students who have never learned about the quality management and technical requirement in forensic laboratories. A knowledge of the process of accreditation and basic requirements for a testing and calibration laboratory to be accredited is must for the student of forensic science.

Course Objective: The objective of this course is to introduce the students with the Quality management system and requirements for the competence of testing and calibration, the technical requirements needed in a laboratory.

Course Outcomes

On completion of this course, the students will be able to

CO1. Apply the quality management in forensic laboratories.

CO2. Summarize the technical requirements for a forensic laboratory to be accredited.

CO3. Perform sampling, handling of test and calibration items, as well as assuring the quality of test and calibration results and reporting the results in forensic cases.

CO4. Setup the forensic laboratory information management system.

Course Contents:	Blooms level	Number of hours
Module I: Management requirements I General requirements for the competence of testing and calibration laboratories – Introduction, scope, management requirements: Organization, Quality system, Document control, Review of requests	L1, L2	5
Module II: Management requirements II Internal Audits; Control of records, Corrective and preventive actions, Tenders and contracts, Sub-contracting of tests and calibration, Purchasing services and supplies, Service to the clients, Complaints	L1, L2, L3	5
Module III: Technical requirements I Technical requirements: General, Personnel, Accommodation and Environmental conditions, Test and Calibration methods	L1, L2, L3	5
Module IV: Technical requirements II Equipment, measurement traceability, sampling, handling of test and calibration items, assuring the quality of test and calibration results and reporting the results	L1, L2, L3	4
Module V: Laboratory Management Laboratory information management system, Validation and safety equipments	L1, L2, L3, L4	5

*Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
A: Attendance

Suggested Readings:

- International standard on General requirements for the competence of testing and calibration laboratories, First Edn., 1999-12-15, ISO/IEC 17025:1999(E)
- Mario Deva RGAS, The Total Quality Management, NCC Blackwell Publication, (1995).
- Willard Merritt, Dean & settle; Instrumental Methods of Analysis, CBS Publishers & Distributors, 7thEdn. New Delhi, (1986)

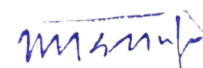
CO, PO, PSO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	2				2		3	3	3			1	3
CO2	2							3	3			1	3
CO3	2				2		3	3	3			1	3
CO4	2				2		3	3	3			1	3

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FCH4408	FORENSIC PSYCHOLOGY	L	T	P	C
Version 1.1	Date of Approval: Dec, 2021	2	1	0	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

This course is intended to give insight of providing the basic knowledge about the human behavior, and its impact on social environment. The students will be able to explain cognitive neuroscience and associated disorders. The course will help the students to understand the concept of intelligence and forensic psychological impact.

Course Objectives:

1. To facilitate the learning of traditional and emergent fields of cognitive neuropsychology.
2. To understand-brain-behaviour relationship in day-to-day life
3. To explore the practical implications of cognitive processes in human performance.

Course Outcomes

On completion of this course, the students will be able to

CO1. Explain the concepts of emergent fields of cognitive neuropsychology.

CO2. Describe brain-behaviour relationship in day to day life

CO3. Apply practical implications of cognitive processes in human performance.

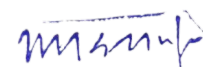
CO4. Analyse impact of intelligence and decision making and language on personal behaviour

Course Contents:	Blooms level	Number of hours
Module-I: Cognitive Neuroscience Introduction, Philosophical antecedents, Emergence of Cognitive psychology, Approaches and key issues, Organization of Nervous system: Cognition in the Brain, Sensation to representation, Theoretical approaches to perception, Deficits in perception. Attention and consciousness	L1, L2	8
Module-II: Memory Models, Processes, Practical Applications of Cognitive Psychology in improving memory processes, Representations and manipulation of knowledge in: Images and Propositions, Spatial cognition and Cognitive map	L1, L2, L3	7
Module-III: Language Nature and Acquisition: Bilingualism and Multilingualism Reading, Bottom-up and Top-down processes, Comprehension, Neuropsychology of Language. Problem-solving and Creativity, Practical applications of cognitive psychology. Decision-making and reasoning: Deductive reasoning and inductive reasoning	L1, L2, L3, L4	9
Module-IV: Intelligence Information possessing and intelligence, alternative approaches to intelligence. Computer simulation, improving intelligence	L1, L2, L3	8

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation*



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Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

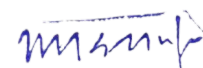
CO, PO, PSO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	1					1		3	3			2	1
CO2	1					1		3	3				1
CO3	1					1		3	3			2	1
CO4	1					1		3	3			2	1

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FCH4437	MAJOR PROJECT	L	T	P	C
Version 1.1	Date of Approval: Dec, 2021	0	0	0	10
Pre-requisites/Exposure					
Co-requisites					

Course outcome

On completion of this course, the students will be able to

CO1. Explain the recent techniques in the forensic field

CO2. Analyse the samples and compile the data for the research publications

CO3. Apply practical and theoretical knowledge of the Research methodology and the relevant subjects for new findings

CO4. Explain the result in the seminar/ research presentations.

GUIDELINES FOR PROJECT FILE AND PROJECT REPORT

Research experience is as close to a professional problem-solving activity as anything in the curriculum. It provides exposure to research methodology and an opportunity to work closely with a faculty guide. It usually requires the use of advanced concepts, a variety of experimental techniques, and state-of-the-art instrumentation.

Research is genuine exploration of the unknown that leads to new knowledge which often warrants publication. But whether the results of a research project are publishable, the project should be communicated in the form of a research report written by the student.

Sufficient time should be allowed for satisfactory completion of reports, considering that initial drafts should be critically analyzed by the faculty guide and corrected by the student at each stage.

PROJECT FILE

The Project File may be a very useful tool for undertaking an assignment along-with a normal semester, an exploratory study, sponsored projects, a project undertaken during summer period or any other period as per curricula where the researcher is working with a company/organization. The project/ assignment may also be a part of the bigger research agenda being pursued by a faculty/ institution/ department

The Project File is the principal means by which the work carried out will be assessed and therefore great care should be taken in its preparation. This file may be considered in continuous assessment.

In general, the File should be comprehensive and include:

- A short account of the activities that were undertaken as part of the project.
- A statement about the extent to which the project has achieved its stated objectives.
- A statement about the outcomes of the evaluation and dissemination processes engaged in as part of the project.
- Any activities planned but not yet completed as part of the project, or as a future initiative directly resulting from the project.
- Any problems that have arisen and may be useful to document for future reference.

PROJECT REPORT

The Project Report is the final research report that the student prepares on the project assigned to him. In case of sponsored project, the lay out of the project could be as prescribed by the sponsoring organization. However, in other cases the following components should be included in the project report:

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Title or Cover Page

The title page should contain Project Title; Student's Name; Programme; Year and Semester and Name of the Faculty Guide.

Acknowledgement(s)

Acknowledgment to any advisory or financial assistance received in the course of work may be given. It is incomplete without student's signature.

Abstract

A good "Abstract" should be straight to the point; not too descriptive but fully informative. First paragraph should state what was accomplished with regard to the objectives. The abstract does not have to be an entire summary of the project, but rather a concise summary of the scope and results of the project. It should not exceed more than 1000 words.

Table of Contents

Titles and subtitles are to correspond exactly with those in the text.

Introduction

Here a brief introduction to the problem that is central to the project and an outline of the structure of the rest of the report should be provided. The introduction should aim to catch the imagination of the reader, so excessive details should be avoided.

Materials and Methods

This section should aim at experimental designs, materials used (wherever applicable). Methodology should be mentioned in details including modifications undertaken, if any. It includes organization site(s), sample, instruments used with its validation, procedures followed and precautions.

Results and Discussion

Present results, discuss and compare these with those from other workers, etc. In writing this section, emphasis should be laid on what has been performed and achieved in the course of the work, rather than discuss in detail what is readily available in textbooks. Avoid abrupt changes in contents from section to section and maintain a lucid flow throughout the thesis. An opening and closing paragraph in every chapter could be included to aid in smooth flow. Note that in writing the various sections, all figures and tables should as far as possible be next to the associated text, in the same orientation as the main text, numbered, and given appropriate titles or captions. All major equations should also be numbered and unless it is necessary, do not write in "point" form.

While presenting the results, write at length about the various statistical tools used in the data interpretation. The result interpretation should be simple but full of data and statistical analysis. This data interpretation should be in congruence with the written objectives and the inferences should be drawn on data and not on impression. Avoid writing straight forward conclusion rather; it should lead to generalization of data on the chosen sample.

Results and its discussion should be supporting/contradicting with the previous research work in the given area. Usually, one should not use more than two researches in either case of supporting or contradicting the present case of research.

Conclusion(s) & Recommendations

A conclusion should be the final section in which the outcome of the work is mentioned briefly.

Check that your work answers the following questions:

1. Did the research project meet its aims (check back to introduction for stated aims)?
2. What are the main findings of the research?
3. Are there any recommendations?
4. Do you have any conclusion on the research process itself?

Implications for Future Research

This should bring out further prospects for the study either thrown open by the present work or with the purpose of making it more comprehensive.

Appendices

The Appendices contain material which is of interest to the reader but not an integral part of the thesis and any problem that have arisen that may be useful to document for future reference.

References

References should include papers, books etc. referred to in the body of the report. These should be written in the alphabetical order of the author's surname. The titles of journals preferably should not be abbreviated; if they are, abbreviations must comply with an internationally recognised system.

Examples:

For research article:

Voravuthikunchai SP, Lortheeranuwat A, Ninrprom T, Popaya W, Pongpaichit S, Supawita T. (2002) Antibacterial activity of Thai medicinal plants against enterohaemorrhagic *Escherichiacoli*O157: H7. *Clin Microbiol Infect* ,8(suppl 1): 116–117.

For book:

Kowalski, M. (1976) Transduction of effectiveness in *Rhizobium meliloti*. SYMBIOTIC NITROGEN FIXATION PLANTS (editor P.S. Nutman IBP), 7: 63-67

The Layout Guidelines for the Project File & Project Report:

1. A4 size Paper
2. Font: Arial (10 points) or Times New Roman (12 points)
3. Line spacing: 1.5
4. Top and bottom margins: 1 inch/ 2.5 cm; left and right margins: 1.25 inches/ 3 cm

ASSESSMENT OF THE PROJECT FILE AND THE PROJECT REPORT

Essentially, the assessment will be based on the quality of the report, the technical merit of the project and the project execution. Technical merit attempts to assess the quality and depth of the intellectual efforts put into the project. Project execution is concerned with assessing how much work has been put in.

The Project should fulfill the following *assessment objectives*:

1. Range of Research Methods used to obtain information
2. Execution of Research
3. Data Analysis (Analyze Quantitative/ Qualitative information)
4. Quality Control
5. Conclusions

Assessment Scheme:

Continuous Evaluation:

40% (Based on punctuality, regularity of work, adherence to plan and methodology, refinements/ mid-course corrections etc. as reflected in the Project File.)

Final Evaluation:

60% (Based on the Documentation in the file, Final report layout, analysis and results, achievement of objectives, presentation/ viva)

It is recommended that the Final evaluation should be carried out by a panel of evaluators.

CO, PO, PSO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	3	2		1				3	3		3	1	
CO2	3	2		1		3		3	3		3	1	3
CO3	3	2		1		3		3	3		3	1	3
CO4	3	2		1		3		3	3		3	1	3

1: strongly related, 2: moderately related and 3: weakly related

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Curriculum & Scheme of Examination

2022

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GURUGRAM

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COMPUTING AND C PROGRAMMING

Course Code: MTH4105

Credit Units: 03

Course Objectives:

The objectives of this course are to acquaint the students with the mathematics involved in basics of computers system, its components, data representation inside computer and to get them familiar with various important features of a procedure-oriented programming language i.e. C.

Course Contents:

Module-I: Data representation: number systems, character representation codes, binary, octal, hexadecimal and their inter conversions, binary arithmetic, floating point arithmetic, header files, static variables, register variables, declaration of variable names, data types and sizes, constants, format specifier, storage class, scope.

Module-II: Arithmetic operators, relational and logical operators, type conversions, increment and decrement operators, bit-wise operators, assignment operators and expressions, conditional expressions; precedence and order of evaluation. if else, nested if.

Module-III: Loops- switch, while and for, do-while. break and continue, go to and labels, Character Input Output Arrays, Character Arrays. Multi-Dimensional Arrays, Basics of Structures, Arrays of Structures, Unions.

Module-IV: Basics of functions, functions arguments block structures, recursion, pointers, function arguments, call by value, call by reference pointers and arrays functions, pointer arrays, pointers to pointers, command line arguments, strings operation.

Examination Scheme

Components	A	CT	HA	EE
Weightage (%)	5	15	10	70

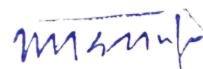
A: Attendance, CT: Class Test, HA: Home Assignment, Seminar, or Quiz, EE: End Semester Exam

References

- Rajaraman, V., Computer Programming in C" , Prentice Hall of India,1995.
- Schildt, H., C: The complete reference", Osbourne Mcgraw Hill, 4th Edition,2002.
- Kanetkar, Y., Let us C", BPB Publications, 14th Edition,2016.
- Kernighan & Ritchie, C Programming Language", The (Ansi C Version), Prentice Hall India Learning Private Limited; 2 edition(1990).



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C PROGRAMMING LAB

Course Code: MTH4106

Credit Units: 01

Software Required: Turbo C

Course Contents:

1. Some basic programs to understand the working of C language.
2. Programs involving conditional operator like if-end, elseif-end
3. Programs involving nested if-else-end
4. Programs involving multiple selections using switch statement
5. Programs involving loops like while and do while.
6. Programs involving for loops.
7. Programs involving user defined function calls.
8. Programs involving arrays and matrices
9. Programs involving strings
10. Programs involving structures
11. Programs involving Unions
12. Programs involving pointers, and solving various problems with the help of those.
13. Programs involving file handling

Examination Scheme

Internal Assessment

Components	Attnd.	Performance	Lab Record	Viva
Weightage (%)	5	10	10	5

End-Term Exam

Components	Performance	Viva
Weightage (%)	35	35

References

- Rajaraman, V., Computer Programming in C" , Prentice Hall of India,1995.
- Schildt, H., C: The complete reference", Osbourne Mcgraw Hill, 4th Edition,2002.
- Kanetkar, Y., Let us C", BPB Publications, 14th Edition,2016.
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OPERATIONS RESEARCH

Course Code: MTH4217

Credit Units: 04

Course Objectives:

The problems in optimization are the most common applications of mathematics. The main aim of this course is to present different methods of solving optimization problems in the areas of linear programming, nonlinear programming, and integer linear programming. In addition to theoretical treatments, there will be some introduction to numerical methods for optimization problems.

Course Contents:

Module-I: Review Introduction to Operation Research, Linear programming problem and its formulation, convex sets and their properties, graphical method, basic feasible solution, simplex method, big-M and two phase methods; infeasible and unbounded LPPs, alternate optima; Dual problem and duality theorems, dual simplex method and its application in post optimality analysis; Sensitivity Analysis, Balanced and unbalanced transportation problems, Vogel's approximation method for solving transportation problems; Hungarian method for solving assignment problems.

Module-II: Dynamic Programming Bellman's Principle of optimality of Dynamic Programming, Multi- stage decision problem and its solution by Dynamic Programming with finite number of stages, Solution of linear programming problems as a Dynamic Programming problem.

Module-III: Integer Linear Programming Problems: Integer Linear Programming Problems, Mixed Integer Linear Programming Problems, Cutting Plane Method, Branch and Bound method.

Module-IV: PERT and CPM: Basic idea of PERT & CPM, Difference between PERT & CPM, PERT/CPM network components and precedence, Relationship critical path analysis, Project Scheduling, Project Time Cost, Trade Off, Resource allocation.

Examination Scheme:

Components	A	CT	HA	EE
Weightage (%)	5	15	10	70

A: Attendance, CT: Class Test, HA: Home Assignment, Seminar, or Quiz, EE: End Semester Exam

References:

- Taha, H.A., Operations Research: An Introduction", MacMillan Pub Co., NY, 9th Ed. (Reprint), 2013.
- Mohan, C. and Deep, K., Optimization Techniques", New Age India Pvt. Ltd, New Delhi, 2009.
- Ravindran, A., Phillips, D.T. and Solberg, J.J., Operations Research: Principles and Practice", John Wiley and Sons, NY, 2nd Ed. (Reprint), 2012.
- Hillier, F. S., and G. J. Lieberman, Introduction to Operations Research", 2nd ed., Holden-Day, San Francisco, 1974.
- Kanthi Swarup, P.K.Gupta and Man Mohan, \Operations Research". Sultan Chand and Sons New Delhi, Fourteenth Edition-2008



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TOPOLOGY

Course Code: MTH4205

Credit Units: 04

Course Objectives:

Topology is a modern branch of geometry. It serves to lay the strong foundations of concepts for study in analysis and in geometry. It is also a prerequisite for many concepts related to Analysis. The course is designed to develop an understanding of topological ideas & techniques and their role in analysis.

Course Contents:

Module-I: Introduction: Finite, countable, uncountable sets, functions, relations, axiom of choice, Zorn's Lemma. Schroder Bernstein theorem.

Module-II: Topological Spaces and Continuous Functions: Open sets, closed sets, basis for a topology, sub basis, T1 and T2 spaces, order topology, product topology, subspace topology, limit point, continuous function, general product topology, metric space and its topology, quotient topology.

Module-III: Connectedness and Compactness: Connected spaces, connected subspaces, local connectedness, compact subspace, limit point compactness, local compactness.

Module-IV: Countability and Separation Axioms: Countability axioms, separation axioms, regular and normal spaces, Urysohn's Lemma, Urysohn Metrization Theorem, Tietze Extension Theorem, Tychonoff Theorem.

Examination Scheme:

Components	A	CT	HA	EE
Weightage (%)	5	15	10	70

A: Attendance, CT: Class Test, HA: Home Assignment, Seminar, or Quiz, EE: End Semester Exam

References

- Munkres, J.R., Topology", 2nd Edition, PHI, 2010.
- Simmons, G.F., Introduction to Topology and Modern Analysis", Krieger Publishing Company, 2003.
- Mansfield, M.J., Introduction to Topology", East-West Student Edition, 1973.
- Min, Y., Introduction to Topology: Theory & Applications", Higher Education Press, 2010.
- Gamelin, T.W. and Greene, R.E., "Introduction to Topology", 2nd Ed., Dover Publications, 1999.



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STATISTICS BASED LAB-I

Course Code: MTH4206

Credit Units:01

MTH4206		L	T	P	C
Version		0	0	2	1
Pre-requisites/Exposure	Basics knowledge of Statistics				
Co-requisites					

Course Objectives:

The objective of this Lab work is to acquaint students to use statistical software in computation and interpretation of various statistical results.

1. To plot the histogram, pi-chart, scatter plot and bar-chart etc.
2. To find the measure of arithmetic mean, geometric mean, and harmonic mean of the given data.
3. To find the measure of median and mode of the given data.
4. To find the measure of Range, Quartile deviation, Mean deviation.
5. To find the measure of standard deviation and variance of the given data.
6. To measurement of moments.
7. To measurement Skewness & Kurtosis.
8. To check the linear relationship between two variables using correlation coefficient.
9. To check the non-linear relationship between two variables using correlation coefficient.
10. To find the lines of best fit used for predictions by using the regression analysis.

Examination Scheme:

Internal Assessment

Components	Attn.	Performance	Lab Record	Viva
Weightage (%)	5	10	10	5

End-Term Exam

Components	Performance	Viva
Weightage (%)	35	35

References

- V. K. Rohatgi and A. K. Md. E. Saleh, An Introduction to Probability and Statistics, 2nd Edn., Wiley, 2001.
- W. Feller, An Introduction to Probability Theory and its Applications, Vol. 1, 3rd Edn., Wiley, 1968.
- Miller, I. and Miller, M:Freunds Mathematical Statistics with Applications, 7th edition, Prentice Hall.
- Hogg, R., Mckean, J. and Craig, A.:Introduction to Mathematical Statistics, 7th edition, Pearson Education

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INTRODUCTION TO MATLAB

Course Code: MTH4215

Credit Units: 03

Course Objectives:

The objectives of the course are to familiarize the students with the main features of the MATLAB integrated design environment. Students will learn concepts related to programming in MATLAB and they will also get to the exposure to use few built-in functions to solve many practical problems.

Course Contents:

Module-I: Introduction to MATLAB and Plotting: vector and matrix generation, subscripting and the colon notation, matrix and array operations and their manipulations, introduction to some inbuilt functions. Two & three-dimensional graphics: basic plots, change in axes and annotation in a figure, multiple plots in a figure, saving and printing figures, mesh plots, surface plots and their variants.

Module-II: m-Files: scripts and user defined functions, calling functions into a script file, sub-functions, and nested functions, concept of local and global variable, few examples of in-built functions, editing, saving m-files.

Module-III: Loops and Conditional statements: Flow control using various statements and loops including For-End and While-End loops with Break commands. Conditional Statements: If-End statement, If-Else-End statement, nested If-Else-End statements.

Module-IV: Applications of MATLAB: Solving a linear system of equations including over determined and system with infinitely many solutions. Calculus of polynomials using inbuilt functions, Solving equations in one variable, Solving IVPs using inbuilt functions.

Examination Scheme:

Components	A	CT	HA	EE
Weightage (%)	5	15	10	70

A: Attendance, CT: Class Test, HA: Home Assignment, Seminar, or Quiz, EE: End Semester Exam

Reference Books:

- Applied Numerical Methods with Matlab for Engineers and Scientists by Steven Chapra, McGraw Hill, 2008.
- MATLAB: An introduction with applications: Amos Gilat, 5th Edition, Wiley India, 2014.
- Getting Started with MATLAB: A Quick Introduction for Scientists and Engineers by Rudra Pratap, Oxford University Press, 2016.



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MATLAB PROGRAMMING LAB

Course Code: MTH4216

Credit Units: 01

Course Objectives:

MATLAB is a scientific computing tool which covers almost all area of science and engineering. Students will be using MATLAB environment to solve various types of mathematical problems.

Course Contents:

Fundamentals of Linear Algebra, Numerical Analysis, Differential Equations and their application using MATLAB :

1. Generating arrays and matrices and their manipulations
2. Eigenvalues & Eigenvectors of various type of matrices
3. Using built-in functions to solve system of equations
4. Functions related to plotting 2D and 3Dplots
5. Introducing built-in functions for numerical approximations
6. Annotation of Plots
7. Writing m files including script and function files
8. Introducing notion of sub-functions and nested functions
9. Solving IVPs using ode45 and other solvers
10. Solving system of equations of IVPs

Examination Scheme

Internal Assessment

Components	Attn.	Performance	Lab Record	Viva
Weightage (%)	5	10	10	5

End-Term Exam

Components	Performance	Viva
Weightage (%)	35	35

Reference Books:

- Applied Numerical Methods with Matlab for Engineers and Scientists by Steven Chapra, McGraw Hill, 2008.
- MATLAB: An introduction with applications: Amos Gilat, 5th Edition, Wiley India, 2014.
- Getting Started with MATLAB: A Quick Introduction for Scientists and Engineers by Rudra Pratap, Oxford University Press, 2016.



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NUMERICAL ANALYSIS

Course Code: MTH4325

Credit Units: 03

Course Objectives:

The objectives of this course are to introduce some advanced numerical methods, commonly used in research to the post graduate students. Student will be introduced to numerical techniques for solving algebraic and transcendental equation, Interpolation of polynomial, Differentiation, Integration and ordinary differential equations.

Course Contents:

Module-I: Solution of Algebraic and Transcendental Equations: Bisection method, Regula-Falsi method, Iteration method, Newton Raphson method, Newton Raphson method for multiple roots, Secant method as an improvement on Newton Raphson method, and Muller's method, Graeffe's Root Square Method. Convergence and error analysis of these methods.

Module-II: Finite differences, interpolation and approximation: Finite difference operators, their properties and their interrelations, problems based on finite difference tables, Newton's forward and Newton's backward interpolation formula, various central difference formulae including Stirling's formula, Bessel's formula and Cubic -Spline interpolation. Divided differences: Operators and difference table, Newton's divided difference formula, Lagrange's interpolation formula.

Module-III: Solution of system of linear equations:

Direct methods: Cramer's rule, Matrix inverse method, Gauss elimination and Gauss-Jordan method, LU decomposition method. Iterative methods: Jacobi's method, Gauss-Seidel method and their convergence criterion. Concept of ill-conditioning, and condition number for system of equations.

Module-IV: Numerical Differentiation and Integration: Numerical differentiation using Newton's forward and backward formula, order of leading error terms. Newton-Cotes quadrature formula - derivations & comparison of Trapezoidal rule, Simpsons 1/3 and 3/8 rules. Error analysis of these methods. Numerical solution of first order differential equations: Euler's method, modified Euler's method, Predictor-Corrector Method, Runge-Kutta second order and fourth order methods, their derivations and their extension to solve system of IVPs.

Examination Scheme:

Components	A	CT	HA	EE
Weightage (%)	5	15	10	70

A: Attendance, CT: Class Test, HA: Home Assignment, Seminar, or Quiz, EE: End Semester Exam

References:

- Gerald, C. F. & Wheatly P. O., Applied Numerical Analysis", 6th Ed., Addison-Wesley Publishing, 2002.
- Fausett, L. V., Applied Numerical Analysis", Prentice Hall, 2nd Ed.2007
- Froberg, C. E., "Introduction to Numerical Analysis", 2nd Ed., Addison Wesley.,2004
- E. Scheid, Numerical Analysis", Mc Graw Hill1988.
- Jain, M.K., S.R.K. Iyengar and R.K. Jain, Numerical Methods for Scientific and Engineering Computations", New Age International, New Delhi,2003.

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NUMERICAL ANALYSIS LAB

Course Code: MTH4327

Credit Units: 01

Softwares required: Turbo C and MATLAB

Course Objective:

The objective of the course is to explain the most common numerical methods used in engineering analysis, when to use each method, and how to implement basic methods in a structured manner using MATLAB's programming language.

Course Contents:

Module-I: Roots of Transcendental Equations: Programs for Initial approximation for roots, Bisection method, Regula-Falsi method, Iterative method, Newton Raphson method, Secant method. Comparison of these methods. How to use built-in functions to find the roots of Transcendental Equations.

Module-II: System of Linear Equations: Programs for Jacobi method, Gauss-Seidal method, their comparative study using various stopping criterion. Programs for forward and back substitution, LU decomposition method, and using built in functions for system of equations.

Module-III: Programs for Numerical Differentiation, Programs for trapezoidal rule, Simpson's 1/3 and 3/8 rule and their comparison. Using built-in functions for both numerical differentiation and numerical integration.

Module-IV: Programs for solving IVPs for Euler's method and its variants. How to use built in functions for solving IVPs and how to extend the code for solving system of IVPs.

Examination Scheme

Internal Assessment

Components	Attn.	Performance	Lab Record	Viva
Weightage (%)	5	10	10	5

End-Term Exam

Components	Performance	Viva
Weightage (%)	35	35

Reference Books:

- Applied Numerical Methods with Matlab for Engineers and Scientists by Steven Chapra, McGraw Hill.
- MATLAB: An introduction with applications: Amos Gilat, 5th Edition, WileyIndia.
- Getting Started with MATLAB: A Quick Introduction for Scientists and Engineers by Rudra Pratap, Oxford University Press.



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Summer Workshop

Course Code: MTH4335

Credit Units: 03

Workshop will be conducted for one-week (six hours per day). The content of the course will be intended to give an exposure to

- Technical softwares /tools related to scientific computing and statistics.
- Report writing, Presentation etc.

The students will have to appear for class-test(s) during the workshop.

- During summer break, students have to work on the assignment(s) given to them.
- The assignment(s) will have to be submitted within two weeks of commencement of new semester followed by viva-voce.
- The evaluation will be done by the committee comprising of faculty members who served as resource persons in the workshop.

Evaluation scheme:

Components	Attendance	Assignment(s)	Class test(s)	Viva-voce
Weightage (%)	5	35	30	30



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NUMBER THEORY & CRYPTOGRAPHY

Course Code: MTH4329

Credit Units: 04

Course Objectives:

The course provides an introduction to basic number theory, where the focus is on computational aspects with applications in cryptography. Moreover, the course provides an introduction to some basic cryptographic techniques to understand fundamental mathematical concepts underlying digital signatures, public key encryption, and key establishment protocols.

Course Contents:

Module-I: Euclid's division lemma, Divisibility, The Linear Diophantine Equation, the fundamental theorem of Arithmetic, Fermat's Little theorem, Wilson's Theorem, Generating functions. Congruences, Residue Systems, The Theorems of Fermat and Wilson Revisited, The Chinese Remainder Theorem.

Module-II: Combinatorial Study of $\phi(n)$, Formulae for $d(n)$ and $\sigma(n)$, Multiplicative Arithmetic Functions, The Mobius Inversion Formula, Primitive Roots Modulo p , Tchebychev's Theorem. Euler's Criterion, the Legendre Symbol, The Quadratic Reciprocity Law, Consecutive Residues and Non-residues.

Module-III: Cryptographic Hash Functions Hash functions and data integrity, security of Hash functions, The random oracle model, algorithms in random oracle model, comparison of security criteria, Compression functions from encryption functions, Hash functions from compression functions.

Module-IV: Public Key Cryptography and Discrete Logarithms Finite fields, construction, The Elgamal crypto system, RSA public key crypto system, algorithms for discrete logarithm problems, Shanks Baby step Giant step algorithms, The pollard algorithm, factoring algorithms, attacks on RSA, security of Elgamal system, The Deffe Hellman key exchange problems, Digital signature algorithms using RSA, secrete key sharing principles, The Shamir Secret sharing protocol.

Examination Scheme:

Components	A	CT	HA	EE
Weightage (%)	5	15	10	70

A: Attendance, CT: Class Test, HA: Home Assignment, Seminar, or Quiz, EE: End Semester Exam

References

- Niven, I., Zuckerman, S.H., Montgomery, L.H., An Introduction to the Theory of Numbers, John Wiley and Sons. New York,1991
- Dan Flath, Introduction to Number Theory, Wiley,1988)
- K. Ireland, M. Rosen. A Classical Introduction to Modern Number Theory, Springer Verlage,1990.
- Douglas R. S. Cryptography Theory and Practice, Third edition, Chaman & Hall/CRC,2005
- Johannes Buchmann. Introduction to Cryptography, Second edition, Springer,2004.
- N. Koblitz. Course in Number Theory and Cryptography, Springer,1994.
- A. J. Menezes, P.C. Van Oorschot and S.A. Vanstone. Handbook of Applied Cryptography, CRC Press, Boca Raton,1997.

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FLUID DYNAMICS

Course Code: MTH4409

Credit Units: 04

Course Objectives:

Almost everything on this planet is either in a state of fluid or moves within or near a fluid. Fluids have the ability to transport matter and its properties as well as transmit force. The main objectives of the course are to develop fundamental knowledge and understanding of the mechanics of fluid both at rest and in motion.

Course Contents:

Module 1: Introduction

Definition: Fluid, Fluid Dynamics, Stress (shear stress and normal stress), strain, viscosity (dynamic and kinematic). Variation of viscosity with temperature for liquids and gases. Continuum hypothesis, No-slip boundary condition, application areas of fluid dynamics.

Kinematics: Different types of forces: Viscous and inertial forces

Some common non-dimensional parameters and their physical significance: Reynolds number, Froude number and Mach number. (12 lectures)

Module 2: Newton's law of viscosity, Classification of fluids: Newtonian and Non-Newtonian fluid, compressible and incompressible fluid. Inviscid, ideal and real fluid. Different types of flow: Uniform and non-uniform, steady and unsteady, rotational and irrotational flow, Laminar, Turbulent and Transient flow. Flow description: Eulerian and Lagrangian description of fluid motion. Fluid element trajectories: Streamline, pathline, streakline, timeline. (12 lectures)

Module 3: Introduction to Tensors: Definition, rank of tensor, Einstein notation or indicial notation, free and dummy indices. Vector operations and calculus operations using index notation (Einstein notation).

Cauchy stress tensor, deviatoric stress tensor, volumetric stress tensor.

Deformation of fluid-elements: derivation of rate of translation vector, rate of rotation, vorticity vector, linear strain rate, strain rate tensor, deformation tensor. (12 lectures)

Module 4: Bernoulli's equation - assumptions and applications.

Differential Analysis: Differential equations of mass and momentum for incompressible flows: inviscid - Euler equation and viscous flows - Navier-Stokes equations, concept of fluid rotation, vorticity, stream function, Exact solutions of Navier-Stokes equation for Couette Flow and Poiseuille flow. (12 lectures)

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	15	5	5	70

A-Attendance; CT-Class Test; S/V/Q-Seminar/Quiz/Viva; HA-Home Assignment; EE-End Semester Examination

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Text Books:

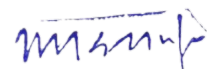
- R. K. Rathy, An Introduction of Fluid Dynamics, Oxford and IBH Publishing company, New Delhi, 1976.
- Y. A. Cengel, J.M. Cimbala , Fluid Mechanics: Fundamentals and Applications, McGraw-Hill, 2006.

Reference Books:

- G. K. Betchelor, An Introduction of Fluid Mechanics, Oxford University Books, New Delhi, 1994.
- F. Charlton, Text Book of Fluid Dynamics, C.B.S. Publishers, Delhi. 1985



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PROJECT

Course Code: MTH4437

Credit Units: 06

GUIDELINES FOR PROJECT REPORT: The Project Report is the final research report that the student prepares on the project assigned to him/her. The following components should be included in the project report:

- 1) **Title or Cover Page:** The title page should contain Project Title; Student's Name; Programme; Year and Semester and Name of the Faculty Guide.
- 2) **Acknowledgement(s):** Acknowledgment to any advisory or financial assistance received in the course of work may be given. It is incomplete without student's signature.
- 3) **Abstract:** A good "Abstract" should be straight to the point; not too descriptive but fully informative. First paragraph should state what was accomplished with regard to the objectives. The abstract does not have to be an entire summary of the project, but rather a concise summary of the scope and results of the project.
- 4) **Table of Contents:** Titles and subtitles are to correspond exactly with those in the text.
- 5) **Introduction:** Here a brief introduction to the problem that is central to the project and an outline of the structure of the rest of the report should be provided. The introduction should aim to catch the imagination of the reader, so excessive details should be avoided.
- 6) **Results and Discussion:** Present results, discuss and compare these with those from other workers, etc. In writing this section, emphasis should be laid on what has been performed and achieved in the course of the work, rather than discuss in detail what is readily available in text books.
- 7) **Conclusion(s) & Recommendations:** A conclusion should be the final section in which the outcome of the work is mentioned briefly. Check that your work answers the following questions: Did the research project meet its aims (check back to introduction for stated aims)? What are the main findings of the research? Are there any recommendations?
- 8) **References:** References should include papers, books etc. referred to in the body of the report. These should be written in the alphabetical order of the author's surname. The titles of journals preferably should not be abbreviated; if they are, abbreviations must comply with an internationally recognised system

The Layout Guidelines for Project Report:

- 1) A4 size Paper
- 2) Font: Arial (10 points) or Times New Roman (12 points)
- 3) Line spacing: 1.5
- 4) Top and bottom margins: 1 inch/ 2.5 cm; left and right margins: 1.25 inches/ 3cm

Assessment Scheme: Continuous Evaluation: 40% (Based on punctuality, regularity of work, adherence to plan and methodology, refinements/ mid-course corrections etc. as reflected in the Project File.)

Final Evaluation: 60% (Based on the Documentation in the file, Final report layout, analysis and results, achievement of objectives, presentation/ viva)

It is recommended that the Final evaluation should be carried out by a panel of evaluators.

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CLASSICAL MECHANICS

Course Code: MTH4410

Credit Units: 04

Course Objectives:

A detailed exposition of classical mechanics for the student, opting for physics is so vitally important for a clear understanding of recent intricate theories of quantum mechanics, modern physics and research for they are built on a well developed and conceptualized foundation.

Course Contents:

Module-I: Lagrangian Formulation Mechanics of a system of particles, constraints, D'Alembert's principle, Variational calculus and its applications, Lagrangian equations, conservation theorems and symmetry properties, applications of Lagrangian formulation.

Module-II: Central Force Problem Reduction to one body problem, equation of motion and first integral, one dimensional problem and classification of orbits, Differential equation for the orbit, Kepler problem and planetary motion, Rutherford formula, scattering in central force field, transformation to laboratory frames.

Module-III: Rigid Body and Vibrating System Euler angles, tensor of inertia, kinetic energy of a rotating body, symmetric top and applications. Vibrating string, solution wave equation, normal vibrations, dispersion, coupled vibrating system. Non linear Dynamics, phase trajectories.

Module-IV: Hamiltonian Formulation Hamiltonian equation of motion, Hamilton's equation in different co-ordinate systems example in Hamiltonian dynamics, two dimensional harmonic oscillator the equations of canonical transformations, cyclic coordinates, phase space and Liouville's theorem, Poisson bracket. Lagrange brackets, general Poisson bracket under canonical transformation.

Examination Scheme

Components	A	CT	HA	EE
Weightage (%)	5	15	10	70

A: Attendance, CT: Class Test, HA: Home Assignment, Seminar, or Quiz, EE: End Semester Exam

References:

- H. Goldstein, Classical Mechanics, 2nd edition, Narosa Publishing House(1994).
- W. Greiner, Classical Mechanics, Springer-Verlag(2003).
- Introduction to classical mechanics R.G.Takwall and P.S.Puranik, Tata McGraw Hill, 1980, New Delhi.
- Classical mechanics N.C.Rana and P.S.Joag, Tata McGraw Hill, 1991, New Delhi.



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BIOMECHANICS

Course Code: MTH4412

Credit Units: 04

Course Objectives:

The objectives of this course are to study the mechanics of flow of blood in human beings and movement of insects, spread of viruses etc by using mathematical tools like ordinary differential equation, partial differential equation, Calculus of variation, Laplace Transforms etc.

Course Contents:

Module-I: Mathematical Aspects of population biology; Some fundamental aspects, Models and their mathematical formulations, Single species models, Stability and classification of equilibrium points, Relationship between eigen values and critical points.

Module-II: Introduction to Biological Fluid Mechanics: Basic concepts of Fluid Dynamics, Fluid Parameters, Viscosity, Navier- Stokes Equations of viscous fluid motion, Poiseuille's flow, Model for blood flow, Properties of blood, Pulsatile Flow of blood sedimentation.

Module-III: Modeling through partial differential equations: simple models, mass balance equations, Variational principles, probability generating function, traffic flow problems, initial & boundary conditions.

Module-IV: Study of alcohol in the blood stream; Volume of blood in human body; Stochastic epidemic model; Genetic graphs; Food webs: Linear programming in forest management; Mathematics in fisheries; Case studies on anchovy wipe out.

Examination Scheme

Components	A	CT	HA	EE
Weightage (%)	5	15	10	70

A: Attendance, CT: Class Test, HA: Home Assignment, Seminar, or Quiz, EE: End Semester Exam

References

- Brauer, F., Driessche, P. V. D. and Wu, J., Mathematical Epidemiology", Springer,2008.
- Murray, J. D., Mathematical Biology", Springer,1993.
- Kapur, J.N., Mathematical modeling", New Age International Publishers, New Delhi,2015.
- Fung, Y. C., Biomechanics", Springer-Verlag,1990.
- Keshet, L. E., Mathematical Models in Biology", SIAM,1988.



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STOCHASTIC PROCESSES

Course Code: MTH4414

Credit Units: 04

Course Objectives:

To introduce the basic concepts of stochastic processes.

Course Contents:

Module-I: Poisson Process: Inter-arrival and waiting time distributions, conditional distributions of the arrival times, non-homogeneous Poisson process, compound Poisson random variables and Poisson processes, conditional Poisson processes.

Module-II: Markov Chains: Introduction and examples, Chapman-Kolmogorov equations and classification of states, limit theorems, transitions among classes, the Gamblers ruin problem, mean time in transient states, branching processes, applications of Markov chain, time reversible Markov chains, semi Markov processes.

Module-III: Continuous-Time Markov Chains: Introduction, continuous time Markov chains, birth and death processes, The Kolmogorov differential equations, limiting probabilities, time reversibility, applications of reversed chain to queueing theory.

Module-IV: Brownian Motion and other Markov Processes: Introduction, hitting time, maximum variable, Arc sine laws, variations on Brownian motion, Brownian motion with drift, backward and forward diffusion equations.

Examination Scheme

Components	A	CT	HA	EE
Weightage (%)	5	15	10	70

A: Attendance, CT: Class Test, HA: Home Assignment, Seminar, or Quiz, EE: End Semester Exam

References

- Ross, S. M., "Stochastic Processes" Wiley India Pvt. Ltd., 2nd Ed. 2008.
- Brzezniak, Z. and Zastawniak, T., "Basic Stochastic Processes: A Course through Exercises", Springer, 1992.
- Medhi, J., "Stochastic Processes", New Age Science, 2009.
- Resnick, S.I., "Adventures in Stochastic Processes", Birkhauser, 1999.
- Hoel, P.G. and Stone, C.J., "Introduction to Stochastic Processes", Waveland Press, 1986



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STATISTICAL INFERENCE

Course Code: MTH4415

Credit Units: 04

Course Objectives:

To introduce the concepts of statistical inference.

Course Contents:

Module-I: Point estimation. Characteristics of a good estimator: Unbiasedness, consistency, sufficiency and efficiency. Method of maximum likelihood and properties of maximum likelihood estimators (without proof). Method of minimum Chi-square. Method of Least squares and method of moments for estimation of parameters. Problems and examples.

Module-II: Sufficient Statistics, Cramer-Rao inequality and its use in finding MVU estimators. Statistical Hypothesis (simple and composite). Testing of hypothesis. Type I and Type II errors, significance level, p-values, power of a test. Definitions of Most Powerful (MP), Uniformly Most Powerful (UMP) and Uniformly Most Powerful Unbiased (UMPU) tests.

Module-III: Neyman-Pearsons lemma and its applications for finding most powerful tests for simple hypothesis against simple alternative. Tests based on t, F and X^2 distributions.

Module-IV: Likelihood ratio tests and their reduction to standard tests. Large sample tests. Interval estimation, Pivotal quantity and its use in finding confidence intervals, concept of best confidence intervals.

Examination Scheme:

Components	A	CT	HA	EE
Weightage (%)	5	15	10	70

A: Attendance, CT: Class Test, HA: Home Assignment, Seminar, or Quiz, EE: End Semester Exam

References

- Hogg & Craig, Introduction to Mathematical Statistics", Pearson Education, 2005.
- Miller, I. and Miller, M., Friends Mathematical Statistics with Applications", Prentice Hall PTR, 7th edition, 2006.
- Lehman, E.L., Testing of Statistical Hypothesis", Wiley Eastern Ltd, 1959
- G. Casella, R. L. Berger, "Statistical Inference", Duxbury Press, 2002.
- Rohatgi, V.K., Statistical Inference", Dover Publications, 2011.



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NUMERICAL SOLUTIONS TO ODE AND PDES

Course Code: MTH4416

Credit Units: 04

Course Objectives:

The course covers few classical and contemporary methods for solving initial and boundary value problems. Finite difference operators and their application to solve various types of PDEs shall be introduced in the course.

Course Contents:

Module-I: Iterative solvers for nonlinear equations and system of linear equations: Iterative method and Newton's method for system of nonlinear equations; Iterative methods to solve system of linear equations including Gauss-Seidel and Jacobi's method with pivoting; Concept of norms and condition number; Application of these methods for test problems using MATLAB codes.

Module-II: Initial value Problems Single-step methods: General definitions and Lipschitz condition, Derivations and stability analysis for Taylor series method, Euler's method and its variants, Runge-Kutta second order and fourth order methods; Implementation of these methods for various test problems using MATLAB.

Module-III: Initial value Problems Multi-step methods: General definitions and derivations of Adams Bashforth, Adams Moulton methods, Predictor-corrector method; stability analysis of these methods and application of these methods for some test problems using MATLAB.

Module-IV: Introduction to Finite difference methods General concepts of truncation error and stability for a finite difference scheme; Numerical solution of one-dimensional heat equation, including Explicit Euler, Backward Euler, Crank-Nicolson schemes with various type of boundary and initial conditions; Laplace Equations and Poisson's equations with different type of boundary and initial conditions.

Examination Scheme

Components	A	CT	HA	EE
Weightage (%)	5	15	10	70

A: Attendance, CT: Class Test, HA: Home Assignment, Seminar, or Quiz, EE: End Semester Exam

Recommended Books:

- Numerical Methods in Engineering and Science by B. S. Grewal, Khanna Publishers, 2014
- Numerical Methods for Scientific and Engineering Computation by Jain, Iyengar, Jain, New Age International Publishers, 1996
- Elements of Numerical Analysis by Radhey S Gupta, Macmillan India Ltd, 2008.



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MATERIALS SCIENCE & TECHNOLOGY

Programme Structure-2019

Course Code	Course Title	Lecture (L) Hours /Week	Tutorial (T) Hours /Week	Practical (P) Hours/Week	Total Credits
PHY2151	Fundamentals of Materials Science	3	-	-	3
PHY2251	Classification & Selection of Materials	3	-	-	3
PHY2351	Properties of Materials	3	-	-	3
PHY2451	Manufacturing Processes for Materials	3	-	-	3
PHY2551	Materials Testing & Characterization	3	-	-	3
PHY2651	Materials at Nanoscale	3	-	-	3
	TOTAL				18



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MATERIALS SCIENCE & TECHNOLOGY

Syllabus - Semester First

FUNDAMENTALS OF MATERIALS SCIENCE

Course Code: PHY2151

Credit Units: 03

Course Objective:

The objective of this course is to introduce the students with the basics of the materials science and physical phenomenon.

Course Contents:

Module-I: Basics of Crystal Structure

Space lattice and unit cells, Crystal system, Symmetry operation, Structures of common metallic and ceramic materials, Packing fraction, coordination number, Crystallographic points, directions and planes, Linear and planar densities, Structure determination using X-ray diffraction and Braggs law, single crystal and polycrystalline materials, non-crystalline materials and glass transition temperature,

Module-II: Bonding in Solids and Imperfections

Forces between Atoms: Mechanism of Bond Formation and Bond Energy, Primary bonding in solids viz. ionic, covalent and metallic bonds, Secondary bonding, Perfect and imperfect crystal, Point defects in metals and ceramics, Frenkel and Schottky defects, Color centres, Dislocations: edge and screw dislocation, Interfacial defects, Volume defects,

Module-III: Diffusion and Alloy Systems

Diffusion and its types, Diffusion mechanisms, Diffusion Coefficient: Fick's Laws of Diffusion, Factors affecting diffusion, Applications of diffusion, Alloy systems, Solid solutions: Substitutional and Interstitial, The families of engineering alloys, Hume-Rothery's Rules, Intermediate solid solutions.


Module-IV: Phase diagrams and phase transformation

Phase, Phase equilibrium, Phase rule, Unary and binary phase diagrams, Interpretation of phase diagrams, Phase diagrams of some important metals and ceramics, microstructure changes during cooling, lever rule, invariant reactions, iron-iron carbide phase diagram. Phase transformation, Nucleation and growth of phases, Introduction to TTT curves, heat treatment processes

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Exam; A: Attendance


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Text and references:

- Fundamentals of Materials Science and Engineering by W Callister, John Willey and Sons
- Materials Science by S. L. Kakani, New Age International
- Materials Science and Engineering by Raghvan, PHI
- Ceramic Materials by C Barry Carter, Springer.
- Materials Science and Engineering by W F Smith, McGraw Hill



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Syllabus - Semester Second

CLASSIFICATION & SELECTION OF MATERIALS

Course Code: PHY2251

Credit Units: 03

Course Objective:

The objective of the course is to introduce and familiarize the students with the different classes of engineering and advanced materials to the students.

Course Contents:

Module-I: Metals and Alloys

Metals, Alloys (ferrous and non-ferrous), types of steel, cast iron, High temperature steels, properties and applications.

Aluminum and its alloys- physical, chemical and mechanical properties, magnesium, titanium alloys - microstructural features, properties and applications.

Copper and its alloys: classification, physical, chemical and mechanical properties; lead, tin, zinc, silver, gold alloys - microstructural features - properties and applications.

Module-II: Ceramics and glasses

Ceramics: bonding, crystal structure and defects; structure of silicates; polymorphic transformations.

Non crystalline materials - structure, requirement for glass formation, Zachariasen rules, viscosity based transition points, devitrification; glass forming methods; Unary; binary and ternary systems.

Module-III: Composites and Polymers

Composites: Introduction, classification, bonding and failure criteria. Reinforcing materials, different processing methods, novel applications.

Polymers: Introduction, comparison with metals and ceramics - classification, Polymerization, molecular weight determination, Properties, processing and applications.

Module-IV: Advanced materials

Biomaterials: Introduction, need for biomaterials; Property requirements; Metallic, ceramic and polymeric implants, composites as biomaterials; applications.

Superalloys, Iron, nickel and cobalt based superalloys, Shape memory alloys, low temperature materials.

Nano materials – Concept, scale /dimensional aspects, materials and coatings for wear resistance.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Exam; A: Attendance



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Text and references

- Avner, S. H., "Introduction to Physical Metallurgy", second edition, McGraw Hill, 1985.
- Raghavan, V., "Physical Metallurgy", Prentice Hall of India, 1985.
- Kingery W. D., Bowen, H. K., Uhlhmen D. R., 'Introduction to Ceramics', 2nd Edition, John Wiley, 1976.
- Chiang Y.M., Birnie D. P., Kingery W.D., Physical Ceramics: Principles for Ceramic Science and Engineering, John Wiley, 1997.
- Billmeyer F, 'Textbook of Polymer Science', Wiley Interscience, 1994
- Hench L. Larry, and Jones J., (Editors), Biomaterials, Artificial organs and Tissue Engineering, Woodhead Publishing Limited, 2005.



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Syllabus - Semester Third

PROPERTIES OF MATERIALS

Course Code: PHY2351

Credit Units: 03

Course Objective:

The objective of the course is to study the properties of the materials to be used in the different applications and to introduce the students to the basics of the structure property correlation in the materials

Course Contents:

Module-I: Mechanical behavior

Concept of stress and strain, tensile strength, compressive strength, yield point phenomenon, Elastic behavior of materials, elastic modulus, Anelastic and Viscoelastic behaviour, strengthening mechanism, work hardening, solid solution hardening, precipitation hardening, hardness, Failure mechanisms: fracture, creep and fatigue.

Module-II: Electrical and dielectric properties

Electricity conductivity, density of states, Fermi energy, Band theory of solids, metals, Semiconductors, Insulators, Semiconductors: Intrinsic and Extrinsic semiconductors, Factors affecting carrier mobility, hall-effect, carrier concentration of semiconductors

Dielectric Behavior: Capacitance, Types of Polarization, Frequency Dependence of the Dielectric Constant, Dielectric Strength, Ferroelectricity, Piezoelectricity, pyro-electricity Applications

Module-III: Magnetic and Optical properties

Introduction, Dia, Para Ferro, Antiferro and Ferrimagnetic materials. Effect of temperature on magnetic behavior, Domains and hysteresis, Soft and Hard magnetic materials. Application.

Optical properties: Light Interactions with Solids, Atomic and Electronic, Interactions, Optical properties of nonmetals, Opacity and translucency in insulators, Luminescence, LEDs, lasers, Light propagation in optical fibers

Module-IV: Thermal Properties and corrosion resistance

Introduction, Heat capacity, thermal expansion, Materials of Importance: Invar and Other Low-Expansion Alloys, Thermal Conductivity, Thermal Stresses

Introduction, Corrosion rates, Passivity, Environmental effects, Cause and Types of corrosion, Corrosion of ceramics and polymers, Corrosion Prevention.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Exam; A: attendance

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Text and references:

- V. Raghavan, Introduction to Materials Science and Engineering; PHI, Delhi, 2005.
- L. H. Van Vlack, Elements of Material Science and Engineering; Thomas Press, India, 1998.
- W.F. Smith, Principles of Materials Science and Engineering: An Introduction; Tata Mc-Graw Hill, 2008.
- W. D. Callister, Materials science and engineering, An introduction, John Wiley and sons 2014.



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Syllabus - Semester Fourth

MANUFACTURING PROCESSES FOR MATERIALS

Course Code: PHY2451

Credit Units: 03

Course Objective:

The different industrial processes used for the fabrication and preparation of the materials is introduced in this course.

Course Contents:

Module-I: Introduction to manufacturing processes

different approaches – technical and economic considerations – significance of material properties with respect to selection of manufacturing process

Module-II: Processing techniques

Conventional casting processes – advantages and limitations – melting practices – design of castings – special casting processes

Powder processing: pre-consolidation-shape forming processes; Fundamental Sintering mechanisms, various advanced sintering techniques.

Module-III: Fabrication of materials

Fabrication of materials by Rolling; forging; extrusion; drawing - sheet metal forming. Classification of rolling, extrusion, drawing, advantages and limitations of different fabrication processes.

Module-IV: Conventional material joining processes

Conventional material joining processes – concept of weldability – need for dissimilar joints- machining processes – concept of machinability – material examples – developments in machining processes

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Exam; A: Attendance

Text and references

- Rao, P.N, 'Manufacturing Technology', Tata McGraw Hill, 1996.
- Kalpakjian, S, 'Manufacturing Engineering and Technology', 3rd Edition, Addison-Wesley, 1995.
- Crawford R.J., "Plastics Engineering", Pergamon Press, 2nd Edition, 1987.
- M.N. Rahaman, Ceramic Processing and Sintering, 2nd ed., CRC press
- F.C. Campbell, Elements of Metallurgy and Engineering Alloys, ASM International, 2008
- J. Beddoes, M.J. Bibby, Principles of Metal Manufacturing Processes, Elsevier, 2003.


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Syllabus - Semester Fifth

MATERIALS TESTING & CHARACTERIZATION

Course Code: PHY2551

Credit Units: 03

Course Objective:

The objective of the course is to introduce different materials testing and characterization techniques to the students.

Course Contents:

Module-I: Introduction and Spectroscopic methods

Introduction: Comparison of major techniques, Advantages and disadvantages; Spectroscopic methods: Atomic absorption spectrometry, Atomic fluorescence spectrometry, UV-Visible spectroscopy; Raman spectroscopy, Fourier transform infrared spectroscopy, XPS, UPS, Auger electron spectroscopy.

Module-II: X-ray techniques and Optical Microscopy

X-ray techniques: XRD, X-ray fluorescence spectroscopy, Wavelength dispersive spectroscopy (WDS); Energy dispersive spectroscopy (EDS),
Optical Microscopy: Image formation, Resolution, Aberrations, Imaging modes, Specimen preparation, Confocal microscopy

Module-III: Electron microscopy and Thermal analysis

Electron microscopy: Scanning electron microscopy; Transmission electron microscopy, Electron diffraction, Scanning tunneling microscope, Atomic force microscope
Thermal analysis: Thermo gravimetric analysis, Differential thermal analysis, Differential scanning calorimetry, Dynamic mechanical analysis, Thermo-mechanical analysis

Module-IV: Electrical, magnetic and non-destructive testing

Electrical and magnetic properties: Two probe and four probe methods for electrical characterization, Vibrating sample magnetometer (VSM),
Non-destructive testing: Radiography, Ultrasonic, Acoustic emission, Thermography, Holography, Basic principles, Applications in airframe and rock.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Exam; A: Attendance.



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Text and references:

- S. Zhang, Lin Li, A. Kumar, Materials Characterization Techniques, CRC press, 2008.
- Y. Leng, Materials Characterization: Introduction to Microscopic and Spectroscopic Methods, John Wiley & Sons (Asia), 2008.
- D.A. Skoog, F.J. Holler, S. R. Crouch, Instrumental Analysis, Cengage Learning, 2007.
- W. Kemp, Organic Spectroscopy, 3rded., Pagrave, 2007.
- W. W. Wendlandt, Thermal Methods of Analysis, John Wiley, 1974.
- B. Raj, T. Jayakumar, M. Thavasimuthu, Practical Non-Destructive Testing, 2nded., Narosa Publishing House, 2002.



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Syllabus - Semester Sixth

MATERIALS AT NANOSCALE

Course Code: PHY2651

Credit Units: 03

Course Objective:

The main objective of the course is familiarize the students to the exciting area of the nanotechnology and preparation, characterization of change in the materials properties at the nanoscale.

Course Contents:

Module-I: Introduction to Nano world:

Introduction to Nanostructures: Carbon Nanotubes (CNT), Graphenes, Fullerenes, Nano Peapods, Quantum Dots and Semiconductor Nanoparticles Metal-based Nanostructures (Iron Oxide Nanoparticles) Nanowires, Polymer based nanostructures including dendrimers, Introduction to metal based nanostructures, Protein-based Nanostructures: Nanomotors etc.

Module-II: Structure, properties and Bonding in Nanomaterials:

Chemical Bonds (types and strength) Intermolecular Forces Molecular and Crystalline Structures, Hierarchical Structures, Bulk to Surface transition, surface reconstruction, Mechanical, Electronic, Optical, Magnetic and Thermal properties.

Module-III: Synthesis & Methods of preparation of nanomaterials:

Bottom -up Synthesis, Top-down Approach: Precipitation, Mechanical Milling, Colloidal routes, Self-assembly, Vapour phase deposition, MOCVD Sputtering, Evaporation, Bio-inspired synthesis, Nanocomposite fabrication, Nanolithography, Molecular Beam Epitaxy, Atomic Layer Epitaxy, MOMBE etc.

Module-IV: Applications

Nano-electronics, Nano optics, Nanoscale chemical-and bio-sensing Biological/biomedical applications, Photovoltaic, fuel cells, batteries and energy-related applications, High strength nanocomposites, Nanoenergetic materials

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Exam; A: Attendance

Text and references:

- B.S. Murty, P. Shankar, Baldev Raj, B.B. Rath, James Murday, textbook of Nanoscience& Nanotechnology (Orient Blackswan Pvt. Ltd.)
- Chris Binns, Introduction to Nanoscience& Nanotechnology (Wiley).
- B.K. Parthasarathy, Nanoscience& Nanotechnology (Isha Books).
- Nanotechnology: Importance and Applications by M.H. Fulekar, IK International 2010.

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PHARMACEUTICALS

Programme Structure-2022

Course Code	Course Title	Lectures (L) Hours per week	Tutorial (T) Hours per week	Practical (P) Hours per week	Total Credits (18)
CHY2152	Cosmetic Formulation	2	1	-	3
CHY2252	Industrial Management & Safety Process	2	1	-	3
CHY2352	Drug Design	2	1	-	3
CHY2452	Application of Nanotechnology in Medicine	2	1	-	3
CHY2552	Intellectual Property Rights & Quality Assurance (THEORY)	2	1	-	3
CHY2652	Pharmaceutical & Cosmetic Sciences Lab	-	-	6	3
	TOTAL				18



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PHARMACEUTICALS

Syllabus - Semester First

COSMETIC FORMULATION

Course Code: CHY2152

Credit Units: 03

Course Objective:

This course is intended to provide a comprehensive survey of ingredients fundamental to the cosmetic industry. The course will emphasize current trends in the selection of cosmetic ingredients. The chemistry and technology of cosmetic raw materials will be related to their behavioral properties as utilized in the construction of stable functional systems. In this way, it is intended to generate a better understanding of the contributions of ingredients to the performance of finished product formulations. Emphasis will be placed on recognizing and dealing with problem areas associated with the use of various ingredients. Safety considerations and other pertinent matters which can influence ingredient selection will be included in these discussions.

Course Content:

Module I:

Classification of raw materials and raw materials used in the cosmetic industry for the manufacture of finished products. Method of sampling, Indian Standard specification laid down for sampling and testing of various cosmetics in finished form by the bureau of Indian standards. Factors affecting stability of a formulation, ICH guidelines, Methods of stabilizations and Methods of stability testing. Concept of development of stability indicating analytical methods.

Module II:

Determination of Physical and chemical constants such as extractive values, moisture content, alcohol content, volatile oil content, ash values, bitterness values, foreign matters, and physical constants applicable to the lipid containing drugs. Microbial counts, bioburden and Pharmacopoeial microbial assays.

Module III:

Brief introduction of the following cosmetic preparation and a detailed study on their quality control: Shampoo, Tooth paste, skin powder, skin creams, hair creams, nail polish, after shave lotion, bath and toiletries, lipstick and hair dyes, perfumes, depilatories.

Module IV:

Packaging of cosmetics –Filling of solids, semisolids & liquids. Materials used for cosmetic packaging Rules & regulations and legal provisions for packaging & labeling.

Examination Scheme:

Components	CT	HA	S/V/Q	ATTD	EE
Weightage(%)	10	7	8	5	70

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CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, ATTD: Attendance EE: End Semester Examination

Text & References:

- Comprehensive Pharmacy Review 5th Edition by Leon Shargel, Alan H. Mutnick, Paul F. Souney, Larry N. Sawnsen – 2004.
- Applied Biopharmaceutics and Pharmacokinetics, 4th Edition by Leon Shargel / Andrew B.C., Yu – 1999.
- A. H. Beckett and J. B. Stenlake Practical Pharmaceutical Chemistry, Part I and Part II, 4th Edition.
- G. H. Jeffery, J. Basset, J. Mendham, R. C. Denny (Rev. by) Vogels Text Book of Quantitative Chemical Analysis, 5th Edition 1989, ELBS.
- The Controller of Publications; New Delhi, Govt. of India, Indian Pharmacopoeia, Vol. I and Vol. II - 1996.
- J. B. Wilkinson and R. J. Moore :Herry'sCosmeticology; Longman Scientific and Technical Publishers, Singapore.
- P.D. Sethi; Quantitative Analysis of Drugs in Pharmaceutical Formulations, 3rd Edition - 1997,
- ICH guideline for impurity determination and stability studies.
- Practical HPLC method development by Lloyd R. Snyder, Joseph J. Kirkland, Joseph I. Glajch, John Wiley and Sons 2nd Edition – 1997.



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Syllabus - Semester Second

INDUSTRIAL MANAGEMENT AND SAFETY PROCESSES

Course Code: CHY2252

Credit Units: 03

Course Objective:

The curriculum is developed to help the students understand the basic functions & responsibilities of a manager, provide him tools and techniques of managing different activities of the business concerned and to understand & interpret the provisions of some of the important provisions related to patent, trademark etc. It also aims at minimizing the chances of risks, injuries and accidents by implementing risk management techniques and safety management operations, monitoring the operating systems and bolstering the safety measures of an industry in general. With the rise of natural disasters in and around our world, the importance of the safety of human capital, protection of the environment and conservation of existing assets of an industry is increasing, leading to growing relevance of these skills.

Course Contents:

Module I:

Basic Concepts of Management Function of Management

Planning, Organizing, Directing, Control, Decision-making, Budgeting, Inventory Management (IM) & Quality Control (QC), Meaning & Importance of Inventory management, Inventory models, Cost consideration, Economic order quantity model.

Quality Management

Meaning & definition of Quality-Quality control systems-quality assurance-planning for quality- total quality management (TQM) philosophy-implementation of TQM in service and manufacturing industries-national & international standards.

Module II:

Manufacturing Management

Production planning & control, dynamics of material flow-inventory-bottlenecks and process variability, planning levels and time scales, forecasting-aggregate planning, synchronized manufacturing and theory of constraints-just in time production-shop floor performance monitoring.

Module III:

Safety in Chemical Process Industries

Safety in industries; need for development; importance safety consciousness in Indian chemical industry; safety programmes, elements of safety programme; effective realization, economic and social benefits. Industrial safety- Chemical process industries; potential hazard; chemical and physical job safety analysis; high pressure; high temperature operation; dangerous and toxic chemicals; highly radioactive materials; safe handling and operation of materials and machineries; planning and layout.

Examination Scheme:

Components	CT	HA	S/V/Q	ATTD	EE
Weightage(%)	10	7	8	5	70

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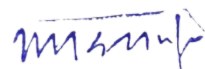
CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, ATTD: Attendance EE: End Semester Examination

Text & References:

- William Handley, "Industrial Safety ", Hand Book McGraw-Hill Book Company 2nd Edition, 1969.
- Fawatt, H.H. and Wood, W.S., "Safety and Accident Prevention in Chemical Operation", Interscience, 1965.
- Heinrich, H.W. Dan Peterson, P.E. and Nester Rood, "Industrial Accident Prevention ", McGraw-Hill Book Co., 1980.
- Blake, R.P., "Industrial Safety ", Prentice Hall Inc., New Jersey - III Edition, 1963.
- Subbaram N.R. "Handbook of Indian Patent Law and Practice", S. Viswanathan (Printers and Publishers) Pvt. Ltd., 1998.
- Eli Whitney, United States Patent Number: 72X, Cotton Gin, March 14, 1794.
- Intellectual Property Today: Volume 8, No. 5, May 2001, [www.iptoday.com].



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Syllabus - Semester Third

DRUG DESIGN

Course Code: CHY2352

Credit Units: 03

Course Objective

The Principles of Drug Design course aims to provide students with an understanding of the process of drug discovery and development from the identification of novel drug targets to the introduction of new drugs into clinical practice. It covers the basic principles of how new drugs are discovered with emphasis on lead identification, lead optimization, classification and kinetics of molecules targeting enzymes and receptors, prodrug design and applications, as well as structure-based drug design methods. Recent advances in the use of computational and combinatorial chemistry in drug design will also be presented. The course is further enhanced with invited lectures on recent developments and applications of drug design principles in the pharmaceutical industry.

Course Content:

Module I:

Introduction- Definition of drug (WHO), classification of drugs, nomenclature of drugs, stereochemical aspects of drugs, definitions of terms commonly used in the chemistry of drugs, routes of drug administration and different dosage forms and applications. Introduction to phase trials in drug development.

Module II:

Structure Activity Relationships in drug design-Structure based drug design, ligand based drug design. Some case studies e.g. development of ciprofloxacin, antidiabetics and recent cephalosporins. Target selection and lead identification, Natural product sources, Fermentation / Microbial sources, Synthetic, Introduction to Pharmacogenomics. Methods of conformational search used in pharmacophore mapping; catalyst/, etc. with practical examples, ADME databases.

Module III:

Molecular Modeling- Energy minimization, geometry optimization, conformational analysis, Approaches and problems; Bioactive vs. global minimum conformations; Mechanism based Drug Design including Quantum Mechanics Automated methods of conformational search; Molecular graphics.

Module IV:

QSAR-Electronic effects; Hammett equation, Lipophilicity effects; Hansch equation, Steric Effects; Taft Equation; Experimental and theoretical approaches for the determination of physico-chemical parameters, parameter inter-dependence; Case studies; Regression analysis, extrapolation versus interpolation, linearity versus non-linearity; Free Wilson Analysis; The importance of biological data in the correct form; 2D – QSAR; 3D-QSAR-examples CoMFA and CoMSIA.

Module V:

Molecular docking and dynamics-Rigid docking, flexible docking, manual docking; Advantages and disadvantages of flex-X, flex-S, autodock and dock softwares with successful examples; Monte Carlo simulations and molecular dynamics in performing conformational search, docking etc. De novo drug design techniques.


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Examination Scheme:

Components	CT	HA	S/V/Q	ATTD	EE
Weightage(%)	10	7	8	5	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, ATTD: Attendance EE: End Semester Examination

Suggested Reading:

- Lednicer, D., & Mitscher, L. A. (1980). The Organic Chemistry of Drug Synthesis, Volume 2 (Vol. 1). John Wiley & Sons.
- Foye, W. O. (2008). Foye's principles of medicinal chemistry. Lippincott Williams & Wilkins.
- Nogrady, T. (1988). Medicinal chemistry: a biochemical approach. Oxford University Press, USA.
- Christoffersen, R. E., Marr, J. J., & Wolff, M. E. (1989). In Burger's Medicinal Chemistry and Drug Discovery, Vol. 1, Principles and Practice.
- Gringauz, A. (1997). Introduction to medicinal chemistry: how drugs act and why. Wiley-VCH.
- Pandeya, S. N., & Dimmock, J. R. (1997). An introduction to drug design. New Age International.
- Veerapandian, P. (Ed.). (2018). Structure-based drug design. Routledge.
- Foye, W. O. (2008). Foye's principles of medicinal chemistry. Lippincott Williams & Wilkins.
- Kubinyi, H. (1993). QSAR: Hansch analysis and related approaches (Vol. 1, pp. p-240). Weinheim: VCH.
- Holtje, H. D., Sippl, W., Rognan, D., & Folkers, G. (2003). *Molecular modeling* (Vol. 5). Weinheim, Germany: Wiley-VCH.



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Syllabus - Semester Fourth

APPLICATION OF NANOTECHNOLOGY IN MEDICINE

Course Code: CHY2452

Credit Units: 03

Course Objective:

This course will focus on developing students' understanding of the fundamental properties, as well as synthesis and characterization of nanomaterials, coupled with their applications in nanomedicine. This course also provides a realistic approach and covers the basic concepts of chemistry, physics and biology in the behavior of molecules and molecular interaction. It also includes various experimental techniques used to characterize bio-nano systems, the nano scientific principle involved in the processing, fabrication and manipulation of nanostructures and nanoparticles.

Course Content:

Module I:

Introduction to nanomedicine-Overview of nanotechnology from medical perspective, different types of nanobiomaterials and their biomedical applications, and cell nanostructure interactions, Synthesis, characterization, and properties of smart nanomaterials, Surface modification/bio functionalization of nanomaterials

Module II:

Nanocarriers (e.g. liposomes, polymer capsules, polymer nanoparticles, porous materials, nanogels, dendrimers, microemulsions, inorganic nanoparticles, carbon nanotubes, lipoproteins, solid lipid nanoparticles) for drug delivery applications, Stimuli-responsive smart nanomaterials, Nanomaterials in different imaging (e.g.fluorescence and MRI) applications

Module III:

BioMEMS, Lab-on-a-Chip, nano/microfluidics, biosensors, Regenerative medicine, including tissue engineering, cell and gene therapy, DNA-based nanostructures, Cellular nanomachines, Toxicology of nanomaterials

Examination Scheme:

Components	CT	HA	S/V/Q	ATTD	EE
Weightage(%)	10	7	8	5	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, ATTD: Attendance EE: End Semester Examination

Text & References:

- Nano Medicines Edited by Dr.ParagDiwan and AshishBharadwaj, Pentagon press(2006) ISBN 81-8274-139-4.
- Christof M. Niemeyer, Chad A. Mirkin, Nanobiotechnology:Concepts, applications and perspectives, Wiley-Interscience 2004).
- Geoffery A. Ozin, Andre C. Arsenault, Nanochemistry: A chemical approach to nanomaterials, RSC publishing (2005)
- Challa Kumar, Biofunctionalization of nanomaterials, Wiley-Interscience (2006).


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Syllabus - Semester Fifth

INTELLECTUAL PROPERTY RIGHTS AND QUALITY ASSURANCE

Course Code: CHY2552

Credit Units: 03

Course Objective:

This course will focus on intellectual property rights and patenting & Indian patent law for pharmaceutical industry.

Course Content:

Module I:

Requirements of GMP, cGMP, GLP, USFDA, WHO Guidelines and ISO 9000 Series, Drugs and Cosmetics Acts and rules, Drug Regulatory Affairs, Documentation- Protocols, Forms and Maintenance of records in Pharmaceutical industry, Preparation of documents for New Drug Approval and Export Registration, Processing and its application, Intellectual Property Rights (Patent, Copyright and Trademarks), Standard Operating Procedure (SOP) for different dosage forms.

Module II:

Concepts in Validation, Validation of manufacturing, Analytical and Process Validation and its Application, Basic concepts of Quality Control and Quality Assurance Systems, Source and Control of Quality Variation of Raw Materials: Containers, Closures, Personnel, Environmental, Etc., In-process quality tests, IPQC problems in Pharmaceutical industries. ICH Guidelines, Sampling Plans, Sampling and Characteristic Curves, Master Formula generation and Maintenance.

Module III:

Patenting, Indian patent law and pharmaceutical industry

Introduction of (IPR) Intellectual Property Rights, Patents, Design, Trademarks, Copyrights, Geographical Indications etc

Patent System: Definition of Patent, Criteria for obtaining patent (Novel, Non-obvious Applications)

Filing and Processing of Patents: General procedure for securing patents in India. Case studies Opposition to Grant of Patent, Patent infringement: Silent features of Indian Patents Act 1970 with latest amendments with special reference to- Product & Process Patents, Provision of compulsory license, Exclusive Marketing Right, The Term of Patent, Patent offices in India; International convention relating to Intellectual Property - Establishment of WIPO - Mission and Activities -History - General Agreement on Trade and Tariff (GATT).

Case Studies on - Patents (Basmati rice, turmeric, neem, etc.) - Copyright and related rights - Trade Marks.

Examination Scheme:

Components	CT	HA	S/V/Q	ATTD	EE
Weightage(%)	10	7	8	5	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, ATTD: Attendance EE: End Semester Examination

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Text & References:

- Willing, S.H., "Good Manufacturing Practices for Pharmaceuticals" Marcel Dekker, Inc., New York
- Drugs and Cosmetics Acts and rules
- Patel, A.H., "Industrial Microbiology" Macmillon India Ltd., Delhi.
- Nash, R.A. and Wachter A.H., "Pharmaceutical Process Validation" Marcel Dekker, Inc., New York
- Bolton, S.H. "Pharmaceutical Statistics"
- Banker, G.S. and Rhodes, C.T. "Modern Pharmaceuticals" Marcel Dekker, Inc., New York.
- Careleton, F.J. and Agallow, J.P. "Validation of Aseptic Pharmaceutical Processes" Marcel Dekker, Inc., New York.
- Garfeild "Quality Assurance Principles of Analytical Laboratories"
- Latest Editions of I.P., U.S.P and B.P.
- Bubharam N. R. - Whatever one should know about patents, 2nd Edition, Pharma book Syndicate.
- P. Narayan – Intellectual Property Law, Edition 3rd; Eastern Law House; 2001.



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Syllabus - Semester Sixth

PHARMACEUTICAL & COSMETICS SCIENCES LAB

Course Code: CHY2652

Credit Units: 03

List of Experiments (Any 15 Experiments are to be performed)

Polymers

- Caprolactum from cyclohexanone
- Synthesis of Nylon-6,10
- Preparation of Polystyrene.
- Study the morphology of polymers through optical microscopy.
- Preparation of Epoxy resin using Bisphenol-A and Epichlorohydrin.
- Determination of molecular weight of high polymer using viscosity method.
- Determination of melt flow index of polymers and Compare their Melt Flow Characteristics

Dyes

- Preparation of Methyl Orange- An azodye.
- Preparation of Indigo

Food Industry

- Separation of artificial colorants in confectionary using TLC.
- Determination of protein content of wheat flour.

Cosmetic Products

- Shampoo
- Detergent
- Talc
- Lipstick
- Perfumes

Drugs Analysis

- Preparation of Paracetamol and Aspirin
- Analysis of Drugs:
 - Novalgin
 - Sulfa-drugs
 - Paracetamol

Examination Scheme:

Components	TA	LR	V	ATTD	EE
Weightage(%)	8	7	10	5	70

Note: TA-Teacher's Assessment, LR-Lab Record, V-Viva

Text & References:

- A Textbook of quantitative chemical analysis, VIth Edition Vogel, Pearson Education Limited.
- Practical Organic Chemistry, Mann and Saunders, IV Edition, ELBS and Longman Publication
- Comprehensive Experimental Chemistry, V. K. Ahluwalia, New Age Publication, Delhi
- Practical Manual of Organic Chemistry, R. K. Bansal
- A Textbook of quantitative inorganic analysis including elementary instrumental analysis, IVth Edition Vogel, ELBS and Longman Publication
- Advanced Practical Inorganic Chemistry, Gurdeep Raj, Goel Publishing House, Meerut

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POLYMER TECHNOLOGY

Programme Structure-2019

Course Code	Course Title	Lecture (L) Hours /Week	Tutorial (T) Hours /Week	Practical (P) Hours/Week	Total Credits
PTE2151	Polymerization	2	-	2	3
PTE2251	Waste Plastic Recycling	3	-	-	3
PTE2351	Polymer Technology	3	-	-	3
PTE2451	Rubber & Tyre Technology	3	-	-	3
PTE2551	Polymeric Nano Composites	2	-	2	3
PTE2651	Bio-Medical Plastics	3	-	-	3
	TOTAL				18



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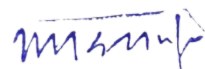
POLYMER TECHNOLOGY

OBJECTIVES OF PROGRAM

The term polymer refers to two different classes of materials – Plastic and Rubber. Polymer engineering uses the theory and knowledge of chemistry in order to handle production and use of polymers. The primary aim of this program is to train students to fulfill the constantly growing requirements of the polymer- based industry. The course provides an in-depth understanding of traditional commodities, such as plastics and specialty polymers, which have wide applications in the biomedical research and pharmaceutical fields. In India, the demand for polymer engineers has increased. After successful completion of the course, one can take up a career in sectors such as automotive, aerospace, packaging, power transmission, and other related manufacturing sectors. Industries based on manufacturing, processing and design of generic polymer (plastics, rubber, composites) also employ such students.



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POLYMER TECHNOLOGY

Syllabus - Semester First

POLYMERIZATION

Course Code: PTE2151

Credit Units: 03

Course Objective:

This course provide principles, mechanism and techniques of polymerization. They will also learn about kinetic of polymerization and copolymerization.

Course Contents:

Module-I: General Characteristics of Chain Growth Polymerization, Alkene Polymerization by Free radical, anionic and cationic initiators. Kinetics of Vinyl radical polymerization

Module-II: General Characteristics of Step Growth Polymerization. Chemistry of Step Growth. Polymerization, Kinetics and Statistics of Linear Stepwise Polymerization, Absolute reaction rates.

Module-III: Chemistry of Non-radical chain Polymerization, Anionic and Cationic Polymerization Co-ordination Polymerization, Ring Opening Polymerization

Module-IV: Copolymers, Types of copolymers, copolymerization, Kinetics of Copolymerization, Block and Graft Copolymerization, Cyclopolymerization.

Module-V: Polymerizations in homogenous & heterogenous systems, Diene and divinyl Polymerization Bulk, suspension, solution and emulsion polymerization


Examination Scheme:

Components	IA				EE	
	CT	Assignment	LR	Attendance	Theory	Practical
Weightage (%)	10	5	10	5	40	30

Note: IA –Internal Assessment, EE- External Exam, CT- Class Test, LR – Lab Record.

Suggested Readings:

- Textbook of Polymer Science, F. W. Billmeyer, John Wiley & Sons
- Polymer Science & Technology, J. R. Fried, Prentice Hall
- Polymer Science, V. R. Gowariker, New Age International
- Polymer Science & Technology, P. Ghosh, Tata McGrawHill
- Principles of Polymerization, Odian, Wiley India


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Syllabus - Semester Second

WASTE PLASTIC RECYCLING

Course Code: PTE2251

Credit Units: 03

Course Objective:

This course is beneficial to deal with different types of plastics waste, identification of plastics, segregation of plastic wastes, different types of recycling techniques, recycling of commingled plastic waste as well as various rules and regulation regarding plastic manufacturing, disposal and recycling.

Course Contents:

Module I: Introduction, Thermoplastics & thermo sets, Terminology used in recycling, coding & labeling of plastic products for sorting and identification.

Module-II: Organizations involved in plastic recycling. Types of recycling- Primary recycling, secondary recycling, tertiary recycling and quaternary recycling, recycling of mixed waste, recycling of nonwoven sacks

Module-III: Residential recycling: collection containers, education and production, recovery of resins, collection vehicles, role of material recovery facilities (MRF), role of MRF.

Module-IV: Plastic separation, working MRF, case studies, collection and separation systems.

Module-V: Recycling of PET, polyethylene, polystyrene, Polyvinyl chloride, Engineering Thermoplastics, Acrylics, Thermo sets.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Suggested Readings:

- Plastics Recycling; Ehrig, Hanser.
- Rubber Recycling: De, IsayevKhait, CRC Press.
- Feedstock Recycling & Pyrolysis of waste plastics, Scheirs&Kaminskey,, Wiley Interscience,
- Handbook of Plastic Technology, Vol, 2, Allen &Baker, CBS Publishers.
- Plastic Fabrication & Recycling, Chanda& Roy, CRC Press,


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Syllabus - Semester Third

POLYMER TECHNOLOGY

Course Code: PTE2351

Credit Units: 03

Course Objective:

In this course students will learn about preparation, properties and applications of different types of plastics, especially thermoplastics and thermosetting plastics.

Course Contents:

Module-I: Preparation, properties and applications of Polyolefins- Polyethylene, Polypropylene, Polyisobutylene, Vinyl Polymers: Polystyrene, Polyvinylchloride, Polyvinylacetate, Poly(methylmethacrylate), Polyacrylonitrile, Poly(acrylic acid)

Module-II: Preparation, properties and applications of Diene Polymers- Polybutadiene, Styrene-Butadiene Rubber, Nitrile Rubber, Polyisoprene, Polychloroprene.

Module-III: Preparation, properties and applications of Polyesters -Poly(ethylene terephthalate), Polycarbonates, Polyester resins.

Module-IV: Preparation, properties and applications of Polyamides- Nylons, Polyimides, Polyurethanes, Raw Materials, PU elastomers, PU Foams, PU coatings, adhesives and sealants.

Module-V: Preparation, properties and applications of Epoxy Polymers - Types of epoxies, Taffy Process, Hardness, Phenolics - Novolacs & Resoles.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Readings:

- Polymer Synthesis: Theory & Practice, Braun, Springer International
- An Introduction to Plastics, Elias, Wiley Interscience
- Principles of Polymerization, G. Odion, Wiley Interscience
- Synthetic Polymers, Feldman & Barbalate, Chapman & Hall
- Synthesis of Polymers, D. Schluter, Wiley VCH



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Syllabus - Semester Fourth

RUBBER & TYRE TECHNOLOGY

Course Code: PTE2451

Credit Units: 03

Course Objective:

At the end of the course students should be able to understand different types of rubbers, different additives used in rubber industries, compounding of rubber, manufacturing of tyres and design of tyres

Course Contents:

Module-I: Rubber Technology: Introduction, natural and synthetic rubbers, filler systems, stabilizer systems, vulcanization system, compounding ingredients, environmental requirements in 4 compounding.

Module-II: Manufacture of nitrilerubber, chloroprene rubber, diene rubber, SBR rubbers.

Module-III: Tyre Technology- Introduction, development of tyres, classification and types of tyres, tyre components, pneumatic tyres.

Module-IV: Tyre & tread design, tread pattern, carcass design, bead design, Unit V: Tyre testing techniques, tubeless tyres, coloured tyres.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70


CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Suggested Readings:

- Handbook of Plastics Testing & Failure Analysis, Vishu Shah, Wiley Interscience
- Polymer Testing & Evaluation of Plastics, Mathur & Bhardwaj, Allied Publishers
- Encyclopedia of Polymer Science & Technology, Herman F. Mark, Wiley Interscience
- Fatigue, Testing & Analysis, Lee, Elsevier
- Introduction to Plastics & Composites, E. Miller, Marcel Dekker



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Syllabus - Semester Fifth

POLYMERIC NANO COMPOSITES

Course Code: PTE2551

Credit Units: 03

Course Objective:

This module deals with introduction, classification, preparation, properties, characterization and applications of polymer nanocomposites.

Course Contents:

Module-I: PREPARATION OF SYNTHESIS: Polymer Nanocomposites, Nanocomposites Preparation and Synthesis, Polymer Matrices: Thermoplastics, Thermosets, Elastomers, Natural and Biodegradable Polymers

Module-II: RHEOLOGY OF NANOCOMPOSITES : Rheology of Multiphase Systems, Rheology of Polymer / clay nanocomposite, Recent studies on Rheology, Measure Techniques, Steady shear Rheology, Dynamic Rheology, Non Linear Viscoelastic properties, Extensional Rheology, Rheological modeling of Nanocomposites.

Module-III: PROCESSING OF NANOCOMPOSITES : Extrusion, Injection Moulding, Blow Moulding, Foaming, Rotational Moulding

Module-IV: STRUCTURE AND PROPERTIES CHARACTERIZATION: Scattering Techniques, Microscopic Techniques, Spectroscopic Techniques, Spectroscopic Techniques, Chromatography, Solid-state characterization: Mechanical Testing, Thermal Characterization

Module-V: APPLICATION OF POLYMER NANOCOMPOSITES: Different applications of Thermoplastics, Thermosets, Biodegradable Polymers nanocomposites.

Examination Scheme:

	IA				EE	
Components	CT	Assignment	LR	Attendance	Theory	Practical
Weightage (%)	10	5	10	5	40	30

Note: IA –Internal Assessment, EE- External Exam, CT- Class Test, LR – Lab Record.

Suggested Readings:

- Luigi Nicolis & Gianfranco Carotenuto “Metal -Polymers Nanocomposites” A John Wiley & Sons, Inc Publication 2005
- Y.C. Ke & P. Stroeve “ Polymer-Layered Silicate and Silica Nanocomposites- Elsevier, 2005 3. L.A. Utracki “ Clay-Containing Polymeric Nanocomposites” Rapra Technology Limited, 2004


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Syllabus - Semester Sixth

BIO-MEDICAL PLASTICS

Course Code: PTE2651

Credit Units: 03

Course Objective:

In this module student will learn about introduction, properties, processing and applications of different polymeric materials used in biomedical and tissue engineering.

Course Contents:

Module-I:

Synthetic and Natural biomaterials used in Biomedical applications

- i) Polyolefin's, Polyamides, Acrylic Polymers, Fluorocarbons, Polyesters, Engg. Plastics.
- ii) Collagen, Polysaccharides, Proteins etc.

Module-II:

Human applications of Plastics : Cardiovascular iMTPLants, Dental IMTPLants, Role of plastics in Ophthalmology, Hydro gels, Drug Delivery Systems, Sutures, Burn Dressings and Artificial Skin. Hernia Mesh, adhesives and Sealants, Artificial organs and devices, Blood bags, Condoms etc.

Module-III:

Blood – polymer interactions and blood compatibility, Chemical and biochemical degradation of polymers, Tissue engineering and polymers.

Module-IV:

Testing and evaluation: in-vitro/-vivo; Standards in product development and regulations; Ethical and sociological issues.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Suggested Readings:

- Buddy D. Ratner, Allan S. Hoffman, Fredrick J. Schoen and Jack E. Lemons (eds), "Biomaterials Science – An Introduction to Materials in Medicine", Academic Press, San Diego (1996).
- Joon B. Park and Roderic S. Lakes, "Biomaterials : An Introduction". 2 edition, Plenum Press, New York (1992).
- Sujata V. Bhat, "Biomaterials", Narosa Publishing House, New Delhi, (2002).


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Bachelor of Science - Earth Science (Honors)

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Curriculum & Scheme of Examination

2022

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GURUGRAM

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Course: EARTH SURFACE FEATURES & PROCESSES
Semester: I

Credit : 3
Course code : ESC2102

Course objective: The objective of the course is to make the students acquainted with the various processes operating on the earth and how the interactions leads to the evolution of different geomorphological features and landscape. This course gives an idea of natural process in line with human approach of growth and development and how a mutual balance caters the human need in best possible ways.

Module I:

Introduction to earth surface processes; Basic concepts of geomorphology and its historical development; Terrestrial relief and scales in geomorphology; nature and scope;; Normal cycle of Erosion; Overview of landscape evolution models.

Module II:

Weathering and erosional processes; Geological work by Geological Agents; Fluvial, Glacial, Aeolian, Coastal and Karst landforms with special reference to Indian context
Hill Slope Stability and Mass movements; Classification, causes and prevention; Tectonics, climate and drainage network development.

Module III:

Overview of Indian geomorphology; Aeolian, Coastal, River valley etc. and their significance.
Extraterrestrial landforms and their formational processes.

Examination Scheme:

Components	A	CT	HA	EE
Weightage (%)	5	15	10	70

A: Attendance, CT: Class Test, HA: Home Assignment, EE: End Semester Examination;

Suggested Readings

1. Bloom, A.L. 1998. Geomorphology: A systematic Analysis of Late Cenozoic Landforms (3rd Edition), Pearson Education, Inc.
2. Singh, S. 1998. Geomorphology. Prayag Pustak Bhavan, Allahabad.
3. Kale, V.S. and Gupta, A. 2001. Introduction to Geomorphology. Orient Longman Ltd.
4. Easterbrook, D.J. 1992. Surface processes and landforms. McMillan Publ.
5. Thornbury

Course: CHEMISTRY LABORATORY
Semester: I

Credit : 1
Course code : ESC2107

Course Content:

1. Titrimetric Analysis

- (i) Calibration and use of apparatus
- (ii) Preparation of solutions of different Molarity/Normality of titrants

2. Acid- Base Titrations

- (i) Estimation of carbonate and hydroxide present together in mixture.
- (ii) Estimation of carbonate and bicarbonate present together in a mixture.
- (iii) Estimation of free alkali present in different soaps/detergents

3. Oxidation- Reduction Titrimetry

- (i) Estimation of Fe(II) and oxalic acid using standardized KMnO_4 solution.
- (ii) Estimation of oxalic acid and sodium oxalate in a given mixture.
- (iii) Estimation of Fe (II) with $\text{K}_2\text{Cr}_2\text{O}_7$ using internal (diphenylamine, anthranilic acid) and external indicator.

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.



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Course: FIELD SURVEY I
Semester: I

Credit : 2
Course code :ESC2108

Course Content:

1. To make the students acquainted with topographical sheets and working on GPS
2. Identification of geomorphological features in a terrain.
3. Introduction to Clinometers compass and its uses.

Examination Scheme:

IA				EE	
FV	PR	LR	V	PR	V
20	10	10	10	25	25

Note: IA –Internal Assessment, EE- External Exam, FV-Field Visit, PR- Presentatione, LR – Lab Record,
V – Viva.



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Course: CRYSTALLOGRAPHY & MINERALOGY
Semester: II

Credit :3
Course code : ESC2201

Course objective: The course will develop an understanding of the science behind the fundamental chemical, geometrical and physical relationship of matter. This course highlights the chemical and optical fundamentals to decipher structural symmetry of minerals and their optical properties.

Module I:

Crystallography: Brief idea of space lattice; Definition and morphology of crystal and crystal notation; Symmetry elements; Parameter, indices and symbols, Laws of Crystallography; Stereographic Projection; Derivation of 32 classes of crystal; Study of following crystal systems: Isometric System, Tetragonal System, Hexagonal System, Orthogonal System, Monoclinic System, Triclinic System.

Module II:

Mineralogy: Definition and physical properties of Minerals; ions, bonds and their types, coordination number, Isomorphism, Polymorphism and Pseudomorphism; Structure of silicates; A detailed study of important rock forming mineral groups with reference to their composition, structure, physical and optical properties.

Module III:

Optical Mineralogy: Elementary concepts of light; Propagation of light through minerals, Principles of optical mineralogy; Introduction to Nicol Prism, Petrological Microscope and its functions; Crystal habits and twinning, laws of twinning, polarization, double refraction; Isotropism and Anisotropism; Important optical properties: Relief, Pleochroism, Pleochroic, Haloes, Extinction and Extinction angle, Birefringence, Interference colours; Behaviour of convergent polarized light in Uniaxial and Biaxial Minerals.

Examination Scheme:

Components	A	CT	HA	EE
Weightage (%)	5	15	10	70

A: Attendance, CT: Class Test, HA: Home Assignment, EE: End Semester Examination;

Suggested Readings

1. W. D. Nesse, (2000), Introduction to Mineralogy, Oxford University Press, ISBN 0-19-510691-1
2. Cornelis Klein and Barbara Dutrow, The manual of Mineral Science, Wiley Publication 2007.
3. P. F. Kerr Optical Mineralogy, 1959
4. Rutley
5. Nesse W.D. , Introduction to Optical mineralogy, 2008
6. Deer, W. A. , Howie, R. A. and Zussman, J., An introduction to the rock forming minerals, ELBS publication, 1962-1963.
7. Dana



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Course: STRUCTURAL GEOLOGY
Semester: II

Credit : 3
Course code : ESC2210

Course objective: This course deals with the study of the three dimensional distribution of rock Modules with respect to their deformational history. The study will make the students understand the structural evolution of a particular region and the important events which occurred in the regional geological past.

Module I:

Definition and objectives; Effects of topography on structural features; Topographic and structural maps; Scale of the map; Survey methods; Contouring and Plotting, Measurement of slope heights, aspects and gradients; Global Position System. Exercise of localization of points, estimation of slope and real distance in the map, Isolines, elevation points; Landform identification and construction of elevation profiles from maps

Module II:

Stresses in rocks, factors controlling rock deformations; Stratification and bedding; Attitude of beds; Outcrops and outcrop patterns, Outliers and inliers; Dip & strike: Significance of top-bottom criteria in structural geology;

Module III:

Definition, Classification, Causes, Recognition, Economic importance and Geologic significance of Folds and Faults; Unconformities, Joints; Lineation, Foliation, Rock cleavage: Definition and types.

Examination Scheme:

Components	A	CT	HA	EE
Weightage (%)	5	15	10	70

A: Attendance, CT: Class Test, HA: Home Assignment, EE: End Semester Examination;

Suggested Readings

1. Davis, GR. 1984. Structural Geology of Rocks and Region. John Wiley
2. Weijermars, R. 1997. Structural Geology and Map Interpretation, Alboran Science Publishing.
3. Billings, M.P. 1987. Structural Geology, 4th edition, Prentice-Hall.
4. Hatcher, Jr., R.D. 1995. Structural Geology - Principles, Concepts and Problems, Merrill Publishing Company.
5. Ghosh, SK. 1993. Structural geology: fundamentals and modern developments, Pergamon Press, London



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Course: EARTH SCIENCES LABORATORY I
Semester: II

Credit : 2
Course code :ESC2208

Course Content:

Crystallography:

1. Study of elements of symmetry of normal classes of six crystal systems.
2. Study of Clinographic Projection
3. Stereographic projection of face poles of crystals.

Mineralogy:

4. Study of physical properties of various common and important minerals in hand specimen –i.e. Silicates, Sulfides, Oxides, Hydroxides, Halides, Carbonates, Phosphates etc.

Optical Mineralogy:

5. Optical identification of common rock forming minerals - Quartz, Plagioclase, Microcline, Muscovite, Biotite, Fluorite, Olivine, Garnet. Tourmaline, Staurolite, Kyanite, Sillimanite, Hypersthene, Augite, Diopside, Hornblende, Tremolite-Actinolite. Corundum, Beryl, Calcite, Barite.

Structural Geology

6. Drawing profile sections and interpretation of geological maps of different complexities.
7. Exercises of stereographic projections of mesoscopic structural data (planar, linear, folded etc.).

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.



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Course: FIELD SURVEY II
Semester: II

Credit : 2
Course code :ESC2209

Course Content:

1. To identify the mineral assemblage on an outcrop through hand lens and physical properties.
2. To identify and relate the various structural features in the field and prepare a geological map.
3. Clinometers compass and its uses

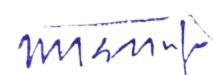
Examination Scheme:

IA				EE	
FV	PR	LR	V	PR	V
20	10	10	10	25	25

Note: IA –Internal Assessment, EE- External Exam, FV-Field Visit, PR- Presentatione, LR – Lab Record,
V – Viva.



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Course: IGNEOUS PETROLOGY
Semester: III

Credit : 3
Course code : ESC2301

Course objective: A basic course in earth sciences which deals with the origin, composition, distribution and structure of the rocks that have an origin from magma. The study of igneous rocks is important because they make up the bulk of the earth's crust in the geological time period.

Module I

Introduction to petrology; its significance, distinguishing features of three types of rocks; concept of intrusion and extrusion; Magma: Definition, generation and crystallization and diversification of magma, Tectonic setting and igneous activities; Bowen's reaction principle and its petrological significance.

Module II

Structure, textures and classification of igneous rocks; Concept of mode and norm; Phase rule and phase diagrams – binary and ternary systems.

Module III

Petrogenesis of granite, alkaline rocks; Basalt, Anorthosite and Ultramafic rocks; Petrographic description of the following rock types: Granite, Rhyolite, Syenite, Nepheline-syenite, Monzonite, Granodiorite, Diorite, Pegmatite, Anorthosite, Gabbro, Dolerite, Basalt, Peridotite, Pyroxenite, Norite, Dunite, Trachyte and Andesite.

Examination Scheme:

Components	A	CT	HA	EE
Weightage (%)	5	15	10	70


A: Attendance, CT: Class Test, HA: Home Assignment, EE: End Semester Examination;

Suggested Readings:

1. John D. Winter 2001. An Introduction to Igneous and Metamorphic Petrology. Prentice Hall Inc
2. Loren A. Raymond 2002. Petrology: The study of Igneous, Sedimentary and Metamorphic rocks. McGraw Hill .New York
3. Bose M.K. 1997. Igneous Petrology. World Press
4. Cox, K.G. Bel, J.D. and Pankthrust, R.J. 2002. The interpretation of Igneous rocks. Allen and Unwin, London
5. Pankthrust, 2000. Igneous and Metamorphic rocks. Prentice Hall.
6. Phillpots, A.R., and Ague, S.J., 2009. Principles of igneous and metamorphic petrology (2ndEdn.) Cambridge.



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Course: SEDIMENTOLOGY
Semester: III

Credit : 2
Course code : ESC2302

Course objective: This course is a branch of petrology, dealing with the study of modern sediments and the processes resulting in their deposition. Sedimentary rocks are particularly significant because of the vast extent on the earth's surface and their close linkages to the geological past.

Module I

Basic concepts of Sedimentary Petrology and Sedimentology; Description and classification of Sedimentary rocks, Sedimentary Environments and facies, Weathering and sedimentary flux; Fluid flow and its types, Sediment transport and deposition; Submarine weathering, soils and paleosols; Application of Sedimentary Petrology.

Module II

Textures of clastic and non-clastic sedimentary rocks; Structures of sedimentary rocks; Lithification and Diagenesis; Provenance; Texture, composition, classification, origin and occurrence of Siliciclastic rocks: Conglomerates, Sandstones, Mudrocks; Introduction to coal and petroleum.

Module III

Non-siliciclastic rocks: Carbonate rocks, controls of carbonate deposition, limestone, dolomite and Dolomitisation; Chert and siliceous sediments; Phosphorites, carbonaceous sediments, iron rich sediments and evaporates; Petrographic description of the major rock types: Conglomerate, Breccia, Sandstones, Arkose, Greywacke, Limestone, Dolomite, Shale.

Examination Scheme:

Components	A	CT	HA	EE
Weightage (%)	5	15	10	70

A: Attendance, CT: Class Test, HA: Home Assignment, EE: End Semester Examination;

Suggested Readings:

1. Prothoreo and Schwab, 2004, Sedimentary Geology, Freeman and Co. New York, 557p
2. Sam Boggs, 1995, Principles of Sedimentology and Stratigraphy, Printice Hall, New Jersey, 765p .
3. Maurice E. Tucker, 2006, Sedimentary Petrology, Blackwell Publishing, 262p.
4. Collinson, J.D. and Thompson, D.B. 1988, Sedimentary structures, Unwin-Hyman, London, 207p.
5. Lindholm, R.C., 1987, A practical approach to sedimentology, Allen and Unwin, London
6. Pettijohn, F.J. 1975, Sedimentary rocks, Harper and Row Publ. New Delhi



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Course: METAMORPHIC PETROLOGY
Semester: III

Credit : 2
Course code : ESC2303

Course objective: This course would highlight the relationship of rocks with the field relations and local tectonic environment, especially how the impact of heat and pressure causes profound physical and chemical change in a rock to change their form.

Module I

Introduction to Metamorphic Petrology; Factors controlling metamorphism; Types of metamorphism: contact, regional, fault zone metamorphism, impact metamorphism; Limitations of metamorphism; Diagenesis, Anataxis, Palingenesis

Module II

Concept of Zones, Facies, Grades and Isograds; Metamorphic differentiation, prograde, retrograde, and poly-metamorphism; Metamorphic fluids and Metasomatism; Paired metamorphic belts, Index minerals; Thermal and Regional metamorphism of argillaceous, calcareous and basic igneous rocks.

Module III

Origin of Migmatites; Petrographic notes on the following metamorphic rocks: Slate, Phyllite, Schists, Gneisses, Amphibolites, Marble, Quartzites, Hornfels, Charnockite, Khondalite, Eclogite, Kodurite and Skarns.

Examination Scheme:

Components	A	CT	HA	EE
Weightage (%)	5	15	10	70

A: Attendance, CT: Class Test, HA: Home Assignment, EE: End Semester Examination;

Suggested Readings:

1. Yardley, B W D. 1990. An introduction to metamorphic petrology. ELBS publication.
2. Bucher K. and Martin F. 2002. Petrogenesis of Metamorphic rocks. Springer-Verlag Publication.
3. Best, M.G. 2002. Igneous and metamorphic petrology. Wiley publication.
4. Vernon R. H. and Clarke G. L. 2008. Principles of metamorphic Petrology. Cambridge publication.
5. Spears F. 1993. Metamorphic Phase Equilibria and Pressure-Temperature-Time Paths. AGU publication
6. John D. Winter 2001. An Introduction to Igneous and Metamorphic Petrology. Prentice Hall Inc



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Course: ATMOSPHERIC SCIENCE
Semester: III

Credit : 2
Course code : ESC2304

Course objective: The purpose of the course is to give a holistic understanding of the various processes and effects of the atmosphere on the other systems and vice versa. This will make the students aware with the fundamental concepts of the climate system and the changes taking place therein.

Module I

Atmosphere: Structure and composition, vertical profile of temperature and pressure, microphysical processes in the atmosphere; Atmospheric physics: Earth's heat budget and radiative forcing; Fundamental forces: Pressure gradient force, centrifugal force, gravity force, Coriolis force; Buys Ballot law; Aurora Borealis and Aurora Australis.

Module II

Introduction to components of climate science; Feedback mechanisms; Atmospheric thermodynamics, greenhouse gases and climate forcing; Heat transfer in ocean.

Module III

Paleoclimatology: Introduction and Measurement techniques; Aerosol in atmosphere, properties; carbonaceous aerosols; radioactive effects of Atmospheric aerosols; Direct and Indirect effects of aerosol particles. Indian monsoon and its variability, western disturbances, Indian Ocean Dipole; El Niño-Southern Oscillation.

Examination Scheme:

Components	A	CT	HA	EE
Weightage (%)	5	15	10	70

A: Attendance, CT: Class Test, HA: Home Assignment, EE: End Semester Examination;

Suggested Readings:

1. Barbara J., Pitts F. and Pitts J.N., Jr (2000) Chemistry of the Upper and Lower Atmosphere- Theory, Experiments and Applications Academic Press, San Diego.
2. Marshall J. and Plumb R.A. (2001) Atmosphere, Ocean and Climate, *Elsevier*, Amsterdam.
3. Oliver J.E. and Hurrell J.J. (2008) *Climatology: An Atmospheric Science*, Prentice Hall.
4. Seinfeld J.H. and Pandis S.N. (2006) Atmospheric Chemistry and Physics-from Air Pollution to Climate Change, John Wiley and Sons, INC.
5. Barry, R. G., 2003. Atmosphere, weather and climate. Routledge Press, UK



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Course: MARINE SCIENCE
Semester: II

Credit : 2
Course code : ESC2309

Course objective: The aim of this course is to make the students aware of the various factors that play an important role in determining the physical and chemical characteristics of the marine water and the associated marine biota.

Module I

Introduction to Hydrological cycle; Origin and chemical composition of sea water; geomorphology and Relief of ocean floor; Vertical and horizontal distribution of temperature and salinity

Module II

Concepts of Eustasy; Ekman rule; Land-Air-Sea interactions; Oceanic current system and effect of Coriolis forces; waves and tides; Ocean currents, Global distribution of major ocean currents; Climate change and ocean; Sea level changes and its impact on coastal areas

Module III

Coastal erosion and stabilization; Delta and estuaries; Coastal zone regulation and management; Concept of Ocean Ecosystem.

Examination Scheme:

Components	A	CT	HA	EE
Weightage (%)	5	15	10	70

A: Attendance, CT: Class Test, HA: Home Assignment, EE: End Semester Examination;

Suggested Readings:

1. Gross, M.G., 1977. *Oceanography: A view of the Earth*, Prentice Hall.
2. Haq and Boersma, 1978. *Introduction to Marine Micropaleontology*, Elsevier.
3. Tolmazin, D., 1985. *Elements of Dynamic Oceanography*, Allen and Unwin.



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Course: EARTH SCIENCES LABORATORY II
Semester: III

Credit : 2
Course code :ESC2307

Course Content:

Igneous Petrology:

1. Megascopic and microscopic (textural and mineralogical) study of major Extrusive and Intrusive igneous rocks.

Metamorphic Petrology:

1. Megascopic and microscopic study (textural and mineralogical) of low and medium to high grade metamorphic rocks:

Sedimentology:

1. Exercises on sedimentary structures and their palaeo-environmental significance,
2. Petrography of clastic and non-clastic rocks through hand specimens and thin sections.

1. Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.



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Course: FIELD SURVEY III
Semester: III

Credit : 3
Course code :ESC2308

Course Content:

1. To identify rocks and mineral assemblages in an outcrop through rock hammer, pocket knife, a hand lens or a magnifying glass or dropper bottle of hydrochloric acid.
2. To acquaint the students with the geomorphological features.
3. Mapping and identification of structural features in the field.

Examination Scheme:

IA				EE	
FV	PR	LR	V	PR	V
20	10	10	10	25	25

Note: IA –Internal Assessment, EE- External Exam, FV-Field Visit, PR- Presentatione, LR – Lab Record,
V – Viva.



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Course: ECONOMIC GEOLOGY
Semester: IV

Credit : 2
Course code : ESC2405

Course objective: This course will emphasize on the earth materials primarily used for economic and/or industrial purposes. This branch of earth sciences is extremely significant as it used in geochemistry, mineralogy, geophysics, petrology, structural geology etc. Economic geology is of utmost concern for environmentalists, engineers and conservationists

Module I

Definition and types of ore and minerals and their origin; Bateman's classification; Principles and processes of ore genesis; Endogenous processes: magmatic concentration, contact metasomatic, hydrothermal, skarns, greisens and pegmatites deposits; Exogenous processes: sedimentary ore deposits, Chemical and bacterial precipitation, Colloidal deposition.

Module II

Weathering products and Residual Deposits: Oxidation and Supergene Enrichment; Evaporite deposits, Metamorphism as ore forming processes; Metallic ores: origin, geological occurrences, geographical distribution and uses of the mineral deposits of –Fe, Cr, W, Sn, Zn Pb, Au, Al, Mg and Co and atomic minerals; Nonmetallic and industrial rocks and minerals, their nature and distribution in space and time in India: refractory, chemical, fertilizer, cement and gemstone industry including building stones.

Module III

Economic importance of the following geological formations of India: Precambrians of Dharwars and Singhbhum, Cuddapah, Vindhyan, Gondwana, Jurassic of Kutch, Cretaceous of South India, Siwaliks and Tertiary of Assam.

Examination Scheme:

Components	A	CT	HA	EE
Weightage (%)	5	15	10	70

A: Attendance, CT: Class Test, HA: Home Assignment, EE: End Semester Examination;

Suggested Reading:

1. Jensen and Bateman: Economic Mineral Deposits.
2. Sen and Guha: A Handbook of Economic Geology.
3. Banerjee: Mineral Resources of India.
4. Sharma and Ram: Introduction to India's Economic Minerals.
5. Deb: Industrial Minerals and Rocks of India.



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Course: REMOTE SENSING AND GIS
Semester: IV

Credit : 3
Course code :ESC2410

Course objective: This course will develop the skills of students in the field of GIS and remote sensing. It will also give the basic concepts of remote sensing and principles associated with image acquisition and image processing. The role of GIS as a tool in environmental management and knowledge of GPS will be facilitated. This course will also look into the application of remote sensing/GIS in database generation and environmental management.

Module I

Remote sensing: Introduction, scope and components; Electromagnetic spectrum, its characteristics and interaction with environment; Platforms & Sensors, Albedo, Atmospheric Windows; Aerial photography, Elements of Visual Image Interpretation, Spectral Signature, Digital image processing; Optical remote sensing, microwave remote sensing; Photogrammetry: Introduction, stereoscopic vision; Concept of Digital Elevation Model.

Module II

Map: definition, types, scale and projection; coordinate systems, survey of India (SOI) topographical maps; Geographic Information System: Introduction, definition and terminologies; Components and fundamental operations of GIS; Data structure, raster and vector data structures; Data input methods; Accuracy, precision and resolution, Global positioning systems (GPS):Basics, satellite generation, positioning services, GPS details and integration, GIS and image processing software.

Module III

Techniques and applications of remote sensing in water resource management, Land Use land cover mapping, forest cover/ type mapping, habitat analysis, biodiversity characterization; Use of GIS and remote sensing in environmental monitoring and early warning system.

Examination Scheme:

Components	A	CT	HA	EE
Weightage (%)	5	15	10	70

A: Attendance, CT: Class Test, HA: Home Assignment, EE: End Semester Examination;

Suggested Readings:

1. Lillisand, Thomas, Ralph W. Kiefer and Jonathan Chipman. 2007. Remote Sensing and Image Interpretation. Wiley India.
2. Jensen, John R. 2004. Introductory Digital Image Processing: A Remote Sensing Perspective. Prentice Hall.
3. Burrough, P.A. and McDonnell, R.A. (1998) Principles of geographical information systems. Oxford University Press, Oxford, 327 pp.
4. Jensen J.R. (2000) Remote Sensing of the Environment: An Earth Resource Perspective, Prentice Hall, ISBN 0-13-489733-1.



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Course: GEOPHYSICS
Semester: IV

Credit : 2
Course code :ESC2412

Course objective: The course is developed to give an insight about the physics of earth and the study of earth using quantitative physical methods.

Module I

Interrelationship between geology and geophysics; General and Exploration geophysics; Basic principles of geophysical exploration; Different types of geophysical methods. Role of geological and geophysical data in explaining geodynamical features of the earth.:

Module II

Geophysical Methods: Gravity, magnetic, Electrical, Seismic- their principles and applications; Concepts and Usage of corrections in geophysical data; Geophysical field operations - Different types of surveys, grid and route surveys, profiling and sounding techniques, scales of survey, presentation of geophysical data.

Module III

Application of Geophysical methods - Regional geophysics, oil and gas geophysics, ore geophysics, groundwater geophysics, engineering geophysics; Geophysical anomalies: correction to measured quantities, geophysical, anomaly, regional and residual (local) anomalies, factors controlling anomaly, depth of exploration; Integrated geophysical methods - Ambiguities in geophysical interpretation; Planning and execution of geophysical surveys.

Examination Scheme:

Components	A	CT	HA	EE
Weightage (%)	5	15	10	70

A: Attendance, CT: Class Test, HA: Home Assignment, EE: End Semester Examination;

Suggested Readings:

1. The Solid Earth: An Introduction to Global Geophysics (2nd ed. 2005) by CMR Fowler, Cambridge University Press.
2. Applied Geophysics by Telford W.M., Geldart L.P. and Sheriff R.E., Cambridge University Press.
3. Milton B. Dobrin (1988): Introduction to Geophysical Prospecting 3rd Ed. McGraw Hill, 630p. ISBN: 0070171955.
4. William Lowrie (1997): Fundamentals of Geophysics. Cambridge University Press, 354p. ISBN-0 521 63454 7.
5. Edwin S. Robinson (1988): Basic Exploration Geophysics. John Wiley & Sons, 562p. ISBN-0-471-87941-x.



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Course: PALAEOLOGY
Semester: V

Credit : 2
Course code : ESC2413

Course objective: The students would develop an understanding of the origin and evolution of the past life which is a vital in giving information about Earth's organic and inorganic past.

Module I

Introduction to Fossils and Index Fossils, Fossilization Processes (Taphonomy) and Modes of Preservation; Concept of Species, Species problem in palaeontology, Fossil nomenclature and methods of description, code of systematic nomenclature; Theory of organic evolution and the fossil record; Palaeoecology: Principles and methods; Palaeobiogeography and palaeoclimate.

Module II

Invertebrate Palaeontology: Morphology, classification and geological history of the following groups: Gastropoda, Lamellibranchia, Brachiopoda, Cephalopoda, Trilobita and Echinoidea; Classification of trace fossils and their utility in palaeo-environmental reconstructions; Vertebrate Palaeontology: Origin of vertebrates; Vertebrate fossil record from Gondwana formations, Deccan volcanic province, Palaeogene and Neogene sequences of India and their evolutionary and palaeobiogeographic significance.

Module III

Palaeobotany: Early plant life; Colonization of land; Carboniferous coal forests; Gondwana flora and role of climate in its evolution; Micropaleontology: Microfossils and their importance.

Examination Scheme:

Components	A	CT	HA	EE
Weightage (%)	5	15	10	70

A: Attendance, CT: Class Test, HA: Home Assignment, EE: End Semester Examination;

Suggested Readings:

1. Clarkson, E.N.K. 1998. Invertebrate Palaeontology and Evolution, George Allen & Unwin.
2. Raup, D.M. and Stanley, S. M. 1971. Principles of Palaeontology, W.H. Freeman and Company.
3. Benton, M. 1997. Basic Palaeontology: An introductory text, D. Harker, Addison Wesley Longman.
4. Prothero, D.R. 1998. Bringing fossils to life – An introduction to Palaeobiology, McGraw Hill.
5. Willis, K.J. & McElwain, J.C. 2002. The evolution of plants, Oxford University Press.
6. Brenchley, P. J., and Harper, D. A. T. 1998. Palaeoecology: Ecosystems, Environments and Evolution. By Chapman and Hall.



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Course: EARTH SCIENCE LABORATORY III
Semester: IV

Credit : 2
Course code :ESC2408

Course Content:

1. Study of Topographic Sheets, map sheets, thematic maps,
2. Study of aerial photographs delineating geomorphic features, rock types and structural features
3. Processing of satellite data and delineation of rock types and mapping of soil, vegetation, water and geologic structure.
4. Element of Image Interpretation, Image enhancement, Image registration and Geo-referencing.
5. Image classifications for land use/ land cover using ERDAS, PCI Geomatica and ENVI.
6. GIS Software, introduction to open source GIS
7. Preparation and interpretation of water table contour maps and depth to water level contour maps.
8. Study, preparation and analysis of hydrographs for differing groundwater conditions.
9. Water potential zones of India (map study) including saline water zones.

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.



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Course: FIELD SURVEY IV
Semester: IV

Credit : 3
Course code :ESC2409

Course Content:

1. Detailed hand on exposure with GPS (Global Positioning System) and its working.
2. Correlation of satellite image with toposheet and ground verification in a terrain and preparation of a geological map.
3. Geological reporting of field including all major parameters and their important significance.

Examination Scheme:

IA				EE	
FV	PR	LR	V	PR	V
20	10	10	10	25	25

Note: IA –Internal Assessment, EE- External Exam, FV-Field Visit, PR- Presentatione, LR – Lab Record,
V – Viva.



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Course: EXPLORATION GEOLOGY
Semester: V

Credit : 2
Course code :ESC2503

Course objective: Basic knowledge of the occurrence of the resources along with the techniques and statistical analysis associated with for mineral exploration.

Module I:

Resource reserve definitions and classification; Mineral resources in industries: Historical and present perspective; A brief overview of classification of mineral deposits with respect to processes of formation in relation to exploration strategies.

Module II:

Principles of mineral exploration; Prospecting and exploration- conceptualization; Methodology and stages; Sampling, subsurface sampling including pitting, trenching and drilling, core and non-core drilling, planning of bore holes and location of boreholes on ground; Core-logging; Geochemical exploration: Principles; Nature of samples; Anomaly, strength of anomaly and controlling factors; primary and secondary dispersion; Coefficient of aqueous migration. Geobotanical survey: Indicators and survey techniques.

Module III:

Introduction to geophysical methods of exploration: Principles of reserve estimation, density and bulk density, factors affecting reliability of reserve estimation, reserve estimation based on geometrical models (square, rectangular, triangular and polygon blocks); Regular and irregular grid patterns; Stage of mineral exploration; Statistics and error estimation.

Suggested Readings:

1. McKinsty, H.E. 1962. Mining Geology (2nd Ed.) Asia Publishing House.
2. Clark, G.B. 1967. Elements of Mining. 3rd Ed. John Wiley & Sons.
3. Arogyaswami, R.P.N. 1996 Courses in Mining Geology. 4th Ed. Oxford-IBH.



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Course: HYDROGEOLOGY
Semester: IV

Credit : 2
Course code :ESC2511

Course objective: The course is designed to make the students aware about the peculiarities of the availability and movement of sub-surface and surface water. The various geological characteristics of ground water and surface water will be dealt with.

Module I:

Scope and significance of hydrogeology Hydrological cycle (Precipitation, Evapo-transpiration, Runoff, and infiltration); Sub-surface movement of water, flow in saturated and unsaturated zones; Vertical distribution of sub-surface water; Origin and age of groundwater.

Module II:

Sub surface hydrogeology: Types, characteristics, classification of aquifers, Porous and Fractured aquifers; Groundwater occurrence in igneous, metamorphic and sedimentary rocks; Darcy's law and its application; Theory and dynamics of groundwater flow, Phreatic and Piezometric level, Analysis of Piezometric surface, Groundwater level fluctuations; Aquifer's hydraulic parameters; Groundwater provinces of India.

Module III:

Elementary well hydraulics, surface and sub-surface exploration of groundwater, drilling and construction of wells, pumping tests and analysis of test data for evaluation of aquifer parameters; Physical and chemical properties of water and water quality; Water balance studies: basic concept, development and management of groundwater resources; Surface and subsurface water interaction; Sea water intrusion in coastal aquifers.

Examination Scheme:

Components	A	CT	HA	EE
Weightage (%)	5	15	10	70

A: Attendance, CT: Class Test, HA: Home Assignment, EE: End Semester Examination;

Suggested Readings

1. Todd, D.K. 2006. Groundwater hydrology, 2nd Ed., John Wiley & Sons, N.Y.
2. Davis, S.N. and De Weist, R.J.M. 1966. Hydrogeology, John Wiley & Sons Inc., N.Y.
3. Karanth K.R., 1987, Groundwater: Assessment, Development and management, Tata McGraw-Hill Pub. Co. Ltd.
4. Fetter, C.W. 2001. Applied Hydrogeology, Prentice Hall Inc., N.J



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Course: ENGINEERING GEOLOGY
Semester: V

Credit : 2
Course code :ESC2510

Course objective: The course deals with the study of geological structures and their role in engineering structures and projects. Students are expected to develop an insight about the role of a geologist in such engineering projects.

Module I

Introduction to the concept of geology vis-à-vis engineering; Role of geology in planning, design and construction of major man-made structural features; Elementary concepts of rock and soil mechanics.

Module II

Site selection and investigation; Types of structures, classification and their effect on civil engineering projects and Geological mapping; Geological and geotechnical investigations for dams, reservoirs and spillways, tunnels, underground caverns, bridges, highways, shorelines.

Module III

Environmental considerations related to civil engineering projects; Construction materials; Geological hazards (landslides and earthquakes), their significance, causes and preventive/remedial measures; Recent trends in engineering geology.

Examination Scheme:

Components	A	CT	HA	EE
Weightage (%)	5	15	10	70

A: Attendance, CT: Class Test, HA: Home Assignment, EE: End Semester Examination;

Suggested Readings:

1. Krynin, D.P. and Judd W.R. 1957. Principles of Engineering Geology and Geotechnique, McGrawHill (CBS Publ).
2. Johnson, R.B. and DeGraf, J.V. 1988. Principles of Engineering Geology, John Wiley & Sons, N.Y.
3. Goodman, R.E., 1993. Engineering Geology: Rock in Engineering constructions. Jonh Wiley & Sons, N.Y.
4. Waltham, T., 2009. Foundations of Engineering Geology (3rdEdn.) Taylor & Francis.



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Course: EARTH SCIENCES LABORATORY IV
Semester: IV

Credit : 2
Course code :ESC2507

Course Content:

1. Selection of sites using topographic maps for dams, tunnels, bridges, highways and similar civil structures.
2. Index Tests for soil, rocks and debris.
3. Evaluation of shear strength parameters.
4. Study of fossils showing various modes of fossilization.
5. Thin section study of fossils to understand important parameters.
6. Study of diagnostic morphological characters through hand specimens of fossils.
7. Study of distribution important metallic, non-metallic deposits in India.

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.



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Course: FIELD SURVEY V
Semester: V

Credit : 3
Course code :ESC2508


Course Content:

1. Detailed hand on exposure with GPS (Global Positioning System) and its working.
2. Correlation of satellite image with toposheet and ground verification in a terrain and preparation of a geological map.
3. Geological reporting of field including all major parameters and their important significance.

Examination Scheme:

IA				EE	
FV	PR	LR	V	PR	V
20	10	10	10	25	25

Note: IA –Internal Assessment, EE- External Exam, FV-Field Visit, PR- Presentatione, LR – Lab Record,
V – Viva.


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Course: COAL AND PETROLEUM GEOLOGY
Semester: VI

Credit : 3
Course code :ESC2603

Course objective: This course will deal with the geological aspects related to coal and petroleum. This is of utmost significance keeping in view the high employability opportunities associated with this branch of earth science.

Module I:

Coal; Origin, types, ranks and uses; Coalification process; Coal Petrology: Lithotypes, Microlithotypes and macerals: Physical, chemical and optical properties; Maceral analysis: Mineral and organic matter in coal;; Coal exploration and estimation of coal reserves; Applications of coal geology in hydrocarbon exploration; coal petrography of different coalfields of India.

Coalbed methane: Elementary idea about generation of methane in coal bed sand exploration

Module II:

Natural occurrence, Chemical composition and physical properties of crudes in nature; Origin of petroleum, maturation of kerogen; Biogenic and thermal effect; Reservoir rocks: General attributes and petrophysical properties; Migration of oil and gas: Geologic framework and factors controlling hydrocarbon migration; migration routes and barriers.

Module III:

Hydrocarbon traps: Definition, theory and classification of hydrocarbon traps - structural, stratigraphic and combination; Time of trap formation and hydrocarbon accumulation; Cap rocks: Definition and general properties; Formation water characteristics as oil exploration leads; Plate tectonics and global distribution of hydrocarbon reserves; Classification of Indian basins and petroleum geology of oilfields of India: Assam, Bengal, Cauvery, Krishna-Godavari, Cambay and Bombay offshore basins.

Examination Scheme:

Components	A	CT	HA	EE
Weightage (%)	5	15	10	70

A: Attendance, CT: Class Test, HA: Home Assignment, EE: End Semester Examination;

Suggested Readings:

1. Coal Geology: Larry Thomas, 2002, Wiley and Sons.
2. Coal: it's composition, analysis, utilisation and valuation.: E.E.Somermier 2008, McGrawHill
3. Petroleum Geology: F.K.North, 1986, Allen and Unwin
4. Petroleum Formation and Occurrence: B.P.Tissot and D.H.Welte 1978, Publisher: Springer-Verlag
5. Elements of petroleum Geology: R.C.Shelley 1998, Academic press.



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WORKSHOP/ CONFERENCE/ TRAINING PROGRAMME

Course: Workshop/Conference/Training
Semester: VI

Credit : 01
Course Code :ESC2633

Objectives

A workshop is primarily an activity based academic event that is organized to provide the students a one to one and hands on experience on any aspect of their learning. The communication in a workshop has to be necessarily two ways. The trainer has to make sure that the aspects covered are practically practiced by the participants. The student will choose the option of workshop from amongst their concentration electives. The evaluation will be done by Board of examiners comprising of the faculties.

Guidelines for Workshop

The procedure for earning credits from workshop consists of the following steps:

1. Relevant study material and references will be provided by the trainer in advance.
2. The participants are expected to explore the topic in advance and take active part in the discussions held
3. Attending and participating in all activities of the workshop
4. Group Activities have to be undertaken by students as guided by the trainer.
5. Evaluation of workshop activities would be done through test and quiz at the end of the workshop.
6. Submitting a write up of at least 500 words about the learning outcome from the workshop.

Evaluation Scheme:

Attendance	Active Participation	Multiple Choice Questions/ Quiz	Solving the case/ Assignment/ Write up	Total
10	30	30	30	100



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DISSERTATION

Course: Dissertation
Semester: VI

Credit : 09
Course Code : ESC2637

GUIDELINES FOR PROJECT FILE AND PROJECT REPORT

Research experience is a professional problem-solving activity and is equally significant as any other aspect of the curriculum. It provides exposure to research methodology and an opportunity to work closely with a faculty guide. It usually requires the use of advanced concepts, a variety of experimental techniques, and state-of-the-art instrumentation.

Research is genuine exploration of the unknown that leads to new knowledge which often warrants publication. But whether or not the results of a research project are publishable, the project should be communicated in the form of a research report written by the student.

Sufficient time should be allowed for satisfactory completion of reports, taking into account that initial drafts should be critically analyzed by the faculty guide and corrected by the student at each stage.

PROJECT FILE

The Project File may be a very useful tool for undertaking an assignment along-with a normal semester, an exploratory study, sponsored projects, a project undertaken during summer period or any other period as per curricula where the researcher is working with a company/organization. The project/ assignment may also be a part of the bigger research agenda being pursued by a faculty/ institution/ department.

The Project File is the principal means by which the work carried out will be assessed and therefore great care should be taken in its preparation. This file may be considered in continuous assessment

The Layout Guidelines for the Project File & Project Report:

- A4 size Paper
- Font: Arial (10 points) or Times New Roman (12 points)
- Line spacing: 1.5
- Top and bottom margins: 1 inch/ 2.5 cm; left and right margins: 1.25 inches/ 3 cm

Assessment Scheme:

Continuous Evaluation:

40% (Based on punctuality, regularity of work, adherence to plan and methodology, refinements/mid-course corrections etc. as reflected in the Project File.)

Final Evaluation:

60% (Based on the Documentation in the file, Final report layout, analysis and results, achievement of objectives, presentation/ viva)

It is recommended that the Final evaluation should be carried out by a panel of evaluators.



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CLIMATE SCIENCE

Programme Structure

Course Code	Course Title	Lecture (L) Hours Per Week	Tutorial (T) Hours Per Week	Practical (P) Hours Per Week	Total Credits
AST2151	Basics of Climate Science	3	-	-	3
AST2251	Introduction to Earth System Science Editing	3	-	-	3
AST2351	Cloud Microphysics and Chemistry	3	-	-	3
AST2451	Climate Change: Impact, Vulnerability and Adaption Foundations	3	-	-	3
AST2551	Primer of Oceanography Psychology	3	-	-	3
AST2651	Fundamentals of Climate Variability and Modeling	3	-	-	3
TOTAL					18



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CLIMATE SCIENCE

Syllabus - Semester First

BASICS OF CLIMATE SCIENCE

Course Code: AST2151

Credit Units: 03

Course Objectives:

The aim of this course is to provide the students a basic understanding about the climate system: its attributes, underlying processes, and the drivers of climate change. Knowledge of various components of climatic system, and their interactions with atmosphere/hydrosphere/lithosphere would further create interest amongst the students about the climate system modelling and climatic vulnerability. This course emphasizes the scientific basis for anthropogenic climate change. Students will learn the physics behind the climate system, how climate has changed in the past and reasons why contemporary climate change is different, the scientific basis for anthropogenic climate change theory and how scientists use models to predict future climate. The course will also provide an overview of the physical, ecological, biological, social and economic impacts of climate change. Finally, students will examine various mitigation and adaptation strategies which society can employ in a warmer world.

Course Contents:

Module I: Introduction to Climate Science and its Components

Fundamentals of meteorology; Vertical profiles of temperature, wind, pressure, water vapor, and microphysical processes in the atmosphere; Climate system and interaction among components (atmosphere, oceans, sea, ice and land surface) of climate system and feedback mechanisms; Atmospheric thermodynamics, radiation in the atmosphere, Greenhouse gases and climate forcing; Overview of weather systems: Extreme weather events and Western disturbance.

Module II: Remote Sensing Techniques

Types of remote sensing; Different remote sensing platforms; Principles of Remote Sensing; Radiometer, Lidar, Radar, Sodar, Sonar, Land-atmosphere-ocean satellites; Calibration and validation methods.

Module III: Climatology and Meteorology

Radiation budget and balance; Solar constant; Lapse rate and stability; Water cycle and role in weather; Mechanism of wind development; Fundamental forces (pressure gradient, centrifugal, gravity, Coriolis); Surface winds and upper air circulations; Jet streams; Planetary circulations.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	15	5	5	70

A-Attendance; CT-Class Test; S/V/Q-Seminar/Quiz/Viva; HA-Home Assignment; EE-End Semester Examination


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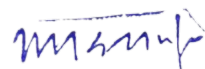

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- Marshall J. and plumb R.A.(2001) Atmosphere, Ocean and Climate, Elsevier, Amsterdam
- Climate Change Science: An analysis of some ket questions- National Academy Press, Washington, DC,2001.
- Oliver J.E. and Hidore J.J.(2008) Climatology:An Atmospheric Science, Prentice - Hall
- Atmospheric Thermodynamics by Bohren and Albrecht.
- IPCC(2001 and 2007) Working group I report” The physical basis of climate change”
- Remote Sensing : Principles and Interpretation, by Floyd F. Sabins, 3rd edition (August 1996).
- W H Freeman & Co.; ISBN: 0716724421.
- Remote Sensing and Image Interpretation, by Thomas M. Lillesand, Ralph W. Kiefer, 4th edition (October 1999) , John Wiley & Sons; ISBN: 0471255157.
- Remote Sensing : Models and Methods for Image Processing, by Robert A. Schowengerdt, 2ndedition (July 1997), Academic Pr; ISBN: 0126289816.
- Principles of Paleoclimtology, Ed. Thomas M. Cronin, Columbia University, USA.



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Syllabus - Semester Second

INTRODUCTION TO EARTH SYSTEM SCIENCE

Course Code: AST2251

Credit Units: 03

Course Objectives:

This course embraces chemistry, biology, mathematics and applied sciences in transcending disciplinary boundaries to treat the Earth as an integrated system. Thus, it imparts knowledge to the students with basic understanding of the physico-chemical, biological and human interactions that determine the past, current and future states of the Earth. Earth system science seeks to integrate various fields of academic study to understand the Earth as a system. It considers interaction between the atmosphere, hydrosphere, lithosphere, biosphere and heliosphere.

Further, the Earth System Science program provides students with a fundamental understanding of the oceanographic, atmospheric, and terrestrial sciences. This program of study prepares students for careers in science, research, or technical fields. Students learn to apply basic sciences (physics, chemistry, mathematics, and biology) to understand the major processes and systems governing the Earth's climate, biogeochemical cycles, and global change. Central to the B.S. program is an understanding of relevant scientific literature, methods to collect/analyze data, and interpret results in the context of scientific theory. Students will learn to work collaboratively to understand and address complex problems and communicate scientific knowledge. Through the core course work, students will learn to explain the current and projected future state of the Earth system in the context of past climate change and current human activities.

Course Contents:

Module I: Fundamental Processes in Earth and Environmental Studies

An introduction to the physical environment, biological systems, and human-environmental interactions, Physical principles such as fluid transport and reaction rates using environmental examples as well as principles of populations, ecosystems, carrying capacity, and sustainable use of resources.

Module II: Hurricanes, Tsunamis and other Catastrophes

Introduction to the basic science and state of predictability of various natural catastrophic events such as hurricanes, tsunamis and volcanoes, future climate catastrophes including severe droughts, abrupt climate change, thermohaline circulation collapse and sea level rise.


Module III: Remote Sensing and Geographic Information System (GIS) for Earth System Science

Principles behind remote sensing, and the types of satellite data available for study of the oceans, land, and atmosphere, GIS Brief History, Techniques and Technology, Uncertainties, Spatial Analysis.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	15	5	5	70

A-Attendance; CT-Class Test; S/V/Q-Seminar/Quiz/Viva; HA-Home Assignment; EE-End Semester Examination


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References:

- The Blue Planet: An Introduction to Earth System Science, 3rd Edition, Brian J. inner, Barbara W. Murck, December 2010, ©201
- Maliene V, Grigonis V, Palevičius V, Griffiths S (2011). "Geographic information system: Old principles with new capabilities". *Urban Design International* 16 (1). pp. 1–6. doi:10.1057/udi.2010.25.
- Goodchild, Michael F (2010). "Twenty years of progress: GIScience in 2010". *Journal of Spatial Information Science*. doi:10.5311/JOSIS.2010.1.2
- Fu, P., and J. Sun. 2010. *Web GIS: Principles and Applications*. ESRI Press. Redlands, CA. ISBN 1-58948-245-X.
- Tim Foresman 1997 The History of GIS (Geographic Information Systems): Perspectives from the Pioneers. (Prentice Hall Series in Geographic Information Science) Prentice Hall PTR; 1st edition (November 10, 1997), 416 p.
- Coppock, J. T., and D. W. Rhind, (1991). The history of GIS. *Geographical Information Systems: principles and applications*. Ed. David J. Maguire, Michael F. Goodchild and David W. Rhind. Essex: Longman Scientific & Technical, 1991. 1: 21–43. "The history of GIS." Retrieved 2013-12-20.



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Syllabus - Semester Third

CLOUD MICROPHYSICS AND CHEMISTRY

Course Code: AST2351

Credit Units: 03

Course Objectives:

This course focuses on understanding how transformation of aerosol particles to droplets or ice crystals, heterogeneous chemistry and acid rain, physics of aerosol and cloud element motion, the interaction of particles with water vapor, chemical composition of particles and the effect on cloud formation processes, and the effect of cloud processing on aerosol chemistry, geo-engineering, weather modification and volcanic effects. Thus, it provides the students an insight into one of the important complex drivers of the local/regional/continental/hemispheric/global climate system.

Course Contents

Module I: Basic Cloud Physics

Water vapour and its thermodynamic effects, mixing and convection, formation of cloud droplets, formation and growth of ice crystals, aerosol sources and sizes, condensation and growth of cloud droplets: curvature, Kelvin, solute effects, cloud growth and precipitation, rain, snow and hail processes.

Module II: Microphysical Processes in warm and cold clouds

Cloud condensation nuclei, microstructures of warm clouds, growth of cloud droplets in warm clouds, growth by condensation and collision-coalescence, microphysics of cold clouds, growth by collection, modification of warm and cold clouds, lightning and thunder.

Module III: Cloud and Precipitation Chemistry

Transport of particles and gases, nucleation scavenging, dissolution of gases in clouds droplets, precipitation scavenging, chemical composition of rain, production of aerosols by clouds.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	15	5	5	70

A-Attendance; CT-Class Test; S/V/Q-Seminar/Quiz/Viva; HA-Home Assignment; EE-End Semester Examination

References

- Atmospheric Science-An Introductory Survey, 2nd Edition, Eds. John M. Wallace and Peter V. Hobbs, University of Washington, 2006, Elsevier Inc.
- The Physics of Clouds, Ed. B.J. Mason, Oxford University Press, Oxford, 1971.
- A Short Course in Physics, Eds. R.R. Rogers and M.K. Yau, 3rd Edition, 1989, Pergamon Press, Oxford.



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Syllabus - Semester Fourth

CLIMATE CHANGE: IMPACT, VULNERABILITY AND ADAPTATION

Course Code: AST2451

Credit Units: 03

Course Objectives:

This course provides the students with an introduction to the vulnerability of climate change and potential adaptation options of natural as well as social systems. A critical view will be laid on the 'attribution problem', the prioritization of adaptation means, mal-adaptations, the implementation problem, ethical views and conflicts with development goals. Win-win-situations and trade-offs between the latter and climate change adaptation is part of this course too.

Course Contents

Module I: Introduction to the Impacts of Climate Change

Fundamentals of climate system and climate change, brief summary of Inter-Governmental Panel of Climate and Climate Change (IPCC) reports, future directions for mitigation processes.

Module II: Vulnerability

Introduction to the concept, ecological and social systems, coastal vulnerability, methods of evaluation of vulnerability and impacts.

Module III: Adaptation

Introduction to the concept, indicators of adaptation, options and limits of adaptation, food and energy security, autonomous versus planned adaptation, adaptation capacity.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	15	5	5	70

A-Attendance; CT-Class Test; S/V/Q-Seminar/Quiz/Viva; HA-Home Assignment; EE-End Semester Examination

References

- McMichael, A.J., Cambell-Lendrum, D.H., Corvalan, C.F., Ebi, K.L., Githeko, A.K., Scheraga, J.D., Woodward, A. (Eds.) 2003, Climate change and human health –Risks and Responses, Geneva, World Health Organization.
- Reckien, D., Hofmann, S., Kit, O., 2009: Qualitative Climate Change Impact Networks for Hyderabad/India. Report from the Project: Hyderabad as a megacity of tomorrow: Climate and energy in a complex transition towards sustainable Hyderabad- Mitigation and adaptation strategies by changing institutions, Governance structures, life styles and consumption patterns. Institute for Climate Research, 2009.
- Roy, J., 2006: The economics of Climate change. A review of studies in the context of South Asia with a special focus on India.
- Jerneck, A., Olsson, L., 2008: Adaptation and the poor, development, resilience and transition, Climate Polity, 8, 170-182.

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Syllabus - Semester Fifth

PRIMER OF OCEANOGRAPHY

Course Code: AST2551

Credit Units: 03

Course Objectives:

Ocean-related science is relevant to many contemporary environmental issues and problems and central to understanding earth-system evolution, dynamics, climate and sustainability. This course offers a very flexible curriculum that serves students with a broad range of educational and career interests including environmental management and regulation, environmental law. The topics selected for this course, are expected to provide the students with a broad conception of the world's oceans; evaluation of its potential contributions to solution of problems presently confronting mankind.

Course Contents

Module I: Ocean Properties

Introduction to Oceans, physical and chemical properties of ocean water, composition of sea water, salinity and density.

Module II: Physical Oceanography

Thermal expansion of sea water, viscosity, surface tension, heat conduction, adiabatic temperature changes, optical properties, temperature-salinity relationship,

Module III: Bathymetry, Eco Systems and Pollution

Basic definition, oceanic life and ecosystems, measurement techniques, bathymetric chart, fish-zone detection, marine pollution.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	15	5	5	70

A-Attendance; CT-Class Test; S/V/Q-Seminar/Quiz/Viva; HA-Home Assignment; EE-End Semester Examination

References

- Baker D.J. 1981. Ocean instruments and experiment design. In Evolution of Physical Oceanography: Scientific Surveys in Honor of Henry Stommel. Edited by B. A. Warren and C. Wunsch. 396–433. Cambridge: Massachusetts Institute of Technology Press.
- Bennett A.F. 1992. Inverse Methods in Physical Oceanography. Cambridge: University Press.
- Philander S.G. 1990. El Niño, La Niña, and the Southern Oscillation. Academic Press.
- Ahn, YH; Hong, GH; Neelamani, S; Philip, L and Shanmugam, P (2006) Assessment of Levels of coastal marine pollution of Chennai city, southern India. Water Resource Management, 21(7), 1187-1206.
- Daoji, L and Dag, D (2004) Ocean pollution from land-based sources: East China sea. AMBIO – A Journal of the Human Environment, 33(1/2), 107-113.
- Laws, Edward A (2000) Aquatic Pollution John Wiley and Sons. ISBN 978-0-471-34875-7
- Slater, D (2007) Affluence and effluents. Sierra 92(6), 27
- UNEP/GPA (2006) The State of the Marine Environment: Trends and processes United Nations Environment Programme, Global Programme of Action, The Hague. 2006 ISBN 92-807-2708-7.
- UNEP (2007) Land-based Pollution in the South China Sea. UNEP/GEF/SCS Technical Publication No 10.

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Syllabus - Semester Sixth

FUNDAMENTALS OF CLIMATE VARIABILITY AND MODELLING

Course Code: AST2651

Credit Units: 03

Course Objectives:

This course essentially deals with fundamentals of climate variability and its modelling. This knowledge to the students makes them familiar with different types of climate models available not only for prediction purposes but also to undertake sensitivity tests and to simulate the future climate scenarios both regionally and globally.

Course Details

Module I: Climate Variability

Natural variability versus anthropogenic forcing to climate system, climate sensitivity, Greenhouse gases and global warming,

Module II: Climate Drivers

Climate Global distributions of temperature, precipitation, precipitation, climate classification, Natural and external forcings to climate variability,

Module III: Basics of Climate Modelling

Simple energy balance climate models, introduction to coupled ocean-atmosphere models, simple models for predicting climate change and impact assessment.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	15	5	5	70

A-Attendance; CT-Class Test; S/V/Q-Seminar/Quiz/Viva; HA-Home Assignment; EE-End Semester Examination

References

- Climate Change and Climate Modelling, Ed. J. David Neelin, 2011.
- An Introduction to Three-dimensional Climate Modelling, Eds. Warren M. Washington and Clarie L. Parkinson, 2005.



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ENVIRONMENTAL HEALTH & CLIMATE

Programme Structure-2021

Course Code	Course Title	Lecture (L) Hours Per Week	Tutorial (T) Hours Per Week	Practical (P) Hours Per Week	Total Credits
AST2152	Linkages between Environment & Health	3	-	-	3
AST2252	Climate Change and Implications on Public Health	3	-	-	3
AST2352	Diseases in Contemporary Society	3	-	-	3
AST2452	Air, Water and Soil Pollution, Environmental Health Professions	3	-	-	3
AST2552	Ground-based and Satellite Remote Sensing	3	-	-	3
AST2652	Instrumentation Lab	-	-	6	3
	TOTAL				18



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Background

The program describes health issues, originated by air/water/soil pollution, scientific understanding of causes and possible approaches to mitigate and control the major environmental health problems in automobile/industry sectors of developing countries. Finally, the course addresses the pathways that connect pollution, human health and climate change at local/regional/global scale. Topics illustrate how the human body reacts with environmental pollutants; physicochemical, dynamical and biological agents of environmental contamination; vectors for dissemination (air, water, soil); solid and hazardous waste; susceptible populations; biomarkers, risk analysis and climate change; the scientific basis for policy decisions; and emerging global environmental health problems. This course also emphasizes the feedback mechanisms and pathways that interplay between air pollution, human health and climate parameters over different environments in a cohort hybrid seamless model, emphasizing integrated approach.

Objectives

Advancing Environmental Health and Climate (EHC) encompasses the study of all levels of biological organization, biochemical pathways, population at all stages across the lifespan, and climate change. EHC uses a rich, diverse, and constantly evolving set of outdoor/indoor observational, experimental, computational, and clinical approaches to explore the impacts of varying levels of exposure and susceptibility to such exposure. The support of novel, cutting-edge research approaches, high risk for high reward, and mitigation methods is an important element of the advancing EHC theme in this program.



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ENVIRONMENTAL HEALTH & CLIMATE

Syllabus - Semester First

LINKAGES BETWEEN ENVIRONMENT & HEALTH

Course Code: AST2152

Credit Units: 03

Course Objectives: To teach students the essential concepts on environment-related health problems, such as asthma and neurological damage from lead exposure, affect children disproportionately. A number of efforts are under way around the nation to educate children about the concepts and principles of environmental health with the goal of expanding science education, empowering children to avoid some adverse environmental exposures, and helping them to grow in to informed citizens who can assess and affect important public health issues.

Course Contents

Module-I: Environment and Public Health

The environment at risk: Converging paradigms for environmental health theory and practice; Understanding linkages between Environment and Public Health: Effect of quality of air, water and soil on health. The Bhopal disaster and its aftermath: are views.

Module II: Human Health Exposure Effects

Ecosystems and Human well-being: Synthesis; Human exposure assessment; Introduction to Bio-monitoring and bio-markers; Exposure assessment; Perspective on Individual health: Nutritional, socio-cultural and developmental aspects, Dietary diversity for good health; Human developmental indices for public health.

Module III: Human Health Risks Assessment

Introduction to environmental hazards and their effects on human health and ecosystems; Health effects of chemical exposure. Known's and unknowns on burden of disease due to chemicals: A systematic review; Cancer-Causing Substances in the Environment. Quantifying selected major risks to health: Selected Occupational risks.

Examination Scheme

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage(%)	7	10	8	5	70

CT: Class Test, H: Home Assignment, P/V/Q: Presentation/Viva/Quiz, A: Attendance, EE: End Semester Examination


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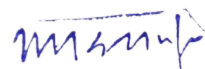

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Suggested Text books/ References

- Adhikari, S.K., 2019: *A Textbook of Environmental Health*, 1st Edition, ISBN: 9789937710305, Samiksha Publication, 420p.
- Bradford, B. and Gwynne, M.A., 2012: *Down to Earth: Community Perspectives on Health, Development and the Environment*, Kumarian Press Library of Management for Development, ISBN-13: 978-1565490505.
- World Health Organization and United Nations, 2017: *Environment Programme Health Environment: Managing the Linkages for Sustainable Development* (Synthesis Report(WHO))1st Edition, ISBN-13: 978-9241563727.
- Kaufmann, R.K. and Cleveland, C.J., 2018: *Earth and Environmental Sciences*, ISBN: 978-1-63097-030-7.



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Syllabus - Semester Second

CLIMATE CHANGE AND IMPLICATIONS ON PUBLIC HEALTH

Course Code: AST2252

Credit Units: 03

Course Objectives: This course intends to educate students about basic principles behind the climate change and public health. Emphasis will be given to how the changes in weather and climate parameters, especially the episodic events influence human health and vice versa.

Course Contents

Module-I: Human Influence on Climate

Global warming- Agricultural practices (chemical agriculture) and Industrial technologies (use of non-biodegradable materials like plastics, aerosols, refrigerants, pesticides); Manifestations of climate change on Public Health-Burning of fossil fuels, automobile emissions and acid rain.

Module-II: Local/ Regional Climate Feedbacks on Human Health

Changes in the greenhouse gas concentrations and other drivers that alter the global climate and bring about myriad human health consequences. Environmental consequences of climate change, such as extreme heat waves, rising sea-levels, changes in precipitation, resulting in flooding and droughts, intense hurricanes, and degraded air quality, affect directly and indirectly the physical, social, and psychological health of humans.

Module-III: Cohort Studies of Weather/ Climate and Health Relationship

Changes in precipitation: availability and quantity of water, underlying extreme weather events such as intense hurricanes and flooding. Climate change: a driver of disease migration, as well as exacerbate health effects resulting from their lease of toxic air pollutants invulnerable populations such as children, the elderly, and those with asthma or cardiovascular disease, Cohort Studies.

Examination Scheme

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage(%)	7	10	8	5	70

CT: Class Test, H: Home Assignment, P/V/Q: Presentation/Viva/Quiz, A: Attendance, EE: End Semester Examination

Suggested Textbooks/ References

- Levy, B.S.and Patz,J.,2015:*ClimateChangeandPublicHealth*,OxfordUniversityPress,405p.
- J. McMichael, D.H. Campbell-Lendrum, C.F.Corvalan, K.L.Ebi, A.Githeko, J.D.Scheraga, A.Woodwar,2015: *Climate Change and Human Health: Risks and Reponses*.
- Patz,J.andLevy,B.S.,2017:*ClimateChangeandAirPollution:TheImpactonHumanHealthin Developed and Developing Countries*, 428p.
- Ebi,K.L.andMenne,B.2006:*ClimateChangeandAdaptationStrategiesforHumanHealth*,
- Ebi,K.L.andMenne,B.,2011:*ModelingtheHealthRisksofClimateChange:WorkshopSummary*
- Ebi,K.L.andMenne,B.2013:*ClimateChangeandHumanWell-Being:GlobalChallengesand Opportunities*

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Syllabus - Semester Third

DISEASES IN CONTEMPORARY SOCIETY

Course Code: AST2352

Credit Units: 03

Course Objectives: This course deals with different types of diseases including communicable ones that are primarily caused by particulate and gaseous pollutants. Several pollutants and corresponding health problems will be delineated. Necessary precautions required to be taken for reducing the health problems will be explained.

Course Contents

Module-I: Health-Susceptibility Relationship

Need for good health-factors affecting health; Types of diseases-deficiency, infection, pollution diseases-allergies, epidemiological, cardiovascular, COPD including non-smokers and cancer; Personal hygiene-food - balanced diet; Food habits and cleanliness; food adulterants, avoiding smoking, drugs and alcohol, Physiology.

Module-II: Biomarkers and Different Diseases

Stem cells and Immune cells, DNA/RNA, Biological Processes, Spirometry, Communicable diseases: Mode of transmission epidemic and endemic diseases; Management of hygiene in public places - Railway stations, Bus stands and other public places; Infectious diseases: Role of sanitation and poverty case studies on TB, diarrhea, malaria, viral diseases. Non-communicable diseases: Role of Life style and built environment; Diabetes and Hypertension.

Examination Scheme

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage(%)	7	10	8	5	70

CT: Class Test, H: Home Assignment, P/V/Q: Presentation/Viva/Quiz, A: Attendance, EE: End Semester Examination

Suggested Textbooks/ References

- Broer,T.,2014: Putting an ameto it: diagnosis in contemporary society, *Disease Control Prioritiesin Developing Countries*.2nd edition,352p.
- Weather all, D., Greenwood, B., Chee, H.L. and Wasi, P., 2015: *Science and Technology for Disease Control: Past, Present, and Future*.
- Barkan,S.E., 2017: *Health, Illness, and Society: An Introduction to Medical Sociology*, Rowman & Little field Publishers, ISBN: 9781442234994.



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Syllabus - Semester Fourth

AIR, WATER AND SOIL POLLUTION, ENVIRONMENTAL HEALTH PROFESSIONS

Course Code: AST2452

Credit Units: 03

Course Objectives: This course will provide students with an understanding and appreciation of the complex interactions between microbial air, water and soil quality and human health. The broad objectives of this course cover (i) impact of both primary and secondary (gas-to-particle conversion) particles on morbidity and mortality of human health and pre-mature deaths, (ii) how the quality of water is affected by natural, seasonal, accidental, intentional and man-made activities, (ii) how the contaminated water increases the burden of human diseases with particular emphasis on infectious diseases, (iii) Industrial processes including mining and manufacturing that lead to cause of soil pollution.

Course Contents

Module-I: Interface Between Indoor and Outdoor Pollution

Indoor and outdoor air pollutants; sources and effects of pollutants in the atmospheric environment; Particulate matter and atmospheric visibility; Atmospheric diffusion theories and types of dispersion models; Lapse rates and various types of stability classification; Wind profile; Wind roses; Mixing depth.

Module-II: Air Pollution and Emission Inventory

General characteristics of the stack plumes; Dispersion of pollutants in the atmosphere and solution of advection diffusion equation with Gaussian distribution for point, line and area sources; plume rise; dispersion parameters and various methods of their evaluation; Atmospheric Removal processes and residence time; Effect of buildings and topography on dispersion; Similarity theory and profiles in the surface layer; Air Quality and Emission standards, their measurements and statistics; Air quality and environmental health.

Module-III: Water Pollution and Purification

Understanding of the significance of the environment for human health; Human population pressures and pollution dynamics; Common terms and definitions in water quality; Aquatic resources of the world & Sources of drinking water -Common contaminants of drinking water and linkages to disease; Non-point source pollution.

Module-IV: Soil Pollution-Causes and Mitigation

Soil contamination from abandoned industrial sites; Ants in to the environment, Improper disposal of house hold waste; Garbage and personal waste that leaks from sewer systems; pollution due to aged waste decompose; pollution due to plastic products like water bottles, bags and diapers. Risings use of chemicals in agriculture; toxic soil issues from industries and agricultural activities; contributions from pesticides and fertilizers, Increase in toxicity and reduction in fertility.

Examination Scheme

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage(%)	7	10	8	5	70

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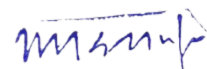
CT: Class Test, H: Home Assignment, P/V/Q: Presentation/Viva/Quiz, A: Attendance, EE: End Semester Examination

Suggested Textbooks/ References

- Maynard, R., Stephen, H., Koren, Samel, J. (Editors) 1999: *Air Pollution and Health*, ISBN: 978012352358, Academic Press, 1065p.
- Daniel, V., 2014: *Fundamentals of Air Pollution*, 5th Edition, ISBN: 9780124017337, Academic Press, 996p.
- Robert, F.P. Phalen, Phalen, R.N. Robert N. Phalen, 2013: *Introduction to Air Pollution Science: A Public Health Perspective*, 331p
- Blumenthal, D. S., and Ruttenger, A. J. (1995). *Introduction to environmental health*. Second Edition. New York: Springer.
- Friis, Robert H. 2007: *Essentials of Environmental Health*. Jones and Bartlett, MA, 390 p.
- Frumkin, Howard 2005 *Environmental Health: From Global to Local*, Jossey-Bass, San Francisco, CA, 1108 p.
- Gasana J., 2003, *Essentials of Environmental Health Management*. Aglob Publishing, Hallandale Beach, FL. 749p.
- Yassi, A., Kjellstrom, T., deKok, T., Guidotti, T.L. (2001). *Basic environmental health*. New York: Oxford University Press.



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Syllabus - Semester Fifth

GROUND-BASED AND SATELLITE REMOTE SENSING

Course Code: AST2552

Credit Units: 03

Course Objectives: The course will make the students aware about various passive and active remote sensing sensors and techniques used now-a-days for observing the weather and climate system. The lectures will focus on the fundamentals of retrievals of various geophysical parameters and interpretation of remote sensing data.

Course Contents

Module-I: Aerial Mapping

Introduction & history to Aerial Photography; vantage points, vertical & oblique aerial photography; Planning; Elements of visual image interpretation; Geometry of aerial photography, photogrammetry; Relief displacement; Stereos copy; Parallax.

Module-II: Multi-Platform Remote Sensing

Definition, history; Electromagnetic radiation, atmospheric windows, atmospheric bands; Orbits sun-synchronous, geo-synchronous; Resolution spectral, spatial, radiometric, temporal; Multispectral & Hyper spectral remote sensing; Satellite remote sensing missions; Active & Passive remote sensing, RADAR, LIDAR; Applications – soil, water, vegetation, air, urban landscape.

Module-III: Geographical Information System (GIS)

Introduction to GIS, Management of data, GIS as DBMS, Data types – vector & raster, Data manipulation and analysis; Components of GIS; Structure of GIS; Digital Elevation Models; Triangulated Irregular Network; GIS applications; Global Positioning System.

Examination Scheme

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage(%)	7	10	8	5	70

CT: Class Test, H: Home Assignment, P/V/Q: Presentation/Viva/Quiz, A: Attendance, EE: End Semester Examination

Suggested Textbooks/ References:

- Kenneth Bowman(Editor), *Satellite Meteorology and Atmospheric Remote Sensing: An Introduction 1st Edition*, Ping Yang (Author), 2015, Wiley-VCH Publishers
- B C Panda, *Remote Sensing: Principles and Applications*, 2008.



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Syllabus - Semester Sixth

INSTRUMENTATION LAB

Course Code: AST2652

Credit Units: 03

Course Objectives: This course essentially deals with different experimental methods, data acquisition and retrieval algorithms being used in environmental pollution, Health risks and Climate Change studies. Special emphasis will be given to the students to get familiarized with latest advancements in ground-based and satellite remote sensing techniques.

Course Content

High Volume Sampler; AAS (Atomic Absorption Spectroscopy); ICPMS (Inductively Coupled Plasma Mass Spectrometry); HPLC (High-Performance Liquid Chromatography); GC/IC (Gas and Ion Chromatography), Sun-Sky Radiometers; Real-Time EC-OC Analyzers; RADAR, LIDAR, SODAR and SONAR; Satellite Remote Sensing Techniques.

Examination Scheme

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA–Internal Assessment, EE-External Exam, PR-Performance, LR-Lab Record, V– Viva.

Suggested Textbooks/ References

- Bernstein, D.M. et al., 1976: A High-Volume Sampler for the Determination of Particle Size Distributions in Ambient Air, *Journal of the Air Pollution Control Association*, 26(11), DOI:10.1080/00022470.1976.10470362.
- Tsao, R. and Yang, R., 2003: Optimization of a new mobile phase to know the complex and real poly phenolic composition: towards a total phenolic index using high- performance liquid chromatography, *Journal of Chromatography*, 1018,29-40.
- Kumar, S., Devara, P.C.S., Dani, K.K., Sonbawne, S.M. and Saha, S.K., 2011:Sun- sky radiometer derived column -integrated aerosoloptical and physical properties over atropical urban station during 2004–2009,*Journal of Geophysical Research (Atmospheres)*,doi.org/ 10.1029/ 2010 JD014944
- Brown, S. et al., 2019: Review of Sunset OC/EC instrument measurements during the EPA’s Sunset evaluation Project, *Atmosphere*, 10,287.
- Armando, D., Anabela, C. and Teresa, R-S., 2017: *Soil Pollution*, 1st Edition, ISBN: 9780128498729, AcademicPress, 327p.



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ENVIRONMENTAL MANAGEMENT

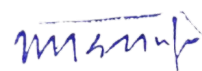
Programme Structure

Course Code	Course Title	Lectures (L) Hours per week	Tutorial (T) Hours per week	Practical (P) Hours per week	Total Credits (16)
ENV2151	Environmental Studies-I *	2	0	0	2
ENV2251	Environmental Studies-II *	2	0	0	2
ENV2152	Environmental Studies *	4	0	0	4
ENV2252	Environmental Studies *	4	0	0	4
ENV2351	Environmental Pollution and Waste Management	3	0	0	3
ENV2451	Environmental Management and Industrial Safety	3	0	0	3
ENV2551	Environmental Economics and Globalization	3	0	0	3
ENV2651	Sustainable Development Practices	3	0	0	3

(* Environmental Studies is mandatory for all undergraduate courses and is taught in three different schemes during first year)



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ENVIRONMENTAL MANAGEMENT

Syllabus - Semester First

ENVIRONMENTAL STUDIES-I

Course Code: ENV2151

Credit Units: 02

Course Objective:

The term environment is used to describe, in the aggregate, all the external forces, influences and conditions, which affect the life, nature, behaviour, growth, development, and maturity of living organisms. At present a great number of environmental issues, have grown in size and complexity day by day, threatening the survival of mankind on earth. A study of environmental studies is quite essential for handling environmental disasters and industrial management. The objective of environmental studies is to enlighten the masses about the importance of the protection and conservation of our environment and control of human activities which has an adverse effect on the environment.

Course Contents:

Module I: The multidisciplinary nature of environmental studies

Definition, scope and importance, Need for public awareness

Module II: Natural Resources - Renewable and non-renewable resources

Natural resources and associated problems

Forest resources: Use and over-exploitation, deforestation, case studies, timber extraction, mining, dams and their effects on forests and tribal people.

Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems.

Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies.

Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies.

Energy resources: Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources, case studies.

Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification.

- Role of an individual in conservation of natural resources.
- Equitable use of resources for sustainable lifestyles.

Module III: Ecosystems

Concept of an ecosystem: Structure and function of an ecosystem, producers, consumers and decomposers, energy flow in the ecosystem, ecological succession, food chains, food webs and ecological pyramids, introduction, types, characteristic features, structure and function of the following ecosystems:

- a. Forest ecosystem
- b. Grassland ecosystem
- c. Desert ecosystem
- d. Aquatic ecosystems (ponds, streams, lakes, rivers, ocean estuaries)


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Module IV: Biodiversity and its conservation

Introduction – Definition: genetic, species and ecosystem diversity, biogeographical classification of India, value of biodiversity: consumptive use, productive use, social, ethical aesthetic and option values, biodiversity at global, national and local levels, India as a mega-diversity nation, hot-spots of biodiversity, threats to biodiversity: habitat loss, poaching of wildlife, man wildlife conflicts, endangered and endemic species of India, conservation of biodiversity: in-situ and ex-situ conservation of biodiversity.

Examination Scheme:

Components	CT	HA	S/V/Q	A	EE
Weightage (%)	15	5	5	5	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, A: Attendance, EE: End Semester Examination

Text & References:

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Syllabus - Semester Second

ENVIRONMENTAL STUDIES-II

Course Code: ENV2251

Credit Units: 02

Course Objective:

The term environment is used to describe, in the aggregate, all the external forces, influences and conditions, which affect the life, nature, behaviour, growth, development, and maturity of living organisms. At present a great number of environmental issues, have grown in size and complexity day by day, threatening the survival of mankind on earth. A study of environmental studies is quite essential for handling environmental disasters and industrial management. The objective of environmental studies is to enlighten the masses about the importance of the protection and conservation of our environment and control of human activities which has an adverse effect on the environment.

Course Contents:

Module I: Environmental Pollution

Definition, causes, effects, and control measures of: air pollution, water pollution, soil pollution, marine pollution, noise pollution, thermal pollution, and nuclear pollution.

Solid waste management: causes, effects and control measures of urban and industrial wastes, role of an individual in prevention of pollution, pollution case studies, disaster management: floods, earthquake, cyclone, and landslides.

Module II: Social Issues and the Environment

From unsustainable to sustainable development, Urban problems related to energy

Water conservation, rain water harvesting, and watershed management

Resettlement and rehabilitation of people, its problems and concerns, case studies

Environmental ethics: issues and possible solutions

Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust, case studies

Wasteland reclamation

Consumerism and waste products

Environmental Protection Act, Air (Prevention and Control of Pollution) Act, Water (Prevention and control of Pollution) Act, Wildlife Protection Act, Forest Conservation Act, Issues involved in enforcement of environmental legislation, Public awareness

Module III: Human Population and the Environment

Population growth, variation among nations

Population explosion – Family Welfare Programmes, Environment and human health

Human Rights, Value education, HIV/ AIDS, Women and child welfare

Role of information technology in environment and human health, Case studies

Module IV: Field Work

Visit to a local area to document environmental assets-river/ forest/ grassland/ hill/ mountain

Visit to a local polluted site – urban / rural / industrial / agricultural

Study of common plants, insects, and birds

Study of simple ecosystems-pond, river, hill slopes, etc (Field work equal to 5 lecture hours)


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Examination Scheme:

Components	CT	HA	S/V/Q	A	EE
Weightage (%)	15	5	5	5	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, A: Attendance, EE: End Semester Examination

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Syllabus - Semester First / Second

ENVIRONMENTAL STUDIES

Course Code: ENV2152 / ENV2252

Credit Units: 04

Course Objective:

The term environment is used to describe, in the aggregate, all the external forces, influences and conditions, which affect the life, nature, behaviour, growth, development, and maturity of living organisms. At present a great number of environmental issues, have grown in size and complexity day by day, threatening the survival of mankind on earth. A study of environmental studies is quite essential for handling environmental disasters and industrial management. The objective of environmental studies is to enlighten the masses about the importance of the protection and conservation of our environment and control of human activities which has an adverse effect on the environment.

Course Contents:

Module I: The multidisciplinary nature of environmental studies

Definition, scope and importance, Need for public awareness

Module II: Natural Resources - Renewable and non-renewable resources

Natural resources and associated problems

Forest resources: Use and over-exploitation, deforestation, case studies, timber extraction, mining, dams and their effects on forests and tribal people.

Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems.

Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies.

Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies.

Energy resources: Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources, case studies.

Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification.

- Role of an individual in conservation of natural resources.
- Equitable use of resources for sustainable lifestyles.

Module III: Ecosystems

Concept of an ecosystem: Structure and function of an ecosystem, producers, consumers and decomposers, energy flow in the ecosystem, ecological succession, food chains, food webs and ecological pyramids, introduction, types, characteristic features, structure and function of the following ecosystems:

- a. Forest ecosystem
- b. Grassland ecosystem
- c. Desert ecosystem
- d. Aquatic ecosystems (ponds, streams, lakes, rivers, ocean estuaries)

Module IV: Biodiversity and its conservation

Introduction – Definition: genetic, species and ecosystem diversity, biogeographical classification of India, value of biodiversity: consumptive use, productive use, social, ethical aesthetic and option values, biodiversity at global, national and local levels, India as a mega-diversity nation, hot-spots of


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biodiversity, threats to biodiversity: habitat loss, poaching of wildlife, man wildlife conflicts, endangered and endemic species of India, conservation of biodiversity: in-situ and ex-situ conservation of biodiversity.

Module V: Environnemental Pollution

Definition, causes, effects, and control measures of: air pollution, water pollution, soil pollution, marine pollution, noise pollution, thermal pollution, and nuclear pollution.

Solid waste management: causes, effects and control measures of urban and industrial wastes, role of an individual in prevention of pollution, pollution case studies, disaster management: floods, earthquake, cyclone, and landslides.

Module VI: Social Issues and the Environment

From unsustainable to sustainable development, Urban problems related to energy

Water conservation, rain water harvesting, and watershed management

Resettlement and rehabilitation of people, its problems and concerns, case studies

Environmental ethics: issues and possible solutions

Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust, case studies

Wasteland reclamation

Consumerism and waste products

Environmental Protection Act, Air (Prevention and Control of Pollution) Act, Water (Prevention and control of Pollution) Act, Wildlife Protection Act, Forest Conservation Act, Issues involved in enforcement of environmental legislation, Public awareness

Module VII: Human Population and the Environment

Population growth, variation among nations

Population explosion – Family Welfare Programmes, Environment and human health

Human Rights, Value education, HIV/ AIDS, Women and child welfare

Role of information technology in environment and human health, Case studies

Module VIII: Field Work

Visit to a local area to document environmental assets-river/ forest/ grassland/ hill/ mountain

Visit to a local polluted site – urban / rural / industrial / agricultural

Study of common plants, insects, and birds

Study of simple ecosystems-pond, river, hill slopes, etc (Field work equal to 5 lecture hours)

Examination Scheme:

Components	CT	HA	S/V/Q	A	EE
Weightage (%)	15	5	5	5	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, A: Attendance, EE: End Semester Examination

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Syllabus - Semester Third

ENVIRONMENTAL POLLUTION AND WASTE MANAGEMENT

Course Code: ENV2351

Credit Units: 3

Course Objective:

The growing pressure on natural resources and the progressive increase in the production of waste poses serious challenges for our society. Waste production and management play a central role in environmental policy. The production of industrial and urban waste has exploded during the last ten years. From a modern viewpoint, waste is to be considered a lost resource and, hence, it is a manufacturing cost variable that must be optimized with both direct costs and the cost to society in mind. Since it is not possible to avoid the production of waste, the main objective in order of importance is to try to reduce it to a minimum.

Course Contents:

Module I: Water pollution – sources, types, and effect of water pollutants, water quality standards, algal bloom, eutrophication, biomagnification/ bioaccumulation, water pollution control - primary, secondary and tertiary wastewater treatment; **Soil Pollution** – soil pollutants – types, sources, effects, and control.

Module II: Air pollution – structure and composition of atmosphere, classification, sources and effects of air pollutants, air pollution control - particulate and gaseous emission control methods; acid rain, green house effect, global warming, ozone depletion, smog, climate change, **Noise Pollution** – sources, effects, and control.

Module III: Waste management: Methods of waste collection, storage, and transportation, treatment and disposal techniques for solid waste: landfill operation and maintenance, composting: advantages and limitations, vermin-composting, autoclaving, incineration, biogas plant, techniques for hazardous waste treatment and safe disposal, nuclear and e-waste management, Government agencies and programs: NCEPC, MoEFCC, CPCB and SPCB's.

Examination Scheme:

Components	CT	HA	S/V/Q	A	EE
Weightage (%)	5	10	10	5	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, A: Attendance EE: End Semester Examination.


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Syllabus - Semester Fourth

ENVIRONMENTAL MANAGEMENT AND INDUSTRIAL SAFETY

Course Code: ENV2451

Credit Units: 03

Course Objective:

The course will give an overview of the safety and environmental issues in the industry. It will provide detailed understanding of the methods and techniques to resolve these key issues for making production and processing cleaner and safer. This course would educate students to identify and assess hazards in any stage of operation, to quantify and manage them as well. This course will also highlight lessons learnt from the past accidents. The aims of this course are: to create awareness for quality of life protection, health and environmental safety, occupational hazards.

Course Contents:

Module I: Public health: definition, need for good health, factors affecting health, communicable diseases, mode of transmission (epidemic and endemic diseases), management of hygiene in public places, occupational health hazards and safety (physical, chemical and biological), health protection measures for workers- health education, first aid, management of medical emergencies.

Module II: Industrial safety and management techniques: industrial safety standards and regulations, accidents – definition, prevention and control, risk analysis and assessment, safety cost and expenses.

Module III: Safety management system - environmental management systems (EMS) ISO 14000 and 14001, OSHA and NIOSH, compensation act, public liability insurance act, mining act, good manufacturing practices (GMP) and good laboratory management practices (GLP).

Examination Scheme:

Components	CT	HA	S/V/Q	A	EE
Weightage (%)	5	10	10	5	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, A: Attendance EE: End Semester Examination


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Syllabus - Semester Fifth

ENVIRONMENTAL ECONOMICS AND GLOBALIZATION

Course Code: ENV2551

Credit Units: 03

Course Objective:

Environmental issues such as pollution, climate change and the conservation of biodiversity are currently in the headlines of economic debate. Economic analysis of the environment is challenging precisely because environmental value is not always conveniently revealed in a market, and thus is subject to inappropriate use. The major topics addressed in this field of study are: the causes of environmental degradation, the need to re-establish the disciplinary ties between ecology and economics, the difficulties associated with assigning ownership right to environmental resources, the trade-off between environmental degradation and economic goods and services, assessing the monetary value of environmental damage etc.

Course Content:

Module I: Introduction: definition and scope of environmental economics, economics and environment, environment inter-linkages, market failure and externality, accounting for the environment.

Module II: Resource economics: natural resources: types and classification, economics of natural resources exploitation, market structure and the exploitation of non-renewable resources, methods of valuation of environmental costs and benefits.

Module III: Economics & Environmental Management: WTO and international trade, environmental trade barriers, natural resource accounting, environmental communication, GRI reports, green marketing, eco-labeling, pollution control: basic approach to environmental policy and management, pollution tax: effluent charges and subsidies.

Examination Scheme:

Components	CT	HA	S/V/Q	A	EE
Weightage (%)	5	10	10	5	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, A: Attendance EE: End Semester Examination


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Syllabus - Semester Sixth

SUSTAINABLE DEVELOPMENT PRACTICES

Course Code: ENV2651

Credit Units: 03

Course Objective

Finding approaches to development that balance economic and social progress, address cultural differences, and respect ecological values and limits is the key to sustainable development. Moving towards this goal requires fundamental changes in human attitudes and behavior in our personal lives, in our community activities, and in our places of work. The success in this regard is critically dependent on education and training. This course will imbue students with respect for the conservation and sustainable use of resources, social equity, and appropriate development along with competencies to practice sustainable tasks at the workplace of today and tomorrow.

Course Content:

Module I: Introduction: Environment, sustainable development and globalization, millennium development goals, regional perspectives, challenges and environmental issues in India, sustainable development and Indian development policies, local environmental management and legislation.


Module II: Climate change and sustainable development: Climate change and sustainable development, climate change and forest management, sustainable consumption, strategies and issues, international environmental agreements and climate change, international environmental agreements and climate change.

Module III: Writing on environment: Environmentalism, environmental journalism and activism, media for environment, conventions and science article styles, fact-checking with sources, research and publication, green peace movement, UNEP, UNCED, WBCSD, WWF, WRI, GRI, and World Bank.

Examination Scheme:

Components	D	P	A	EE
Weightage(%)	15	10	5	70

D: Dissertation, P: Publication, A: Attendance EE: End Semester Examination


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ENVIRONMENTAL MANAGEMENT

Programme Structure

Course Code	Course Title	Lectures (L) Hours per week	Tutorial (T) Hours per week	Practical (P) Hours per week	Total Credits (16)
ENV2151	Environmental Studies-I *	2	-	-	2
ENV2251	Environmental Studies-II *	2	-	-	2
ENV2152/ ENV2252	Environmental Studies *	4	-	-	4

(Environmental Studies is mandatory for all undergraduate courses and is taught in three different schemes during first year)*

ENVIRONMENTAL MANAGEMENT

Syllabus - Semester First

ENVIRONMENTAL STUDIES-I

Course Code: ENV2151

Credit Units: 02

Course Objective:

The term environment is used to describe, in the aggregate, all the external forces, influences and conditions, which affect the life, nature, behaviour, growth, development, and maturity of living organisms. At present a great number of environmental issues, have grown in size and complexity day by day, threatening the survival of mankind on earth. A study of environmental studies is quite essential for handling environmental disasters and industrial management. The objective of environmental studies is to enlighten the masses about the importance of the protection and conservation of our environment and control of human activities which has an adverse effect on the environment.

Course Contents:

Module I: The multidisciplinary nature of environmental studies

Definition, scope and importance, Need for public awareness

Module II: Natural Resources - Renewable and non-renewable resources

Natural resources and associated problems

Forest resources: Use and over-exploitation, deforestation, case studies, timber extraction, mining, dams and their effects on forests and tribal people.

Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems.

Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies.

Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies.

Energy resources: Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources, case studies.

Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification.

- Role of an individual in conservation of natural resources.
- Equitable use of resources for sustainable lifestyles.

Module III: Ecosystems

Concept of an ecosystem: Structure and function of an ecosystem, producers, consumers and decomposers, energy flow in the ecosystem, ecological succession, food chains, food webs and ecological pyramids, introduction, types, characteristic features, structure and function of the following ecosystems:

- a. Forest ecosystem
- b. Grassland ecosystem
- c. Desert ecosystem
- d. Aquatic ecosystems (ponds, streams, lakes, rivers, ocean estuaries)

Module IV: Biodiversity and its conservation

Introduction – Definition: genetic, species and ecosystem diversity, biogeographical classification of India, value of biodiversity: consumptive use, productive use, social, ethical aesthetic and option values, biodiversity at global, national and local levels, India as a mega-diversity nation, hot-spots of biodiversity, threats to biodiversity: habitat loss, poaching of wildlife, man wildlife conflicts, endangered and endemic species of India, conservation of biodiversity: in-situ and ex-situ conservation of biodiversity.

Examination Scheme:

Components	CT	HA	S/V/Q	A	EE
Weightage (%)	15	5	5	5	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, A: Attendance, EE: End Semester Examination

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Syllabus - Semester Second

ENVIRONMENTAL STUDIES-II

Course Code: ENV2251

Credit Units: 02

Course Objective:

The term environment is used to describe, in the aggregate, all the external forces, influences and conditions, which affect the life, nature, behaviour, growth, development, and maturity of living organisms. At present a great number of environmental issues, have grown in size and complexity day by day, threatening the survival of mankind on earth. A study of environmental studies is quite essential for handling environmental disasters and industrial management. The objective of environmental studies is to enlighten the masses about the importance of the protection and conservation of our environment and control of human activities which has an adverse effect on the environment.

Course Contents:

Module I: Environmental Pollution

Definition, causes, effects, and control measures of: air pollution, water pollution, soil pollution, marine pollution, noise pollution, thermal pollution, and nuclear pollution.

Solid waste management: causes, effects and control measures of urban and industrial wastes, role of an individual in prevention of pollution, pollution case studies, disaster management: floods, earthquake, cyclone, and landslides.

Module II: Social Issues and the Environment

From unsustainable to sustainable development, Urban problems related to energy

Water conservation, rain water harvesting, and watershed management

Resettlement and rehabilitation of people, its problems and concerns, case studies

Environmental ethics: issues and possible solutions

Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust, case studies

Wasteland reclamation

Consumerism and waste products

Environmental Protection Act, Air (Prevention and Control of Pollution) Act, Water (Prevention and control of Pollution) Act, Wildlife Protection Act, Forest Conservation Act, Issues involved in enforcement of environmental legislation, Public awareness

Module III: Human Population and the Environment

Population growth, variation among nations

Population explosion – Family Welfare Programmes, Environment and human health

Human Rights, Value education, HIV/ AIDS, Women and child welfare

Role of information technology in environment and human health, Case studies

Module IV: Field Work

Visit to a local area to document environmental assets-river/ forest/ grassland/ hill/ mountain

Visit to a local polluted site – urban / rural / industrial / agricultural

Study of common plants, insects, and birds

Study of simple ecosystems-pond, river, hill slopes, etc (Field work equal to 5 lecture hours)

Examination Scheme:

Components	CT	HA	S/V/Q	A	EE
Weightage (%)	15	5	5	5	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, A: Attendance, EE: End Semester Examination

Text & References:

- Agarwal, K.C., 2001, Environmental Biology, Nidi Publ. Ltd. Bikaner.
- Bharucha, E., The Biodiversity of India, Mapin Publishing Pvt. Ltd., Ahmedabad 380013, India (R).
- Brunner, R.C., 1989, Hazardous Waste Incineration, McGraw Hill Inc. 480p.
- Clark, R.S., Marine Pollution, Clanderson Press Oxford (TB).
- Cunningham, W.P., Cooper, T.H., Gorhani, E. & Hepworth, M.T., 2001, Environmental Encyclopedia, Jaico Publ. House, Mumbai, 1196p.
- De, A.K., Environmental Chemistry, Wiley Eastern Ltd.
- Down to Earth, Centre for Science and Environment (R).
- Gleick, H.P., 1993, Water in Crisis, Pacific Institute for Studies in Dev., Environment & Security. Stockholm Env. Institute Oxford Univ. Press. 473p.
- Hawkins, R.E., Encyclopedia of Indian Natural History, Bombay Natural History Society, Bombay (R).
- Heywood, V.H. & Waston, R.T., 1995, Global Biodiversity Assessment. Cambridge Univ. Press 1140p.
- Jadhav, H. & Bhosale, V.M., 1995, Environmental Protection and Laws, Himalaya Pub. House, Delhi 284 p.
- Mckinney, M.L. & School, R.M., 1996, Environmental Science Systems & Solutions, Web enhanced edition, 639p.
- Mhaskar, A.K., Matter Hazardous, Techno-Science Publication (TB).
- Miller, T.G., Jr. Environmental Science, Wadsworth Publishing Co. (TB).
- Odum, E.P., 1971, Fundamentals of Ecology, W.B. Saunders Co. USA, 574p.
- Rao, M.N. & Datta, A.K., 1987, Waste Water Treatment, Oxford & IBH Publ. Co. Pvt. Ltd. 345p.
- Sharma, B.K., 2001, Environmental Chemistry. Geol Publ. House, Meerut.
- Survey of the Environment, The Hindu (M).
- Townsend, C., Harper, J., and Michael Begon, Essentials of Ecology, Blackwell Science.
- Trivedi, R.K., Handbook of Environmental Laws, Rules Guidelines, Compliances and Standards, Vol I and II, Enviro Media (R).
- Trivedi, R.K. and Goel, P.K., Introduction to air pollution, Techno-Science Publication (TB).
- Wanger, K.D., 1998, Environmental Management, W.B. Saunders Co. Philadelphia, USA 499p.

Syllabus - Semester First / Second

ENVIRONMENTAL STUDIES

Course Code: ENV2152 / ENV2252

Credit Units: 04

Course Objective:

The term environment is used to describe, in the aggregate, all the external forces, influences and conditions, which affect the life, nature, behaviour, growth, development, and maturity of living organisms. At present a great number of environmental issues, have grown in size and complexity day by day, threatening the survival of mankind on earth. A study of environmental studies is quite essential for handling environmental disasters and industrial management. The objective of environmental studies is to enlighten the masses about the importance of the protection and conservation of our environment and control of human activities which has an adverse effect on the environment.

Course Contents:

Module I: The multidisciplinary nature of environmental studies

Definition, scope and importance, Need for public awareness

Module II: Natural Resources - Renewable and non-renewable resources

Natural resources and associated problems

Forest resources: Use and over-exploitation, deforestation, case studies, timber extraction, mining, dams and their effects on forests and tribal people.

Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems.

Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies.

Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies.

Energy resources: Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources, case studies.

Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification.

- Role of an individual in conservation of natural resources.
- Equitable use of resources for sustainable lifestyles.

Module III: Ecosystems

Concept of an ecosystem: Structure and function of an ecosystem, producers, consumers and decomposers, energy flow in the ecosystem, ecological succession, food chains, food webs and ecological pyramids, introduction, types, characteristic features, structure and function of the following ecosystems:

- a. Forest ecosystem
- b. Grassland ecosystem
- c. Desert ecosystem
- d. Aquatic ecosystems (ponds, streams, lakes, rivers, ocean estuaries)

Module IV: Biodiversity and its conservation

Introduction – Definition: genetic, species and ecosystem diversity, biogeographical classification of India, value of biodiversity: consumptive use, productive use, social, ethical aesthetic and option values, biodiversity at global, national and local levels, India as a mega-diversity nation, hot-spots of

biodiversity, threats to biodiversity: habitat loss, poaching of wildlife, man wildlife conflicts, endangered and endemic species of India, conservation of biodiversity: in-situ and ex-situ conservation of biodiversity.

Module V: Environnemental Pollution

Definition, causes, effects, and control measures of: air pollution, water pollution, soil pollution, marine pollution, noise pollution, thermal pollution, and nuclear pollution.

Solid waste management: causes, effects and control measures of urban and industrial wastes, role of an individual in prevention of pollution, pollution case studies, disaster management: floods, earthquake, cyclone, and landslides.

Module VI: Social Issues and the Environment

From unsustainable to sustainable development, Urban problems related to energy

Water conservation, rain water harvesting, and watershed management

Resettlement and rehabilitation of people, its problems and concerns, case studies

Environmental ethics: issues and possible solutions

Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust, case studies

Wasteland reclamation

Consumerism and waste products

Environmental Protection Act, Air (Prevention and Control of Pollution) Act, Water (Prevention and control of Pollution) Act, Wildlife Protection Act, Forest Conservation Act, Issues involved in enforcement of environmental legislation, Public awareness

Module VII: Human Population and the Environment

Population growth, variation among nations

Population explosion – Family Welfare Programmes, Environment and human health

Human Rights, Value education, HIV/ AIDS, Women and child welfare

Role of information technology in environment and human health, Case studies

Module VIII: Field Work

Visit to a local area to document environmental assets-river/ forest/ grassland/ hill/ mountain

Visit to a local polluted site – urban / rural / industrial / agricultural

Study of common plants, insects, and birds

Study of simple ecosystems-pond, river, hill slopes, etc (Field work equal to 5 lecture hours)

Examination Scheme:

Components	CT	HA	S/V/Q	A	EE
Weightage (%)	15	5	5	5	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, A: Attendance, EE: End Semester Examination

Text &References:

- Agarwal, K.C., 2001, Environmental Biology, Nidi Publ. Ltd. Bikaner.
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- Hawkins, R.E., Encyclopedia of Indian Natural History, Bombay Natural History Society, Bombay (R).
- Heywood, V.H. & Waston, R.T., 1995, Global Biodiversity Assessment. Cambridge Univ. Press 1140p.
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- Mhaskar, A.K., Matter Hazardous, Techno-Science Publication (TB).
- Miller, T.G., Jr. Environmental Science, Wadsworth Publishing Co. (TB).
- Odum, E.P., 1971, Fundamentals of Ecology, W.B. Saunders Co. USA, 574p.
- Rao, M.N. & Datta, A.K., 1987, Waste Water Treatment, Oxford & IBH Publ. Co. Pvt. Ltd. 345p.
- Sharma, B.K., 2001, Environmental Chemistry. Geol Publ. House, Meerut.
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- Trivedi, R.K. and Goel, P.K., Introduction to air pollution, Techno-Science Publication (TB).
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**Curriculum & Scheme of Examination
2022**

**AMITY UNIVERSITY HARYANA
GURUGRAM**

A handwritten signature in blue ink, appearing to read 'Anil'.

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A handwritten signature in blue ink, appearing to read 'Manesar'.

Registrar
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Course: Ecology and Ecosystem Dynamics
Semester: I

Credit : 3
Course code : ENV4101

Course objective: The course will lead the students through different levels of the living world starting from ecological principles, parameters and analytics to organisms, continuing through populations and introducing finally communities and ecological succession. Structure, function, and process of ecological sciences are main components of this course.

Module I: Ecosystem: Earth as a life support system, components and organization, limiting factors, Laws of limiting factors – Liebig's law of minimum, Shelford's law of tolerance, adaptation, habitat and niche, Keystone species; population parameters - structure, growth regulation, interactions between populations, life history strategies (r and k species), concept of carrying capacity; Growth Model (Prey-Predator, Lotka- Volterra, Leslie's matrix model); Soil: types, composition, and formation, soil origin, texture, horizons and profile, soils of the world and India.

Module II: Ecosystem analysis: Synecology, species area relations, methods of sampling, community coefficients, association analysis, ecological succession, succession models and concept of climax; Human population dynamics, Human ecology.

Module III: Framework of ecosystem: Structure and function of ecosystems, productivity, decomposition, energy flow, ecological efficiency, global pattern of productivity, biogeochemical cycling (pool, fluxes, and residence time), major biomes of India and the world, ecosystem services: scope, application, model, and case studies.

Examination Scheme:

Components	A	CT	HA	EE
Weightage (%)	5	15	10	70


A: Attendance, CT: Class Test, HA: Home Assignment, EE: End Semester Examination;

Books Suggested:

1. Odum, Eugene P., and Gary W. Barrett. 2007. Fundamentals of Ecology, 5th edition, Thomson Brooks /Cole
2. Primack, Richard B. 2010. Essentials of Conservation Biology, 5th edition. Sinauer Associates, Sunderland, Ma, USA
3. Ecology and field biology - R.L.Smith
4. Begon, M., Townsend, C. R., and Harper, J. L. *Ecology from Individuals to Ecosystems*. Wiley-Blackwell, USA. 2005.



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Course: Earth System Sciences
Semester: I

Credit : 3
Course code : ENV4102

Course objective: The purpose of the course is to develop a holistic understanding of earth as a system. It attempts to illustrate the reasons for why things happen in nature, the way they happen and how humans have adapted and influenced the natural processes. The course will have application in ecosystem management, conservation and understanding of environmental hazards through in-depth understanding of earth processes. It provides vital inputs to grasp the concept of sustainable development in context of global and regional level.

Module I: The Universe: concepts and origin of solar system and planets, shape and size of the Earth - structure and composition of Earth's interior and surface, plate-tectonic processes, weathering and erosional processes, Earth processes, geological cycle, tectonic cycle, and rock cycle.

Module II: Marine environment: Coastal environment, coastal erosion, and stabilization, relief of the ocean floor, origin, and chemical composition of sea water, vertical and horizontal distribution of temp and salinity, waves and tides, ocean currents, Global distribution of major ocean currents, sea level change and its impact on coastal areas.

Module III: Physiography of India: Environmental setting of India: Structure and relief, drainage system, and watersheds, Rainfall patterns, floods and droughts. India's agriculture (Types, cropping pattern, green revolution and food security), land use planning in India.

Examination Scheme:

Components	A	CT	HA	EE
Weightage (%)	5	15	10	70

A: Attendance, CT: Class Test, HA: Home Assignment, EE: End Semester Examination

Books Suggested:

1. Carla Montgomery (2011) Environmental Geology, McGraw Hill, Ryerson
2. Edward A. Keller (9th edition) Environmental Geology, Prentice Hall, USA 9th
3. Tom Garrison (2011) Essential of Oceanography, Brooks/Cole CENGAGE learning.
4. Press F. & Siever R. Understanding Earth 9th edition, W. H. Freeman; 4 edition (July 17, 2003)



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Course: Environmental Biology
Semester: I

Credit : 2
Course code : ENV4103

Course objective: The purpose of the course is to focus on the contribution of microbial ecology in the management, restoration, and sustainability of the biosphere. The role of microbial communities in ecosystem both in natural and managed ecosystems, and their influence on environmental quality and sustainability will be discussed in detail. The objective of the course would be to review the role of microbial communities and their processes in order to conserve and restore the ecosystem

Module I: Environmental Biochemistry: Proteins - biologically important proteins, biological functions of proteins, Nucleic acids – DNA, RNA, biological functions of nucleic acids, biochemical degradation of pollutants, bioconversion of pollutants.

Module II: Environmental Microbiology: Microbes in agriculture - biological nitrogen fixation, bio-fertilizers, mycorrhiza; Food microbiology - micro-organisms in food production, food poisoning and its prevention; Classification, characteristics, occurrence and ecological significance of microorganisms, photoautotrophs, chemoautotrophs, chemolithotrophs, organotrophs; Soil microorganisms and their interactions, microbial toxins, Microbial diseases of plants and their effects on the ecosystem.

Module III: Microbial Process & Applications: Microflora of atmosphere - sampling techniques, identification of aeroallergens, airborne diseases, and allergies, microbes, and pollution abatement, Environmental biotechnology: introduction, genetic engineering, and its applications, Gene-Bank, Tissue culture, Fermentation, Enzyme technology.

Examination Scheme:

Components	A	CT	HA	EE
Weightage (%)	5	15	10	70

A: Attendance, CT: Class Test, HA: Home Assignment, EE: End Semester Examination;

Books Suggested:

1. Fundamentals of Ecology: E. P. Odum
2. Botany: A. C. Dutta; Oxford University Press, Calcutta
3. Aquatic Ecosystems: Kumar, APH Publications
4. Microbiology 6th Ed: Purohit, Agrobios
5. Global environmental Biotechnology: D. L. Wise
6. Methods in Biotechnology: Hans Peter Schmauder



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Course: Chemistry of Environment
Semester: I

Credit : 3
Course code : ENV4109

Course objective: The course is designed to make the student understand various aspects of chemistry which are significant to environmental science and get knowledge of various analytical techniques required for research. An understanding about various types of pollution, their control measures and emerging trends will also be achieved. The course will also give an idea about impact of pollution on the environment and health.

Module I: Environmental Chemistry: Concept and scope, Gibb's free energy, chemical potential, phase equilibrium, stoichiometry, acid base reactions, Solubility and solubility product, The carbonate system, solutions: normality, molality, and molarity.

Module II: Air and Water Chemistry: Properties of water, water quality parameters: Physical, Chemical & Biological parameters, composition of seawater and physico-chemical speciation in oceans, pesticides in water; Chemical composition of atmosphere; Photochemistry of atmosphere; Chemistry of particulate matter, ozone, aerosols, photochemical smog, and acid rain.

Module III: Soil and Toxic Chemicals Chemistry: Chemical composition of Soil; Cation exchange capacity of soil, acid-base, and ion-exchange reactions in soil; Acidity, Salinity and Alkalinity in Soil; Biochemical aspects of arsenic, cadmium, lead, mercury, carbon monoxide, O₃, PAN, pesticides, insecticides, and MIC, carcinogens in the air, PAH's, PCB's, dioxins, and dibenzo furans; Chemistry of hydrocarbon decay and green chemistry.

Examination Scheme:

Components	A	CT	HA	EE
Weightage (%)	5	15	10	70


A: Attendance, CT: Class Test, HA: Home Assignment, EE: End Semester Examination;

Books Suggested:

1. Masters G.M. (2004) Introduction to Environmental Engineering and Science, 2nd Edition, Pearson Education.
2. Buell P. and Girard J. (2002) Chemistry Fundamentals: An Environmental Perspective (2nd edition), Jones & Bartlett Publishers.
3. Cunningham W.P. and Cunningham M.A. (2007) Principles of Environmental Science: Inquiry and Applications, TataMcGraw-Hill.
4. Miller G.T. (2001) Environmental Science, (eighth edition), Brooks/Cole.
5. Pepper I.L., Gerba C.P. and Brusseau M.L. (2006) Environmental and Pollution Science, (2nd edition) Academic Press.
6. Fundamentals of Environmental Chemistry:- Stanley E. Manahan.



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Course: Environmental Physics & Energy
Semester: I

Credit : 3
Course code : ENV4110

Course objective: The aim of this course is to facilitate the students with the concepts of energy and various renewable and non-renewable resources. A general idea of the production and utilization scenario with respect to energy resources and its impact on environment will be dealt with. The significance of energy in Indian scenario and possible alternatives would be overviewed with a brief study of policy prospective of energy sectors.

Module I: Environmental Physics: Thermodynamics: Energy, Entropy laws, Heat Transfer, Thermal conductivity, diffusivity; Fourier's equation for heat conduction - its solution for rectilinear and radial (spherical and cylindrical) flow of heat, Matter and Energy Exchange, Basic assumptions of kinetic theory, Ideal gas approximation, deduction of perfect gas laws, Black- Body Radiation, Energy Budget of Earth and associated processes.

Module II: Non Renewable Energy Sources: Fossil fuels (coal, oil and natural gases): Classification, reserve and geographical distribution; Environmental impact of production and consumption of fossil fuels; Hydrocarbons: formation, reserves, production, refining, and transport of petroleum products.

Module III: New/ renewable Energy Sources: Production, consumption, and potential, Solar Spectrum, solar thermal energy, solar photovoltaic, hydroelectricity, tidal power, wind energy, geothermal energy, OTEC, fuel cell (hydrogen fuel cell, metal hydrate fuel cell, and microbial fuel cell), Biomass and Bio fuels; Nuclear energy: chemistry, feasible material, nuclear reactors, nuclear fuel cycle, and environmental issues, current potential, achievements, and future prospects of renewable energy, Energy conservation policies.

Examination Scheme:

Components	A	CT	HA	EE
Weightage (%)	5	15	10	70

A: Attendance, CT: Class Test, HA: Home Assignment, EE: End Semester Examination;

Books Suggested:

1. Tiwari, G.N. and M. K. Ghosal. 2005. Renewable Energy Resources: Basic Principles and Application, Narosa Publishing.
2. Ginley, David S., and David Cahen. 2011. Fundamentals of Materials for Energy and Environmental Sustainability. Cambridge.
3. Master, Gilbert M. 2004. Renewables and Efficient Electric Power Systems. John Wiley and Sons.
4. Boyle, Godfrey. 2004. Renewable Energy, 2nd Edition. Oxford University Press.
5. Twidell, I. John and Tony Weir. 2007. Renewable Energy Resources. Taylor and Francis Group.



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Course: Analytical Laboratory I
Semester: I

Credit : 3
Course code : ENV4107

1. Determination of minimum size of quadrat for community study.
2. Determination of density, frequency, abundance, and dominance of plant species using quadrat method.
3. Calculation of the Importance Value Index (IVI) of species.
4. Study of ecological adaptation of Hydrophytes and Xerophytes
5. Determination of hardness (Ca, Mg, and total) and alkalinity of water.
6. Determination of total dissolved solids (TDS) in waste water
7. Determination of residual chlorine in water sample.
8. Determination of Dissolved Oxygen (DO) of wastewater.
9. Determination of Biological Oxygen Demand (BOD) of waste water.
10. Determination of Chemical Oxygen Demand (COD) of waste water.
11. Visit of wastewater treatment plant to understand various unit operations.

Books Suggested:

1. Misra, R. (1968) Ecology Workbook, Oxford & IBH Publications Co., New Delhi.
2. American Public Health Association (2012) Standard Methods for Examination of Water and Wastewater, APHA, AWWA, WPCF, American Public Health Association Inc., Springfield, New York.
3. Maiti, S.K. (2003) Hand Book of Methods in Environmental Studies, Vol. I & II, ABD Publishers, Jaipur.



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Course: Term Paper/ Seminar
Semester: I

Credit : 1
Course code : ENV4131

Objectives:

The objective of this course is to judge the understanding as well as application of the knowledge gained by the students. The aim of the term paper/ seminar is to provide the students with an opportunity to further enhance their knowledge in a sector of their choice by undertaking examination and analysis of various aspects of environmental issues at a level commensurate with the learning outcomes of the various courses taken up by them in the ongoing semester.

A term paper/ seminar is primarily a record of intelligent reading in several sources on a particular subject. The students will choose the topic at the beginning of the session in consultation with the faculty assigned.

Guidelines:

- Choosing the topic: contemporary issue and will be given by the department
- Finding relevant materials
- Presentation: before the commencement of Semester examinations
- Response to queries
- Submission of the write-up


Presentation of the seminar will be of 30 min maximum (25 min presentation and rest question answer session)

Examination Scheme:

Organisation and Relevance of Content	Literature Review	Bibliography	Presentation	Response to the Queries	Total
30	10	10	40	10	100



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Course: Pollution Control and Management
Semester: II

Credit : 3
Course code : ENV4201

Course objective: The course aims at giving detailed knowledge about different pollution control and management strategies. The course will also deals with the sources of pollution in air, soil, water, soil, and also noise and their impact on the environment and health.

Module I: Air Pollution and Control: Air pollution: types of pollutants, sources and effects, ambient air quality standards, wind rose; control methods and devices: particulate matter control: wall collection devices, gravity settlers, centrifugal separators, electrostatic precipitators, dividing collection devices: surface filters, depth filters, scrubbers; gaseous contaminants control: absorption, adsorption, combustion, and condensation; Basic air pollution modeling i.e. Gaussian Plume Model and Box Model.

Module II: Waste Water Treatment: Water pollution: types of pollutants, sources, and effects, water quality parameters and standards, segregation, neutralization; Physical methods: sedimentation, coagulation and flocculation, filtration, and sludge dewatering; Chemical methods: disinfection, removal of hardness, fluoride, arsenic, chromium, iron, and manganese, removal of nitrogen and phosphorus; biochemical methods: aerobic and anaerobic treatment, septic tank, Imhoff tank, oxidation ponds, and aerobic lagoons; Water reuse and recycle.

Module III: Soil and Noise Pollution Control: Soil contaminants, organic and inorganic (including heavy metals): sources and fate, control and abatement of contamination, bioremediation by microorganisms, phytoremediation, and factors affecting uptake of contaminants, Noise pollution: sources and effects, SEL, LAeq, T, L90, L10, SIL, noise control: source reduction, control along the source-receiver pathway, receiver protection, assessing, and predicting noise.

Examination Scheme:

Components	A	CT	HA	EE
Weightage (%)	5	15	10	70

A: Attendance, CT: Class Test, HA: Home Assignment, EE: End Semester Examination;

Books Suggested:

1. Manahan S.E. (2000) Fundamentals of Environmental Chemistry, CRC Press.
2. Brady N.C. (2007) The Nature and Properties of Soil, Thirteenth edition, Prentice-Hall India.
3. Eckenfelder W. (1990) Industrial Pollution Control, McGraw Hill Int. Ed.
4. Pepper I.L., Gerba C.P. and Brusseau M.L. (2006) Environmental and Pollution Science, Academic Press.
5. Harrison R.M. (2001) Pollution: Causes, Effects and Control, Fourth Edition, Royal Society of Chemistry.
6. Nevers N.D. (2000) Air Pollution Control Engineering, McGraw Hill Int.



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Course: Environmental Analysis: Tools and Techniques
Semester: II

Credit : 3
Course code : ENV4204

Course objective: The purpose of the course is to develop analytical skills required for environmental monitoring. The students will become familiar with various physical, chemical and biological parameters involved in water, air and soil research. They would also be able to follow various standard protocols used in environmental analysis. With the theoretical knowledge they would also be able to develop their skills to use contemporary tools and techniques required for environmental impact assessment.

Module I: Introduction: Sampling techniques, basic concept of quantitative analysis (Titrimetry, Gravimetry, and Colourimetry); Measurement of Concentration: Principles of Spectrophotometry, Lambert-Beer relationship, atomic spectroscopy; Microscopy; simple, compound, and electron microscope; Electrophoresis and Chromatography.

Module II: Air Pollution Analysis: Ambient air sampling and monitoring: aerosols (SPM and RSPM) and gaseous pollutants, hydrocarbons (HCs), Polycyclic Aromatic Hydrocarbon (PAHs) and Volatile Organic Compounds (VOCs).

Module III: Instrumental Methods of Analysis: Gas chromatography (GC), Atomic absorption/ emission spectrophotometry, Gas liquid chromatography (GLC), High performance liquid chromatography (HPLC), X-ray fluorescence, X-ray diffraction, and flame photometry, Fourier Transform Infrared Spectroscopy (FTIR).

Examination Scheme:

Components	A	CT	HA	EE
Weightage (%)	5	15	10	70

A: Attendance, CT: Class Test, HA: Home Assignment, EE: End Semester Examination;

Books Suggested:

1. APHA (1980), Standard Methods for the Examination of Water and Wastewater Published by American Public Health Association, 15th ed.
2. Laboratory Analytical Techniques Series (LATS), published by CPCB.



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Course: Atmospheric Science and Climate Change
Semester: II

Credit : 3
Course code : ENV4209

Course objective: This course would make the students familiar with the dynamics of earth and the factors governing the climate-weather system. Knowledge of various components of climatic system and their interaction with atmosphere/ hydrosphere/ lithosphere would further create curiosity among the students about the climate system modeling and climatic vulnerability. Focus will be given on mitigation and adaptive measures at international and national platform.

Module I: Climatology and Global Climate System: Atmosphere: structure and composition, vertical profile of temperature and pressure; Components of climate system and their interactions; Radiation budget, solar constant, lapse rate, and stability, Fundamental forces (pressure gradient, centrifugal, gravity, and coriolis), surface wind and upper air circulation: jet stream, planetary circulations; western disturbances, Indian ocean dipole, El Niño-Southern Oscillation, madden-Julian oscillation and Indian monsoon.

Module II: Climate Change: Natural variability vs. anthropogenic forcing to climate system, climate sensitivity, paleoclimatology and measurement techniques (tree rings and ice core analysis), climate system modeling (circulation models), green house gases and global warming, concept of vulnerability, sectoral vulnerabilities, impacts, and adaptation.

Module III: Contemporary Issues: International efforts and India's national policy framework for climate change CDM project cycle and modalities, procedures and global carbon market (carbon trade); CO₂ sequestration; Linking climate change mitigation and adaptation.

Examination Scheme:

Components	A	CT	HA	EE
Weightage (%)	5	15	10	70

A: Attendance, CT: Class Test, HA: Home Assignment, EE: End Semester Examination;

Books Suggested:

1. James R.H. An Introduction to Dynamic Meteorology, International Geophysics Series.
2. IPCC (2001 & 2007) Working Group I Report "The Physical Basis of Climate change"
3. Atmospheric Thermodynamics by Bohren and Albrecht.
4. Marshall J. and Plumb R.A. (2001) Atmosphere, Ocean and Climate, Elsevier, Amsterdam.
5. Oliver J.E. and Hurrell J.J. (2008) Climatology: An Atmospheric Science, Prentice Hall.
6. Peake S. and Smith J. (2009) Climate Change from Science to Sustainability, Oxford Publications.
7. Cole B., 7th Ed. (2002) Meteorology Today: An Introduction to Weather, Climate, and the Environment—Ahrens, CD.



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Course: Geoinformatics for Environmental Management
Semester: II

Credit : 3
Course code : ENV4210

Course objective: This course will develop the skills of students in the field of GIS and remote sensing. It will also give the basic concepts of remote sensing and principles associated with image acquisition and image processing. The role of GIS as a tool in environmental management and knowledge of GPS will be facilitated. This course will also look into the application of remote sensing/GIS in database generation and environmental management.

Module I: Fundamentals of Remote Sensing: Introduction, scope and components of remote sensing; Electromagnetic spectrum, its characteristics and interaction with atmosphere and earth's surface, Platforms and Sensors, Spectral Signature, Albedo, Atmospheric Window, Aerial photography, Multispectral remote sensing, Elements of visual image interpretation, Digital Image Processing: Rectification, enhancements, Classification: unsupervised, supervised, hybrid, and accuracy assessment; Concept of Digital Elevation Model; microwave remote sensing.

Module II: Geographic Information System (GIS): Map: definition, types, scale, and projections; Introduction, definition and components of Geographic information system; Functional elements: Data in GIS, Raster and Vector data structure, Data input methods: keyboard entry, manual digitizing, scanning and automatic digitizing, accuracy, precision, and resolution, consistency, completeness. Basics, satellite generation, positioning services, GPS details, integration, and coordinate systems.

Module III: Remote Sensing and GIS - application in environmental management: Techniques and applications of remote sensing in Water resource management, Land use land cover mapping, Forest cover/ type mapping, Habitat analysis, Biodiversity characterization, Environmental monitoring, Geo-hazard assessment), National initiatives (NNRMS/NRDMS and ISRO-DOS).

Examination Scheme:

Components	A	CT	HA	EE
Weightage (%)	5	15	10	70

A: Attendance, CT: Class Test, HA: Home Assignment, EE: End Semester Examination;

Books Suggested:

1. Dutta A (2001) Biodiversity and Ecosystem Conservation. Kalyani Publisher, Kolkata.
2. JhaLK (1997) Natural Resource Management. APH Publishing Corporation, New Delhi.
3. Nalini KS (1993) Environmental Resources and Management, Anmol Publishers. Owen OS & Chiras DD (1995) Natural Resources Conservation. Prentice Hall India.



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Course: Statistical Tools and Research Methodology
Semester: II

Credit : 2
Course code : ENV4211

Course objective: The course aims to address the issues related to acquisition and analysis of environmental data and use of statistics in solving them. The students will have an insight into extracting information and analysis of data through various statistical tools and techniques. A preliminary introduction to fundamental concepts of research would make them understand the intricacies of writing and proposing research ideas and hypotheses.

Module I: Introduction: Basic elements and tools of statistical analysis, measurement of central tendency, measures of dispersion: absolute and relative measures, range, standard deviation, variance, quartile deviation, coefficient of variability, skewness, kurtosis, probability: probability distribution functions and their applications, data sampling, sampling locations, times, distributions and types, sampling theory.

Module II: Statistical Methods: Hypothesis testing, significance and correlation, correlation coefficients, linear models and regressions: multiple regressions, distribution- normal, t and chi square test, test of hypothesis and significance, analysis of variance, computer-based modeling: linear, regression, validation and forecasting, difference among means: F-test: 1 way ANOVA, F-test: 2 ways ANOVA.

Module III: System Analysis & Research Methodology: Introduction to research ethics and plagiarism; Mathematical models-deterministic and stochastic, generation of environmental data, stochastic processes in environment, approaches to development of model, validation and forecasting, Perspective of research, sample proposals, framing a statement of the problem (objective), literature survey, methodology of research.

Examination Scheme:

Components	A	CT	HA	EE
Weightage (%)	5	15	10	70

A: Attendance, CT: Class Test, HA: Home Assignment, EE: End Semester Examination;

Books Suggested:

1. John J. Schiller, Seymour Lipschutz, Schaum's Outline of Probability and Statistics, 4th Edition, Tata McGraw-Hill Education.
2. Manly (2001) Statistics for environmental science and management, Chapman and Hall /CRC.
3. Wayne, R. Ott (1995). Environmental Statistics and Data Analysis, CRC Press.
4. Shaefer S.J. and Theodore L. (2007) Probability and Statistics Applications for Environmental Science, CRC Press, Boca Raton, FL.
5. Csuros M. (1997) Environmental Sampling and Analysis, Lab Manual, Lewis Publishers, Boca Raton, FL.
6. Strunk W. and White E.B. (1999). The Elements of Style, Longman; 4th Edition.



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Course: Analytical Laboratory II
Semester: II

Credit : 3
Course code : ENV4212

1. Study of toposheet for geographic information and spatial data types.
2. Description of base map with attributes and image data.
3. Data entry and preparations (input, editing and attributing)
4. Element of Image Interpretation, Image enhancement, Image registration and Georeferencing.
5. Image classifications for land use/ land cover using ERDAS, PCI Geomatica and ENVI.
6. GIS Software, introduction to open source GIS
7. Thin layer paper chromatography analysis of organic compounds.
8. Determination of SPM and RSPM in ambient air by high volume sampler.
9. Monitoring of Air Quality Parameters using Sun Photometer.
10. Sampling and measurement of black carbon in the ambient air.
11. Soil analysis: pH, organic carbon, moisture, water holding capacity, and nutrients.

Book Suggested:

1. Shryock, H.S. (1976) *The methods and Materials of Demography*, Academic Press, New York.
2. Gurumani, N. (2006) *Research Methodology for Biological Sciences*, MJP Publishers, Chennai.



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Course: Term Paper/ Seminar
Semester: II

Credit : 1
Course code : ENV4231

Objectives:

The objective of this course is to judge the understanding as well as application of the knowledge gained by the students. The aim of the term paper/ seminar is to provide the students with an opportunity to further enhance their knowledge in a sector of their choice by undertaking examination and analysis of various aspects of environmental issues at a level commensurate with the learning outcomes of the various courses taken up by them in the ongoing semester.

A term paper/ seminar is primarily a record of intelligent reading in several sources on a particular subject. The students will choose the topic at the beginning of the session in consultation with the faculty assigned.

Guidelines:

- Choosing the topic: contemporary issue and will be given by the department
- Finding relevant materials
- Presentation: before the commencement of Semester examinations
- Response to queries
- Submission of the write-up

Presentation of the seminar will be of 30 min maximum (25 min presentation and rest question answer session)

Examination Scheme:

Organisation and Relevance of Content	Literature Review	Bibliography	Presentation	Response to the Queries	Total
30	10	10	40	10	100



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Course: Project (Field Survey)
Semester: II

Credit : 2
Course code : ENV4232

Objectives:

The aim of the project is to provide the students with an opportunity to explore the natural environment for enhancing their knowledge and understanding about various components of environment, human interaction and impact. The project may involve field visits to various places i.e. forested area, natural landscape, pond, lake, river, dam, wastewater treatment plant etc. The project can be defined as a scholarly inquiry into a problem or issues, involving a systematic approach to gathering and analysis of information / data, leading to production of a structured report. The student will need to submit a report in the end.


Guidelines for Report:

- a) Title: It will be given by student
- b) Introduction: about the particular site/habitat.
- c) Observations and significance
- d) Presentation and queries
- e) Submission of the report

Presentation of the report will be of 15 min maximum (10 min presentation and rest question answer session)

Examination Scheme:

Organisation and relevance of content	Introduction	Bibliography	Presentation	Response to the queries	Total
30	10	10	40	10	100


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Course: Environmental Conservation & Sustainable Development **Credit** : 3
Semester: III **Course code** : ENV4301

Course objective: The paper aims at providing insight into human dimension of development and management of natural resources. It will develop an understanding of biodiversity in the context of ecosystem dynamics, ecosystem functioning and provision of ecosystem services alongwith an introduction to basic conservation methodologies. An approach towards the challenges encountered for sustainability would also be looked at to enable the students' focus on complex relationships between social, economic and environmental processes.

Module I: Resource conservation : Natural resources: classification, concept, global vs regional issues and challenges of Forest, Grasslands & Mangroves, Water resources, Mineral and Energy resources, Food resources, Land & Soil resources: Coastal zone management, coral reefs. Natural Resource Management: concept, approaches and challenges, Traditional knowledge and Natural resource conservation.

Module II: Biodiversity: Biodiversity: Definition, levels, gradients, distribution; global & regional, ecosystem services, Indicators, Measurements & Hotspots of Biodiversity, Biodiversity loss: global and regional scenario, threats, Biodiversity conservation & restoration: historical prospects, Red data book and IUCN categorization, methods and tools, national and global efforts.

Module III: Sustainable development : Sustainable Development: definition, historical prospects, principals, measurements and Millennium Development Goal (MDGs), Sustainable Development Goal (SDGs), Challenges and responses to sustainable development: global and regional issues and efforts.


Examination Scheme:

Components	A	CT	HA	EE
Weightage (%)	5	15	10	70

A: Attendance, CT: Class Test, HA: Home Assignment, EE: End Semester Examination;

Books Suggested:

1. World Commission on Environment and Development (1987) Our Common Future, Oxford, OUP.
2. An Introduction to Sustainable Development (2008) by Peter P. Rogers, Kazi F. Jalal, John A. Boyd., Glen Education Foundation. Inc. USA
3. Primack R.B. (2006) Essentials of Conservation Biology (4th ed.), Sinauer Associates, Sunderland.
4. Ecological Diversity and Measurement by Magurran, A.E. Princeton University Press. New Jersey.
5. Millennium Ecosystem Assessment Report, 2005.
6. The Living planet index.
7. UN Millennium Project (2005) Innovation: Applying Knowledge in Development, Science, Technology and Innovation Task Force Report.
8. Contemporary research publication on relevant area of subject for greater understanding updated time to time.


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Course: Water Resources Management
Semester: III

Credit : 3
Course code : ENV4313

Course objective: The course is designed to make the students aware about the availability and assessment of water resources along with various terminologies associated. An understanding about the need to conserve water has to be made. An approach to watershed development and various principles, common guidelines and policies will be overviewed.

Module I: Water in ecosystem World water inventory, hydrologic cycle, precipitation and runoff: global water balance and Indian scenario, , aquifers (confined and unconfined), quality and quantity of ground water and its usefulness in water supply; Rainwater harvesting; Agriculture and environmental impacts of Irrigation System; crop water management; agro-climatic zonation and crop planning (reference to India).

Module II: Watershed management: Wetlands: Management and Conservation; Ramsar convention, objectives and strategy. Concepts and principles of Watershed Management, water budgeting, land-use and land-cover classification, resource appraisal, water and soil conservation measures: (a) drain-line treatment; (b) area treatment, watershed as unit of sustainable development, selection of plant species for plantation, organic farming and organic fertilizers, watershed development in India.

Module III: Water conservation, conflicts and challenges: Water crisis, water footprint, atmosphere continuum (SPAC), water use efficiency (WUE), water auditing, water treatment, recycling and reuse, water sharing and conflicts, current water issues in India: Narmada Dam, Tehri, Almetti Dam, Sardar Sarovar, Interlinking of rivers and river basin management.


Examination Scheme:

Components	A	CT	HA	EE
Weightage (%)	5	15	10	70

A: Attendance, CT: Class Test, HA: Home Assignment, EE: End Semester Examination;

Books Suggested:

1. Patra K.C. (2011) Hydrology and Water Resources Engineering, Narosa Publishing House.
2. Subramanya K. (2004) Engineering Hydrology, Tata McGraw-Hill, New Delhi.
3. Sharda V.N., Sikka A.K. and Juyal G.P. (2006) Participatory Integrated Watershed Management: A Field Manual, Central Soil and Water Conservation Research and Training Institute, 218, Kaulagarh Road, Dehradun.
4. Tideman E.M. (1999) Watershed Management–Guidelines for Indian Conditions, Omega Scientific Publishers, New Delhi.
5. Black P.E. (1996) Watershed Hydrology, Lewis Publishers.
6. Developing the Environment Problems and Management – C.J. Barrow.
7. Jain S.K., Agarwal P.K. and Singh V.P. (2007) Hydrology and Water Resources of India, Springer, The Netherlands.
8. Common Guidelines for Watershed Development Projects (2008) Government of India.


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Course: Eco-toxicology, Health and Safety
Semester: III

Credit : 3
Course code : ENV4314

Course objective: Development of knowledge and skills to reinforce the attitudes and behaviors required for safe and environmentally sound work habits. Another aspect of eco-toxicology would deal with effects of various toxic materials posing adverse environmental health. A brief overview of industrial hazards and safety management will keep the students updated about occupational health.

Module I: Overview of Environmental Health: Public exposure from industrial sources, hazards by industry, major chemical contaminants at workplace, industrial environmental accidents, Hospital Waste Management.

Module II: Eco-toxicology: Toxicity: case studies (F, As, Hg etc.), entry, movement and fate (biotransformation, bioaccumulation and biomagnifications) of pollutants in ecosystems, natural toxins: animal toxins, snake venoms, plant toxins, metals, pesticides, POPs: portals of entry and toxic effects, chromosome damage, gene mutation, factors influencing toxicity, environmental carcinogenesis: chemical carcinogenesis, organic carcinogens, metal carcinogens, occupational cancer, toxicity testing, test organisms used in bioassays, coliform bacteria count and MPN method, dose response curves, LC50, LD50.

Module III: Industrial Safety: Public health, personal hygiene, food adulterants, diseases (deficiency, infection, pollution, occupational and communicable) prevention and control, management of hygiene in public places, occupational health and safety, hazards - physical, chemical and biological, industrial safety standards and regulations, accidents - prevention and control, good manufacturing practices (GMP) and good laboratory management practices (GLP), OSHA & NIOSHA.


Examination Scheme:

Components	A	CT	HA	EE
Weightage (%)	5	15	10	70

A: Attendance, CT: Class Test, HA: Home Assignment, EE: End Semester Examination;

Books Suggested:

1. Handbook of Environmental Health and Safety – principle and practices (Vol. II): H. Koren; Lewis Publishers
2. Basic Environmental Health (2001): Annalee Yassi, Tord Kjellström, Theo de Kok, Tee Guidotti.
3. Environmental Health: Monroe T. Morgan.
4. Newman, M.C, Lawrence, C.A., and Unger. M.A., 2002. Ecotoxicology: Fundamentals of Ecotoxicology, 2nd Ed., CRC
5. Press, Boca Raton, Florida.
6. Walker, C.H., Hopkin, S.P., Sibly, R.M., and Peakall, D.B. 2001. Principles of Ecotoxicology. 2nd Ed. Taylor & Francis, London.
7. Stanely E. Manahan. 1992. Toxicological chemistry. Lewis Publishers


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Course: Waste Management & Valorization
Semester: III

Credit : 2
Course code : ENV4315

Course objective: The course would comprise of general introduction and various components of solid waste. It would cover the characterization, collection, treatment and disposal techniques and related environmental issues. Students would be conceptualized with the onsite vs. offsite waste management as well as integrated waste management.

Module I: Introduction: Sources and characterization of solid and hazardous wastes, hazard identification, risk characterization, and exposure assessment. health and environmental impacts of solid and hazardous waste management, integrated waste management strategy: reduce, recover/ reuse and recycling.

Module II: Waste Management: Methods of waste collection, storage and transportation, treatment and disposal techniques for solid waste - landfill operation and maintenance, Leachate collection and treatment , composting, (advantages and limitation), vermin-composting, incineration, Pyrolysis, biogas plant, , Techniques of hazardous waste treatment and safe disposal, Nuclear and e-waste management.

Module III: Waste Valorization from Residues: Biomass & Bio-fuels: Environmental & economic aspects; Bio-fuels from agro residues, Clean technologies concepts for the biological conversion of wastes- aerobic and anaerobic;


Examination Scheme:

Components	A	CT	HA	EE
Weightage (%)	5	15	10	70

A: Attendance, CT: Class Test, HA: Home Assignment, EE: End Semester Examination;

Books Suggested:

1. Batstone R., Smith J.E. (Jr.) and Wilson D. (1989), The Safe Disposal of Hazardous Wastes-the Special Needs and Problems of Developing Countries, The World Bank Technical Paper No. 93, Vol. I, II and III, Washington, DC, TheWorldBank.
2. Central Public Health and Environmental Engineering Organization (CPHEEO) (2000) Manual on Municipal Solid Waste Management, New Delhi, Controller of Publications.
3. Freeman H.M. (1988) Standard Handbook of Hazardous Waste Treatment and Disposal, New York, McGraw-Hill.
4. SW-846 (1980) Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, Washington, DC, USEPA, Available at <http://www.epa.gov/epawaste/hazard/testmethods/sw846/index.htm>.
5. Tchobanoglous G., Theisen H. and Vigil S. (1993) Integrated Solid Waste Management: Engineering Principles and Management Issues, New York, McGraw-Hill.
6. Vesilind P.A., Worrell W.A. and Reinhart D.R. (2001) Solid Waste Engineering, Australia, CL-Engineering.
7. Ramachandra, T. V. (2011) Management of Municipal Solid Waste. TERI Press, New Delhi


Course: Analytical Laboratory III
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Credit : 3


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Semester: III

Course code : ENV4316

1. Use of microscope: bacterial morphology and staining methods.
2. Biological examination of water: algae and bacteria
3. Isolation of fungi from environmental samples
4. Standard plate count
5. Bacterial water quality: Measuring quality of water by using coli form organisms (MPN method and membranefilter).
6. Estimation of sugars, proteins, lipids.
7. Water analysis: Maximum Probable Number (of Bacteria), E.coli
8. Experiments related to Microbiological analysis of waste water MPN, Total and Faecal coliforms [in potable water], and other organisms.
9. Process and analysis of biological composting and vermicomposting.

Book Suggested:

1. Gurumani, N. (2006) *Research Methodology for Biological Sciences*, MJP Publishers, Chennai.
2. Jacobson-Kram, D. (2006) *Toxicological Testing Handbook: Principles, Applications and Data Interpretation*. Taylor & Francis, New York.
3. Gurumani, N. (2006) *An introduction to Biostatistics*, MJP Publishers, Chennai.
4. Murugesan, A.G. and Rajakumari. C. (2006) *Environmental Science and Biotechnology*, MJP Publishers, Chennai.



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Course: Term Paper/ Seminar (Research Article)
Semester: III

Credit : 1
Course code : ENV4331

Objectives:

The objective of this course is to judge the understanding as well as application of the knowledge gained by the students.

The aim of the term paper/seminar is to provide the students with an opportunity to further enhance their knowledge in a sector of their choice by undertaking examination and analysis of various aspects of environmental issues at a level commensurate with the learning outcomes of the various courses taken up by them in the ongoing semester.

A term paper/ seminar is primarily a record of intelligent reading in several sources on a particular subject. The students will choose the topic at the beginning of the session in consultation with the faculty assigned.

A workshop is primarily an activity based academic event where the students practically obtain hands on experience on any aspect of their learning. The student will choose the option of workshop from amongst their concentration electives. The evaluation will be done by Board of examiners comprising of the faculties.

Major Themes

- Waste to energy
- Green building
- Disaster management
- Renewable energy
- Climate change and adaptation
- Remote sensing and GIS
- Wild life management
- Sustainable practices

These themes are merely indicative and other recent and relevant topics of study may be included.

Guidelines for term paper/ seminar:

- Choosing the topic: contemporary issue/ relevant study material will be given by the department
- The participants are expected to explore the topic in advance and take active part in the discussions
- Presentation: before the commencement of Semester examinations
- Group Activities have to be undertaken by students as guided by the trainer in a workshop.
- Response to queries
- Submitting a write up of at least 500 words about the learning outcome from the workshop/term paper.

Presentation of the seminar will be of 30 min maximum (25 min presentation and rest question answer session)

Methodology

The methodology followed at the workshop could be based on any one or more of the following methods:

- Case Study
- Simulation
- Business Planning
- Quiz
- Quality analysis & characterization
- Identification and preparation of materials

Examination Scheme:

Organisation and relevance of content	Literature Review	Bibliography	Presentation	Response to the queries	Total
30	10	10	40	10	100

Course: Summer Internship Evaluation +Project Formulation
Semester: III

Credit : 6
Course code : ENV4335

Methodology:

Practical training is based on the theoretical subjects studied by the students. It can be arranged within the college or in any related industrial unit/ research organization. The students shall get a chance for practical exposure to various industrial processes, technical and experimental research skills. In case of on campus training the students will be given specific tasks which may be experimental or observation and analysis based i.e. analysis of water, air and soil, biodiversity analysis, short term project, data generation and analysis etc. On completion of the practical training the students are to present a report covering various aspects learnt by them and give a presentation of the same. The summer internship may further lead to Major project formulation for lastsemester.

Examination Scheme

Feedback from Industry	Training Report	Viva	Presentation	Total
10	30	30	30	100



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Course: Environmental Biotechnology
Semester: III

Credit : 3
Course code : ENV4309

Course objective: Environmental biotechnology utilizes microorganisms to exploit biotic resources for environmental management practices. This management includes treatment of contaminated water and wastewater, clean up of industrial waste streams, and remediation of soils contaminated with hazardous and toxic chemicals and application of biotechnology in improvement of environment quality. Environmental biotechnology is essential to society and truly important as a technical discipline.

Module I: Bioremediation and metagenomics: Bioremediation: concept and types (natural and engineered): bio- attenuation, ex-situ and in-situ, bio-augmentation and bio-stimulation, advantages and disadvantages, bioremediation to control pollution e.g. solid waste, sewage, industrial effluents, heavy metals, radioactive substances and oil spill, Metagenomics: environmental and community genomics, the study of genetic material recovered directly from environmental samples and future applications in bioremediation, Genetically modified organisms (GMO's) and bio- safety.

Module II: Industrial biotechnology: Maintenance of stock cultures, culture collection centers/microbial gene banks, inoculum build-up, industrial substrates, design of a bioreactor, batch and continuous fermentation and solid-substrate fermentations, immobilization technologies, microbial production of food (SCP), essential prerequisites for organisms to be used as SCP and as food and feed supplements, microbial transformation, accumulation and concentration of metals, metal leaching, extraction and future prospects, biosensors.

Module III: Applied biotechnology: Practical aspects of genetic engineering with microorganisms from extreme environment: use of extremophilic microorganisms in waste treatment and methane production from agro industrial wastes, enzyme production: cellulase, proteases, amylases, alcohol and acetic acid production, biocomposting and biomining, alternate fuels: biofuels, sources and production.

Examination Scheme:

Components	A	CT	HA	EE
Weightage (%)	5	15	10	70


A: Attendance, CT: Class Test, HA: Home Assignment, EE: End Semester Examination;

Books Suggested:

1. M.H. Fulekar (2005) Environmental Biotechnology Oxford IBH Publishing cooperation.
2. Industrial Microbiology - Casida, Wiley Eastern publishers, 1994.
3. Biodegradation and Bioremediation- Martin Alexander.
4. Biotechnology-A new industrial revolution Prentis S. Orbis Publishing Ltd., London.
5. Microbiology Davis, B>D., Dulbecco, R., Eisen, H.N and Ginsberg, H.S. Harper and Row Publishers, Singapore.
6. Environmental Microbiology, 2000, Maier, R.M. Pepper, I.L and Gerba, C.P. Academic Press.



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Course: Environmental Geology
Semester: III

Credit : 3
Course code : ENV4310

Course objective: The course is designed to provide a clear knowledge of Earth as a system and the basic concepts influencing the processes and dynamics of Earth. It will also give an understanding of geological processes vis-à-vis the human influences and its implications.

Module I: Earth Processes and Dynamics: Distribution of elements in the solar system and the Earth, chemical differentiation and composition of the Earth, Structure and composition of earth's interior and surface, rocks and minerals and associated processes, Geological time scale.

Module II: Earth Tectonics and Dynamics: Concept of plate tectonics, sea-floor spreading and continental drift, geodynamic elements of Earth: Mid Oceanic Ridges, trenches, transform faults and island arcs, origin of oceans, continents, mountains and rift valleys, earthquake and earthquake belts, volcanoes: types, products and distribution.

Module III: Processes of Soil Formation: Types of soil, soil degradation and changing land use pattern, concepts of natural ecosystems on the Earth and their mutual inter-relations and interactions (atmosphere, hydrosphere, lithosphere and biosphere), Impact assessment of water availability, quality and contamination of surface water and groundwater, atmosphere and air pollution, soil contamination due to urbanization, industrialization and mining, basic tenets of environmental laws.

Examination Scheme:

Components	A	CT	HA	EE
Weightage (%)	5	15	10	70


A: Attendance, CT: Class Test, HA: Home Assignment, EE: End Semester Examination;

Books Suggested:

1. Seismotectonic Atlas. 2000. GSI Publication.
2. Kellar, E. A. 2000. Environmental Geology. Prentice Hall, N. Jersey.
3. Merritts, D., de Wet, A. and Menking, K. 1998. Environmental Geology: an earth system science approach. W.H. Freeman & Co., N.Y.
4. Strahler, A.N. and Strahler, A.H. 1973. (Revised Ed.) Environmental Geoscience: interaction between natural systems and man. Hamilton Pub, USA.



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Course: Green Energy
Semester: III

Credit : 3
Course code : ENV4311

Course objective: The purpose of this course is to provide a survey of the most important renewable energy resources, and the technologies for harnessing these within the framework of a broad range of simple to state-of-the-art advanced energy systems. After completion of the course, students will be able to describe the fundamentals and main characteristics of renewable energy sources and their differences compared to fossil fuels.

Module I: Green Energy and Sustainable Development: Clean/ green energy technologies, sustainable development, international agreements/conventions on energy and sustainability: UNFCCC, nuclear energy: fission reactors, fission power and environment, fuel cells: hydrogen fuel cell, metal hydrate fuel cell, microbial fuel cell, renewable energy sources: solar, geothermal, tidal and wind energy, hydropower, ocean thermal energy conversion (OTEC), energy use pattern: India and global, renewable energy management in India.

Module II: Solar Energy: Solar radiation: measurement and prediction, solar collectors: flat plate and concentrating collectors, solar heating of buildings, solar still, solar water heaters, solar driers, conversion of heat to mechanical energy, solar thermal power generation systems, solar photovoltaic: principle, types of solar cells and fabrication, photovoltaic applications: battery charger, domestic lighting, street lighting, water pumping and power generation.

Module III: Energy From Waste – bio-chemical conversion: Anaerobic digestion of sewage and municipal wastes, direct combustion of MSW-refuse derived solid fuel, industrial waste, agro residues, anaerobic digestion, biogas production, land fill gas generation and utilization, present status of technologies for conversion of waste into energy, design of waste to energy plants for cities, small townships and villages.

Examination Scheme:

Components	A	CT	HA	EE
Weightage (%)	5	15	10	70

A: Attendance, CT: Class Test, HA: Home Assignment, EE: End Semester Examination;

Books Suggested:

1. Municipal Solid Waste to Energy Conversion Processes: Economic, Technical, and Renewable Comparisons, by Gary C. Young, ISBN: 9780470539675, Publisher: John Wiley & Sons, Publication Date: June 2010.
2. Recovering Energy from Waste Various Aspects Editors: Velma I. Grover and Vaneeta Grover, ISBN 978-1-57808-200-1; 2002
3. G. Evans, Biowaste and Biological Waste Treatment, 2005
4. Biogas from waste and renewable resources, by Dieter D. And Angelika S. Wiley-Vch Publication 2010.


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Course: Waste Water Treatment
Semester: III

Credit : 3
Course code : ENV4312

Course objective:

Module I: Water Pollutants: Types and sources, generation and collection of wastewater, sewerage systems, quantities of sanitary wastes and storm water, carrying capacity of rivers.

Module II: Wastewater Characteristics: Waste quality parameters: physical, chemical and biological, water borne diseases, primary, secondary and tertiary treatment, physical unit processes: screening, commutation, grit removal, equalization, coagulation-flocculation, sedimentation, and disinfection.

Module III: Biological Wastewater Treatment Systems: Aerobic processes - activated sludge process and its modifications, trickling filter, RBC, anaerobic processes: suspended growth, attached growth, fluidized bed and sludge blanket systems, natural wastewater treatment systems: ponds and lagoons, phytoremediation, wetlands and root-zone systems, operation and design aspects.

Module IV: Advanced Wastewater Treatment: Iron and manganese removal, colour and odour removal, activated carbon treatment, ion exchange, electro-dialysis, reverse osmosis and fluoride management, nitrogen and phosphorus removal, heavy metals removal, oil and refractory organics removal, micro-screening, ultra-filtration, centrifugation, wastewater disposal standards, sludge digestion and handling, disposal of effluent and sludge.

Examination Scheme:

Components	A	CT	HA	EE
Weightage (%)	5	15	10	70

A: Attendance, CT: Class Test, HA: Home Assignment, EE: End Semester Examination;

Books Suggested:

1. Waste water engineering, treatment and reuse by Metcalf and eddy, fifth edition, Tata McGraw Hill.
2. Garg, S.K., Environmental Engineering, Vol. I, Khanna Publications, 2001, New Delhi.
3. Garg, S.K., Environmental Engineering, Vol. II, Khanna Publications, 2001, New Delhi.
4. Mark J. Hammer and Mark J. Hammer Jr., Water and Waste Water Technology, Prentice Hall of India Pvt. Ltd., 1998, New Delhi.


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Course: Environmental Law & Environmental Impact Assessment **Credit : 3**
Semester: IV **Course code : ENV4401**

Course objective: The students will have an overview of Environment Impact Assessment and newer approaches related to it. This course aims to acquaint the students with an in-depth knowledge of laws and policies concerned with environmental protection. A brief outline of the efforts being done through global summits and laws implemented at national level would make the students familiar with basic knowledge of environmental law issues.

Module I: Environmental Protection & International Efforts: National Environmental Policy, provisions for environment protection in constitution of India; Ecomark; major environmental movements in India and role of NGOs. United Nations Bodies for environmental protection; Introduction to Stockholm Conference on Human Environment (1972), Nairobi Declaration, Montreal Protocol(1987), Basel Convention (1989 and 1992), Earth summit at Rio de Janeiro (1992), Kyoto Protocol (1997), Earth summit at Johannesburg (2002), CBD, Paris Agreement

Module II: Environmental Laws: Air Pollution Act (1981), Water Pollution Act(1974), Environmental (Protection) Act (1986), Hazardous Wastes Management and Handling Rules(1989), Municipal Solid Waste (Management and Handling Rules) (2000), Public Liability Insurance Act (1991) and Rules(1991), Coastal Regulation Zones (CRZ) Rules (2011),Wildlife (Protection) Act(1972),Forest (Conservation) Act(1980), Biological Diversity Act(2002).

Module III: Environmental impact assessment (EIA): Introduction & Significance of EIA; Environmental impact statement (EIS), environmental management: (EMP& EMS), ISO standards; scope and types of environmental audit, environmental management plan (EMP), eco-management and audit scheme (EMAS); safety management system; Life Cycle Analysis (LCA) and its components.

Examination Scheme:

Components	A	CT	HA	EE
Weightage (%)	5	15	10	70

A: Attendance, CT: Class Test, HA: Home Assignment, EE: End Semester Examination;

Books Suggested:

1. Global Biodiversity - W.R. L.IUCN
2. Shyam Divan and Armin Rosencranz, 2005,Environmental Law and Policy in India, Oxford University Press, Delhi
3. Leelakrishnan. P, 2008, Environmental Law Case Book. Lexis Nexis, Butterworths.
4. Shastri S C, 2008, Environmental Law, (2nd Edn.), Eastern Book Company, Lucknow.
5. Singh Gurdip, 2004, Environmental Law in India, Mcmillan and Co.
6. ShantakumarS,2005 Introduction to Environmental Law, (2nd Edn.), Wadhwa and Company, Nagpur
7. Sahasranaman P B, 2008 Handbook of Environmental Law in India, Oxford University Press(India).


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Course: Urban Ecosystem and Industrial Ecology
Semester: IV

Credit : 2
Course code : ENV4402

Course objective: The purpose of this course is to have an understanding of concepts and processes governing urbanization and its impact on natural resources. Students will also be given an exposure about urban space as well as industrial systems and the strategies to emulate ecological systems for minimizing the waste production in urban and industrial processes. The course would also discuss key issues involved with eco-industrial development and some cases from India.

Module I: Urbanization: Global and regional scenario of urbanization: factors and impact, population dynamics and push-pull factors, vegetative distributions in cities (green spaces), land use and GIS, urban green habitat, ecosystem services for cities. Hydrological effects of urbanization (water demand/wet land/ water conservation/waste water); climate resilient cities for sustainable urban habitat, integrating urban and environmental planning framework

Module II: Concepts of Industrial Ecology: origin, definition, environment and the anthrosphere, industrial systems, material resources, societal factors and environmental equity, Systems analysis, industrial metabolism, biological analogies; perspective on industrial ecology from India and other developing countries such as China and Brazil, with case studies.

Module III: Issues of Eco-industrial Development: Components of an industrial ecosystem (Kalundborg example), industrial symbiosis, role of government, community, developers, management, evaluating the success of eco-industrial development, life cycle analysis and assessment: life cycle of products, processes and facilities.


Examination Scheme:

Components	A	CT	HA	EE
Weightage (%)	5	15	10	70

A: Attendance, CT: Class Test, HA: Home Assignment, EE: End Semester Examination;

Books Suggested:

1. Bourg D. and Erkman S., (edited) Perspectives on Industrial Ecology, 46(2) (hardback).
2. Jari N., Jürgen H.B., Guntenspergen G., Nancy E.M., Elmqvist T. and James P. (ed) (2011) Urban Ecology: Patterns, Processes and Applications, Oxford University Press, New York, US.
3. Allen A. and You N. (2002) Sustainable Urbanization: Bridging the Green and Brown Agendas, University College London, UK.
4. Erkman S. and Rama swamy R. (2003) Applied Industrial Ecology – A New Platform for Planning Sustainable Societies, AICRA Publishers, Bangalore, India.


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Course: Natural Hazards and Disaster Management
Semester: IV

Credit : 2
Course code : ENV4403

Course objective: This paper introduces the students to various environmental hazards, their causes, nature, preparedness and assessment of loss. It teaches them to model hazards and familiarizes with methods of management of disasters and consequently risk zonation.

Module I: Introduction: Disaster: nature and causes, climate change and disaster, hazard, risk, vulnerability, impacts of disasters: health, physical and socio-economic.; Natural hazard profile of India.

Module II: Natural and Human Induced Hazards: Hazards: classification, causes, impact and prediction; floods and droughts; drought and its management-causes and impacts, water conservation practices for deserts, mass wasting/ landslides; avalanche; nature and causes of volcanoes. Human induced hazards: hazards due to dams/ reservoirs, nuclear power plants, industrial and occupational hazards, tropical cyclones and tsunami, sea level change and its impact on coastal areas.

Module III: Disaster Management Cycle: disaster preparedness: preventive measures, early warning system; Mitigation: disaster risk reduction (DRR), the emergency operation plan (EOP); Response and recovery; Applications of science, technology and engineering in disaster management.


Examination Scheme:

Components	A	CT	HA	EE
Weightage (%)	5	15	10	70

A: Attendance, CT: Class Test, HA: Home Assignment, EE: End Semester Examination;

Books Suggested:

1. Valdiya K. S. (1987).Environmental Geology (Indian Context). Tata-McGraw-Hill, New Delhi.
2. Keller Edward A. (1996).Environmental Geology. Prentice-Hall, NJ.
3. Kates, B.I& White, G.F The Environment as Hazards, oxford, New York, 1978.
4. H.K. Gupta (Ed) Disaster Management, Universities Press, India, 2003.
5. Dr. Satender, Disaster Management in Hills, Concept Publishing Co., New Delhi, 2003.
6. R.K. Bhandani: An overview on Natural & Manmade Disaster & their Reduction, CSIR, New Delhi.
7. M.C. Gupta Manuals on Natural Disaster management in India, National Centre for Disaster Management, IIPA, New Delhi, 2001.


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Course: Term Paper/ Seminar (Research Article)
Semester: IV

Credit : 1
Course code : ENV4431

Objectives:

The objective of this course is to judge the understanding as well as application of the knowledge gained by the students. The aim of the term paper/ seminar is to provide the students with an opportunity to further enhance their knowledge in a sector of their choice by undertaking examination and analysis of various aspects of environmental issues at a level commensurate with the learning outcomes of the various courses taken up by them in the ongoing semester.

A term paper/ seminar is primarily a record of intelligent reading in several sources on a particular subject. The students will choose the topic at the beginning of the session in consultation with the faculty assigned.

Guidelines:

- Choosing the topic: contemporary issue and will be given by the department
- Finding relevant materials
- Presentation: before the commencement of Semester examinations
- Response to queries
- Submission of the write-up

Presentation of the seminar will be of 30 min maximum (25 min presentation and rest question answer session)

Examination Scheme:

Organisation and Relevance of	Literature Review	Bibliography	Presentation	Response to the Queries	Total
30	10	10	40	10	100



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GUIDELINES FOR PROJECT FILE AND PROJECT REPORT

Research experience is a professional problem-solving activity and is equally significant as any other aspect of the curriculum. It provides exposure to research methodology and an opportunity to work closely with a faculty guide. It usually requires the use of advanced concepts, a variety of experimental techniques, and state-of-the-art instrumentation.

Research is genuine exploration of the unknown that leads to new knowledge which often warrants publication. But whether or not the results of a research project are publishable, the project should be communicated in the form of a research report written by the student.

Sufficient time should be allowed for satisfactory completion of reports, taking into account that initial drafts should be critically analyzed by the faculty guide and corrected by the student at each stage.

PROJECT FILE

The Project File may be a very useful tool for undertaking an assignment along-with a normal semester, an exploratory study, sponsored projects, a project undertaken during summer period or any other period as per curricula where the researcher is working with a company/organization. The project/ assignment may also be a part of the bigger research agenda being pursued by a faculty/ institution/ department.

The Project File is the principal means by which the work carried out will be assessed and therefore great care should be taken in its preparation. This file may be considered in continuous assessment.

In general, the File should be comprehensive and include:

- A short account of the activities that were undertaken as part of the project;
- A statement about the extent to which the project has achieved its stated objectives;
- A statement about the outcomes of the evaluation and dissemination processes engaged in as part of the project;
- Any activities planned but not yet completed as part of the project, or as a future initiative directly resulting from the project;
- Any problems that have arisen and may be useful to document for future reference.

PROJECT REPORT

The Project Report is the final research report that the student prepares on the project assigned to him. In case of sponsored project the layout of the project could be as prescribed by the sponsoring organization. However, in other cases the following components should be included in the project report:

➤ Title or Cover Page

The title page should contain Project Title; Student's Name; Programme; Year and Semester and Name of the Faculty Guide.

➤ Acknowledgement(s)

Acknowledgment to any advisory or financial assistance received in the course of work may be given. It is incomplete without student's signature.

➤ Abstract

A good "Abstract" should be straight to the point; not too descriptive but fully informative. First paragraph should state what was accomplished with regard to the objectives. The abstract does not have

to be an entire summary of the project, but rather a concise summary of the scope and results of the project. It should not exceed more than 1000 words.

➤ **Table of Contents**

Titles and subtitles are to correspond exactly with those in the text.

➤ **Introduction**

Here a brief introduction to the problem that is central to the project and an outline of the structure of the rest of the report should be provided. The introduction should aim to catch the imagination of the reader, so excessive details should be avoided.

➤ **Materials and Methods**

This section should aim at experimental designs, materials used (wherever applicable). Methodology should be mentioned in detail including modifications undertaken, if any. It includes organization site(s), sample, instruments used with its validation, procedures followed and precautions.

➤ **Results and Discussion**

Present results, discuss and compare these with those from other workers, etc. In writing this section, emphasis should be laid on what has been performed and achieved in the course of the work, rather than discuss in detail what is readily available in text books. Avoid abrupt changes in contents from section to section and maintain a lucid flow throughout the thesis. An opening and closing paragraph in every chapter could be included to aid in smooth flow.

Note that in writing the various sections, all figures and tables should as far as possible be next to the associated text, in the same orientation as the main text, numbered, and given appropriate titles or captions. All major equations should also be numbered and unless it is really necessary, do not write in “point” form.

While presenting the results, write at length about the various statistical tools used in the data interpretation. The result interpretation should be simple but full of data and statistical analysis. This data interpretation should be in congruence with the written objectives and the inferences should be drawn on data and not on impression. Avoid writing straight forward conclusion rather; it should lead to generalization of data on the chosen sample.

Results and its discussion should be supporting/ contradicting with the previous research work in the given area. Usually one should not use more than two researches in either case of supporting or contradicting the present case of research.

➤ **Conclusion(s) & Recommendations**

A conclusion should be the final section in which the outcome of the work is mentioned briefly. Check that your work answers the following questions:

- Did the research project meet its aims (check back to introduction for state aims)?
- What are the main findings of the research?
- Are there any recommendations?
- Do you have any conclusion on the research process itself?

➤ **Implications for Future Research**

This should bring out further prospects for the study either thrown open by the present work or with the purpose of making it more comprehensive.

➤ **Appendices**

The Appendices contain material which is of interest to the reader but not an integral part of the thesis and any problem that have arisen that may be useful to document for future reference.

➤ **References**

References should include papers, books etc. referred to in the body of the report. These should be written in the alphabetical order of the author's surname. The titles of journals preferably should not be abbreviated; if they are, abbreviations must comply with an internationally recognised system.

Examples:

For research article:

Voravuthikunchai, S.P., Lortheeranuwat, A., Ninprom, T., Popaya, W., Pongpaichit, S., Supawita, T., Photocatalytic treatment of tannery wastewater for the removal of toxic compounds, Journal of Environmental Science and Technology, 8 (1): 116-117 (2002).

For book:

Kowalski, M., Biological wastewater treatment for pulp and paper industry, Wastewater Treatment (Eds. P.S. Nutman IBP), 7: 63-67 (1976).

The Layout Guidelines for the Project File & Project Report:

- A4 size Paper
- Font: Arial (10 points) or Times New Roman (12points)
- Line spacing: 1.5
- Top and bottom margins: 1 inch/ 2.5 cm; left and right margins: 1.25 inches/ 3cm

ASSESSMENT OF THE PROJECT FILE AND THE PROJECT REPORT

Essentially, the assessment will be based on the quality of the report, the technical merit of the project and the project execution. Technical merit attempts to assess the quality and depth of the intellectual efforts put into the project. Project execution is concerned with assessing how much work has been put in.

The Project should fulfill the following *assessment objectives*:

- Range of Research Methods used to obtain information
- Execution of Research
- Data Analysis (Analyze Quantitative/ Qualitative information)
- Quality Control
- Conclusions

Assessment

Scheme:

Continuous

Evaluation:

40% (Based on punctuality, regularity of work, adherence to plan and methodology, refinements/mid-course corrections etc. as reflected in the Project File.)

Final Evaluation:

60% (Based on the Documentation in the file, Final report layout, analysis and results, achievement of objectives, presentation/ viva)

 It is recommended that the Final evaluation should be carried out by a panel of evaluators.

AEROSPACE ENGINEERING

Programme Structure-2022

Course Code	Course Title	Lecture (L) Hours Per	Tutorial (T) Hours Per Week	Practical (P) Hours Per	Total Credits
ASE2153	Elements of Aeronautics	3	-	-	3
ASE2253	Elements of Astronautics	3	-	-	3
ASE2353	Theory of Flight	3	-	-	3
ASE2453	Principles of Stability and Control	3	-	-	3
ASE2553	Introduction to Flight Vehicle Design	3	-	-	3
ASE2653	Principles of Aerospace Propulsion	3	-	-	3
	TOTAL				18



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AEROSPACE ENGINEERING

Syllabus – First Semester

ASE2153	Elements of Aeronautics	L	T	P	C
Version 2019-1	Date of Approval: May 2019	3	0	0	3
Pre-requisites/ Exposure	Physics, Engineering Mechanics, Chemistry				
Co-requisites					

Course Catalog

This course provides basic knowledge and understanding of various kinds of flight vehicles and their classifications based on various aspects. Knowledge of basic physics is crucial to comprehend the contents of this course. This course also provides introductory knowledge to the students about various components and systems of flight vehicles which serve as a foundation for better understanding of advanced course.

Course Objectives

The objective of this course is to

1. Provide introductory knowledge to the students regarding the basic science and principles as applicable to various flight vehicles and their structure.
2. Provide education to the students about the aerodynamics, propulsion, and systems of different types of flight vehicles.

Course Outcomes

On completion of this course, the students will be able to

- CO1. List, explain, and categorize amongst various kinds of flight vehicles and their design.
- CO2. List, explain, and compare amongst various structural components of flight vehicles and loads acting on them.
- CO3. List, explain, categorize, and apply the basic concepts of flight and properties of atmosphere.
- CO4. List, explain, categorize, and apply the basic concepts of propulsion and propulsion systems.
- CO5. List, explain, categorize, and apply the basic concepts of various types of aerospace systems and instrumentations.

Course Content:

Modules	Blooms level*	Number of hours
Module 1: Introduction to Flight Vehicles History and development of flying machines; Classification of flight vehicles; Introduction to prominent design features of - Airplanes, helicopter and other flying machines.	L1, L2, L4	7
Module 2: Aerospace Structure Importance of Strength/Weight Ratio of Materials; Monocoque, Semi-Monocoque and Truss Type Construction; Detailed Description of the Fuselage, Wing and Tail Structures; Loads on Different Parts of the Aerospace Vehicles; Types of Undercarriages.	L1, L2, L4	7
Module 3: Principles of Flight	L1, L2,	7

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International Standard Atmosphere; Relationship between Temperature, Pressure and Altitude; Bernoulli's Principle; Propagation of Sound; Mach Number; Aerodynamic forces and moments on airfoil; Lift and drag; Roll, Pitch and yaw, Wing Planform; Control surfaces.	L4	
Module 4: Principles of Propulsion Newton's Third Law of Motion and its Application in Propulsion; Propulsive Force; Air-Breathing Propulsion; Types of Air-Breathing Engines; Rocket Propulsion; Thrust Equation; Propulsion System Design Criteria.	L1, L2, L4	8
Module 5: Aerospace Systems and Instrumentation Introduction to Mechanical, Electrical and Avionics Systems; Conventional Control; Powered Control; Actuation Systems; Environmental Control Systems; Air Data Systems; Communication Systems; Navigation Systems.	L1, L2, L4	7

*Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Text & Reference Books:

Text:

- A. C. Kermode, "Mechanics of Flight", 11th Edition, Prentice Hall, 2006.
- A. C. Kermode, "Aeroplane Structures", 2nd Edition, Pitman Publications, UK, 1986.
- M. J. Kroes, J. Rardon, M. Nolan, "Aircraft Basic Science", 8th Edition, McGraw-Hill Education, 2013.
- J. D. Anderson Jr., "Fundamentals of Aerodynamics", 5th Edition, McGraw Hill Education, 2010.
- E. L. Houghten, P. W. Carpenter, "Aerodynamics for Engineering Students", 5th Edition, Butterworth-Heinemann, 2003.

Reference:

- M. J. Kroes, T. W. Wild, "Aircraft Power Plants", 7th Edition, McGraw Hill Education, 1994.
- I. E. Treager, "Aircraft Gas Turbine Engine Technology", 3rd Edition, McGraw Hill Education, 2017.
- J. G. Bertin, R. M. Cummings, "Aerodynamics for Engineers", 6th Edition, Pearson Education, 2013.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

A: Attendance, CT: Class Test, S/V/Q: Seminar/Viva/Quiz, HA: Home Assignment, EE: End Semester Examination

CO, PO, PSO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	-	-	-	-	-	3	-	-	3	2	2	1	-	-	2	1
CO2	-	-	-	-	-	3	-	-	3	2	2	1	-	-	2	1
CO3	-	-	-	-	-	3	-	-	3	2	2	1	-	-	2	1
CO4	-	-	-	-	-	3	-	-	3	2	2	1	-	-	2	1
CO5	-	-	-	-	-	3	-	-	3	2	2	1	-	-	2	1

1: strongly related, 2: moderately related and 3: weakly related



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Syllabus – Second Semester

ASE2253	Elements of Astronautics	L	T	P	C
Version 2019-1	Date of Approval: May 2019	3	0	0	3
Pre-requisites/ Exposure	Elements of Aeronautics				
Co-requisites					

Course Catalog

This course deals with the techniques of numerical analysis, which gives the solution to applied problem when ordinary analytical method fails. The given techniques can be used in design of engineering and scientific problems. This course provides the basic knowledge and fundamentals related to the concepts of engineering mathematics, errors and approximation theory, interpolation, graph fitting and statistical computation.

Course Objectives

The objective of this course is to

1. Provide an understanding to the students about the space, celestial bodies, trajectories, orbits, and orbital mechanics.
2. Equip the students with knowledge about various types of rockets, satellites and spacecraft, their crucial systems and subsystems.

Course Outcomes

On completion of this course, the students will be able to

- CO1.** List and explain the various peculiarities and properties of space, celestial bodies, manned and unmanned spaceflight.
- CO2.** State and explain elements, principles and laws associated with the motion of orbiting bodies.
- CO3.** Define, explain and compare amongst the various elements and properties related to maneuvering of artificial satellites in orbits.
- CO4.** List, explain, distinguish and compare amongst the different types of rockets and satellites, their design and operation.
- CO5.** Define, explain, distinguish and compare amongst the different systems and subsystems of spacecraft.

Course Content:

Modules	Blooms level*	Number of hours
Module 1: Introduction Planet/Solar Systems; History of Spaceflight; Peculiarities of Space Environment, Challenges in Space Environment; Interstellar Flights; Manned Space Missions.	L1, L2	7
Module 2: Orbital Principles Motion of Planets and Satellites; History of Various Models; Trajectory and Orbits; Circular and Elliptical Orbits; Orbital Elements and Properties; Kepler's Laws of Planetary Motion and Proof of the Laws; Newton's Universal Law of Gravitation; Total Energy of an Orbiting Body; Orbital Velocity.	L1, L2	7
Module 3: Orbital Maneuvers	L1, L2,	7

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Orbit Establishment; Orbital Perturbations and Corrections; Orbital Maneuvers; Single-Impulse Maneuvers; Delta-V and Delta-V Requirements; Hohmann Transfer; Simple Plane Changes.	L4	
Module 4: Rockets and Satellites Rockets; Missiles; Satellite Launch Vehicles; PSLV, GSLV; Propellant & Rocket Propulsion Systems; Thermal Protection; Natural and Artificial Satellites; Different Types of Satellites; Communication Satellites; Radio Wave Propagation, Modulation And Demodulation; Remote Sensing Satellites.	L1, L2, L4	7
Module 5: Spacecraft Systems Spacecraft Launch Site Selection; Attitude Reference and Control Subsystem; Power Subsystem; Thermal Subsystem; Propulsion Subsystem; Onboard Computer Subsystem.	L1, L2, L4	8

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation*

Text & Reference Books

Text:

- A. K. Maini, V. Agrawal, "Satellite Technology, Principles and Applications", 3rd Edition, Wiley, 2014.
- P. Fortescue, G. Swinerd, J. Stark, "Space Systems Engineering", Wiley, 2011.
- S. G. Gould, "Getting Started with Amateur Satellites", 2003.

Reference Books

- B. G. Evans, "Satellite Communication Systems", 3rd Edition, The Institution of Engineering and Technology, 1999.
- B. A. Campbell, S. W. McCandless, "Introduction to Space Sciences and Spacecraft Applications", Gulf publishing, 1996.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

A: Attendance; CT: Class Test; S/V/Q: Seminar/Viva/Quiz; HA: Home Assignment; EE: End Semester Examination


CO, PO and PSO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	-	-	-	-	-	3	-	-	3	2	2	1	-	-	2	1
CO2	-	-	-	-	-	3	-	-	3	2	2	1	-	-	2	1
CO3	-	-	-	-	-	3	-	-	3	2	2	1	-	-	2	1
CO4	-	-	-	-	-	3	-	-	3	2	2	1	-	-	2	1
CO5	-	-	-	-	-	3	-	-	3	2	2	1	-	-	2	1

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Syllabus – Third Semester

ASE2353	Theory of Flight	L	T	P	C
Version 2019-1	Date of Approval: May 2019	3	0	0	3
Pre-requisites/ Exposure	Physics, Elements of Aeronautics				
Co-requisites					

Course Catalog

This course contains Fundamental characteristics of standard atmosphere which are crucial for aerodynamic characteristics of airfoil and airplane. The course is designed to make students to understand aerodynamic forces and moments in steady, accelerated flight and in maneuvers for different flight modes and conditions.

Course Objectives

The objective of this course is to

1. Provide an insight to students about the characteristics of atmosphere.
2. Equip students about different forces on airfoil and wing due to immersion in free stream of air in flight.

Course Outcomes

On completion of this course, the students will be able to

- CO1.** Define and explain parameters of International Standard Atmosphere.
- CO2.** State, explain and apply the physical principle in estimation of aerodynamic drag over flight vehicles.
- CO3.** Describe, apply and analyze the aerodynamic characteristics over airfoils and wings of flight vehicles.
- CO4.** Explain and apply the basic equations and principles to analyze the airplane mechanics in steady flight.
- CO5.** Explain and apply the basic equations and principles to analyze the airplane performance in accelerated flight and maneuvers.

Course Content

Modules	Blooms level*	Number of hours
Module 1: Standard Atmosphere Standard atmosphere, pressure, temperature and density altitudes, Relation for stratosphere and troposphere, Stability of atmosphere, Measurement of air-speed: true airspeed, indicated airspeed and equivalent airspeed, Airspeed indicator	L1, L2	7
Module 2: Aerodynamic Drag Drag and its effects, Types of drag and affecting factors, Drag polar, Compressibility drag, Design for minimum drag, Terminal velocity	L1, L2, L3	7
Module 3: Aerodynamic Characteristics Force and Moments coefficients, dimensional analysis, Pressure distribution over 2D airfoil, Variation with angle of attack, Center of pressure, Aerodynamic center and connected problems, Lift, Drag and moment coefficients; Relations between lift and drag, Effect of span, Aspect ratio, plan form, sweep, taper and	L2, L3, L4	7

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twist on aerodynamic characteristics of a lifting surface.		
Module 4: Airplane Mechanics in Steady Flight Straight and Level flight, stalling speed; Variation of drag with flight, Speed conditions for minimum drag, minimum power conditions; Gliding flight, Sinking speed, Minimum sinking speed, Time of descent, Climbing flight Time to flight, Maximum rate of climb.	L2, L3, L4	7
Module 5: Airplane Performance in Accelerated Flight Take-off and landing, Calculations of take-off ground run, Take-off distances, Minimum ground run, assisted take-off, Calculation of landing ground run, Range and endurance and problems, Turning flight.	L2, L3, L4	8

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation*

Text & Reference Books:

Text:

- D. O. Dommasch, S. S. Sherby & T. F. Connolly, "Airplane Aerodynamics", 4th Ed. Pitman Publishing Group, 1998.
- E. L. Houghton and A. E. Brock, "Aerodynamics for Engineering Students", Edward Arnolds, 1986.
- R. S. Shevell, "Fundamentals of Flight", 3rd Ed. Prentice Hall, 1999.
- J. D. Anderson, "Introduction to Flight", McGraw Hill, 3rd Ed, 2004.

References:

- J. J. Bertin and M. L. Smith, "Aerodynamics for Engineers", 2nd Ed., Prentice Hall.
- C. D. Perkins, and R. E. Hage, "Airplane Performance, Stability and Control", John Wiley, 1949.

Examination Scheme

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

A: Attendance, CT: Class Test, S/V/Q: Seminar/Viva/Quiz, HA: Home Assignment, EE: End Semester Examination

CO, PO, PSO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
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CO3	-	-	-	-	-	3	-	-	3	2	2	1	-	-	2	1
CO4	-	-	-	-	-	3	-	-	3	2	2	1	-	-	2	1
CO5	-	-	-	-	-	3	-	-	3	2	2	1	-	-	2	1

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Syllabus – Fourth Semester

ASE2453	Principles of Stability & Control	L	T	P	C
Version 2019-1	Date of Approval: May 2019	3	0	0	3
Pre-requisites/ Exposure	Introduction to Aerospace Engineering, Flight Mechanics, Low Speed Aerodynamics				
Co-requisites					

Course Catalog

This course provides the fundamental knowledge of stability and control of an aircraft. Students will understand the importance of different components of an aircraft in providing stability and giving control to aircraft motion. This course also provides understanding of mathematics behind the designing of aircraft and its components. The content of this course serves as a foundation for advance course of aircraft designing.

Course Objectives

The objective of this course is to

1. Provide understanding of various aspects of stability of an aircraft in flight and how geometric features of control surfaces and their proper angular movements achieve it.
2. Provide an analytical understanding of longitudinal, lateral and directional stability and measures that can be taken to control the same.

Course Outcomes

On completion of this course, the students will be able to

- CO1.** Define and explain the concepts of stability and control as applicable to flight vehicles.
- CO2.** Define, explain, apply and compare the various fundamentals and aspects of stick fixed static longitudinal stability.
- CO3.** Define, explain, apply and compare the various fundamentals and aspects of stick free static longitudinal stability.
- CO4.** Define, explain, apply and compare the various fundamentals and aspects of directional stability and control of flight vehicles.
- CO5.** Define, explain, apply and compare the various fundamentals and aspects of lateral stability and control of flight vehicles.

Course Content

Modules	Blooms level*	Number of hours
Module 1: Introduction Overview of Static and Dynamic Stability of Flight Vehicles; Positive, Negative and Neutral Stability; Types of Moments; Role of Tailplane in Stability and Balancing of Aircraft;	L1, L2	7
Module 2: Stick Fixed Static Longitudinal Stability Introduction to Stick Fixed Longitudinal Stability; Conditions for Longitudinal Stability; Contribution of Wing and Tail; Neutral Point; Centre of Gravity Limits; In-flight Measurement of Stick Fixed Neutral Point.	L1, L2, L3, L4	8

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Module 3: Stick Free Static Longitudinal Stability Control Surface Hinge Moments; Floating and Restoring Tendencies; The Tab; Effect of Free Elevator on Airplane Stability; Elevator Control Force; Stick Force Gradients; Neutral Point; Controls Free Center of Gravity Limit; In-Flight Measurement of Stick Free Neutral Point.	L1, L2, L3, L4	7
Module 4: Directional Stability and Control Asymmetric Flight; Feather Cock Stability; Conditions for Directional Stability; Contribution of Wing and Tail; Rudder Fixed and Rudder Free Static Directional Stability.	L1, L2, L3, L4	7
Module 5: Lateral Stability and Control Dihedral Effect, Conditions for Lateral Stability; Contribution of Wing and Tail; Aileron Control Power, Adverse Yaw; Roll Control.	L1, L2, L3, L4	7

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation*

Text & Reference Books:

Text:

- C. D. Perkins, R. E. Hage, "Airplane Performance Stability and Control", John Wiley & Sons, 1949.
- B. Dickinson, "Aircraft Stability and control for Pilots and Engineers", Pitman, 1968.
- B. N. Pamadi, "Performance, Stability, Dynamics and Control of Airplanes", 2nd Edition, American Institute of Aeronautics & Astronautics, 2004.
- R. Nelson, "Flight Stability and Automatic Control", McGraw Hill Education, 2017.

Reference:

- M. V. Cook, "Flight Dynamics Principles: A Linear Systems Approach to Aircraft Stability and Control", Wiley, 1997.
- J. Roskam, "Airplane Flight Dynamics and Automatic Flight Controls", Roskam Aviation and Engineering Corporation, 2001.
- B. Etkin, L. D. Reid, "Dynamics of Flight: Stability and Control", 3rd Edition, Wiley, 1995.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

A: Attendance, CT: Class Test, S/V/Q: Seminar/Viva/Quiz, HA: Home Assignment, EE: End Semester Examination

CO, PO, PSO Mapping

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CO3	-	-	-	-	-	3	-	-	3	2	2	1	-	-	2	1
CO4	-	-	-	-	-	3	-	-	3	2	2	1	-	-	2	1
CO5	-	-	-	-	-	3	-	-	3	2	2	1	-	-	2	1

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Syllabus – Fifth Semester

ASE2553	Introduction to Flight Vehicle Design	L	T	P	C
Version 2019-1	Date of Approval: May 2019	3	0	0	3
Pre-requisites/ Exposure	Introduction to Aerospace Engineering, Flight Mechanics, Low Speed Aerodynamics				
Co-requisites					

Course Catalog

This course provides basic knowledge and understanding of various aspects and processes of aircraft design. This course provides in-depth knowledge to the students about flow process of carrying out the designing of aircraft, its associated loads and the safety requirements. Based on this course, students will be able to investigate new and emerging design aspects

Course Objectives

The objective of this course is to

1. Provide introductory knowledge to the students regarding the fundamentals of aircraft designing and its structural analysis
2. Provide education to the students about the concepts of different structural members and various associated loads

Course Outcomes

On successful completion of this course, the students will be able to

- CO1.** List and describe the basics of aircraft system design and aircraft structures
- CO2.** Identify, explain and analyze the applicability of design aspects and different aircraft loads.
- CO3.** Identify and explain the design considerations of wings and high lift devices.
- CO4.** Identify, correlate and apply the numerical and theoretical knowledge to investigate new and emerging design aspects

Course Content

Modules	Blooms level*	Number of hours
Module 1: Introduction Aircraft design, requirements and specifications, Different design phases, Importance of each phase. Weight, its importance. Aerodynamic and structural design considerations. Classifications of airplane.	L1, L2	8
Module 2: Air Loads during Flight Ground Loads, Airframe loads, maneuvering loads in flight, Load factor, V-n diagram, gust loads, and estimation of gust loads.	L1, L2, L4	6
Module 3: Wing Design Consideration Selection of airfoil and planform. Span wise air loads variation, BMD and SFD. Weight distribution.	L1, L2	8
Module 4: High Lift Systems Airfoil's maximum lift coefficient, leading and trailing edge devices, effect of	L1, L2	7

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sweep back. Stall and the deep stall. Effect of Re, V/STOL configurations.		
Module 5: Conceptual Design of Airplane & Layout Preparation of 3-views and layout. Estimation of take-off, landing, climbing and cruise performance. Flight envelope.	L1, L2, L3	7

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation*

Text & Reference Books:

Text:

- D.P. Raymer, "Airplane Design-A Conceptual Approach", 3rd Edition, AIAA Education Series, 1999.
- D. Stinton, "The Design of Airplane", 1st edition, Granada, UK, 2000.

References:

- L.M. Nikolai, "Fundamentals of Aircraft Design", 2nd Edition, Univ. of Dayton Ohio, 1975.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

A: Attendance, CT: Class Test, S/V/Q: Seminar/Viva/Quiz, HA: Home Assignment, EE: End Semester Examination;

CO, PO and PSO Mapping

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CO3	-	-	-	-	-	3	-	-	3	2	2	1	-	-	2	1
CO4	-	-	-	-	-	3	-	-	3	2	2	1	-	-	2	1
CO5	-	-	-	-	-	3	-	-	3	2	2	1	-	-	2	1

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Syllabus – Sixth Semester

ASE2653	Principles of Aerospace Propulsion	L	T	P	C
Version 2019-1	Date of Approval: May 2019	3	0	0	3
Pre-requisites/ Exposure	Elements of Aeronautics, Elements of Astronautics				
Co-requisites					

Course Catalog

This course covers the fundamentals of spacecraft propulsion and discusses advanced concepts in space propulsion ranging from chemical to electrical engines. Topics include conventional and advanced propulsion systems, physics and engineering of spacecraft propulsion, and various schemes for accelerating propellants.

Course Objectives

The objective of this course is to

1. Provide introductory knowledge to the students regarding the basic science and principles as applicable to various flight vehicles and their structure.
2. Provide education to the students about the aerodynamics, propulsion, and systems of different types of flight vehicles.

Course Outcomes

On completion of this course, the students will be able to

- CO1.** Define, explain, and apply the different theoretical aspects and associated mathematical principles to spacecraft propulsion.
- CO2.** List, explain, and compare amongst various types, systems and subsystems of chemical propulsion.
- CO3.** Outline, describe, and contrast amongst various types, systems and subsystems of electric propulsion.
- CO4.** Identify, explain, and compare amongst various types, systems and subsystems of nuclear propulsion.
- CO5.** List, summarize and contrast amongst the different advanced propulsion concepts for interstellar travels.

Course Content

Modules	Blooms level*	Number of hours
Module 1: Introduction to Spacecraft Propulsion Overview of Spacecraft Propulsion; Basic Theory of Thermal Jet/Rocket Engines; Launch Vehicle Selection; Newton's Third Law and Rocket Equation; Tsiolkovsky's Rocket Equation.	L1, L2, L3	6
Module 2: Chemical Propulsion Basic Configuration of -Liquid Propellant Engines; Types and Examples; Solid Propellant Rockets; Types and Examples; Hybrid Rocket Motors; Types and Examples; Cryogenic Engines; Types and Examples; Specific Impulse; Propulsive Efficiency.	L1, L2, L4	6

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Module 3: Electric Propulsion Overview of Electric Propulsion; Basics and Classification; Principles of Electric Propulsion; Electrothermal Thrusters; Electrostatic Thrusters; Electromagnetic Thrusters; Electrical Power Generation; Applications of Electric Propulsion.	L1, L2, L4	9
Module 4: Nuclear Propulsion Nuclear Propulsion Basics; Nuclear Fission Concept; Principle of Nuclear Thermal Propulsion; Fuel Elements; Exhaust Velocity of Nuclear Thermal Rocket; Radiation; Potential Applications; Operational Issues.	L1, L2, L4	9
Module 5: Advanced Concepts Interstellar Distances; Energy Requirements; Propulsion Systems requirements; Improving Efficiency; Single Stage to Orbit; Air-breathing Engines.	L1, L2, L4	6

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation*

Text & Reference Books:

Text:

- G. P. Sutton, O. Biblarz, "Rocket Propulsion Elements", 7th Edition, John Wiley & Sons, Inc., 2001.
- M. J. L. Turner, "Rocket and Spacecraft Propulsion", 3rd Edition, Praxis Publishing, Springer, 2009.

Reference:

- A. K. Gupta, D. G. Lilley, "Advances in Chemical Propulsion", CRC Press, 2001.
- G. C. Oates, "Aerothermodynamics of Gas Turbine and Rocket Propulsion", 3rd Edition, American Institute of Aeronautics and Astronautics, Inc., 1997.
- M. Tajmar, "Advanced Space Propulsion Systems", Springer Science & Business Media, 2012.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

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CO3	-	-	-	-	-	3	-	-	3	2	2	1	-	-	2	1
CO4	-	-	-	-	-	3	-	-	3	2	2	1	-	-	2	1
CO5	-	-	-	-	-	3	-	-	3	2	2	1	-	-	2	1

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ARTIFICIAL INTELLIGENCE

Programme Structure

Course Code	Course Title	Lecture (L) Hours Per Week	Tutorial (T) Hours Per Week	Practical (P) Hours Per Week	Total Credits
CSE2351	Basics of Artificial Intelligence	3	-	-	3
CSE2451	Artificial Neural Networks	3	-	-	3
CSE 2551	Fuzzy Logic	3	-	-	3
CSE2651	Introduction to Genetic Algorithm	3	-	-	3
CSE2751	Soft Computing	3	-	-	3
CSE2851	Project (Artificial Intelligence)	3	-	-	3
	TOTAL				18



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ARTIFICIAL INTELLIGENCE

Syllabus

BASICS OF ARTIFICIAL INTELLIGENCE

Course Code: CSE2351

Credit Units: 03

Course Objective:

To develop semantic-based and context-aware systems to acquire, organize process, share and use the knowledge embedded in multimedia content. Research will aim to maximize automation of the complete knowledge lifecycle and achieve semantic interoperability between Web resources and services. The field of Robotics is a multi disciplinary as robots are amazingly complex system comprising mechanical, electrical, electronic H/W and S/W and issues germane to all these.

MODULE- I

AI problems, foundation of AI and history of AI intelligent agents: Agents and Environments, the concept of rationality, the nature of environments, structure of agents, problem solving agents, problem formulation.

MODULE-II

Searching- Searching for solutions, uniformed search strategies – Breadth first search, depth first Search. Search with partial information (Heuristic search) Hill climbing, A* ,AO* Algorithms, Problem reduction, Game Playing-Adversial search, Games, mini-max algorithm, optimal decisions in multiplayer games, Problem in Game playing, Alpha-Beta pruning, Evaluation functions.

MODULE-III

Knowledge representation issues, predicate logic- logic programming, semantic nets- frames and inheritance, constraint propagation, representing knowledge using rules, rules based deduction systems. Reasoning under uncertainty, review of probability, Baye's probabilistic interferences and dempstershafer theory.

MODULE- IV

First order logic. Inference in first order logic, propositional vs. first order inference, unification & lifts forward chaining, Backward chaining, Resolution, Learning from observation Inductive learning, Decision trees, Explanation based learning, Statistical Learning methods , Reinforcement Learning.

MODULE- V

Expert systems:- Introduction, basic concepts, structure of expert systems, the human element in expert systems how expert systems works, problem areas addressed by expert systems, expert systems success factors, types of expert systems, expert systems and the internet interacts web, knowledge engineering, scope of knowledge, difficulties, in knowledge acquisition methods of knowledge acquisition, machine learning, intelligent agents, selecting an appropriate knowledge acquisition method, societal impacts reasoning in artificial intelligence, inference with rules, with frames: model based reasoning, case based reasoning, explanation & meta knowledge inference with uncertainty representing uncertainty.


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Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Reference Books:-

1. S. Russel and P. Norvig, "Artificial Intelligence – A Modern Approach", Second Edition, Pearson Education
2. David Poole, Alan Mackworth, Randy Goebel, "Computational Intelligence : a logical approach", Oxford University Press.
3. G. Luger, "Artificial Intelligence: Structures and Strategies for complex problemsolving", Fourth Edition, Pearson Education.
4. J. Nilsson, "Artificial Intelligence: A new Synthesis", Elsevier Publishers.



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ARTIFICIAL NEURAL NETWORKS

Course Code: CSE2451

Credit Units: 03

Module-I

Artificial Neural Networks (ANN) and their biological roots and motivations. ANNs as numerical data/signal/image processing devices. a summing dendrite, synapses and their weights, pre- and post-synaptic signals, activation potential and activation function. Excitatory and inhibitory synapses. The biasing input. Types of activating functions. Encoding (training phase) and decoding (active phase). Taxonomy of neural networks:- feedforward and recurrent networks with supervised and unsupervised learning laws, static & dynamic processing systems, basic data structures: mapping of vector spaces, clusters, principal components.

Module-II

Linear Networks:- Adaline - the adaptive linear element, Linear regression. The Wiener-Hopf equation. The Least-Mean-Square (Widrow-Hoff) learning algorithm. Method of steepest descent. Adaline as a linear adaptive filter. A sequential regression algorithm.

Multi-Layer Feedforward Neural Networks:- Multi-Layer Perceptrons. Supervised Learning. Approximation and interpolation of functions. Back-Propagation Learning law. Fast training algorithms. Applications of multilayer perceptrons: Image coding, Paint-quality inspection, Nettetalk.

Module-III

Self-Organising Systems:- Unsupervised Learning, Pattern clustering, Topological mapping, Kohonen's self-organizing map, Local learning laws- Generalised Hebbian Algorithm. The Oja's and Sanger's rules. Principal component analysis - Karhunen-Loeve transform.

Module-IV

Feedback neural networks:- Pattern storage and retrieval, Hopfield model, Boltzmann machine, Recurrent neural networks.

Module-V

Radial basis function networks:- Regularization theory, RBF networks for function approximation, RBF networks for pattern classification.

Kernel methods for pattern analysis:- Statistical learning theory, Support vector machines for pattern classification, Support vector regression for function approximation, Relevance vector machines for classification and regression.

Examination Scheme:

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Reference Books:-

1. B. Yegnanarayana, Artificial Neural Networks, Prentice Hall of India.
2. Satish Kumar, Neural Networks – A Classroom Approach, Tata McGraw-Hill.
3. S. Haykin, Neural Networks – A Comprehensive Foundation, Prentice Hall.


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FUZZY LOGIC

Course Code: CSE2551

Credit Units: 03

MODULE- I

Introduction: Background, Uncertainty and imprecision, Statistics and random processes, Uncertainty in information, Fuzzy sets and membership, Chance versus ambiguity, Classical sets - operations on classical sets to functions, Fuzzy sets-fuzzy set operations, Properties of fuzzy sets, sets as points in hypercube.

MODULE-II

Classical Relations And Fuzzy Relations: Cartesian product, Crisp relations-cardinality of crisp relations, Operations on crisp relations, Properties of crisp relations, Compositions, Fuzzy relations-cardinality of fuzzy relations, Operations on fuzzy relations, Properties of fuzzy relations, Fuzzy Cartesian product and composition, Non interactive fuzzy sets, Tolerance and equivalence relations-crisp equivalence relation, Crisp tolerance relation, Fuzzy tolerance, Max-min Method, other similarity methods.

MODULE-III

Membership Functions: Features of the membership function, Standards forms and boundaries, fuzzification, Membership value assignments-intuition, Inference, Rank ordering, Angular fuzzy sets.

MODULE- IV

Fuzzy-To-Crisp Conversions And Fuzzy Arithmetic: Lambda-cuts for fuzzy sets, Lambda-cuts for fuzzy relations, Defuzzification methods. Extension principle-crisp functions, Mapping and relations, Functions of fuzzy sets-extension principle, Fuzzy transform (Mapping), Fuzzy numbers Interval analysis in Arithmetic.

MODULE- V

Fuzzy Logic &Fuzzy Rule-Based Systems: Fuzzy logic, approximate reasoning, Fuzzy tautologies, Contradictions, Equivalence and logical proofs. Natural language, Linguistic hedges, Rule-based system-canonical rule forms, Decomposition of compound rules, Likelihood and truth qualification, Aggregation of fuzzy rules.

MODULE- VI

Fuzzy Decision Making, Classification & Hybrid formation: Fuzzy synthetic evaluation, Fuzzy ordering, Preference and consensus, Multiobjective decision making under fuzzy states and fuzzy actions. Classification by equivalence relations-crisp relations, Fuzzy relations cluster analysis, neuro fuzzy and fuzzy genetic system, applications to engineering problems.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

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Reference Books:-

- Neural Networks and Fuzzy Logic System by Bart Kosko, PHI Publications.
- Neural Networks, Fuzzy logic, Genetic algorithms: synthesis and applications by Rajasekharan and Rai – PHI Publication.
- Fuzzy Sets, Fuzzy Logic, and Fuzzy Systems by Lotfi A. Zadeh
- Fuzzy logic with engineering application by Timothy J. Ross-wiley



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INTRODUCTION TO GENETIC ALGORITHM

Course Code: CSE2651

Credit Units: 03

Module-I

Fundamentals of genetic algorithm: A brief history of evolutionary computation, biological terminology, search space encoding, reproduction elements of genetic algorithm, genetic modeling, comparison of GA and traditional search methods. The Fundamental Theorem, Schema Processing at work, Two-armed and k-armed Bandit problem, The Building block hypothesis.

Module-II

Genetic technology:- steady state algorithm, fitness scaling, inversion. Genetic programming:- Genetic Algorithm in problem solving, Implementing a Genetic Algorithm:- computer implementation, operator (reproduction, crossover and Mutation, Fitness Scaling, Coding, Discretization). Knowledge based techniques in Genetic Algorithm. Advanced operators and techniques in genetic search:- Dominance, Diploidy and Abeyance. Inversion and other reordering operators, Niche and speciation.

Module-III

Genetic Algorithm in engineering and optimization-natural evolution –Simulated annealing and Tabu search -Genetic Algorithm in scientific models and theoretical foundations.

Module-IV

Introduction to genetics - based machine learning: Classifier system, Rule and Message system, Apportionment of credit, Knowledge based Techniques, Genetic Algorithms and parallel processors.

Module-V

Applications of Genetic based machine learning-Genetic Algorithm and parallel processors- composite laminates- constraint optimization- multilevel optimization- real life problem.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text Book:-

David E. Goldberg, "Genetic Algorithms in search , Optimization & Machine Learning"

Reference Books:-

1. William B. Langdon, Riccardo Poli, "Foundations of Genetic Programming"
2. P. J. Fleming, A. M. S. Zalzala "Genetic Algorithms in Engineering Systems "
3. David A. Coley, "An Introduction to Genetic Algorithms for Scientists and Engineers ".
4. Melanie Mitchell- 'An introduction to Genetic Algorithm' - Prentice-Hall of India



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SOFT COMPUTING

Course Code: CSE2751

Credit Units: 03

Module-I

Introduction of soft computing, soft computing vs. hard computing, various types of soft computing techniques, applications of soft computing. Artificial Intelligence: Introduction, Various types of production systems, characteristics of production systems, breadth first search, depth first search techniques, other Search Techniques like hill Climbing, Best first Search, A* algorithm, AO* Algorithms and various types of control strategies. Knowledge representation issues, Propositional and predicate logic, monotonic and non monotonic reasoning, forward Reasoning, backward reasoning, Weak & Strong Slot & filler structures, NLP.

Module-II

Structure and Function of a single neuron: Biological neuron, artificial neuron, definition of ANN, Taxonomy of neural net, Difference b/w ANN and human brain, characteristic and applications of ANN, single layer network, Perceptron training algorithm, Linear separability, Delta rule. Introduction of MLP, different activation functions, Error back propagation algorithm, derivation of BBPA, momentum, limitation, characteristics and application of EBPA.

Module-III

Counter propagation network: -Architecture, functioning & characteristics of counter Propagation network, Hop field/ Recurrent network, configuration, stability constraints, associative memory, and characteristics, limitations and applications.

Module-IV

Fuzzy set theory, Fuzzy set versus crisp set, Crisp relation & fuzzy relations, Fuzzy systems: crisp logic, fuzzy logic, introduction & features of membership functions, Fuzzy rule base system : fuzzy propositions, formation, decomposition & aggregation of fuzzy Rules, fuzzy reasoning, fuzzy inference systems, fuzzy decision making.

Module-V

Genetic algorithm: Fundamental, basic concepts, working, principle, encoding, fitness function, reproduction, Genetic modeling: Inheritance operator, cross over, inversion & deletion, mutation operator, Bitwise operator, Generational Cycle, Convergence of GA, Applications & advances in GA, Differences & similarities between GA & other traditional methods.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance



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Reference Books :

- S, Rajasekaran & G.A. VijayalakshmiPai, Neural Networks, Fuzzy Logic & Genetic Algorithms, Synthesis & applications, PHI Publication.
- Rich E and Knight K, Artificial Intelligence, TMH, New Delhi.
- Bose, Neural Network fundamental with Graph , Algo.&Appl, TMH
- Kosko: Neural Network & Fuzzy System, PHI Publication



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PROJECT (ARTIFICIAL INTELLIGENCE)

Course Code: CSE2851

Credit Units: 03

Methodology

Topics of project are to be based on the latest trends in Artificial Intelligence, verifying engineering concepts in Artificial Intelligence /principals and should involve elementary research work. The projects may involve design, fabrications, testing, computer modeling, and analysis of any engineering problem. On completion of the project, the students are to present a report covering various aspects learnt by them and give a presentation on same.

Examination Scheme:

Literature study/ Fabrication/ Experimentation	40
Written Report	20
Viva	15
Presentation	25
Total	100



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Amity School of Engg. & Technology

Bachelor of Technology - Aerospace Engineering

FLEXILEARN

-Freedom to design your degree



Curriculum & Scheme of Examination

2022

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GURUGRAM

A handwritten signature in blue ink, appearing to read 'Anil'.

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A handwritten signature in blue ink, appearing to read 'Manesar'.

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ASE2105	Introduction to Computers and Programming in C	L	T	P	C
Version: 2019.1	Date of Approval: May 21, 2019	2	1	0	3
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

The objective of this course module is to acquaint the students with the basics of computers system, its components, data representation inside computer and to get them familiar with various important features of procedure-oriented programming language i.e. C.

Course Objectives

The objective of this course is to

1. Equip the students with concepts of Programming through C Language
2. Provide an overview of advanced programming concepts like Structure, Union and File Handling

Course Outcomes

On completion of this course, the students will be able to

After the completion of course, the students will be able to,

- CO 1: Define the purpose and structure of C Program for programming; identify and distinguish various data types and operators; conditional and control statement; Apply if-else, Switch and loops to rewrite basic C program for problem solving.
- CO 2: Compare and contrast various Array types, its declaration and implementation; differentiate between Call by Value and Reference if Functions; apply the concepts to rewrite C Programs
- CO 3: Differentiate between various String Handling Functions; describe the concept of Pointers in C Language
- CO 4: Explain the concept of Structure and Union; apply the concept of File Handling to provide data storage support to the programs.
- CO 5: Apply the concept of Computer Graphics using C programming concepts for implementing line drawing, circle drawing algorithms.

Modules	Blooms level*	Number of hours
Module I: Introduction Introduction to computer, history, von-Neumann architecture, memory system (hierarchy, characteristics and types), H/W concepts (I/O Devices), S/W concepts (System S/W & Application S/W, utilities). Data Representation: Number systems, character representation codes, Binary, octal, hexadecimal and their interconversions. Binary arithmetic, floating point arithmetic, signed and unsigned numbers, Memory storage unit.	L1, L2 and L3	7
Module II: Programming in C History of C, Introduction of C, Basic structure of C program, Concept of variables, constants and data types in C, Operators and expressions: Introduction, arithmetic, relational, Logical, Assignment, Increment and decrement operator, Conditional, bitwise operators, Expressions, Operator precedence and associativity. Managing Input and output Operation,	L2, L3 and L4	7

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formatting I/O.		
Module III: Fundamental Features in C C Statements, conditional executing using if, else, nesting of if, switch and break Concepts of loops, example of loops in C using for, while and do-while, continue and break. Storage types (automatic, register etc.), predefined processor, Command Line Argument.	L2, L3 and L4	7
Module IV: Arrays and Functions One dimensional arrays and example of iterative programs using arrays, 2-D arrays Use in matrix computations. Concept of Sub-programming, functions Example of user defined functions. Function prototype, Return values and their types, calling function, function argument, function with variable number of argument, recursion.	L2 and L3	7
Module V: Advanced features in C Pointers, relationship between arrays and pointers Argument passing using pointers, Array of pointers. Passing arrays as arguments. Strings and C string library. Structure and Union. Defining C structures, Giving values to members, Array of structure, Nested structure, passing strings as arguments. File Handling.	L2, L3 and L4	8

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6:Evaluation

Text Books

1. E Balagurusamy, "Programming in ANSI C", Seventh Edition, Tata McGraw Hill Education private limited, July 2017.
2. Yashwant Kanetkar, "Let Us C", 16th Edition, BPB Publication, June 2017.

Reference Books

1. Brain W Kernighan and Dennis M Ritchie, "The C Programming Language", 2nd Edition, Pearson Publication, Jan 2015.
2. Byron Gottfried, "Programming with C", Third Edition, Tata McGraw Hill Education private limited, July 2017.
3. E Balagurusamy, "Computer Concepts & Programming in C", Seventh Edition, Tata McGraw Hill Education private limited, July 2011.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination


Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance



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CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	2	--	2	--	--	--	--	--	--	--	--	1	--	1	--
CO2	1	1	2	2	--	--	--	--	--	--	--	--	1	--	1	--
CO3	1	1	2	3	--	--	--	--	--	--	--	--	1	--	1	--
CO4	1	1	2	2	3	--	--	--	--	--	--	--	1	--	1	--
CO5	1	1	2	2	3	--	--	--	--	--	--	--	1	--	1	--

1: strongly related, 2: moderately related and 3: weakly related



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ASE2110	Programming in C Lab	L	T	P	C
Version 2019.1	Date of Approval: May 21, 2019	0	0	2	1
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

The primary objective of this course is to understand all the components of C, including the C language, the C Preprocessor, and the C Standard Library. An understanding of some advanced practical issues, including memory management, testing and debugging, complex declarations and expression evaluation, building and using libraries, and evaluating tradeoffs, such as size vs. speed and speed vs. complexity. The ability to write C code and create and manipulate logical programs.

Course Objectives

The objective of this course is to

- Equip the students with concepts of Programming through C Language
- Provide an overview of advanced programming concepts like Structure, Union and File Handling.

Course Outcomes

After the completion of course, the students will be able to,

CO 1: Demonstrate the use of various data types and operators in C programs; Solve various problems using conditional control statements (if-else, Switch case).

CO 2: Construct C programs related to problems involving the usage of loops, arrays and functions.

CO 3: Apply the concept of Pointers for efficient memory management and construct C programs using string handling functions.

CO 4: Demonstrate the use of Structure, Union and concept of File Handling to provide data storage support to the programs.

Modules	Blooms level*	Number of hours
LABORATORY SESSSION 1 OPERATORS, EXPRESSIONS and DECISION MAKING <ol style="list-style-type: none"> 1. Write a program to calculate simple interest and amount. 2. Write a program to swap two numbers using third variable. 3. Write a program to demonstrate Greatest of 3 nos and to print the given no in ascending order. 4. Write a program to check if the number is even or odd. 5. Write a program to perform arithmetic operations using Switch Case statement. 6. Write a program to calculate area of circle, rectangle, square and triangle using Switch Case statement. 	L3	5
LABORATORY SESSSION 2 LOOPING	L3	6

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<ol style="list-style-type: none"> 1. Write a program to find factorial of given no using do while statement. 2. Write a program to print prime numbers up to 'n'. 3. Write a program to sum of n natural no. 4. Write a program to print Fibonacci series. 5. Write a program to reverse a number. 6. Write a program to print the following pattern using for loop 1 2 2 3 3 3 4 4 4 4 7. Write a program to print the following pattern using for loop A A B A B C A B C D 		
LABORATORY SESSSION 3 ARRAYS and FUNCTIONS <ol style="list-style-type: none"> 1. Write a program to read nnum of students and 5 subjects marks. 2. Write a program to swap two numbers using call by value. 3. Write a program to convert all lower case to uppercase characters 4. Write a program to find the factorial of a number using recursion. 5. Write a program to print the add/product of two matrices of any order. 	L3	5
LABORATORY SESSSION 4 POINTERS AND STRING <ol style="list-style-type: none"> 1. Write a program to perform operations on strings using string handling in-built functions (concatenation, reversal, copy etc.) 2. Write a program to swap two numbers using call by reference. 3. Write a program to perform dynamic memory allocation and de-allocation. 4. Write a program to print elements of array using pointers. 	L3	4
LABORATORY SESSSION 5 STRUCTURE, UNION & FILE HANDLING <ol style="list-style-type: none"> 1. WAP program to display student information by initializing structures. 2. WAP program to find the total salary of employee and employee details using structure. 3. Write a program to store and display information using Union. 4. Program to write data into file and read data from file. 	L3	4

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

- E Balagurusamy, "Programming in ANSI C", Seventh Edition, Tata McGraw Hill Education private limited, July 2017.
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Reference Books

1. Brain W Kernighan and Dennis M Ritchie, "The C Programming Language", 2nd Edition, Pearson Publication, Jan 2015.
2. Byron Gottfried, "Programming with C", Third Edition, Tata McGraw Hill Education private limited, July 2017.
3. E Balagurusamy, "Computer Concepts & Programming in C", Seventh Edition, Tata McGraw Hill Education private limited, July 2011.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

IA				EE
A	PR	LR	V	70
5	10	10	5	

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS O 1	PS O 2	PS O 3	PS O 4
CO 1	1	2	--	2	--	--	--	--	--	--	--	--	1	--	2	--
CO 2	1	1	2	2	--	--	--	--	--	--	--	--	1	--	2	--
CO 3	1	1	2	3	--	--	--	--	--	--	--	--	1	--	2	--
CO 4	1	1	2	2	3	--	--	--	--	--	--	--	1	--	2	--

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ASE2215	Workshop Technology	L	T	P	C
Version 1.1	Date of Approval: May, 2019	2	0	0	2
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

In this course the concepts of machine tool like Lathe, Shaper, Milling, and Drilling machines are discussed. Elementary concept of foundry, sheet metal and welding processes are discussed in detail. The aim of this course is to make the students familiar with the basic workshop processes.

Course Objectives

The objective of this course is to

- Equip the students with concept of machine tool, foundry, sheet metal and welding processes.
- Provide an overview of workshop technology.

Course Outcomes

On completion of this course, the students will be able to

CO1: Define the manufacturing process and engineering materials.

CO2: Explain the foundry, sheet metal and welding processes.

CO3: Demonstrate the machine tools like Lathe, Shaper, Milling, Drilling machines.

CO4: Discuss the basic elements of metal cutting and cutting parameters.

Modules	Blooms level*	Number of hours
MODULE 1: Introduction: Introduction to Manufacturing Processes and their Classification. Engineering Materials: General Properties and Applications of Engineering Materials, Plain carbon steel & classification.	L1, L2 and L3	3
MODULE 2: Foundry: Introduction to Casting Processes, Basic Steps in Casting Process, Pattern, Types of Patterns, Pattern Allowances, Moulding Sand and its composition, Sand Preparation, Molding Methods, Mould Assembly, Melting (Cupola) and Pouring, Fettling, Casting Defects and Remedies.	L1, L2 and L3	5
MODULE 3: Sheet Metal Work: Sheet Metal Operations, Measuring, Layout Marking, Shearing, Punching, Blanking, Piercing, Forming and Bending.	L1, L2 and L3	4
MODULE 4: Introduction to Machine Tools: Specifications and Uses of commonly used Machine Tools in a Workshop such as Lathe, Shaper, Milling, Drilling. Basic elements of metal cutting and cutting parameters.	L1, L2 and L3	6
MODULE 5: Welding: Introduction to Welding, Classification of Welding Processes, Gas Welding: Oxy-Acetylene Welding, Resistance Welding; Spot and Seam Welding, Arc Welding: Metal Arc, Welding Defects and Remedies.	L1, L2 and L3	6

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*Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

- Jain, R.K. (2004). *Production Technology: Manufacturing Processes, Technology and Automation*. Delhi: Khanna Publishers.
- Hazra, S.K. and Chaudhary, A.K. (2012). *Workshop Technology Vol. II*. New Delhi: Asian Book Comp.
- Rao, P.N. (2018). *Manufacturing Technology (Foundry, Forming and Welding)*. Delhi: Tata McGraw.

Reference Books

- Khanna, O.P. (2015). *Foundry Technology*. Delhi: Dhanpat Rai Publication.
- Parmer, R. S. (2003). *Welding Engineering and Technology*. Delhi: Khanna Publishers.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	1	--	--	--	--	--	--	--	--	--	--	1	1	--	--
CO2	1	1	--	--	--	--	--	--	--	--	--	--	1	1	--	--
CO3	1	1	--	--	--	--	--	--	--	--	--	--	1	1	--	--
CO4	1	1	--	--	--	--	--	--	--	--	--	--	1	1	--	--

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ASE2212	ENGINEERING GRAPHICS LAB	L	T	P	C
Version 2019.1	Date of Approval: July 14, 2019	0	0	4	2
Pre-requisites/Exposure	Concepts Mathematics (especially Trigonometry and Geometry)				
Co-requisites	Machine Drawing & CAD				

Catalog Description:

A freshman level course which provides the undergraduate engineering students with a background in descriptive geometry, orthographic projection, engineering drawing standards and annotation, computer-aided engineering graphics. The concepts of point, line and plane relationships in projection, multi-view engineering drawings, auxiliary and section views, basic dimensioning and annotation, engineering applications of drawings are also discussed.

Course Objective:

The objective of this course is to

- Equip the students with the in-depth knowledge of drawings of points, straight line, planes, cylinders, prisms, pyramids, parabola, ellipse etc.
- Draw different figures manually and will be capable of using various instruments involved in drawings.

Course Outcomes (COs):

At the end of the course, the student shall be able to:

CO 1 - Define and explain basic principles of projections of points and lines.

CO 2 - Define, describe and construct the different orientations and projections of planes.

CO 3 – Explain and construct the projections of solids and sectioning of solids in different orientations.

CO 4 - State and draw the concepts of development of surfaces and introduction to auto CAD.

CO 5 – Define and construct orthographic and isometric view of an object.

Modules	Blooms level*	Number of hours
Module I: Introduction Importance, significance and scope of engineering drawing, drawing instruments and their use, lettering, dimensioning, scales, sense of proportioning, different types of projections, B.I.S. Specifications.	L1 and L2	8



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Module II: Projection of points, lines and plane surface Principal planes, principles of orthographic projections, Projection of points in all quadrants, Projection methods - First angle & third angle projection, Projections of straight lines (first angle projection) inclined to both the planes, true lengths and traces, projection of planes, projection of planes in simple position and inclined to both the principal planes, auxiliary planes and views	L1, L2 and L3	12
Module III: Projection of solids & section of solids Projection of simple solids like prisms, pyramids, cylinder, cone and truncated solids when the axis is inclined to both of the principal planes, Sectioning of above solids in simple vertical position when the cutting plane is inclined to the one of the principal planes and perpendicular to the other, obtaining true shape of section	L1, L2 and L3	12
Module IV: Development of surfaces & Isometric projections Development of surfaces of simple and sectioned solids – Prisms, pyramids cylinders and cones, Principles of isometric projection, isometric scale, Isometric projections of simple solids and truncated solids, Prisms, pyramids, cylinders, cones, Conversion of Orthographic Views to Isometric Views and Vice-versa.	L1, L2 and L3	8
Module V: Introduction to CAD Introduction to CAD and use of its commands, practice of some 2D figures using CAD.	L1, L2 and L3	8

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	50	20

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

Text Books:

- PS Gill, 2013, Engineering Drawing, Kataria Publication.
- ND Bhatt, 2014, Engineering Drawing, Charotar publications.

References Books:

- N Sidheshwar, 2014 Machine Drawing Drawing, Tata McGraw Hill
- M.B. Shah & B.C. Rana, 2007, Engineering Drawing, Pearson Education.
- CADFolks, AutoCAD 2018 For Beginners, CreateSpace Independent Publishing Platform; 6 edition.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	2	--	--	--	--	--	--	--	--	--	--	1	--	--	--
CO2	1	2	--	--	--	--	--	--	--	--	--	--	1	--	--	--
CO3	1	2	--	--	--	--	--	--	--	--	--	--	1	--	--	--
CO4	1	2	--	--	--	--	--	--	--	--	--	--	1	--	--	--
CO5	1	2	--	--	--	--	--	--	--	--	--	--	1	--	--	--

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ENGINEERING MECHANICS LAB

Course Code: ASE2218

Credit Units: 01

Engineering Mechanics:

1. To verify the law of Force Polygon
2. To verify the law of Moments using Parallel Force apparatus. (Simply supported type)
3. To determine the co-efficient of friction between wood and various surface (like
4. Leather, Wood, Aluminum) on an inclined plane.
5. To find the forces in the members of Jib Crane.
6. To determine the mechanical advantage, Velocity ratio and efficiency of a screw jack.
7. To determine the mechanical advantage, Velocity ratio and Mechanical efficiency of the
8. Wheel and Axle
9. To determine the MA, VR, η of Worm Wheel (2-start)
10. Verification of force transmitted by members of given truss.
11. To verify the law of moments using Bell crank lever
12. To find CG and moment of Inertia of an irregular body using Computation method

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.



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ASE2315	Strength of Materials	L	T	P	C
Version 2019-1	Date of Approval: May 2019	3	0	0	3
Pre-requisites/ Exposure	Physics, Engineering Mechanics				
Co-requisites					

Course Catalog

The objective of this course is to make the students understand the concept of stress and strain in different types of structure/machine under different loading conditions. The course also covers the simple and compound stresses due to forces, stresses and deflection in beams due to bending, torsion in circular section, strain energy, different theories of failure and stress in thin cylinder thick cylinder and spheres due to external and internal pressure.

Course Objectives

The objective of this course is to

- Equip the students with concept of stress and strain induced in material under various loading conditions.
- Provide an overview of stresses induced in beam, shaft, column and deflection of beam under various loading conditions.

Course Outcomes

On completion of this course, the students will be able to

- CO1.** Identify, explain, and apply the principles of stress and strain and relationship between elastic constant to solve complex engineering problems.
- CO2.** Identify, explain, and apply the principles of shear force and bending moment under various loads to solve complex engineering problems.
- CO3.** Identify, explain, and apply the principles of torsion and torsional stresses to solve complex engineering problems.
- CO4.** Identify, explain, and apply the methods to solve complex engineering problems related to columns and struts.
- CO5.** Identify, explain, and apply the methods to solve complex engineering problems related to slope and deflection of different bodies.

Course Content

Modules	Blooms level*	Number of hours
Module I: Simple Stresses and Strains Concept of stress and strain; Hooke's law, Young's modulus, Poisson ratio, stress at a point, stress and strains in bars subjected to axial loading. Modulus of elasticity, stress produced in compound bars subject to axial loading. Mohr Circle, problems.	L1, L2, L3	6
Module II: Shear Force and Bending Moment Definitions, Types of loads, Types of beams, Shear force and bending moment diagrams for cantilevers, simply supported beams, calculation of maximum bending moment & shear force. Bending Stress, assumptions in the simple bending theory, derivation of formula and its application to beams of rectangular, circular and channel sections, problems.	L1, L2, L3	8
Module III: Torsion Derivation of torsion equation and its assumptions. Applications of the equation for the hollow and solid circular shafts, torsional rigidity, combined	L1, L2, L3	7

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torsion and bending of circular shafts, principal stress and maximum shear stresses under combined loading of bending and torsion, problems.		
Module IV: Columns and Struts Columns and Struts and their failure mechanism, Euler's formulas; Rankine-Gordon's formula, Johnson's empirical formula for axially loaded columns and their applications, problems.	L1, L2, L3	7
Module IV: Slope and Deflection Relationship between moment, slope and deflection, Mohr's theorem; Moment area method; method of integration; Macaulay's method: Use of all these methods to calculate slope and deflection for the following: a) Cantilevers b) Simply supported beams with or without overhang c) Under concentrated loads, uniformly distributed loads or combination of concentrated and uniformly distributed loads, problems.	L1, L2, L3	8

*Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Text & Reference Books

Text:

1. Ramamurtham, S., "Strength of Materials", 16th Edition, Dhanpat Rai Publishing Company, 2011.
2. Peery, D. J., "Aircraft Structures", Dover Publications, 2011.
3. Megson, T. H. G., "Aircraft Structures for Engineering Students", Elsevier India, 2005.
4. Sun, C. T., "Mechanics of Aircraft Structures", 2nd Edition, Wiley-India Pvt. Ltd., 2006.

Reference:

1. Timoshenko, S. P. and Goodier, J. N., "Theory of Elastic Stability", 2nd Edition, Dover Publications Inc., New York, 2009.
2. Sinha, N. C., "Elements of Structural Analysis", New Central Book Agency, 2011

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

A: Attendance, CT: Class Test, S/V/Q: Seminar/Viva/Quiz, HA: Home Assignment, EE: End Semester Examination

CO, PO and PSO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	1	2	-	-	-	-	-	-	-	-	-	1	-	-	-
CO2	1	1	2	-	-	-	-	-	-	-	-	-	1	-	-	-
CO3	1	1	2	-	-	-	-	-	-	-	-	-	1	-	-	-
CO4	1	1	2	-	-	-	-	-	-	-	-	-	1	-	-	-
CO5	1	1	2	-	-	-	-	-	-	-	-	-	1	-	-	-

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ASE2317	Strength of Materials Lab	L	T	P	C
Version 2019-1	Date of Approval: May 2019	0	0	2	1
Pre-requisites/ Exposure	Physics, Engineering Mechanics				
Co-requisites	Strength of Materials				

Course Catalog

The objective of the Strength of Materials lab is to demonstrate the basic principles in the area of strength and mechanics of materials and structural analysis to the undergraduate students through a series of experiments. In this lab, the experiments are performed to measure the properties of the materials such as impact strength, tensile strength, compressive strength, hardness, ductility etc.

Course Outcomes

At the end of the course, the student shall be able to:

- CO1.** Identify, explain, and demonstrate the procedure to conduct hardness tests using different testing techniques.
- CO2.** Identify, explain, and demonstrate the procedure to conduct compression and stiffness tests using different testing techniques.
- CO3.** Identify, explain, and demonstrate the procedure to conduct impact and tensile tests using different testing techniques.
- CO4.** Identify, explain, and demonstrate the procedure to conduct torsion tests and draw shear force and bending moment diagrams for bodies under different loading conditions.

Modules	Blooms level*	Number of hours
1. To study the Brinell hardness testing machine & perform the Brinell hardness test.	L1, L2, L3	2
2. To study the Rockwell hardness testing machine & perform the Rockwell hardness test.	L1, L2, L3	2
3. To study the Spring Compression Testing machine and perform the Spring Stiffness test.	L1, L2, L3	2
4. To study the Impact testing machine and perform the Impact tests (Izod & Charpy Test)	L1, L2, L3	2
5. To study the Universal Testing Machine and perform the tensile test on Universal Testing Machine.	L1, L2, L3	2
6. To perform compression & bending tests on UTM.	L1, L2, L3	2
7. To study the torsion testing machine and perform the torsion test.	L1, L2, L3	2
8. To draw shear Force, Bending Moment Diagrams for a simply Supported Beam under Point and Distributed Loads.	L1, L2, L3	2

*Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Text & Reference Books

Text:

- G. H. Ryder, "Strength of Materials", India: Macmillan, 1969.
- R. K. Bansal, "A Textbook of Strength of Materials", Laxmi Publications, 2010.
- V. Jain, "Strength of Material –I". Dhanpat Rai Publications, 2012.

Reference:

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- S. Singh, “Strength of Material”, Khanna Publisher, 2010.
- R. K. Rajput, “Strength of Materials”, S. Chand Publications, 2006.

Examination Scheme

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

CO, PO and PSO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	3	-	1	-	-	-	-	2	2	3	3	1	-	-	3
CO2	1	3	-	1	-	-	-	-	2	2	3	3	1	-	-	3
CO3	1	3	-	1	-	-	-	-	2	2	3	3	1	-	-	3
CO4	1	3	-	1	-	-	-	-	2	2	3	3	1	-	-	3

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ASE2322	Fluid Mechanics and Dynamics	L	T	P	C
Version 2019-1	Date of Approval: May 2019	3	0	0	3
Pre-requisites/ Exposure	Basic Physics				
Co-requisites					

Course Catalog

This course provides the basic knowledge and understanding of the properties, types, motion and forces of fluid. A student is supposed to have a basic knowledge of physics to comprehend the contents of this course. The subject will further enhance the knowledge regarding different types of flows and their practical applications in the field of aerospace. The course also includes different fluid equations like Euler's, Bernoulli's etc. and their practical applications.

Course Objectives

The objective of this course is to

- Provide introductory knowledge to the students about different properties of fluids and equip the students with the knowledge of basic principles and laws governing the motion of fluid.
- Equip the students with knowledge and understanding of the different behaviors of flow past submerged bodies of different shapes and cross-sections.

Course Outcomes

On successful completion of this course, students will be able to

- CO1.** Identify, describe, and distinguish amongst the various types and properties of fluids, hydrostatic forces and their measurement techniques.
- CO2.** Identify, describe, and distinguish amongst the various properties of Kinematics of fluid motion and solve relevant engineering problems.
- CO3.** Identify, describe, and distinguish amongst the various properties of Dynamics of fluid motion and solve relevant engineering problems using various techniques of dimensional analysis.
- CO4.** Define, and explain various forces and moments acting on fully submerged bodies and apply the basic principles to solve relevant engineering problems.
- CO5.** Identify, describe, and distinguish between various properties of internal and external laminar and turbulent flows and solve relevant engineering problems.

Course Content

Modules	Blooms level*	Number of hours
Module 1: Introduction to Fluid Properties and Fluid Static Physical properties of fluids, Newtonian and Non-Newtonian Fluids, Incompressible and compressible fluids. Pascal's Law, Hydrostatic law, concept of pressure and its measurement, forces on plane and curved surfaces. Buoyancy, stability of floating bodies.	L1, L2	7
Module 2: Fluid Kinematics Description of fluid flow; Lagrangian and Eulerian approach, Types of fluid flows, streamline, pathline and streakline, velocity potential and stream function. Source, sink, doublet, superimposed flow, vorticity and circulation, vortex flow, free and forced vortex.	L1, L2	8
Module 3: Fluid Dynamics and Dimensional Analysis Conservation equations, Euler's equation, Bernoulli's equation, Introduction to Navier-stokes equation, Pilot tube, Venturimeter, orificemeter, notches. Buckingham π -Theorem, Rayleigh Theorem, Types of similarity, Dimensionless numbers and their significance.	L1, L2, L3	7

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Module 4: Flow past Submerged Bodies Drag and Lift, Types of drag force, Drag on various bodies, circulation and lift on cylinder and airfoil, Magnus Effect, Introduction to boundary layer, Boundary layer thickness, boundary layer separation.	L1, L2, L3	7
Module 5: Laminar and Turbulent Flow Reynolds' experiment, critical velocity, steady laminar flow through a circular tube, flow between parallel plates, Transition from laminar to turbulent flow, velocity distribution law near a solid boundary. Flow through pipes, Energy losses, minor losses in pipe lines.	L1, L2, L3	7

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation*

Text & Reference Books:

Text:

1. R. K. Bansal, "Fluid Mechanics & Hydraulic Machines", Laxmi Publications Pvt. Ltd., 2002.
2. D. S. Kumar, "Fluid Mechanics and Fluid Power Engineering", S. K. Kataria & Sons, 2000.

References:

1. G. S. Sawhney, "Fundamentals of Fluid Mechanics", I K International Publishing House, 2011.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

A: Attendance, CT: Class Test, S/V/Q: Seminar/Viva/Quiz, HA: Home Assignment, EE: End Semester Examination

CO, PO and PSO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	1	3	-	-	-	-	-	-	-	-	-	1	3	-	-
CO2	1	1	3	-	-	-	-	-	-	-	-	-	1	3	-	-
CO3	1	1	3	-	-	-	-	-	-	-	-	-	1	3	-	-
CO4	1	1	3	-	-	-	-	-	-	-	-	-	1	3	-	-
CO5	1	1	3	-	-	-	-	-	-	-	-	-	1	3	-	-

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ASE2323	Fluid Mechanics and Dynamics Lab	L	T	P	C
Version 2019-1	Date of Approval: May 2019	0	0	2	1
Pre-requisites/ Exposure	Basic Physics				
Co-requisites	Fluid Mechanics and Dynamics				

Course Catalog

The objective of the Fluid Mechanics and Dynamics lab is to familiarize the students with application of basic physics of fluids, its viscosity, and its laws of conservation of energy. It provides the students with the knowledge of laboratory methods and interpretation of results with regard to fluid engineering applications such as design and operation of water, losses it goes through while energy is being transferred.

Course Objectives

- Equip the students with concepts of properties of fluid flow and fluids; energy losses calculations and its measurement through different geometric cross sections.
- Provide an outline of calculations of coefficient of discharge velocity and contraction through various flow measuring devices.

Course Outcomes

At the end of the course, the student shall be able to:

- CO1.** Describe the working, interpret, calculate, and validate the Bernoulli's experiment.
- CO2.** Describe the working of Venturimeter and Orificemeter, determine the coefficient of discharge.
- CO3.** Describe, categorize, differentiate the various major and minor losses, and calculate the losses in the pipeline structure.
- CO4.** Describe the Reynolds's experiment and metacenter. Determine the type of the flow and interpret the conditions for a body to float.
- CO5.** State the pressure measuring devices, their working and determine the viscosity of fluid with change in the temperature.

Modules	Blooms level*	Number of hours
1. Verification of Bernoulli's Theorem	L2, L4	1
2. To determine the coefficient of discharge of Venturimeter	L2, L3	2
3. To determination of coefficient of Discharge C_d , coefficient of contraction C_c and coefficient of velocity C_v of an Orificemeter	L2, L3	1
4. To find major head losses in a pipe line	L2, L3 and L4	1
5. To find minor head losses in a pipe line (sudden expansion/contraction/bend)	L2, L3 and L4	1
6. To find critical Reynold's number for a pipe flow	L2, L3	1
7. To determine the metacentric height of a floating body	L2, L3	1
8. To study pressure measuring devices	L1, L2	1
9. To determine the viscosity of the fluid with the change in the temperature	L1, L2	1
10. To determine the coefficient of discharge by falling head method	L2, L3	1

*Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

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Text & Reference Books

Text:

1. R. K. Bansal, "Fluid Mechanics & Hydraulic Machines", Laxmi Publications Pvt. Ltd., 2002.
2. D. S. Kumar, "Fluid Mechanics and Fluid Power Engineering", S. K. Kataria & Sons, 2000.

References:

1. G. S. Sawhney, "Fundamentals of Fluid Mechanics", I K International Publishing House, 2011.

Examination Scheme

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA – Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

CO, PO and PSO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	3	-	1	-	-	-	-	2	2	3	3	1	-	-	3
CO2	1	3	-	1	-	-	-	-	2	2	3	3	1	-	-	3
CO3	1	3	-	1	-	-	-	-	2	2	3	3	1	-	-	3
CO4	1	3	-	1	-	-	-	-	2	2	3	3	1	-	-	3

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ASE2324	Aircraft Manufacturing Processes	L	T	P	C
Version 2019-1	Date of Approval: May 2019	2	0	0	2
Pre-requisites/ Exposure	Basic Physics, Chemistry, Engineering Mechanics				
Co-requisites					

Course Catalog

This course provides basic knowledge and understanding of various tools, techniques, processes, and practices utilized in manufacturing and maintenance workshops. This course also deals with various specific processes utilized in manufacturing of aircraft structure and components. Basic understanding of engineering physics and elements of mechanical engineering is prerequisite to comprehend the contents of this course.

Course Objectives

The objective of this course is to

- Provide introductory knowledge to the students regarding the basic manufacturing processes, and heat treatment techniques.
- Equip the students with knowledge of various tools, processes, and techniques used in manufacturing of aircraft and its components.

Course Outcomes

On successful completion of this course, students will be able to

- CO1.** Identify, describe and distinguish amongst the basic tools and processes used in sheet metal and wood working.
- CO2.** Identify, describe, and distinguish between various heat treatment processes and their impacts on material properties.
- CO3.** Identify, describe, and distinguish between various types of machining tool used in manufacturing and fabrication of components.
- CO4.** Identify, describe, and distinguish between various types of jigs and fixtures used in manufacturing and fabrication of aircraft components.
- CO5.** Identify, describe, and distinguish between various processes and techniques used in manufacturing and fabrication of aircraft structure and components.

Course Content

Modules	Blooms level*	Number of hours
Module 1: Introduction Selection of materials. Importance of material processes. Manufacturing Processes. Sheet Metal working. Wood Working.	L1, L2	4
Module 2: Heat Treatment of Steels Relation between heat treatment and physical properties of steels. Critical temperatures, annealing, normalizing, tempering, case carburizing, hardening, nitriding and other surface hardening methods. Quenching. Hardness numbers, hardness testing machines.	L1, L2	6
Module 3: Machining Tools Types of lathe, lathe operations – facing, turning, threading, shapers. Types of shapers, general applications. Milling machines, types of milling machines. Work holding devices, cutter holding devices. Abrasives, bonds, grinding wheels.	L1, L2	5
Module 4: Jigs and Fixtures	L1, L2	4

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General design. Method of location of cylindrical and flat surfaces. Design principles of Wing Jig, Fuselage jig and other components.		
Module 5: Aircraft Manufacturing Processes Profiling, hydroforming, spar milling, spark erosion, high energy rate forming. Manufacturing of honeycomb structures. General methods of construction of aircraft and engine parts.	L1, L2	5

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation*

Text & Reference Books:

Text:

1. W. A. J. Chapman, "Workshop Technology-Vol. I, II, III", 5th Edition, Butterworth-Heinemann, 1972.
2. G. F. Titterton, "Aircraft Materials and Processes", Sterling Book House, 2007.
3. G. B. Ashmead, "Aircraft Production Methods" 1st Edition, Chilton Company, 1956.

References:

1. L. Gupta, "Advanced Composite Materials", Himalayan Books, New Delhi, 1998.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

A: Attendance, CT: Class Test, S/V/Q: Seminar/Viva/Quiz, HA: Home Assignment, EE: End Semester Examination

CO, PO and PSO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	-	1	-	2	-	-	-	-	-	-	-	3	1	2	-
CO2	1	-	1	-	2	-	-	-	-	-	-	-	3	1	2	-
CO3	1	-	1	-	2	-	-	-	-	-	-	-	3	1	2	-
CO4	1	-	1	-	2	-	-	-	-	-	-	-	3	1	2	-
CO5	1	-	1	-	2	-	-	-	-	-	-	-	3	1	2	-

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ASE2412	Numerical Analysis and Programming	L	T	P	C
Version 2019-1	Date of Approval: May 2019	2	0	0	2
Pre-requisites/ Exposure	Basic Mathematics				
Co-requisites					

Course Catalog

This course deals with the techniques of numerical analysis, which gives the solution to applied problem when ordinary analytical method fails. The given techniques can be used in design of engineering and scientific problems. This course provides the basic knowledge and fundamentals related to the concepts of engineering mathematics, errors and approximation theory, interpolation, graph fitting and statistical computation.

Course Objectives

The objective of this course is to

- Provide an understanding to the students about the various numerical tools to solve problems related to formulation of algebraic equations and data interpolation.
- Equip the students with knowledge to use various numerical tools to solve problems related to calculus, differential equations, and statistics.

Course Outcomes

On completion of this course, the students will be able to

- CO1.** Identify, distinguish and apply the concept of errors, data interpretation and approximation theory to solve relevant problems.
- CO2.** Identify, distinguish the various methods of Interpolation, and apply the concept to solve realistic problems.
- CO3.** Distinguish and apply the various methods of numerical integration and differentiation to solve complex engineering problems.
- CO4.** Interpret and construct differential equations various different methods to solve complex engineering problems.
- CO5.** Identify, distinguish and apply various technical tools of curve fitting and their utilisation in engineering.

Course Content

Modules	Blooms level*	Number of hours
Module 1: Solution of Algebraic and Transcendental Equation Error in a series approximation, Bisection Method, Iteration method, Method of false position, Newton-Raphson method. Solutions of Simultaneous equation: Gauss elimination method, Jacobi iteration method, Gauss Seidal method.	L1, L2, L3	10
Module 2: Interpolation Finite Differences, Difference tables, Polynomial Interpolation: Newton's forward and backward formula, Central Difference Formulae: Gauss forward and backward formula. Interpolation with unequal intervals: Lagrange's Interpolation, Newton Divided difference formula.	L1, L2, L3	10
Module 3: Numerical Integration and Differentiation Introduction, Numerical differentiation Numerical Integration: Trapezoidal rule, Simpson's 1/3 and 3/8 rules.	L2, L3	5
Module 4: Solution of Differential Equations Euler's Method, Runge-Kutta Methods	L2, L3, L4	3
Module 5: Statistical Computation	L1, L2,	8

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Frequency chart, Curve fitting by method of least squares, fitting of straight lines, polynomials, exponential curves etc., Data fitting with Cubic splines.	L3	
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**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation*

Text & Reference Books

Text:

- Eyengar, S. R. K., Jain, S. K. and Jain, R. K., "Numerical Methods for Scientific and Engineering Computations", New Age International Publishers, 2007.
- Sastry, S. S., "Introductory Methods of Numerical Analysis", 5th Edition, Pearson, 2012.

Reference Books

- Gerald, "Applied Numerical Analysis", 7th Edition, Pearson, 2007.
- Gupta, C. B., "Introduction to statistical Methods", 23rd Edition, Vikas Publishing House Pvt. Ltd., 2007.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

A: Attendance; CT: Class Test; S/V/Q: Seminar/Viva/Quiz; HA: Home Assignment; EE: End Semester Examination

CO, PO and PSO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	1	2	-	3	-	-	-	-	-	-	-	1	1	-	-
CO2	1	1	2	-	3	-	-	-	-	-	-	-	1	1	-	-
CO3	1	1	2	-	3	-	-	-	-	-	-	-	1	1	-	-
CO4	1	1	2	-	3	-	-	-	-	-	-	-	1	1	-	-
CO5	1	1	2	-	3	-	-	-	-	-	-	-	1	1	-	-

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ASE2416	Aircraft Propulsion	L	T	P	C
Version 2019-1	Date of Approval: May 2019	3	0	0	3
Pre-requisites/ Exposure	Basic Physics, Introduction to Aerospace Engineering, Engineering Thermodynamics				
Co-requisites					

Course Catalog

This course provides basic knowledge and understanding of aerospace propulsive devices as systems, with functional requirements and environmental considerations. This course provides intermediate knowledge to the students about the design, construction, and working of different types of propulsion systems and of their components and sub-systems. Knowledge of basic physics, thermodynamics, and components of flight vehicle's power plant is crucial to comprehend the contents of this course. This course serves as a prerequisite for better understanding of advanced courses related to propulsion of flight vehicles.

Course Objectives

The objective of this course is to

1. Equip the students with basic knowledge and governing principles of jet propulsion, propulsion systems, and their components.
2. Enable students with problem solving skills related to design, construction, and performance of aircraft powerplants, their systems, and subsystems.

Course Outcomes

On successful completion of this course, students will be able to

- CO1.** Identify and explain the basic science and principles of jet propulsion and relevant performance parameters.
- CO2.** Identify, describe and compare amongst the various types of propellers and explain the mathematical theories behind the operation of propellers.
- CO3.** List, summarize and compare amongst the construction, components, and operation of various types of air-breathing engines, their systems, and subsystems and solve relevant problems.
- CO4.** List, summarize, and compare amongst the construction, components, and operation of various types of aircraft piston engines, their systems and subsystems.
- CO5.** Outline and describe different types of fuels, their characteristics, and environmental consideration associated with their use.

Course Content

Modules	Blooms level*	Number of hours
Module 1: Introduction Basics of Jet propulsion. Classification of powerplants. Propulsive efficiency, Specific fuel consumption, Thrust and power. Factors affecting thrust and power.	L1, L2	7
Module 2: Propeller Blade Theory Ideal momentum theory and blade element theory. Selection of propellers, Types of propellers, Prop-fan, Shrouded propellers. Propeller power losses, Propeller performance parameters. Windmilling Effect.	L1, L2, L4	7
Module 3: Air-breathing Engines Gas turbine cycle. Compressor and turbine efficiencies. Compressor work and turbine work. Centrifugal and axial type of compressor and their comparative action. Combustion chambers, various arrangements and performance. Nozzles and their operation, afterburners.	L1, L2, L3, L4	6

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Module 4: Aircraft Piston Engines S.I. and C.I. engines, 4-stroke and 2-stroke engines. Various type of arrangements, multi-cylinder engines, their merits and operational efficiencies. Intake and exhaust manifolds. Cooling and lubrication systems. Valve timing and arrangements. Combustion knock, knock rating. Carburetion and fuel injection. Ignition of the charge, ignition system. I.H.P., B.H.P and F.H.P, engine performance, effect of altitude, power required and power available. Supercharging and turbocharging	L1, L2, L4	10
Module 5: Aviation Fuel and Environmental Considerations Liquid fuels, hydrocarbons, gasoline, aviation turbine fuels. Fuel characteristics, vapor lock. Aircraft emission standards, environmental implications.	L1, L2	6

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation*

Text & Reference Books:

Text:

- Hill, P. and Peterson, C., "Mechanics and Thermodynamics of Propulsion", 2nd Edition, Pearson, 1991.
- Mattingly, J. D., "Elements of Gas Turbine Propulsion", 1st Edition, McGraw Hill, 1997.
- Heywood, J. B., "Internal-Combustion Engine Fundamentals", 1st Edition, McGraw Hill, 2017.

Reference:

- Treager, I., "Aircraft Gas Turbine Engine Technology", 3rd Edition, McGraw Hill, 2017.
- Sarvanmattoo, H. I. H., Rogers, G. F. C., Cohen, H. and Straznicky, P., "Gas Turbine Theory", 6th Edition, Pearson Education, 2008.
- Mukunda, H. S., "Understanding Aerospace Chemical Propulsion", I K International Publishing House Pvt. Ltd., 2017.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

A: Attendance, CT: Class Test, S/V/Q: Seminar/Viva/Quiz, HA: Home Assignment, EE: End Semester Examination

CO, PO and PSO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	2	-	-	-	-	-	-	-	-	-	-	-	1	-	-
CO2	1	2	2	-	-	-	-	-	-	-	-	-	-	1	-	-
CO3	1	2	3	-	-	-	-	-	-	-	-	-	-	1	3	-
CO4	1	2	3	-	3	-	-	-	-	-	-	-	-	1	3	-
CO5	1	3	-	-	-	-	1	-	-	-	-	-	-	1	1	-

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ASE2417	Aerospace Structures-I	L	T	P	C
Version 2019-1	Date of Approval: May 2019	3	0	0	3
Pre-requisites/ Exposure	Engineering Mechanics, Strength of Materials				
Co-requisites					

Course Catalog

This course provides basic knowledge and understanding of various kinds of loads acting on aircraft structural members and their importance. This course provides knowledge and understanding to the students about the analysis of stress, strain, deflection, and torsion of a structure under varying loads using numerous methods. Knowledge of engineering mechanics and strength of materials is crucial to comprehend the contents of this course. This course serves as a prerequisite for better understanding of advanced courses related to structure of flight vehicles.

Course Objectives

The objective of this course is to

- Provide an overview of structural problems of beams and trusses which serves as benchmarks in analysis of structural members of flight vehicles.
- Enable the students to understand and utilized different theorems and principles governing the structural designing of flight vehicles.

Course Outcomes

On completion of this course, the students will be able to

- CO6.** Identify, describe, and analyze structural problems of stress and strain in Cartesian and Polar coordinates using governing equations.
- CO7.** Describe and determine the deflection and rotation of beams under different loads using various theorems.
- CO8.** Identify, describe, and determine the forces acting on statically indeterminate structures under different loads using various theorems.
- CO9.** Describe and apply the fundamental knowledge of torsion to solve relevant problems about solid bars, shells, and tubes.
- CO10.** Identify, describe and compare amongst various loads acting on structure members of an aircraft.

Course Content

Modules	Blooms level*	Number of hours
Module 1: Analysis of 2D Problems Plane Stress and Plane Strain. Equilibrium equations, compatibility conditions, governing equations and boundary conditions. Analysis of 2D problems, Theory of Elasticity.	L1, L2, L4	6
Module 2: Structural Analysis Method Energy method, strain energy due to axial, bending and torsional loads, complimentary energy. Castigliano's theorems, Maxwell's reciprocal theorem. Unit load method. Principle of virtual work and virtual displacement. Principle of superposition.	L2, L3	6
Module 3: Statically Indeterminate Structures Statically determinate and indeterminate structures. Analysis of plane truss: Moment distribution method, Stiffness method, Flexibility method. Analysis of frames and rings.	L1, L2, L3, L4	6
Module 4: Torsion	L2, L3	6

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Torsion of non-circular solid bars, warping, axially constrained stresses. Torsional deflection of non-circular shell. Analysis of thin and thick walled tubes. Multi-cell sections.		
Module 5: Structural Loads Loads on flight vehicles, Aerodynamic loads, Maneuvering loads, Inertia loads, Gust loads. Velocity-load factor diagram. Factor of safety.	L1, L2, L4	6

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation*

Text & Reference Books

Text:

- Ramamurtham, S., "Strength of Materials", 16th Edition, Dhanpat Rai Publishing Company, 2011.
- Peery, D. J., "Aircraft Structures", Dover Publications, 2011.
- Megson, T. H. G., "Aircraft Structures for Engineering Students", Elsevier India, 2005.
- Sun, C. T., "Mechanics of Aircraft Structures", 2nd Edition, Wiley-India Pvt. Ltd., 2006.

Reference:

- Timoshenko, S. P. and Goodier, J. N., "Theory of Elastic Stability", 2nd Edition, Dover Publications Inc., New York, 2009.
- Sinha, N. C., "Elements of Structural Analysis", New Central Book Agency, 2011

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

A: Attendance, CT: Class Test, S/V/Q: Seminar/Viva/Quiz, HA: Home Assignment, EE: End Semester Examination

CO, PO and PSO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	1	-	2	-	-	-	-	-	-	-	-	1	-	-	-
CO2	1	1	-	2	-	-	-	-	-	-	-	-	1	-	-	-
CO3	1	1	-	2	-	-	-	-	-	-	-	-	1	-	-	-
CO4	1	1	-	2	-	-	-	-	-	-	-	-	1	-	-	-
CO5	1	1	-	2	-	-	-	-	-	-	-	-	1	-	-	-

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ASE2419	Low Speed Aerodynamics Lab	L	T	P	C
Version 2019-1	Date of Approval: May 2019	0	0	2	1
Pre-requisites/ Exposure	Fluid Mechanics and Dynamics				
Co-requisites	Low Speed Aerodynamics				

Course Catalog

The objective of this course is to provide practical knowledge and understanding to the students about the aerodynamics over bodies of different cross-sections and shapes. Knowledge of fluid mechanics and basic aerodynamics is necessary to comprehend the contents of this course. This course equip the students with necessary knowledge to design and carry out experiments, gather results and interpret them in order to observe the aerodynamic behavior of bodies.

Course Objectives

The objective of this course is to

1. Equip the students with necessary practical understanding and skill to carry out experiments to visualize and observe the flow behavior over different bodies.
2. Provide practical skill and knowledge to carry out experiments using wind tunnel to gather results as per designed experiment.

Course Outcomes

On completion of this course, the students will be able to

- CO1.** Explain and demonstrate the construction and procedure of operating a wind tunnel and measurement of pressure gradient along a wind tunnel.
- CO2.** Explain and demonstrate the procedure of utilizing Pitot - static tube and anemometer for flow velocity calculations.
- CO3.** Explain and demonstrate the procedure of determining pressure distribution over bodies of different cross-sections.
- CO4.** Explain and demonstrate the procedure of utilizing Hele-shaw apparatus for flow visualization over bodies of different cross-sections.

Course Content

Modules	Blooms level*	Number of hours
Experiment 1: Wind tunnel as a tool, their classification, uses and applications.	L1, L2	2
Experiment 2: Measurement of pressure gradient along a wind tunnel	L1, L2	2
Experiment 3: Use of Pitot - static tube and Anemometer for measuring velocity	L1, L2	2
Experiment 4: Pressure distribution over a 2D cylinder	L1, L2	2
Experiment 5: Pressure distribution over an airfoil	L1, L2	2
Experiment 6: Flow visualization over flat plate	L1, L2	2
Experiment 6: Flow visualization over cylinder	L1, L2	2
Experiment 7: Flow visualization over an airfoil	L1, L2	2
Experiment 8: Experiments on potential flow Analogy (Hele-Shaw flow).	L1, L2	2

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Experiment 9: Setting up of liquid paraffin smoke wire for flow visualization.	L1, L2	2
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**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation*

Text & Reference Books

Text:

1. J. D. Anderson, Jr., "Fundamentals of Aerodynamics", 2nd Edition, McGraw Hill, 1990.
2. E. L. Houghton, P. W. Carpenter, "Aerodynamics of Engineering Students", 4th Edition, CBS Publishers & Distributors, 2005.
3. F. M. White, "Fluid Mechanics", 2nd Edition, McGraw Hill, 1986.

Reference Books

1. J. G. Bertin, R. M. Cummings, "Aerodynamics for Engineers", 6th Edition, Pearson, 2013.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

IA: Internal Assessment, EE: External Exam, PR: Performance, LR: Lab Record, V: Viva.


CO, PO and PSO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	3	-	-	-	-	-	-	2	2	3	3	1	1	-	3
CO2	1	3	-	-	-	-	-	-	2	2	3	3	1	1	-	3
CO3	1	3	-	-	-	-	-	-	2	2	3	3	1	1	-	3
CO4	1	3	-	-	-	-	-	-	2	2	3	3	1	1	-	3

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ASE2420	Aircraft Propulsion Lab	L	T	P	C
Version 2019-1	Date of Approval: May 2019	0	0	2	1
Pre-requisites/ Exposure	Introduction to Aerospace Engineering				
Co-requisites	Aircraft Propulsion				

Course Description

The objective of this course is to provide practical knowledge and understanding to the students about the various propulsion systems and subsystems used in aerospace applications. Knowledge of fluid mechanics, thermodynamics, and heat transfer is necessary to comprehend the contents of this course. This course equips the students with necessary knowledge to understand the construction and operation of propulsion systems.

Course Objectives

The objective of this course is to

1. Provide practical knowledge to the students about the various types of piston engine, their construction, and operation.
2. Provide practical knowledge to the students about the various subsystems of SI and CI engines, their construction, and operation.

Course Outcomes

On completion of this course, the students will be able to

- CO1.** List, explain, and differentiate amongst the various types of piston engines based on their construction and operation.
- CO2.** Explain and demonstrate the construction and operation of various subsystems of piston engines.
- CO3.** Explain and demonstrate the knowledge of determining different kinds of powers in a piston engine.
- CO4.** Determine and analyze the performance of nozzle and duct burner.

Course Content

Modules	Blooms level*	Number of hours
Experiment 1: To study the construction and working of CI and SI engines having various arrangements of cylinders.	L2, L3	1
Experiment 2: To study the construction and working of two-stroke and four-stroke piston engines.	L2, L3	1
Experiment 3: To study the construction and working of a carburettor.	L2, L3	1
Experiment 4: To study the components and working of the fuel system of petrol and diesel engine.	L2, L3	1
Experiment 5: To study the components and working of the ignition system of the petrol engine.	L2, L3	1
Experiment 6: To determine the valve timings for a given piston-cylinder arrangement.	L2, L3	1
Experiment 7: To determine the IHP, BHP, and FHP of a four-stroke petrol engine.	L2, L3, L4	2
Experiment 8:	L2, L3,	2

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To determine the performance of a nozzle.	L4	
Experiment 9: To determine the performance of a duct burner.	L2, L3, L4	2

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation*

Text & Reference Books:

Text:

1. P. Hill, C. Peterson, "Mechanics and Thermodynamics of Propulsion", 2nd Edition, Pearson, 1991.
2. J. D. Mattingly, "Elements of Gas Turbine Propulsion", 1st Edition, McGraw Hill, 1997.
3. J. B. Heywood, "Internal-Combustion Engine Fundamentals", 1st Edition, McGraw Hill, 2017.

Reference:

1. I. Treager, "Aircraft Gas Turbine Engine Technology", 3rd Edition, McGraw Hill, 2017.
2. H. I. H. Sarvanmattoo, G. F. C. Rogers, H. Cohen, P. Straznicky, "Gas Turbine Theory", 6th Edition, Pearson Education, 2008.
3. H. S. Mukunda, "Understanding Aerospace Chemical Propulsion", I K International Publishing House Pvt. Ltd., 2017.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

IA: Internal Assessment, EE: External Exam, PR: Performance, LR: Lab Record, V: Viva.

CO, PO and PSO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	3	-	-	-	-	-	-	2	2	3	3	-	1	-	3
CO2	1	3	-	-	-	-	-	-	2	2	3	3	-	1	-	3
CO3	1	3	-	-	-	-	-	-	2	2	3	3	-	1	-	3
CO4	1	3	-	-	-	-	-	-	2	2	3	3	-	1	-	3

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ASE2421	NUMERICAL ANALYSIS AND PROGRAMMING LAB USING MATLAB	L	T	P	C
Version		0	0	2	1
Pre-requisites/Exposure					
Co-requisites					

Catalog Description:

The purpose of this course is to provide students with the skill, knowledge and attitude required to determine approximate numerical solutions to mathematical problems which cannot always be solved by conventional analytical technique, and to demonstrate the importance of selecting the right numerical technique for a particular application, and carefully analyzing and interpreting the results obtained.

Course Objectives:

1. Demonstrate understanding of common numerical methods and how they are used to obtain approximate solutions to otherwise intractable mathematical problems.
2. Derive numerical methods for various mathematical operations and tasks, such as interpolation, differentiation, integration, the solution of linear and nonlinear equations, and the solution of differential equations.

Course Outcomes:

On completion of this course, the students will be able to

CO1: Define and describe the Algebraic and Transcendental Equation and solve the problems using appropriate Numerical methods.

CO2: Describing the interpolation methods to find intermediate values in given graphical or tabulated data.

CO3: Describe and apply Trapezoidal and Simpson's Rule to solve given integration problems.

CO4: Define and describe Runge-Kutta method and Euler's Method to solve differential equations.

CO5: Explain and describe the Statistical Computation using frequency charts, methods of least square etc.

Modules	Blooms level*	Number of hours
1. Solving Problems using <u>Newton-Raphson Method in C Programming</u>	L1,L2,L3	2
2. Solving Problems using <u>Secant Method in C Programming</u>	L1,L2,L3	2
3. Solving Problems using <u>Bisection Method in C Programming</u>	L1,L2,L3	1
4. Solving Problems using <u>Regula Falsi Method in C Programming</u>	L1,L2,L3	1
5. Solving Problems using <u>Trapezoidal Rule in C Programming</u>	L1,L2,L3	1
6. Solving Problems using <u>Simpson's 1/3rd Rule in C Programming</u>	L1,L2,L3	1
7. Solving Problems using <u>Simpson's 3/8th Rule in C Programming</u>	L1,L2,L3	1

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8. Solving Problems using <u>Euler's Method in C Programming</u>	L1,L2,L3	1
9. Solving Problems using <u>Modified Euler's Method in C Programming</u>	L1,L2,L3	1
10. Solving Problems using <u>Gauss Elimination Method in C Programming</u>	L1,L2,L3	1

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

Text Books

- V. Rajaraman, Computer oriented Numerical Methods, PHI Learning, 1993.
- Gerald & Whealey, Applied Numerical Analysis, Pearson Education, Limited, 2006.
- Grewal B S , Numerical methods in Engineering and Science, Khanna Publishers, Delhi, 2014.

References Books

- T Veerarajan, T Ramachandran, “Theory and Problems in Numerical Methods, TMH
- Pradip Niyogi, “Numerical Analysis and Algorithms”, TMH
- Francis Scheld, ” Numerical Analysis”, TMH
- Sastry S. S, “Introductory Methods of Numerical Analysis”, Pearson Education.
- Gupta C.B., Vijay Gupta, “Introduction to Statistical Methods”, Vikas Publishing.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	1	--	--	3	--	--	--	-	--	-	-	1	--	-	1
CO2	1	1	--	--	3	--	--	--	-	-	--	-	1	--	-	1
CO3	1	1	--	--	3	--	--	--	-	-	-	-	1	--	-	1
CO4	1	1	--	--	3	--	--	--	--	-	--	-	1	--	-	1
CO5	1	1	--	--	3	--	--	--	--	-	--	-	1	--	-	1

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ASE2422	Fuels and Combustion	L	T	P	C
Version 2019-1	Date of Approval: May 2019	3	0	0	3
Pre-requisites/ Exposure	Introduction to Aerospace Engineering, Chemistry				
Co-requisites	Aircraft Propulsion				

Course Description

This course provides basic understanding to the students about various types of fuels used in aviation application along with an insight to their physical and chemical parameters. This course also deals with various combustion mechanisms of fuels and enable the students in understanding the need and techniques of flame stability and fuel treatment. Basic knowledge of engineering chemistry and thermodynamics is a prerequisite to comprehend the contents of this course.

Course Objectives

The objective of this course is to

1. Provide a basic understanding to the students about the various aviation fuels and their properties.
2. Equip the students with knowledge about combustion fundamentals and performance.

Course Outcomes

On completion of this course, the students will be able to

- CO1. Identify, explain, and compare amongst the various properties of fuels.
- CO2. Identify, explain, and compare amongst the various types of alternative fuels used in aviation applications.
- CO3. Explain, describe, and compare amongst the various fundamentals of combustion and flames.
- CO4. Identify, explain and compare amongst the various fundamentals and techniques related to flame stabilization.
- CO5. List, explain, and compare amongst the various methods and processes of fuel treatments.

Course Content

Modules	Blooms level*	Number of hours
Module 1: Fuel and its Properties. Fuels, types of fuels, relative density, molecular mass, vapor pressure, flash point, volatility point, viscosity, surface tension, freezing point, specific heat, latent heat, thermal conductivity. Combustion properties of fuels. Calorific value, enthalpy, spontaneous-ignition temperature, limits of flammability, smoke point. Pressure and temperature effects.	L1, L2	7
Module 2: Alternative Fuels for Aerospace Applications Alternative fuels, synthetic fuels, biofuels, biodiesels, alternative fuel properties. Combustion and emissions performance. Fuel preparation, fuel atomization.	L1, L2	7
Module 3: Fundamentals of Combustion Deflagration, detonation, classification of flames, physics of combustion chemistry. Flammability limits, weak mixtures, rich mixtures. Laminar and turbulent flames, Premixed and diffusion flames, flame burning velocity. Factors influencing flame propagation speed. Stoichiometric ratio, equivalence ratio. Flame propagation in heterogeneous mixtures of fuel drops, fuel vapor, and air.	L2, L4	8
Module 4: Flame Stabilization Flame stability, definition of stability performance, measurement of stability performance. Bluff-body flame holders, stabilization. Mechanisms of flame stabilization, flame stabilization in combustion chambers.	L1, L2	7

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Module 5: Fuel Treatment Introduction to fuel treatment, removal of sulfur compounds, contaminants, asphaltenes, gum, sediment, ash, water, sodium, vanadium, additives, gum prevention, corrosion inhibition/lubricity improvers, anti-icing, antismoke. Environmental considerations.	L1, L2	7
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**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation*

Text & Reference Books

Text:

1. S. Sarkar, "Fuels & Combustion", 3rd Edition, CRC Press, 2010.
2. R. L. Bechtold, "Alternative Fuels Guidebook", SAE International, 1997.
3. K. K. Kuo, "Principles of Combustion", 2nd Edition, Wiley India Pvt. Ltd., 2012.

Reference:

1. J. Hancsok, S. P. Srivastava, "Fuels and Fuel Additives", 1st Edition, Wiley, 2014.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

A: Attendance; CT: Class Test; S/V/Q: Seminar/Viva/Quiz; HA: Home Assignment; EE: End Semester Examination


CO, PO and PSO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-
CO2	1	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-
CO3	1	2	-	-	-	-	-	-	-	-	-	-	-	1	-	-
CO4	1	2	-	-	-	-	-	-	-	-	-	-	-	1	3	-
CO5	1	-	3	-	-	-	1	-	-	-	-	-	-	1	1	-

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ASE2423	Control Systems	L	T	P	C
Version 2019-1	Date of Approval: May 2019	3	0	0	3
Pre-requisites/ Exposure	Basics of Electrical and Electronics Engineering				
Co-requisites					

Course Description

This course provides basic understanding and knowledge to the students about various control systems and their utilization in aerospace applications. Basic knowledge of electronics is a prerequisite to comprehend the contents of this course. This course also deals with analysis and design of control systems and enables the students in understanding the application of control systems in automatic flying control of flight vehicles.

Course Objectives

The objective of this course is to

1. Provide a basic understanding to the students about the control systems and their applications.
2. Equip the students with knowledge about operation, design, and analysis of control systems.

Course Outcomes

On completion of this course, the students will be able to

- CO1.** Identify, explain, and categorize amongst the various types of control systems used in flight vehicle operation and control.
- CO2.** Explain, describe, and compare amongst the various types of open and closed loop control systems, illustrate block diagrams and signal flow graphs.
- CO3.** Explain and analyze the operation of transient and steady-state response control systems.
- CO4.** List, explain, design, and analyze different types of controllers using various approaches.
- CO5.** Describe, distinguish, and compare amongst the different types of control systems utilized in Automatic flying control systems of aircrafts.

Course Content

Modules	Blooms level*	Number of hours
Module 1: Introduction to Control Systems History of Automatic Control. Control Engineering Practice. Simple pneumatic, hydraulic, and thermal systems. Parallel and series systems. Analogies-mechanical and electrical components. Development of flight control systems.	L1, L2, L4	7
Module 2: Open and Closed Loop Systems Concept of controls. Open-loop and closed-loop systems with examples. Concepts of feedback and basic structure of feedback control system. Laplace's transform. Block diagram, representation of block diagram, reduction block diagram. Output to input ratios, signal flow graph. Requirements of an ideal control system.	L2, L3, L4	7
Module 3: Transient and Steady-State Response Analysis Introduction. Type and order of systems, time response specifications. Transient, and steady state response. Input signals. First order system with unit step response, Second order system with unit step response for un-damped, critical damped, overdamped, and underdamped cases. Higher order system. Routh's – Hurwitz Criterion. Steady and transient state errors in unit feedback control systems.	L2, L4	8
Module 4: Control Systems Analysis and Design Introduction. Types of controllers. Root locus plot, lead and lag compensation techniques. Bode plot: concepts and construction. Lead and lag compensation technique based on the frequency-response approach.	L1, L2, L3, L4	7

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Module 5: Automatic Flight Control Introduction to Automatic flight control, automatic flight control system components. Autopilot, longitudinal autopilots. Brief description through block diagrams and Root locus of displacement auto pilot. Pitch orientation control system. Acceleration control system.	L2, L4	7
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**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation*

Text & Reference Books

Text:

1. K. Ogata, "Modern Control Engineering", 5th Edition, Prentice Hall of India, 2010.
2. R. C. Drof, R. H. Bishop, "Modern Control System", 13th Edition, Pearson, 2017.
3. B. C. Kuo, F. Golnaraghi, "Automatic Control Systems", 9th Edition, John Wiley & Sons, 2014.

Reference:

1. I. J. Nagrath, M. Gopal, "Control Systems Engineering" New Age Publication, 2001.
2. J. J. Distefano, "Feedback and Control Systems", 2nd Edition, Tata McGraw hill, 2011.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

A: Attendance; CT: Class Test; S/V/Q: Seminar/Viva/Quiz; HA: Home Assignment; EE: End Semester Examination

CO, PO and PSO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	2	-	-	-	-	-	-	-	-	-	-	-	1	3	-
CO2	1	2	-	-	-	-	-	-	-	-	-	-	-	1	3	-
CO3	1	2	-	-	-	-	-	-	-	-	-	-	-	1	3	-
CO4	1	3	1	-	-	-	-	-	-	-	-	-	-	1	3	-
CO4	1	3	1	-	-	-	-	-	-	-	-	-	-	1	3	-

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ASE2424	Mechatronics	L	T	P	C
Version 2019-1	Date of Approval: May 2019	3	0	0	3
Pre-requisites/ Exposure	Basics of Electrical and Electronics Engineering				
Co-requisites					

Course Description

This course represents the design of computer-controlled electromechanical system. Basic knowledge of electronics and measurements systems is a prerequisite to comprehend the contents of this course. This course enables the student to design and operate a mechatronics system after integrating the principles of mechanical, computer, electrical, and controls engineering.

Course Objectives

The objective of this course is to

1. Provide brief introduction of various components of mechatronics systems comprising electrical, mechanical and control systems along with basic knowledge of mathematical models and theories.
2. Equip the students with knowledge about different types of sensors, actuation systems and microprocessors and their applications.

Course Outcomes

On completion of this course, the students will be able to

- CO1.** List, explain, and describe different types of mechatronics systems, their components and working.
- CO2.** Describe and represent mathematical models and blocks of mechatronic systems with various system theories.
- CO3.** Identify, describe and select appropriate sensors and transducers and design an instrumentation system for collecting information about processes.
- CO4.** Describe and distinguish between Pneumatic and hydraulic actuation systems, their design and operation.
- CO5.** Identify, describe, and design the architecture and the instruction set for a microprocessor and its language programming with various types of digital and analog interfaces.

Course Content

Modules	Blooms level*	Number of hours
Module 1: Introduction Introduction to mechatronics systems. Mechatronics in manufacturing, products, and design. Mechatronics system components. Measurement systems, control systems, electrical systems, mechanical systems.	L1, L2	6
Module 2: System Models Mathematical models. Mechanical system building blocks. Modeling dynamic systems. First order systems, second order systems.	L2, L4	6
Module 3: Transducers and Sensors Definition and classification of transducers and sensors. Principle of working and applications of light sensors, proximity sensors and Hall effect sensors. Signal conditioning, introduction to signal conditioning. Operational amplifier, protection, filtering, Wheatstone bridge. Digital signals multiplexers. Data acquisition.	L1, L2, L3	8
Module 4: Actuation Systems Introduction. Need and necessity of actuation systems. Pneumatic and hydraulic actuation systems, system components, graphic representations, symbols. Directional control valves, pressure control valves, process control valves.	L2, L3	8

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Hydraulic power packs, pumps. Design of hydraulic circuits.		
Module 5: Introduction to Microprocessors Evolution of Microprocessor. Organization of Microprocessors (Preliminary concepts). Basic concepts of programming of microprocessors. Review of concepts - Boolean algebra, logic gates and gate networks, binary & decimal number systems, memory representation. Conversion of real, numbers, floating point notation, representation of floating point numbers, accuracy and range, overflow and underflow, addition of floating point numbers, character representation.	L1, L2, L3	8

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation*

Text & Reference Books

Text:

1. N. Mahalik, "Mechatronics - Principles, Concepts and Applications", Tata McGraw Hill Education, 2017.
2. R. K. Rajput, "A Textbook of Mechatronics", S. Chand & Company, 2007.
3. W. Bolton, "Mechatronics", 4th Edition, Pearson Education, 2010.
4. M. A. Mazidi, J. G. Mazidi, "The 8051 Microcontroller", Pearson, 2004.

Reference:

- D. Alciatore, "Introduction to Mechatronics and Measurement Systems, 4th Edition, Tata McGraw Hill Education, 2017.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

A: Attendance; CT: Class Test; S/V/Q: Seminar/Viva/Quiz; HA: Home Assignment; EE: End Semester Examination

CO, PO and PSO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	2	-	-	-	-	-	-	-	-	-	-	1	1	-	-
CO2	1	2	-	-	-	-	-	-	-	-	-	-	2	2	-	-
CO3	1	2	-	-	-	-	-	-	-	-	-	-	1	1	-	-
CO4	1	2	-	-	-	-	-	-	-	-	-	-	1	1	-	-
CO5	1	2	-	-	-	-	-	-	-	-	-	-	2	2	-	-

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ASE2510	Turbomachinery	L	T	P	C
Version 2019-1	Date of Approval: May 2019	3	0	0	3
Pre-requisites/ Exposure	Engineering Thermodynamics, Aircraft Propulsion				
Co-requisites					

Course Catalog

This course provides basic knowledge and understanding of shaft power and aircraft engines components such as inlet compressor, combustion chamber and nozzles. This course focuses on educating the students about various physical laws and mathematical theories that define the flow behavior, efficiencies and losses, i.e., performance characteristics of the components based on thermodynamics and aerodynamics. Knowledge of basic physics and fluid mechanics is crucial to comprehend the contents of this course. This course serves as a prerequisite for designing of engine components.

Course Objectives

The objective of this course is to

1. Provide knowledge about the basic principles and parameters of gas turbine/Turbomachinery.
2. Educate the students about the theories and laws governing the aerodynamic and thermodynamics analysis of turbomachinery.

Course Outcomes

On completion of this course, the students will be able to

- CO6.** Identify and explain various configurations of shaft power and aircraft engines.
- CO7.** Describe and analyze various components of centrifugal compressor and also describe its performance characteristics.
- CO8.** Describe and analyze various components of axial flow compressor and also describe its performance characteristics.
- CO9.** Describe and analyze various components of axial flow turbines and also describe its performance characteristics.

Course Content

Modules	Blooms level*	Number of hours
Module 1: Introduction Open-cycle single shaft and twin shaft arrangements, Multi spool arrangements, Closed cycles, Aircraft propulsion, Industrial applications, Marine and land transportation	L1, L2	6
Module 2: Shaft power cycles Ideal cycles, Methods of accounting components losses, Design point performance calculations, Comparative performance of practical cycles, Combined cycles and cogeneration schemes, Closed cycle gas turbines	L1, L2	8
Module 3: Centrifugal compressor Principle of operation, Work done and pressure rise, The diffuser, Non dimensional quantities for plotting compressor characteristics, compressor characteristics.	L2, L4	6
Module 4: Axial flow compressor Basic operation, Elementary theory, Factor affecting stage pressure ratio. Blockage in compressor annulus, Degree of reaction, Three dimensional Flow, Design process, Blade design, Calculations of stage performance, compressibility effects, Off design Performance, Axial compressor characteristics.	L2, L4	8
Module 5: Axial Flow turbines	L2, L4	8

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Elementary theory of axial flow turbine, vortex theory, choice of blade profile, pitch and chord, Estimation of stage performance, overall turbine performance, The cooled turbine		
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**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation*

Text & Reference Books:

Text:

1. H. I. H. Saravanamuttoo, H. Cohen, G. F. C. Rogers, "Gas Turbine Theory", 2001.
2. S. M. Yahya, "Turbine, Compressors and Fans", Tata McGraw- Hill Publishing Company Ltd., New Delhi,

Reference:

1. N. Cumpsty, Compressor Aerodynamics, Kreiger Publications, USA, 2004.
2. I. A. Johnson, R. O. Bullock, "NASA-SP-36: Axial Flow Compressors", NTIS (re-release), 2002.
3. M. M. El-Wakil, "Powerplant Technology", McGraw-Hill Pub, 1984.
4. NASA-SP-290, "Axial Flow turbines", NTIS, USA, 2002 (re-release).

Examination Scheme

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

A: Attendance, CT: Class Test, S/V/Q: Seminar/Viva/Quiz, HA: Home Assignment, EE: End Semester Examination

CO, PO, PSO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	1	-	-	-	-	-	-	-	-	-	-	1	-	-	-
CO2	1	1	-	-	-	-	-	-	-	-	-	-	1	-	-	-
CO3	1	1	3	-	-	-	-	-	-	-	-	-	1	-	-	-
CO4	1	1	3	-	-	-	-	-	-	-	-	-	1	-	-	-

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ASE2511	High Speed Aerodynamics	L	T	P	C
Version 2019-1	Date of Approval: May 2019	3	0	0	3
Pre-requisites/ Exposure	Low Speed Aerodynamics				
Co-requisites					

Course Catalog

Course contains the basic material essential for a foundation of compressible flow aerodynamics. The course introduces the fundamental concepts and principles of compressible flow and intends to provide the necessary background for advanced studies on the subject. The course covers the general principles and essentials of compressible flow, the flow equations, one-dimensional gas dynamics, wave motion and waves in supersonic flow, flow in ducts, small-perturbation theory. The exercises included in the course are intended to demonstrate the use of the course material and to outline additional equations and results.

Course Objectives

The objective of this course is to

1. Provide knowledge to the students about compressible flow and its applications.
2. Enable students to know about shock waves in supersonic flow and different related techniques to solve problems

Course Outcomes

On completion of this course, the students will be able to

- CO1.** Identify and explain fundamental principles of compressible flow.
- CO2.** Describe and derive wave motion and waves in supersonic flow.
- CO3.** Explain, derive, and apply various governing equations and theories of compressible flow in ducts.
- CO4.** Explain, derive, and apply governing small perturbation theory.

Course Content

Modules	Blooms level*	Number of hours
Module 1: Compressible Aerodynamics Basic concepts of compressible flow continuity, energy and momentum equations. One dimensional inviscid flow; Stagnation quantities; Isentropic conditions. Speed of sound and Mach number; Isentropic relations; Area-velocity relation. Flow through constant area duct; Normal shock; Propagating Normal Shock. One dimensional linear and nonlinear wave motion.	L1, L2	9
Module 2: Oblique shocks and compressible Flows through ducts Oblique shock and supersonic compression by turning. Weak shocks and Mach waves; Supersonic expansion by turning. Prandtl-Meyer expansion fan; Reflection and intersection of shocks. Shock detachment and bow shock; Shock Expansion theory with application to thin airfoils. Governing equations for quasi One Dimensional Flow through converging and diverging ducts. Diffusers and supersonic Wind Tunnels.	L2, L3	9
Module 3: Subsonic compressible Flow over Airfoils, Linear Theory The derivation of velocity potential equation, Linearized velocity potential equation, Prandtl-Glauert compressibility correction, Critical Mach number, Whitcomb's area rule, Super critical airfoil.	L1, L2, L3	9
Module 4: Linearized Supersonic Flow Introduction, Derivation of Linearized supersonic Pressure Coefficient Formula, Application to supersonic Airfoils Viscous Flow Supersonic Airfoil Drag	L1, L2, L3	9

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**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation*

Text & Reference Books:

Text:

1. J. D. Anderson, Jr., "Fundamentals of Aerodynamics", 2nd Edition, McGraw Hill, 1990.
2. E. L. Houghton, and P. W. Carpenter, "Aerodynamics of Engineering Students", 4th Edition, CBS Publishers & Distributors, 2005.
3. F. M. White, "Fluid Mechanics", 2nd Edition, McGraw Hill, 1986.

Reference:

1. A. H. Shapiro, "Dynamics and Thermodynamics of Compressible Fluid Flow - Volume I & II", Ronald Press, 2002.
2. H. W. Liepmann, and A. Roshko, "Elements of Gas Dynamics", John Wiley & Sons, 1999.
3. J. G. Bertin and R. M. Cummings, "Aerodynamics for Engineers", 6th Edition, Pearson, 2013.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

A: Attendance, CT: Class Test, S/V/Q: Seminar/Viva/Quiz, HA: Home Assignment, EE: End Semester Examination

CO, PO, PSO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	1	-	-	-	-	-	-	-	-	-	-	1	-	-	-
CO2	1	1	-	-	-	-	-	-	-	-	-	-	1	-	-	-
CO3	1	1	3	-	-	-	-	-	-	-	-	-	1	-	-	-
CO4	1	1	3	-	-	-	-	-	-	-	-	-	1	-	-	-

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ASE2512	Aerospace Structures - II	L	T	P	C
Version 2019-1	Date of Approval: May 2019	3	0	0	3
Pre-requisites/ Exposure	Mechanics of Solids, Aerospace Structures-I				
Co-requisites					

Course Catalog

Knowledge of basic mechanics and structures-I is crucial to comprehend the contents of this course. This course provides exhaustive knowledge to the students about the buckling and post buckling behavior of columns, plates and beams, which serve as a foundation for solving critical aerospace problems.

Course Objectives

The objective of this course is to

- Equip the students to understand the analytical study of the buckling behavior of columns and plates.
- Provide the knowledge to the students about the post buckling behavior of plates and field beams under tension.

Course Outcomes

On successful completion of this course, the students will be able to

- CO1.** Identify, explain, apply and analyze the fundamentals of buckling of columns and plates.
- CO2.** Identify, describe and determine the buckling of open sections.
- CO3.** Identify, explain and analyze the post buckling behavior of plates.
- CO4.** Identify, explain, apply and analyze the fundamentals of buckling of columns.
- CO5.** List and explain the different types of stress & strain measurement techniques.

Course Content

Modules	Blooms level*	Number of hours
Module 1: Elastic Buckling of Columns Stability criteria: equilibrium approach, energy approach, imperfection approach, dynamic approach; Higher order governing equation; Large deflection of columns; Buckling of laminated composite columns; Approximate Techniques: Timoshenko's method, Rayleigh-Ritz method, Galerkin's technique; Effect of shear on buckling load; Problems.	L1, L2, L3, L4	8
Module 2: Buckling of Open Sections Torsional load –deformation characteristics; Equilibrium approach in Torsional Buckling & Torsional-Flexural Buckling; Energy Approach: Rayleigh-Ritz Method; Problems.	L1, L2	8
Module 3: Elastic Buckling of Thin Plates Introduction; Equilibrium approach; Energy Approach; Approximate Techniques: Rayleigh-Ritz method, Galerkin's Technique; Buckling of Stiffened Plates, Circular Plates & Thick Rectangular Plates; Problems.	L1, L2, L4	8
Module 4: Post-Buckling Behavior of Plates Introduction; Governing Equation; Energy Approach; Complete Tension Field Beams; Semi-Tension Field Beam; Angle of Diagonal Tension.	L1, L2, L3, L4	5
Module 5: Inelastic Buckling of Columns Double Modulus Theory; Tangent Modulus Theory; Eccentrically Loaded Columns; Empirical Relations for Short Columns.	L1, L2, L3, L4	4
Module 6: Measurement of Stress & Strain Measurement of Strain and Stress; Techniques & principles of measurement; Strain Gauges; Photoelasticity: principle, working, applications.	L1, L2	3

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**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation*

Text & Reference Books

Text:

1. N. G. R. Iyengar, "Structural stability of Columns and Plates", 1st Edition, affiliated East-West Press (Pvt.) Ltd., New Delhi, 1986.
2. D. J. Perry, "Aircraft Structures", Dover Publications, 2011.
3. T. H. G. Megson, "Aircraft Structures for Engineering Students", Elsevier India, 2005.

Reference:

3. S. P. Timoshenko, and J. N. Goodier, "Theory of Elastic Stability", 2nd Edition, Dover Publications Inc., New York, 2009.
4. N. C. Sinha, "Elements of Structural Analysis", New Central Book Agency, 2011

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

A: Attendance, CT: Class Test, S/V/Q: Seminar/Viva/Quiz, HA: Home Assignment, EE: End Semester Examination;

CO, PO and PSO Mapping

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CO2	1	1	-	2	-	-	-	-	-	-	-	-	1	-	-	-
CO3	1	1	-	2	-	-	-	-	-	-	-	-	1	-	-	-
CO4	1	1	-	2	-	-	-	-	-	-	-	-	1	-	-	-
CO5	1	1	-	2	-	-	-	-	-	-	-	-	1	-	-	-

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ASE2513	Flight Mechanics	L	T	P	C
Version 2019-1	Date of Approval: May 2019	3	0	0	3
Pre-requisites/ Exposure	Introduction to Aerospace Engineering, Low Speed Aerodynamics				
Co-requisites					

Course Catalog

This course contains Fundamental characteristics of standard atmosphere which are crucial for aerodynamic characteristics of airfoil and airplane. The course is designed to make students to understand aerodynamic forces and moments in steady, accelerated flight and in maneuvers for different flight modes and conditions.

Course Objectives

The objective of this course is to

1. Provide an insight to students about the characteristics of atmosphere.
2. Equip students about different forces on airfoil and wing due to immersion in free stream of air in flight.

Course Outcomes

On completion of this course, the students will be able to

- CO1.** Define and explain parameters of International Standard Atmosphere.
- CO2.** State, explain and apply the physical principle in estimation of aerodynamic drag over flight vehicles.
- CO3.** Describe, apply and analyze the aerodynamic characteristics over airfoils and wings of flight vehicles.
- CO4.** Explain and apply the basic equations and principles to analyze the airplane mechanics in steady flight.
- CO5.** Explain and apply the basic equations and principles to analyze the airplane performance in accelerated flight and maneuvers.

Course Content

Modules	Blooms level*	Number of hours
Module 1: Standard Atmosphere Standard atmosphere, relation between Geopotential and Geometric altitudes, pressure, temperature and density altitudes, Relation for stratosphere and troposphere, Stability of atmosphere, aero-thermodynamics, Measurement of air-speed: true airspeed, indicated airspeed and equivalent airspeed, Airspeed indicator	L1, L2	7
Module 2: Aerodynamic Drag Drag and its effects, Types of drag and affecting factors, Drag polar, Compressibility drag, Design for minimum drag, Estimation of drag of complete airplane, Terminal velocity	L1, L2, L3	7
Module 3: Aerodynamic Characteristics Force and Moments coefficients dimensional analysis, Pressure distribution over 2D airfoil, Variation with angle of attack, Center of pressure, Aerodynamic center and connected problems, Lift, Drag and moment coefficients; Relations between lift and drag, Estimation of these characteristics from measured pressure distributions, Variation of aerodynamic coefficients with Reynolds Number and Mach Number, Effect of span, Aspect ratio, plan form, sweep, taper and twist on aerodynamic characteristics of a lifting surface, Delta wing aerodynamics	L2, L3, L4	7

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Module 4: Airplane Mechanics in Steady Flight Straight and Level flight, stalling speed; Variation of drag with flight, Speed conditions for minimum drag, minimum power conditions; Power at other speeds, Gliding flight, Shallow and steep angles of glide; Sinking speed, Minimum sinking speed, Time of descent, Climbing flight at shallow angles, Correction for steep angles, Time to flight, Maximum rate of climb	L2, L3, L4	7
Module 5: Airplane Performance in Accelerated Flight and Maneuvers Take-off and landing, Calculations of take-off ground run, Take-off distances, Minimum ground run, assisted take-off, Calculation of landing ground run, Range and endurance and problems connected with them. Introductory comments on spins and stalls; turning flight, Maneuvers in 3D space	L2, L3, L4	8

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation*

Text & Reference Books:

Text:

1. D. O. Dommasch, S. S. Sherby & T. F. Connolly, "Airplane Aerodynamics", 4th Ed. Pitman Publishing Group, 1998.
2. E. L. Houghton and A. E. Brock, "Aerodynamics for Engineering Students", Edward Arnolds, 1986.
3. R. S. Shevell, "Fundamentals of Flight", 3rd Ed. Prentice Hall, 1999.
4. John D. Anderson, "Introduction to Flight", McGraw Hill, 3rd Ed, 2004.

References:

1. J. J. Bertin and M. L. Smith, "Aerodynamics for Engineers", 2nd Ed., Prentice Hall.
2. C. D. Perkins and R. E Hage, "Airplane Performance, Stability and Control", John Wiley, 1949.

Examination Scheme

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

A: Attendance, CT: Class Test, S/V/Q: Seminar/Viva/Quiz, HA: Home Assignment, EE: End Semester Examination

CO, PO, PSO Mapping

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CO2	1	1	-	-	-	-	-	-	-	-	-	-	1	-	-	-
CO3	1	1	3	-	-	-	-	-	-	-	-	-	1	-	-	-
CO4	1	1	3	-	-	-	-	-	-	-	-	-	1	-	-	-
CO5	1	1	3	-	-	-	-	-	-	-	-	-	1	-	-	-

1: strongly related, 2: moderately related and 3: weakly related



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ASE2514	Computer Aided Drafting Lab	L	T	P	C
Version 2019-1	Date of Approval: May 2019	0	0	2	1
Pre-requisites/ Exposure	Engineering Graphics				
Co-requisites					

Course Catalog

In this course the concept of design, drafting and modeling are discussed in details using AutoCAD software. The course contents include the basic commands, 2D and 3D modeling of machine components using AutoCAD. To master this course, students should have a background in basic knowledge of Engineering graphics and design.

Course Objectives

The objective of this course is to

- Equip the students with the concept of basic commands and features used in AutoCAD.
- Provide an overview to learn and apply the use of basic commands in generating the 2D sketches and 3D models of machine components.

Course Outcomes

On completion of this course, the students will be able to

- CO1:** Construct, edit and plot drawings using basic AutoCAD commands and features.
- CO2:** Construct and edit the model of machine components such as Piston, Connecting rod.
- CO3:** Construct and edit 2D sketches of pentagon, hexagon and any 2D drawing.
- CO4:** Construct and edit 3D model of nut, bolt and gear.
- CO5:** Construct and edit the geometry of hollow cylinder containing sphere and triangle.

Course Content

Modules	Blooms level*	Number of hours
Experiment 1: Basics of AutoCAD	L2, L3	2
Experiment 2: Modeling of machine Components such as Connecting, Rod, piston etc.	L2, L3	2
Experiment 3: 2D modeling for different Geometrics such as Hexagon, Pentagon etc	L2, L3	2
Experiment 4: 3D modeling of nut and Bolt.	L2, L3	2
Experiment 5: Modeling of Gear.	L2, L3	2
Experiment 6: Modeling of Compound Geometrics such as Hollow Cylinder containing Sphere, Triangle etc.	L2, L3	2

*Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Text & Reference Books:

Text:

- P. S. Gill, "Engineering Drawing", S. K. Kataria & Sons, New Delhi, 2009.
- N. D. Bhat, "Engineering Drawing: Plane and Solid Geometry", Charotar Publishing House Pvt. Limited, New Delhi, 2010.

Reference:

- J. M. Kirkpatrick, "The AutoCAD Book: Drawing, Modeling, and Applications", Prentice Hall,

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1996

- P. Karaiskos, N. Fulton, “AutoCAD for Mechanical Engineers and Designer”, Wiley, 1995

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

IA: Internal Assessment, EE: External Exam, PR: Performance, LR: Lab Record, V: Viva.

CO, PO and PSO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	3	-	-	-	-	-	-	2	2	3	3	1	-	-	-
CO2	1	2	-	-	-	-	-	-	2	2	3	3	1	-	-	-
CO3	1	2	-	-	-	-	-	-	2	2	3	3	1	-	-	-
CO4	1	3	-	-	-	-	-	-	-	-	-	-	1	-	-	-
CO5	1	2	-	-	-	-	-	-	-	-	-	-	1	-	-	-

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ASE2515	Structural Analysis Lab	L	T	P	C
Version 2019-1	Date of Approval: May 2019	0	0	2	1
Pre-requisites/ Exposure	Aerospace Structures-I, Aerospace Structures-II				
Co-requisites					

Course Catalog

Knowledge of basic structures and modeling is crucial to comprehend the contents of this course. This course provides extensive knowledge to the students about various modeling and analysis tools for the designing of aircraft structures and testing them practically, leading to the development and fabrication that serve as a foundation for better and safe futuristic designs.

Course Objectives

The objective of this course is to

1. Equip the students with the practical knowledge and applications of different types of beams and columns.
2. Provide an overview to learn and apply the FEM based tool for detailed structural analysis

Course Outcomes

On completion of this course, the students will be able to

CO1: List, explain and apply the basics of FEM and structures lab.

CO2: Explain and apply the different theorems in finding loads and shear center over the given types of beams and sections.

CO3: Describe and apply the concepts of photoelasticity for visualizing the stress distribution.

CO4: Describe, apply and analyze the stress distribution using FEM based designing tool.

Course Content

Modules	Blooms level*	Number of hours
Experiment 1: Introduction to FEM & Aircraft Structures Lab	L1, L2, L3	2
Experiment 2: To Verify the following theorems for the given beams a. Maxwell's Reciprocal Theorem b. Principle of Superposition c. Castigliano's Theorem	L2, L3	2
Experiment 3: To determine the shear center for Open & Closed sections	L2, L3	2
Experiment 4: To study the Photoelasticity apparatus and visualize the stress distribution over different sample shapes.	L2, L3	2
Experiment 5: To determine the stress distribution over a circular cylinder under axial compressive and tensile load using ANSYS structural workbench.	L2, L3, L4	2
Experiment 6: To determine the stress distribution over a rectangular plate under compressive and tensile load using ANSYS structural workbench.	L2, L3, L4	2

*Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation



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Text & Reference Books:*Text:*

1. B. C. Nakra and K. K. Chaudhary, "Instrumentation Measurement and Analysis", Tata McGraw Hill, 2nd Ed, 1993.
2. N. G. R. Iyengar, "Structural stability of Columns and Plates", 1st Edition, affiliated East-West Press (Pvt.) Ltd., New Delhi, 1986.
3. D. J. Perry, "Aircraft Structures", Dover Publications, 2011.

Reference:

1. S. P. Timoshenko, and J. N. Goodier, "Theory of Elastic Stability", 2nd Edition, Dover Publications Inc., New York, 2009.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination**Examination Scheme:**

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

IA: Internal Assessment, EE: External Exam, PR: Performance, LR: Lab Record, V: Viva.

CO, PO and PSO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	3	-	-	-	-	-	-	2	2	3	3	1	-	-	-
CO2	1	2	-	-	-	-	-	-	2	2	3	3	1	-	-	-
CO3	1	2	-	-	-	-	-	-	2	2	3	3	1	-	-	-
CO4	1	3	-	-	-	-	-	-	2	2	3	3	1	-	-	-

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ASE2535	Summer Internship Evaluation-I	L	T	P	C
Version 2019-1	Date of Approval: May 2019	3	0	0	3
Pre-requisites/ Exposure					
Co-requisites					

Course Catalog

The internship experience provides the student with an opportunity to explore career interests while applying knowledge and skills learned in the classroom in a work setting. The training may undergo in an industrial environment or may be an in-house training on some latest software which is in high demand in market. The experience also helps students gain a clearer sense of what they still need to learn and provides an opportunity to build professional networks. The intern develops a greater understanding about career options while more clearly defining personal career goals. Hence, the training will be useful for their future employment in industry. Entire effort in internship is in terms of extending the program of education and evaluation beyond the classroom of a university.

Course Objectives

The objective of this course is to

1. Provide practical training on some demo or live projects that will increase the capability of the students to work in a team on actual problems in industry.
2. Provide students with capabilities to design systems, analyze results, write technical reports and engage in life-long learning practices.

Course Outcomes

On completion of this course, the students will be able to

- CO1. Relate and apply the acquired classroom knowledge with technical, real-time industry environment.
- CO2. Relate and demonstrate capabilities to create and review technological solutions to complex engineering problems of relevant domains.
- CO3. Apply the acquired knowledge to demonstrate the skills to create and compile technical reports pertaining to a given project.
- CO4. Demonstrate the skills to work ethically and professionally in a team and engage in life-long learning.

Course Content

Guidelines

In order to achieve the objectives:

- Each student will be allotted a supervisor for proper guidance.
- Student will first submit details of company, external guide, project title to coordinator/supervisor as per given schedule.
- For internal assessment purpose, students will submit an industry feedback and a progress report.
- Student will maintain a file (Internship File/Project Report) which he/she will submit after completion of internship. Further, coordinator will provide Non-Teaching Credit Course project guidelines and sample to help in preparation of file. The Internship File aims to encourage students to keep a personal record of their learning and achievement throughout the Programme. It can be used as the basis for lifelong learning and for job applications. Items can be drawn from activities completed in the course modules and from the workplace to demonstrate learning and personal development. The file will assess the student's analytical skills and ability to present supportive evidence, whilst demonstrating understanding of their organization, its needs and their own personal contribution to the organization.

The layout guidelines for the Project Report

1. File should be in the following specification

- A4 size paper

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- Spiral Binding

- **Font**

For normal text Font Type and Size must be- Times New Roman, 12 pt. The minimum font size of materials within a table or a figure can be 10 point.

- **Margins**

A margin of 3.75 cm (1½ inch) is to be given on the binding edge while on the other sides it is to be 2.5 cm (1 inch). The text of the report, including headings, figures, tables, and notes, but excluding page numbers, must be accommodated within the page area.

- **Line Spacing**

The line spacing in the main text must be between one-and-a-half (1.5). Single line spacing should be given for figure captions, table titles, figure legends, and footnotes. Equations, tables, figures, and quotations should be set off from the main text with adequate space (not less than the normal line spacing adopted for the main text). Two consecutive paragraphs should be separated by a spacing which must be larger than the line spacing adopted for the text.

- **Tables and Figures**

Each sketch, drawing, graph and photograph should have a figure number and title below the figure etc. Numbering should be sequential, chapter wise. For instance, if there are 24 figures chapter 3 spread over all of its sections the figure numbers run from Figure 3.1 through Figure 3.24. In figures experimental data should typically be represented by centered symbols, and theoretical data by continuous curves.

Each table should have a table number and caption above the table. Numbering should be sequential, chapter wise, as in the case of Figure numbers. For instance, if there are 18 tables in chapter 3 the table numbers run from Figure 3.1 through Figure 3.18.

Make sure that figures and tables are complete in other respects such as legends, references (if any) and coordinate labels with units. Each figure and table must be explicitly referred to in the text and located where its first reference occurs, preferably after the reference.

- **Drawings**

All engineering drawings must conform to relevant Standards and should include a title block. If drawings are large they should be included at the back of the report in a separate pocket. In case drawings are made using CAD packages, a CD ROM should be included which contains all the files and details of the packages used.

- **Equations**

The numbering of equations should be sequential, chapter wise. Numbered equations must be explicitly referred to in the text.

2. Report Size: The maximum number of pages of the Report should be preferably between 40-70 pages.

3. Report Layout: The report should contain the following components

- Front Page
- Declaration
- Student Certificate (University)
- Certificate(Company)
- Acknowledgement
- Abstract
- Contents
- List of Figures
- List of Tables
- Company Profile (optional)
- Chapters
- Appendices(optional)
- References / Bibliography

The above components are described below:

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- **Title Page** - Format will be given by coordinator/supervisor.
- **Declaration by the Students**-This is page number (i), the beginning of the small case Roman numeral page numbers. The student has to give a declaration to the effect that the data used for the work, the work depicted in the report, and the written material contained in the report are not copied from others and that due permission has been taken from, and due credit has been given to, the sources whenever they are used.
- **Certificate**-This is page number (ii). It is given by the Institute. The certificate will be signed by the Faculty Supervisor(s) before the viva-voce after verifying the format and by the Head of the Department after review with the Supervisor(s).
- **Company Certificate** -This is a certificate, which the company gives to the students.
- **Contents**-This is page number (iii). The table of Contents should be titled just *Contents* (not Table of Contents). Try to fit it into one or two pages.
- **Acknowledgement**-This is page number (iv). Keep this brief and avoid using informal language. This page must be signed by the candidate.
- **Abstract and Keywords**-This is page number (v). The abstract (preferably one page) should contain the context/relevance of the problem at hand, a description of what was done and a gist of the significant observations/results.
- The keywords (maximum 6) are a hint that what is contained in the report.
- **Company Profile** -A Company Profile corresponds to a file with company-specific data. Company data can be stored there and included in a booking when needed.
- **Chapters**-Introduction, Literature Review/Background Study etc. as given by coordinator/supervisor.
- **References / Bibliography**-This should include papers and books referred to in the body of the report. These should be ordered alphabetically on the author's surname. The titles of journals preferably should not be abbreviated; if they are, abbreviations must comply with an internationally recognised system.

Modes of Evaluation: Viva/Progress Report/Presentation/Final Report

Continuous Internal Assessment	Final Assessment
50 Marks	50 Marks

Examination Scheme

Components	V	IF	R	PR	FP
Weightage (%)	20	20	20	20	20

V – Viva, IF – Industry Feedback, FP – Final Presentation, R – Report, PR–Progress Report

CO, PO, PSO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	2	2	-	-	-	-	-	-	-	-	-	1	1	-	-
CO2	2	2	-	1	3	-	-	-	-	-	-	-	1	1	1	-
CO3	-	-	-	2	-	-	-	-	-	1	-	-	-	-	-	1
CO4	-	-	-	-	-	-	-	1	1	-	1	1	-	-	-	1

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ASE2517	Aircraft Systems and Instrumentation	L	T	P	C
Version 2019-1	Date of Approval: May 2019	3	0	0	3
Pre-requisites/ Exposure	Introduction to Aerospace Engineering				
Co-requisites					

Course Catalog

This course provides basic knowledge and understanding of various kinds of aircraft systems and their importance based on various aspects. Knowledge of basic physics is crucial to comprehend the contents of this course. Studying this course the students will learn about various components, systems and instruments of aircrafts that serve as a foundation for better understanding of advanced course.

Course Objectives

The objective of this course is to

1. Provide knowledge of different types of control systems used in the aircraft and their associated instruments.
2. Provide knowledge about the applications and real time problems associated with those systems.

Course Outcomes

On completion of this course, the students will be able to

- CO1.** List, explain and compare various types of flight control systems.
- CO2.** Identify and describe the engine control system with applications.
- CO3.** List and explain the hydraulic and environment control system.
- CO4.** Outline and describe about the gyroscopic systems used in aircrafts.
- CO5.** List and explain about the different types of navigational and pitot static instruments.

Course Content

Modules	Blooms level*	Number of hours
Module 1: Flight Control Systems Primary and secondary flight control, Flight control linkage systems, push-pull control rod system, cable and pulley systems, High lift control surfaces, Flight control actuation, linear actuator, mechanical actuator, mechanical screw jack actuator, Direct drive actuation, fly-by-wire actuator, electro-hydrostatic actuator, electro-mechanical actuator	L1, L2, L4	6
Module 2: Engine Control Systems Engine technology and principle of operation, fuel flow control, air flow control, control systems, control system parameters, input signals, output signals, example systems, engine starting, fuel control, ignition control, engine rotation, throttle levers, starting sequence, engine oil systems.	L1, L2	6
Module 3: Hydraulic and Environment Control Systems Hydraulic circuit design, hydraulic actuation, hydraulic fluid, fluid pressure and temperature, fluid flow rate, hydraulic piping and pumps, need for controlled environment, heat sources, ram air cooling, fuel cooling, engine bleed, bleed flow and temperature control, air cycle refrigeration, humidity control, hypoxia, g tolerance.	L1, L2	6
Module 4: Gyroscopic Systems Gyroscope and its properties, Gyro horizon, Turn and bank indicator, turn coordinator, Direct reading magnetic compass, Directional gyros.	L1, L2	6

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Module 5: Navigational Instruments Very high and ultra-high frequency radio aids, VOR, TACAN, VORTAC, VHF direction finding, instrument landing system, microwave landing system.	L1, L2	6
Module 6: Pitot Static Instruments Pitot static system, air speed indicator, altimeter, Mach meter, Mach /airspeed indicator, vertical speed indicator.	L1, L2	6

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation*

Text & References Books:

Text:

- I. Moir, and A. Seabridge, "Aircraft Systems: Mechanical, electrical, and avionics subsystems integration", John Wiley & Sons, 2011.
- E. H. Pallett, "Aircraft instruments: principles and applications", London: Pitman, 1981.

Reference:

1. D. A. Lombardo, "Aircraft Systems", 2nd edition, Tata McGraw Hill, 2009.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

A: Attendance, CT: Class Test, S/V/Q: Seminar/Viva/Quiz, HA: Home Assignment, EE: End Semester Examination;

CO, PO and PSO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	-	2	-	-	-	-	-	-	-	-	-	1	2	1	-
CO2	1	-	2	-	-	-	-	-	-	-	-	-	1	2	1	-
CO3	1	-	2	-	-	-	-	-	-	-	-	-	1	2	1	-
CO4	1	-	2	-	-	-	-	-	-	-	-	-	1	2	1	-
CO5	1	3	2	-	-	-	-	-	-	-	-	-	1	2	1	-

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ASE2609	Aircraft Maintenance & Quality Assurance	L	T	P	C
Version 2019-1	Date of Approval: May 2019	3	0	0	3
Pre-requisites/ Exposure	Introduction to Aerospace Engineering				
Co-requisites					

Course Catalog

This course provides basic knowledge and understanding of various kinds of aircraft maintenances and their importance based on various aspects. This course provides introductory knowledge to the students about testing of various components as well as the fabrication of FRPs that serve as a foundation for better understanding of advanced course.

Course Objectives

The objective of this course is to

- Provide knowledge of various types of preventive maintenance: repairs, overhauls, and calibration, rigging and testing of aircraft and its instruments and components/systems.
- Provide knowledge about the layout of aircraft structure, corrosion of aircraft components and its prevention.

Course Outcomes

On completion of this course, the students will be able to

- CO5.** Identify and explain the importance of aircraft maintenance and quality assurance.
- CO6.** List and explain various types of testings for aircraft materials using DTs and NDTs and the corrosion prevention methods.
- CO7.** Illustrate the fabrication and repair of FRP components and explain the quality assurance practices.
- CO8.** Explain and demonstrate the layout of an aircraft along with the assembly and rigging.
- CO9.** Explain and demonstrate their course knowledge to disciplinary as well as interdisciplinary audience.

Course Content

Modules	Blooms level*	Number of hours
Module 1: Introduction to Maintenance Requirement of maintenance of aircraft, its components, systems, subsystems. Types of maintenance scheduling, Inspection of aircraft components. Types of Inspections, Repair, Modifications, and Reconditioning. Role of airworthiness, Issue of C of A.	L1, L2	6
Module 2: Testing of Aircraft Materials and Components Testing techniques for Tension, Hardness, Bending, Impact, Crushing, Torsion, Fatigue, Hydrostatic tests. NDT Techniques: X-ray, Gamma Ray, Ultra-sonic; Magna-flux.	L1, L2	6
Module 3: Layout of Aircraft Structure Principle and important sub-groups, Aircraft Station numbering sub-assemblies in airframe, landing gear, Power plant and its attachment, Rotorcraft Structure.	L1, L2	6
Module 4: Aircraft Assembly and Rigging Aircraft Assembly, Rigging, Alignment of fixed surfaces and flight controls and systems in details, balancing, Inspection and Maintenance. Flight control system of Helicopter.	L1, L2	6

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Module 5: Fabrication and Repair of FRP Components Development of metal bonding and composite materials, Bonding Structures, Composites: Characteristics, types, Fabrication and repair.	L1, L2	6
Module 6: Quality Assurance Meaning of Quality and quality improvement, need of Quality, Statistical methods for quality control, Process capability. Need of Quality Assurance, Quality Audit, Concept of Zero defect, ISO 9000 quality systems, TQM.	L1, L2	6

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation*

Text & Reference Books:

Text:

- M. J. Kroes, W. A. Watkins, F. Delp, and R. Sterkenburg, "Aircraft Maintenance and Repair", 7th edition, McGraw-Hill Education, 2013.
- G. F. Titterton, "Aircraft Materials and Processes", 3rd edition, Himalayan Books, New Delhi, 1998.
- A. Mitra, "Fundamentals of Quality Control", Wiley-Blackwell; 4th edition, 2016.

References:

1. A. V. Feigenbaum, "Total Quality Control", 40th anniversary edition, 1983.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

A: Attendance; CT: Class Test; S/V/Q: Seminar/Viva/Quiz; HA: Home Assignment; EE: End Semester Examination

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	-	3	-	-	-	-	-	-	-	-	-	2	1	-	-
CO2	1	2	3	-	-	-	-	-	-	-	-	-	2	1	-	-
CO3	1	2	1	3	-	-	-	-	-	-	-	-	2	1	-	-
CO4	-	-	2	-	1	-	-	-	-	-	-	-	2	1	-	-
CO5	-	3	-	3	-	-	-	-	-	1	-	-	2	1	-	-

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ASE2613	Computational Fluid Dynamics	L	T	P	C
Version 2019-1	Date of Approval: May 2019	3	0	0	3
Pre-requisites/ Exposure	Fluid Mechanics and Dynamics, Flight Dynamics				
Co-requisites					

Course Catalog

This course introduces the beginning graduate and advanced undergraduate students to finite difference methods as a means of solving different type of differential equations that arise in fluid dynamics. Fundamentals of numerical analysis, ordinary differential equations and partial differential equations related to fluid mechanics and heat transfer will be reviewed. Error control and stability considerations are discussed and demonstrated. The Navier-Stokes equations will be solved using a commercial software.

Course Objectives

The objective of this course is to

- Provide introductory knowledge to the students about a variety of computational techniques that can be used for solving engineering problems.
- Provide education to the students about utilizing the computational software for result presentations and data visualization of engineering problems.

Course Outcomes

On completion of this course, the students will be able to

- CO1.** Describe, and apply the various governing equations to solve engineering problems.
- CO2.** Describe, and apply various mathematical approaches to solve partial differential equations.
- CO3.** Describe, and apply the fundamental knowledge and various techniques to create computational grids.
- CO4.** Describe, and apply the fundamental knowledge and various techniques to discretize computational grids.
- CO5.** Describe, and apply the knowledge and technique of finite volume method to achieve numerical solution of problems.

Course Content

Modules	Blooms level*	Number of hours
Module 1: Introduction Governing Equations of Fluid Dynamics: Continuity, Momentum and Energy Equations; Derivation in Various Forms; Integral Versus Differential Form of Equations; Models of Flows; Substantial Derivative; Divergence of Velocity; Physical Boundary Conditions.	L2, L3	6
Module 2: Mathematical Behaviour of Partial Differential Equations Classification of Partial Differential Equations; Cramer Rule and Eigen Value Methods for Classification; Hyperbolic, Parabolic, and Elliptic Forms of Equations.	L2, L3	5
Module 3: Grid Generation and Techniques Need for Grid Generation; General Transformation of The Equations; Metrics and Jacobians; Structured Grids-Essential Features; Structured Grid Generation Techniques - Algebraic and Numerical Methods; Unstructured Grids-Essential Features; Unstructured Grid Generation Techniques- Delaunay-Voronoi Diagram; Advancing Front Method.	L2, L3, L5	5
Module 4: Discretization Finite Differences Methods and Difference Equations; Explicit and Implicit Approaches; Unsteady Problem - Explicit Versus Implicit Scheme; Errors and	L2, L3, L5	6

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Stability Analysis; Time Marching and Space Marching; Reflection Boundary Condition; Relaxation Techniques; Alternating Direction Implicit Method; Successive over Relaxation/Under Relaxation.		
Module 5: Finite Volume Technique and Some Applications Spatial Discretization - Cell Centered and Cell Vertex Techniques (Overlapping Control Volume, Dual Control Volume); Temporal Discretization - Explicit Time Stepping and Implicit Time Stepping; Time Step Calculation; Upwind Scheme and High Resolution Scheme; Unsteady Flows and Heat Conduction Problems.	L2, L3, L4	6

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation*

Text & Reference Books:

Text:

1. C. A. J. Fletcher, "Computational Techniques for Fluid Dynamics", 2nd Edition, Springer, 2002.
2. J. D. Anderson, "Computational Fluid Dynamics", McGraw Hill, 2013.

Reference:

1. J. F. Wendt, "Computational Fluid Dynamics - An Introduction", 3rd Edition, Springer, 2013.
2. C. Hirsch, "Numerical Computation of Internal and External Flows", 1st Edition, Elsevier, 2007.
3. K. A Hoffmann, S. T. Chiang, "Computational Fluid Dynamics for Engineers", Vols. I & II, Engineering Education System, 1993.
4. T. K. Sengupta, "Fundamentals of CFD", Universities Press, 2004.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

A: Attendance, CT: Class Test, S/V/Q: Seminar/Viva/Quiz, HA: Home Assignment, EE: End Semester Examination

CO, PO, PSO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	2	-	3	-	-	-	-	-	-	-	-	1	1	3	-
CO2	1	2	-	3	-	-	-	-	-	-	-	-	1	1	3	-
CO3	1	2	-	3	-	-	-	-	-	-	-	-	1	1	3	-
CO4	1	2	-	3	-	-	-	-	-	-	-	-	1	1	3	-
CO5	1	2	-	3	-	-	-	-	-	-	-	-	1	1	3	-

1: strongly related, 2: moderately related and 3: weakly related



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ASE2614	Aerospace Materials	L	T	P	C
Version 2019-1	Date of Approval: May 2019	3	0	0	3
Pre-requisites/ Exposure	Introduction to Aerospace Engineering, Aerospace Structures-I				
Co-requisites					

Course Catalog

This course provides basic knowledge and understanding of various types of materials, their properties and their applications in aerospace. This course serves as a foundation for better understanding of advanced courses relevant to aircraft manufacturing, aircraft design, construction and fabrication.

Course Objectives

The objective of this course is to

1. Provide strong knowledge base to students in respect of various important aerospace materials used in the manufacture of aircraft.
2. Provide introductory knowledge base to students regarding different types of alloys, their heat treatment processes and applications.

Course Outcomes

On completion of this course, the students will be able to

- CO1.** Identify and explain the fundamental of materials and their importance on flight vehicle.
- CO2.** Identify, explain and compare the properties of various aluminum and magnesium alloys and steel compositions. Also their application to aerospace vehicle vehicles.
- CO3.** Identify, describe and compare the properties of high strength and high resistance alloys along with their application to aerospace vehicle vehicles.
- CO4.** Identify and explain the corrosion and its different prevention methods for preventing aircraft components.
- CO5.** Identify and explain about the composite materials, their applications and different types.

Course Content

Modules	Blooms level*	Number of hours
Module 1: Introduction To Materials Properties of flight vehicle materials, Importance of strength/weight ratio of materials for Aerospace Vehicles, Importance of temperature variations, factors affecting choice of material for different parts of airplane.	L1, L2	6
Module 2: Aluminium & Magnesium Alloys Aluminium alloys, Heat treatment, High strength and high corrosion resistant alloys, Magnesium alloys and their properties, Heat treatment. Application to Aerospace Vehicle of these alloys.	L1, L2, L4	6
Module 3: Aircraft Steels Classification of alloy steels, Effect of alloying elements, Carbon steels v/s Alloys steels, corrosion resistant steels, Heat treatment, Corrosion prevention methods, Selection and application of steel alloys to aircraft manufacture.	L1, L2, L4	6
Module 4: High Strength And Heat Resistant Alloys Classification of heat resistant materials and iron, Nickel and cobalt base alloys, Refractory materials: Ceramics, Titanium and its alloys, properties of Inconel, Monal and K-Monal, Nimonic and super alloys: Application to Aerospace vehicles.	L1, L2	6
Module 5: Corrosion And Its Prevention Corrosion of dissimilar metals, protection, Cleaning, Plating anodic, Oxidation,	L1, L2	6

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Paints. Problems of corrosion to aircraft near sea, Protective/Preventive measures.		
Module 5: Composite Materials Classification and characteristics of Composite materials, Types of Composite materials, Matrix phase, Dispersion phase, Advantages of composite materials, FRP, MMC, PMC, CMC, and Applications of Composites in Aircrafts.	L1, L2	6

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation*

Text & Reference Books:

Text:

- W. A. J. Chapman, "Workshop Technology-Vol. I-III", 5th Edition, Butterworth-Heinemann, 1972.
- G. F. Titterton, "Aircraft Materials and Processes", Sterling Book House, 2007.
- L. Gupta, "Advanced Composite Materials", Himalayan Books, New Delhi, 1998.

References:

- G. B. Ashmead, "Aircraft Production Methods", 1st Edition, Chilton Company, 1956.
- R. F. Gibson, "Principles of composite Materials Mechanics", 2nd Edition, McGraw Hill, CRC Press, 2011.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

A: Attendance; CT: Class Test; S/V/Q: Seminar/Viva/Quiz; HA: Home Assignment; EE: End Semester Examination

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	-	2	-	-	-	-	-	-	-	-	-	3	1	-	-
CO2	1	-	2	-	-	-	-	-	-	-	-	-	3	1	-	-
CO3	-	-	1	-	2	-	-	-	-	-	-	-	3	1	-	-
CO4	1	2	1	3	-	-	-	-	-	-	-	-	3	1	-	-
CO5	-	-	1	2	2	-	-	-	-	-	-	-	3	1	-	-

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ASE2651	Aircraft Stability and Control	L	T	P	C
Version 2019-1	Date of Approval: May 2019	3	0	0	3
Pre-requisites/ Exposure	Introduction to Aerospace Engineering, Low Speed Aerodynamics, Flight Mechanics				
Co-requisites					

Course Catalog

This course provides the fundamental knowledge of stability and control of an aircraft. Students will understand the importance of different components of an aircraft in providing stability and giving control to aircraft motion. This course also provides understanding of mathematics behind the designing of aircraft and its components. The content of this course serves as a foundation for advance course of aircraft designing.

Course Objectives

The objective of this course is to

1. Provide understanding of various aspects of stability of an aircraft in flight and how geometric features of control surfaces and their proper angular movements achieve it.
2. Provide an analytical understanding of longitudinal, lateral and directional stability and measures that can be taken to control the same.

Course Outcomes

On completion of this course, the students will be able to

- CO1.** Define, explain, apply and compare the various fundamentals and aspects of stick fixed static longitudinal stability.
- CO2.** Define, explain, apply and compare the various fundamentals and aspects of stick free static longitudinal stability.
- CO3.** Define, explain, apply and compare the various fundamentals and aspects of directional stability and control of flight vehicles.
- CO4.** Define, explain, apply and compare the various fundamentals and aspects of lateral stability and control of flight vehicles.
- CO5.** Define, explain, apply and compare the various fundamentals and aspects of dynamic stability of flight vehicles.

Course Content

Modules	Blooms level*	Number of hours
Module 1: Stick Fixed Static Longitudinal Stability Introduction to stability of airplane, stick fixed longitudinal stability, Neutral point, Centre of gravity limits, In flight measurement of stick fixed neutral point	L1, L2, L3, L4	8
Module 2: Stick Free Static Longitudinal Stability Control surface hinge moments, floating and restoring tendencies, the tab, Effect of free elevator on airplane stability, Elevator Control force, stick force gradients, Neutral point, Controls free center of gravity limit, In-flight measurement of stick free neutral point	L1, L2, L3, L4	7
Module 3: Directional Stability and Control Asymmetric flight, Feather cock stability, contribution of different parts of Airplane, Rudder Fixed and Rudder free static directional stability, rudder lock	L1, L2, L3, L4	7
Module 4: Lateral Stability and Control Dihedral Effect, Contribution of different parts of airplane controls in roll, aileron control power, cross coupling of lateral and directional effects	L1, L2, L3, L4	7

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Module 5: Dynamic Stability (a) Longitudinal Dynamic Stability: Simple analysis of short period and phugoid modes, stick-fixed and stick-free (b) Lateral and Directional Dynamic Stability: Simple analysis of roll subsidence spiral mode and Dutch roll	L1, L2, L3, L4	7
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**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation*

Text & Reference Books:

Text:

1. C. D. Perkins, R. E. Hage, "Airplane Performance Stability and Control", John Wiley & Sons, 1949.
2. B. Dickinson, "Aircraft Stability and control for Pilots and Engineers", Pitman, 1968.
3. B. N. Pamadi, "Performance, Stability, Dynamics and Control of Airplanes", 2nd Edition, American Institute of Aeronautics & Astronautics, 2004.
4. R. Nelson, "Flight Stability and Automatic Control", McGraw Hill Education, 2017.

Reference:

1. M. V. Cook, "Flight Dynamics Principles: A Linear Systems Approach to Aircraft Stability and Control", Wiley, 1997.
2. J. Roskam, "Airplane Flight Dynamics and Automatic Flight Controls", Roskam Aviation and Engineering Corporation, 2001.
3. B. Etkin, L. D. Reid, "Dynamics of Flight: Stability and Control", 3rd Edition, Wiley, 1995.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

A: Attendance, CT: Class Test, S/V/Q: Seminar/Viva/Quiz, HA: Home Assignment, EE: End Semester Examination

CO, PO, PSO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	2	-	-	-	-	-	-	-	-	-	-	-	1	-	-
CO2	1	2	-	-	-	-	-	-	-	-	-	-	-	1	-	-
CO3	1	2	-	-	-	-	-	-	-	-	-	-	-	1	-	-
CO4	1	2	-	-	-	-	-	-	-	-	-	-	-	1	-	-
CO5	1	2	-	-	-	-	-	-	-	-	-	-	-	1	-	-

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ASE2612	Computational Fluid Dynamics Lab	L	T	P	C
Version 2019-1	Date of Approval: May 2019	0	0	2	1
Pre-requisites/ Exposure	Fluid Mechanics and Dynamics, Low Speed Aerodynamics, CAD				
Co-requisites	Computational Fluid Dynamics				

Course Description

The objective of this course is to provide knowledge and understanding to the students about the modeling, meshing and simulation of flow over aircraft and its components. Knowledge of Fluid Mechanics and Dynamics, Low Speed Aerodynamics, Computer Aided drafting is necessary to comprehend the contents of this course. This course equips the students with various approaches and tools of modeling and grid generations, also a brief knowledge is provided to the students about the numerical methods to solve numerous problems related to aerospace and mechanical systems.

Course Objectives

The objective of this course is to

1. Provide experience in computing aerodynamic problems and understanding flow physics over flat plate, pipe, cylinder, over a wedge and flow over an airfoil.
2. Provide knowledge to estimate flow characteristics with different Mach numbers to determining the pressure coefficients over different structural objects.

Course Outcomes

On completion of this course, the students will be able to

- CO5.** Describe and apply the engineering fundamentals and principles to model flat plate, pipe, cylinder, wedge, Nozzle, airfoil and wing in ANSYS Workbench/ AutoCAD.
- CO6.** Describe and apply the engineering fundamentals and principles to generate different types of grids with varying qualities, arrangement of nodes and topology.
- CO7.** Describe and apply the engineering fundamentals and principles to simulate the flow with varying parameters over the object with different numerical methods.
- CO8.** Compare and analyze the results of flow simulation to achieve an optimum design of the structure.

Course Content

Modules	Blooms level*	Number of hours
Experiment 1: Introduction to ANSYS	L1, L2,	1
Experiment 2: To simulate and analyze the flow over a flat plate	L1, L2, L3, L4	1
Experiment 3: To simulate and analyze the flow through a pipe	L1, L2, L3, L4	1
Experiment 4: To simulate and analyze the flow over a circular cylinder	L1, L2, L3, L4	1
Experiment 5: To simulate and analyze the flow over a wedge	L1, L2, L3, L4	1
Experiment 6: To simulate and analyze the subsonic flow through a nozzle	L1, L2, L3, L4	1
Experiment 7: To simulate and analyze the supersonic flow through a nozzle	L1, L2, L3, L4	1
Experiment 8: To simulate and analyze the flow over a symmetric aerofoil	L1, L2, L3, L4	1
Experiment 9:	L1, L2,	2

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To simulate and analyze the flow over a cambered aerofoil	L3, L4	
Experiment 10: To simulate and analyze the flow over a wing structure	L1, L2, L3, L4	2

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation*

Text & Reference Books:

Text:

- C. A. Fletcher, "Computational Techniques for Fluid Dynamics", 2nd Edition, Springer, 2002.
- J. D. Anderson, "Computational Fluid Dynamics", McGraw Hill, 2013.
- ANSYS, Inc., ANSYS Fluent Tutorial Guide, 2018.
- ANSYS, Inc., ANSYS Theory Reference, 11th Edition, 1999.
- ANSYS, Inc., ANSYS Workbench, 2005.

Reference:

- C. Hirsch, "Numerical Computation of Internal and External Flows", 1st Edition, Elsevier, 2007.
- T. K. Sengupta, "Fundamentals of CFD", Universities Press, 2004.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

IA: Internal Assessment, EE: External Exam, PR: Performance, LR: Lab Record, V: Viva.


CO, PO and PSO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	2	2	-	-	-	-	-	3	2	-	3	1	1	2	3
CO2	1	2	2	-	-	-	-	-	3	2	-	3	1	1	2	3
CO3	1	2	2	-	-	-	-	-	3	2	-	3	1	1	2	3
CO4	1	2	2	-	-	-	-	-	3	2	-	3	1	1	2	3

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ASE2615	Aeromodelling Lab	L	T	P	C
Version 2019-1	Date of Approval: May 2019	0	0	2	1
Pre-requisites/ Exposure	Introduction to Aerospace Engineering, Low Speed Aerodynamics, Aircraft Propulsion				
Co-requisites					

Course Description

The objective of this course is to provide practical knowledge and understanding to the students about the design and fabrication of models and prototypes of aircraft. Knowledge of Introduction to Aerospace Engineering, Low Speed Aerodynamics, Aircraft Propulsion, and Aircraft Structures is necessary to comprehend the contents of this course. This course equips the students with necessary knowledge to understand the construction and operation of model and prototype flight vehicles.

Course Objectives

The objective of this course is to

- Provide practical knowledge to the students about the design of model and prototypes of flight vehicles.
- Provide practical knowledge to the students about the fabrication and operation of model and prototypes of flight vehicles.

Course Outcomes

On completion of this course, the students will be able to

- CO1.** Explain and apply the engineering fundamentals and principles to design and create various types airfoils and wing planforms using basic construction materials.
- CO2.** Explain and apply the engineering fundamentals and principles to design and create unpowered and powered gliders using basic construction materials.
- CO3.** Explain and apply the engineering fundamentals and principles to design and create radio-controlled flight vehicles.

Course Content

Modules	Blooms level*	Number of hours
Experiment 1: To design and fabricate various types of airfoils using basic raw materials (Thermocol, Balsa wood, Cardboard, etc.).	L2, L3, L5	2
Experiment 2: To design and fabricate various types of wing planforms using basic raw materials (Thermocol, Balsa wood, Cardboard, etc.).	L2, L3, L5	2
Experiment 3: To perform design calculations and fabrication of an unpowered glider aircraft.	L2, L3, L5	2
Experiment 4: To perform design calculations and fabrication of a powered glider aircraft.	L2, L3, L5	2
Experiment 5: To perform design calculations of a small-scale, radio-controlled, fixed-wing flight vehicle.	L2, L3, L5	2
Experiment 6: To fabricate and test a small-scale, radio-controlled, fixed-wing flight vehicle.	L2, L3, L5	2

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**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation*

Text & Reference Books:

Text:

- J. D. Anderson, "Fundamentals of Flight", McGraw Hill, 2000.
- V. Smeed, "The Basics of Aeromodelling", Nexus Special Interests, 1995.
- R. H. Warring, "Basic Aeromodelling", Special Interest Model Books, 1976.

Reference:

1. R. Randolph, "R/C Airplane Building Techniques", Air Age Publications, 1991.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

IA: Internal Assessment, EE: External Exam, PR: Performance, LR: Lab Record, V: Viva.

CO, PO and PSO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	2	2	-	-	-	-	-	2	2	3	3	1	1	1	2
CO2	1	2	2	-	-	-	-	-	2	2	3	3	1	1	1	2
CO3	1	2	2	-	-	-	-	-	2	2	3	3	1	1	1	2

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ASE2637	Minor Project	L	T	P	C
Version 2019-1	Date of Approval: May 2019	2	0	0	2
Pre-requisites/ Exposure					
Co-requisites					

Course Catalog

The minor project provides the student with an opportunity to apply knowledge and skills learned in the classroom in carrying out a project. The minor project is an in-house training on real-time project or on latest software. The experience and skills that come with carrying out minor project build a foundation and aptitude in students to conduct meaningful research towards a practical outcome. The minor project aims to impart necessary training to the students that is a value addition for their employability.

Course Objectives

The objective of this course is to

1. Provide practical training on small-scale projects that will increase the capability of the students to work individually or in teams on actual problems in industry.
2. Provide students with capabilities to design systems, analyze results, write technical reports and engage in life-long learning practices.

Course Outcomes

On completion of this course, the students will be able to

- CO1.** Relate and apply the acquired classroom knowledge with technical and real-time environment.
- CO2.** Relate and demonstrate capabilities to create and review technological solutions to complex engineering problems of relevant domains.
- CO3.** Apply the acquired knowledge to demonstrate the skills to create and compile technical reports pertaining to a given project.
- CO4.** Demonstrate the skills to work ethically and professionally in a team and engage in life-long learning.

Course Content

Guidelines

In order to achieve the objectives:

- Each student will be allotted a supervisor for proper guidance.
- Student will first submit details of company, external guide, project title to coordinator/supervisor as per given schedule.
- For internal assessment purpose, students will submit an industry feedback and a progress report.
- Student will maintain a file (Internship File/Project Report) which he/she will submit after completion of internship. Further, coordinator will provide Non-Teaching Credit Course project guidelines and sample to help in preparation of file. The Internship File aims to encourage students to keep a personal record of their learning and achievement throughout the Programme. It can be used as the basis for lifelong learning and for job applications. Items can be drawn from activities completed in the course modules and from the workplace to demonstrate learning and personal development. The file will assess the student's analytical skills and ability to present supportive evidence, whilst demonstrating understanding of their organization, its needs and their own personal contribution to the organization.

The **layout guidelines** for the Project Report

1. File should be in the following specification

- A4 size paper
- Spiral Binding
- **Font**

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For normal text Font Type and Size must be- Times New Roman, 12 pt. The minimum font size of materials within a table or a figure can be 10 point.

- **Margins**

A margin of 3.75 cm (1½ inch) is to be given on the binding edge while on the other sides it is to be 2.5 cm (1 inch). The text of the report, including headings, figures, tables, and notes, but excluding page numbers, must be accommodated within the page area.

- **Line Spacing**

The line spacing in the main text must be between one-and-a-half (1.5). Single line spacing should be given for figure captions, table titles, figure legends, and footnotes. Equations, tables, figures, and quotations should be set off from the main text with adequate space (not less than the normal line spacing adopted for the main text). Two consecutive paragraphs should be separated by a spacing which must be larger than the line spacing adopted for the text.

- **Tables and Figures**

Each sketch, drawing, graph and photograph should have a figure number and title below the figure etc. Numbering should be sequential, chapter wise. For instance, if there are 24 figures chapter 3 spread over all of its sections the figure numbers run from Figure 3.1 through Figure 3.24. In figures experimental data should typically be represented by centered symbols, and theoretical data by continuous curves.

Each table should have a table number and caption above the table. Numbering should be sequential, chapter wise, as in the case of Figure numbers. For instance, if there are 18 tables in chapter 3 the table numbers run from Figure 3.1 through Figure 3.18.

Make sure that figures and tables are complete in other respects such as legends, references (if any) and coordinate labels with units. Each figure and table must be explicitly referred to in the text and located where its first reference occurs, preferably after the reference.

- **Drawings**

All engineering drawings must conform to relevant Standards and should include a title block. If drawings are large they should be included at the back of the report in a separate pocket. In case drawings are made using CAD packages, a CD ROM should be included which contains all the files and details of the packages used.

- **Equations**

The numbering of equations should be sequential, chapter wise. Numbered equations must be explicitly referred to in the text.

2. Report Size: The maximum number of pages of the Report should be preferably between 40-70 pages.

3. Report Layout: The report should contain the following components

- Front Page
- Declaration
- Student Certificate (University)
- Certificate(Company)
- Acknowledgement
- Abstract
- Contents
- List of Figures
- List of Tables
- Company Profile (optional)
- Chapters
- Appendices(optional)
- References / Bibliography

The above components are described below:

- **Title Page** - Format will be given by coordinator/supervisor.

- **Declaration by the Students** - This is page number (i), the beginning of the small case Roman numeral page numbers. The student has to give a declaration to the effect that the data used for the work, the work depicted in the report, and the written material contained in the report are not copied from others and that due permission has been taken from, and due credit has been given to, the sources whenever they are used.
- **Certificate** - This is page number (ii). It is given by the Institute. The certificate will be signed by the Faculty Supervisor(s) before the viva-voce after verifying the format and by the Head of the Department after review with the Supervisor(s).
- **Company Certificate** - This is a certificate, which the company gives to the students.
- **Contents** - This is page number (iii). The table of Contents should be titled just *Contents* (not Table of Contents). Try to fit it into one or two pages.
- **Acknowledgement** - This is page number (iv). Keep this brief and avoid using informal language. This page must be signed by the candidate.
- **Abstract and Keywords** - This is page number (v). The abstract (preferably one page) should contain the context/relevance of the problem at hand, a description of what was done and a gist of the significant observations/results.
- The keywords (maximum 6) are a hint that what is contained in the report.
- **Company Profile** - A Company Profile corresponds to a file with company-specific data. Company data can be stored there and included in a booking when needed.
- **Chapters** - Introduction, Literature Review/Background Study etc. as given by coordinator/supervisor.
- **References / Bibliography** - This should include papers and books referred to in the body of the report. These should be ordered alphabetically on the author's surname. The titles of journals preferably should not be abbreviated; if they are, abbreviations must comply with an internationally recognised system.

Modes of Evaluation: Viva/Progress Report/Presentation/Final Report

Continuous Internal Assessment	Final Assessment
50 Marks	50 Marks

Examination Scheme

Examination Scheme													
Internal and Final Assessment (50)													
S. No.	Name of the Student	Project Title	Guide	Co - guide	Well defined problem, objectives and methodology (5)	Individual Contribution by the student to the project work (5)	Subject Knowledge / skill related to project work (10)	Presentation skills (5)	The sis Report (7)	Presentation (6)	Execution (6)	Vi va Voce (6)	Total (50)

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CO, PO, PSO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	2	2	-	-	-	-	-	-	-	-	-	1	1	-	-
CO2	2	2	-	1	3	-	-	-	-	-	-	-	1	1	1	-
CO3	-	-	-	2	-	-	-	-	-	1	-	-	-	-	-	1
CO4	-	-	-	-	-	-	-	1	1	-	1	1	-	-	-	1

1: strongly related, 2: moderately related and 3: weakly related



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ASE2618	Finite Element Method	L	T	P	C
Version 2019-1	Date of Approval: May 2019	2	0	0	2
Pre-requisites/ Exposure	Engineering Thermodynamics, Aircraft Propulsion				
Co-requisites					

Course Catalog

This course provides basic knowledge and understanding of various kinds of aircraft maintenances and their importance based on various aspects. This course provides introductory knowledge to the students about testing of various components as well as the fabrication of FRPs that serve as a foundation for better understanding of advanced course.

Course Objectives

The objective of this course is to

1. Provide knowledge of various concepts of Mathematical Modeling of Engineering Problems.
2. Provide knowledge about the basics of the Finite Element Technique, a numerical tool for the solution of different classes of problems in solid mechanics.

Course Outcomes

On completion of this course, the students will be able to

- CO1.** Identify and explain the basics of finite elements analysis.
- CO2.** Summarize and explain various types of techniques used in the formulation of finite elements methods.
- CO3.** List, identify and describe the different elemental properties along with their applications in the FEM of plates and shells.
- CO4.** List, explain and apply the gained knowledge in related FEM domains.

Course Content

Modules	Blooms level*	Number of hours
Module 1: Introduction to Finite Element Analysis Introduction; Basic Concepts of Finite Element Analysis; Introduction to Elasticity; Steps in Finite Element Analysis	L1, L2	4
Module 2: Finite Element Formulation Techniques Virtual Work and Variational Principle; Galerkin Method; Finite Element Method: Displacement Approach; Stiffness Matrix and Boundary Conditions	L1, L2	4
Module 3: Element Properties Natural Coordinates; Triangular Elements; Rectangular Elements; Lagrange and Serendipity Elements; Solid Elements; Isoparametric Formulation;	L1, L2	6
Module 4: FEM for Plates and Shells Introduction to Plate Bending Problems; Finite Element Analysis of Thin Plate ; Finite Element Analysis of Thick Plate; Finite Element Analysis of Skew Plate ;	L1, L2	6
Module 5: Additional Applications of FEM Finite Elements for Elastic Stability; Finite Elements in Fluid Mechanics; Dynamic Analysis	L1, L2, L3	4

*Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

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Text & Reference Books:*Text:*

1. J. N. Reddy, "An Introduction to the Finite Element Method", 3rd Edition, Tata McGraw-Hill, 2005.
2. P. Seshu, "Text Book of Finite Element Analysis", Prentice-Hall of India Pvt. Ltd., New Delhi, 2007.

References:

1. C. S. Krishnamoorthy, "Finite element analysis: theory and programming", Tata McGraw-Hill Education, 1994.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination**Examination Scheme:**

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

A: Attendance; CT: Class Test; S/V/Q: Seminar/Viva/Quiz; HA: Home Assignment; EE: End Semester Examination

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	-	-	-	-	-	-	-	-	-	-	-	1	2	-	-
CO2	1	2	-	-	-	-	-	-	-	-	-	-	1	2	-	-
CO3	1	2	-	3	-	-	-	-	-	-	-	-	1	2	-	-
CO4	1	-	-	-	-	-	-	-	-	-	-	-	1	2	-	-

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ASE2702	Flight Dynamics	L	T	P	C
Version 2019-1	Date of Approval: May 2019	3	0	0	3
Pre-requisites/ Exposure	Basic Mathematics, Low Speed Aerodynamics, Flight Mechanics,				
Co-requisites					

Course Catalog

This course contains Fundamental mathematical and dynamic principles for flight dynamics. The course also provides basic knowledge and understanding of use of general equations for unsteady motion of airplane, such as force equations, momentum equations and principle of rotation. It also provides basic knowledge of small disturbance theory for aircraft stability and control.

Course Objectives

The objective of this course is to

- Equip students to understand the complexities of airplane and rocket dynamics
- Equip the students about the degrees of freedom of flight trajectory and analysis of stability and control based on small disturbance theory and stability derivatives for airplane and rockets.

Course Outcomes

On completion of this course, the students will be able to

- CO10.** Define and explain particle and rigid body kinematics for different system of frames and use of co-ordinate transformation.
- CO11.** Define, explain and apply the equations of motion of aircraft and flight simulation of powered and unpowered flight.
- CO12.** Describe, apply and analyze small disturbance theory for stability and control.
- CO13.** Describe, apply and analyze Physical significance of stability derivatives and their use.

Course Content

Modules	Blooms level*	Number of hours
Module 1: Introduction Overview; Fundamental of Vectors; Fixed and Inertial frame of reference, Earth as a flat surface, Coriolis Effect, Longitudinal, Directional and Lateral forces and moments; Longitudinal, Directional and Lateral Stability.	L1, L2	6
Module 2: Transformation Coordinate Systems; Transformation from Cartesian to Cylindrical and Cylindrical to Spherical Coordinate Systems; Transformation Matrix about X, Y And Z Axis; Rotation Matrix about X, Y And Z Axis; Earth, Body, Wind and Stability Axis Systems and their Transformation.	L1, L2	6
Module 3: Aircraft Equations of Motion Force equations in moving frame, Moment equations in moving frame, Orientation and position of the airplane: Principle Rotation, Euler angles, Euler rates, Transformation matrix, External forces, Angular velocities equations in moving frame	L1, L2, L3	8
Module 4: Small Disturbance Theory Introduction; Assumptions, Linearized equations of aircraft motion: Control fixed longitudinal directional equations, control fixed lateral directional equations, Stability analysis of linearized equations of motion	L1, L3, L4	8
Module 5: Stability Derivatives Introduction, Expressions for C_x , and C_z . The α Derivatives:	L1, L3, L4	8

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$Cx_\alpha, Cz_\alpha, Cm_\alpha$. The u Derivatives: Cx_u, Cz_u, Cm_u . The q Derivatives: Cz_q, Cm_q . The $\dot{\alpha}$ Derivatives: $C_{L\dot{\alpha}}, C_{m\dot{\alpha}}$. The β Derivatives: $C_{y\beta}, C_{l\beta}, C_{n\beta}$. The p Derivatives: C_{yp}, C_{lp}, C_{np} . The r Derivatives: C_{yr}, C_{lr}, C_{nr}		
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*Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Text & Reference Books:

Text:

1. B. Etkin, "Dynamics of Flight" 3rd Edition, John Wiley & Sons, Inc., 2007.
2. J. L. Meriam, "Dynamics" John Wiley & Sons, Inc., 1987.
3. R. C. Nelson, "Flight Stability and Automatic Control", McGraw-Hill, 2002.

References:

1. A. E. Roy, "Foundation of Astrodynamics", Macmillan, US, 1997.
2. M. H. Kaplan, "Spacecraft Dynamics and Control", John Wiley & Sons, Inc., 2004.

Examination Scheme

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

A: Attendance, CT: Class Test, S/V/Q: Seminar/Viva/Quiz, HA: Home Assignment, EE: End Semester Examination

CO, PO, PSO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	1	-	-	-	-	-	-	-	-	-	-	1	-	-	-
CO2	1	1	-	-	-	-	-	-	-	-	-	-	1	-	-	-
CO3	1	1	3	-	-	-	-	-	-	-	-	-	1	-	-	-
CO4	1	1	3	-	-	-	-	-	-	-	-	-	1	-	-	-

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ASE2709	Aircraft Design	L	T	P	C
Version 2019-1	Date of Approval: May 2019	3	0	0	3
Pre-requisites/ Exposure	Basic Mathematics, Low Speed Aerodynamics, Flight Mechanics				
Co-requisites					

Course Catalog

This course provides basic knowledge and understanding of various aspects and processes of aircraft design. This course provides in-depth knowledge to the students about flow process of carrying out the designing of aircraft, its associated loads and the safety requirements. Based on this course, students will be able to investigate new and emerging design aspects

Course Objectives

The objective of this course is to

- Provide introductory knowledge to the students regarding the fundamentals of aircraft designing and its structural analysis
- Provide education to the students about the concepts of different structural members and various associated loads

Course Outcomes

On successful completion of this course, the students will be able to

- CO1.** List and describe the basics of aircraft system design and aircraft structures
- CO2.** Identify, explain and analyze the applicability of design aspects and different aircraft loads.
- CO3.** Identify and explain the design considerations of wings and high lift devices.
- CO4.** Identify, correlate and apply the numerical and theoretical knowledge to investigate new and emerging design aspects

Course Content

Modules	Blooms level*	Number of hours
Module 1: Introduction Aircraft design, requirements and specifications, Different design phases, Importance of each phase. Weight, its importance. Aerodynamic and structural design considerations. Classifications of airplane.	L1, L2	8
Module 2: Air Loads during Flight Ground Loads, Airframe loads, maneuvering loads in flight, Load factor, V-n diagram, gust loads, and estimation of gust loads.	L1, L2	6
Module 3: Wing Design Consideration Selection of airfoil and planform. Span wise air loads variation, BMD and SFD. Weight distribution.	L1, L2, L4	8
Module 4: High Lift Systems Airfoil's maximum lift coefficient, leading and trailing edge devices, effect of sweep back. Stall and the deep stall. Effect of Re, V/STOL configurations.	L1, L2	7
Module 5: Conceptual Design of Airplane & Layout Preparation of 3-views and layout. Estimation of take-off, landing, climbing and cruise performance. Flight envelope.	L1, L2, L3	7

*Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

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Text & Reference Books:*Text:*

1. D. P. Raymer, "Airplane Design-A Conceptual Approach", 3rd Edition, AIAA Education Series, 1999.
2. D. Stinton, "The Design of Airplane", 1st edition, Granada, UK, 2000.

References:

1. L. M. Nikolai, "Fundamentals of Aircraft Design", 2nd edition, Univ. of Dayton Ohio, 1975.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination**Examination Scheme:**

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

A: Attendance, CT: Class Test, S/V/Q: Seminar/Viva/Quiz, HA: Home Assignment, EE: End Semester Examination;

CO, PO and PSO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	-	1	-	2	-	-	-	-	-	-	-	3	1	-	-
CO2	1	-	1	-	2	-	-	-	-	-	-	-	3	1	-	-
CO3	1	-	2	-	2	-	-	-	-	-	-	-	3	1	-	-
CO4	1	2	2	-	2	-	-	-	-	-	-	-	3	1	-	-

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ASE2713	Vibration Engineering	L	T	P	C
Version 2019-1	Date of Approval: May 2019	3	0	0	3
Pre-requisites/ Exposure	Engineering Mechanics				
Co-requisites					

Course Catalog

This subject will cover the fundamental concepts on the vibration of mechanical systems of one degree freedom, Lagrange's equations of motion and multiple degree of freedom systems. This course includes introduction to matrix methods, influence coefficient, forced vibration, principle mode of vibration, Rayleigh method, measuring instruments, isolation, torsional systems and balancing of machine.

Course Objectives

The objective of this course is to

1. Provide adequate knowledge to analyse one-degree and multi-degree of freedom systems of vibrations using different methods.
2. Find out natural frequencies and amplitude responses of different systems.

Course Outcomes

On completion of this course, the students will be able to

- CO1:** Explain, determine and apply the equation of motions for free vibration under damped and undamped condition for one degree freedom system.
- CO2:** Explain, determine and apply the equation of motion for forced vibration due to excitation of support.
- CO3:** Determine and apply the equation of motion in reciprocating and rotary balancing of machine and explain the vibration isolation.
- CO4:** Explain, determine and apply the equation of motion for two degree of freedom system and explain vibration absorber
- CO5:** Derive and apply the principle mode of vibration by matrix iteration, influence coefficient and solve the problem free and forced vibration having multi degree of freedom systems.

Course Content

Modules	Blooms level*	Number of hours
Module 1: Scope of Vibration Important terminology and classification, Degrees of freedom, Harmonic motion, vectorial representation, complex number representation, addition, Derivation of equation of motion for one dimensional longitudinal, transverse and torsional vibrations without damping using Newton's second law, D' Alembert's principle and Principle of conservation of energy, Compound pendulum and centre of percussion, Damped vibrations of single degree of freedom systems, Viscous damping, underdamped, critically damped and overdamped systems, Logarithmic decrement, Vibration characteristics of Coulomb damped and Hysteretic damped systems.	L1, L2, L3	6
Module 2: Forced Vibrations of Single Degree of Freedom Systems Forced vibration with constant harmonic excitation, Steady state and transient parts, Frequency response curves and phase angle plot, Forced vibration due to excitation of support.	L1, L2, L3	8
Module 3: Vibration Isolation and Transmissibility Force transmissibility, Motion transmissibility, Forced vibration with rotating	L1, L2, L3	6

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and reciprocating unbalance, Materials used in vibration isolation.		
Module 4: System with Two Degrees of Freedom principle mode of vibration, Mode shapes, Undamped forced vibrations of two degrees of freedom system with harmonic excitation, Vibration Absorber, Undamped dynamic vibration absorber and centrifugal pendulum absorber	L1, L2, L3	8
Module 5: Multi-degree of Freedom Systems Undamped free vibrations, principal modes, and normal co-ordinates. Orthogonality of principal modes of vibrations. Semi-definitive systems. Systems with equal frequencies, influence coefficients, natural frequencies and principal modes by matrix iteration, damped free vibrations, forced vibrations, Rayleigh's, Dunkerley's, Stodola's and Holzer's methods. Vibrations of continuous systems, Transverse vibration of a string, longitudinal vibration of a bar, Torsional vibration of a shaft.	L1, L2, L3	8

*Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text & Reference Books

Text:

1. S. T. Francis, I. E. Morse, "Mechanical Vibrations", Prentice Hall of India, 1994.
2. H. A. Church, "Mechanical Vibrations", John Wiley and Sons, Reprint 199.
3. S. Timoshenko, "Vibration Problems in Engineering", Van Nostrand, 1961.

Reference:

1. S. G. Kelly, "Mechanical Vibrations", McGraw-Hill, New Delhi, 1960.
2. G. K. Grover, "Mechanical Vibrations", Nem Chand, New Delhi, 1977.
3. V. P. Singh, "Mechanical Vibrations", Dhanpat Rai Publications, 2002.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

PS O3	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS O1	PS O2	PS O3	PS O4
CO 1	1	2	-	-	-	-	-	-	-	-	-	-	1	1	-	-
CO 2	1	1	2	-	-	-	-	-	-	-	-	-	1	1	-	-
CO 3	1	2	3	-	-	-	-	-	-	-	-	-	1	1	-	-
CO 4	1	1	2	-	-	-	-	-	-	-	-	-	1	1	-	-
CO 5	1	1	2	--	--	--	--	--	--	--	--	--	--	1	3	

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ASE2714	Vibration Engineering Lab	L	T	P	C
Version 2019-1	Date of Approval: May 2019	0	0	2	1
Pre-requisites/ Exposure	Engineering Mechanics				
Co-requisites	Vibrations Engineering				

Course Catalog

The vibration engineering lab will cover the fundamental concepts on the vibration of mechanical systems of free vibration of simple and compound pendulum and Torsional vibration of rotor. An Interpretation of results is to find out the natural frequency of different mechanical systems.

Course Objectives

The objective of this course is to

1. Provide adequate knowledge to analyses one-degree and multi-degree of freedom systems of vibrations using different methods.
2. Find out natural frequencies and amplitude responses of different systems.

Course outcomes

On completion of this course, the students will be able to

- CO1:** Explain and apply the natural frequency of simple pendulum, compound pendulum and bifilar suspension.
- CO2:** Explain and apply the equation of motion of torsional vibration and determine the damping coefficient of free vibration.
- CO3:** Explain and apply the equation of motion of longitudinal vibration and determine the natural frequency of spring mass system.
- CO4:** Explain and apply the Dunkerley's rule and determine the natural frequency of beam.
- CO5:** Determine and apply the principle mode of vibration of shaft with different end conditions.

Course Content

Experiment	Blooms level*	Number of hours
1. To verify the relation $T = 2\pi \sqrt{\frac{L}{g}}$ for a simple pendulum.	L2, L3	1
2. To determine the radius of gyration 'k' of compound pendulum and verify the relation $T = 2\pi \sqrt{\frac{k^2 + og^2}{g(og)}}$	L2, L3	1
3. To determine the radius of gyration of bar using Bi-filar suspension.	L2, L3	1
4. To study the torsional vibration (undamped) of single rotor shaft system	L2, L3	1
5. To study the damped torsional oscillations and determine the damping coefficient	L2, L3	1
6. To study the longitudinal vibration of spring and to determine the frequency theoretically and actually by experiment	L2, L3	1
7. To study the undamped free vibration of equivalent spring mass system.	L2, L3	1
8. To verify the Dunkerley's rule on simply supported beam and compare it with actually by experiment.	L2, L3	1
9. To study the forced lateral vibration of the beam for different damping	L2, L3	1
10. To determine experimentally the whirling speed of shaft for a given system.	L2, L3	1
11. Harmonic excitation of cantilever beam using electro-dynamics shaker	L2, L3	2

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and determination of resonant frequencies		
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**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation*

Text & Reference Books

Text:

1. S. T. Francis, I. E. Morse, "Mechanical Vibrations", Prentice Hall of India, 1994.
2. H. A. Church, "Mechanical Vibrations", John Wiley and Sons, Reprint 199.
3. S. Timoshenko, "Vibration Problems in Engineering", Van Nostrand, 1961.

Reference:

1. S. G. Kelly, "Mechanical Vibrations", McGraw-Hill, New Delhi, 1960.
2. G. K. Grover, "Mechanical Vibrations", Nem Chand, New Delhi, 1977.
3. V. P. Singh, "Mechanical Vibrations", Dhanpat Rai Publications, 2002.

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.


CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	1	-	2	--	--	--	--	3	1	--	1	1	1	3	1
CO2	1	1	-	2	--	--	--	--	3	1	--	1	1	1	3	1
CO3	1	1	-	2	--	--	--	--	3	1	--	1	1	1	3	1
CO4	1	1	-	2	--	--	--	--	3	1	--	1	1	1	3	1
CO5	1	1	-	2	--	--	--	--	3	1	--	1	1	1	3	1

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ASE2735	Summer Internship Evaluation-II	L	T	P	C
Version 2019-1	Date of Approval: May 2019	3	0	0	3
Pre-requisites/ Exposure					
Co-requisites					

Course Catalog

The internship experience provides the student with an opportunity to explore career interests while applying knowledge and skills learned in the classroom in a work setting. The training may undergo in an industrial environment or may be an in-house training on some latest software which is in high demand in market. The experience also helps students gain a clearer sense of what they still need to learn and provides an opportunity to build professional networks. The intern develops a greater understanding about career options while more clearly defining personal career goals. Hence, the training will be useful for their future employment in industry. Entire effort in internship is in terms of extending the program of education and evaluation beyond the classroom of a university.

Course Objectives

The objective of this course is to

1. Provide practical training on some demo or live projects that will increase the capability of the students to work in a team on actual problems in industry.
2. Provide students with capabilities to design systems, analyze results, write technical reports and engage in life-long learning practices.

Course Outcomes

On completion of this course, the students will be able to

- CO1. Relate and apply the acquired classroom knowledge with technical, real-time industry environment.
- CO2. Relate and demonstrate capabilities to create and review technological solutions to complex engineering problems of relevant domains.
- CO3. Apply the acquired knowledge to demonstrate the skills to create and compile technical reports pertaining to a given project.
- CO4. Demonstrate the skills to work ethically and professionally in a team and engage in life-long learning.

Course Content

Guidelines

In order to achieve the objectives:

- Each student will be allotted a supervisor for proper guidance.
- Student will first submit details of company, external guide, project title to coordinator/supervisor as per given schedule.
- For internal assessment purpose, students will submit an industry feedback and a progress report.
- Student will maintain a file (Internship File/Project Report) which he/she will submit after completion of internship. Further, coordinator will provide Non-Teaching Credit Course project guidelines and sample to help in preparation of file. The Internship File aims to encourage students to keep a personal record of their learning and achievement throughout the Programme. It can be used as the basis for lifelong learning and for job applications. Items can be drawn from activities completed in the course modules and from the workplace to demonstrate learning and personal development. The file will assess the student's analytical skills and ability to present supportive evidence, whilst demonstrating understanding of their organization, its needs and their own personal contribution to the organization.

The layout guidelines for the Project Report

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1. File should be in the following specification

- A4 size paper
- Spiral Binding

• Font

For normal text Font Type and Size must be- Times New Roman, 12 pt. The minimum font size of materials within a table or a figure can be 10 point.

• Margins

A margin of 3.75 cm (1½ inch) is to be given on the binding edge while on the other sides it is to be 2.5 cm (1 inch). The text of the report, including headings, figures, tables, and notes, but excluding page numbers, must be accommodated within the page area.

• Line Spacing

The line spacing in the main text must be between one-and-a-half (1.5). Single line spacing should be given for figure captions, table titles, figure legends, and footnotes. Equations, tables, figures, and quotations should be set off from the main text with adequate space (not less than the normal line spacing adopted for the main text). Two consecutive paragraphs should be separated by a spacing which must be larger than the line spacing adopted for the text.

• Tables and Figures

Each sketch, drawing, graph and photograph should have a figure number and title below the figure etc. Numbering should be sequential, chapter wise. For instance, if there are 24 figures chapter 3 spread over all of its sections the figure numbers run from Figure 3.1 through Figure 3.24. In figures experimental data should typically be represented by centered symbols, and theoretical data by continuous curves.

Each table should have a table number and caption above the table. Numbering should be sequential, chapter wise, as in the case of Figure numbers. For instance, if there are 18 tables in chapter 3 the table numbers run from Figure 3.1 through Figure 3.18.

Make sure that figures and tables are complete in other respects such as legends, references (if any) and coordinate labels with units. Each figure and table must be explicitly referred to in the text and located where its first reference occurs, preferably after the reference.

• Drawings

All engineering drawings must conform to relevant Standards and should include a title block. If drawings are large they should be included at the back of the report in a separate pocket. In case drawings are made using CAD packages, a CD ROM should be included which contains all the files and details of the packages used.

• Equations

The numbering of equations should be sequential, chapter wise. Numbered equations must be explicitly referred to in the text.

2. Report Size: The maximum number of pages of the Report should be preferably between 40-70 pages.

3. Report Layout: The report should contain the following components

- Front Page
- Declaration
- Student Certificate (University)
- Certificate(Company)
- Acknowledgement
- Abstract
- Contents
- List of Figures
- List of Tables
- Company Profile (optional)
- Chapters
- Appendices(optional)


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Registrar
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Manesar Gurgaon-122413

– References / Bibliography

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Modes of Evaluation: Viva/Progress Report/Presentation/Final Report

Continuous Internal Assessment	Final Assessment
50 Marks	50 Marks

Examination Scheme

Components	V	IF	R	PR	FP
Weightage (%)	20	20	20	20	20

V – Viva, IF – Industry Feedback, FP – Final Presentation, R – Report, PR – Progress Report

CO, PO, PSO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	2	2	-	-	-	-	-	-	-	-	-	1	1	-	-
CO2	2	2	-	1	3	-	-	-	-	-	-	-	1	1	1	-
CO3	-	-	-	2	-	-	-	-	-	1	-	-	-	-	-	1
CO4	-	-	-	-	-	-	-	1	1	-	1	1	-	-	-	1

1: strongly related, 2: moderately related and 3: weakly related

Anil

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ASE2737	Major Project	L	T	P	C
Version 2019-1	Date of Approval: May 2019	2	0	0	2
Pre-requisites/ Exposure					
Co-requisites					

Course Catalog

The major project provides the student with an opportunity to apply knowledge and skills learned in the classroom in carrying out a project. The major project is an in-house training on real-time project or on latest software. The experience and skills that come with carrying out major project build a foundation and aptitude in students to conduct meaningful research towards achieving practical and technological outcomes for a given engineering problem. The major project aims to impart necessary training to the students that is a value addition for their employability.

Course Objectives

The objective of this course is to

1. Provide practical training on projects that will increase the capability of the students to work individually or in teams on actual problems in industry.
2. Provide students with capabilities to design systems, analyze results, write technical reports and engage in life-long learning practices.

Course Outcomes

On completion of this course, the students will be able to

- CO1.** Relate and apply the acquired classroom knowledge with technical and real-time environment.
- CO2.** Relate and demonstrate capabilities to create and review technological solutions to complex engineering problems of relevant domains.
- CO3.** Apply the acquired knowledge to demonstrate the skills to create and compile technical reports pertaining to a given project.
- CO4.** Demonstrate the skills to work ethically and professionally in a team and engage in life-long learning.

Course Content

Guidelines

In order to achieve the objectives:

- Each student will be allotted a supervisor for proper guidance.
- Student will first submit details of company, external guide, project title to coordinator/supervisor as per given schedule.
- For internal assessment purpose, students will submit an industry feedback and a progress report.
- Student will maintain a file (Internship File/Project Report) which he/she will submit after completion of internship. Further, coordinator will provide Non-Teaching Credit Course project guidelines and sample to help in preparation of file. The Internship File aims to encourage students to keep a personal record of their learning and achievement throughout the Programme. It can be used as the basis for lifelong learning and for job applications. Items can be drawn from activities completed in the course modules and from the workplace to demonstrate learning and personal development. The file will assess the student's analytical skills and ability to present supportive evidence, whilst demonstrating understanding of their organization, its needs and their own personal contribution to the organization.

The **layout guidelines** for the Project Report

1. File should be in the following specification

- A4 size paper
- Spiral Binding

• Font

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For normal text Font Type and Size must be- Times New Roman, 12 pt. The minimum font size of materials within a table or a figure can be 10 point.

- **Margins**

A margin of 3.75 cm (1½ inch) is to be given on the binding edge while on the other sides it is to be 2.5 cm (1 inch). The text of the report, including headings, figures, tables, and notes, but excluding page numbers, must be accommodated within the page area.

- **Line Spacing**

The line spacing in the main text must be between one-and-a-half (1.5). Single line spacing should be given for figure captions, table titles, figure legends, and footnotes. Equations, tables, figures, and quotations should be set off from the main text with adequate space (not less than the normal line spacing adopted for the main text). Two consecutive paragraphs should be separated by a spacing which must be larger than the line spacing adopted for the text.

- **Tables and Figures**

Each sketch, drawing, graph and photograph should have a figure number and title below the figure etc. Numbering should be sequential, chapter wise. For instance, if there are 24 figures chapter 3 spread over all of its sections the figure numbers run from Figure 3.1 through Figure 3.24. In figures experimental data should typically be represented by centered symbols, and theoretical data by continuous curves.

Each table should have a table number and caption above the table. Numbering should be sequential, chapter wise, as in the case of Figure numbers. For instance, if there are 18 tables in chapter 3 the table numbers run from Figure 3.1 through Figure 3.18.

Make sure that figures and tables are complete in other respects such as legends, references (if any) and coordinate labels with units. Each figure and table must be explicitly referred to in the text and located where its first reference occurs, preferably after the reference.

- **Drawings**

All engineering drawings must conform to relevant Standards and should include a title block. If drawings are large they should be included at the back of the report in a separate pocket. In case drawings are made using CAD packages, a CD ROM should be included which contains all the files and details of the packages used.

- **Equations**

The numbering of equations should be sequential, chapter wise. Numbered equations must be explicitly referred to in the text.

2. Report Size: The maximum number of pages of the Report should be preferably between 40-70 pages.

3. Report Layout: The report should contain the following components

- Front Page
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- **References / Bibliography** - This should include papers and books referred to in the body of the report. These should be ordered alphabetically on the author's surname. The titles of journals preferably should not be abbreviated; if they are, abbreviations must comply with an internationally recognised system.

Modes of Evaluation: Viva/Progress Report/Presentation/Final Report

Continuous Internal Assessment	Final Assessment
50 Marks	50 Marks

Examination Scheme

Internal Examiner (50)													
S. No.	Name of the Student	Project Title	Guide	Co-guide	Well defined problem, objectives and methodology (5)	Individual Contribution by the student to the project work (5)	Subject Knowledge / skill related to project work (10)	Presentation skills (5)	Thesis Report (7)	Presentation (6)	Execution (6)	Viva Voce (6)	Total (50)

External Examiner (50)													
S. No.	Name of the Student	Project Title	Guide	Co-guide	Well defined problem, objectives and methodology (5)	Individual Contribution by the student to the project work (5)	Subject Knowledge / skill related to project work (10)	Presentation skills (5)	Thesis Report (7)	Presentation (6)	Execution (6)	Viva Voce (6)	Total (50)

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ASE2812	Aerospace Navigation, Guidance & Control	L	T	P	C
Version 2019-1	Date of Approval: May 2019	2	0	0	2
Pre-requisites/ Exposure	Introduction to Avionics				
Co-requisites					

Course Catalog

This course provides basic knowledge and understanding of science and principles governing the navigation and communication of aerospace vehicles. Knowledge of basic physics, natural laws, interplanetary flight and flight vehicles is crucial to comprehend the contents of this course. This course provides introductory knowledge to the students about the construction, components and operation of various systems and sub-systems used for navigation, guidance and communication of interplanetary flight vehicles.

Course Objectives

The objective of this course is to

1. Provide introductory knowledge to the students regarding the basic science and principles as applicable to navigation of interplanetary flight vehicles in atmosphere, space and around planetary bodies.
2. Provide education to the students about the various navigation, guidance and communication systems and subsystems of different types of spacecraft.

Course Outcomes

On completion of this course, the students will be able to

- CO1.** State, explain, and summarize the basic science and principles behind the operation of Radar.
- CO2.** State and explain the physical and natural laws as applicable to the navigation of flight vehicles in atmosphere and space.
- CO3.** List, explain, and categorize various systems and sub-systems used for navigation, guidance and control of interplanetary flight vehicles.
- CO4.** List, explain, and summarize the different Fly-by-wire avionics systems used in modern aircrafts.

Course Content

Modules	Blooms level*	Number of hours
Module 1: Introduction Concepts of Navigation, Guidance and Control, Introduction to Basic Principles, Air Data Information, Principle of Working of Radar, MTI and Pulsed Doppler Radar, Moving Target Detector, Limitation of MTI Performance.	L1, L2	6
Module 2: Navigation on Earth's Surface Basic Principle of Navigation; Position Fixing; Global Positioning System; Geodetics and Basic Reference Frames; Simplified Aerospace Vehicle Equation; Fundamental of Navigation Equation; International Satellite navigation system.	L1, L2	6
Module 3: Guidance of Aerospace Vehicles Introduction; Classification; Description; Guidance Phases During Flight; Categories of Homing and Command Guidance, Kinematic Equations, Missile Guidance Laws; Classification of Guidance Laws; Classical Guidance Laws; Modern Guidance Laws	L1, L2	6
Module 4: Control Systems Basic Definitions; Open Loop and Closed Loop Systems; Input-Output	L1, L2	6

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Description; Performance Criteria; Feedback Control; Root Locus; Evan's Form; Steps to Obtain Root Locus; Root Locus Example.		
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**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation*

Text & Reference Books:

Text:

1. P. T. Kabamba, A. R. Girard, "Fundamentals of Aerospace Navigation and Guidance", Cambridge Aerospace Series, 2014
2. J. H. Blakelock, "Automatic control of Aircraft & Missiles", 2nd Edition, Wiley Interscience Publication, 1990.

Reference:

1. R. B. Underdown, Tony Palmer, "Navigation", Black Well Publishing, 2001.
2. M. I. Skolnik, "Introduction to Radar Systems", 3rd Edition, Tata McGraw Hill, 2001.
3. G. M. Siouris, "Missile Guidance and Control Systems", Springer, 2004.
4. M. Kayton, W. Fried, "Avionics Navigation System", Wiley Interscience Publication, 1997.
5. P. Zarchan, "Tactical and Strategic Missile Guidance", AIAA, 2007.
6. N. S. Nise, "Control Systems Engineering", Wiley-India, 2004.
7. B. Friedland, "Control System Design", Dover Publication, 2005.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

A: Attendance, CT: Class Test, S/V/Q: Seminar/Viva/Quiz, HA: Home Assignment, EE: End Semester Examination

CO, PO, PSO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	2	-	-	-	-	-	-	-	-	-	-	-	1	3	-
CO2	1	2	-	-	-	-	-	-	-	-	-	-	-	1	3	-
CO3	1	2	-	-	-	-	-	-	-	-	-	-	-	1	3	-
CO4	1	2	-	-	-	-	-	-	-	-	-	-	-	1	3	-

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ASE2837	Project-Dissertation	L	T	P	C
Version 2019-1	Date of Approval: May 2019	2	0	0	2
Pre-requisites/ Exposure					
Co-requisites					

Course Catalog

The project-dissertation provides the student with an opportunity to apply knowledge and skills learned in the classroom in carrying out a project. The project-dissertation is an in-house training on real-time project or on latest software. The experience and skills that come with carrying out project-dissertation build a foundation and aptitude in students to conduct meaningful research towards achieving practical and technological outcomes for a given engineering problem. The project-dissertation aims to impart necessary training to the students that is a value addition for their employability.

Course Objectives

The objective of this course is to

1. Provide practical training on projects that will increase the capability of the students to work individually or in teams on actual problems in industry.
2. Provide students with capabilities to design systems, analyze results, write technical reports and engage in life-long learning practices.

Course Outcomes

On completion of this course, the students will be able to

- CO1.** Relate and apply the acquired classroom knowledge with technical and real-time environment.
- CO2.** Relate and demonstrate capabilities to create and review technological solutions to complex engineering problems of relevant domains.
- CO3.** Apply the acquired knowledge to demonstrate the skills to create and compile technical reports pertaining to a given project.
- CO4.** Demonstrate the skills to work ethically and professionally in a team and engage in life-long learning.

Course Content

Guidelines

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The **layout guidelines** for the Project Report

1, File should be in the following specification

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The numbering of equations should be sequential, chapter wise. Numbered equations must be explicitly referred to in the text.

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Modes of Evaluation: Viva/Progress Report/Presentation/Final Report

Continuous Internal Assessment	Final Assessment
50 Marks	50 Marks



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Examination Scheme

Internal Examiner (50)													
S. No.	Name of the Student	Project Title	Guide	Co-guide	Well defined problem, objectives and methodology (5)	Individual Contribution by the student to the project work (5)	Subject Knowledge / skill related to project work (10)	Presentation skills (5)	Thesis Report (7)	Presentation (6)	Execution (6)	Viva Voce (6)	Total (50)

External Examiner (50)													
S. No.	Name of the Student	Project Title	Guide	Co-guide	Well defined problem, objectives and methodology (5)	Individual Contribution by the student to the project work (5)	Subject Knowledge / skill related to project work (10)	Presentation skills (5)	Thesis Report (7)	Presentation (6)	Execution (6)	Viva Voce (6)	Total (50)

CO, PO, PSO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
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CO3	-	-	-	2	-	-	-	-	-	1	-	-	-	-	-	1
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ASE2813	Aeroelasticity	L	T	P	C
Version 2019-1	Date of Approval: May 2019	2	0	0	2
Pre-requisites/ Exposure	High Speed Aerodynamics				
Co-requisites					

Course Catalog

This course provides basic knowledge and understanding of aeroelastic phenomenon. The courses on educating students about different aeroelastic phenomenon related to aircraft and their effect on aircraft performance. This also provides mathematical strategies to solve aeroelastic problems. Knowledge of basic strength of materials and aerodynamics is crucial to comprehend the content this course. This course serves as a prerequisite for designing of engine components.

Course Objectives

The objective of this course is to

1. Provide students knowledge about the Elastic behavior of the different parts of aircraft under loads.
2. Educate the students about the theories and laws governing the aero elasticity.
3. Provide solution of elastic phenomenon for arbitrary shaped oscillatory objects.

Course Outcomes

On completion of this course, the students will be able to

- CO1.** Define, explain and apply about the elastic behavior of the different parts of aircraft under loads
- CO2.** Define, explain, apply and distinguishes between static and dynamic aero elastic phenomenon.
- CO3.** Define, explain, and apply phenomena of divergence of 2D wing sections and cantilever wind and their solutions in generalized co-ordinates.
- CO4.** Define and explain reversal of aileron and its consequences on longitudinal stability.

Course Content

Modules	Blooms level*	Number of hours
Module 1: Introduction Definition and historical background, Static and dynamic aeroelasticity phenomenon, integration of aerodynamic, elastic and inertia forces, Influence of aeroelasticity phenomenon on aircraft design	L1, L2, L3	5
Module 2: Divergence of Lifting Surface Phenomenon of divergence, Divergence of 2-D wing section, Divergence of an idealized cantilever wing, Solution to generalized co-ordinates, Method of successive approximation	L1, L2, L3	5
Module 3: Steady State Aeroelasticity Problems in General Loss and reversal of aileron control: 2D case, Aileron reversal general case, Lift distribution on a rigid and elastic wing, Effect on static longitudinal stability of aircraft	L1, L2, L3	4
Module 4: Introduction to Flutter and Buffeting Phenomenon of flutter, Flutter of a cantilever wing, Approximate determination of critical speed by Galerkin's Method, Buffeting and stall flutter	L1, L2, L3	5
Module 5: Non - Aeroelastic Problems Flow around an oscillating circular cylinder, Applications to H-shaped sections, Prevention of aero-elastic instabilities	L1, L2	5

*Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

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Text & Reference Books:*Text:*

1. Y. C. Fung, "An Introduction to Theory of Aeroelasticity", Dover Publication, 1st Ed., 1967.
2. R. L. Bisplinghoff, H. Ashley and R. L. Halfman, "Aeroelasticity", Addison-Wesley Publishing Company, Reading Mass, 1st Ed 1963.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination**Examination Scheme**

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

A: Attendance, CT: Class Test, S/V/Q: Seminar/Viva/Quiz, HA: Home Assignment, EE: End Semester Examination

CO, PO, PSO Mapping

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CO3	1	1	3	-	-	-	-	-	-	-	-	-	1	-	-	-
CO4	1	1	3	-	-	-	-	-	-	-	-	-	1	-	-	-

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Amity University Haryana
Manesar Gurgaon-122413

ASE2814	Aerospace Industrial Management	L	T	P	C
Version 2019-1	Date of Approval: May 2019	2	0	0	2
Pre-requisites/ Exposure	Introduction to Aerospace Engineering				
Co-requisites					

Course Catalog

This course provides basic knowledge and understanding of the management practices of airlines, airports and businesses related to the aerospace industry. This course is aimed to equip the students with necessary information and knowledge about the various aspects related to the design, maintenance, and production management practices of aerospace industries.

Course Objectives

The objective of this course is to

1. Provide introductory knowledge to the students regarding the management practices of aerospace industries for the maintenance and design of flight vehicles.
2. Provide education to the students about the production, safety and quality management practices followed in aerospace industries.

Course Outcomes

On completion of this course, the students will be able to

- CO1.** Identify, describe, and compare amongst the various management practices and principles followed by aerospace industries for maintenance of flight vehicles.
- CO2.** Identify, describe, and compare amongst the various management practices and principles followed by aerospace industries for product design.
- CO3.** Identify, describe, and compare amongst the various management practices and principles followed by aerospace industries for preferred production processes.
- CO4.** Identify, describe, and compare amongst the various management practices and principles followed by aerospace industries regarding the safety and outcome quality of carried out processes.

Course Content

Modules	Blooms level*	Number of hours
Module 1: Maintenance Management Maintenance Programme – Necessity, Structure, Content, Life Cycle Monitoring, Status Reporting; Reliability Managements; Aircraft Maintenance – Scheduled, Unscheduled, Line and Base Maintenance; Setup of Maintenance Organization; Planning and Controlling; Engine and Propeller Maintenance.	L1, L2, L4	6
Module 2: Design Management Basic Design Organization Requirements; Essential Design Organizational Structure; Specifications of Design Project; Design Classifications; Management Basics of Major Design Projects; Minor Design Changes; Component Development.	L1, L2, L4	6
Module 3: Production Management Production and Maintenance Planning; Technical, Organizational and Personnel Requirements; Infrastructure, Work Environment and Equipment; Selection and Monitoring of Supplies; Material Control and Handling	L1, L2, L4	6
Module 4: Quality and Safety Management Quality Management Systems – Basics, Purpose, Objectives and Documentation; Safety/ Risk Management Systems – Basics, Organizational Framework, Safety/	L1, L2, L4	6

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Risk Monitoring, Promoting Safety Expertise and Culture; Auditing – Internal and External.		
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**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation*

Text & Reference Books:

Text:

1. M. Hinsch, "Industrial Aviation Management" Springer, 2018.
2. P. Malaval, C. Bénaroya, J. Aflalo, "Aerospace Marketing Management: A Handbook for the Entire Value Chain (Management for Professionals)", Springer, 2016.

Reference:

1. H. Geraint, "Management in the Airline Industry", Routledge, 2007.
2. S. Eriksson, H. Steenhuis, "The Global Commercial Aviation Industry", Routledge, 2015.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

A: Attendance, CT: Class Test, S/V/Q: Seminar/Viva/Quiz, HA: Home Assignment, EE: End Semester Examination

CO, PO, PSO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	-	-	-	-	3	2	-	-	-	-	1	-	-	-	1	3
CO2	-	-	-	-	3	2	-	-	-	-	1	-	-	-	1	3
CO3	-	-	-	-	3	2	-	-	-	-	1	-	-	-	1	3
CO4	-	-	-	-	3	1	-	-	-	-	1	-	-	-	1	3

1: strongly related, 2: moderately related and 3: weakly related



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**Bachelor of Technology - Computer Science
Engineering**

FLEXILEARN

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Curriculum & Scheme of Examination

2022

**AMITY UNIVERSITY HARYANA
GURUGRAM**

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CSE2104	INTRODUCTION TO COMPUTERS AND PROGRAMMING IN C	L	T	P	C
Version: 2017.1	Date of Approval: 14 th June 2017	2	1	0	3
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

The objective of this course module is to acquaint the students with the basics of computers system, its components, data representation inside computer and to get them familiar with various important features of procedure-oriented programming language i.e. C.

Course Objectives

The objective of this course is to

1. Equip the students with concepts of Programming through C Language
2. Provide an overview of advanced programming concepts like Structure, Union and File Handling

Course Outcomes

On completion of this course, the students will be able to

After the completion of course, the students will be able to,

- CO 1: Define the purpose and structure of C Program for programming; identify and distinguish various datatypes and operators; conditional and control statement; Apply if-else, Switch and loops to rewrite basic C program for problem solving.
- CO 2: Compare and contrast various Array types, its declaration and implementation; differentiate between Call by Value and Reference if Functions; apply the concepts to rewrite C Programs
- CO 3: Differentiate between various String Handling Functions; describe the concept of Pointers in C Language
- CO 4: Explain the concept of Structure and Union; apply the concept of File Handling to provide data storage support to the programs.
- CO 5: Apply the concept of Computer Graphics using C programming concepts for implementing line drawing, circle drawing algorithms.

Modules	Blooms level*	Number of hours
Module I: Introduction Introduction to computer, history, von-Neumann architecture, memory system (hierarchy, characteristics and types), H/W concepts (I/O Devices), S/W concepts (System S/W & Application S/W, utilities). Data Representation: Number systems, character representation codes, Binary, octal, hexadecimal and their interconversions. Binary arithmetic, floating point arithmetic, signed and unsigned numbers, Memory storage unit.	L1, L2 and L3	7
Module II: Programming in C History of C, Introduction of C, Basic structure of C program, Concept of variables, constants and data types in C, Operators and expressions: Introduction, arithmetic, relational, Logical, Assignment, Increment and decrement operator, Conditional, bitwise operators, Expressions, Operator precedence and associativity. Managing Input	L2, L3 and L4	7

and output Operation, formatting I/O.		
Module III: Fundamental Features in C C Statements, conditional executing using if, else, nesting of if, switch and break Concepts of loops, example of loops in C using for, while and do-while, continue and break. Storage types (automatic, register etc.), predefined processor, Command Line Argument.	L2, L3 and L4	7
Module IV: Arrays and Functions One dimensional arrays and example of iterative programs using arrays, 2-D arrays Use in matrix computations. Concept of Sub-programming, functions Example of user defined functions. Function prototype, Return values and their types, calling function, function argument, function with variable number of argument, recursion.	L2 and L3	7
Module V: Advanced features in C Pointers, relationship between arrays and pointers Argument passing using pointers, Array of pointers. Passing arrays as arguments. Strings and C string library. Structure and Union. Defining C structures, Giving values to members, Array of structure, Nested structure, passing strings as arguments. File Handling.	L2, L3 and L4	8

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6:Evaluation

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text Books

- E Balagurusamy, "Programming in ANSI C", Seventh Edition, Tata McGraw Hill Education private limited, July 2017.
- Yashwant Kanetkar, "Let Us C", 16th Edition, BPB Publication, June 2017.

Reference Books

- Brain W Kernighan and Dennis M Ritchie, "The C Programming Language", 2nd Edition, Pearson Publication, Jan 2015.
- Byron Gottfried, "Programming with C", Third Edition, Tata McGraw Hill Education private limited, July 2017.
- E Balagurusamy, "Computer Concepts & Programming in C", Seventh Edition, Tata McGraw Hill Education private limited, July 2011.



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CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	2	--	2	--	--	--	--	--	--	--	--	1	--	1	--
CO2	1	1	2	2	--	--	--	--	--	--	--	--	1	--	1	--
CO3	1	1	2	3	--	--	--	--	--	--	--	--	1	--	1	--
CO4	1	1	2	2	3	--	--	--	--	--	--	--	1	--	1	--
CO5	1	1	2	2	3	--	--	--	--	--	--	--	1	--	1	--

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CSE2107	PROGRAMMING IN C LAB	L	T	P	C
Version 2017.1	Date of Approval: 14 June, 2017	0	0	2	1
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

The primary objective of this course is to understand all the components of C, including the C language, the C Preprocessor, and the C Standard Library. An understanding of some advanced practical issues, including memory management, testing and debugging, complex declarations and expression evaluation, building and using libraries, and evaluating tradeoffs, such as size vs. speed and speed vs. complexity. The ability to write C code and create and manipulate logical programs.

Course Objectives

The objective of this course is to

1. Equip the students with concepts of Programming through C Language
2. Provide an overview of advanced programming concepts like Structure, Union and File Handling.

Course Outcomes

After the completion of course, the students will be able to,

- CO 1: Demonstrate the use of various data types and operators in C programs; Solve various problems using conditional control statements (if-else, Switch case).
- CO 2: Construct C programs related to problems involving the usage of loops, arrays and functions.
- CO 3: Apply the concept of Pointers for efficient memory management and construct C programs using string handling functions.
- CO 4: Demonstrate the use of Structure, Union and concept of File Handling to provide data storage support to the programs.

Modules	Blooms level*	Number of hours
LABORATORY SESSSION 1 OPERATORS, EXPRESSIONS and DECISION MAKING <ol style="list-style-type: none"> 1. Write a program to calculate simple interest and amount. 2. Write a program to swap two numbers using third variable. 3. Write a program to demonstrate Greatest of 3 nos and to print the given no in ascending order. 4. Write a program to check if the number is even or odd. 5. Write a program to perform arithmetic operations using Switch Case statement. 6. Write a program to calculate area of circle, rectangle, square and triangle using Switch Case statement. 	L3	5
LABORATORY SESSSION 2 LOOPING <ol style="list-style-type: none"> 1. Write a program to find factorial of given no using do while statement. 	L3	6

2. Write a program to print prime numbers up to 'n'. 3. Write a program to sum of n natural no. 4. Write a program to print Fibonacci series. 5. Write a program to reverse a number. 6. Write a program to print the following pattern using for loop 1 2 2 3 3 3 4 4 4 4 7. Write a program to print the following pattern using for loop A A B A B C A B C D		
LABORATORY SESSSION 3 ARRAYS and FUNCTIONS 1. Write a program to read n num of students and 5 subjects marks. 2. Write a program to swap two numbers using call by value. 3. Write a program to convert all lower case to uppercase characters 4. Write a program to find the factorial of a number using recursion. 5. Write a program to print the add/product of two matrices of any order.	L3	5
LABORATORY SESSSION 4 POINTERS AND STRING 1. Write a program to perform operations on strings using string handling in-built functions (concatenation, reversal, copy etc.) 2. Write a program to swap two numbers using call by reference. 3. Write a program to perform dynamic memory allocation and deallocation. 4. Write a program to print elements of array using pointers.	L3	4
LABORATORY SESSSION 5 STRUCTURE,UNION & FILE HANDLING 1. WAP program to display student information by initializing structures. 2. WAP program to find the total salary of employee and employee details using structure. 3. Write a program to store and display information using Union. 4. Program to write data into file and read data from file.	L3	4

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination**Examination Scheme:**

IA				EE
A	PR	LR	V	70
5	10	10	5	

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

Text Books

- E Balagurusamy, “Programming in ANSI C”, Seventh Edition, Tata McGraw Hill Education private limited, July 2017.
- Yashwant Kanetkar, “Let Us C”, 16th Edition, BPB Publication, June 2017.

Reference Books

- Brain W Kernighan and Dennis M Ritchie, “The C Programming Language”, 2nd Edition, Pearson Publication, Jan 2015.
- Byron Gottfried, “Programming with C”, Third Edition, Tata McGraw Hill Education private limited, July 2017.
- E Balagurusamy, “Computer Concepts & Programming in C”, Seventh Edition, Tata McGraw Hill Education private limited, July 2011.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	2	--	2	--	--	--	--	--	--	--	--	1	--	2	--
CO2	1	1	2	2	--	--	--	--	--	--	--	--	1	--	2	--
CO3	1	1	2	3	--	--	--	--	--	--	--	--	1	--	2	--
CO4	1	1	2	2	3	--	--	--	--	--	--	--	1	--	2	--

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CSE2204	OBJECT ORIENTED PROGRAMMING USING C++	L	T	P	C
Version 1.1	Date of Approval: 14 th June 2017	2	1	0	3
Pre-requisites/Exposure	Hands on knowledge of C Programming				
Co-requisites	Basic concepts of C Programming				

Catalog Description

The objective of this course is to introduce object-oriented programming. To explore and implement the various features of OOP such as inheritance, polymorphism, Exceptional handling using programming language C++. After completing this course student can easily identify the basic difference between the programming approaches like procedural and object oriented.

Course Objectives

The objective of this course is

1. Equip the students with the basic features of C++ supporting object-oriented programming. Perform object oriented programming to develop solutions to problems demonstrating usage of control structures, modularity, I/O. and other standard language constructs.
2. Provide the overview of major object-oriented concepts to implement object oriented programs in C++ like encapsulation, inheritance and polymorphism, stream I/O, templates and operator overloading

Course Outcomes

On completion of this course, the students will be able to

- CO 1: Explain the basic principles of object-oriented programming approach; Differentiate it with procedural programming approach and also discuss difference between C and C++.
- CO 2: Illustrate the different ways to define a member function inline and explain how the private members of a class can be accessed. Explain how the objects can be instantiated and destroyed with static data member?
- CO 3: Explain the concept of inheritance, types and implementation with suitable examples; find out ambiguity problem in inheritance; use the concept of overriding and constructors in inheritance.
- CO 4: Explain polymorphism in detail and implement the concept of overloading in functions as well as in operators. Write the programs for virtual function and pointer with objects.
- CO 5: Explain the exception handling mechanism. Design the programs for class and function Template. Compare and contrast various formatted and unformatted i/o function in file handling.

Modules	Blooms level*	Number of hours
MODULE 1: INTRODUCTION Review of C, Difference between C and C++, Procedure Oriented and Object Oriented Approach. Basic Concepts: Objects, classes, Principals like Abstraction, Encapsulation, Inheritance and	L1 and L2	5

Polymorphism. Dynamic Binding, Message Passing. Characteristics of Object-Oriented Languages. Introduction to Object-Oriented Modeling techniques (Object, Functional and Dynamic Modeling).		
MODULE 2: CLASSES AND OBJECTS Abstract data types, Object & classes, attributes, methods, C++ class declaration, Local Class and Global Class, State identity and behaviour of an object, Local Object and Global Object, Scope resolution operator, Friend Functions, Inline functions, Constructors and destructors, instantiation of objects, Types of Constructors, Static Class Data, Array of Objects, Constant member functions and Objects, Memory management Operators.	L1, L2 and L3	7
MODULE 3: INHERITANCE Inheritance, Types of Inheritance, access modes – public, private & protected, Abstract Classes, Ambiguity resolution using scope resolution operator and Virtual base class, Aggregation, composition vs classification hierarchies, Overriding inheritance methods, Constructors in derived classes, Nesting of Classes	L2, L3 and L4	8
MODULE 4: POLYMORPHISM Polymorphism, Type of Polymorphism – Compile time and runtime, Function Overloading, Operator Overloading (Unary and Binary) Polymorphism by parameter, Pointer to objects, this pointer, Virtual Functions, pure virtual functions.	L2, L3 and L4	8
MODULE 5: STRINGS, FILES AND EXCEPTION HANDLING Manipulating strings, Streams and files handling, formatted and Unformatted Input output. Exception handling, Generic Programming – function template, class Template Standard Template Library: Standard Template Library, Overview of Standard Template Library, Containers, Algorithms, Iterators, Other STL Elements, The Container Classes, General Theory of Operation, Vectors.	L2, L3 and L4	8

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

- A.R. Venugopal, Rajkumar, T. Ravishanker “Mastering C++”, TMH, 1997
- R. Lafore, “Object Oriented Programming using C++”, BPB Publications, 2004.
- E. Balagurusamy, “Object Oriented Programming with C++”, Mc Graw Hill, 6th Edition, 2013.
- Schildt Herbert, “C++: The Complete Reference”, Wiley DreamTech, 2005.

Reference Book

- Parsons, “Object Oriented Programming with C++”, BPB Publication, 1999.
- Steven C. Lawlor, “The Art of Programming Computer Science with C++”, Vikas Publication, 2002.
- Yashwant Kanethkar, “Object Oriented Programming using C++”, BPB, 2004

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination**Examination Scheme:**

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O 1	PS O 2	PS O 3	PS O 4
CO 1	1	2	--	--	--	--	--	--	--	--	--	--	1	--	2	--
CO 2	1	1	2	3	--	--	--	--	--	--	--	--	1	--	1	2
CO 3	1	1	2	--	--	--	--	--	--	--	--	--	1	--	2	2
CO 4	1	1	2	3	--	--	--	--	--	--	--	--	1	1	--	2
CO 5	1	1	2	--	--	--	--	--	--	--	--	--	1	1	--	1

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CSE2208	OBJECT ORIENTED PROGRAMMING USING C++ LAB	L	T	P	C
Version 2017.1	Date of Approval: 14 th June 2017	0	0	1	1
Pre-requisites/Exposure	Turbo C++				
Co-requisites	NIL				

Catalog Description

The objective of this course is to introduce object-oriented programming. To explore and implement the various features of OOP such as inheritance, polymorphism, Exceptional handling using programming language C++. After completing this course student can easily identify the basic difference between the programming approaches like procedural and object oriented.

Course Objectives

The objective of this course is

1. Perform object-oriented programming to develop solutions to problems demonstrating usage of control structures, modularity, I/O. and other standard language constructs.
2. Demonstrate adeptness of object-oriented programming in developing solutions to problems demonstrating usage of data abstraction, encapsulation, and inheritance.
3. Demonstrate ability to implement one or more patterns involving realization of an abstract interface and utilization of polymorphism in the solution of problems which can take advantage of dynamic dispatching, syntax, features of, and how to utilize the Standard Template Library.

Course Outcomes

On completion of this course, the students will be able to

- CO 1: Define and identify the basic principles of object-oriented programming approach; Differentiate it with procedural programming approach.
- CO 2: Determine the different ways to define a member function inline and explain how the private members of a class can be accessed. Solve how the objects can be instantiated and destroyed with static data member?
- CO 3: Apply the concept of inheritance, types and implementation with suitable examples; find out ambiguity problem in inheritance; use the concept of overriding and constructors in inheritance.
- CO 4: Relate the concept polymorphism with overloading in detail and implement the concept of overloading in functions as well as in operators. Write the programs for virtual function and pointer with objects.
- CO 5: Determine the exception handling mechanism. Design the programs for class and function Template. Compare and contrast various formatted and unformatted i/o function in file handling.

Modules/ Topics Covered**	Blooms level*	Number of hours
1. Sample Programs using objects and classes (a) Write a program to illustrate the concept of one class with two objects by taking student data. (b) Write a program to show the relationship of class and object to display roll no., grade and fee paid by student.	L1, L3, L5	4
2. Sample Programs for different use of private, public member	L1, L3,	4

variables and functions and friend functions (a) Write a program to define the member function outside and inside the class. (b) Write a program to read and display the information of N persons to illustrate the concept of array of objects. (c) Write a program to add two numbers to illustrate the use of friend function.	L5	
3. Sample Programs using constructors and destructors (a) Write a program to assign and copy values to illustrate the concept of parametrized and copy constructor. (b) Write a program to show the order of constructor and destructor.	L1, L3, L5	4
4. Sample Programs using operator overloading (a) Write a program to add two numbers using binary operator overloading. (b) Write a program to illustrate the assignment operator overloading.	L1, L3, L5	4
5. Sample Programs using inheritance in and accessing objects of different derived classes (a) Write a program to compute the marks explaining the concept of multiple inheritance. (b) Write a program to find the factorial of a number using inheritance.	L1, L3, L5	4
6. Sample Programs using polymorphism and virtual functions (using pointers) and File Handling (a) Write a program to find the volume of cylinder and cuboid using function overloading. (b) Write a program to reverse a string using pointers. (c) Write a program to explain the relationship of inheritance and virtual function. (d) Write a program to read the student name and fee paid using read() function from the file.	L1, L3, L4, L5	4

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation


**** Sample Programs provided are not limited to these only, can include others as desired.**

Text Books

1. A.R. Venugopal, Rajkumar, T. Ravishanker "Mastering C++", TMH, 1997
2. R. Lafore, "Object Oriented Programming using C++", BPB Publications, 2004.
3. "Object Oriented Programming with C++" By E. Balagurusamy.
4. Schildt Herbert, "C++: The Complete Reference", Wiley DreamTech, 2005.

Reference Book

1. Parsons, "Object Oriented Programming with C++", BPB Publication, 1999.
2. Steven C. Lawlor, "The Art of Programming Computer Science with C++", Vikas Publication, 2002.
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Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination
Examination Scheme:

IA					EE
Components	A	PR	LR	V	70
Weightage (%)	5	10	10	5	

Note: IA –Internal Assessment, A – Attendance, PR – Performance, LR – Lab Record, V – Viva, EE- External Exam

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	3	1	2	--	--	--	--	--	--	--	--	--	2	--	--	--
CO2	3	1	2	--	--	--	--	--	--	--	--	--	1	2	--	--
CO3	2	1	2	--	--	--	--	--	--	--	--	--	1	2	--	--
CO4	2	1	2	--	--	--	--	--	--	--	--	--	1	2	--	--
CO5	2	1	2	--	--	--	--	--	--	--	--	--	1	2	--	--

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BASICS OF ELECTRICAL & ELECTRONICS ENGINEERING LAB

Course Code: CSE2218

Credit Units: 01

List of Experiments:

1. To verify KVL & KCL in the given network.
2. To verify Superposition Theorem.
3. To verify Maximum Power Transfer Theorem.
4. To verify Reciprocity Theorem.
5. To determine and verify R_{Th} , V_{Th} , R_N , I_N in a given network.
6. To perform open circuit & short circuit test on a single-phase transformer.
7. To study transient response of a given RLC Circuit.
8. To perform regulation, ratio & polarity test on a single-phase transformer.
9. To measure power & power factor in a three phase circuit by two wattmeter method.
10. To measure power & power factor in a three phase load using three ammeter & three voltmeter method.

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.



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ENGINEERING GRAPHICS LAB

Course Code: CSE2219

Credit Units : 02

Course Objective:

This course will provide students concepts on the drawings of different curves like straight line, parabola, ellipse etc. After completion of this course, students will be able to draw different figures manually and will be capable of using various instruments involved in drawings.

Course Contents:

Module I: General

Importance, Significance and scope of engineering drawing, Lettering, Dimensioning, Scales, Sense of proportioning, Different types of projections, Orthographic Projection, B.I.S. Specifications.

Module II: Projections of Point and Lines

Introduction of planes of projection, Reference and auxiliary planes, projections of points and Lines in different quadrants, traces, inclinations, and true lengths of the lines, projections on Auxiliary planes, shortest distance, intersecting and non-intersecting lines.

Module III: Planes other than the Reference Planes

Introduction of other planes (perpendicular and oblique), their traces, inclinations etc., Projections of points and lines lying in the planes, conversion of oblique plane into auxiliary Plane and solution of related problems.

Module IV: Projections of Plane Figures

Different cases of plane figures (of different shapes) making different angles with one or both reference planes and lines lying in the plane figures making different given angles (with one of both reference planes). Obtaining true shape of the plane figure by projection.

Module V: Projection of Solids

Simple cases when solid is placed in different positions, Axis faces and lines lying in the faces of the solid making given angles.

Module VI: Development of Surface

Development of simple objects with and without sectioning. Isometric Projection

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

Text & References:

- M.B. Shah & B.C. Rana, Engineering Drawing, Pearson Education, 2007
- PS Gill, Engineering Drawing, Kataria Publication
- ND Bhatt, Engineering Drawing, Charotar publications
- N Sidheshwar, Engineering Drawing, Tata McGraw Hill
- CL Tanta, Mechanical Drawing, “Dhanpat Rai”

CSE2302	DATABASE MANAGEMENT SYSTEMS	L	T	P	C
Version 2017.1	Date of Approval: 14 June 2017	3	1	0	4
Pre-requisites/Exposure	Computer Fundamentals and Mathematics Set Theory				
Co-requisites	Nil				

Catalog Description

This course is design to get students familiar with the fundamentals & basic concepts in Data Base Management Systems and their use. This course discusses architecture of Database Systems with concept of different types of available database model, concurrency techniques and new applications of the DBMS. The techniques for database design, normalization, database recovery and protection will enable students to work easily and efficiently on real databases.

Course Objectives

The objective of this course is

1. To make students familiar with the fundamental and necessary concepts of DBMS.
2. Provide an overview of normalization, concurrency techniques and database recovery with examples.

Course Outcomes

On completion of this course, the students will be able to

- CO1. Differentiate between traditional data processing system and database management system and understand characteristics and applications of DBMS in real world.
- CO2. Explain and use different data models such as Entity Relationship Model, Network, and Relational Model etc.
- CO3. Solve queries using relational algebra, relational calculus and SQL.
- CO4. Illustrate normalization concepts and apply them in real database applications.
- CO5. Explain database concurrency techniques and recovery mechanisms.

Modules	Blooms level*	Number of hours
Module I: Introduction Concept and goals of DBMS, Database Languages, Database Users, Database Abstraction. Basic Concepts of ER Model, Relationship sets, Keys, Mapping, Design of ER Model.	L1, L2 and L6	9
Module II: Hierarchical model & Network Model Concepts, Data definition, Data manipulation and implementation. Network Data Model, DBTG Set Constructs, and Implementation	L1 and L2	9
Module III: Relational Model Relational database, Relational Algebra, Relational & Tuple Calculus.	L1 and L3	10

Module IV: Relational Database Design and Query Language SQL, QUEL, QBE, Normalization using Functional Dependency, Multivalued dependency and Join dependency.	L2, L3 and L4	10
Module V: Concurrency Control and New Applications Transaction basics: ACID property, Lifecycle of Transaction, Why Concurrency Control, Schedule, Serializability, Lock Based Protocols, Time Stamped Based Protocols, Deadlock Handling, Crash Recovery. Distributed Database, Objective Oriented Database, Multimedia Database, Data Mining, Digital Libraries.	L2, L3 and L4	10

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

- Korth, Silberschatz, "Database System Concepts", TMH, 4th Ed., 2000.
- Elmsari and Navathe, "Fundamentals of Database Systems", A. Wesley, 6th Ed., 2004

Reference Books

- Date C. J., "An Introduction to Database Systems", Narosa Publishing, 7th Ed., 2004

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	2	--	--	--	--	--	--	--	--	--	--	1	--	-	-
CO2	1	1	2	3	--	--	--	--	--	--	--	--	1	--	--	--
CO3	1	2	2	3	--	--	--	--	--	--	--	--	1	2	--	--
CO4	--	1	2	--	--	2	--	3	--	--	--	--	1	1	-	-
CO5	1	1	3	--	--	--	--	--	2	--	--	--	1	--	-	3

1: strongly related, 2: moderately related and 3: weakly related

CSE2303	OPERATING SYSTEMS	L	T	P	C
Version 2017.1	Date of Approval: 14 th June 2017	3	0	0	3
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

In this course Operating System, its generic types, characteristics and functions are discussed in detail. Concepts covered would enable students to identify various categories of operating systems, with details about concepts of process management and scheduling. Contents will be helpful in identifying deadlocks in the system and designated approaches used to prevent, handle or recover from them. Further it covers the concepts of managing memory, devices and mechanisms for providing security to system and files using operating system.

Course Objectives

The objective of this course is to

1. Equip the students with the knowledge about categories of operating systems and their functions.
2. Provide detailed knowhow about functions of operating system like process, memory and device management along with file system security and protection.

Course Outcomes

On completion of this course, the students will be able to

- CO1: Define and explain operating systems and their evolution, also differentiate among its various types.
- CO2: Explain concepts of process and inter-process communication and synchronization. Identify solutions to detect, prevent and handle deadlocks occurring in the operating systems. Solve synchronization and CPU scheduling problems related to processes.
- CO3: Define and explain concepts of memory management like fragmentation, paging and segmentation. Solve problems related to memory management using page replacement algorithms.
- CO4: Describe the concepts of device management and list various disk allocation methods. Determine solutions for disk scheduling problems using available disk scheduling algorithms.
- CO5: State the concept of file and file system security, also distinguish among various file allocation methods.

Modules	Blooms level*	Number of hours
MODULE 1: INTRODUCTION TO OPERATING SYSTEM Operating system and function, Evolution of operating system, Batch, Interactive, multiprogramming, Time Sharing and Real Time System, multiprocessor system, Distributed system, System protection. Operating System structure, Operating System Services, System Program and calls	L1, L2 and L4	6

MODULE 2: PROCESS MANAGEMENT Process concept, State model, process scheduling, job and process synchronization, structure of process management, Threads Interprocess Communication and Synchronization: Principle of Concurrency, Producer Consumer Problem, Critical Section problem, Semaphores, Hardware Synchronization, Critical Regions, Conditional critical region, Monitor, Inter Process Communication. CPU Scheduling: Job scheduling functions, Process scheduling, Scheduling Algorithms, Non-Preemptive and preemptive Strategies, Algorithm Evaluation, Multiprocessor Scheduling. Deadlock: System Deadlock Model, Deadlock Characterization, Methods for handling deadlock, Prevention strategies, Avoidance and Detection, Recovery from deadlock combined approach	L1, L2 and L3	12
MODULE 3: MEMORY MANAGEMENT Single Contiguous Allocation: H/W support, S/W support, Advantages and disadvantages, Fragmentation, Paging, Segmentation, Virtual memory concept, Demand paging, Performance, Paged replaced algorithm, Allocation of frames, Thrashing, Cache memory, Swapping, Overlays	L1, L2 and L3	7
MODULE 4: DEVICE MANAGEMENT Principles of I/O hardware, Device controller, Device Drivers, Memory mapped I/O, Direct Access Memory, Interrupts, Interrupt Handlers, Application I/O interface, I/O Scheduling, Buffering, Caching, Spooling, Disk organization, Disk space management, Disk allocation Method, Disk Scheduling, Disk storage	L1, L2 and L3	7
MODULE 5: FILE SYSTEM AND PROTECTION AND SECURITY File Concept, File Organization and Access Mechanism, File Directories, Basic file system, File Sharing, Allocation method, Free space management. Policy Mechanism, Authentication, Internal excess Authorization	L1 and L2	4

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5:Synthesis, L6:Evaluation

Text Books

- Milenekovic, "Operating System Concepts", McGraw Hill
- Silberschatz, P.B. Galvin "Operating System Concepts", John Willey & son

Reference Books

- Dietel, "An introduction to operating system", Addison Wesley
- Tannenbaum, "Operating system design and implementation", PHI
- Operating System, A Modern Perspection, Gary Nutt, Pearson Edu. 2000
- A. S Tanenbaum, Modern Operating System, 2nd Edition, PHI
- Willam Stalling "Operating system" Pearson Education

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	2	--	--	--	--	--	--	--	--	--	--	1	2	--	--
CO2	1	2	3	--	--	--	--	--	--	--	--	--	1	2	--	--
CO3	1	2	3	--	--	--	--	--	--	--	--	--	1	2	--	--
CO4	1	2	3	--	--	--	--	--	--	--	--	--	1	2	--	--
CO5	1	--	2	--	--	--	--	--	--	--	--	--	1	--	--	--

1: strongly related, 2: moderately related and 3: weakly related



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CSE2304	DATA STRUCTURES USING C	L	T	P	C
Version:2017.1	Date of Approval: 14 th June 2017	3	1	2	5
Pre-requisites/Exposure	Basic Knowledge of C++ Programming				
Co-requisites	Nil				

Catalog Description

This course covers the design, analysis, and implementation of data structures and algorithms to solve engineering problems using C programming language. Topics include elementary data structures, (including arrays, stacks, queues, and lists), advanced data structures (including trees and graphs), the algorithms used to manipulate these structures, and their application to solving practical engineering problems. At the end of this course student will gain knowledge about different kinds of file structures and their related operations.

Course Objectives

The objective of this course is to

- Equip the students with knowledge of algorithms, different types of data structures and analysis of space and time complexity.
- Provide an overview of various algorithms of data structures like stack and queues and related operations and implementation.
- Provide an overview of dynamic Data Structure like linked list and its related operations, algorithms and programs. Demonstrate practical use of dynamic data structure to solve engineering problems.
- Equip the students with knowledge of algorithms and operations related to tree and graph data structures and their practical applications.
- Provide an overview of Sorting, Searching and file structures and its related algorithms and techniques.

Course Outcomes

On completion of this course, the students will be able to

CO1: Identify operations on array, multidimensional, string and their implementation and analyze space and time complexity of algorithms.

CO2: Explain various algorithms and operations of data structures like stack and queues and analyze complexity of each operation.

CO3: Explain dynamic data structures and various algorithms and operations of data structures like linked list and their applications in computer science.

CO4: Illustrate the algorithms and operations related to tree and graph data structures, their practical applications and analyze complexity of algorithm associated with each operations

CO5: Explain Sorting, Searching and file organization and its related techniques.



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Modules	Blooms level*	Number of hours
Module I: Introduction to Data structures Data structures: Definition, Types. Algorithm design, Complexity, Time-Space Tradeoffs. Use of pointers in data structures. Array Definition and Analysis, Representation of Linear Arrays in Memory, Traversing of Linear Arrays, Insertion and Deletion, Single Dimensional Arrays, Two Dimensional Arrays, Multidimensional Arrays, Function Associated with Arrays, Character String in C, Character String Operations, Arrays as parameters, Implementing One Dimensional Array, Sparse matrix.	L1, L2	7
Module II: Introduction to Stacks and queue Stack: Definition, Array representation of stacks, Operations Associated with Stacks- Push & Pop, Polish expressions, Conversion of infix to postfix, infix to prefix (and vice versa), Application of stacks recursion, polish expression and their compilation, conversion of infix expression to prefix and postfix expression, Tower of Hanoi problem. Queue: Definition, Representation of Queues, Operations of queues- QInsert, QDelete, Priority Queues, Circular Queue, Dequeue.	L1, L2, L3, L4	8
Module III: Dynamic Data Structure Linked list: Introduction to Singly linked lists: Representation of linked lists in memory, Traversing, Searching, Insertion into, Deletion from linked list, doubly linked list, circular linked list, generalized list. Applications of Linked List-Polynomial representation using linked list and basic operation. Stack and queue implementation using linked list.	L1, L3 and L4	7
Module IV: Trees and Graphs Trees: Basic Terminology, Binary Trees and their representation, expression evaluation, Complete Binary trees, extended binary trees, Traversing binary trees, Searching, Insertion and Deletion in binary search trees, General trees, AVL trees, Threaded trees, B trees. Graphs: Terminology and Representations, Graphs & Multigraphs, Directed Graphs, Sequential representation of graphs, Adjacency matrices, Transversal Connected Component and Spanning trees.	L1, L3 and L5	7
Module V: Sorting and Searching and file structures Sorting: Insertion Sort, Bubble sort, Selection sort, Quick sort, two-way Merge sort, Heap sort, Partition exchange sort, Shell sort, Sorting on different keys, External sorting. Searching: Linear search, Binary search File structures: Physical storage media, File Organization, Linked organization of file, Inverted file, Organization records into blocks, Sequential blocks, Hash function, Indexing & Hashing, Multilevel indexing, Tree Index, Random file, Primary Indices, Secondary Indices, B tree index files.	L1, L4, L5	7

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

1. Horowitz and Sahani, — Fundamentals of Data structures, Galgotia publications.
2. R.L. Kruse, B.P. Leary, C.L. Tondo, —Data structure and program design in C, PHI
3. Data structures and algorithms – Schaum Series.

4. File Structures An object-Oriented Approach with C++ by Michael J. Folk, Bill Zoellick, Breg Riccardi, Published by Addison Wesley (1st ISE Reprint, 1999).

Reference Books

1. J. P. Tremblay and P. G. Sorenson, Introduction to Data Structures with Applications, McGraw – Hill
2. Algorithms by Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Published by Prentice-Hall
3. India(1999).
4. Data Structures Using C and C++ second edition by Yeddiyah Langsam, Moshe J. Augenstein, Aaron M. Tenenbaum, Published by Prentice-Hall India
5. Data Structures and Algorithm analysis in C++ by Mark Allen Weiss, Published by Addison Wesley (3rd Indian Reprint 2000).
6. Data Structures – R. S. Salaria

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	1	2	1	--	--	--	--	--	--	--	--	--	2	--	--
CO2	1	2	2	--	--	--	--	--	--	--	--	--	2	2	1
CO3	1	2	2	1	--	--	--	--	--	--	--	--	2	2	1
CO4	1	2	2	1	--	--	--	--	--	--	--	--	2	2	1
CO5	1	2	2	1	--	--	--	--	--	--	--	--	2	2	2

1: strongly related, 2: moderately related and 3: weakly related

CSE2305	DATA STRUCTURES USING C LAB	L	T	P	C
2017.1	Date of Approval: 14 th June 2017	0	0	2	1
Pre-requisites/Exposure	Basic Knowledge of C Programming				
Co-requisites	Nil				

Catalog Description

This course covers the design, analysis, and implementation of data structures and algorithms to solve engineering problems using C programming language. Topics include elementary data structures, (including arrays, stacks, queues, and lists), advanced data structures (including trees and graphs), the algorithms used to manipulate these structures, and their application to solving practical engineering problems. At the end of this course student will gain knowledge about different kinds of file structures and their related operations.

Course Objectives

The objective of this course is to

1. Equip the students with knowledge of algorithms, different types of data structures and analysis of space and time complexity.
2. Provide an overview of various algorithms of data structures like stack and queues and related operations and implementation.
Provide an overview of dynamic Data Structure like linked list and its related operations, algorithms and programs. Demonstrate practical use of dynamic data structure to solve engineering problems.
3. Equip the students with knowledge of algorithms and operations related to tree and graph data structures and their practical applications.
4. Provide an overview of Sorting, Searching and file structures and its related algorithms and techniques.

Course Outcomes

On completion of this course, the students will be able to

CO 1: Identify operations and their implementation on array and multidimensional, string and estimation space and time complexity.

CO 2: Explain various algorithm and operations of data structures like stack and queues and analyze complexity of each operation.

CO 3: Explain dynamic data structures and various algorithms and operations of data structures like linked list and their applications in computer science.

CO 4: Illustrate the algorithms and operations related to tree and graph data structures, their practical applications and analyze complexity of algorithm associated with each operations.

CO5: Explain Sorting, Searching and file organization and its related techniques.

Modules	Blooms level*	Number of hours
Module I: Introduction to Data structures		
1. Write a program to copy one string into another without using library functions.	L3,L5	2
2. Write a program to demonstrate array and linked list implementation of sparse matrix.		
3. Write a program to multiply two 2D matrix.		
Module II: Introduction to Stacks and queue	L3,L5	4

<ol style="list-style-type: none"> 1. Write a program to implement push and pop operations on the stack. 2. Write a program to demonstrate conversion of infix to postfix. 3. Write a program to implement simple queue and perform insertion and deletion operation on it. 4. Write a program to implement circular queue and perform insertion and deletion operation on it. 5. Write a program to implement dqueue and perform insertion and deletion operations on it. 6. Write a program to implement priority queue and perform insertion and deletion operation on it. 		
Module III: Dynamic Data Structure <ol style="list-style-type: none"> 1. Write a program to implement singly linked list and perform following operations on it. <ul style="list-style-type: none"> • Insertion at end • Insertion at last • Insertion at desired place. 2. Write a program to implement singly linked list and perform following operations on it. <ul style="list-style-type: none"> • Deletion at end • Deletion at last • Deletion at desired place. 3. Write a program to implement doubly linked list and perform following operations on it. <ul style="list-style-type: none"> • Insertion at end • Insertion at last • Insertion at desired place. 4. Write a program to implement singly linked list and perform addition of two polynomials. 	L3,L5	4
Module IV: Trees and Graphs <ol style="list-style-type: none"> 1. Write a program to calculate in order, preorder and post order traversal on binary tree. 2. Write a program to construct binary search tree and perform following operations on it. <ul style="list-style-type: none"> • Deletion of element • Insertion of elements. 3. Write a program to construct binary search tree and search an element in it. 4. Write a program to implement kruskal's algorithm to find out minimum spanning tree. 	L3,L5	6
Module V: Sorting and Searching and file structures <ol style="list-style-type: none"> 1. Write program to implement insertion sort. 2. Write a program to search an element in array using binary search. 3. Write a program to implement merge sort. 4. Write a program to implement quick sort. 5. Write a program to implement heap sort. 	L3,L5	8

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

1. Horowitz and Sahani, — Fundamentals of Data structures, Galgotia Publications.
2. R.L. Kruse, B.P. Leary, C.L. Tondo, —Data structure and program design in C, PHI
3. Data structures and algorithms – Schaum Series.
4. File Structures an Object-Oriented Approach with C++ by Michael J. Folk, Bill Zoellick, Breg Riccardi, Published by Addison Wesley (1st ISE Reprint, 1999).

Reference Books

1. J. P. Tremblay and P. G. Sorenson, Introduction to Data Structures with Applications, McGraw – Hill.
2. Algorithms by Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Published by Prentice-Hall India (1999).
3. Data Structures Using C and C++ second edition by Yeddydyah Langsam, Moshe J. Augenstein, Aaron M. Tenenbaum, Published by Prentice-Hall India
4. Data Structures and Algorithm analysis in C++ by Mark Allen Weiss, Published by Addison Wesley (3rd Indian Reprint 2000).
5. Data Structures – R. S. Salaria

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

CO, PO and PSO mapping

1: strongly related, 2: moderately related and 3: weakly related

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	1	2	1	--	--	--	--	--	--	--	--	--	2	--	--
CO2	1	2	2	--	--	--	--	--	--	--	--	--	2	2	1
CO3	1	2	2	1	--	--	--	--	--	--	--	--	2	2	1
CO4	1	2	2	1	--	--	--	--	--	--	--	--	2	2	1
CO5	1	2	2	1	--	--	--	--	--	--	--	--	2	2	2

CSE2314	DIGITAL ELECTRONICS	L	T	P	C
Version 2019.1	Date of Approval: 15 May 2019	2	0	2	3
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

This course explores the theory and operation of the basic building blocks of digital electronics which includes combinational and sequential circuits. This course also explains the logic families and data convertors. The concepts learnt in the studies of sequential circuits will be applied in the design and analysis of Melay and Moore machines.

Course Objectives

The objective of this course is to

1. Provide the basic knowledge of digital logic levels and application of knowledge to understand combinational and sequential circuits.
2. Explain the operation of logic family and data convertors.

Course Outcomes

On completion of this course, the students will be able to

- CO1: Explain the difference between analog and digital signal; Describe the Boolean algebra; Analyze the SOP & POS form of Boolean function; Solve k-map and tabulation method to simplify the logical function; Apply universal gates to implement the given logic.
- CO2: Define the multiplexer and decoder; Explain the adder & subtractor; Apply multiplexer to design Boolean function; Analyze the difference between decoder and encoder.
- CO3: Define flip flops; Compare combinational and sequential circuits; Describe shift registers; Design counters and synchronous sequential circuits.
- CO4: Explain the logic families; Compare the RTL, DTL, TTL and ECL logic families.
- CO5: Define data convertors; Explain analog to digital convertor and digital to analog convertor.

Modules	Blooms level*	Number of hours
MODULE 1: BOOLEAN FUNCTIONS Analog & digital signals, AND, OR, NOT, NAND, NOR & XOR gates, Boolean algebra, Standard representation of logical functions, K-map representation and simplification of logical function, don't care conditions, XOR & XNOR simplifications of K-maps, Tabulation method.	L1,L2 and L3	6
MODULE 2: COMBINATIONAL CIRCUITS Adders, Subtractors, Multiplexer, de-multiplexer, decoder & encoder, code converters, Comparators, decoder / driver for display devices, Implementation of logic functions using multiplexer / de-multiplexer.	L1, L2,L3 and L4	6
MODULE 3: SEQUENTIAL CIRCUITS Flip-flops: SR, JK, D & T flip flops – Truth table, Excitation table, Conversion of flip-flops, race around condition, Master Slave flip	L1, L2,L4 and L5	8

flop, Shift registers: SIPO, PISO, PIPO, SIPO, Bi-directional; Counters: ripple & synchronous counters – up / down; Synchronous Sequential circuit: design procedure.		
MODULE 4: LOGIC FAMILIES RTL, DTL, TTL, ECL.	L2 and L4	2
MODULE 5: DATA CONVERTERS ADC – successive approximation, linear ramp, dual slope; DAC – Binary Weighted, R-2R ladder type.	L1 and L2	2

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. Anand Kumar, "Fundamentals of Digital Circuits", 2nd Edition, Prentice-Hall, 2004
2. Moris Mano, "Digital Design", 2nd Edition, Pearson Education, 2007.
3. R.P. Jain, "Modern Digital Electronics", 2nd Edition, Tata Mcgraw Hill, 2003

Reference Books

1. Thomas L. Floyd, "Digital Fundamentals", 11th Edition, Pearson Education, 2015
2. Malvino and Leech, "Digital Principles & Applications", 1st Edition, Tata McGraw Hill, 1993

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O 1	PS O 2	PS O 3	PS O 4
CO 1	1	2	1	--	--	--	--	--	--	--	--	--	1	--	--	--
CO 2	1	2	1	2	--	--	--	--	--	--	--	--	1	2	--	3
CO 3	1	2	1	2	--	--	--	--	--	--	--	--	1	--	--	3
CO 4	2	3	3	3	--	--	--	--	--	--	--	--	1	--	--	--
CO 5	2	3	3	3	--	--	--	--	--	--	--	--	1	--	--	3

1: strongly related, 2: moderately related and 3: weakly related

Anil

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CSE2307	DATABASE MANAGEMENT SYSTEMS LAB	L	T	P	C
Version 2017.1	Date of Approval: 14 June 2017	0	0	2	1
Pre-requisites/Exposure	Basic Concepts of DBMS				
Co-requisites	Relational Algebra and Relational Calculus				

Catalog Description

This course is designed to get students familiar with the basic concepts of SQL including DDL, DML and DCL statements. The course also explains the basic concepts of PL/SQL. Students will learn practical on Oracle software and hence can work on any RDBMS software in future.

Course Objectives

The objective of this course is

1. To make students familiar with the concepts and working of SQL.
2. Provide an overview of PL/SQL.

Course Outcomes

On completion of this course, the students will be able to

- CO1. Illustrate SQL basic concepts like languages DDL, DML etc., data types and working.
CO2. Explain concepts of database creation, manipulation of data and data retrieval and apply them in real database applications.
CO3. Design and implement various data constraints on a database for a given problem.
CO4. Solve queries using concepts like joins, subqueries, aggregate functions, triggers etc.
CO5. Prepare PL/SQL blocks.

Modules	Blooms level*	Number of hours
Lab Session 1 Introduction of RDBMS, Oracle, SQL and data types.	L1 and L2	2
Lab Session 2 Basic concept of database creation and manipulation of data.	L1 and L3	2
Lab Session 3 Working with SELECT query.	L1 and L3	2
Lab Session 4 To apply data constraints on a table-Primary Key, Not Null, Unique.	L1 and L3	2
Lab Session 5 Working with Foreign Key and Check Constraint.	L1 and L3	2
Lab Session 6 To implement the basic concept of Aggregate and Grouping Functions.	L1 and L3	2
Lab Session 7	L1 and	2

To apply various set operators on data.	L3	
Lab Session 8 Concept of Nested queries in database and its application in database.	L1 and L3	2
Lab Session 9 Implementation different types of JOINS in database.	L1 and L3	2
Lab Session 10 Basic concepts of Triggers and Procedures and related queries.	L1 and L3	2
Lab Session 11 Introduction to PL/SQL and basic syntax.	L1 and L3	2
Lab Session 12 Write programs in PL/SQL Using Control Structures.	L3	2

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. Ivan Bayross , “SQL, PL/SQL the Programming Language of Oracle”, 4th Ed., BPB Publications,2009.
2. Lynn Beighley, “Head First SQL”, 1st Ed., O'Reilly, 2007.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	2	--	--	--	--	--	--	--	--	--	--	1	--	-	-
CO2	1	-	2	--	--	3	--	--	--	--	--	2	1	--	1	-
CO3	1	-	1	--	--	3	--	--	--	--	--	2	1	1	2	-
CO4	1	-	2	--	--	--	--	--	--	--	--	--	1	1	--	--
CO5	1	-	2	--	--	--	--	--	2	--	--	--	1	1	--	-

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CSE2308	UNIX PROGRAMMING LAB	L	T	P	C
Version 2017.1	Date of Approval: 14 th June 2017	0	0	2	1
Pre-requisites/Exposure	Basic knowledge of Operating System				
Co-requisites					

Catalog Description

This course introduces the UNIX operating system commands, shell programming. Explores the use of operating system utilities such as vi text editors, filters, process handling etc.

Course Objectives

The objective of this course is to

1. Provide knowledge of working on Unix.
2. Provide sound foundation of writing Shell scripts.
3. Implement features like piping, filters and redirection.

Course Outcomes

On completion of this course, the students will be able to

CO1: To implement various Unix commands.

CO2: To demonstrate the use of Vi Editor and other editors of UNIX.

CO3: To write simple Shell scripts.

Modules	Blooms level*	Number of hours
1. UNIX structure, history, basic commands.	L1,L3	10
2. Working of Vi Editor and its commands.	L1,L3	4
3. Shell Script <ol style="list-style-type: none"> Write shell script to find largest among three numbers. Write shell script to print multiplication table of any number. Write a shell script that copies multiple files into directory. Write a shell script to find number of words and characters in a given file. Write a shell script to find the sum, the average and the product of the four integers entered. Write a shell script to calculate the factorial of a number. Write a shell script to generate Fibonacci series. Write a shell script that computes the gross salary of employee. Write a shell script that takes a command –line argument and reports on whether it is directory, a file, or something else. Write a shell script which receives two file names as arguments. It should check whether the two file contents are same or not. If they are same then second file should be deleted. Write a shell script to calculate gcd of two numbers. 	L1,L3	10

xii. Write a shell script to concatenate two strings and find the length of the resultant string.		
---	--	--

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. “ Unix Concepts and application” Das Sumitabha Tata Mcgraw Hill

Reference Books

1. “Unix Programming Environment” The Kernighan and Pike Prentice – Hall of India

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

IA				EE
A	PR	LR	V	70
5	10	10	5	

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	--	1	--	--	--	--	--	--	--	--	--	1	1	--	--
CO2	1	--	1	--	--	--	--	--	--	--	--	--	1	1	--	--
CO3	1	--	1	--	--	--	--	--	--	--	--	--	1	1	--	--

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DIGITAL ELECTRONICS LAB

Course Code: CSE2315

Credit Units: 01

List of Experiments:

1. To verify the truth tables of OR, AND, NOR, NAND, EX-OR, EX-NOR gates.
2. To obtain half adder, full adder and subtractor using gates and verify their truth tables.
3. To verify the truth tables of RS, JK and D flip- flops.
4. To design and study a binary counter.
5. To design and study synchronous counter.
6. To design and study ripple counter.
7. To convert BCD number into excess 3 form
8. To design and study a decade counter.
9. To design and study a sequence detector.
10. To implement control circuit using multiplexer.

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

CSE2310	ELECTRONIC DEVICES & CIRCUITS	L	T	P	C
Version:2017.1	Date of Approval: 14 th June 2017	3	0	0	3
Pre-requisites/Exposure	Elementary Resistive Circuit, Theorems and Analysis Techniques: KCL, KVL, Nodal & Mesh Analysis, Thevenin & Norton Equivalents, Maximum Power Transfer.				
Co-requisites	Semiconductor Physics				

Catalog Description

This is the first course in Electronics and Communication Engineering, to educate and explain the methods used for biasing circuits in a graphical analysis of non-linear electronic circuits and also includes small signal transistor models, parameters and their frequency responses. Following this, analyzing different types of feedback amplifiers, and power amplifiers using transistor and designing of different electronic circuits are included in the course. This course also considers the mathematical modeling of active solid state devices their analysis and design of single state circuits. Topics covered include the study of device characteristics and applications of p-n-junction diodes, bipolar junction transistors, and field effect transistors.

Course Objectives

The objective of this course is to

1. build from basic knowledge of Semiconductor Physics to an understanding of basic devices and their models
2. familiarize the student with the analysis and design of basic transistor amplifier circuits, feedback amplifiers and wave shaping circuits
3. build a foundation for Analog Electronics-II, Digital Circuits and Systems I & II, VLSI design and analog CMOS IC Design.

Course Outcomes

On completion of this course, the students will be able to

- CO1. explain different types of diodes and demonstrate wave shaping circuits
- CO2. explain operating principal of Bipolar Junction Transistor, its properties, biasing techniques and stability
- CO3. describe low and high frequency transistor amplifiers along with single and multi-stage amplifier
- CO4. explain operating principal of JFET, MOSFET, its properties, and biasing techniques
- CO5. solve and analyse different negative feedback amplifiers configurations
- CO6. describe and outline power amplifiers and their application.

Modules	Blooms level*	Number of hours
Module I: Semiconductor Diode and Diode Circuits Different types of diodes: Zener, Schottky, LED. Zener as voltage regulator, Diffusion capacitance, Drift capacitance, the load line concept, half wave, full wave rectifiers, clipping and clamping circuits.	L1 L2 & L3	6
Module II: Bipolar Junction Transistor Bipolar junction transistor: Introduction, Transistor, construction, transistor operations, BJT characteristics, load line, operating point, leakage currents, saturation and cut off mode of operations. Bias	L1 L2 & L3	9

stabilization: Need for stabilization, fixed Bias, emitter bias, self bias, bias stability with respect to variations in I_{co} , V_{BE} & β , Stabilization factors, thermal stability.		
Module III: Small signal Analysis of transistor and Multistage Amplifier Hybrid model for transistors at low frequencies, Analysis of transistor amplifier using h parameters, emitter follower, Miller's theorem, THE CE amplifier with an emitter resistance, Hybrid π model, Hybrid π Conducances and Capacitances, CE short circuit current gain, CE short circuit current gain with R_L Multistage amplifier: Cascading of Amplifiers, Coupling schemes(RC coupling and Transformer coupling)	L2 & L3	6
Module IV: Field Effect Transistors Field effect transistor (JFET, MOSFET): volt-ampere characteristics, small signal model –common drain, common source, common gate, operating point, MOSFET, enhancement and -depletion mode, Common source amplifier, Source follower	L1, L2 & L3	5
Module V: Feedback Amplifiers Feedback concept, Classification of Feedback amplifiers, Properties of negative Feedback amplifiers, Impedance considerations in different Configurations, Examples of analysis of feedback Amplifiers.	L1, L2, L3 & L4	6
Module VI: Power amplifiers Power dissipation in transistors, difference with voltage amplifiers, Amplifier classification (Class A, Class B, Class C, Class AB) class AB push pull amplifier, collector efficiency of each, cross over distortion.	L1 & L2	4

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

- Jacob Millman, Christos Halkias, Chetan Parikh, Millman's Integrated Electronics, McGraw Hill Education, 2nd Edition, New Delhi
- Sanjeev Gupta, Electronic Devices and Circuits, Dhanpat Rai Publications, 2010
- Theraja B.L., Sedha R.S, Principles of Electronic Devices and Circuits, S Chand & Company, First Edition, New Delhi, 2002

Reference Books

- Robert L. Boylestad: Electronic Devices and Circuits, Pearson Education, 11th Edition, 2013
- Robert F. Pierret, Semiconductor Device Fundamentals, Pearson Education, 1st Edition, 2006
- Nagrath I.J, Electronics: Analog and Digital, Prentice Hall India Learning Private Limited, Second Edition, 2013

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	2	3	--	--	--	--	--	--	--	--	3	1	--	--	3
CO2	1	2	--	--	--	--	--	--	--	--	--	3	1	3	--	3
CO3	1	2	3	--	--	--	--	--	--	--	--	--	1	-	--	--
CO4	1	2	--	--	--	--	--	--	--	--	--	3	1	3	--	3
CO5	1	2	3	--	--	--	--	--	--	--	--	3	1	--	--	3
CO6	1	3	--	--	--	--	--	--	--	--	--	3	1	--	--	3

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ELECTRONIC DEVICES & CIRCUITS LAB

Course Code: CSE2311

Credit Units: 01

Course Contents:

1. To study and plot the characteristics of a junction diode.
2. To study Zener diode as a voltage regulator.
3. To study diode based clipping and clamping circuits.
4. To study half wave, full wave and bridge rectifier with filters.
5. To study the input and output characteristics of a transistor in its various configurations.
6. To study and plot the characteristics of a JFET in its various configurations.
7. To study and plot the characteristics of a MOSFET in its various configurations.
8. To study various types of Bias Stabilization for a transistor.
9. To study the gain and plot the frequency response of a single stage transistor amplifier.
10. To measure gain and plot the frequency response of double stage RC coupled amplifier.

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

CSE2312	E-COMMERCE AND ERP	L	T	P	C
Version 2017.1	Date of Approval:14, June 2017	3	1	0	4
Pre-requisites/Exposure	Knowledge of basic computer				
Co-requisites	Nil				

Catalog Description

This course examines the evolution of enterprise resource planning (ERP) systems - from internally focused client/server systems to externally focused e-business. This class studies the types of issues that managers will need to consider in implementing cross-functional integrated ERP systems. The objective of this course is to make students aware of the potential and limitations of ERP systems. This objective will be reached through hands-on experience, case studies, lectures, guest speakers and a group project. The course would equip students with the basics of E-Commerce, technologies involved with it and various issues associated with.

Course Objectives

The objective of this course is to

1. Understand the students with the role of consultants, vendors and employees.
2. Provide an overview of various phases in ERP implementation and identify various technologies used in ERP.

Course Outcomes

On completion of this course, the students will be able to

- CO1: Describe the key features of Internet, Intranets and Extranets and explain how they relate to each other. Demonstrate an understanding of the foundations and importance of E-commerce and assess electronic payment systems.
- CO2: Understand concepts of reengineering, data mining, data warehousing and how they relate to ERP system implementations.
- CO3: Explain the challenges associated with implementing enterprise systems and their impacts on organizations.
- CO4: Describe the selection, acquisition and implementation of enterprise systems and demonstrate an ability to work independently and in a group.
- CO5: Identify and describe typical functionality in an ERP system.
- CO6: Analyze the strategic options for ERP identification and adoption.

Modules	Blooms level*	Number of hours
MODULE 1: INTRODUCTION AND CONCEPTS: Networks and commercial transactions - Internet and other novelties; Networks and electronic transactions today, Model for commercial transactions; Internet environment - internet advantage, world wide web and other internet sales venues; Online commerce solutions. Security Technologies: Why is internet insecure? A brief introduction to Cryptography; Public key solution. Digital payment systems; First virtual internet payment system; cyber cash model Operational process of Digicash, Ecash Trail; Using Ecash; Smart cards; Electronic Data Interchange: Its basics; EDI versus Internet and EDI over Internet.	L1, L2 and L3	8

MODULE 2: INTRODUCTION ERP An Overview, Enterprise-An Overview, Benefits of ERP, ERP and Related Technologies, Business Process Reengineering (BPR), Data Warehousing, Data Mining, On-line Analytical Processing (OLAP), Supply Chain Management, Management Information systems (MIS), Decision support system (DSS), Executive Information systems (EIS). ERP – A Manufacturing Perspective Materials Requirement Planning (MRP), Bill of Material (Bom), Distribution Requirements Planning (DRP), JIT & Kanban, CAD/CAM, Product Data Management (PDM), Benefits of PDM, MTO, MTS, ATO, ETO, CTO.	L1,L2 and L3	10
MODULE 3: ERP IMPLEMENTATION To be or not to be, ERP Implementation Lifecycle, Implementation Methodology, Not all Packages are Created Equal!, ERP Implementation-The Hidden Costs, Organizing the Implementation, Vendors, Consultants and Users, Contracts with Vendors, Consultants and Employees, Project Management and Monitoring, After ERP Implementation.	L1,L2 and L3	8
MODULE 4: THE BUSINESS MODULES Business Modules in an ERP Package, Finance, Manufacturing (Production), Human Resources, Plant Maintenance, Materials Management, Quality Management, Sales and Distribution	L1,L2 and L3	8
MODULE 5: THE ERP MARKET ERP Market Place, SAP AG, PeopleSoft, Baan Company, JD Edwards World Solutions Company, Oracle Corporation, QAD, System Software Associates, Inc (SSA) ERP-Present and Future Turbo Charge the ERP System, Enterprise Integration Applications (EIA), ERP and E-Commerce, ERP and Internet, Future Directions in ERP, Appendices"	L2, L3 and L4	8
MODULE 6: BENEFITS OF ERP Time Reduction, Resource Utilization, Performance, Customer Satisfaction, Flexibility, Quality, Accuracy.	L1,L2 and L3	6

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Text Books

- Alexis Leon, “Enterprise Resource Planning”, 4th Edition, TMH,2012.

Reference Books

- Daniel E.O’Leary, “Enterprise Resource Planning Systems,” Cambridge University Press, 2012.
- Ellen Monk, Bret Wagner, “Concepts in Enterprise resource planning,” Cengage learning, 4th edition, 2012.

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Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination
Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

A: Attendance, CT: Class Test, S/V/Q: Seminar/Viva/Quiz, HA: Home Assignment, EE: End Semester Examination

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS O 1	PS O 2	PS O 3	PS O 4
CO 1	--	2	--	--	--	--	--	3	--	--	1	2	--	1	2	--
CO 2	--	--	--	-	--	--	--	--	--	--	1	2	--	1	2	--
CO 3	--	2	--	-	-	--	--	--	2	--	1	2	--	--	1	--
CO 4	1	1	2	--	--	--	--	--	1	1	1	2	--	--	1	--
CO 5	--	1	1	--	--	--	--	--	--	1	1	2	3	--	--	2
CO 6	--	--	--	--	--	--	--	--	--	1	1	3	--	--	1	--

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CSE2412	ARTIFICIAL INTELLIGENCE	L	T	P	C
Version 2017.1	Date of Approval: 14, June 2017	3	0	0	3
Pre-requisites/Exposure	Exposure to data structure and programming and an ability to discuss algorithms is the only pre-requisite.				
Co-requisites	Nil				

Catalog Description

Introduction to computational models of thought and construction of intelligent information systems. Topics include search algorithms, data dependencies and truth-maintenance systems, approaches to knowledge representation, automated deduction, reasoning under uncertainty, and machine learning. The field of Robotics is a multi-disciplinary as robots are amazingly complex system comprising mechanical, electrical, electronic H/W and S/W and issues germane to all these.

Course Objectives

The objective of this course is to

1. Provide an overview of problem solving skills methods using Artificial Intelligence.
2. Equip the students with the study of programming languages that is used to develop an Intelligence System.

Course Outcomes

On completion of this course, the students will be able to

- CO1: Explain how Artificial Intelligence enables capabilities that are beyond conventional technology, for example, chess-playing computers, self-driving cars, robotic vacuum cleaners and Understand the various searching techniques.
- CO2: Attain the capability to represent various real life problem domains using logic based techniques and use this to perform inference or planning.
- CO3: Acquire the knowledge of real world Knowledge representation. Apply concept Natural Language processing to problems leading to understanding of cognitive computing.
- CO4: Use different machine learning techniques to design AI machine and Write algorithms and implement programs in 'Prolog' language.
- CO5: Explain some of the more advanced topics of AI such as Robotics and Explain what constitutes "Artificial" Intelligence and how to identify systems with Artificial Intelligence.

Modules	Blooms level*	Number of hours
MODULE 1: PROBLEM SOLVING AND SCOPE OF AI Introduction to Artificial Intelligence. Applications- Games, theorem proving, natural language processing, vision and speech processing, robotics, expert systems. AI techniques- search knowledge, abstraction. PROBLEM SOLVING State space search; Production systems, search space control: depth-first, breadth-first search. Heuristic search - Hill climbing, best-first search, branch and bound. Problem Reduction, Constraint Satisfaction End, Means-End Analysis. LA* Algorithm, L(AO*) Algorithm.	L1, L2, L3 and L4	10
MODULE 2: KNOWLEDGE REPRESENTATION Knowledge Representation issues, first order predicate calculus, Horn Clauses, Resolution, Semantic Nets, Frames, Partitioned Nets, Procedural Vs Declarative knowledge, Forward Vs Backward Reasoning.	L1, L2 and L4	6
MODULE 3: UNDERSTANDING NATURAL LANGUAGES Introduction to NLP, Basics of Syntactic Processing, Basics of Semantic Analysis, Basics of Parsing techniques, context free and transformational grammars, transition nets, augmented transition nets, Shanks Conceptual Dependency, Scripts, Basics of grammar free analyzers, Basics of sentence generation, and Basics of translation.	L1, L2 and L4	7
MODULE 4: EXPERT SYSTEM Need and justification for expert systems, knowledge acquisition, Case studies: MYCIN, R1 LEARNING Concept of learning, learning automation, genetic algorithm, learning by inductions, neural nets. Programming Language: Introduction to programming Language, LISP and PROLOG. HANDLING UNCERTAINTIES Non-monotonic reasoning, Probabilistic reasoning, use of certainty factors, Fuzzy logic.	L1, L2, L4 and L5	7
MODULE 5: INTRODUCTION TO ROBOTICS Fundamentals of Robotics, Robot Kinematics: Position Analysis, Dynamic Analysis and Forces, Robot Programming languages & systems: Introduction, the three levels of robot programming, requirements of a robot programming language, problems peculiar to robot programming languages.	L1, L2 and L3	6

*Bloom's Level:

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. E. Rich and K. Knight, "Artificial intelligence", TMH, 2nd ed., 1992.
2. N.J. Nilsson, "Principles of AI", Narosa Publ. House, 1990.
3. John J. Craig, "Introduction to Robotics", Addison Wesley publication.

4. Richard D. Klafter, Thomas A. Chmielewski, Michael Negin, "Robotic Engineering – An integrated approach", PHI Publication.
5. Tsuneo Yoshikawa, "Foundations of Robotics", PHI Publication

Reference Books

1. D.W. Patterson, "Introduction to AI and Expert Systems", PHI, 1992.
2. Peter Jackson, "Introduction to Expert Systems", AWP, M.A., 1992.
3. R.J. Schalkoff, "Artificial Intelligence - an Engineering Approach", McGraw Hill Int. Ed., Singapore, 1992.
4. M. Sasikumar, S. Ramani, "Rule Based Expert Systems", Narosa Publishing House, 1994.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	3	--	1	1	--	--	--	--	--	--	2	1	2	--	--
CO2	1	2	--	1	--	--	--	--	--	--	3	--	2	1	--	2
CO3	1	3	--	1	1	--	--	--	--	--	3	2	--	--	1	2
CO4	1	--	1	3	1	--	--	--	3	--	--	2	2	1	--	--
CO5	1	1	1	2	--	2	3	--	--	--	--	--	--	1	2	--

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CSE2413	ARTIFICIAL INTELLIGENCE LAB	L	T	P	C
Version2017.1	Date of Approval: 14, June 2017	0	0	2	1
Pre-requisites/Exposure	Basic Concepts of C and C++				
Co-requisites	Nil				

Catalog Description

PROLOG programs tell the computer what to do (declarative programming) rather than how to do it (procedural programming). PROLOG does this by making deductions and derivations, instigated by user-defined queries, from facts and rules stored in a database. The module teaches PROLOG as a practical programming tool, useful in solving various interesting problems especially in the Artificial Intelligence domain.

Course Objectives

The objective of this course is to

1. Provide an overview of a programming paradigm: programming by means of logic (also known as logic programming)
2. Provide an experience with development of AI application using PROLOG.

Course Outcomes

On completion of this course, the students will be able to

CO1: Use the basic knowledge of PROLOG programming in order to write simple PROLOG programs and explore more sophisticated PROLOG code on their own.

CO2: Use Prolog for developing artificial intelligence applications.

Modules/Topics Covered**	Blooms level*	Number of hours
1: INTRODUCTION TO PROLOG- SIMPLE FACTS, FACTS WITH ARGUMENTS. PROBLEM STATEMENT 1: <ul style="list-style-type: none"> • Convert the following into Prolog Equivalent: It is raining. This is a book. PROBLEM STATEMENT 2: <ul style="list-style-type: none"> • Convert the following into Prolog Equivalent: 1. The cakes are delicious. 2. Priya relishes coffee. 3. Edwin plays badminton. 	L1 and L3	4
2: DEFINING VARIABLES, MATCHING AND BACKTRACKING. PROBLEM STATEMENT 3: <ul style="list-style-type: none"> • Convert the sentences into Prolog Equivalent and answer the following questions: 1. Sun rises in east. 2. Dovey is a good girl. 3. Dora likes books. 4. Chin is an intelligent student? Query 1: Who is a good girl? Query 2: Dora likes What?	L1, L3 and L5	4

PROBLEM STATEMENT 4: <ul style="list-style-type: none"> Consider the following facts: <ol style="list-style-type: none"> parent (pam, bob). parent (tom, bob). parent (bob, ann). parent (tom, liz). <p>Query: Who is the parent of Whom? Or Find X and Y such that X is the parent of Y.</p>		
3: RULES. PROBLEM STATEMENT 5: <ul style="list-style-type: none"> Consider the given knowledge. Represent the knowledge into the PROLOG equivalence and answer the question using rules. <p>Joy is father of Jay. Jay is father of Sam. Sam is brother of Sue. Alvin is father of Ali. Sim is mother of Sam. Sis is mother of Alvin.</p> <p>Question: Who are Sue's parent?</p>	L1, L3 and L5	2
4: INPUT AND OUTPUT PREDICATES. PROBLEM STATEMENT 6: <ul style="list-style-type: none"> Write a code to print a message on the screen. Write a program to perform addition of two numbers. 	L1 and L3	2
5: CONTROL STRUCTURES AND RECURSION. PROBLEM STATEMENT 7: <ul style="list-style-type: none"> Write a code in PROLOG to design a calculator. PROBLEM STATEMENT 8: <ul style="list-style-type: none"> Write a code in PROLOG to find the largest number among two numbers. Write a code in PROLOG to find the largest number among three numbers. PROBLEM STATEMENT 9: <ul style="list-style-type: none"> Write a code in PROLOG to find the factorial of a number. PROBLEM STATEMENT 10: <ul style="list-style-type: none"> Write a code in PROLOG to print the Fibonacci series. 	L1, L3 and L5	8
6: Data Structure and Operations. PROBLEM STATEMENT 11: <ul style="list-style-type: none"> Create a LIST of 10 elements and print Head and Tail. Write a code in PROLOG to concatenate two strings. PROBLEM STATEMENT 12: <ul style="list-style-type: none"> Write a code in PROLOG to search an item from a given LIST. 	L1 and L3	4

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

**** Sample Programs provided are not limited to these only, can include others as desired.**

Text Books

- o E. Rich and K. Knight, "Artificial intelligence", TMH, 2nd ed., 1992.
- o Bratko, "PROLOG Programming for A.I.", 3rd Ed Ed., Addison Wesley, 2001.

Reference Books

- D.W. Patterson, "Introduction to AI and Expert Systems", PHI, 1992.
- R.J. Schalkoff, "Artificial Intelligence - an Engineering Approach", McGraw Hill Int. Ed., Singapore, 1992.

Examination Scheme:

IA					EE
Components	A	PR	LR	V	70
Weightage (%)	5	10	10	5	

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	--	--	--	2	1	--	--	--	--	--	--	3	--	1	--	--
CO2	--	--	1	2	--	3	--	--	2	--	3	--	--	1	2	--

1: strongly related, 2: moderately related and 3: weakly related



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CSE2420	DATA COMMUNICATION AND COMPUTER NETWORKS LAB	L	T	P	C
Version 2019.1	Date of Approval: 15 May, 2019	0	0	2	1
Pre-requisites/Exposure					
Co-requisites	Nil				

Catalog Description

The objective is to acquaint the students with the basics of data communication and networking. A structured approach to explain how networks work from the inside out is being covered. The physical layer of networking, computer hardware and transmission systems have been explained. In-depth application coverage includes email, the domain name system; the World Wide Web (both client- and server-side), routing protocols and data link layer protocols.

Course Objectives

The objective of this course is to

1. Equip the students with concepts of data communication and networking.
2. Provide an overview of various protocols and their configurations using networking devices and servers.

Course Outcomes

On completion of this course, the students will be able to

CO1: Demonstrate the use of Command Line Interface (CLI) and other features and Cisco Packet Tracer; describe and distinguish networking devices and transmission media.

CO2: Apply various application layer protocols capability on server device including DNS, DHCP, HTTP, SMTP and POP.

CO3: Construct network topology and operate routing protocols (RIP, OSPF and EIGRP) for end-to-end connectivity.

CO4: Illustrate the use of data link protocols-HDLC and PPP; determine network connectivity issues and fix them.

Modules	Blooms level*	Number of hours
LABORATORY SESSION 1 THE PHYSICAL LAYER <ul style="list-style-type: none"> • Introduction to different types of transmission media and cables. • Introduction to various networking devices and equipment. • Construct network topology and understand configuration of devices using Cisco Packet Tracer (tool). 	L2, L3	6
LABORATORY SESSION 2 THE APPLICATION LAYER <ol style="list-style-type: none"> 1. Configuration of Domain Name System (DNS) server using Cisco Packet Tracer. 2. Configuration of Dynamic Host Configuration Protocol (DHCP) server using Cisco Packet Tracer. 3. Configuration of mail server using Cisco Packet Tracer. 4. Configuration of web server using Cisco Packet Tracer. 	L3	6

LABORATORY SESSION 3 THE NETWORK LAYER 1. Configure Routing Information Protocol (RIP) using Cisco Packet Tracer. 2. Configure Open Shortest Path First (OSPF) routing protocol using Cisco Packet Tracer. 3. Configure Enhanced Interior Gateway Routing Protocol (EIGRP) using Cisco Packet Tracer.	L3	6
LABORATORY SESSION 4 DATA LINK LAYER 1. Configure and Analyse the working of data link control protocols-HDLC and PPP access. 2. Configure PPP security protocols-PAP and CHAP using Cisco Packet Tracer. 3. Determine various issues in network connectivity and communication using troubleshooting commands.	L3,L4	6

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. Cisco Networking Academy Programme CCNA 3 & 4 Lab Companion, 3rd Edition, Pearson Education, 2003.

Reference Books

1. Scott Empson, CCNA Routing and Switching portable command guide, 3rd Edition, Cisco Press, 2016.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	2	--	--	--	--	--	--	--	--	--	--	1	3	--	--
CO2	1	2	3	--	--	--	--	--	--	--	--	--	1	3	--	--
CO3	1	1	2	3	--	--	--	--	--	--	--	--	1	3	--	--
CO4	1	1	2	3	3	--	--	--	--	--	--	--	1	3	--	--
CO5	1	1	2	3	3	--	--	--	--	--	--	--	1	3	--	--

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CSE2410	ARTIFICIAL NEURAL NETWORK	L	T	P	C
Version 2017.1	Date of Approval: 14 th June 2017	2	-	1	2
Pre-requisites/Exposure	Basic Knowledge of Brain functioning				
Co-requisites	Nil				

Catalog Description

The course provides introduction to neural network and a deep insight into the basics of brain & its functioning basics of various neural models & neural schema used for learning. With this course students would be able to know the basics of each introductory feature of human brain and its features which would prove to be very helpful throughout their degree and would prove helpful in understanding other related subjects also.

Course Objectives

The objective of this course is to

1. Equip the students with concepts of learning of brain problem solving techniques and develop proficiency in creating neural structures using the MATLAB.
2. Provide an overview of various control statements, data structures, packages related to image addition, graphics, different types of neural models.

Course Outcome

On completion of this course, the students will be able to

CO 1: Define Artificial Neural Network & its similarity to biological neural network and explain its application in our day to day life.

CO 2: Analyze ANN learning, Error correction learning, Hebbian learning, Competitive learning and Boltzman Learning.

CO 3: Implement simple perceptron, Perceptron Learning rule, modified perceptron learning rule, feed forward neural network & feedback Neural Network.

CO 4: Explain self-organizing Map, Hopfield network, Adaptive resonance theory and its various learning rules.

CO 5: Analyze memory-based learning, Associative learning, Bi-directional learning and Auto associative learning.

Modules	Blooms level*	Number of hours
Module-I Artificial Neural Networks (ANN) and biological neural networks, supervised and unsupervised learning rules, neural network applications	L1, L2 and L3	6
Module-II Unsupervised learning:- Hebbian learning and competitive learning. Supervised learning:- Back propagation algorithms, Learning rule:- Delta learning rule, Widrow-Hoff learning rule, Winner-Take-All learning rule	L1, L2 and L3	6
Module-III Feed forward neural network, feed backward neural network, Perceptron and its learning law, single-layer perceptron, multi-layer perceptron.	L2, L3 and L4	6

Module-IV Self-organizing networks: Kohonen algorithm, Hopfield Networks: Hopfield network algorithm, Adaptive resonance theory: Network and learning rules.	L2, L3 and L4	6
Module V Associative memory, auto-associative memory, bi-directional associative memory.	L2, L3 and L4	6

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Book:

- o Kenji Suzuki (ed.) - InTech , 2013
- o Todd Troyer - University of Texas at San Antonio, 2005.

Reference Book:

- MATLAB 2017 Book released by MATWORS

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1												1			
CO2	1												1		1	
CO3		1	2										1			
CO4		1	2	1									1		1	
CO5			2										1			

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CSE2411	ARTIFICIAL NEURAL NETWORK LAB	L	T	P	C
Version 2017.1	Date of Approval: 14 th June 2017	0	0	1	1
Pre-requisites/Exposure	Basics of MATLAB				
Co-requisites	NIL				

Catalog Description

In this Lab course first student should learn about advanced level of software used for easy calculation and toolbox used for software like MATLAB.

Course Objectives

The objective of this course is to

1. Make the students apply knowledge of various neural models required for solving complex problems.
2. Provide a demonstration of different types of image processing techniques through MATLAB toolbox.

Course Outcomes

On completion of this course, the students will be able to

CO1: Acquiring knowledge of Basics of High-end calculation software and need in Computer Science & engineering

CO2: Demonstrate the All preliminary functions in MATLAB

CO3: Apply the knowledge of all the basics function and toolbox knowledge of MATLAB

CO4: Demonstrate the Neural Network model in MATLAB

CO5: Demonstrate usage of applications involving with Image processing & Its Toolbox used by MATLAB

Modules/Topics Covered**	Blooms level*	Number of hours
1. Introduction of MATLAB (a) Basic Variable declaration & its operation (b) Function use & its application	L3, L5	4
2. Sample Programs in MATLAB (a) Basic use of Matrix and Graph Plotting (b) Different type of graph plotting with use of different -2 type of data	L3, L5	6
3. Sample Programs using MATLAB functions (a) Create a basic program MATLAB using functions (b) Use of basic function Image processing (c) Practice on Basic function of Image processing tool box.	L3, L5	6
4. Sample programs of ANN functions (a) Practice on ANN toolbox function in MATLAB (b) Write a program for training a small network in MATLAB	L3, L5	6
5. Sample Programs using ANN tool box & Image processing toolbox (a) Demonstrate the use of ANN tool box & Image processing toolbox and write a program after combining it.	L3, L5	2

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

**** Sample Programs provided are not limited to these only, can include others as desired.**

Text Books

1. Kenji Suzuki (ed.) - InTech , 2013
2. Todd Troyer - University of Texas at San Antonio , 2005

Reference Books

1. MATLAB 2017 Book released by MATWORS.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

IA					EE
Components	A	PR	LR	V	70
Weightage (%)	5	10	10	5	

Note: IA –Internal Assessment, A – Attendance, PR – Performance, LR – Lab Record, V – Viva, EE- External Exam

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	2	1	--	--	--	--	--	--	--	--	--	--	2	--	--	--
CO2	3	1	--	--	--	--	--	--	--	--	--	--	1	2	--	--
CO3	2	1	2	--	--	--	--	--	--	--	--	--	1	2	--	--
CO4	1	3	2	--	--	--	--	--	--	--	--	--	2	--	2	--
CO5	1	3	--	--	--	--	--	--	--	--	--	--	1	--	--	--

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CSE2414	COMMUNICATION SYSTEM	L	T	P	C
Version 2017.1	Date of Approval: 14 July 2017	3	0	0	3
Pre-requisites/Exposure	Signal and System				
Co-requisites					

Catalog Description

The purpose of this course is to introduce students to the basic principles of the design and analysis of modern communication systems. It will provide a thorough study of both analog and digital modulation and demodulation schemes. The performance analysis of various techniques based on requirements of noise and bandwidth will also be explained. It also introduces the students to the information theory and coding for basic understanding of mobile communication system.

Course Objectives

The objective of this course is to

1. Provide a thorough introduction to analog and digital communications
2. Provide in depth study of various modulation and demodulation techniques.
3. Introduce students to basics of information theory and coding for applications in mobile communication.

Course Outcomes

On completion of this course, the students will be able to

CO1. Define and Distinguish analog and digital communication systems.

CO2. Differentiate modulation and demodulation techniques of AM and FM systems and compare them in terms of Bandwidth and noise.

CO3. Distinguish and categorize various digital modulation techniques.

CO4. Describe Information theory and coding for applications in mobile communication system by solving different encoding problems.

Modules	Blooms level*	Number of hours
MODULE I: INTRODUCTION Communication Process, Source of Information, base-band and pass-band signals, Review of Fourier transforms, Random variables, different types of PDF, need of modulation process, analog versus digital communications	L1 and L2	4
MODULE II: AMPLITUDE MODULATION Amplitude modulation with full carrier, suppressed carrier systems, single side band transmission, switching modulators, synchronous detection, envelope detection, effect of frequency and phase errors in synchronous detection, comparison of various AM systems, vestigial side band transmission.	L1, L2, L3 and L4	8
MODULE III: ANGLE MODULATION	L1, L2, L3 and L4	9

Narrow and wide band FM, BW calculations using Carson rule, Direct & Indirect FM generations, phase modulation, Demodulation of FM signals, noise reduction using pre & de-emphasis.		
MODULE IV: PULSE MODULATION Pulse amplitude, width & position modulation, generation & detection of PAM, PWM & PPM, Comparison of frequency division and time division multiplexed systems. Basics of Digital Communications: ASK, PSK, FSK, QPSK basics & waveform with brief mathematical introduction	L1, L2, L3 and L4	6
MODULE V: NOISE Different types of noise, noise calculations, equivalent noise band width, noise figures, effective noise temperature, noise figure.	L1 and L2	4
MODULE VI: INTRODUCTION TO INFORMATION THEORY Measurement of Information, mutual, Shannon's theorem, Source coding, channel coding and channel capacity theorem, Huffman code	L1, L2 and L3	5

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. B. P. Lathi and Zhi Ding, "Modern Digital and Analog Communication Systems", Fourth Edition, Oxford University Press, 2009
2. Wayne Tomasi, "Electronic Communication systems", 5th edition, Pearson Education, 2008

Reference Books

1. Simon Haykin, "Communication Systems", Third Edition, John Wiley & Sons, 2007
2. Taub and schilling, "Principles of Communication Systems", Third Edition, TMH, 2008

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	--	--	--	--	2	--	--	--	--	--	--	1	--	1	--
CO2	1	3	2	--	--	2	--	--	--	--	--	--	1	--	1	--
CO3	1	3	2	--	--	2	--	--	--	--	--	--	1	--	1	--
CO4	1	2	2	--	--	3	--	--	--	--	--	--	1	--	1	--

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COMMUNICATION SYSTEMS LAB

Course Code: CSE2415

Credit Units: 01

List of Experiments:

1. To study the sampling and reconstruction of a given signal.
2. To study amplitude modulation and demodulation.
3. To study frequency modulation and demodulation.
4. To study time division multiplexing.
5. To study pulse amplitude modulation.
6. To study delta and adaptive delta modulation and demodulation.
7. To study carrier modulation techniques using amplitude shift keying and Frequency shift keying.
8. To study carrier modulation techniques using binary phase shift keying and differential shift keying.
9. To study pulse code modulation & differential pulse code modulation as well as relevant demodulations.
10. To study quadrature phase shift keying & quadrature amplitude modulation.

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

CSE2422	WEB DESIGNING TECHNOLOGIES	L	T	P	C
Version: 2019.1	Date of Approval: 15 May 2019	2	0	2	3
Pre-requisites/Exposure	knowledge of Internet fundamentals				
Co-requisites	NIL				

Catalog Description

The objective of this course is to introduce the basic concepts of HTML5 and CSS3. To explore and implement the various concepts of website design using HTML with the concept of the tags, script, and code that create web pages. To understand how the web and web pages work and web pages styles using CSS3. After completing this course students can easily develop static web sites and style them using CSS3.

Course Objectives

The objective of this course is

1. Understand the advanced features of HTML5 which includes images, links, tables, frames and forms etc and gives an overview of CSS3 which is used to add style to the web pages.
2. Demonstrate the application of HTML5 in developing solutions to web site creation and understanding how CSS will affect web page creation.
3. Design a responsive web site using HTML5 and CSS3.

Course Outcomes

On completion of this course, the students will be able to

CO 1: Explain the basic concepts of HTML, structure of HTML. Apply the different tags for images, hypertext and lists in web pages.

CO 2: Illustrate the different ways to use styles in web pages using CSS? Apply CSS style sheets for formatting text in web pages.

CO 3: Explain the layout of CSS style and describe how to add audio and video in html web pages.

CO 4: Demonstrate the use of Table and frames in web pages and setting properties for tables and frames.

CO 5: Explain the writing scripts in web pages and publishing Webpages on web.

Modules	Blooms level*	Number of hours
Module I History of HTML, Basic HTML Structure, Creating title, Creating header and footer, Adding Comments, Formatting Text, Specifying time, Indicating citations/references, quotes, abbreviations, pre-formatted text, Inserting Images, Creating Image Links, Scaling images with the browser, setting icons for web page, Creating hypertext, anchor tag, Creating List, Creating Definition List, Creating Hyper Text Links, Creating Link Lists.	L2 and L3	8

Module II CSS building blocks, working with style sheets, Creating different types of style sheets- External , embedded and inline style sheets, defining selectors , Selecting on basis of class and id, selecting elements based on the attributes, combining selectors, Formatting text with styles, setting font properties.	L3 and L4	7
Module III CSS: Layout with style, changing the background color, setting border, changing the cursor, style sheets for mobile to desktop, working with web fonts, creating forms, organizing the form elements. Adding audio , video and other multi-media .	L2 and L3	7
Module IV Tables and frames, Creating Tables, Table Element, Adding Border, Adding Column Headings, Adding Spacing and Padding, Adding a Caption, Setting the table Width and Height, Add Row Headings, Aligning Cell contents, Setting Column Width, Centering a Table, Inserting and Image, Spanning Columns, Spanning Rows Assigning Background Colors, Frame Elements, Creation of Frame Based Pages.	L3	7
Module V: Working with scripts : Loading an external script, testing & debugging web pages, publishing your web page on the web.	L2	7

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books:

1. HTML HTML5 and CSS3, Seventh Edition: Visual QuickStart Guide ,Elizabeth Castro and Bruce Hyslop.
2. HTML, XHTML and CSS Bible, Steven M. Schefar, Wiley Publishing, Inc.

Reference Books:

1. HTML & CSS: The Complete Reference, Fifth Edition ,Thomas A. Powell, Tata McGraw Hill.
2. HTML5: Up and Running ,Mark Pilgrim, O'Reilly Media, Inc.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS O 1	PS O 2	PS O 3	PS O 4
CO 1	--	--	1	--	1	--	--	--	--	1	--	--	1	--	--	--
CO 2	--	--	2	--	2	--	--	--	--	1	--	--	1	--	--	--
CO 3	--	--	1	--	1	--	--	--	--	2	--	--	1	--	--	--
CO 4	--	--	2	--	1	--	--	--	--	2	--	--	1	--	--	--
CO 5	--	--	1	--	2	--	--	--	2	1	--	--	1	1	--	2

1: strongly related, 2: moderately related and 3: weakly related

CSE2423	WEB DESIGNING TECHNOLOGIES LAB	L	T	P	C
Version: 2019.1	Date of Approval: 15 May 2019	0	0	2	1
Pre-requisites/Exposure	knowledge of Internet fundamentals				
Co-requisites	NIL				

Catalog Description

The objective of this course is to introduce the basic concepts of HTML5 and CSS3. To explore and implement the various concepts of website design using HTML with the concept of the tags, script, and code that create web pages. To understand how the web and web pages work and web pages styles using CSS3. After completing this course students can easily develop static web sites and style them using CSS3.

Course Objectives

The objective of this course is

1. Understand the advanced features of HTML5 which includes images, links, tables, frames and forms etc and gives an overview of CSS3 which is used to add style to the web pages.
2. Demonstrate the application of HTML5 in developing solutions to web site creation and understanding how CSS will affect web page creation.
3. Design a responsive web site using HTML5 and CSS3.

Course Outcomes

On completion of this course, the students will be able to

- CO 1: Explain the basic concepts of HTML, structure of HTML. Apply the different tags for images, hypertext and lists in web pages.
- CO 2: Illustrate the different ways to use styles in web pages using CSS? Apply CSS style sheets for formatting text in web pages.
- CO 3: Explain the layout of CSS style and describe how to add audio and video in html web pages.
- CO 4: Demonstrate the use of Table and frames in web pages and setting properties for tables and frames.
- CO 5: Explain the writing scripts in web pages and publishing Webpages on web.

Modules	Blooms level*	Number of hours
Module I Programs based on : <ul style="list-style-type: none"> • Basic HTML Structure, Creating title, Creating header and footer, Adding Comments, • Formatting Text, Specifying time, Indicating citations/references, quotes, abbreviations, • pre-formatted text, Inserting Images, Creating Image Links, Scaling images with the browser, • setting icons for web page, Creating hypertext, anchor tag, Creating List, • Creating Definition List, Creating Hyper Text Links, Creating Link Lists. 	L2 and L3	6

Module II & Module III Programs based on: <ul style="list-style-type: none"> • CSS style sheets, Creating different types of style sheets- External , embedded and inline style sheets, • Selection on basis of class and id, selecting elements based on the attributes, combining selectors, • Formatting text with styles, setting font properties. • Changing the background color, setting border, changing the cursor, • style sheets for mobile to desktop, • working with web fonts, creating forms, organizing the form elements. Adding audio , video and other multi-media . 	L2,L3 and L4	4
Module IV Programs based on: <ul style="list-style-type: none"> • Tables and frames, Creating Tables, Table Element, Adding Border, Adding Column Headings, • Adding Spacing and Padding, Adding a Caption, Setting the table Width and Height, Add Row Headings, • Aligning Cell contents, Setting Column Width, Centering a Table, Inserting and Image, • Spanning Columns, Spanning Rows Assigning Background Colors, • Frame Elements, Creation of Frame Based Pages. 	L3	4
Module V: Programs based on Working with scripts : Loading an external script, testing & debugging web pages, publishing your web page on the web.	L2	1

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books:

1. HTML HTML5 and CSS3, Seventh Edition: Visual QuickStart Guide ,Elizabeth Castro and Bruce Hyslop.
2. HTML, XHTML and CSS Bible, Steven M. Schefar, Wiley Publishing, Inc.

Reference Books:

1. HTML & CSS: The Complete Reference, Fifth Edition ,Thomas A. Powell, Tata McGraw Hill.
2. HTML5: Up and Running ,Mark Pilgrim, O'Reilly Media, Inc.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS O 1	PS O 2	PS O 3	PS O 4
CO 1	--	--	1	--	1	--	--	--	--	1	--	--	1	--	--	--
CO 2	--	--	2	--	2	--	--	--	--	1	--	--	1	--	--	--
CO 3	--	--	1	--	1	--	--	--	--	2	--	--	1	--	--	--
CO 4	--	--	2	--	1	--	--	--	--	2	--	--	1	--	--	--
CO 5	--	--	1	--	2	--	--	--	2	1	--	--	1	1	--	2

1: strongly related, 2: moderately related and 3: weakly related



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CSE2502	COMPUTER ARCHITECTURE	L	T	P	C
Version 2017.1	Date of Approval: 14 th June 2017	3	1	0	4
Pre-requisites/Exposure	Logic Gates				
Co-requisites	nil				

Catalog Description

Computer architecture is concerned with the structure and behavior of the various functional modules of the computer and how they interact to provide the processing needs of the user. It includes basic register transfer language and computer organization and design. Complete insight on the working of CPU, Memory and I/O communication will be provided. Pipelining and related topics will also be discussed.

Course Objectives

The objective of this course is to

1. Equip the students with concepts of computer architectures and their modules.
2. Provide an overview of various algorithms used and hardware implementation computer.

Course Outcomes

On completion of this course, the students will be able to

- CO1. Explain about Register transfer language and various micro operations of arithmetic logic unit.
- CO2. Explain about the organization of computer modules and their details.
- CO3. Explain in details of central processing unit like general purpose register, accumulator etc. and computer arithmetic.
- CO4. Explain memory organization of computer and their interconnections. Details of direct memory access.
- CO5. Explain parallel processing and pipeline techniques.

Modules	Blooms level*	Number of hours
Module I: Register Transfer Language Register Transfer, Bus and Memory Transfers, Arithmetic Micro-operations, Logic Micro-operations, Shift Micro-operations, Arithmetic Logic shift Unit.	L1, L2 and L3	10
Module II: Basic Computer Organizations and Design Instruction Codes, Computer Registers, Computer Instructions, Timing and Control, Instruction Cycle, Memory-Reference Instructions, Input-Output and Interrupt, Design of Accumulator Logic. Hardwired and Microprogrammed control: Control Memory, Address Sequencing, Design of Control Unit	L1,L2	9
Module III: Central Processing Unit Introduction, General Register Organization, Stack Organization, Instruction representation, Instruction Formats, Instruction type, Addressing Modes, Data Transfer and Manipulation, Program Control, Reduced Instruction Set Computer RISC and CISC Computer Arithmetic: Introduction, Addition and Subtraction Algorithm, Multiplication Algorithms, Booth Multiplication, Division Algorithms, Floating-Point Arithmetic Operations	L1,L2, L3	10

Module IV: Memory and Intersystem Communication and Input output organisation Memory: Memory types and organization Memory Hierarchy, Main Memory, Auxiliary Memory, Associative Memory, Cache Memory with mapping techniques, Virtual Memory, Memory Management Hardware Intrasystem communication and I/O: Peripheral Devices, Input-Output Controller and I/O driver, IDE for hard disk, I/O port and Bus concept, Bus cycle, Synchronous and asynchronous transfer, Modes of Transfer, DMA, DMA Transfer, DMA Controller, I/O Processor, CPU-IOP Communication	L1,L2, L3.	10
Module V: Pipelining, Vector Processing and Multiprocessors Parallel Processing, Pipelining, Arithmetic Pipeline, Instruction Pipeline, RISC Pipeline Multiprocessors: Characteristics of Multiprocessors	L1 and L2	9

*Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Book:

1. Morris Mano, Computer System Architecture, 3rd Edition – 1999, Prentice-Hall of India Private Limited.
2. Harry & Jordan, Computer Systems Design & Architecture, Edition 2000, Addison Wesley, Delhi.

References Books:

1. William Stallings, Computer Organization and Architecture, 4th Edition-2000, Prentice-Hall of India Private Limited.
2. Kai Hwang-McGraw-Hill, Advanced Computer Architecture.
3. John D. Carpinelli, Computer system Organization & Architecture, Edition 2001, Addison Wesley, Delhi
4. M. Morris Mano and Charles, Logic and Computer Design Fundamentals, 2nd Edition Updated, Pearson Education, ASIA.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	ATT	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

ATT: Attendance, CT: Class Test, S/V/Q: Seminar/Viva/Quiz, HA: Home Assignment, EE: End Semester Examination.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS O 1	PS O 2	PS O 3
CO 1	1	2	3	3	--	--	--	--	--	--	--	--	2	1	--
CO 2	1	--	--	--	--	--	--	--	--	--	--	--	--	2	--
CO 3	1	2	3	3	--	--	--	--	--	--	--	--	2	1	--
CO 4	1	2	3	3	--	--	--	--	--	--	--	--	2	1	--
CO 5	1	--	--	--	--	--	--	--	--	--	--	--	--	1	--

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CSE2503	JAVA PROGRAMMING	L	T	P	C
Version 2017.1	Date of Approval: 14 th June 2017	3	0	0	3
Pre-requisites/Exposure	Basics of Programming				
Co-requisites	NIL				

Catalog Description

The objective is to impart programming skills used in this object-oriented language java. The course explores all the basic concepts of core java programming like object, classes, data types, features, operators, control structures, interfaces, packages, applets, awt, swings and socket programming. The students are expected to learn it enough so that they can develop the basic applications as well as web solutions like creating applets etc.

Course Objectives

The objective of this course is to

1. Equip the students with the basic feature of contemporary java required in solving complex problems.
2. Provide a practical knowhow and implementation of java programming concepts like classes, objects, packages, swings, socket programming.

Course Outcomes

On completion of this course, the students will be able to

- CO1: Define and explain concept of byte code and platform independence, demonstrate basic java-based application development using operators, if-else, loops and arrays.
- CO2: Distinguish between various types of inheritances, polymorphisms and other concepts and able to solve complex programming problems involving class objects, inheritances, and packages.
- CO3: Describe hierarchy of exception classes and thread life cycle along with demonstrate and design solutions for some simple and complex applications using exception and multithreading concepts.
- CO4: Explain event delegation model and describe AWT class hierarchy; Apply knowledge of event handling and AWT controls create some new dynamic graphical applications.
- CO5: Explain the architecture of applet and concept of swing package. Demonstrate applications based on java applets and swings.

Modules	Blooms level*	Number of hours
Module I: Java Basics Concepts of OOP, Features of Java, How Java is different from C++, Environmental setup, Basic syntax, Objects and classes, Basic Data Types, Variable Types, Modifier Types, Basic operators, Loop Control, Decision Making, Strings and Arrays, Methods, I/O.	L1, L2 and L3	6
Module II: Java Object Oriented Inheritance, Overriding, Polymorphism, Abstraction, Encapsulation, Interfaces, Packages, Exploring java.util package.	L2 and L3	7
Module III: Exception Handling and Threading Exception Hierarchy, Exception Methods, Catching Exceptions, Multiple catch Clauses, Uncaught Exceptions Java's Built-in	L2, L3 and L5	8

Exception. Creating, Implementing and Extending thread, thread priorities, synchronization suspending, resuming and stopping Threads, Multi-threading.		
Module IV: Event Handling And AWT Event handling Mechanism, Event Model, Event Classes, Sources of Events, Event Listener Interfaces, AWT: Working with Windows, AWT Controls, Layout Managers	L2, L3, L4 and L5	8
Module V: Java Advanced Applet Class, Architecture, Skeleton, Display Methods. Swings: Japplet, Icons, labels, Text Fields, Buttons, Combo Boxes. Socket Programming: Socket methods, Server Socket methods, Socket Client and Socket Server examples.	L2 and L3	7

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text:

- "JAVA The Complete Reference" by Patrick Naughton & Herbert Schild, 10th Edition, TMH
- "Introduction to JAVA Programming a primer", E. Balaguruswamy, 4th Edition, TMH

References:

- "Introduction to JAVA Programming" By Daniel/Young PHI
- "Java Script", By Jeff Frentzen and Sobotka, Tata McGraw Hill, 1999

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	2	1	--	--	--	--	--	--	--	--	--	--	2	--	--	--
CO2	3	1	--	--	--	--	--	--	--	--	--	--	1	2	--	--
CO3	2	1	2	--	--	--	--	--	--	--	--	--	1	2	--	--
CO4	1	3	2	--	--	--	--	--	--	--	--	--	2	--	2	--
CO5	1	3	--	--	--	--	--	--	--	--	--	--	1	--	--	--

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CSE2505	JAVA PROGRAMMING LAB	L	T	P	C
Version 2017.1	Date of Approval: 14 th June 2017	0	0	2	1
Pre-requisites/Exposure	Basics of Programming				
Co-requisites	NIL				

Catalog Description

In this Lab course the basic features of contemporary java are implemented and demonstrated. Problems or programs will be related to concepts of classes, objects, threads, packages, exception handling, applets, AWT control, swings and socket programming. Concepts covered would enable them to create basic and complex console and graphical based applications for desktop and Internet

Course Objectives

The objective of this course is to

1. Equip the students to apply knowledge of various basic java features required in solving basic and complex problems.
2. Provide a demonstration of basic java programming concepts like classes, objects, threads, packages, exception handling, applets, AWT control, swings and socket programming

Course Outcomes

On completion of this course, the students will be able to

- CO1: Apply the concepts learned of operators, if-else, loops and arrays to java based application development.
- CO2: Demonstrate the use of various types of inheritances, polymorphisms, class objects, inheritances, packages and other concepts to basic and complex java programming problems.
- CO3: Apply the knowledge of exception handling and multithreading concepts for some simple and complex applications.
- CO4: Apply knowledge of event handling and AWT controls to create some new dynamic graphical applications.
- CO5: Demonstrate graphical applications based on java applets, swings and event handling.

Modules/Topics Covered**	Blooms level*	Number of hours
1. Sample Programs using Objects and classes, Variable Types, Modifier Types, operators, Loops Decision Making, Strings and Arrays, (a) WAP to display "Hello, it's a first program in java". (b) WAP to find sum of two integers taken as input from user at runtime. (c) WAP to find sum of two float numbers taken as command line arguments (d) WAP to find changed case of entered character. (e) WAP to find maximum of 3 integer numbers taken as input from user at runtime. (f) WAP in java to find out the greatest out of ten numbers	L3, L5	6

<p>stored using arrays.</p> <p>(g) WAP to create class with “name” as String and “age” as integer data members. The class should have two methods to take input from user and display the data.</p> <p>(h) WAP to find factorial of a number using class and object.</p>		
<p>2. Sample Programs using Inheritance, Overriding, Polymorphism, Interfaces, Packages</p> <p>a. WAP in java to illustrate the concept of interfaces.</p> <p>b. WAP to create a package as MyPack having a class with three methods: max, fact and show. Use it in other folder with setting classpath and without setting class path.</p> <p>c. Write a program in java to showcase uses of super keyword</p>	L3, L5	4
<p>1. Sample Programs using exception handling and threads</p> <p>a) Write a program to demonstrate the use of nesting of try-catch block</p> <p>b) WAP in java to illustrate the concept of using multiple catch clauses to handle different types of exceptions.</p> <p>c) WAP in java to create a user defined Exception and throw it explicitly.</p> <p>d) Demonstrate thread using Thread class and Runnable interface</p> <p>e) Demonstrate various thread methods using a program</p>	L3, L5	6
<p>(a) Sample Programs using event handling and AWT controls</p> <p>(b) Write a program to display “hello” in different color where user clicks left mouse button and “world” where right mouse button is clicked. Use black background.</p> <p>(c) WAP in java to create a Frame and handle window-closing event implementing the WindowListener interface.</p> <p>(d) WAP to create an Applet having various different buttons, recognizing them using action command string method and handling click event generated by them.</p> <p>(e) WAP to create a frame and illustrate the concept of using an adapter class in place of interfaces for handling various mouse events generated over frame window.</p> <p>(f) WAP in java to create a frame with AWT controls (like label, push buttons, Checkbox, Checkbox Group) and handle various events generated by them.</p> <p>(g) WAP in java to create a frame with various AWT controls (like choice, list, TextField and Buttons) and handle the events thrown by them.</p>	L3, L5	6
<p>5. Sample Programs using applets, swings and stream socket</p> <p>a) . Write an applet which will display “HAPPY” and “DEEPAVALI” as: The word “HAPPY” will roll from top to bottom and “DEEPAVLI” from bottom to “top” . Both will run at the same speed and stop simultaneously at the center of the applet.</p> <p>b) Write an applet to display last 32 shades of red, green and blue in equal sized square grid accompanied by appropriate labels like” Last 32 shades of Red/Green/Blue color”. Make use of BorderLayout to apply border for each individual shade.</p>	L3, L5	2

c) Create an applet with one single button with caption "Click". On clicking the button will open a new Frame with title "Factorial". The frame will have two three controls :TextField, Label and button. On clicking button calculate the factorial entered in TextField control. d) Create Java programs to demonstrate day time client and server e) Create java programs to create echo client and server		
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**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

**** Sample Programs provided are not limited to these only, can include others as desired.**

Text:

1. "JAVA The Complete Reference" by Patrick Naughton & Herbert Schild, 10th Edition, TMH
2. "Introduction to JAVA Programming a primer", E. Balaguruswamy, 4th Edition, TMH

References:

1. "Introduction to JAVA Programming" By Daniel/Young PHI .
2. "Java Script", By Jeff Frentzen and Sobotka, Tata McGraw Hill, 1999

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

IA					EE
Components	A	PR	LR	V	35
Weightage (%)	5	10	10	5	

Note: IA –Internal Assessment, A – Attendance, PR – Performance, LR – Lab Record, V – Viva, EE- External Exam

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	2	1	--	--	--	--	--	--	--	--	--	--	2	--	--	--
CO2	3	1	--	--	--	--	--	--	--	--	--	--	1	2	--	--
CO3	2	1	2	--	--	--	--	--	--	--	--	--	1	2	--	--
CO4	1	3	2	--	--	--	--	--	--	--	--	--	2	--	2	--
CO5	1	3	--	--	--	--	--	--	--	--	--	--	1	--	--	--

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CSE2515	MICROPROCESSOR	L	T	P	C
Version 2019.1	Date of Approval: 15 May 2019	3	1	0	4
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

This course deals with the systematic study of the architecture and programming issues of 8085-microprocessor family. Explanation of microprocessor in terms of ALP and timing diagrams, Memory System Design & I/O Interfacing, peripheral devices and advance Pentium Processors.

Course Objectives

The objective of this course is to

1. Equip with concepts of microprocessor and interfacing with peripheral devices.
2. Provide an overview of advance microprocessors.

Course Outcomes

On completion of this course, the students will be able to

CO1: Describe the architecture of 8085 microprocessor.

CO2: Describe assembly language programming and show timing diagram for 8085 microprocessors.

CO3: Explain the input output interfacing with peripheral devices and design of memory system for 8085 microprocessors.

CO4: Describe the architecture of 8086 microprocessor and compare with 8085 microprocessors.

CO5: Explain the working principles and architecture of 8087, 80x86 and Pentium processors.

Modules	Blooms level*	Number of hours
Module I: Introduction to Microcomputer Systems Introduction to Microprocessors and microcomputers, Study of 8-bit Microprocessor, 8085 pin configuration, Internal Architecture and operations, interrupts, Stacks and subroutines, various data transfer schemes.	L1 and L2	8
Module II: ALP and timing diagrams Introduction to 8085 instruction set, advance 8085 programming, Addressing modes, Counters and time Delays, Instruction cycle, machine cycle, T-states, timing diagram for 8085 instruction.	L2 and L3	10
Module III: Memory System Design & I/O Interfacing Interfacing with 8085. Interfacing with input/output devices (memory mapped, peripheral I/O), Cache memory system. Study of following peripheral devices 8255, 8253, 8257, 8255, 8251.	L1 and L5	10
Module IV: Architecture of 16-Bit Microprocessor Difference between 8085 and 8086, Block diagram and architecture of	L1 and L2	10

8086 family, pin configuration of 8086, Minimum mode & Maximum mode Operation. Internal architecture of 8086, Bus Interface Unit, Register Organization, Instruction Pointer, Stack & Stack pointer, merits of memory segmentation, Execution Unit, Register Organization.		
Module V: Pentium Processors .Internal architecture of 8087, Operational overview of 8087, Introduction to 80186, 80286, 80386 & 80486 processors, Pentium processor.	L1 and L2	10

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

- Ramesh. S. Gaonkar, "Microprocessor architecture Programming and Application with 8085" Penram International Publishing, 4th Edition
- B. Ram, "Fundamentals of microprocessors and microcomputer" Dhanpat Rai, 5th Edition.

Reference Books

- M. Rafiquzzaman, "Microprocessor Theory and Application" PHI – 10th Indian Reprint.
- Naresh Grover, "Microprocessor comprehensive studies Architecture, Programming and Interfacing" Dhanpat Rai, 2003.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	2	3												1	1	
CO2	1	2	3		3									3	1	3
CO3			1		2						3	3		2	1	3
CO4	1	2	3												1	3
CO5	1	2	3												1	3

1: strongly related, 2: moderately related and 3: weakly related

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MICROPROCESSOR LAB

Course Code: CSE2517

Credit Units: 01

Course Contents:

1. To load the numbers 49H and 53H in the memory location 9510 and 9511
2. respectively and add the contents of memory location 9601
3. To write assembly language programming for 8 bit addition with and without carry.
4. To write assembly language programming for 8 bit subtraction with and without borrow.
5. To write assembly language programming for 8 bit multiplication and division.
6. To write assembly language programming for sorting an array of numbers in ascending and descending order.
7. To write assembly language programming with additional instructions.
8. To write and execute a program using stacks.
9. To study and program the programmable peripheral interface (8255) board.
10. To study and program the programmable interval timer (8253) board.
11. To study and program the programmable DMA controller (8257) board.
12. To study and program the programmable interrupt controller (8259) board.

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

CSE2535	SUMMER INTERNSHIP EVALUATION-I	L	T	P	C
Version: 2017.1	Date of Approval: 14 th June 2017	0	0	0	3
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

The objective of this course is to provide practical training on some live projects that will increase capability to work on actual problem in industry. This training may undergo in an industrial environment or may be an in-house training on some latest software which is in high demand in market. This training will be designed such that it will useful for their future employment in industry.

Course Objectives

The objective of this course is to

1. Provide practical training on live projects
2. Increase technical capabilities on solving real life problems in company environment

Course Outcomes

On completion of this summer internship, the students will be able to:

CO1: Develop communication, interpersonal and other critical skills in the job interview process.

CO2: Design and develop software and hardware projects

CO3: Assess interests and abilities in their field of study.

CO4: Demonstrate excellent technical and communication skills to acquire employment contacts leading directly to a full-time job following graduation from college.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	2	1	2	2	--	--	--	1	--	--	--	1	1	1	1
CO2	1	1	2	2	2	--	--	--	1	--	--	--	1	1	1	1
CO3	1	1	2	3	2	--	--	--	1	--	--	--	1	1	1	1
CO4	1	1	2	2	2	--	--	--	1	--	--	--	1	1	1	1

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VHDL PROGRAMMING

Course Code: CSE2506

Credit Units: 02

Course Objective:

VHDL is commonly used as a design-entry language for field-programmable gate arrays and application-specific integrated circuits in electronic design automation of digital circuits. The course aims to discuss the syntax of the language to model a digital system.

Course Contents:

Module I

Fundamental VHDL Units, LIBRARY Declarations, ENTITY, ARCHITECTURE, Introductory Examples, Specification of combinational systems using VHDL, Introduction to VHDL, Basic language element of VHDL, Behavioural Modeling, Data flow modeling, Structural modeling, Subprograms and overloading, VHDL description of gates.

Module II

Data Types; Pre-Defined Data Types, User-Defined Data Types, Subtypes, Arrays, Port Array, Records, Signed and Unsigned Data Types, Data Conversion

Module III: Sequential codes

PROCESS: Signals and Variables, IF, WAIT, CASE, LOOP, CASE versus IF, CASE versus WHEN, Bad Clocking, Using Sequential Code to Design Combinational Circuits
Description and design of sequential circuits using VHDL,

Module IV

Standard combinational modules, Design of a Serial Adder with Accumulator, State Graph for Control Network, design of a Binary Multiplier, Multiplication of a Signed Binary Number, Design of a Binary Divider.

Module V

Micro programmed Controller, Structure of a micro programmed controller, Basic component of a micro system, memory subsystem. Overview of PAL, PLA, FPGA, CPLD.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

Text:

- J. Bhaskar, "A VHDL Primer", Addison Wesley, 1999.
- Volnei A. Padroni, "Circuit Design with VHDL."
- M. Ercegovic, T. Lang and L.J. Moreno, "Introduction to Digital Systems", Wiley, 2000
- C. H. Roth, "Digital System Design using VHDL", Jaico Publishing, 2001

References:

- VHDL Programming by Examples by Douglas L. Perry, TMH, 2000
- Hardware Description Languages by Sumit Ghose, PHI, 2000
- The Designer Guide to VHDL by P.J. Ashendern; Morgan Kaufmann Pub. 2000
- Digital System Design with VHDL by Mark Zwolinski; Prentice Hall Pub. 1999
- Designing with FPGA & CPLDs by Zeidman; CMP Pub. 1999
- HDL Chip Design by Douglas J. Smith; Doone Pub. 2001

VHDL PROGRAMMING LAB

Course Code: CSE2507

Credit Units: 01

Software Required: Mentor Graphics

Topics covered in lab will include:

- Designing Basic Gates.
- Designing Combinational circuits like adder, multiplexer, PLA
- Designing Sequential Circuits like flip-flops, counters, registers.

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.



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CSE2518	ADVANCED WEB DESIGNING TECHNOLOGIES	L	T	P	C
Version 2019.1	Date of Approval: 15 May 2019	0	0	2	1
Pre-requisites/Exposure	Knowledge of Internet fundamentals				
Co-requisites	NIL				

Catalog Description

This course is aimed to provide a fundamental understanding of JavaScript and two of its related library: Bootstrap and React for dynamic web site client side scripting. Javascript is a famous scripting language for client side. The bootstrap and react libraries are rich API for creating dynamic websites. The course builds strong foundation for client-side scripting for creating dynamic websites

Course Objectives

The objective of this course is

1. Equip the students with basic and advanced features of javascript and bootstrap library to create dynamic web sites
2. Provide an overview of basic features of react library to design dynamic websites.

Course Outcomes

On completion of this course, the students will be able to

CO1: Explain basic concepts of java scripts and apply them to create basic scripts

CO2: Explain the fundamentals of client side scripting ,document object model and apply them to create dynamic websites.

CO3: Apply basic APIs of bootstrap library to create dynamic websites

CO4: Demonstrate bootstrap java plugins and its use in designing sample websites.

CO5: Explain and apply react APIs in client side scripting

Modules	Blooms level*	Number of hours
Module 1: Basics Introduction to JavaScript, JavaScript Core Features—Overview, Data Types and Variables, Operators, Expressions, and Statements, Functions, Objects, Array, Date, Math, and Type-Related Objects, Regular Expressions	L2 and L3	8
Module 2: Fundamental of Client-Side JavaScript JavaScript Object Models, The Standard Document Object Model, Event Handling, Controlling Windows and Frames, Handling Documents, Form Handling, Dynamic Effects: Rollovers, Positioning, and Animation, Navigation and Site Visit Improvements, Browser and Capabilities Detection Advanced Topics: JavaScript and Embedded Objects, Remote JavaScript, JavaScript and XML	L2 and L3	7
Module 3: Introduction to Bootstrap (Part 1) Bootstrap Scaffolding: What Is Bootstrap?, Bootstrap File Structure, Basic HTML template, Global Styles Default: Grid System, Basic Grid HTML, Offsetting Columns, Nesting Column, Fluid Grid System, Container Layouts Bootstrap CSS: Typography, Code, Tables, Bootstrap Layout Components: Dropdown Menus, Button Groups, Buttons with Dropdowns,	L2 and L3	7

Navigation Elements, Navbar, Breadcrumbs Pagination, Labels, Badges, Typographic Elements		
Module 4: Introduction to Bootstrap (Part 2) Bootstrap JavaScript Plugins: Overview, Transitions ,Modal ,Dropdown, Scrollspy, Toggleable Tabs, Tooltips, Popover	L2and L3	7
Module 5: The React Library Writing Your First React App, Thinking in React, Server Communication, JSX and the Virtual DOM, Advanced Components, Forms in React.	L2 and L3	7

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books:

1. "Javascript: The Complete Reference", Thomas Powell ,Fritz Schneider,Oreilly, 2004.
2. "Bootstrap", Jake Spurlok, Orielly, 2013.
3. "Full Stack React", Anthony Accamozo, Fullstack, 2017.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/ Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS O 1	PS O 2	PS O 3	PS O 4
CO 1	--	1	1	--	1	--	--	--	--	1	--	--	1	--	--	--
CO 2	--	1	2	--	2	--	--	--	--	1	--	--	1	--	--	--
CO 3	--	1	1	--	1	--	--	--	--	2	--	--	1	--	--	--
CO 4	--	1	2	--	1	--	--	--	--	2	--	--	1	--	--	--
CO 5	--	1	1	--	2	--	--	--	2	1	--	--	1	1	--	2

1: strongly related, 2: moderately related and 3: weakly related

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CSE2519	ADVANCED WEB DESIGNING TECHNOLOGIES LAB	L	T	P	C
Version 2019.1	Date of Approval: 14 th June 2019	0	0	2	1
Pre-requisites/Exposure	Knowledge of Internet fundamentals				
Co-requisites	NIL				

Catalog Description

This course is aimed to provide a fundamental understanding of JavaScript and two of its related library: Bootstrap and React for dynamic web site client side scripting. Javascript is a famous scripting language for client side. The bootstrap and react libraries are rich API for creating dynamic websites. The course builds strong foundation for client-side scripting for creating dynamic websites

Course Objectives

The objective of this course is

1. Equip the students with basic and advanced features of javascript and bootstrap library to create dynamic web sites
2. Provide an overview of basic features of react library to design dynamic websites.

Course Outcomes

On completion of this course, the students will be able to

CO1: Explain basic concepts of java scripts and apply them to create basic scripts

CO2: Explain the fundamentals of client side scripting ,document object model and apply them to create dynamic websites.

CO3: Apply basic APIs of bootstrap library to create dynamic websites

CO4: Demonstrate bootstrap java plugins and its use in designing sample websites.

CO5: Explain and apply react APIs in client side scripting

Modules	Blooms level*	Number of hours
Module 1: Basics Programs based on: <ul style="list-style-type: none"> • JavaScript Core Features—Overview, • Data Types and Variables, Operators, Expressions, and Statements, Functions, • Objects, Array, Date, Math, Type-Related Objects, • Regular Expressions 	L2 and L3	2
Module 2: Fundamental of Client-Side JavaScript Programs based on: <ul style="list-style-type: none"> • JavaScript Object Models, The Standard Document Object Model, • Event Handling, Controlling Windows and Frames, Handling Documents, • Form Handling, Dynamic Effects: Rollovers, Positioning, and Animation, • Navigation and Site Visit Improvements, Browser and Capabilities • Detection Advanced Topics: JavaScript and Embedded Objects, Remote JavaScript, JavaScript and XML 	L2 and L3	3

Module 3: Introduction to Bootstrap (Part 1) Programs based on: <ul style="list-style-type: none"> • Bootstrap File Structure, Basic HTML template, Global Styles • Default: Grid System, Basic Grid HTML, Offsetting Columns, Nesting Column, Fluid Grid System, Container Layouts • Typography, Code, Tables, • Dropdown Menus, Button Groups, Buttons with Dropdowns, Navigation Elements, Navbar, • Breadcrumbs Pagination, Labels, Badges, Typographic Elements 	L2 and L3	3
Module 4: Introduction to Bootstrap (Part 2) Programs based on: <ul style="list-style-type: none"> • Transitions ,Modal ,Dropdown, • Scrollspy, Toggleable Tabs, • Tooltips, Popover 	L2and L3	2
Module 5: The React Library <ul style="list-style-type: none"> • Writing Your First React App, • Thinking in React, Server Communication, • JSX and the Virtual DOM, • Advanced Components, • Forms in React. 	L2 and L3	2

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books:

- "Javascript: The Complete Reference", Thomas Powell ,Fritz Schneider,Oreilly, 2004.
- "Bootstrap", Jake Spurlok, Orielly, 2013.
- "Full Stack React", Anthony Accamozo, Fullstack, 2017.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/ Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS O 1	PS O 2	PS O 3	PS O 4
CO 1	--	1	1	--	1	--	--	--	--	1	--	--	1	--	--	--
CO 2	--	1	2	--	2	--	--	--	--	1	--	--	1	--	--	--
CO 3	--	1	1	--	1	--	--	--	--	2	--	--	1	--	--	--
CO 4	--	1	2	--	1	--	--	--	--	2	--	--	1	--	--	--
CO 5	--	1	1	--	2	--	--	--	2	1	--	--	1	1	--	2

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CSE2604	ADVANCED JAVA PROGRAMMING	L	T	P	C
Version 2017.1	Date of Approval: 14 th June, 2017	3	0	0	3
Pre-requisites/Exposure	Basics of Java Programming				
Co-requisites	NIL				

Catalog Description

In this course the advanced features of contemporary java are discussed in detail. Concepts covered would enable them to handle complex programs relating to managing data and processes over the network. Discussion will be on relating to concepts of remote method invocation to working with swings architecture. Further practical implementation of database connectivity and using them in servlet and jsp based applications will be made.

Course Objectives

The objective of this course is to

1. Equip the students with the advanced feature of contemporary java required in solving complex problems.
2. Provide a practical knowhow and implementation of advanced java programming concepts like database programming with servlets and jsp.

Course Outcomes

On completion of this course, the students will be able to

- CO1: Define and explain concept of an Remote method invocation application, demonstrate swing based application developed using concepts of remote method invocation
- CO2: Distinguish between various java and open database connectivity drivers and able to solve complex programming problems involving database interaction.
- CO3: Describe servlet and its lifecycle, along with demonstrate and design solutions for some complex dynamic web applications using servlets.
- CO4: Explain jsp scripting and Differentiate between processing of servlets and jsp scripting pages. Apply knowledge of servlets and jsp scripting to create some new dynamic web applications.
- CO5: Explain the architecture of Model View Controller and struts. Demonstrate applications based on java beans and struts.

Modules	Blooms level*	Number of hours
MODULE 1: DISTRIBUTED COMPUTING Introduction to Java RMI, RMI services, RMI client, Running client and server, Introduction of Swing, Swing Components, Look and Feel for Swing Components, Introduction to Multimedia Programming.	L1, L2 and L3	6
MODULE 2: DATABASE CONNECTIVITY ODBC and JDBC Drivers, Connecting to Database with the java.sql Package, Using JDBC Terminology, JDBC with mysql, postgresql.	L2 and L3	7
MODULE 3: SERVLET PROGRAMMING Introduction to Servlets, Servlet Life Cycle, Servlet based Applications, Servlet and HTML.Filters, jdbc with servelets, session Management techniques in detail.	L2, L3 and L5	8

MODULE 4: JSP PROGRAMMING JSP: Introduction to JSP, JSP implicit objects, JSP based Applications, Java. Net. Login & Logout Example, jdbc with jsp.	L2, L3, L4 and L5	8
MODULE 5: J2EE WEB APPLICATION The Model-View-Controller Architecture What is Struts, Struts Tags, Creating Beans, Other Bean Tags, Bean Output, Creating HTML Forms, The Action Form class The Action class, Simple Struts: a simple Struts application; Introduction to EJB.	L2 and L3	7

*Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. J. Jaworski, Java 1.2 Unleashed, Techmedia – SAMS, 1998, United States
2. S. Allamaraju, Professional Java Server Programming, Wrox Press Limited, 2001, United States.
3. J. Goodwill and B. Morgan, Developing Java Servlets, Techmedia – SAMS, 2017, United States

Reference Books

1. D. Flanagan, J. Parley, W. Crawford and K. Magnusson, Java Enterprise in a nutshell - A desktop Quick reference, O'REILLY, 2003, USA.
2. S. Ausbury and S. R. Weiner, Developing Java Enterprise Applications, John Wiley and Sons, 2001, USA.
3. J. Hunder and W. Crawford, Java Servlet Programming, O'REILLY, 2002, USA

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	2	1	--	--	--	--	--	--	--	--	--	--	2	--	--	--
CO2	3	1	--	--	--	--	--	--	--	--	--	--	1	2	--	--
CO3	2	1	2	--	--	--	--	--	--	--	--	--	1	2	--	--
CO4	1	3	2	--	--	--	--	--	--	--	--	--	2	--	2	--
CO5	1	3	--	--	--	--	--	--	--	--	--	--	1	--	--	--

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CSE2608	ADVANCED JAVA PROGRAMMING LAB	L	T	P	C
Version 2017.1	Date of Approval: 14 th June, 2017	0	0	2	1
Pre-requisites/Exposure	Basics of Java and Advanced Java Programming				
Co-requisites	NIL				

Catalog Description

In this Lab course the advanced features of contemporary java are implemented and demonstrated. Concepts covered would enable them to create complex applications related to data management. Problems or programs will be related to concepts of remote method invocation, swings, servlets, jsp and java beans.

Course Objectives

The objective of this course is to

1. Make the students apply knowledge of various advanced java features required in solving complex problems.
2. Provide a demonstration of advanced java programming concepts like database programming with servlets, jsp and creating java beans.

Course Outcomes

On completion of this course, the students will be able to

- CO1: Apply the knowledge of swings architecture and remote method invocation used to provide solution to distributed computing problems
- CO2: Demonstrate the use of JDBC connectivity along with swings based architecture, thereby handling data management.
- CO3: Apply the knowledge of servlets and server programming to construct dynamic web applications using web servers.
- CO4: Demonstrate the differences between creating and deploying dynamic web applications using jsp concepts and servlets.
- CO5: Demonstrate usage of applications involving java beans and jdbc programming to handle data management.

Modules/Topics Covered**	Blooms level*	Number of hours
1. Sample Programs using swings architecture and remote method invocation (a) Write a program using swings creating tabbed panes and menu over a frame and handle their associated events (b) Write a program using swings List control containing list of cities, allowing the user to choose any one of them and display using event handing. (c) Demonstrate an application showcasing the use of remote method invocation(RMI) for designing a distributed application. (d) Create an application using concepts of RMI to depict a client server based interaction.	L3, L5	6
2. Sample Programs using JDBC and swings (a) Create an application demonstrating the use of swings, having a menu over a frame and jdbc programming to perform insert and select operations by handling menu related	L3, L5	4

events. (b) Create an application using swings, having a design providing features for iterating over a dataset performing operations like forward, backward, start and end with help of jdbc programming.		
(c) Sample Programs using servlets with jdbc, html and swings 3. Create an application using servlets to perform redirection based on validating user data entered through a web form. 4. Design an application to fetch data from database using servlets and display it using its post method. 5. Demonstrate the process of writing cookies using a servlet and display a message after writing. 6. Write a program to create a session object for the username fetched from user using a servlet, further access that session value on another servlet invoked by redirection.	L3, L5	6
7. Sample Programs using JSP with jdbc, html and swings (a) Write a program using jsp to demonstrate the features of jsp elements used to declare, define and display sum of two integers. (b) Create an application using jsp to calculate and display the greatest out of two integers using if else statements. Integer numbers should be entered using a web form. (c) Demonstrate with a jsp program mechanism to retrieve checkbox data accessed using multiple value parameters fetching approach. (d) Write a program to demonstrate the use of jsp forward action tag used with parameters and processed using another jsp page.	L3, L5	6
8. Sample Programs using jsp, java beans and swings (a) Demonstrate the use of jsp include action tag for including an html and another jsp page in initial jsp resource. (b) Write a program creating Java bean class and setting its properties using required jsp action tags. Output should also display the retrieved property values.	L3, L5	2

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

**** Sample Programs provided are not limited to these only, can include others as desired.**

Text Books

1. J. Jaworski, Java 1.2 Unleashed, Techmedia – SAMS, 1998, United States
2. S. Allamaraju, Professional Java Server Programming, Wrox Press Limited, 2001, United States
3. J. Goodwill and B. Morgan, Developing Java Servlets, Techmedia – SAMS, 2017, United States

Reference Books

1. D. Flanagan, J. Parley, W. Crawford and K. Magnusson, Java Enterprise in a nutshell - A desktop Quick reference, O'REILLY, 2003, USA
2. S. Ausbury and S. R. Weiner, Developing Java Enterprise Applications, John Wiley and Sons, 2001, USA
3. J. Hunder and W. Crawford, Java Servlet Programming, O'REILLY, 2002, USA

**Modes of Evaluation: Lab Record /Viva- Via /Performance/Written Examination
Examination Scheme:**

IA					EE
Components	A	PR	LR	V	70
Weightage (%)	5	10	10	5	

Note: IA –Internal Assessment, A – Attendance, PR – Performance, LR – Lab Record, V – Viva, EE- External Exam

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	2	1	--	--	--	--	--	--	--	--	--	--	2	--	--	--
CO2	3	1	--	--	--	--	--	--	--	--	--	--	1	2	--	--
CO3	2	1	2	--	--	--	--	--	--	--	--	--	1	2	--	--
CO4	1	3	2	--	--	--	--	--	--	--	--	--	2	--	2	--
CO5	1	3	--	--	--	--	--	--	--	--	--	--	1	--	--	--

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CSE2613	SOFTWARE ENGINEERING	L	T	P	C
Version 2019.1	Date of Approval: 15 May 2019	3		0	3
Pre-requisites/Exposure	Basic Knowledge of software development				
Co-requisites	Nil				

Catalog Description

In this course the concepts of Software development are discussed in detail. Various models of SDLC are introduced along with its application. Students will be able to apply these concepts in real time software project development.

Course Objectives

The objective of this course is to

1. Gain the knowledge of how Analysis, Design, Implementation, Testing and Maintenance processes are conducted in a software project.
2. Apply their foundations in software engineering to adapt to readily changing environments using the appropriate theory, principles and processes.

Course Outcomes

On completion of this course, the students will be able to

- CO1: Apply current theories, models, and techniques that provide a basis for the software lifecycle.
- CO2: Enable the students to apply a systematic application of scientific knowledge in creating and building cost effective software solutions to business and other types of problems.
- CO3: Be able to elicit, analyze and specify software requirements through a productive working relationship with various stakeholders of a software development.
- CO4: Be able to evaluate the impact of potential solutions to software engineering problems in a global society, using the knowledge of contemporary issues and emerging software engineering trends, models, tools, and techniques.
- CO5: Work as an individual and as part of a multidisciplinary team to design, develop and deliver quality software.

Modules	Blooms level*	Number of hours
MODULE 1: Introduction Software life cycle models: Waterfall, Prototype, Evolutionary and Spiral models, Overview of Quality Standards like ISO 9001, SEI-CMM	L1, L2 and L4	5
MODULE 2: Software Metrics and Project Planning Size Metrics like LOC, Token Count, Function Count, Design Metrics, Data Structure Metrics, Information Flow Metrics. Cost estimation, static, Single and multivariate models, COCOMO model, Putnam Resource Allocation Model, Risk management.	L2, L3 and L6	7

MODULE 3: Software Requirement Analysis, design and coding Problem Analysis, Software Requirement and Specifications, Behavioural and non-behavioural requirements, Software Prototyping Cohesion & Coupling, Classification of Cohesiveness & Coupling, Function Oriented Design, Object Oriented Design, User Interface Design Top-down and bottom-up Structured programming, Information hiding.	L2, L3 and ,L5	8
MODULE 4: Software Reliability, Testing and Maintenance Failure and Faults, Reliability Models: Basic Model, Logarithmic Poisson Model, Software process, Functional testing: Boundary value analysis, Equivalence class testing, Structural testing: path testing, Data flow and mutation testing, unit testing, integration and system testing, Debugging, Testing Tools, & Standards. Management of maintenance, Maintenance Process, Maintenance Models, Reverse Engineering, Software RE-engineering	L2, L3 and L4,L6	10
MODULE 5: UML Introduction to UML, <u>Use Case Diagrams</u> , <u>Class Diagram</u> : <u>State Diagram in UML</u> <u>Activity Diagram in UML</u> <u>Sequence Diagram in UML</u> <u>Collaboration Diagram in UML</u> , Domain, Component Diagram and Deployment Diagram	L3,L4,L5	6

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books:

- K. K. Aggarwal & Yogesh Singh, "Software Engineering", 2nd Ed, New Age International, 2005.
- R. S. Pressman, "Software Engineering – A practitioner's approach", 5th Ed., McGraw Hill Int. Ed., 2001.

Reference Books:

- R. Fairley, "Software Engineering Concepts", Tata McGraw Hill, 1997.
- P. Jalote, "An Integrated approach to Software Engineering", Narosa, 1991.
- Stephen R. Schach, "Classical & Object -Oriented Software Engineering", IRWIN, 1996.
- James Peter, W. Pedrycz, "Software Engineering", John Wiley & Sons.
- Sommerville, "Software Engineering", Addison Wesley, 1999.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

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CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O 1	PS O 2	PS O 3	PS O 4
CO 1	--	1	2	--	--	--	--	--	--	--	--	--	1	--	--	--
CO 2	1	--	2	3	--	--	--	--	--	--	4	--	1	2	--	--
CO 3	--	1	--	--	--	--	--	--	--	2	3	--	-	1	2	--
CO 4	-	1	-	--	2	--	--	--	--	--	--	--	2	1	--	--
CO 5	--	--	1	--	--	--	--	--	2	--	--	--	--	--	--	1

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CSE2615	SOFTWARE ENGINEERING LAB	L	T	P	C
Version 2017.1	Date of Approval: 15 May 2019	0	0	1	1
Pre-requisites/Exposure	Basics of Software Engineering				
Co-requisites	NIL				

Catalog Description

The course provides introduction to the fundamental's principles of software engineering. The organization broadly based on the classical analysis-design-implementation framework. Software Engineering is the systematic approach to the development, operation, maintenance, and retirement of software. Rational Rose Enterprise Edition software is used to serve the objectives. Students will be able to design models according to user requirement.

Course Objectives

The objective of this course is to

1. The basic objective of Software Engineering is to develop methods and procedures for software development that can scale up for large systems and that can be used to consistently produce high-quality software at low cost and with a small cycle time.
2. Apply basic techniques of modeling computer systems.

Course Outcomes

On completion of this course, the students will be able to

CO1: collect requirements and prepare their scenarios

CO2: Construct various UML models (including use case diagrams, class diagrams, interaction diagrams, state chart diagrams, activity diagrams, and implementation diagrams) using the appropriate notation

CO3: Demonstrate the role and function of each UML model in developing object oriented software.

CO4: Recognize the difference between various object relationships: inheritance, association, whole-part, and dependency relationships.

Modules/Topics Covered**	Blooms level*	Number of hours
1. Introduction to Rational Rose Enterprise Edition tool and SRS (c) Explain features and characteristics of Rational Rose tool along with screenshots. (d) Create Software requirement specification document for Website application of educational institute.	L1, L2	4
2. Concept of UML and Use case diagram (c) Design Use case Diagram of ATM machine (d) Show dependencies and relationships through Use case diagram of Banking Management System	L1, L3	4
3. Class Diagrams and object diagram concepts (d) Design class diagram of Flight Reservation system (e) Design class diagram of student Management system (f) Design object diagram of courier service system (g) Design object diagram of Train Reservation system	L3, L1	8

4. Sequence, Activity, Collaboration, State chart diagram concepts (h) Design Activity diagram of Library Management system (i) Design Sequence diagram of Food Ordering system (j) Design Collaboration diagram of Hotel Management system (k) Design State chart diagram of Turing Machine	L3, L1	8
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**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

**** Sample Programs provided are not limited to these only, can include others as desired.**

Text Books

- Rambugh, Grady Booch, Unified Modeling Language User Guide, Pearson Education 1998.
- K.K. Agrawal, Yogesh Singh, Software Engineering,

Reference Books

- Martin Fowler, UML distilled: A Brief Guide to the Standard Object Modeling Language, Addison Wesley, 1997.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

IA					EE
Components	A	PR	LR	V	70
Weightage (%)	5	10	10	5	

Note: IA –Internal Assessment, A – Attendance, PR – Performance, LR – Lab Record, V – Viva, EE- External Exam

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	--	1	2	3	4	--	--	--	--	--	--	--	1	--	--	--
CO2	--	--	1	2	3	--	--	--	--	--	--	--	1	2	--	--
CO3	--	1	2	3	--	--	--	--	--	4	--	--	-	2	3	--
CO4	--	1	2	3	--	--	--	--	4	--	--	--	3	--	1	2

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CSE2637	MINOR PROJECT- I	L	T	P	C
Version: 2019.1	Date of Approval: 15 May 2019	0	0	0	2
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

The objective of this course is to provide practical training on some live/demo projects that will increase capability to work on actual problem in industry. It will be an in house training on some latest software which is in high demand in market. This training will be designed such that it will useful for their future employment in industry.

Course Objectives

The objective of this course is to

1. Provide practical training on live projects
2. Increase technical capabilities on solving real life problems in company environment

Course Outcomes

On completion of this minor project, the students will be able to:

CO1: Demonstrate a sound technical knowledge of their selected project topic.

CO2: Design and develop engineering solutions to complex problems utilising a systems approach.

CO3: Analyse various approaches for solving a complex engineering problem using different tools and techniques

CO4: Demonstrate the knowledge, skills and attitudes of a professional engineer.

CO5: Apply technical skills and knowledge in completing the project.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	2	--	--	--	--	--	--	1	--	--	--	--	--	1	1
CO2	1	1	--	--	--	--	--	--	1	--	--	--	--	--	1	1
CO3	1	1	--	--	--	--	--	--	1	--	--	--	--	--	1	1
CO4	1	1	--	--	--	--	--	--	1	--	--	--	--	--	1	1
CO5	1	1	--	--	--	--	--	--	1	-	-	-	--	--	1	1

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CSE2614	IOT AND WIRELESS SENSOR NETWORK	L	T	P	C
Version 2019.1	Date of Approval: 15 May 2019	3	0	0	3
Pre-requisites/Exposure	Concept of Networking				
Co-requisites					

Catalog Description

This course provides comprehensive and insight knowledge of Internet of Things and Wireless sensor networks. The objective of the course is to provide the students the core knowledge of architecture, routing protocols, time synchronization and security of IoT along with wireless sensor networks.

Course Objectives

The objective of this course is to

1. Equip the students with concepts of internet-of-things and provide an overview of designing IoT devices.
2. Equip the students with concepts of wireless sensor networks and its architecture.
3. Provide a thorough understanding of routing protocols and power management.
4. Give an insight of time synchronization and network security.

Course Outcomes

On completion of this course, the students will be able to

- CO1: Explain key terms and trends around the Internet of Things along with its physical and logical design.
- CO2: Understand the potential and value of the Internet of Things and Smart Services.
- CO3: Compare and analyze different routing techniques, protocols and power management.
- CO4: Explain problems, fundamentals and protocols of time synchronization and localization.
- CO5: Describe the fundamentals, issues and mechanism of network security.

Modules	Blooms level*	Number of hours
Module 1: Introduction Module I: Introduction to Internet of Things Definition & characteristics of IoT, physical design of IoT-things in IoT, IoT protocols, logical design of IoT- IoT functional block, IoT communication models, IoT communication APIs, IoT enabling technologies-wireless sensor networks, cloud computing, big data analytics, communication protocols, embedded systems, IoT levels and deployment templates, IoT application.	L1, L2 and L4	9
Module 2: Developing Internet of Things IoT Design Methodology, Logical design using Python- Python data types & data structures, control flow, functions, modules, packages, classes, file handling, Python packages for IoTJSON, XML, HTTPLib, URLLib, SMTPLib, IoT end devices-building blocks, Introduction to Raspberry Pi.	L1, L2	6
Module 3: Introduction of WSN and Architectural Framework Motivation for a Network of Wireless Sensor Nodes, Classification of	L1, L2	9

sensor networks, Hardware architecture, Applications: Structural Health Monitoring, Traffic Control, Health Care, Pipeline Monitoring, Precision Agriculture, Active Volcano, Underground Mining Node Architecture: The Sensing Subsystem, the Processor Subsystem, Communication Interfaces, Prototypes. Operating Systems: Functional Aspects, Non-functional Aspects, Prototypes, Evaluation Physical Layer,		
Module 4: Concept of Network Layer and Time Synchronization Basic Components, Source Encoding, Channel Encoding, Modulation Medium Access Control: Wireless MAC Protocols, Characteristics of MAC Protocols in Sensor Networks, Contention-Free MAC Protocols, Contention-Based MAC Protocols, Hybrid MAC Protocols Routing Metrics, Flooding and Gossiping, Data-Centric Routing, Proactive Routing, On-Demand Routing, Hierarchical Routing, Location-Based Routing, Clocks and the Synchronization Problem, Time Synchronization in Wireless Sensor Networks, Basics of Time Synchronization, Time Synchronization Protocols Localization: Ranging Techniques, Range-Based Localization, Range-Free Localization, Event Driven Localization.	L1, L2 and L4	8
Module 5: Security in WSN Fundamentals of Network Security, Challenges of Security in Wireless Sensor Networks , Security Attacks in Sensor Networks, Protocols and Mechanisms for Security, IEEE 802.15.4 and Zig Bee Security	L1, L2	6

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

- Internet of Things: A Hands-On Approach by Arshdeep Bahga, Vijay Madisetti.
- Designing the Internet of Things by Adrian McEwen, Hakim Classically
- Waltenegus Dargie, Christian Poellabauer, "Fundamentals of Wireless Sensor Networks: Theory and Practice", Wiley 2010.
- Mohammad S. Obaidat, Sudip Misra, "Principles of Wireless Sensor Networks", Cambridge, 2014.

Reference Books

- From Machine-to-Machine to the Internet of Things: Introduction to a New Age by Jan Holler, Vlasios Tsiatsis, Catherine Mulligan, Stefan Avesand, Stamatis Karnouskos, David Boyle
- Ian F. Akyildiz, Mehmet Can Vuran , "Wireless Sensor Networks", Wiley 2010
- C S Raghavendra, K M Sivalingam, Taieb Znati, "Wireless Sensor Networks", Springer, 2010
- C. Sivarm murthy & B.S. Manoj, "Adhoc Wireless Networks", PHI-2004

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS O 1	PS O 2	PS O 3
CO 1	1	--	3	--	--	2	--	--	--	--	--	--	1	--	--
CO 2	3	--	--	--	1	--	--	--	--	--	--	--	1	--	2
CO 3	3	--	--	--	1	--	--	--	--	--	--	--	1	--	2
CO 4	3	--	--	--	1	--	--	--	--	--	--	--	1	--	2
CO 5	1	2	--	--	--	3	--	--	--	--	--	--	1	--	--

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CSE2610	VLSI DESIGN	L	T	P	C
Version 2017.1	Date of Approval: 14 th June 2017	3	0	0	0
Pre-requisites/Exposure	Basics of semiconductor and analog electronics				
Co-requisites	Nil				

Catalog Description

This course deals with basic theories and techniques of digital VLSI design in CMOS technology. It covers the fundamental concepts and structures of designing digital VLSI systems which include CMOS devices and circuits, standard CMOS fabrication processes, CMOS design rules, static and dynamic logic structures, CMOS chip layout, simulation and testing, low power techniques, design tools and methodologies and Stick Diagrams.

Course Objectives

The objective of this course is to

- Provide a deep understanding of the concepts, techniques and design of complex digital VLSI circuits.
- Apply mathematical methods and circuit analysis models to analyse CMOS digital circuits, and their logic components.

Course Outcomes

On completion of this course, the students will be able to

CO1.Explain the characteristics of Basic VLSI components.

CO2. Apply the knowledge of various CMOS inverters to compare their performance.

CO3. To design and realize basic combinational and sequential functions using CMOS logic.

CO4. Design circuit Layout and Stick diagram of CMOS logics.

Modules	Blooms level*	Number of hours
Module I: Devices and the wire Dynamic and transient behavior of Diode, Diffusion capacitance, SPICE Diode model, MOSFET basic, depletion and enhancement device. MOSFET static behavior, Threshold voltage and its dependence on V_{SB} MOSFET Operation in resistive and saturation region, channel length modulation, Velocity saturation and its impact on sub micron devices, sub threshold conduction, Model for manual analysis, Equivalent resistance for MOSFET in (velocity) saturated region, comparison of equations for PMOS and NMOS. Dynamic behavior, Channel capacitance in different regions of operation, junction capacitance, Level 1 SPICE models for MOS transistors. The Wire, Interconnect parameters: resistance, capacitance and Inductance, Lumped RC model, Elmore Delay.	L1, L2	8
Module II: CMOS Inverter VTC of an ideal inverter, Switching Model of the CMOS inverter: NMOS /PMOS discharge and charge, VTC of CMOS inverter : PMOS and NMOS operation in various regions including velocity saturation, Switching threshold, $(W/L)_p/(W/L)_n$ ratio for setting desired V_M with and without velocity saturation, Noise Margins, buffer.	L3, L4	8

<p>Ratioed logic: Pseudo NMOS inverter and PMOS to NMOS ratio for performance, tri-state inverter, Resistive load inverter.</p> <p>Load Capacitance calculations: fan out capacitance, self capacitance calculations: Miller effect, wire capacitance; Improving delay calculation with input slope, Propagation delay: first order analysis, analysis from a design perspective, sizing a chain of inverters for minimum delay, choosing optimum number of stages, Power, Energy and Energy Delay: Dynamic power consumption, Static power, Glitches and power dissipation due to direct path currents, power and delay trade off, Transistor sizing for energy minimization.</p>		
<p>Module III: Combinational circuits</p> <p>CMOS LOGIC: Good 0 and Poor 0, series and parallel N and P switches, Two and Higher input NAND and NOR gates, Functions of the type $(AB+C(D+E))$ and their complements, XOR and XNOR gates, 2 input Multiplexer, Full Adder; Transistor sizing in CMOS logic for optimal delay, Pseudo NMOS NAND NOR and other gates and the transistor sizing, Introduction to DSVCL logic, CPL AND/NAND, OR/NOR, XOR/XNOR gates, Logical effort, Electrical Effort, Branching effort, Examples of sizing Combinational logic chains for minimum delay, Pass-transistor logic, pass gate configurations for NMOS and PMOS, 2 input and 4 input MUX, XOR, XNOR and implementation of general functions like $AB+AB*C+A*C*$, Robust and Efficient PTL Design, Delay of Transmission Gate chain.</p> <p>Dynamic CMOS design: Pre-charge and Evaluation, charge leakage, bootstrapping, charge sharing, Cascading Dynamic Gates, DOMINO Logic, Optimization of Domino Logic Gates, simple example circuit implementations of DOMINO logic.</p>	L2,L3,L4	10
<p>Module IV: Sequential Logic circuits</p> <p>Principle of biostability, NAND and NOR based SR latch, and clocked SR Latch, JK latch, example of master slave flip flop, CMOS D latch, , MUX based Latches, master slave edge triggered register, Static Timing Analysis –setup, hold time, clock skew, clock period, non ideal clocks, clock overlap, C2MOS register, TSPCR Register, Schmitt Trigger, Pipelining and NORA CMOS</p>	L2,L3,L4	5
<p>Module V: Layout Design Rules</p> <p>5 Lecture hours</p> <p>Introduction to CMOS Process technology, Latch up and its prevention Layout of CMOS inverter, CMOS NAND and NOR gates, Concept of Euler path, and stick diagrams for functions like $(AB+E+CD)*$.</p>	L2,L3,L4	5

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

- **Jan M Rabaey**, Digital Integrated Circuits ,Second Edition, Pearson.
- **David Hodges**, Analysis and Design of Digital ICs, McGraw Hill
- **Sung-MoKang**, CMOS Digital ICs, third edition, 2008

Reference Books

- **WesteNiel and Harris**, CMOS VLSI design. A Circuits And Systems Perspective,

3/E,Pearson

- **Weste and Eshragian**,Principles of CMOS VLSI Design: a systems perspective, Addison-Wesley Publishing Company, 01-Jan-1993

**Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination
Examination Scheme:**

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS O 1	PS O 2	PS O 3	PS O 4
CO 1	1	3	--	--	--	--	--	--	--	--	--	--	2	1	-	-
CO 2	3	1	3	--	1	--	--	--	--	--	--	2	2	1	-	2
CO 3	3	2	1	2	--	--	--	--	--	--	--	2	2	1	-	2
CO 4	2	2	1	-	--	--	--	--	--	--	--	--	2	1	-	-

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CSE2616	OPEN SOURCE TECHNOLOGIES (PHP, MYSQL)	L	T	P	C
Version :2019.1	Date of Approval: 15 May 2019	2	0	0	2
Pre-requisites/Exposure	Basic Knowledge of HTML				
Co-requisites	Nil				

Catalog Description

The course includes the content about PHP and its Programming Concepts. It includes basic architecture of running a PHP Script. It also includes the concepts about Conditional, Control Statements, Array, Associative Array, String Functions and Concepts of Functions : Call by Value and Reference. The course also includes concepts related to Object Oriented Programming in PHP and website design support along with Database Support concepts which will be useful to design Backend for the website.

Course Objectives

The objective of this course is:

1. To provide a fundamental understanding of Dynamic Website Design in PHP.
2. To provide knowledge about various Frameworks build for Website Designing.

Course Outcomes

On completion of this course, the students will be able to

After completing the course, the students will be able to,

CO 1: Explain the basic concepts of PHP programming and write PHP scripts using Strings and functions

CO 2: Explain and write PHP scripts based on Conditional statements, control statements and Arrays.

CO 3: Apply Object Oriented and Web Design concepts of PHP in order to create responsive web pages and websites

CO 4: Apply the concepts of Database and Database connectivity in order to provide backend support to website to make them Dynamic in nature

CO 5: Demonstrate the website designing process on various PHP Frameworks.

Modules	Blooms level*	Number of hours
Module I: Introduction to Open Source and PHP programming Introduction to Open Sources Technologies, Introduction to PHP, installation and configuration, Advantages and Disadvantages of PHP, Client Side Scripting, Server Side Scripting, Variables, data types, various types of function, creating your own function, Strings in PHP, String Functions.	L1, L2 and L3	4
Module II: Operators, Loops, Array, Exception and Error Handling Operators, Conditions, Loops, Using for each, Creating and Using Arrays, Multidimensional Array, Associative Array. Error Handling in PHP, Errors and Exceptions, Exception class, try/catch block, throwing an exception, defining your own Exception subclass.	L1, L2, L3	5
Module III: Classes, File system, Passing Information between pages	L2, L3 and L4	7

Object oriented programming with Php, Working with Datetime, code re-use, require (), include(), and the include_path; Understanding PHP file permissions, File reading and writing functions, File system functions, File uploads, Sending mail & use of email server. HTTP, GET arguments, POST arguments, Using Session in PHP, cookies, The setcookie() function, Deleting Cookies and Reading Cookies.		
Module IV: Working with database HTML Tables and Database tables, Databasemanipulation(Select, Insert, Update, Delete), validating User Input using Javascript. MYSQL, Introducing MySQL; database design concepts; the Structured Query Language (SQL); communicating with a MySQL backend via the PHP, MySQL API Building Database Applications, Developing PHP scripts for dynamic web page like feedback form, online admission form and online test.	L2, L3 and L4	5
Module V: Working with Frameworks Working with Mambo, Working with Joomla, Working with framework. Working with wordpress, Working with drupal, Use of Joomla in rapid development of website. Developing of simple website using joomla.	L2, L3 and L4	3

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5:Synthesis, L6:Evaluation

Text Books

- Steven Holzner “**PHP : The Complete Reference**”, Mc Graw Hill Education, 2007.
- Ivan Bayross, “**Web enabled commercial Application Development using HTML, Javascript, DHTML and PHP**”, 4th Edition, BPB Publication, 2010.
- Laura Thomson, “**PHP and MySQL Web Development**”, 5th Edition, Pearson Education, 2016.

Reference Books

- Robin Nixon, “**Learning PHP, MySQL and Javascript**”, Shroff Publishers and Distributors private limited, 2015.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	1	3	1	--	--	--	--	--	--	--	--	--			
CO2	1	1	1	--	--	--	--	--	--	--	--	--			
CO3	1	1	1	3	2	--	--	--	--	--	--	--			
CO4	1	1	2	2	2	--	--	--	--	--	--	--			
CO5	1	3	2	1	1	--	--	--	--	--	--	--			

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CSE2617	OPEN SOURCE TECHNOLOGIES (PHP, MYSQL) LAB	L	T	P	C
Version 2019.1	Date of Approval: 15 May 2019	0	0	2	1
Pre-requisites/Exposure	Basic Knowledge of HTML				
Co-requisites	Nil				

Catalog Description

The course includes PHP Programming Concepts. Conditional, Control Statements, Array, Associative Array, String Functions and Concepts of Functions: Call by Value and Reference are implemented. The course also includes concepts related to Object Oriented Programming in PHP and website design support along with Database Support concepts which will be useful to design Backend for the website.

Course Objectives

The objective of this course is:

1. To provide a fundamental understanding of Dynamic Website Design in PHP.
2. To provide knowledge about various Frameworks build for Website Designing.

Course Outcomes

On completion of this course, the students will be able to

- CO 1: Apply the basic concepts of PHP programming to rewrite PHP scripts using Strings and Functions
- CO 2: Demonstrate the concept of Conditional & Control Statements and 1 D, 2 D & Associative Array using PHP scripts
- CO 3: Apply Object Oriented and Web Design concepts of PHP in order to prepare responsive web pages and websites
- CO 4: Apply the concepts of Database and Database connectivity to prepare backend support for website.

Lab Sessions	Blooms level*	Number of hours
1. PHP Scripts on Basic Concepts <ul style="list-style-type: none"> • Write the process of installation of web server. • Write programs to print all details of your php server. Use phpinfo(). • Write a program to give demo of ECHO and PRINT command. • Write a program to implement the string functions. 	L1,L3	2
2. PHP Script on Conditional and Control Statements <ul style="list-style-type: none"> • Write a script to print Fibonacci series upto a given number. • Write a menu driven program to implement a calculator which performs only addition, subtraction, multiplication and division. The operation should happen based on user choice. • Write a script to calculate Factorial of a given number 	L1,L3	4
3. PHP Scripts on Arrays: 1D, 2D, Associative <ul style="list-style-type: none"> • Write a program sort ten number by using array. • Write a program to demonstrate the concept of associative array. • Write a program to demonstrate the concept of 	L1,L3	4

multidimensional array.		
4. PHP Scripts on Object Oriented Programming and File Handling Concepts <ul style="list-style-type: none"> Write a program to demonstrate the concept of Classes & objects. Write a php script including all the file handling functions. 	L1,L3	2
<ul style="list-style-type: none"> PHP Scripts on Webpage and Website Design Concepts Create a login form with two text fields called “login” and “password”. When user enters “Amity” as a user name and “university” as a password it should be redirected to a Welcome.HTML page or to Sorry. HTML in case of wrong username/password. Write a program to design login form in which find the greatest number amongst three numbers. WAP for Marksheet generation. Design a webpage for entering the student details with all the validations applied on it. Create a form with a text box asking to enter your favorite city with a submit button when the user enters the city and clicks the submit button another php page should be opened displaying “Welcometo the city”. 	L1,L3	6
5. PHP Scripts on Database Creation a Connectivity <ul style="list-style-type: none"> Create a database in MySql and connect that database from PHP. Write a program to Update, insert and delete the values of table in database. 	L1,L3	4

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5:Synthesis, L6:Evaluation

Text Books

- Steven Holzner “PHP : The Complete Reference”, Mc Graw Hill Education, 2007.
- Ivan Bayross, “Web enabled commercial Application Development using HTML, Javascript, DHTML and PHP”, 4th Edition, BPB Publication, 2010.
- Laura Thomson, “PHP and MySQL Web Development”, 5th Edition, Pearson Education, 2016.

Reference Books

- Robin Nixon, “Learning PHP, MySQL and Javascript”, Shroff Publishers and Distributers private limited, 2015.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

PR: Practical, LR: Lab Record, V: Viva, EE: End Semester Examination, A: Attendance, IA: Internal Assessment

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	3	1	--	--	--	--	--	--	--	--	--	2	--	2	--
CO2	1	1	1	--	--	--	--	--	--	--	--	--	2	--	2	--
CO3	1	1	1	3	2	--	--	--	--	--	--	--	1	3	1	2
CO4	1	1	2	2	2	--	--	--	--	--	--	--	2	--	1	2

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CSE2618	DATA MINING	L	T	P	C
Version 2019.1	Date of Approval: 15 May 2019	3	0	0	3
Pre-requisites/Exposure	Concept of Database and Data Mining				
Co-requisites	Nil				

Catalog Description

Data Mining serve as one of the most important courses for postgraduate students, since it builds computational abilities, inferential thinking, and practical skills for tackling core data scientific challenges. The students will get a comprehensive understanding of different data mining techniques that can be used for prediction and for discovering patterns, be prepared to select the right technique for a given data problem and will be able to create a general-purpose analytic process.

Course Objectives

The objective of this course is to

- Provide students with an in-depth knowledge of data mining. To introduce students to basic applications, concepts, and techniques of data mining.
- Develop skills for using recent data mining software to solve practical problems and prediction in a variety of disciplines and
- Gain experience doing independent study and research.

Course Outcomes

On completion of this course, the students will be able to

CO 1: Explain concepts of Data mining, predictive analytics and analyses architecture of data mining. Differentiate between supervised and unsupervised methods

CO 2: Apply classification techniques on different data sets and solve cost –benefit analysis numerical. Analyze decision tree methods.

CO 3: Implement various clustering algorithm on different data sets and describe these algorithms.

CO 4: Prepare data representation for market basket analysis and determine the usefulness of association rules. Interpret supervised and unsupervised learning methods.

CO 5: Predict market trends and outline different factors associated mail marketing.

Course Content

Modules	Bloom's level	Number of Hours
Module I Data Preparation An introduction to data mining and predictive analytics, Data Pre-processing Exploratory Data Analysis, Dimension- Reduction Methods.	L1, L2	8
Module II Classification k- Nearest Neighbour Algorithm, Decision Trees, Model Evaluation Technique, Cost –Benefit Analysis Using Data Driven Cost.	L1, L2, L3	7
Module III Clustering Hierarchical and k- Means Clustering, Kohonen Networks, Birch Clustering, Measuring Cluster Goodness.	L1, L2, L3, L4	8

Module IV Association Rules Affinity Analysis and Market Basket Analysis, Data Representation for Market Basket Analysis, Support, Confidence, Frequent Item sets, and the a Priori Property, How Does a Priori Algorithm Work? Generating Frequent Item sets, Generating Association Rules, Extension from Flag Data to General Categorical Data, Information-Theoretic Approach: Generalized Rule Induction Method, J-Measure, Association Rules are Easy to do Badly, how can we Measure the Usefulness of Association Rules? Do Association Rules Represent Supervised or Unsupervised Learning?	L1, L2, L3, L6	9
Module IV Case Study: Predicting Response to Direct Mail Marketing Business Understanding, Data Preparation, and Eda, Clustering and Principal Components Analysis, Modelling and Evaluation for Performance and Interpretability, Modelling and Evaluation for High Performance.	L2, L3, L4, L5	8

***Bloom's Level:**

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

1. Daniel T. Larose, Chantal D. Larose, "Data Mining and Predictive Analytics", John Wiley & Sons, Inc., Hoboken, New Jersey, 2015.
2. Jiawei Han and Micheline Kamber, "Data mining: concepts and techniques", Morgan Kaufmann, Second Edition, 2006.

Reference Books

1. Alex Berson, Data Warehousing, Data Mining, and Olap, Tata McGraw Hill, 2014.
2. Markus Hofmann, Ralf Klinkenberg, "Rapid-Miner: Data Mining Use Cases and Business Analytics Applications", Chapman and Hall/CRC, 2016.
3. George M Marakas, Modern Data Warehousing, Mining & Visualization Core Concepts, Pearson Education.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	2	--	--	--	--	--	--	--	--	--	--	1	2	2	3
CO2	1	1	2	--	--	--	--	--	--	--	--	--	1	2	3	3
CO3	1	2	3	3	3	--	--	--	--	--	--	--	1	2	2	2
CO4	1	1	2	--	--	3	--	--	--	--	--	3	1	1	2	3
CO5	1	1	2	--	--	2	--	--	--	--	--	3	1	3	2	1

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CSE2710	COMPUTER GRAPHICS	L	T	P	C
Version: 2019.1	Date of Approval: 15 May 2019	3	-	-	3
Pre-requisites/Exposure	Basic Knowledge of C++ Programming				
Co-requisites	Nil				

Catalog Description

This course covers understanding of software and hardware related to computer graphics systems. Topics include an introduction to the basic concepts, 2-D and 3-D modeling and transformations, viewing transformations, clipping, color filling, projections, rendering techniques, visible surface detection and elimination algorithms, graphical software packages and graphics systems. Students will use a standard computer graphics API to reinforce concepts and study fundamental computer graphics algorithms. Last module covers elementary image processing techniques and various library function in C to build animations.

Course Objectives

The objective of this course is to

1. Equip the students with fundamental concepts of graphics system and standards.
2. Equip the students with mathematical concepts of graphics algorithms to draw objects using C language.
3. Provide an overview of various 2D & 3D transformation, clipping operations, algorithms related to hidden surface detection and elimination and their implementation.
4. Provide an overview of various elementary image processing techniques and basic library function in C to create animation sequence.

Course Outcomes

On completion of this course, the students will be able to

CO 1: Explain applications of computer graphics and define various standards and components in development of computer graphics.

CO 2: Explain generation of graphics primitives and analyze their problems and solutions. Demonstrate solid filling algorithms. Demonstrate polygon clipping and line clipping algorithm and analyze their problems and solutions.

CO 3: Apply 2D geometric transformations on 2D graphics objects with their practical implementation. Illustrate use of window to viewport transformation in computer graphics.

CO4: Apply 3D geometric transformations on 3D objects with their practical implementation.

CO 5: Illustrate the use of 3D object modeling, Visible Surface detection and elimination algorithm and analyze their problems and solutions.

Modules	Blooms level*	Number of hours
Module I: Introduction to Graphics and Graphics Hardware System Application of computer graphics, Video Display Devices, Raster Scan Display, Random Scan Display, Input Devices, Graphic Software and graphics standards, Numerical based on Raster and Random scan display, Frame buffer, Display processor.	L1, L2	5

Module II: Output Primitives and Clipping operations Algorithms for drawing 2D Primitives lines (DDA and Bresenham's line algorithm), circles (Bresenham's and midpoint circle algorithm), ellipses (midpoint ellipse algorithm), Antialiasing and filtering techniques. Line clipping (cohen-sutherland algorithm), Curve clipping algorithm, and polygon clipping with Sutherland Hodgeman algorithm, Area fill algorithms for various graphics primitives: Scanline fill algorithm, boundary fill algorithm, flood fill algorithm, Polygon representation, various method of Polygon Inside test: Even-Odd method, winding number method, Character generation techniques.	L2, L3, L4	6
Module III: 2D Geometric transformation 2D Transformation: Basic transformation, Translation, Rotation, Rotation relative to an arbitrary point, scaling, Matrix Representations and Homogeneous coordinates, window to viewport transformation.	L3 and L4	6
Module IV: 3D Geometric transformation 3D Concepts: Parallel projection and Perspective projection, 3D Transformations, composite 3D transformation, co-ordinate transformation, Inverse transformation	L3 and L5	7
Module V: object modelling and Visible Surface detection fractal geometry methods, fractal dimensions, Geometric construction of deterministic self-similar fractals, Iterated function system to generate fractals. Bezier curves and Bezier surfaces, Bspline curves and surfaces, Visible surface detection method: Basic illumination, diffuse reflection, specular reflection, shadows. Ray tracing method, Depth-buffer method, A-buffer method, Depth-sorting method (painter's algorithm), Binary search partition method, Scan line method,	L4, L5	7
Module VI: Introduction to multimedia Design of animation sequences, Computer Animation languages, Elementary filtering techniques and elementary Image Processing techniques, graphics library functions used in animation design	L2, L3, L5	5

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

- Udit Agrawal, "Principles of Computer Graphics", 2nd Edition, Dhanpat Rai Publications, New Delhi, 2017.
- Hughes, Van Dam, et al. "Computer Graphics Principles and Practice", 3rd Edition, Pearson, 2014.
- Hearn and Baker, "Computer Graphics with OpenGL", 3rd Edition, Prentice Hall, 2004.
- Donald Hearn & M. Pauline Baker, "Computer Graphics C Version", Pearson Education, New Delhi, 2004.

Reference Books

- James D. Foley, Andries van Dam, Steven K. Feiner, John Hughes, "Computer Graphics: Principles and Practice", 2nd Edition, Pearson Education, 2007.

- F.S. Hill, “Computer Graphics using OPENGL”, 2nd edition, Pearson Education, 2003.
- David F. Rogers; “Procedural Elements for Computer Graphics” TMH. Publications.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination
Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	1	—	—	—	—	—	—	—	—	—	—	—	2	—	2
CO2	1	1	1	—	—	—	—	—	—	—	—	—	2	—	2
CO3	1	1	1	3	—	—	—	—	—	—	—	—	1	3	1
CO4	1	1	2	2	—	1	—	—	—	—	—	—	2	—	1
CO5	1	3	2	1	1	2	—	—	—	—	—	—	2	3	2
CO6	1	2	3	—	1	2	—	—	—	—	—	—	2	3	2

1: strongly related, 2: moderately related and 3: weakly related



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CSE2712	COMPUTER GRAPHICS LAB	L	T	P	C
Versionn: 2019.1	Date of Approval: 15 May 2019	0	0	2	1
Pre-requisites/Exposure	Basic Knowledge of C++ Programming				
Co-requisites	Nil				

Catalog Description

This course covers understanding of software and hardware related to computer graphics systems. Topics include an introduction to the basic concepts, 2-D and 3-D modeling and transformations, viewing transformations, clipping, color filling, projections, rendering techniques, visible surface detection and elimination algorithms, graphical software packages and graphics systems. Students will use a standard computer graphics API to reinforce concepts and study fundamental computer graphics algorithms. Last module covers elementary image processing techniques and various library function in C to build animations.

Course Objectives

The objective of this course is to

1. Equip the students with fundamental concepts of graphics system and standards.
2. Equip the students with mathematical concepts of graphics algorithms to draw objects using C language.
3. Provide an overview of various 2D & 3D transformation, clipping operations, algorithms related to hidden surface detection and elimination and their implementation.
4. Provide an overview of various elementary image processing techniques and basic library function in C to create animation sequence.

Course Outcomes

On completion of this course, the students will be able to

CO1: Explain applications of computer graphics and define various standards and components in development of computer graphics.

CO2: Explain generation of graphics primitives and analyze their problems and solutions. Demonstrate solid filling algorithms. Demonstrate polygon clipping and line clipping algorithm and analyze their problems and solutions.

CO3: Apply 2D geometric transformations on 2D graphics objects with their practical implementation. Illustrate use of window to viewport transformation in computer graphics.

CO4: Apply 3D geometric transformations on 3D objects with their practical implementation.

CO5: Illustrate the use of 3D object modeling, Visible Surface detection and elimination algorithms and analyze their problems and solutions.

CO6: Explain Elementary filtering techniques and elementary Image Processing techniques. Apply C++ graphics library functions to design animation sequence.

Modules	Blooms level*	Number of hours
Module I: Introduction to Graphics and Graphics Hardware System <ol style="list-style-type: none"> 1. Demonstrate the use of graphics library functions to draw various graphics objects. 2. Demonstrate the use of graphics library functions to draw pie chart. 3. Demonstrate the use of graphics library functions to draw bar 	L3,L5	2

chart on screen.		
Module II: Output Primitives and Clipping operations <ol style="list-style-type: none"> 1. Demonstrate the use of DDA line drawing algorithm to draw line on the screen when $m \leq 1$ and $m > 1$. 2. Demonstrate the use of DDA line drawing algorithm to draw line on the screen when $m \leq 1$ and $m > 1$. 3. Demonstrate the use of Bresenham's line drawing algorithm to draw line on the screen when $m \leq 1$ and $m > 1$. 4. Demonstrate the use of circle drawing algorithm to draw circle on the screen. 5. Write a program to draw characters on screen using bitmap character generation method. 6. Write a program to fill a polygon using boundary fill algorithm. 7. Write a program to fill a polygon using flood fill algorithm. 8. Write a program to demonstrate line clipping algorithm to clip a line where line slope is $m \leq 1$. 	L3,L5	6
Module III: 2D Geometric transformation <ol style="list-style-type: none"> 1. Write a program to translate a triangle where translation factors are $t_x=20$ and $t_y=30$. 2. Write a program to rotate a triangle in clock-wise and anti-clock-wise direction where rotation angle is 300. 3. Write a program to scale a square where scaling factors are $S_x=2$ and $S_y=3$. 4. Write a program to reflect a triangle about X axis. 5. Demonstrate combine 2D transformation after applying translation, rotation and scaling transformations. 6. Write a program to demonstrate fix point scaling where scaling factors are $S_x=2$ and $S_y=3$. 7. Write a program to demonstrate window to viewport transformation and linear mapping of the object coordinates in viewport where size of viewport is half to the size of window. 	L3,L5	6
Module IV: 3D Geometric transformation <ol style="list-style-type: none"> 1. Write a program to translate a 3D triangle where translation factors are $t_x=20$ and $t_y=30$. 2. Write a program to rotate a 3D triangle in clock-wise and anti-clock-wise direction where rotation angle is 300. 3. Write a program to scale a 3D square where scaling factors are $S_x=2$ and $S_y=3$. 4. Demonstrate combine 3D transformation after applying translation, rotation and scaling transformations. 	L3,L5	4
Module V: Object modelling and Visible Surface detection <ol style="list-style-type: none"> 1. Write a program to draw Bezier curve on the screen with 4 control points. 2. Write a program to draw spline curve on screen using 6 control points. 3. Write a program to implement fractal objects using Iterated 	L3,L5	3

Function System.		
Module VI: Introduction to multimedia		
1. Create animation Sequence using C++ Graphics Library Function.	L3,L5	3
2. Write a program to generate histogram of an image.		

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

1. Udit Agrawal, "Principles of Computer Graphics", 2nd Edition, Dhanpat Rai Publications, New Delhi, 2017.
2. Hughes, Van Dam, et al. "Computer Graphics Principles and Practice", 3rd Edition, Pearson, 2014.
3. Hearn and Baker, "Computer Graphics with OpenGL", 3rd Edition, Prentice Hall, 2004.
4. Donald Hearn & M. Pauline Baker, "Computer Graphics C Version", Pearson Education, New Delhi, 2004.

Reference Books

1. James D. Foley, Andries van Dam, Steven K. Feiner, John Hughes, "Computer Graphics: Principles and Practice", 2nd Edition, Pearson Education, 2007.
2. F.S. Hill, "Computer Graphics using OPENGL", 2nd edition, Pearson Education, 2003.
3. David F. Rogers; "Procedural Elements for Computer Graphics" TMH. Publications.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	1	–	–	–	–	–	–	–	–	–	–	–	2	–	2
CO2	1	1	1	–	–	–	–	–	–	–	–	–	2	–	2
CO3	1	1	1	3	–	–	–	–	–	–	–	–	1	3	1
CO4	1	1	2	2	–	1	–	–	–	–	–	–	2	–	1
CO5	1	3	2	1	1	2	–	–	–	–	–	–	2	3	2
CO6	1	2	3	–	1	2	–	–	–	–	–	–	2	3	2

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CSE2713	CRYPTOGRAPHY & NETWORK SECURITY	L	T	P	C
Version 2019.1	Date of Approval: 15 May 2019	2	1	0	3
Pre-requisites/Exposure	Basic Mathematics				
Co-requisites	Nil				

Catalog Description

In this course the concepts of cryptography and network security are discussed in detail. Substitution and transposition techniques, symmetric and asymmetric cryptographic algorithms, their applications, differences will be introduced. As a precursor to the study of cryptography studies will be made on impact of various network and web security protocols. The concepts learnt in the studies of cryptography & network security will be applied in the studies and analysis of authentication, integrity and security related protocols.

Course Objectives

The objective of this course is to

1. Equip the students with concepts of cryptography & network security through problem solving and analytical approach.
2. Provide an overview of various network attacks and related security mechanism , various algorithms for modular arithmetic, symmetric and asymmetric cryptography and web and network security

Course Outcomes

On completion of this course, the students will be able to

CO1: Explain, describe and distinguish various security attacks; Describe and solve block and stream ciphers and its applications in cryptography; Solve problems based on substitution and transposition ciphers.

CO2: Explain the basic mathematics of cryptography; Solve problems of groups, modular arithmetic ,gcd and inverse algorithm, chinese remainder theorem and its application in cryptography; Applying algorithms for solving problems in cryptography

CO3: Describing the concept of public key cryptosystems and its related algorithm; Explain and solve problems related to hash functions, digital signature and its applications in cryptography; Compare symmetric and asymmetric key cryptography.

CO4: Explain management, distribution, secure exchange of keys and authentication certificate and its applications in real life. Explain, compare various authentication protocols used in cryptography and network security, also solve problems based on these protocols.

CO5: Explain various security protocols: IPsec, SSL, TLS, SET; Describing malicious software's and illustrating various design approaches to Firewall.

Modules	Blooms level*	Number of hours
MODULE 1: Introduction to security attacks, services and mechanism, Classical encryption techniques: substitution ciphers and transposition ciphers, cryptanalysis, steganography, Stream and block ciphers. Modern Block Ciphers: Block ciphers principles, Shannon's theory of confusion and diffusion, fiestal structure, Data encryption standard (DES), Strength of DES, Idea of differential cryptanalysis, block cipher modes of operations, Triple DES	L1, L2 and L3	7

MODULE 2: Introduction to group, field, finite field of the form $GF(p)$, modular arithmetic, prime and relative prime numbers, Extended Euclidean Algorithm, Advanced Encryption Standard (AES) encryption and decryption, Fermat's and Euler's theorem, Primality testing, Chinese Remainder theorem, Discrete Logarithm Problem, Principles of public key crypto systems, RSA algorithm, security of RSA.	L1,L2, L3	6
MODULE 3: Message Authentication Codes: Authentication requirements, authentication functions, message authentication code, hash functions, birthday attacks, security of hash functions, Secure hash-algorithm (SHA) Digital Signatures: Digital Signatures, Elgamal Digital Signature Techniques, Digital signature standards (DSS).	L1,L2, L3 and L5	7
MODULE 4: Key Management and distribution: Symmetric key distribution, Diffie-Hellman Key Exchange, Public key distribution, X.509 Certificates, Public key Infrastructure. Authentication Applications: Kerberos	L1, L2 and L3	7
MODULE 5: IP Security: Architecture, Authentication header, Encapsulating security payloads, combining security associations, key management. Viruses and related threats, Firewalls	L1, L2	9

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. William Stallings, "Cryptography & Network Security", 4th Edition, Pearson Education, New Delhi, 2017.
2. Behrouz A. Forouzan, "Cryptography & Network Security", 2nd Edition, Tata Mcgraw Hills, New Delhi, 2015

Reference Books

1. Douglas R. Stinsons, "Cryptography Theory and Practice", 3rd Edition, McMillan Publications, London, 2003
2. Atul Kahate, "Cryptography & Network Security", 3rd Edition, Tata Mcgraw Hills, New Delhi, 2017

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

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CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	1	1	--	--	--	--	--	--	--	--	--	1	1	3	-
CO2	1	1	1	--	--	--	--	--	--	--	--	--	1	1	3	-
CO3	1	1	1	--	-	--	--	--	--	--	--	--	1	1	3	-
CO4	1	2	3	--	--	--	--	--	--	--	--	--	1	1	3	-
CO5	1	2	3	--	--	--	--	--	--	--	--	--	2	2	3	-

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CSE2714	SYSTEM PROGRAMMING & COMPILER CONSTRUCTION	L	T	P	C
Version 2019.1	Date of Approval: 15 May 2019	3	1	0	4
Pre-requisites/Exposure	Fundamental concept of computer architecture and operating system and theory of automata				
Co-requisites	Basics of programming languages				

Catalog Description

This course includes the concept of system programming and compiler construction in which all the system applications and programming concepts will be discussed. All the phases of compiler construction will be discussed in detail with some brief description of context free grammar. Using Basic Parsing Techniques efficient Parsers can be constructed with the help of error detection and recovery techniques.

Course Objectives

The objective of this course is to

1. Equip the students with concepts of system programming and working of system utilities.
2. Provide an overview of estimation of performance of compiler design in real time compilation with error handling techniques during compilation.

Course Outcomes

On completion of this course, the students will be able to

- CO 1: Describe the basics of compiler design and its co-relation with the subject computation theory of automation in terms of lexical analyzer.
- CO 2: Explain the working of assembler and macro processor with all the phases of it. And also describe the concept of loader and other system utilities of system software at the time of program translation.
- CO 3: Explain and differentiate the construction of parser through top-down and bottom up parsing techniques.
- CO 4: Explain and analyze the automatic construction of different parsing table which do not allow any ambiguity and backtracking in the given grammar.
- CO 5: Explain the process of syntax analyzer and identify any error occurs in this phase and also generate the three-address code the given grammar and the postfix translation.

Modules	Blooms level*	Number of hours
MODULE 1: Introduction Phases, FSM & RE's and their application to Lexical Analysis, Implementation of Lexical Analysers, The Syntactic specification of Languages: CFG, Derivation and Parse Trees, Capabilities of CFG.	L1 and L2	4
MODULE 2: System Programming Editors: Introduction to system Programming Line editor, Full screen editor and multi window editor, First pass and second pass of assembler and their algorithms. Assemblers for CISC Machines: case study x85 & x86 machines. Bootstrapping for compilers, Introduction to. Design of a compiler in C++ as Prototype. Basic Macro Processor functions- Macro definition & expansion – Macro Processor Algorithm & Data Structures, conditional – Macro Expansion, Keyword Macro Parameters, Macro with in Macro Implementation,	L1 and L2	11

Linkers and Loaders Concept of linking. Case study of Linker in x86 machines. Loading of various loading schemes. Booting techniques and sub-routines.		
MODULE 3: Basic Parsing Techniques Parsers, Shift Reduce Parsing, Operator precedence parsing, top down Parsing, Predictive Parsers.	L2, L3 and L4	9
MODULE 4: Automatic Construction of efficient Parsers LR Parsers, the canonical collection of LR(0) items, constructing SLR Parsing Tables, Constructing canonical LR Parsing tables and LALR parsing tables, An Automatic Parser Generator, Implementation of LR parsing Tables, Constructing LALR sets of items.	L2, L3 and L4	8
MODULE 5: Syntax Directed Translation Syntax directed Translation Schemes, Implementation of Syntax directed translators, Intermediate Code, Postfix notation, Parse Trees and Syntax Trees, Three address Code, Quadruple & Triples, Translation of Assignment Statements, Postfix Translation.	L2 and L3	9
MODULE 6: Error detection and Recovery Lexical phase errors, syntax phase errors, semantic errors Code Optimization: Loop optimization, the DAG representation of basic blocks, value numbers and Algebraic Laws, Global Data – Flow Analysis.	L1, L2 and L3	7

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

- Alfred V. Aho, Ravi Sethi & J.D. Ullman, "Compiler Design", Addison Wesley
- Ullman, Principles of Compiler Design, Narosa publications.
- Donovan J.J., Systems Programming, New York, Mc-Graw Hill, 1972.

Reference Books

- Dhamdhere, D.M., Introduction to Systems Software, Tata Mc-Graw Hill 1996.
- D.M. Dhamdhere, "Compiler Construction – Principles & Practice", Macmillan India Ltd.
- Holub, "Compiler Design in C", PHI.
- Tremblay K.P & Sorenson P.G., "The Theory and practice of Compiler writing" McGraw Hill

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination



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Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance


CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO 1	1	--	--	--	--	--	--	--	--	--	--	--	1	--	--	--
CO 2	1	--	2	--	--	--	--	--	--	--	--	--	--	1	--	--
CO 3	--	--	1	--	--	--	--	--	--	--	--	--	--	2	1	--
CO 4	--	--	1	2	--	--	--	--	--	--	--	--	--	2	1	--
CO 5	--	--	1	--	--	--	--	--	--	--	--	--	2	1	--	--
CO 6	2	2	3	--	--	--	--	--	--	--	--	--	2	1	--	3

1: strongly related, 2: moderately related and 3: weakly related



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CSE2716	SYSTEM PROGRAMMING & COMPILER LAB	L	T	P	C
Version 2019.1	Date of Approval: 15 May 2019	0	0	2	1
Pre-requisites/Exposure	concept of pointer and file handling of C/C++ programming languages				
Co-requisites	NIL				

Catalog Description

In this Lab course the concept of system programming and compiler construction are implemented and demonstrated. Concepts covered would enable them to create and solve complex problems.

Problems or programs will be related to concepts of assembler, macro processor, text editor and parser.

Course Objectives

The objective of this course is to

1. Make the students apply knowledge of various system programming concepts such as assembler, macro processor and text editor.
2. Provide a demonstration of compiler concepts like parsing techniques and implementation.

Course Outcomes

On completion of this course, the students will be able to

CO1: Apply the knowledge of regular languages and context free grammar.

CO2: Demonstrate the use of lexical analyzer and concept of editors.

CO3: Apply the knowledge of compiler design to convert the given expression into acceptable form of compiler.

CO4: Demonstrate the concept of assemble and macro-processor and their calling and expansion.

CO5: Demonstrate and apply the knowledge of compiler parsing techniques to construct parse tree for the given expression.

Modules/Topics Covered**	Blooms level*	Number of hours
1. Sample Programs using the theory of computation concepts of regular language. (a) WAP to check whether string is accepted or not for entered grammar. (b) WAP to convert NFA to DFA. (c) WAP to convert Regular Expression to NFA.	L3, L5	6
2. Sample Programs using context free grammar and editors (a) WAP to find no of Tokens in an expression. (b) Write a program to implement Text Editor.	L3, L5	4
3. Sample Programs using the notation conversion and their usage in parsing. (a) WAP to convert Infix to Postfix notation. (b) WAP to convert Infix to Prefix notation.	L3, L5	2
4. Sample Programs using the concept of assemble and macro	L3, L5	4

processor (a) Write a program to implement Assembler Pass one and Pass two. (b) Write a program to implement Macro-processor.		
5. Sample Programs using the compiler parsing techniques (a) WAP to implement symbol table. (b) WAP calculate FIRST and FOLLOW of a grammar. (c) WAP to implement shift reduce parser.	L3, L5	6

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

**** Sample Programs provided are not limited to these only, can include others as desired.**

Text Books

1. Alfred V. Aho, Ravi Sethi & J.D. Ullman, "Compiler Design", Addison Wesley
2. Ullman, Principles of Compiler Design, Narosa publications.
3. Donovan J.J., Systems Programming, New York, Mc-Graw Hill, 1972.

Reference Books

1. Dhamdhare, D.M., Introduction to Systems Software, Tata Mc-Graw Hill 1996.
2. D.M. Dhamdhare, "Compiler Construction – Principles & Practice", Macmillan India Ltd.
3. Holub, "Compiler Design in C", PHI.
4. Tremblay K.P & Sorenson P.G., "The Theory and practice of Compiler writing" McGraw Hill

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

IA					EE
Components	A	PR	LR	V	70
Weightage (%)	5	10	10	5	

Note: IA –Internal Assessment, A – Attendance, PR – Performance, LR – Lab Record, V – Viva, EE- External Exam

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS O 1	PS O 2	PS O 3	PS O 4
CO 1	2	1	--	--	--	--	--	--	--	--	--	--	1	--	--	--
CO 2	2	1	--	--	--	--	--	--	--	--	--	--	2	1	--	--
CO 3	2	3	1	--	--	--	--	--	--	--	--	--	3	2	1	--
CO 4	3	1	2	--	--	--	--	--	--	--	--	--	2	--	1	--
CO 5	--	3	1	--	--	--	--	--	--	--	--	--	3	2	3	--

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CSE2735	SUMMER INTERNSHIP EVALUATION-II	L	T	P	C
Version: 2017.1	Date of Approval: 14 th June 2017	0	0	0	3
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

The objective of this course is to provide practical training on some live projects that will increase capability to work on actual problem in industry. This training may undergo in an industrial environment or may be an in-house training on some latest software which is in high demand in market. This training will be designed such that it will useful for their future employment in industry.

Course Objectives

The objective of this course is to

1. Provide practical training on live projects
2. Increase technical capabilities on solving real life problems in company environment

Course Outcomes

On completion of this summer internship, the students will be able to:

CO1: Develop communication, interpersonal and other critical skills in the job interview process.

CO2: Design and develop software and hardware projects

CO3: Assess interests and abilities in their field of study.

CO4: Demonstrate excellent technical and communication skills to acquire employment contacts leading directly to a full-time job following graduation from college.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	2	1	2	2	--	--	--	1	--	--	--	1	1	1	1
CO2	1	1	2	2	2	--	--	--	1	--	--	--	1	1	1	1
CO3	1	1	2	3	2	--	--	--	1	--	--	--	1	1	1	1
CO4	1	1	2	2	2	--	--	--	1	--	--	--	1	1	1	1

1: strongly related, 2: moderately related and 3: weakly related

CSE2737	MINOR PROJECT-II	L	T	P	C
Version: 2019.1	Date of Approval: 15 May 2019	0	0	0	2
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

The objective of this course is to provide practical training on some live/demo projects that will increase capability to work on actual problem in industry. It will be an in house training on some latest software which is in high demand in market. This training will be designed such that it will useful for their future employment in industry.

Course Objectives

The objective of this course is to

1. Provide practical training on live projects
2. Increase technical capabilities on solving real life problems in company environment

Course Outcomes

On completion of this minor project, the students will be able to:

CO1: Demonstrate a sound technical knowledge of their selected project topic.

CO2: Design and develop engineering solutions to complex problems utilising a systems approach.

CO3: Analyse various approaches for solving a complex engineering problem using different tools and techniques

CO4: Demonstrate the knowledge, skills and attitudes of a professional engineer.

CO5: Apply technical skills and knowledge in completing the project.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	2	--	--	--	--	--	--	1	--	--	--	--	--	1	1
CO2	1	1	--	--	--	--	--	--	1	--	--	--	--	--	1	1
CO3	1	1	--	--	--	--	--	--	1	--	--	--	--	--	1	1
CO4	1	1	--	--	--	--	--	--	1	--	--	--	--	--	1	1
CO5	1	1	--	--	--	--	--	--	1	-	-	-	--	--	1	1

1: strongly related, 2: moderately related and 3: weakly related

CSE2707	MOBILE COMPUTING	L	T	P	C
Version 2017.1	Date of Approval: June 2017	3	0	0	3
Pre-requisites/Exposure	Basic Networking				
Co-requisites	Nil				

Catalog Description

The objective of this consortium is to shape and expand a full-scale and sound mobile computing system market. To achieve this, cooperation is required of interests related to communication (network), computer hardware/software, system integrators (including service providers), and the media.

Course Objectives

The objective of this course is to

1. Give a general overview of the cellular technology and the associated terms and discuss the generations of the mobile technologies starting from 1G to 3G techniques.
2. Illustrate the GPRS and WAP model for 2G internet connectivity in detail.
3. Elaborate the third-generation mobile services
4. Describe the Global Mobile Satellite Systems in detail and basic architecture of Bluetooth technology and advanced topics in mobile computing.

Course Outcomes

On completion of this course, the students will be able to

CO1: Explain the basic concepts mobile technology, computing and basic architecture of PCS and GSM.

CO2: Describe the mobile networking Infrastructure through 2G technologies (GSM, GPRS, WAP).

CO3: Explain the basic concepts of 3G technologies (WCDMA, CDMA 2000) and WLL.

CO4: Discuss the working of mobile satellite systems like IRIDIUM and GLOBALSTAR.

CO5: Explain the concepts of Bluetooth technology, its working and protocols, virtual networks and enterprise networks.

Modules	Blooms level*	Number of hours
Module I: Introduction to Personal Communications Services (PCS) PCS Architecture, Mobility management, Networks signalling. Global System for Mobile Communication (GSM) system overview: GSM Architecture, Mobility management, Network signalling.	L1, L2 and L3	8
Module II: General Packet Radio Services (GPRS) & Wireless Application Protocol (WAP) GPRS Architecture, GPRS Network Nodes. Mobile Data Communication: WLANs (Wireless LANs) IEEE 802.11 standard, Mobile IP. Wireless Application Protocol (WAP): The Mobile Internet standard, WAP Gateway and Protocols, wireless mark up Languages (WML).	L1,L2	10

Module III: Third Generation (3G) Mobile Services Introduction to International Mobile Telecommunications 2000 (IMT 2000) vision, Wideband Code Division Multiple Access (W-CDMA), and CDMA 2000, Quality of services in 3G. Wireless Local Loop (WLL): Introduction to WLL Architecture, wireless Local Loop Technologies.	L1, L2	7
Module IV: Global Mobile Satellite Systems Global Mobile Satellite Systems; case studies of the IRIDIUM and GLOBALSTAR systems.	L1, L2	7
Module V: Enterprise Networks Introduction to Virtual Networks, Blue tooth technology, Blue tooth Protocols. Advanced techniques in mobile computing.	L1, L2	4

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. "Wireless and Mobile Networks Architectures", by Yi-Bing Lin & Imrich Chlamtac, John Wiley & Sons, 2001.
2. "Mobile and Personal Communication systems and services", by Raj Pandya, Prentice Hall of India, 2001.

Reference Books

1. "Wireless Web Development", Ray Rischpater, Springer Publishing, 2000.
2. "The Wireless Application Protocol", by Sandeep Singhal, Pearson Education Asia, 2000.
3. "Third Generation Mobile Telecommunication systems", by P.Stavronlakis, Springer Publishers, 2001.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	2	2	--	--	--	--	--	--	--	--	--	1	-	3	-
CO2	1	1	2	--	--	--	--	--	--	--	--	--	1	-	3	--
CO3	1	2	-	--	-	--	--	--	--	--	--	--	1	-	--	--
CO4	1	2	-	--	--	--	--	--	--	--	--	--	1	-	--	--
CO5	1	2	3	--	--	--	--	--	--	--	--	--	1	2	--	--

1: strongly related, 2: moderately related and 3: weakly related

CSE2717	ROBOTIC PROCESS AUTOMATION DESIGN & DEVELOPMENT	L	T	P	C
Version 2019.1	Date of Approval: 15 May 2019	3	0	0	3
Pre-requisites/Exposure	Basic Networking Concepts				
Co-requisites	Nil				

Catalog Description

This course aims at providing knowledge of basic concepts of Robotic Process Automation to University students. It further builds on these concepts and introduces key RPA Design and Development strategies and methodologies specifically in context of UiPath products. The student undergoing the course shall develop the competence to design and develop a robot for a defined process.

Course Objectives

The objective of this course is to

1. Equip the students with concepts of robotic process automation
2. Provide an overview of designing with uipath software.

Course Outcomes

On completion of this course, the students will be able to

- CO1: Explain key terms and trends around the robotic process automation along with its physical and logical design
- CO2: Understand the potential and value of the robotic process automation .
- CO3: Describe the technologies used for the robotic process automation and mobile devices, including (passive and active) sensors, the physical communications layer, communications protocols, programming frameworks,.
- CO4: Design programs and have hands on experience on uipath software
- CO5: Develop RPA programs of moderate complexity for a well-used robotic automation process using uipath.

Modules	Blooms level*	Number of hours
Module 1: Programming Basic and Recap Programming Concepts Basics I - Understanding the application, Basic Web Concepts, Protocols, Email Clients, Data Structures, Data Tables, Algorithms, Software Processes, Software Design, SDLC. Programming Concepts Basics 2- Scripting, Net Framework, Net Fundamentals, XML, Control structures and functions, XML, HTML, CSS, Variables & Arguments.	L1, L2	8
Module II: RPA Concepts RPA Basics - History of Automation, what is RPA, RPA vs Automation, Processes & Flowcharts, Programming Constructs in RPA, What Processes can be Automated, Types of Bots, Workloads which can be automated. RPA Advanced Concepts - Standardization of processes, RPA Development methodologies, Difference from SDLC, Robotic control flow architecture, RPA business case, RPA Team, Process Design Document/Solution Design Document, Industries best suited for RPA, Risks & Challenges with RPA, RPA and emerging ecosystem	L2, L3 and L4	8
Module III: UiPath Introduction & Basics Introduction to UiPath- Installing UiPath Studio community edition, The User Interface, Keyboard Shortcuts, About Updating, About Automation Projects, Introduction to Automation Debugging, Managing Activation Packages, Reusing Automations Library, Installing the Chrome Extension, Installing the Firefox Extension, Connecting your project to a source control system, Activities Guide. Variables, Control Flow Data Manipulation- Data Manipulation Introduction, Scalar variables, collections and Tables, Text Manipulation, Data Manipulation, Gathering and Assembling Data. Recording and Advanced UI Interaction - Recording Introduction, Basic and Desktop Recording, Web Recording, Input/Output Methods, Screen Scraping, Data Scraping, Scraping advanced techniques. Selectors.	L2, L3 and L4	8
Module IV: UiPath Advanced Automation concepts and techniques Image, Text & Advanced Citrix Automation- Introduction to Image & Text Automation, Image based automation, Keyboard based automation, Information Retrieval, Advanced Citrix Automation challenges, Best Practices, using tab for Images, Starting Apps. Excel Data Tables & PDF - Data Tables in RPA, Excel and Data Table basics, Data Manipulation in excel, Extracting Data from PDF, extracting a single piece of data, Anchors, Using anchors in PDF. Email Automation- Email Automation, Incoming Email automation, Sending Email automation	L2, L3 and L4	12

*Bloom's Level:

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

"Learning Robotic Process Automation" By Alok Mani Tripathi, Packt Publications, 1st Edition, 2018

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination**Examination Scheme:**

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	--	--	3	--	--	--	--	--	--	2	--	1	1	-	-
CO2	1	--	1	2	--	--	--	--	--	--	--	--	-	1	-	-
CO3	1	--	1	2	--	--	--	--	--	--	--	--	-	1	-	2
CO4	1	--	--	2	--	--	--	--	--	--	--	--	1	1	-	2

1: strongly related, 2: moderately related and 3: weakly related



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CSE2718	RESPONSIVE WEB DESIGN	L	T	P	C
Version : 2019.1	Date of Approval: 15 May 2019	2	0	1	3
Pre-requisites/Exposure	knowledge of website design				
Co-requisites	NIL				

Catalog Description

This course is aimed to provide a fundamental understanding of JavaScript and two of its related library: Bootstrap and React for dynamic web site client side scripting. Javascript is a famous scripting language for client side. The bootstrap and react libraries are rich API for creating dynamic websites. The course builds strong foundation for client-side scripting for creating dynamic websites

Course Objectives

The objective of this course is

1. Equip the students with basic and advanced features of javascript and bootstrap library to create dynamic web sites
2. Provide an overview of basic features of react library to design dynamic websites.

Course Outcomes

On completion of this course, the students will be able to

CO1: Define the and explain concept of responsive web design and responsive content.

CO2 Explain HTML and CSS contents for responsive websties; Design and Create responsive websites using html, css and media queries.

CO3: Explain the concept of responsive workflow and working with responsive web design tools; Creating responsive websites that work on variety of devices.

CO4: Designing responsive websites using the concepts of typography, navigation and header layout; Evaluating performance of responsive websites.

Modules	Blooms level*	Number of hours
Module 1: Foundations of responsive design What Is Responsive Design?: Just the Basics ,A Short History, Why Responsive Design Responsive Content: Content Strategy ,Managing Content, Developing Content, Content Parity, Content Governance, Adaptive Content	L2 and L3	8
Module 2: Creating Responsive Websites HTML for Responsive Sites: Working with HTML, Basic Page Structure Viewport, Structural Elements, Creating a Page, Clean and Semantic HTML CSS for Responsive Sites: How CSS Works, Versions of CSS, Where CSS Goes, The Cascade, Using the Cascade, Comments, Organizing Your Stylesheet, The Box Model, display, Positioning, float and clear, Basic Styles Media Queries: What's a Media Query? Media Query Structure, Using Media Queries in Stylesheet Links, Other Ways to Use Media Queries, What We Can Query, Browser Support, Breakpoints, Design Ranges, Designing Responsively, Using Media Queries, Two-Column Layout, Setting a Maximum Width, How to Choose Breakpoints	L2 and L3	8

Images: Ways to Display Images, Alt Text, Image File Formats, Optimizing Images, Content Images, Background Images Responsive Images		
Module 3: Working Responsively Responsive Workflow: Strategy and Planning, Content Before Layout Thinking About Layout, Prototypes, Visual Design, Responsive Design Tools, Selling Responsive Design, Working with Clients Mobile and Beyond: User Experience , Device-Agnostic Design, Focusing on Mobile First, Do What You Can, Types of Devices, Touch, Screen Size, Accessibility (Universal Design), Deciding Which Devices to Support Why Use Real Devices for Testing, Testing	L2 and L3	8
Module 4: Designing Responsive Websites Typography: Start with HTML, Typefaces, Using Fonts, Sizing Text, Line Length, Whitespace, Margins and Padding, Changing Typeface for Screen Size Navigation and Header Layout: Responsive Navigation , Branding, Navigation Links, Navigation Patterns, Header Performance: Why Performance Matters, Performance as Design ,How Web Pages Are Loaded and Rendered, Measuring Performance Cleaning Up Your Code, Minimizing HTTP Requests, Server Stuff JavaScript, CSS, Hosting, Conditionally Loading Content, Reflows and Repaints, RESS	L2and L3	12

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books:

1. "Learning Responsive Web Design A Beginner's Guide", Clarissa Peterson, Orielly, 2014

Reference Books:

1. "Responsive Web Design with HTML5 and CSS3", Ben Frain, Packt, 2012
2. "Responsive Web Design by Example", Farhaan Hussain, Packt, 2017

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS O 1	PS O 2	PS O 3	PS O 4
CO 1	--	1	1	--	1	--	--	--	--	1	--	--	1	--	--	--
CO 2	--	1	2	--	2	--	--	--	--	1	--	--	1	--	--	--
CO 3	--	1	1	--	1	--	--	--	--	2	--	--	1	--	--	--
CO 4	--	1	2	--	1	--	--	--	--	2	--	--	1	--	--	--

1: strongly related, 2: moderately related and 3: weakly related

CSE2719	RESPONSIVE WEB DESIGN LAB	L	T	P	C
Version : 2019.1	Date of Approval: 15 May 2019	0	0	2	1
Pre-requisites/Exposure	knowledge of website design				
Co-requisites	NIL				

Catalog Description

This course is aimed to provide a fundamental understanding of JavaScript and two of its related library: Bootstrap and React for dynamic web site client side scripting. Javascript is a famous scripting language for client side. The bootstrap and react libraries are rich API for creating dynamic websites. The course builds strong foundation for client-side scripting for creating dynamic websites

Course Objectives

The objective of this course is

1. Equip the students with basic and advanced features of javascript and bootstrap library to create dynamic web sites
2. Provide an overview of basic features of react library to design dynamic websites.

Course Outcomes

On completion of this course, the students will be able to

CO1: Define the and explain concept of responsive web design and responsive content.

CO2 Explain HTML and CSS contents for responsive websties; Design and Create responsive websites using html, css and media queries.

CO3: Explain the concept of responsive workflow and working with responsive web design tools; Creating responsive websites that work on variety of devices.

CO4: Designing responsive websites using the concepts of typography, navigation and header layout; Evaluating performance of responsive websites .

Modules	Blooms level*	Number of hours
Module 1: Foundations of responsive design Programs based on: <ul style="list-style-type: none"> • Content Strategy ,Managing Content, • Developing Content, Content Parity, • Content Governance, Adaptive Content 	L2 and L3	3
Module 2: Creating Responsive Websites Programs based on: <ul style="list-style-type: none"> • Working with HTML, Basic Page Structure Viewport, Structural Elements, Creating a Page, Clean and Semantic HTML • The Cascade, Using the Cascade, Comments, Organizing Your Stylesheet, The Box Model, display, Positioning, float and clear, Basic Styles • Media Query Structure, Using Media Queries in Stylesheet Links, Other Ways to Use Media Queries, • What We Can Query, Browser Support, Breakpoints, Design Ranges, Designing Responsively, Using Media Queries, Two-Column Layout, Setting a Maximum 	L2 and L3	3

<ul style="list-style-type: none"> Width, How to Choose Breakpoints Images: Ways to Display Images, Alt Text, Image File Formats, Optimizing Images, Content Images, Background Images Responsive Images 		
Module 3: Working Responsively Programs based on: <ul style="list-style-type: none"> Responsive Workflow, Visual Design, Responsive Design Tools, Selling Responsive Design, Working with Clients Mobile and Beyond: User Experience , Device-Agnostic Design, Focusing on Mobile First, Do What You Can, Types of Devices, Touch, Screen Size, Accessibility (Universal Design), Deciding Which Devices to Support Why Use Real Devices for Testing, Testing 	L2 and L3	3
Module 4: Designing Responsive Websites <ul style="list-style-type: none"> Typography: Start with HTML, Typefaces, Using Fonts, Sizing Text, Line Length, Whitespace, Margins and Padding, Changing Typeface for Screen Size Navigation and Header Layout: Responsive Navigation , Branding, Navigation Links, Navigation Patterns, Header Performance: Why Performance Matters, Performance as Design ,How Web Pages Are Loaded and Rendered, Measuring Performance Cleaning Up Your Code, Minimizing HTTP Requests, Server Stuff JavaScript, CSS, Hosting, Conditionally Loading Content, Reflows and Repaints, RESS 	L2and L3	3

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books:

1. "Learning Responsive Web Design A Beginner's Guide", Clarissa Peterson, Orielly, 2014

Reference Books:

1. "Responsive Web Design with HTML5 and CSS3", Ben Frain, Packt, 2012
2. "Responsive Web Design by Example", Farhaan Hussain, Packt, 2017

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS O 1	PS O 2	PS O 3	PS O 4
CO 1	--	1	1	--	1	--	--	--	--	1	--	--	1	--	--	--
CO 2	--	1	2	--	2	--	--	--	--	1	--	--	1	--	--	--
CO 3	--	1	1	--	1	--	--	--	--	2	--	--	1	--	--	--
CO 4	--	1	2	--	1	--	--	--	--	2	--	--	1	--	--	--

1: strongly related, 2: moderately related and 3: weakly related

CSE2837	PROJECT DISSERTATION	L	T	P	C
Version: 2017.1	Date of Approval: 14 th June 2017	0	0	0	3
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

The objective of this course is to provide practical training on some live/demo projects that will increase capability to work on actual problem in industry. It will be an in house training on some latest software which is in high demand in market. This training will be designed such that it will useful for their future employment in industry.

Course Objectives

The objective of this course is to

1. Provide practical training on live projects
2. Increase technical capabilities on solving real life problems in company environment

Course Outcomes

On completion of this summer internship, the students will be able to:

CO1: Demonstrate a sound technical knowledge of their selected project topic.

CO2: Design and develop engineering solutions to complex problems utilising a systems approach.

CO3: Analyse various approaches for solving a complex engineering problem using different tools and techniques

CO4: Demonstrate the knowledge, skills and attitudes of a professional engineer.

CO5: Apply technical skills and knowledge in completing the project.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	2	--	--	--	--	--	--	1	--	--	--	--	--	1	1
CO2	1	1	--	--	--	--	--	--	1	--	--	--	--	--	1	1
CO3	1	1	--	--	--	--	--	--	1	--	--	--	--	--	1	1
CO4	1	1	--	--	--	--	--	--	1	--	--	--	--	--	1	1
CO5	1	1	--	--	--	--	--	--	1	--	--	--	--	--	1	1

1: strongly related, 2: moderately related and 3: weakly related



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CSE2804	DOT NET PROGRAMMING	L	T	P	C
Version:2017.1	Date of Approval: 14 June, 2017	3	0	1	4
Pre-requisites/Exposure	C#.NET, HTML and CSS				
Co-requisites	Nil				

Catalog Description

This course provides knowledge regarding Creating Dynamic Web Pages with the help of ASP.NET framework. Various topics

Course Objectives

The objective of this course is to

1. Equip the students with concepts of ASP.NET web applications including State management, Web Controls and ADO.NET.
2. Provide knowledge to develop secure ASP.NET web applications using C#.NET programming language.

Course Outcomes

On completion of this course, the students will be able to

CO1: Explain the components of .NET framework and create basic ASP.NET web page.

CO2: Use various standard and advance web controls for developing ASP.NET dynamic web pages and also create custom controls.

CO3: Establish database connectivity and perform various operations on database through ASP.NET web pages.

CO4: Maintain states at client and server site both.

CO5: Develop and use web services.

Modules	Blooms level*	Number of hours
MODULE 1: .NET FRAMEWORK .NET Framework and its features CLR, MSIL,CTS, .NET class library, .NET Languages, CTS, assemblies, manifest, and metadata, What is ASP.NET?, Difference between ASP and ASP.NET	L1, L2	4
MODULE 2: WEB CONTROLS Standard Controls, Validation controls, Adv. Controls, Custom Controls	L2, L3 and L4	14
MODULE 3: ADO.NET ADO.NET,ADO.NET Architecture Data Adapters, Datasets, Command, Data Reader Data Reader Data bind Controls Displaying data in data grid XML in ADO.NET	L2, L3 and L4	7
MODULE 4: SECURITY ASP.NET applications : Security, Error Handling	L2 and L3	2
MODULE 5: STATE MANAGEMENT State Management : View State, Session State, Web Services	L2, L3 and L4	5

*Bloom's Level:

L1:Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. Stephen Walther, ASP.NET Unleashed, SAMS Publication
2. Matthew MacDonald, Beginning with ASP.NET 4.5 in C#, Apress Publications

Reference Books

1. Imar Spaanjaars, Beginning with ASP.NET 4.5.1 in C# and VB, Worx Publication
2. Jesse Liberty, Dan Hurwitz, Programming ASP.NET, O'Reilly.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	3	--	--	--	--	--	--	--	--	--	--	--	2	3	--	--
CO2	2	2	1	2	1	--	--	--	--	--	--	--	2	2	3	--
CO3	2	2	1	2	2	--	--	--	--	--	--	--	2	2	3	--
CO4	2	1	1	2	1	--	--	--	--	--	--	--	2	2	2	--
CO5	2	1	1	2	2	--	--	--	--	--	--	--	2	2	2	--

1: strongly related, 2: moderately related and 3: weakly related



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CSE2806	DOT NET PROGRAMMING LAB	L	T	P	C
Version 2017.1	Date of Approval: 14, June, 2017	0	0	1	1
Pre-requisites/Exposure	C#.NET, HTML and CSS				
Co-requisites	Nil				

Catalog Description

This lab course covers development of Web applications using ASP.NET. The concepts are designed to impart the knowledge of ASP.NET framework concepts at implementation level. The major topic covered includes theme, state management, web controls and database connectivity using ADO.NET and web services.

Course Objectives

The objective of this course is to

1. Equip the students with concepts of ASP.NET web applications including State management, Web Controls and ADO.NET.
2. Provide knowledge to develop secure ASP.NET web applications using C#.NET programming language.

Course Outcomes

On completion of this course, the students will be able to

CO1: Use various standard and advance web controls for developing ASP.NET dynamic web pages and also create custom controls.

CO2: Maintain states at client and server site both.

CO3: Establish database connectivity and perform various operations on database through ASP.NET web pages.

CO4: Develop and use web services.

Modules	Blooms level*	Number of hours
1. Basics of ASP.NET Page a) Write a program to implement C#.NET class with properties and methods. b) Design a Login Page, which displays a Welcome Page on successful Login and an error message in case of invalid Id/Password. c) Design a form and apply themes (design time and dynamically).	L1, L2	4
2. State Management a) Implement state management for Login page which move to welcome page when credentials are correct. The welcome page displays a welcome message along with the user Id. b) Implement various state management methods using a suitable web form.		2
3. Built-in Controls, Custom Controls a) Design any web form and apply various validation controls. b) Create a web form which can work in Hindi and English language both. c) Design a web form to upload an image to server. d) Design a custom control, Numeric Textbox, which should accept only integer value for a particular range. The range should be customizable.	L2, L3 and L4	6
4. ADO.NET	L2, L3	4

a) Create any database table and apply basic operations (Insert/Delete/Update) on it using ASP.NET application. b) Implement various methods of execution of SQL command. c) Display data in a Grid and perform basic database operations.	and L4	
5. Security, Web Services a) Develop any web application to illustrate SQL Injection attack and redesign it to prevent the attack. b) Develop a web application to illustrate XSS attack and redesign it to prevent the attack	L2 and L3	2
6. Web Application Create a small web application having some application.	L2, L3 and L4	6

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. Stephen Walther, ASP.NET Unleashed, SAMS Publication
2. Matthew MacDonald, Beginning with ASP.NET 4.5 in C#, Apress Publications

Reference Books

1. Imar Spaanjaars, Beginning with ASP.NET 4.5.1 in C# and VB, Worx Publication
2. Jesse Liberty, Dan Hurwitz, Programming ASP.NET, O'Reilly.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3	PS O4
C O1	2	1	--	--	--	--	--	--	--	--	--	--	2	2	2	--
C O2	2	1	--	--	--	--	--	--	--	--	--	--	2	2	2	--
C O3	1	1	--	--	--	--	--	--	--	--	--	--	2	1	1	--
C O4	1	1	--	--	--	--	--	--	--	--	--	--	2	1	1	--

1: strongly related, 2: moderately related and 3: weakly related

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CSE2812	ADVANCED ROBOTIC PROCESS AUTOMATION DESIGN & DEVELOPMENT	L	T	P	C
Version 2019.1	Date of Approval: 15 May 2019	3	0	0	3
Pre-requisites/Exposure	Basic Networking Concepts				
Co-requisites	Nil				

Catalog Description

This course aims at providing knowledge of basic concepts of Robotic Process Automation to University students. It further builds on these concepts and introduces key RPA Design and Development strategies and methodologies specifically in context of UiPath products. The student undergoing the course shall develop the competence to design and develop a robot for a defined process.

Course Objectives

The objective of this course is to

1. Equip the students with concepts of robotic process automation
2. Provide an overview of designing with uipath software.

Course Outcomes

On completion of this course, the students will be able to

CO1: Explain key terms and trends around the robotic process automation along with its physical and logical design

CO2: Understand the potential and value of the robotic process automation .

CO3: Describe the technologies used for the robotic process automation and mobile devices, including (passive and active) sensors, the physical communications layer, communications protocols, programming frameworks,.

CO4: Design programs and have hands on experience on uipath software

CO5: Develop RPA programs of moderate complexity for a well-used robotic automation process using uipath.

Modules	Blooms level*	Number of hours
Module I: Exception handling and Best Practices Debugging and Exception Handling- Debugging Tools, Strategies for solving issues, Catching errors. Project Organization- Concept of project organization, Best practices, Avoiding pitfalls, Invoke Activity.	L1, L2	8
Module II: Introduction to Orchestrator Orchestrator, Tenants, Authentication, Users, Roles, Robots, Environments, Queues & Transactions, Schedules.	L2, L3 and L4	8
Module III: merging and Future Trends in IT Artificial Intelligence, Machine Learning, Agent awareness, Natural Language Processing Computer Vision	L2, L3 and L4	8
Module IV: Capstone Project Real life case studies which can be used to apply the concepts learnt during the course. The projects shall test student's skills right from process transformation and documentation to the design and development of the actual robot	L2, L3 and L4	12

*Bloom's Level:

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

"Learning Robotic Process Automation" By Alok Mani Tripathi, Packt Publications, 1st Edition, 2018

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	--	--	3	--	--	--	--	--	--	2	--	1	1	-	-
CO2	1	--	1	2	--	--	--	--	--	--	--	--	-	1	-	-
CO3	1	--	1	2	--	--	--	--	--	--	--	--	-	1	-	2
CO4	1	--	--	2	--	--	--	--	--	--	--	--	1	1	-	2

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CSE2803	DIGITAL IMAGE PROCESSING	L	T	P	C
Version: 2017.1	Date of Approval: 14 th June 2017	2	0	0	2
Pre-requisites/Exposure	Basics of Computer Graphics				
Co-requisites	NIL				

Catalog Description

This course gives students an insight into the basics of Image Processing along with visualization of real concept of Image processing. Concepts covered would enable students to define and differentiate among various types of image refinement. Further they would be able to gain insights about various Image restoration and modification technique.

Course Objectives

Processing color and grayscale images or other two-dimensional signals has become an important tool for research and investigation in many areas of science and engineering. *Digital Image Processing* is designed to give professionals and students a powerful collection of fundamental and advanced image processing tools on the desktop. Digital Image Processing takes full advantage of the computational technology of Mathematica.

Course Outcomes

On completion of this course, the students will be able to

CO1: Define and explain introductory part of Digital Image Processing

CO2: List out the Image Enhancement techniques in the Spatial Domain

CO3: Explain concepts of Image Enhancement in the Frequency Domain

CO4: Describe the architecture Image Compression

CO5: Explain the basics of Representation and Description

Modules	Blooms level*	Number of hours
MODULE 1: Introduction and Digital Image Fundamentals The origins of Digital Image Processing, Examples of Fields that Use Digital Image Processing, Fundamentals Steps in Image Processing, Elements of Digital Image Processing Systems, Image Sampling and Quantization, Some basic relationships like Neighbors, Connectivity, Distance Measures between pixels, Linear and Non Linear Operations.	L1 and L2	8
MODULE 2: Image Enhancement in the Spatial Domain Some basic Gray Level Transformations, Histogram Processing, Enhancement Using Arithmetic and Logic operations, Basics of Spatial Filters, Smoothing and Sharpening Spatial Filters, Combining Spatial Enhancement Methods.	L2 and L3	8
MODULE 3: Image Enhancement in the Frequency Domain Introduction to Fourier Transform and the frequency Domain, Smoothing and Sharpening Frequency Domain Filters, Homomorphism Filtering.	L1 and L2	10

MODULE 4: Image Compression Coding, Interpixel and Psychovisual Redundancy, Image Compression models, Elements of Information Theory, Error free comparison, Lossy compression, Image compression standards. Image Segmentation Detection of Discontinuities, Edge linking and boundary detection, Threshold, Region Oriented Segmentation, Motion based segmentation.	L2 and L3	12
MODULE 5: Representation and Description Representation, Boundary Descriptors, Regional Descriptors, Use of Principal Components for Description, Introduction to Morphology, Some basic Morphological Algorithms. Object Recognition Patterns and Pattern Classes, Decision-Theoretic Methods, Structural Methods.	L2 and L3	10

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

Text:

- Rafael C. Gonzales & Richard E. Woods, "Digital Image Processing", 2nd edition, Pearson Education.
- A. K. Jain, "Fundamental of Digital Image Processing", PHI.

References:

- Rosefield Kak, "Digital Picture Processing",
- W.K. Pratt, "Digital Image Processing",

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

A: Attendance, CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3	PS O4
C O1	1	2	--	--	--	--	--	--	--	--	--	--	1	--	--	--
C O2	1	--	2	--	--	--	--	--	--	--	--	--	1	2	--	--
C O3	3	--	1	--	2	--	--	--	--	--	--	--	1	3	2	--
C O4	3	--	2	--	1	--	--	--	--	--	--	--	1	--	2	--
C O5	3	--	2	--	1	--	--	--	--	--	--	--	1	--	2	--

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CSE2805	DIGITAL IMAGE PROCESSING LAB	L	T	P	C
Version 2017.1	Date of Approval: 15May 2019	0	0	2	1
Pre-requisites/Exposure	Basics of MATLAB				
Co-requisites	NIL				

Catalog Description

In this Lab course first student should learn about advanced level of software used for easy calculation and toolbox used for software like MATLAB.

Course Objectives

The objective of this course is to

1. Make the students apply knowledge of various Image processing & pattern recognition required for solving complex problems.
2. Provide a demonstration of different types of image processing techniques through MATLAB toolbox.

Course Outcomes

On completion of this course, the students will be able to

CO1: Acquiring knowledge of Basics of High-end calculation software and need in Computer Science & engineering

CO2: Demonstrate the All preliminary functions in MATLAB

CO3: Apply the knowledge of all the basics function and toolbox knowledge of MATLAB

CO4: Demonstrate the Use of MATLAB in image Processing

CO5: Demonstrate usage of applications involving with Image processing & Recognition Its Toolbox used by MATLAB

Modules/Topics Covered**	Blooms level*	Number of hours
1. Introduction of MATLAB (e) Basic Variable declaration & its operation (f) Function use & its application	L3, L5	4
2. Sample Programs in MATLAB (e) Basic use of Matrix and Graph Plotting (f) Different type of graph plotting with use of different -2 type of data	L3, L5	6
3. Sample Programs using MATLAB functions (l) Create a basic program MATLAB using functions (m) Use of basic function Image processing (n) Practice on Basic function of Image processing tool box.	L3, L5	6
4. Sample programs of ANN functions (c) Practice on Pattern Recognition functions in MATLAB (d) Write a program for training a small network in MATLAB	L3, L5	6
5. Sample Programs using ANN toolbox & Image processing toolbox (b) Demonstrate the use of ANN tool box & Image processing toolbox and write a program after combining it.	L3, L5	2

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

**** Sample Programs provided are not limited to these only, can include others as desired.**

Text Books

Text & References:

- Rafael C. Gonzalez & Richard E. Woods, "Image Processing Using MATLAB", 2nd edition, Pearson Education.
- "Pattern classifications", Richard O. Duda, Peter E. Hart, David G. Stroke. Wiley student edition, Second Edition

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

IA					EE
Components	A	PR	LR	V	70
Weightage (%)	5	10	10	5	

Note: IA –Internal Assessment, A – Attendance, PR – Performance, LR – Lab Record, V – Viva, EE- External Exam

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	2	1	--	--	--	--	--	--	--	--	--	--	2	--	--	--
CO2	3	1	--	--	--	--	--	--	--	--	--	--	1	2	--	--
CO3	2	1	2	--	--	--	--	--	--	--	--	--	1	2	--	--
CO4	1	3	2	--	--	--	--	--	--	--	--	--	2	--	2	--
CO5	1	3	--	--	--	--	--	--	--	--	--	--	1	--	--	--

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Curriculum & Scheme of Examination

2022

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INTRODUCTION TO COMPUTERS AND PROGRAMMING IN C

Course Code: NCE6104

Credit Units : 03

Course Objective:

The objective of this course module is to acquaint the students with the basics of computers system, its components, data representation inside computer and to get them familiar with various important features of procedure oriented programming language i.e. C.

Course Contents:

Module I: Introduction

Introduction to computer, history, von-Neumann architecture, memory system (hierarchy, characteristics and types), H/W concepts (I/O Devices), S/W concepts (System S/W & Application S/W, utilities). Data Representation: Number systems, character representation codes, Binary, octal, hexadecimal and their interconversions. Binary arithmetic, floating point arithmetic, signed and unsigned numbers, Memory storage unit.

Module II: Programming in C

History of C, Introduction of C, Basic structure of C program, Concept of variables, constants and data types in C, Operators and expressions: Introduction, arithmetic, relational, Logical, Assignment, Increment and decrement operator, Conditional, bitwise operators, Expressions, Operator precedence and associativity. Managing Input and output Operation, formatting I/O.

Module III: Fundamental Features in C

C Statements, conditional executing using if, else, nesting of if, switch and break Concepts of loops, example of loops in C using for, while and do-while, continue and break. Storage types (automatic, register etc.), predefined processor, Command Line Argument.

Module IV: Arrays and Functions

One dimensional arrays and example of iterative programs using arrays, 2-D arrays Use in matrix computations.

Concept of Sub-programming, functions Example of user defined functions. Function prototype, Return values and their types, calling function, function argument, function with variable number of argument, recursion.

Module V: Advanced features in C

Pointers, relationship between arrays and pointers Argument passing using pointers, Array of pointers. Passing arrays as arguments.

Strings and C string library.

Structure and Union. Defining C structures, Giving values to members, Array of structure, Nested structure, passing strings as arguments.

File Handling.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

Text & References:

Text:

- “ANSI C” by E Balagurusamy
- Yashwant Kanetkar, “Let us C”, BPB Publications, 2nd Edition, 2001.
- Herbert Schildt, “C: The complete reference”, Osbourne Mcgraw Hill, 4th Edition, 2002.
- V. Raja Raman, “Computer Programming in C”, Prentice Hall of India, 1995.

References:

- Kernighan & Ritchie, “C Programming Language”, The (Ansi C Version), PHI, 2nd Edition.
- I. B. Dixit, “Fundamentals of Computers and Programming in ‘C’.
- P. K. Sinha and Priti Sinha, “Computer Fundamentals”, BPB publication.

PROGRAMMING IN C LAB

Course Code: NCE6106

Credit Units : 01

Software Required: Turbo C

Course Contents:

- C program involving problems like finding the nth value of cosine series, Fibonacci series. Etc.
- C programs including user defined function calls
- C programs involving pointers, and solving various problems with the help of those.
- File handling

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.



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ENGINEERING GRAPHICS LAB

Course Code: NCE6211

Credit Units : 01

Course Objective:

This course will provide students concepts on the drawings of different curves like straight line, parabola, ellipse etc. After completion of this course, students will be able to draw different figures manually and will be capable of using various instruments involved in drawings.

Course Contents:

Module I: General

Importance, Significance and scope of engineering drawing, Lettering, Dimensioning, Scales, Sense of proportioning, Different types of projections, Orthographic Projection, B.I.S. Specifications.

Module II: Projections of Point and Lines

Introduction of planes of projection, Reference and auxiliary planes, projections of points and Lines in different quadrants, traces, inclinations, and true lengths of the lines, projections on Auxiliary planes, shortest distance, intersecting and non-intersecting lines.

Module III: Planes other than the Reference Planes

Introduction of other planes (perpendicular and oblique), their traces, inclinations etc., Projections of points and lines lying in the planes, conversion of oblique plane into auxiliary Plane and solution of related problems.

Module IV: Projections of Plane Figures

Different cases of plane figures (of different shapes) making different angles with one or both reference planes and lines lying in the plane figures making different given angles (with one of both reference planes). Obtaining true shape of the plane figure by projection.

Module V: Projection of Solids

Simple cases when solid is placed in different positions, Axis faces and lines lying in the faces of the solid making given angles.

Module VI: Development of Surface

Development of simple objects with and without sectioning. Isometric Projection


Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

Text & References:

- M.B. Shah & B.C. Rana, Engineering Drawing, Pearson Education, 2007
- PS Gill, Engineering Drawing, Kataria Publication
- ND Bhatt, Engineering Drawing, Charotar publications
- N Sidheshwar, Engineering Drawing, Tata McGraw Hill
- CL Tanta, Mechanical Drawing, “Dhanpat Rai”


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NCE6213	BASIC ELECTRICAL AND ELECTRONICS ENGINEERING LAB	L	T	P	C
Version 2019.1	Date of Approval: May 21, 2019	0	0	2	1
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

In this course, students will become familiar with basic electrical circuits. The students will learn practical aspects and implementation of theorems related to electrical circuits, law's related to flow of current, voltages, transformer and transistors.

Course Objectives

The objective of this course is to:

- Provide the overview of concept of flow of current/voltage of electrical circuits.
- Provide the basic knowledge about the concepts of electrical circuits and BJTs.

Course Outcomes

On completion of this course, the students will be able to:

- CO1. Explain the fundamental theorems and laws related to the electrical circuits and experimentally verify the basic circuit theorems
- CO2. Explain the working principle and estimate the performance of single phase transformers.
- CO3. Understand 3 phase balanced and unbalanced, star and delta connected supply and load and to measure power in 3 phase circuits
- CO4. Able to design circuit with Bipolar Junction Transistor in CB, CE & CC configurations

Modules	Blooms level*	Number of hours
Lab Session 1: Network Analysis Techniques & Theorems <ol style="list-style-type: none"> To verify KVL & KCL in the given network. To verify Superposition Theorem. To verify Maximum Power Transfer Theorem. To verify Reciprocity Theorem. To determine and verify R_{Th}, V_{Th}, R_N, I_N in a given network. 	L1, L2 and L3	6
Lab session II: Transformers and transistors <ol style="list-style-type: none"> To perform open circuit & short circuit test on a single-phase transformer. To perform regulation, ratio & polarity test on a single-phase transformer. To obtain the characteristics of a transistor under common base (CB) and common emitter (CE) configuration. 	L1, L2 and L3	3
Lab session III: Alternating Current Circuits <ol style="list-style-type: none"> To study transient response of a given RLC Circuit. To measure power & power factor in a three phase circuit by two wattmeter method. To measure power & power factor in a three phase load using three ammeter & three voltmeter method. 	L1, L2 and L3	3

*Bloom's Level:

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

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Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

Text Books

- V K Mehta and Rohit Mehta, Principles of Electrical Engineering and Electronics, 3rd edition, S. Chand Publications, 2014, New Delhi
- D. P. Kothari and I. J. Nagrath, Theory and Problem of Basic Electrical Engineering, PHI Learning Pvt. Ltd., 2015, New Delhi.
- J B Gupta, Electrical Science, S K Kataria and Sons, 2015, New Delhi.

Reference Books

- R J Smith and R C Dorf, Circuits Devices and Systems, 5th Edition, John Wiley
- B.L. Thareja, Basic Electronics, 5th edition, S. Chand Publishing, 2011, New Delhi
- V. Del Toro, Electrical Engineering fundamentals, PHI, 2016
- Mahmood Nahvi, Joseph Edminister, Electric Circuits, 7th edition, McGraw-Hill Education, 2017

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	1	2	--	--	--	--	--	--	--	--	--	--	1	-	-
CO2	1	1	2	3	--	--	--	--	--	--	--	--	1	-	-
CO3	1	1	3	3	-	--	--	--	--	--	--	--	1	-	-
CO4	1	1	2	--	--	--	--	--	--	--	--	--	1	-	-

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OBJECT ORIENTED PROGRAMMING USING C++

Course Code: NCE6204

Credit Units : 03

Course Objective:

The objective of this module is to introduce object oriented programming. To explore and implement the various features of OOP such as inheritance, polymorphism, Exceptional handling using programming language C++. After completing this course student can easily identify the basic difference between the programming approaches like procedural and object oriented.

Course Contents:

Module I: Introduction

Review of C, Difference between C and C++, Procedure Oriented and Object Oriented Approach. Basic Concepts: Objects, classes, Principles like Abstraction, Encapsulation, Inheritance and Polymorphism. Dynamic Binding, Message Passing. Characteristics of Object-Oriented Languages. Introduction to Object-Oriented Modeling techniques (Object, Functional and Dynamic Modeling).

Module II: Classes and Objects

Abstract data types, Object & classes, attributes, methods, C++ class declaration, Local Class and Global Class, State identity and behaviour of an object, Local Object and Global Object, Scope resolution operator, Friend Functions, Inline functions, Constructors and destructors, instantiation of objects, Types of Constructors, Static Class Data, Array of Objects, Constant member functions and Objects, Memory management Operators.

Module III: Inheritance

Inheritance, Types of Inheritance, access modes – public, private & protected, Abstract Classes, Ambiguity resolution using scope resolution operator and Virtual base class, Aggregation, composition vs classification hierarchies, Overriding inheritance methods, Constructors in derived classes, Nesting of Classes.

Module IV: Polymorphism

Polymorphism, Type of Polymorphism – Compile time and runtime, Function Overloading, Operator Overloading (Unary and Binary) Polymorphism by parameter, Pointer to objects, this pointer, Virtual Functions, pure virtual functions.

Module V: Strings, Files and Exception Handling

Manipulating strings, Streams and files handling, formatted and Unformatted Input output. Exception handling, Generic Programming – function template, class Template Standard Template Library: Standard Template Library, Overview of Standard Template Library, Containers, Algorithms, Iterators, Other STL Elements, The Container Classes, General Theory of Operation, Vectors.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

Text & References:

Text:

- A.R. Venugopal, Rajkumar, T. Ravishanker “Mastering C++”, TMH, 1997
- R. Lafore, “Object Oriented Programming using C++”, BPB Publications, 2004.
- “Object Oriented Programming with C++” By E. Balagurusamy.
- Schildt Herbert, “C++: The Complete Reference”, Wiley DreamTech, 2005.

References:

- Parsons, “Object Oriented Programming with C++”, BPB Publication, 1999.
- Steven C. Lawlor, “The Art of Programming Computer Science with C++”, Vikas Publication, 2002.
- Yashwant Kanethkar, “Object Oriented Programming using C++”, BPB, 2004

OBJECT ORIENTED PROGRAMMING USING C++ LAB

Course Code: NCE6208

Credit Units : 01

Software Required: Turbo C++

Course Contents:

- Creation of objects in programs and solving problems through them.
- Different use of private, public member variables and functions and friend functions.
- Use of constructors and destructors.
- Operator overloading
- Use of inheritance in and accessing objects of different derived classes.
- Polymorphism and virtual functions (using pointers).
- File handling.

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab



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DATABASE MANAGEMENT SYSTEMS

Course Code: NCE6302

Credit Units : 04

Course Objective:

The objective of this course is to get students familiar with Databases and their use. They can identify different types of available database model, concurrency techniques and new applications of the DBMS.

Course Contents:

Module I: Introduction

Concept and goals of DBMS, DBMS Architecture, Database Languages, Database Users, Database Abstraction. Basic Concepts of ER Model: Entity Type, Entity Set, Relationship type, Relationship sets, Constraints: Cardinality Ratio and Participation Constraint, Keys, Mapping, Design of ER Model

Module II: Hierarchical model & Network Model

Concepts, Data definition, Data manipulation and implementation.
Network Data Model, DBTG Set Constructs, and Implementation

Module III: Relational Model

Relational database, Relational Algebra, Relational Calculus, Tuple Calculus.

Module IV: Relational Database Design and Query Language

SQL, QUEL, QBE, Normalization using Functional Dependency, 1NF, 2NF, 3NF, BCNF, Multivalued dependency and Join dependency.

Module V: Concurrency Control and New Applications

Transaction basics: ACID property, Lifecycle of Transaction, Why Concurrency Control, Schedule, Serializability, Lock Based Protocols, Time Stamped Based Protocols, Deadlock Handling, Crash Recovery. Distributed Database, Objective Oriented Database, Multimedia Database, Data Mining, Digital Libraries.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

Text & References:

Text:

- Korth, Silberschatz, "Database System Concepts", 4th Ed., TMH, 2000.
- Steve Bobrowski, "Oracle & Architecture", TMH, 2000

References:

- Date C. J., "An Introduction to Database Systems", 7th Ed., Narosa Publishing, 2004
- Elmsari and Navathe, "Fundamentals of Database Systems", 4th Ed., A. Wesley, 2004
- Ullman J. D., "Principles of Database Systems", 2nd Ed., Galgotia Publications, 1999.

OPERATING SYSTEMS

Course Code: NCE6303

Credit Units : 03

Course Objective:

Operating Systems serve as one of the most important courses for undergraduate students, since it provides the students with a new sight to envision every computerized systems especially general purpose computers. Therefore, the students are supposed to study, practice and discuss on the major fields discussed in the course to ensure the success of the education process. The outcome of this course implicitly and explicitly affects the abilities the students to understand, analyze and overcome the challenges they face with in the other courses and the real world.

Course Contents:

Module I: Introduction to operating system

Operating system and function, Evolution of operating system, Batch, Interactive, multiprogramming, Time Sharing and Real Time System, multiprocessor system, Distributed system, System protection. Operating System structure, Operating System Services, System Program and calls.

Module II: Process Management

Process concept, State model, process scheduling, job and process synchronization, structure of process management, Threads, Inter-process Communication and Synchronization: Principle of Concurrency, Producer Consumer Problem, Critical Section problem, Semaphores, Hardware Synchronization, Critical Regions, Conditional critical region, Monitor, Inter Process Communication.

CPU Scheduling: Job scheduling functions, Process scheduling, Scheduling Algorithms, Non Preemptive and preemptive Strategies, Algorithm Evaluation, Multiprocessor Scheduling.

Deadlock: System Deadlock Model, Deadlock Characterization, Methods for handling deadlock, Prevention strategies, Avoidance and Detection, Recovery from deadlock combined approach.

Module III: Memory Management

Single Contiguous Allocation: H/W support, S/W support, Advantages and disadvantages, Fragmentation, Paging, Segmentation, Virtual memory concept, Demand paging, Performance, Paged replaced algorithm, Allocation of frames, Thrashing, Cache memory, Swapping, Overlays

Module IV: Device management

Principles of I/O hardware, Device controller, Device Drivers, Memory mapped I/O, Direct Access Memory, Interrupts, Interrupt Handlers, Application I/O interface, I/O Scheduling, Buffering, Caching, Spooling,

Disk organization, Disk space management, Disk allocation Method, Disk Scheduling, Disk storage.

Module V: File System and Protection and security

File Concept, File Organization and Access Mechanism, File Directories, Basic file system, File Sharing, Allocation method, Free space management.

Policy Mechanism, Authentication, Internal excess Authorization.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

Text & References:

Text:

- Milenekovic, "Operating System Concepts", McGraw Hill
- A. Silberschatz, P.B. Galvin "Operating System Concepts", John Willey & son

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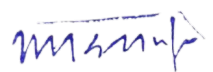
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References:

- Dietel, “An introduction to operating system”, Addison Wesley
- Tannenbaum, “Operating system design and implementation”, PHI
- Operating System, A Modern Perspective, Gary Nutt, Pearson Edu. 2000
- A. S Tanenbaum, Modern Operating System, 2nd Edition, PHI.
- William Stalling “Operating system” Pearson Education
- B. W. Kernighan & R. Pike, “The UNIX Programming Environment” Prentice Hall of India, 2000
- Sumitabha Das “Your UNIX The ultimate guide” Tata McGraw Hill
- “Design of UNIX Operating System” The Bach Prentice – Hall of India



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DATA STRUCTURES USING C

Course Code: NCE6304

Credit Units : 04

Course Objective:

Data structure deals with organizing large amount of data in order to reduce space complexity and time requirement. This course gives knowledge of algorithms, different types of data structures and the estimation space and time complexity.

Course Contents:

Module I: Introduction to Data structures

Data structures: Definition, Types. Algorithm design, Complexity, Time-Space Trade- offs. Use of pointers in data structures. Array Definition and Analysis, Representation of Linear Arrays in Memory, Traversing of Linear Arrays, Insertion And Deletion, Single Dimensional Arrays, Two Dimensional Arrays, Multidimensional Arrays, Function Associated with Arrays, Character String in C, Character String Operations, Arrays as parameters, Implementing One Dimensional Array, Sparse matrix.

Module II: Introduction to Stacks and queue

Stack: Definition, Array representation of stacks, Operations Associated with Stacks- Push & Pop, Polish expressions, Conversion of infix to postfix, infix to prefix (and vice versa), Application of stacks recursion, polish expression and their compilation, conversion of infix expression to prefix and postfix expression, Tower of Hanoi problem.

Queue: Definition, Representation of Queues, Operations of queues- QInsert, QDelete, Priority Queues, Circular Queue, Deque.

Module III: Dynamic Data Structure

Linked list: Introduction to Singly linked lists: Representation of linked lists in memory, Traversing, Searching, Insertion into, Deletion from linked list, doubly linked list, circular linked list, generalized list. Applications of Linked List-Polynomial representation using linked list and basic operation. Stack and queue implementation using linked list.

Module IV: Trees and Graphs

Trees: Basic Terminology, Binary Trees and their representation, expression evaluation, Complete Binary trees, extended binary trees, Traversing binary trees, Searching, Insertion and Deletion in binary search trees, General trees, AVL trees, Threaded trees, B trees.

Graphs: Terminology and Representations, Graphs & Multigraphs, Directed Graphs, Sequential representation of graphs, Adjacency matrices, Transversal Connected Component and Spanning trees.

Module V: Sorting and Searching and file structures

Sorting: Insertion Sort, Bubble sort, Selection sort, Quick sort, two-way Merge sort, Heap sort, Partition exchange sort, Shell sort, Sorting on different keys, External sorting.

Searching: Linear search, Binary search, File structures: Physical storage media, File Organization, Linked organization of file, Inverted file, Organization records into blocks, Sequential blocks, Hash function, Indexing & Hashing, Multilevel indexing, Tree Index, Random file, Primary Indices, Secondary Indices, B tree index files.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

Text & References:

Text:

- Horowitz and Sahani, "Fundamentals of Data structures", Galgotia publications
- Tannenbaum, "Data Structures", PHI
- R. L. Kruse, B.P. Leary, C.L. Tondo, "Data structure and program design in C" PHI
- "Data structures and algorithms" – Schaum Series.

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DATA STRUCTURES USING C LAB

Course Code: NCE6305

Credit Units : 01

Software Required: Turbo C++

Assignment will be provided for following:

- Practical application of sorting and searching algorithm.
- Practical application of various data structure like linked list, queue, stack, tree

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.



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DATABASE MANAGEMENT SYSTEMS LAB

Course Code: NCE6307

Credit Units : 01

Software Required: Oracle 9i

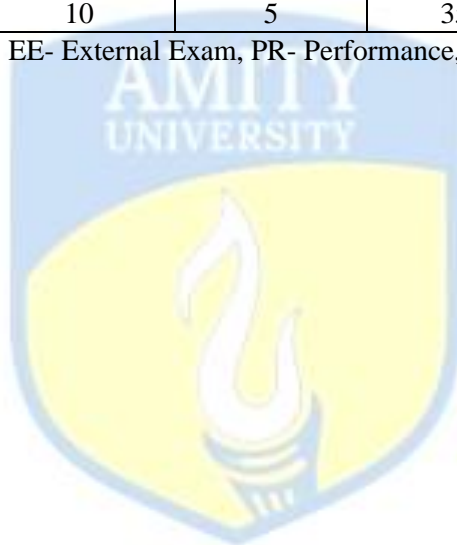
Topics covered in lab will include:

- Database Design
- Data Definition (SQL)
- Data Retrieval (SQL)
- Data Modification (SQL)
- Views
- Triggers and Procedures
- PL\SQL

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

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UNIX PROGRAMMING LAB

Course Code: NCE6308

Credit Units : 01

Software Required: UNIX SCO

Assignments will be provided for the following

- Introduction to UNIX Commands
- Introduction to vi editor
- Programming in shell script
- Introduction to programming in C Shell

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

Text & References:

- “Unix Programming Environment” The Kernighan and Pike Prentice – Hall of India
- “Unix –Shell Programming” Kochar
- “ Unix Concepts and application” Das Sumitabha Tata Mcgraw Hill




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E-COMMERCE AND ERP

Course Code: NCE6310

Credit Units : 03

Course Objective:

This course examines the evolution of enterprise resource planning (ERP) systems - from internally focused client/server systems to externally focused e-business. This class studies the types of issues that managers will need to consider in implementing cross-functional integrated ERP systems. The objective of this course is to make students aware of the potential and limitations of ERP systems. This objective will be reached through hands-on experience, case studies, lectures, guest speakers and a group project. The course would equip students with the basics of E-Commerce, technologies involved with it and various issues associated with.

Course Contents:

Module I: Introduction E-commerce and ERP

E-commerce and its types, EDI and its basics, Digital payment systems, Enterprise-An Overview, Benefits of ERP, ERP and Related Technologies-Business Process Reengineering (BPR), Data Warehousing, Data Mining, On-line Analytical Processing (OLAP), Supply Chain Management, Management Information systems (MIS), Decision support system (DSS), Executive Information systems (EIS). ERP – A Manufacturing Perspective Materials Requirement Planning (MRP), Bill of Material (Bom), Distribution Requirements Planning (DRP), JIT & Kanban, CAD/CAM, Product Data Management (PDM), Benefits of PDM, MTO, MTS, ATO, ETO, CTO.

Module II: ERP Modules

Business Modules in an ERP Packag- Finance, Manufacturing (Production), Human Resources, Plant Maintenance, Materials Management, Quality Management, Sales and Distribution.

Module III: Benefits of ERP

Time Reduction, On time shipment, Improved Resource Utilization, Performance, Customer Satisfaction, Flexibility, information accuracy and decision making capability, reduction in quality costs, Accuracy.

Module IV: ERP Implementation

ERP Implementation Lifecycle, Implementation Methodology, In-house implementation-Pros and cons, Vendors, Consultants and Users and their roles, Project Management and Monitoring after ERP Implementation.

Module V: The ERP Market and Future Directions

ERP Market Place- SAP AG, PeopleSoft, Baan Company, JD Edwards World Solutions Company, Oracle Corporation, QAD, System Software Associates, Inc. (SSA).Future directions in ERP.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

Text & References:

Text:

- Alexis Leon, "Enterprise Resource Planning", Tata McGraw Hill 2001
- Bajaj, Kamlesh K. and Nag, Debjani, E-Commerce: The Cutting Edge of Business, Tata McGraw-Hill Publishing Company

References:

- Loshin, Pete and Murphy, Paul, *Electronic Commerce*, Second edition, 1990, Jaico Publishing House, Mumbai.
- S. Sadagopan, "Enterprise Resource Planning", Tata McGraw Hill 2000

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ELECTRONIC DEVICES & CIRCUITS

Course Code: NCE6311

Credit Units : 02

Course Objective:

This course builds from basic knowledge of Semiconductor Physics to an understanding of basic devices and their models. This course builds a foundation for courses on VLSI design and analog CMOS IC Design.

Course Contents:

Module I: Semiconductor physics: Mobility & conductivity, Charge densities in a semiconductor, Fermi dirac distribution, carrier concentration and Fermi levels in semiconductor, generation and recombination of charges, diffuse and continuity equations, Hall effect.

Module II: Semiconductor Diode and Diode Circuits

Junction diode, Diode as circuit element, Different types of diodes: Zener, Schottky, LED. Zener as voltage regulator, Diffusion capacitance, Drift capacitance, the load line concept, half wave, full wave rectifiers, clipping and clamping circuits.

Module III: Bipolar Junction Transistor

Bipolar junction transistor: Introduction, Transistor, construction, transistor operations, BJT characteristics, load line, operating point, leakage currents, saturation and cut off mode of operations. Bias stabilization: Need for stabilization, fixed Bias, emitter bias, self bias, bias stability with respect to variations in I_{co} , V_{BE} & β , Stabilization factors, thermal stability.

Module IV: Small signal Analysis of transistor and Multistage Amplifier

Hybrid model for transistors at low frequencies, Analysis of transistor amplifier using h parameters, emitter follower, Miller's theorem, THE CE amplifier with an emitter resistance, Hybrid π model, Hybrid π Conductances and Capacitances, CE short circuit current gain, CE short circuit current gain with R_L Multistage amplifier: Cascading of Amplifiers, Coupling schemes (RC coupling and Transformer coupling)

Module V: Field Effect Transistors

Field effect transistor (JFET, MOSFET): volt-ampere characteristics, small signal model –common drain, common source, common gate, operating point, MOSFET, enhancement and -depletion mode, Common source amplifier, Source follower

Module VI: Feedback Amplifiers

Feedback concept, Classification of Feedback amplifiers, Properties of negative Feedback amplifiers, Impedance considerations in different Configurations, Examples of analysis of feedback Amplifiers.

Module VII: Power Amplifiers

Power dissipation in transistors, difference with voltage amplifiers, Amplifier classification (Class A, Class B, Class C, Class AB) class AB push pull amplifier, collector efficiency of each, cross over distortion.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

Text & References:

- Robert F. Pierret: Semiconductor Device Fundamentals, Pearson Education.
- Millman and Halkias: Electronic Devices and circuits, Tata McGraw.
- Boylestad: Electronic Devices and Circuits, Pearson Education.

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ELECTRONIC DEVICES & CIRCUITS LAB

Course Code: NCE6312

Credit Units : 01


Course Contents:

1. To study and plot the characteristics of a junction diode.
2. To study Zener diode as a voltage regulator.
3. To study diode based clipping and clamping circuits.
4. To study half wave, full wave and bridge rectifier with filters.
5. To study the input and output characteristics of a transistor in its various configurations.
6. To study and plot the characteristics of a JFET in its various configurations.
7. To study and plot the characteristics of a MOSFET in its various configurations.
8. To study various types of Bias Stabilization for a transistor.
9. To study the gain and plot the frequency response of a single stage transistor amplifier.
10. To measure gain and plot the frequency response of double stage RC coupled amplifier.

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.


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DIGITAL ELECTRONICS

Course Code: NCE6313

Credit Units : 02

Course Objective:

This course is an introduction to the basic principles of digital electronics. At the conclusion of this course, the student will be able to quantitatively identify the fundamentals of computers, including number systems, logic gates, logic and arithmetic subsystems, and integrated circuits. They will gain the practical skills necessary to work with digital circuits through problem solving and hands on laboratory experience with logic gates, encoders, flip-flops, counters, shift registers, adders, etc. The student will be able to analyze and design simple logic circuits using tools such as Boolean Algebra and Karnaugh Mapping, and will be able to draw logic diagrams.

Course Contents:

Module I: Boolean Functions

Analog & digital signals, AND, OR, NOT, NAND, NOR & XOR gates, Boolean algebra, Standard representation of logical functions, K-map representation and simplification of logical function, don't care conditions, XOR & XNOR simplifications of K-maps, Tabulation method.

Module II: Combinational Circuits

Adders, Subtractors, Multiplexer, de-multiplexer, decoder & encoder, code converters, Comparators, decoder / driver for display devices, Implementation of logic functions using multiplexer / de-multiplexer,.

Module III: Sequential Circuits

Flip-flops: SR, JK, D & T flip flops – Truth table, Excitation table, Conversion of flip-flops, race around condition, Master Slave flip flop, Shift registers: SIPO, PISO, PIPO, SIPO, Bi-directional; Counters: ripple & synchronous counters – up / down; Synchronous Sequential circuit: design procedure.

Module IV: Logic families

Logic families: RTL, DTL, TTL, ECL

Module V: Data Converters

Data converters: ADC – successive approximation, linear ramp, dual slope; DAC – Binary Weighted, R-2R ladder type

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

- Moris Mano: Digital Circuits Systems
- R. P. Jain: Digital Logic & Circuits
- Thomas L. Floyd: Digital Fundamentals
- Malvino and Leech: Digital Principles & Applications


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ARTIFICIAL INTELLIGENCE

Course Code: NCE6404

Credit Units : 03

Course Objective:

To develop semantic-based and context-aware systems to acquire, organize process, share and use the knowledge embedded in multimedia content. Research will aim to maximize automation of the complete knowledge lifecycle and achieve semantic interoperability between Web resources and services. The field of Robotics is a multi disciplinary as robots are amazingly complex system comprising mechanical, electrical, electronic H/W and S/W and issues germane to all these.

Course Contents:

Module I: Problem solving and Scope of AI

Introduction to Artificial Intelligence. Applications- Games, theorem proving, natural language processing, vision and speech processing, robotics, expert systems. AI techniques- search knowledge, abstraction.

Problem Solving

State space search; Production systems, search space control: depth-first, breadth-first search. Heuristic search - Hill climbing, best-first search, branch and bound. Problem Reduction, Constraint Satisfaction End, Means-End Analysis. LA* Algorithm, L(AO*) Algorithm.

Module II: Knowledge Representation

Knowledge Representation issues, first order predicate calculus, Horn Clauses, Resolution, Semantic Nets, Frames, Partitioned Nets, Procedural Vs Declarative knowledge, Forward Vs Backward Reasoning.

Module III: Understanding Natural Languages

Introduction to NLP, Basics of Syntactic Processing, Basics of Semantic Analysis, Basics of Parsing techniques, context free and transformational grammars, transition nets, augmented transition nets, Shanks Conceptual Dependency, Scripts ,Basics of grammar free analyzers, Basics of sentence generation, and Basics of translation..

Module IV

Expert System: Need and justification for expert systems, knowledge acquisition, Case studies: MYCIN, R1

Learning: Concept of learning, learning automation, genetic algorithm, learning by inductions, neural nets. **Programming Language:** Introduction to programming Language, LISP and PROLOG.

Handling Uncertainties: Non-monotonic reasoning, Probabilistic reasoning, use of certainty factors, Fuzzy logic.

Module V: Introduction to Robotics

Fundamentals of Robotics, Robot Kinematics: Position Analysis, Dynamic Analysis and Forces, Robot Programming languages & systems: Introduction, the three levels of robot programming, requirements of a robot programming language, problems peculiar to robot programming languages.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

Text & References:

Text:

- E. Rich and K. Knight, "Artificial intelligence", TMH, 2nd ed., 1992.
- N.J. Nilsson, "Principles of AI", Narosa Publ. House, 1990.
- John J. Craig, "Introduction to Robotics", Addison Wesley publication
- Richard D. Klafater, Thomas A. Chmielewski, Michael Negin, "Robotic Engineering – An Integrated approach", PHI Publication

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- Tsuneo Yoshikawa, “Foundations of Robotics”, PHI Publication

References:

- D.W. Patterson, “Introduction to AI and Expert Systems”, PHI, 1992.
- Peter Jackson, “Introduction to Expert Systems”, AWP, M.A., 1992.
- R.J. Schalkoff, “Artificial Intelligence - an Engineering Approach”, McGraw Hill Int. Ed., Singapore, 1992.
- M. Sasikumar, S. Ramani, “Rule Based Expert Systems”, Narosa Publishing House, 1994.



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DIGITAL ELECTRONICS LAB

Course Code: NCE6314

Credit Units : 01

List of Experiments:

1. To verify the truth tables of OR, AND, NOR, NAND, EX-OR, EX-NOR gates.
2. To obtain half adder, full adder and subtractor using gates and verify their truth tables.
3. To verify the truth tables of RS, JK and D flip- flops.
4. To design and study a binary counter.
5. To design and study synchronous counter.
6. To design and study ripple counter.
7. To convert BCD number into excess 3 form
8. To design and study a decade counter.
9. To design and study a sequence detector.
10. To implement control circuit using multiplexer.

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.



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ARTIFICIAL INTELLIGENCE LAB

Course Code: NCE6406

Credit Units : 01

Course Contents:

Assignments will be provided for the following:

- Programming in Prolog
- Programming for Robotics

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.



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COMMUNICATION SYSTEMS

Course Code: NCE6407

Credit Units : 02

Course Objective:

The purpose of this course is to provide a thorough introduction to analog and digital communications with an in depth study of various modulation techniques, Random processes are discussed, and information theory is introduced.

Course Contents:

Module I: Introduction

Communication Process, Source of Information, Communication channels, base-band and pass-band signals, Review of Fourier transforms, Random variables, different types of PDF, need of modulation process, primary communication resources, analog versus digital communications

Module II: Amplitude modulation

Amplitude modulation with full carrier, suppressed carrier systems, single side band transmission, switching modulators, synchronous detection, envelope detection, effect of frequency and phase errors in synchronous detection, comparison of various AM systems, vestigial side band transmission.

Module III: Angle Modulation

Narrow and wide band FM, BW calculations using Carlson rule, Direct & Indirect FM generations, phase modulation, Demodulation of FM signals, noise reduction using pre & de-emphasis.

Module IV: Pulse Modulation

Pulse amplitude, width & position modulation, generation & detection of PAM, PWM & PPM, Comparison of frequency division and time division multiplexed systems, Basics of digital communications: ASK, PSK, FSK, QPSK basics & waveform with brief mathematical introduction

Module V: Noise

Different types of noise, noise calculations, equivalent noise band width, noise figures, effective noise temperature, noise figure.

Module VI: Introduction to Information Theory

Measurement of Information, mutual, Shannon's theorem, Source coding, channel coding and channel capacity theorem, Huffman code

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

Text:

- B. P. Lathi: "Modern analog & digital communication", OXFORD Publications
- Wayne Tomasi: "Electronic Communication systems", Pearson Education, 5th edition

References:

- Simon Haykin, "Communication Systems", John Wiley & Sons, 1999, Third Edition.
- Taub and schilling, "Principles of Communication Systems" TMH


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COMMUNICATION SYSTEMS LAB

Course Code: NCE6408

Credit Units : 01

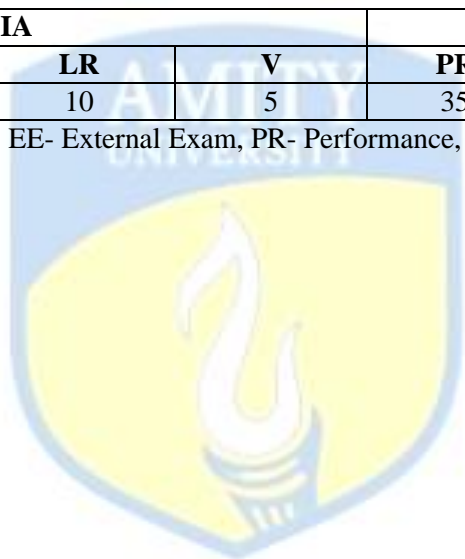
List of Experiments:

- To study the sampling and reconstruction of a given signal.
- To study amplitude modulation and demodulation.
- To study frequency modulation and demodulation.
- To study time division multiplexing.
- To study pulse amplitude modulation.
- To study delta and adaptive delta modulation and demodulation.
- To study carrier modulation techniques using amplitude shift keying and Frequency shift keying.
- To study carrier modulation techniques using binary phase shift keying and differential shift keying.
- To study pulse code modulation & differential pulse code modulation as well as relevant demodulations.
- To study quadrature phase shift keying & quadrature amplitude modulation.

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

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ARTIFICIAL NEURAL NETWORK

Course Code: NCE6411

Credit Units : 02

Course Objective:

Aim of this course is to introduce the students fundamentals concepts of Neural network and its various application in computer science.

Course Contents:

Module I:-

Artificial Neural Networks (ANN) and biological neural networks, supervised and unsupervised learning rules, neural network applications.

Module II:-

Unsupervised learning:- Hebbian learning and competitive learning. Supervised learning:- Back propagation algorithms,

Learning rule:-

Delta learning rule, Widrow-Hoff learning rule, Winner-Take-All learning rule.

Module III:-

Feed forward neural network, feed backward neural network, Perceptron and its learning law, single-layer perceptron, multi-layer perceptron.

Module IV:-

Self organizing networks: Kohonen algorithm, Hopfield Networks: Hopfield network algorithm, Adaptive resonance theory: Network and learning rules.

Module V:-

Associative memory, auto-associative memory, bi-directional associative memory.


Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

Text Book:

- Kenji Suzuki (ed.) - InTech , 2013
- Todd Troyer - University of Texas at San Antonio , 2005


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ARTIFICIAL NEURAL NETWORK LAB

Course Code: NCE6412

Credit Units : 01

Course Objective

The aim of this lab to gain the practical knowledge of basic neuron models and learning algorithms.

Lab Assignment

To study some basic neuron models and learning algorithms by using Matlab's neural network toolbox

Examination Scheme :

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.



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NCE6417	WEB DESIGNING TECHNOLOGIES	L	T	P	C
Version: 2019.1	Date of Approval: 15 May 2019	2	0	2	3
Pre-requisites/Exposure	knowledge of Internet fundamentals				
Co-requisites	NIL				

Catalog Description

The objective of this course is to introduce the basic concepts of HTML5 and CSS3. To explore and implement the various concepts of website design using HTML with the concept of the tags, script, and code that create web pages. To understand how the web and web pages work and web pages styles using CSS3. After completing this course students can easily develop static web sites and style them using CSS3.

Course Objectives

The objective of this course is

1. Understand the advanced features of HTML5 which includes images, links, tables, frames and forms etc and gives an overview of CSS3 which is used to add style to the web pages.
2. Demonstrate the application of HTML5 in developing solutions to web site creation and understanding how CSS will affect web page creation.
3. Design a responsive web site using HTML5 and CSS3.

Course Outcomes

On completion of this course, the students will be able to

CO 1: Explain the basic concepts of HTML, structure of HTML. Apply the different tags for images, hypertext and lists in web pages.

CO 2: Illustrate the different ways to use styles in web pages using CSS? Apply CSS style sheets for formatting text in web pages.

CO 3: Explain the layout of CSS style and describe how to add audio and video in html web pages.

CO 4: Demonstrate the use of Table and frames in web pages and setting properties for tables and frames.

CO 5: Explain the writing scripts in web pages and publishing Webpages on web.

Modules	Blooms level*	Number of hours
Module I History of HTML, Basic HTML Structure, Creating title, Creating header and footer, Adding Comments, Formatting Text, Specifying time, Indicating citations/references, quotes, abbreviations, pre-formatted text, Inserting Images, Creating Image Links, Scaling images with the browser, setting icons for web page, Creating hypertext, anchor tag, Creating List, Creating Definition List, Creating Hyper Text Links, Creating Link Lists.	L2 and L3	8
Module II CSS building blocks, working with style sheets, Creating different types of style sheets- External , embedded and inline style sheets, defining selectors , Selecting on basis of class and id, selecting elements based on the attributes, combining selectors, Formatting text with styles, setting font properties.	L3 and L4	7
Module III CSS: Layout with style, changing the background color, setting border, changing the cursor, style sheets for mobile to desktop, working with web fonts, creating forms, organizing the form elements. Adding audio , video and other multi-media .	L2 and L3	7
Module IV Tables and frames, Creating Tables, Table Element, Adding Border, Adding Column Headings, Adding Spacing and Padding, Adding a Caption, Setting the table Width and Height, Add Row Headings, Aligning Cell contents, Setting Column Width, Centering a Table, Inserting and Image, Spanning Columns, Spanning Rows Assigning Background Colors, Frame Elements, Creation of Frame Based Pages.	L3	7

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Module V: Working with scripts : Loading an external script, testing & debugging web pages, publishing your web page on the web.	L2	7
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**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books:

1. HTML HTML5 and CSS3, Seventh Edition: Visual QuickStart Guide ,Elizabeth Castro and Bruce Hyslop.
2. HTML, XHTML and CSS Bible, Steven M. Schefar, Wiley Publishing, Inc.

Reference Books:

1. HTML & CSS: The Complete Reference, Fifth Edition ,Thomas A. Powell, Tata McGraw Hill.
2. HTML5: Up and Running ,Mark Pilgrim, O'Reilly Media, Inc.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS O 1	PS O 2	PS O 3	PS O 4
CO 1	--	--	1	--	1	--	--	--	--	1	--	--	1	--	--	--
CO 2	--	--	2	--	2	--	--	--	--	1	--	--	1	--	--	--
CO 3	--	--	1	--	1	--	--	--	--	2	--	--	1	--	--	--
CO 4	--	--	2	--	1	--	--	--	--	2	--	--	1	--	--	--
CO 5	--	--	1	--	2	--	--	--	2	1	--	--	1	1	--	2

1: strongly related, 2: moderately related and 3: weakly related

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NCE6418	WEB DESIGNING TECHNOLOGIES LAB	L	T	P	C
Version: 2019.1	Date of Approval: 15 May 2019	0	0	2	1
Pre-requisites/Exposure	knowledge of Internet fundamentals				
Co-requisites	NIL				

Catalog Description

The objective of this course is to introduce the basic concepts of HTML5 and CSS3. To explore and implement the various concepts of website design using HTML with the concept of the tags, script, and code that create web pages. To understand how the web and web pages work and web pages styles using CSS3. After completing this course students can easily develop static web sites and style them using CSS3.

Course Objectives

The objective of this course is

1. Understand the advanced features of HTML5 which includes images, links, tables, frames and forms etc and gives an overview of CSS3 which is used to add style to the web pages.
2. Demonstrate the application of HTML5 in developing solutions to web site creation and understanding how CSS will affect web page creation.
3. Design a responsive web site using HTML5 and CSS3.

Course Outcomes

On completion of this course, the students will be able to

CO 1: Explain the basic concepts of HTML, structure of HTML. Apply the different tags for images, hypertext and lists in web pages.


CO 2: Illustrate the different ways to use styles in web pages using CSS? Apply CSS style sheets for formatting text in web pages.

CO 3: Explain the layout of CSS style and describe how to add audio and video in html web pages.

CO 4: Demonstrate the use of Table and frames in web pages and setting properties for tables and frames.

CO 5: Explain the writing scripts in web pages and publishing Webpages on web.

Modules	Blooms level*	Number of hours
Module I Programs based on : <ul style="list-style-type: none"> • Basic HTML Structure, Creating title, Creating header and footer, Adding Comments, • Formatting Text, Specifying time, Indicating citations/references, quotes, abbreviations, • pre-formatted text, Inserting Images, Creating Image Links, Scaling images with the browser, • setting icons for web page, Creating hypertext, anchor tag, Creating List, • Creating Definition List, Creating Hyper Text Links, Creating Link Lists. 	L2 and L3	6


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Module II & Module III Programs based on: <ul style="list-style-type: none"> CSS style sheets, Creating different types of style sheets- External , embedded and inline style sheets, Selection on basis of class and id, selecting elements based on the attributes, combining selectors, Formatting text with styles, setting font properties. Changing the background color, setting border, changing the cursor, style sheets for mobile to desktop, working with web fonts, creating forms, organizing the form elements. Adding audio , video and other multi-media . 	L2,L3 and L4	4
Module IV Programs based on: <ul style="list-style-type: none"> Tables and frames, Creating Tables, Table Element, Adding Border, Adding Column Headings, Adding Spacing and Padding, Adding a Caption, Setting the table Width and Height, Add Row Headings, Aligning Cell contents, Setting Column Width, Centering a Table, Inserting and Image, Spanning Columns, Spanning Rows Assigning Background Colors, Frame Elements, Creation of Frame Based Pages. 	L3	4
Module V: Programs based on Working with scripts : Loading an external script, testing & debugging web pages, publishing your web page on the web.	L2	1

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books:

- HTML HTML5 and CSS3, Seventh Edition: Visual QuickStart Guide ,Elizabeth Castro and Bruce Hyslop.
- HTML, XHTML and CSS Bible, Steven M. Schefar, Wiley Publishing, Inc.

Reference Books:

- HTML & CSS: The Complete Reference, Fifth Edition ,Thomas A. Powell, Tata McGraw Hill.
- HTML5: Up and Running ,Mark Pilgrim, O'Reilly Media, Inc.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS O 1	PS O 2	PS O 3	PS O 4
CO 1	--	--	1	--	1	--	--	--	--	1	--	--	1	--	--	--
CO 2	--	--	2	--	2	--	--	--	--	1	--	--	1	--	--	--
CO 3	--	--	1	--	1	--	--	--	--	2	--	--	1	--	--	--
CO 4	--	--	2	--	1	--	--	--	--	2	--	--	1	--	--	--
CO 5	--	--	1	--	2	--	--	--	2	1	--	--	1	1	--	2

1: strongly related, 2: moderately related and 3: weakly related

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COMPUTER ARCHITECTURE

Course Code: NCE6502

Credit Units : 04

Course Objective:

This course deals with computer architecture as well as computer organization and design. Computer architecture is concerned with the structure and behaviour of the various functional modules of the computer and how they interact to provide the processing needs of the user. Computer organization is concerned with the way the hardware components are connected together to form a computer system. Computer design is concerned with the development of the hardware for the computer taking into consideration a given set of specifications.

Course Contents:

Module I: Register Transfer Language

Register Transfer, Bus and Memory Transfers, Arithmetic Micro-operations, Logic Micro-operations, Shift Micro-operations, Arithmetic Logic shift Unit.

Module II: Basic Computer Organizations and Design

Instruction Codes, Computer Registers, Computer Instructions, Timing and Control, Instruction Cycle, Memory-Reference Instructions, Input-Output and Interrupt, Design of Accumulator Logic. Hardwired and Microprogrammed control: Control Memory, Address Sequencing, Design of Control Unit

Module III: Central Processing Unit

Introduction, General Register Organization, Stack Organization, Instruction representation, Instruction Formats, Instruction type, Addressing Modes, Data Transfer and Manipulation, Program Control, Reduced Instruction Set Computer RISC and CISC. Computer Arithmetic: Introduction, Addition and Subtraction Algorithm, Multiplication Algorithms, Booth Multiplication, Division Algorithms, Floating-Point Arithmetic Operations

Module IV: Memory and Intrasystem Communication and Input output organisation

Memory: Memory types and organization Memory Hierarchy, Main Memory, Auxiliary Memory, Associative Memory, Cache Memory with mapping techniques, Virtual Memory, Memory Management Hardware, **Intrasystem communication and I/O:** Peripheral Devices, Input-Output, Controller and I/O driver, IDE for hard disk, I/O port and Bus concept, Bus cycle, Synchronous and asynchronous transfer, Modes of Transfer, DMA, DMA Transfer, DMA Controller, I/O Processor, CPU-IOP Communication

Module V: Introduction to Pipelining and Multi-Processor

Parallel Processing, Pipelining, Arithmetic Pipeline, Instruction Pipeline, RISC Pipeline, Multiprocessors: Characteristics of Multiprocessors

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

Text:

- Morris Mano, Computer System Architecture, 3rd Edition – 1999, Prentice-Hall of India Private Limited.

Harry & Jordan, Computer Systems Design & Architecture, Edition 2000, Addison Wesley, Delhi.

References:

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- William Stallings, Computer Organization and Architecture, 4th Edition-2000, Prentice-Hall of India Private Limited.
- Kai Hwang-McGraw-Hill, Advanced Computer Architecture.
- Kai Hwang & Faye a Briggs, McGraw Hill, inc., Computer Architecture & Parallel Processing.
- John D. Carpinelli, Computer system Organization & Architecture, Edition 2001, Addison Wesley, Delhi
- John P Hayes, McGraw-Hill Inc, Computer Architecture and Organization.
- M. Morris Mano and Charles, Logic and Computer Design Fundamentals, 2nd Edition Updated, Pearson Education, ASIA.
- Hamacher, "Computer Organization," McGraw hill.
- Tennenbaum, "Structured Computer Organization," PHI
- B. Ram, "Computer Fundamentals architecture and organization," New age international Gear C. w., "Computer Organization and Programming, McGraw hill



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JAVA PROGRAMMING

Course Code: NCE6503

Credit Units : 03

Course Objective:

The objective is to impart programming skills used in this object oriented language java. The course explores all the basic concepts of core java programming. The students are expected to learn it enough so that they can develop the web solutions like creating applets etc.

Course Contents:

Module I: Java Basics

Concepts of OOP, Features of Java, How Java is different from C++, Environmental setup, Basic syntax, Objects and classes, Basic Data Types, Variable Types, Modifier Types, Basic operators, Loop Control, Decision Making, Strings and Arrays, Methods, I/O.

Module II: Java Object Oriented

Inheritance, Overriding, Polymorphism, Abstraction, Encapsulation, Interfaces, Packages, Exploring java.util package.

Module III: Exception Handling and Threading

Exception Hierarchy, Exception Methods, Catching Exceptions, Multiple catch Clauses, Uncaught Exceptions Java's Built-in Exception.

Creating, Implementing and Extending thread, thread priorities, synchronization suspending, resuming and stopping Threads, Multi-threading.

Module IV : Event Handling And AWT

Event handling Mechanism, Event Model, Event Classes, Sources of Events, Event Listener Interfaces, AWT: Working with Windows, AWT Controls, Layout Managers

Module V: Java Advanced

AppletClass, Architecture, Skeleton, Display Methods., Swings: Japplet, Icons, labels, Text Fields, Buttons, Combo Boxes., Socket Programming: Socket methods, Server Socket methods, Socket Client and Socket Server examples.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance


Text & References:

Text:

- JAVA The Complete Reference by Patrick Naughton & Herbert Schild, TMH
- Introduction to JAVA Programming a primer, Balaguruswamy.

References:

- "Introduction to JAVA Programming" Daniel/Young PHI
- Jeff Frentzen and Sobotka, "Java Script", Tata McGraw Hill, 1999


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JAVA PROGRAMMING LAB

Course Code: NCE6507

Credit Units : 01

Software Required: JDK1.3

Assignments will be provided for the following:

- Java programs using classes & objects and various control constructs such as loops etc, and data structures such as arrays, structures and functions
- Java programs for creating Applets for display of images and texts.
- Programs related to Interfaces & Packages.
- Input/Output and random files programs in Java.
- Java programs using Event driven concept.
- Programs related to network programming.

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.



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PYTHON PROGRAMMING LAB

Course Code: NCE6508

Credit Units : 01

Course Contents:

- Setting up python on Windows/Linux/Mac
- First program in python
- Programs related to basic input/output.
- Programs related to variables, strings, numbers
- Programs related to Lists and Tuples
- Programs related to Functions
- Programs related to If Statements
- Programs related to While Loops and Input
- Programs related to Basic Terminal Apps
- Programs related to Dictionaries
- Programs related to Classes
- Programs related to Exceptions
- Programs related to GUI programming
- Using Word, Excel, PDF files in python.
- Web programming in python,
- Case study of application areas of python.

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.


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SUMMER INTERNSHIP EVALUATION-I

Course Code: NCE6535

Credit Units : 03

Course Objective:

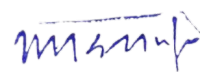
The objective of this course is to provide practical training on some live projects that will increase capability to work on actual problem in industry. This training may undergo in an industrial environment or may be an in house training on some latest software which is in high demand in market. This training will be designed such that it will be useful for their future employment in industry.

Examination Scheme:

Feedback from industry/work place	20
Training Report	40
Viva	15
Presentation	25
Total	100



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VHDL PROGRAMMING

Course Code: NCE6512

Credit Units : 02

Course Objective:

VHDL is commonly used as a design-entry language for field-programmable gate arrays and application-specific integrated circuits in electronic design automation of digital circuits. The course aims to discuss the syntax of the language to model a digital system.

Course Contents:

Module I

Fundamental VHDL Units, LIBRARY Declarations, ENTITY, ARCHITECTURE, Introductory Examples, Specification of combinational systems using VHDL, Introduction to VHDL, Basic language element of VHDL, Behavioural Modeling, Data flow modeling, Structural modeling, Subprograms and overloading, VHDL description of gates.

Module II

Data Types; Pre-Defined Data Types, User-Defined Data Types, Subtypes, Arrays, Port Array, Records, Signed and Unsigned Data Types, Data Conversion

Module III: Sequential codes

PROCESS: Signals and Variables, IF, WAIT, CASE, LOOP, CASE versus IF, CASE versus WHEN, Bad Clocking, Using Sequential Code to Design Combinational Circuits
Description and design of sequential circuits using VHDL,

Module IV

Standard combinational modules, Design of a Serial Adder with Accumulator, State Graph for Control Network, design of a Binary Multiplier, Multiplication of a Signed Binary Number, Design of a Binary Divider.

Module V

Micro programmed Controller, Structure of a micro programmed controller, Basic component of a micro system, memory subsystem. Overview of PAL, PLA, FPGA, CPLD.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

Text & References:

Text:

- J. Bhaskar, "A VHDL Primer", Addison Wesley, 1999.
- Volnei A. Padroni, "Circuit Design with VHDL."
- M. Ercegovic, T. Lang and L.J. Moreno, "Introduction to Digital Systems", Wiley, 2000
- C. H. Roth, "Digital System Design using VHDL", Jaico Publishing, 2001

References:

- VHDL Programming by Examples by Douglas L. Perry, TMH, 2000
- Hardware Description Languages by Sumit Ghose, PHI, 2000
- The Designer Guide to VHDL by P.J. Ashendern; Morgan Kaufmann Pub. 2000
- Digital System Design with VHDL by Mark Zwolinski; Prentice Hall Pub. 1999
- Designing with FPGA & CPLDs by Zeidman; CMP Pub. 1999
- HDL Chip Design by Douglas J. Smith; Doone Pub. 2001

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VHDL PROGRAMMING LAB

Course Code: NCE6513

Credit Units : 01

Software Required: Mentor Graphics

Topics covered in lab will include:

- Designing Basic Gates.
- Designing Combinational circuits like adder, multiplexer, PLA
- Designing Sequential Circuits like flip-flops, counters, registers.

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.



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MICROPROCESSOR

Course Code: NCE6515

Credit Units : 03

Course Objective:

This course deals with the systematic study of the Architecture and programming issues of 8085-microprocessor family. The aim of this course is to give the students basic knowledge of the above microprocessor needed to develop the systems using it.

Course Contents:

Module I: Introduction to Microcomputer Systems

Introduction to Microprocessors and microcomputers, Study of 8 bit Microprocessor, 8085 pin configuration, Internal Architecture and operations, interrupts, Stacks and subroutines, various data transfer schemes.

Module II: ALP and timing diagrams

Introduction to 8085 instruction set, advance 8085 programming, Addressing modes, Counters and time Delays, Instruction cycle, machine cycle, T-states, timing diagram for 8085 instruction.

Module III: Memory System Design & I/O Interfacing

Interfacing with 8085. Interfacing with input/output devices (memory mapped, peripheral I/O), Cache memory system. Study of following peripheral devices 8255, 8253, 8257, 8255, 8251.

Module IV: Architecture of 16-Bit Microprocessor

Difference between 8085 and 8086, Block diagram and architecture of 8086 family, pin configuration of 8086, Minimum mode & Maximum mode Operation. Internal architecture of 8086, Bus Interface Unit, Register Organization, Instruction Pointer, Stack & Stack pointer, merits of memory segmentation, Execution Unit, Register Organization.

Module V: Pentium Processors

Internal architecture of 8087, Operational overview of 8087, Introduction to 80186, 80286, 80386 & 80486 processors, Pentium processor.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

Text & References:

Text:

- Ramesh. S. Gaonkar, "Microprocessor architecture Programming and Application with 8085" Penram International Publishing, 4th Edition
- B. Ram, "Fundamentals of microprocessors and microcomputer" Dhanpat Rai, 5th Edition.]
- Douglas V Hall.

References:

- M. Rafiquzzaman, "Microprocessor Theory and Application" PHI – 10th Indian Reprint.
- Naresh Grover, "Microprocessor comprehensive studies Architecture, Programming and Interfacing" Dhanpat Rai, 2003.
- Gosh," 0000 to 8085" PHI.


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SYSTEM PROGRAMMING AND COMPILER CONSTRUCTION

Course Code: NCE6714

Credit Units : 03

Course Objective:

This course provides knowledge to design various system programs.

Course Contents:

Module I: Introduction

Definition, Evolution, Components, Editors: Introduction to system Programming Line editor, Full screen editor and multi window editor. Case study MS-Word, DOS Editor and vi editor.

Module II: Assemblers

First pass and second pass of assembler and their algorithms. Assemblers for CISC Machines: case study x85 & x86 machines.

Module III: Compilers & Macro Processor

Introduction to various translators. Various phases of compiler. Bootstrapping for compilers, Introduction to. Design of a compiler in C++ as Prototype. Basic Macro Processor functions- Macro definition & expansion – Macro Processor Algorithm & Data Structures, conditional – Macro Expansion, Keyword Macro Parameters, Macro with in Macro Implementation, case study MASM and ANSI C Macro language.

Module IV: Debuggers, Loaders and Linkers

Introduction to various debugging techniques. Case study:- Debugging in Turbo C++ IDE. Linkers and Loaders Concept of linking. Case study of Linker in x86 machines. Loading of various loading schemes.

Module V: Operating System

Booting techniques and sub-routines. Design of kernel and various management for OS. Design of Shell and other utilities, (Overview of Unix OS, Difference Between Unix and Linux, Commands in Unix.)-changes made

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

Text & References:

Text:

- Donovan J.J., Systems Programming, New York, Mc-Graw Hill, 1972.
- Dhamdhare, D.M., Introduction to Systems Software, Tata Mc-Graw Hill 1996.

References:

- Aho A.V. and J.D. Ullman Principles of compiler Design Addison Wesley/ Narosa 1985.


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ADVANCED JAVA PROGRAMMING

Course Code: NCE6603

Credit Units : 03

Course Objective:

The objective is to equip the students with the advanced feature of contemporary java which would enable them to handle complex programs relating to managing data and processes over the network. The major objective of this course is to provide a sound foundation to the students on the concepts, precepts and practices, in a field that is of immense concern to the industry and business.

Course Contents:

Module I: Distributed Computing

Introduction to Java RMI, RMI services, RMI client, Running client and server, Introduction of Swing, Swing Components, Look and Feel for Swing Components, Introduction to Multimedia Programming.

Module II: Database Connectivity

ODBC and JDBC Drivers, Connecting to Database with the java.sql Package, Using JDBC Terminology, JDBC with mysql, postgresql.

Module III: Servlet Programming

Introduction to Servlets, Servlet Life Cycle, Servlet based Applications, Servlet and HTML.Filters, jdbc with servelets, session Management techniques in detail.

Module IV: JSP Programming

JSP: Introduction to JSP, JSP implicit objects, JSP based Applications, Java. Net. Login & Logout Example, jdbc with jsp.

Module V: JEE Web Appliaction

The Model-View-Controller Architecture What is Struts, Struts Tags, Creating Beans, Other Bean Tags, Bean Output, Creating HTML Forms, The Action Form class The Action class, Simple Struts: a simple Struts application; Introduction to EJB.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

Text:

- Java 2 Unleashed (Techmedia – SAMS), Jamie Jaworski
- Professional Java Server Programming (a Press), Allamaraju
- Developing Java Servlets (Techmedia – SAMS), James Goodwill sing Java 1.2 Special Edition (PHI), Webber

References:

- David Flanagan, Jim Parley, William Crawford & Kris Magnusson, Java Enterprise in a nutshell - A desktop Quick reference - O'REILLY, 2003
- Stephen Ausbury and Scott R. Weiner, Developing Java Enterprise Applications, Wiley-2001
- Jaision Hunder & William Crawford, Java Servlet Programming, O'REILLY, 2002
- Dietal and Deital, "JAVA 2" PEARSON publication


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ADVANCE DATABASE MANAGEMENT SYSTEMS

Course Code: NCE6604

Credit Units : 03

Course Objective:

The objective of this course is to expose the students to the implementation techniques of database system. This course explains techniques for query processing and optimization with transaction and concurrency control techniques

Course Contents:

Module I: Relational Databases

Integrity Constraints revisited, Extended ER diagram, Relational Algebra & Calculus, Functional, Multivalued and Join Dependency, Normal Forms, Rules about functional dependencies.

Module II: Query Processing and Optimization

Valuation of Relational Operations, Transformation of Relational Expressions, Indexing and Query Optimization, Limitations of Relational Data Model, Null Values and Partial Information.

Object Oriented and Object Relational Databases

Modeling Complex Data Semantics, Specialization, Generalization, Aggregation and Association, Objects, Object Identity, Equality and Object Reference, Architecture of Object Oriented and Object Relational Databases

Module III: Parallel and Distributed Databases

Distributed Data Storage – Fragmentation & Replication, Location and Fragment Transparency Distributed Query Processing and Optimization, Distributed Transaction Modeling and concurrency Control, Distributed Deadlock, Commit Protocols, Design of Parallel Databases, Parallel Query Evaluation.

Advanced Transaction Processing

Nested and Multilevel Transactions, Compensating Transactions and Saga, Long Duration Transactions, Weak Levels of Consistency, Transaction Work Flows, Transaction Processing Monitors.

Module IV

Multimedia databases, Databases on the Web and Semi-Structured Data
Case Study: Oracle Xi

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

Text & References:

Text:

- Elmars, Navathe, Somayajulu, Gupta, "Fundamentals of Database Systems", 4th Edition, Pearson Education, 2007
- Garcia, Ullman, Widom, "Database Systems, The complete book", Pearson Education, 2007
- R. Ramakrishnan, "Database Management Systems", McGraw Hill International Editions, 1998

References:

- Date, Kannan, Swaminathan, "An Introduction to Database Systems", 8th Edition Pearson Education, 2007
- Singh S.K., "Database System Concepts, design and application", Pearson Education, 2006.
- Silberschatz, Korth, Sudarshan, "Database System Concepts", McGraw Hill, 6th Edition, 2006
- W. Kim, "Modern Database Systems", 1995, ACM Press, Addison – Wesley,
- D. Maier, "The Theory of Relational Databases", 1993, Computer Science Press, Rockville, Maryland
- Ullman, J. D., "Principals of database systems", Galgotia publications, 1999
- Oracle Xi Reference Manual
- Dietrich and Urban, "An Advanced Course in Database Systems", Pearson, 2008.

DIGITAL COMPUTER ORGANIZATION

Course Code: NCE6605

Credit Units : 03

Course Objective:

The Objective of this course is to expose the students to the fundamentals and the concepts of Digital & Computer Organization and Representation of Information and Basic Building Blocks, Basic Organization, Memory Organization, Input-Output Organization, Processor Organization etc. This course is designed to understand the concepts of Computer Organization for Research & Development as well as for application.

Course Contents:

Module I: Representation of Information and Basic Building Blocks

Number Systems, Binary, Octal, Hexadecimal, Character Codes (BCD, ASCII, EBCDIC), Logic gates, Boolean algebra, K-map Simplification, Half adder, Full adder, Decoders, Multiplexes, Binary Counters, Flip/Flops: SR FF, JK FF, Master Slave FF, T and D FF, Registers: Parallel and Serial Registers, Counters (Synchronous & Asynchronous), ALU, Micro-Operation, ALU-chip.

Module II: Basic Organization

Von Neumann Machine (IAS Computer), Operational flow chart (Fetch, Execute), Instruction Cycle, Organization of Central Processing Unit, Hardwired and Micro programmed control unit, Single Organization, General Register Organization, Stack Organization, Addressing Modes, Instruction Formats, Data transfer & Manipulation, I/O organization, Bus Architecture, Programming Registers.

Module III: Memory Organization

Memory hierarchy, Main Memory (RAM/ROM chips) with mapping, Auxiliary memory, Associative memory and its mapping, Virtual memory, Cache memory with mapping techniques, Memory management hardware.

Module IV: Input-Output organization

Peripheral devices, I/O interface, Direct memory access, Modes of transfer, Priority Interrupt, I/O Processors, Serial Communication, Asynchronous data transfer, Strobe Control, Handshaking, I/O Controllers, CPU-IOP Communication.

Module V: Processor Organization

Introductory Concept of pipeline, Flynn's Classification, Parallel processing. RISC and CISC characteristics, arithmetic pipeline with example.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

Text & References:

Text:

- Computer System Architecture: M. Mano (PHI Publication)
- William Stalling, "Computer Organization & Architecture", Pearson education Asia.
- B. Ram, "Computer Fundamental Architecture & Organization" New Age.

References:

- Computer Organization: Vrsarie, Zaky & Hamacher (TMH Publication).
- Tannenbaum, "Structured Computer Organization", PHI.


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MICROPROCESSOR LAB

Course Code: NCE6517

Credit Units : 01

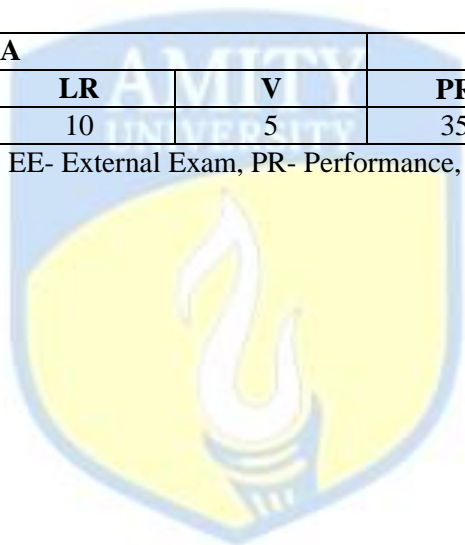
Course Contents:

- To load the numbers 49H and 53H in the memory location 9510 and 9511 respectively and add the contents of memory location 9601
- To write assembly language programming for 8 bit addition with and without carry.
- To write assembly language programming for 8 bit subtraction with and without borrow.
- To write assembly language programming for 8 bit multiplication and division.
- To write assembly language programming for sorting an array of numbers in ascending and descending order.
- To write assembly language programming with additional instructions.
- To write and execute a program using stacks.
- To study and program the programmable peripheral interface (8255) board.
- To study and program the programmable interval timer (8253) board.
- To study and program the programmable DMA controller (8257) board.
- To study and program the programmable interrupt controller (8259) board.

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.



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SYSTEM PROGRAMMING AND COMPILER CONSTRUCTION LAB

Course Code: NCE6715

Credit Units : 01

Software Required: Turbo C++

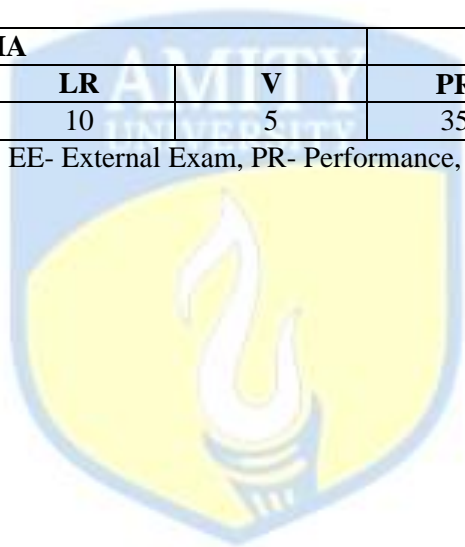
Assignment will be provided for following:

- WAP to determine the length of the machine instructions.
- WAP to differentiate between symbols, literals and tokens.
- WAP to implement Symbol table.
- WAP to implement base table.
- WAP to find the relative addresses.
- Design a macro to perform add operation.
- On the basis of above program display the values of PC, LC and IR.
- Perform programming on loader based programme.
- Perform programming on linker based programme.
- Perform Programming on editor based programme.

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

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ADVANCED JAVA PROGRAMMING LAB

Course Code: NCE6608

Credit Units : 01


Programming Language: Java

1. WAP to display label on a frame with the help of JFrame
2. WAP to display six buttons on a panel using JFrame.
3. WAP. To display an image and a string in a label on the JFrame.
4. WAP that implement a JApplet that display a simple label
5. WAP that implement a JApplet and display the following frame
 - a. Customer name
 - b. Customer number
 - c. Age
 - d. Address
6. WAP to access a table Product Master from MS-Access using Java code.
7. WAP that implement a simple servlet program.
8. WAP for authentication, which validate the login-id and password by the servlet code.
9. WAP to connecting a database using user-id and password.
10. WAP to insert data into the database using the prepared statement.
11. WAP to read data from the database using the ResultSet.
12. WAP to read data send by the client (HTML page) using servlet.
13. WAP to include a HTML page into a JSP page.
14. WAP to handle the JSPEException.
15. WAP to read data send by a client (HTML page) using JSP.

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.


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ADVANCE DATABASE MANAGEMENT SYSTEM LAB

Course Code: NCE6609

Credit Units : 01

Programs should be based on following topics:

Quick Review of Simple SQL Statements, SQL Built-in Functions, Primary Key, Foreign Key, Normalization, Joins View, Union. **Emphasis** on PL/SQL, Cursors 8. Exception handling, Procedure, Functions, Trigger, concurrency control, transaction processing. Introduction to SQLite. Recommended Software: PostgreSQL, MySQL, Oracle.

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.



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CRYPTOGRAPHY AND NETWORK SECURITY

Course Code: NCE6713

Credit Units : 03

Course Objective:

The objective here is to acquaint the students with the application of networking. Detail description of the various TCP/IP protocols and the working of ATM and its performance, Network security and authentication, and various algorithms related to it has been dealt, to get a practical approach.

Course Contents:

Module I: Advanced TCP/IP

TCP Services, TCP format and connection management, Encapsulation in IP, UDP Services, Format and Encapsulation in IP, IP Services, Header format and addressing, Fragmentation and reassembly, Migration to IPv6, Protocols: BOOTP, DHCP, ICMP, IGMP; Internet Routing Protocols: OSPF, RIP, EIGRP, BGP.

Module II: High Speed Networks

Packet Switching Networks; Frame Relay Networks; Asynchronous Transfer Mode (ATM); ATM protocol Architecture; ATM logical connections; ATM cells; ATM Service categories; ATM Adaptation Layer; QoS in ATM and Frame Relay

Module III: High Speed LANs

LAN Ethernet, fast Ethernet, gigabit Ethernet, FDDI, DSL, ADSL

Module IV: Wireless communication

Wireless networks, wireless channels, channel access, network architecture, IEEE 802.11, Bluetooth, Satellite Networks.

Module V: Network Security and Management

Principles of cryptography, Authentication, integrity, key distribution and certification, Access control and Firewalls, attacks and counter measures, security in many layers. Infrastructure for network management, The internet standard management framework, SMI, MIB, SNMP, Security and administration.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

Text:

- William Stallings, "High-Speed Networks and Internets, Performance and Quality of Service", Pearson Education.
- High performance communication networks by: J. Walrand & Pravin Varaiya, Morgan Kaufman, 1999.
- Internetworking with TCP/IP Vol.1: Principles, Protocols, and Architecture (4th Edition) by Douglas E. Comer
- ATM networks: Concepts, Protocols, Applications by: Handel, Addison Wesley.
- Cryptography & Networks Security Stallings, William 3rd edition

References:

- Computer networks: Tanenbaum, Andrew S, Prentice Hall
- Data communication & networking: Forouzan, B. A.
- Computer network protocol standard and interface Uysell, Black

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VLSI DESIGN

Course Code: NCE6612

Credit Units : 02

Course Objective:

In the recent years, IC manufacturing technology has gone through dramatic evolution and changes, continuously scaling to ever smaller dimensions. This scaling has a double impact on the design of ICs. First, the complexity of the designs that can be put on a single die has increased dramatically which led to new design methodologies. At the same time, this plunge into deep submicron space causes devices to behave differently and brings challenging issues to forefront. This course along with the course of Digital Circuits and Systems II and Analog CMOS IC design will give you many of the basic essentials to work in the area of Circuit Design. Since this course takes the latest trends in the industry into account, you will find yourself at a definite edge.

Course Contents:

Module I: Devices and the wire

Diode, dynamic and transient behaviour-diffusion capacitance, SPICE diode model.

MOSFET STATIC BEHAVIOUR: Threshold voltage and its dependence on V_{SB} MOSFET Operation in resistive and saturation region, channel length modulation, Velocity saturation and its impact on sub micron devices, sub threshold conduction, Model for manual analysis, Equivalent resistance for MOSFET in (velocity) saturated region, comparison of equations for PMOS and NMOS, depletion and enhancement device

DYNAMIC BEHAVIOUR: Channel capacitance in different regions of operation, junction capacitance, Level 1 SPICE MODELS for MOS transistors

The Wire: Interconnect parameters: resistance, capacitance and Inductance, Lumped RC model, Elmore Delay

Module II: CMOS Inverter

VTC of an ideal inverter, Switching Model of the CMOS inverter: nMOS /pMOS discharge and charge, VTC of CMOS inverter: PMOS AND NMOS operation in various regions including velocity saturation, Switching threshold, $(W/L)_p/(W/L)_n$ ratio for setting desired V_M with and without velocity saturation, Noise Margins, buffer

Ratioed logic: Pseudo NMOS inverter and PMOS to NMOS ratio for performance, tristate inverter, Resistive load inverter.

Load Capacitance calculations: fan out capacitance, self capacitance calculations: Miller effect, wire capacitance; Improving delay calculation with input slope, Propagation delay: first order analysis, analysis from a design perspective, sizing a chain of inverters for minimum delay, choosing optimum number of stages

Power, Energy and Energy Delay: Dynamic power consumption, Static power, Glitches and power dissipation due to direct path currents, power and delay trade off, Transistor sizing for energy minimization

Module III: Combinational circuits

CMOS LOGIC: Good 0 and poor 0, Good 1 and poor 1, series and parallel N and P switches, 2 and Higher input NAND and NOR gates, Functions of the type $(AB+C(D+E))$ and their complements, XOR and XNOR gates, 2 input Multiplexer, Full Adder; Transistor sizing in CMOS logic for optimal delay,

Pseudo NMOS NAND NOR and other gates and the transistor sizing, Introduction to DSVCL logic, CPL AND/NAND, OR/NOR, XOR/XNOR gates

Logical effort, Electrical Effort, Branching effort, Examples of sizing Combinational logic chains for minimum delay. Pass-transistor logic, pass gate configurations for nmos and pmos, 2 input and 4 input MUX, XOR, XNOR and implementation of general functions like $AB+AB*C+A*C^*$, Robust and Efficient PTL Design, Delay of Transmission Gate chain

Dynamic CMOS design: Precharge and Evaluation, charge leakage, bootstrapping, charge sharing, Cascading Dynamic Gates, DOMINO Logic, Optimization of Domino Logic Gates, simple example circuit implementations of DOMINO logic

Module IV: Sequential Logic circuits

Principle of Bistability, NAND and NOR based SR latch, and clocked SR Latch, JK latch, example of master slave flip flop, CMOS D latch, MUX based Latches, master slave edge triggered register, non ideal clocks, clock overlap, C2MOS register, TSPCR Register, Schmitt Trigger, Pipelining and NORA CMOS

Module V: Layout Design Rules

Introduction to CMOS Process technology, Layout of CMOS inverter, CMOS NAND and NOR gates, Concept of Euler path, and stick diagrams for functions like $(AB+E+CD)^*$

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

Text & References:

- Jan M Rabaey: Digital Integrated Circuits
- David Hodges et al: Analysis and Design of Digital ICs
- Kang: CMOS Digital ICs
- Weste and Harris: CMOS VLSI design
- Weste and Eshragian: Principles of CMOS VLSI Design



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VLSI DESIGN LAB

Course Code: NCE6613

Credit Units : 01

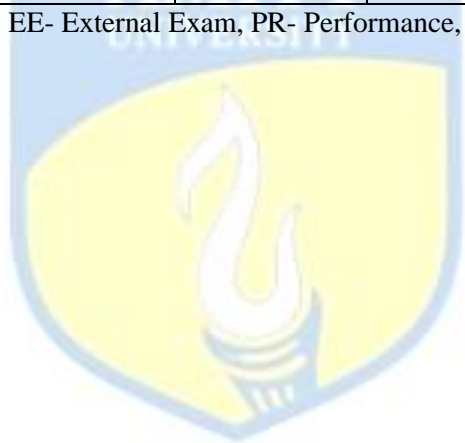
Course Contents:

- Using Design architect and simulate V vs time for CMOS inverter using same W/L ratio for PMOS and NMOS.
- Design and simulate again by Sizing PMOS to NMOS appropriately and repeat experiment 1
- Design and simulate V vs t for 2 input NAND and Nor gates.
- Design and Simulation for general CMOS functions
- One bit full adder simulation
- 2:1 MUX using pass transistor logic
- Other functions using pass transistor logic
- Layout of CMOS inverter
- Layout of NAND and NOR gates
- Design and Simulation SR latch using NAND and NOR representations
- Design and simulate D flip flop

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.




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DATA MINING

Course Code: NCE6618

Credit Units : 03

Course Objective:

The objective of this course is to introduce students to Data Warehousing & Data mining technologies that will help To Inspect, Control and Secure Information through Databases.

Course Contents:

Module I: Introduction to Data Warehousing

The need for data ware housing, Operational & Informational Data Stores, Data Warehouse definition & Characteristics, Data Warehouse role & Structure, The cost of warehousing data, Foundation & Roots of Data,

Module II: Data Warehousing Components& Architecture:

Stores, warehouses and marts, Data warehouse database, Sourcing, acquisition, clean up & transformation tools, meta data, Access tools, Data ware house administration & management,. operational & External Database layer, Information access layer, data access layer, metadata layer, process management layer, Application messaging layer, Physical DW layer, Data staging layer.

Module III: Building a Data Warehouse:

Business, Design, Technical & Implementation Considerations, DW project plan. Overview of Mapping the DW to Multiprocessor Architecture, & DBMS Schemas for Decision Support.

Module IV: Metadata and OLAP:

METADATA: Definition, repository, management & trends.

OLAP: Need, guidelines, Multi Relational & Multi-Dimensional: MOLAP, ROLAP, OLAP Tools.

Module V: Data Mining & Visualization:

Techniques to mine the data, Market Basket analysis, Measuring data mining effectiveness, embedding data mining to business process, current limitations and challenges in DM.

Introduction to EIS, The future of Data Mining, Warehousing & Virtualization, Applications: PowerBuilder, Forte. Technical Exposure to Data Mining

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

TEXT BOOKS:

- Alex Berson, Data Warehousing, Data Mining, and Olap, Tata McGraw Hill.
- George M Marakas, Modern Data Warehousing, Mining & Visualization Core Concepts, Pearson Education.

References:

- (Berry, Michael)Data Mining Techniques.
- (Sharma, Gajendra)Data Mining, Data Warehousing and OLAP.
- (Gupta, GK) Data Mining with Case Studies.
- (Han & Kamber)Data Mining: Concepts and Techniques.
- (Paulraj Ponniah) Datawarehousing Fundamentals.


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COMPUTER GRAPHICS

Course Code: NCE6702

Credit Units : 03

Course Objective:

The objective of the course is to provide the understanding of the fundamental graphical operations and the implementation on computer, the mathematics behind computer graphics, including the use of spline curves and surfaces. It gives the glimpse of recent advances in computer graphics, user interface issues that make the computer easy, for the novice to use.

Course Contents:

Module I: Introduction to Graphics and Graphics Hardware System

Application of computer graphics, Video Display Devices, Raster Scan Display, Random Scan Display, Input Devices, Graphic Software and graphics standards, Numerical based on Raster and Random scan display, Frame buffer, Display processor.

Module II: Output Primitives and Clipping operations

Algorithms for drawing 2D Primitives lines (DDA and Bresenham's line algorithm), circles (Bresenham's and midpoint circle algorithm), Antialiasing and filtering techniques. Line clipping (cohen-sutherland algorithm), Curve clipping algorithm, and polygon clipping with Sutherland Hodgeman algorithm, Area fill algorithms for various graphics primitives: Scanline fill algorithm, boundary fill algorithm, flood fill algorithm, Polygon representation, various method of Polygon Inside test: Even-Odd method, winding number method, Character generation techniques.

Module III: 2D Geometric transformation

2D Transformation: Basic transformation, Translation, Rotation, Rotation relative to an arbitrary point, scaling, Matrix Representations and Homogeneous coordinates, window to viewport transformation.

Module IV: 3D Geometric transformation

3D Concepts: Parallel projection and Perspective projection, 3D Transformations, composite 3D transformation, co-ordinate transformation, Inverse transformation

Module V: object modeling and Visible Surface detection

fractal geometry methods, fractal dimensions, Geometric construction of deterministic self-similar fractals, Iterated function system to generate fractals. Bezier curves and Bezier surfaces, Bspline curves and surfaces, Visible surface detection method: Basic illumination, diffuse reflection, specular reflection, shadows. Ray tracing method, Depth-buffer method, A-buffer method, Depth-sorting method (painter's algorithm), Binary search partition method, Scan line method,

Module VI: Introduction to multimedia

Design of animation sequences, Computer Animation languages, Elementary filtering techniques and elementary Image Processing techniques, graphics library functions used in animation design

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

Text & References:

Text:

- Foley et. al., "Computer Graphics Principles & practice", 2nd ed. AWL, 2000.
- D. Hearn and P. Baker, "Computer Graphics", Prentice Hall, 1986.
- R. Van Dam and G. Kalley, "Theory and Problems of Computer Graphics", Schaum's Series, McGraw Hill, 1986

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References:

- R.H. Bartels, J.C. Beatty and B.A. Barsky, “An Introduction to Splines for use in Computer Graphics and Geometric Modeling”, Morgan Kaufmann Publishers Inc., 1987.
- C.E. Leiserson, T.H. Cormen and R.L. Rivest, “Introduction to Algorithms”, McGraw-Hill Book Company, 1990.
- W. Newman and R. Sproul, “Principles of Interactive Computer Graphics, McGraw-Hill, 1973.
- F.P. Preparata and M.I. Shamos, “Computational Geometry: An Introduction”, Springer-Verlag New York Inc., 1985.
- D. Rogers and J. Adams, “Mathematical Elements for Computer Graphics”, MacGraw-Hill International Edition, 1989
- David F. Rogers, “Procedural Elements for Computer Graphics”, McGraw Hill Book Company, 1985.
- Alan Watt and Mark Watt, “Advanced Animation and Rendering Techniques”, Addison-Wesley, 1992



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ADVANCED COMPUTER NETWORKS

Course Code: NCE6704

Credit Units : 03

Course Objective:

The objective of the course is to provide thorough understanding & in-depth knowledge of concepts in computer networks Such as Internet protocols and routing, local area networks, wireless communications and networking, performance analysis, congestion control, TCP, network address translation, multimedia over IP, switching and routing, mobile IP, multicasting, IPv6. Peer-to-peer networking, network security, and other current research topics. A focus will be placed on wireless networking, reflecting rapid advances in this area. This course motivates the students to explore current research areas in the same field.

Course Contents:

Module I : Introduction to Networks

Networking introduction, Reference Models, TCP/IP, OSI, Addressing, Protocol Layering, Transmission impairment, performance, Switching, Transmission Media, Introduction to MAC, Channel allocation, MAC protocol classification for LAN's, MAN's, MAC protocols for Adhoc N/ws, MAC Protocol for WLAN's(adhoc and sensor n/ws), Introduction to Ethernet protocol (Fast, Gigabit and standard Ethernet).

Module II: Network Layer

Network Layer Design Issues, Routing Algorithms, Congestion Control Algorithms, Quality of Service, Internet Working, Network Layer in Internet. IPv6 basic protocol, extensions and options, support for QoS, security, etc., Changes to other protocols, Application Programming Interface for IPv6.

Module III : Mobile IP

Mobile IP, IP Multicasting. Multicast routing protocols, address assignments, session discovery, etc.

Module IV : Transport Layer and Application Layer

The Transport Protocol: The Transport Service, Elements of transport protocol, a simple Transport Protocol, Internet Transport Protocols UDP, Internet Transport Protocols TCP, TCP extensions for high-speed networks, transaction-oriented applications Performance Issues.

The Application Layer: DNS-(Domain Name System), Electronic Mail, World Wide Web Multimedia.

Module V : Network Security

Overview of network security, Secure-HTTP, SSL, ESP, Key distribution protocols. Digital signatures, digital certificates-mail Security, Web security, Social Issues.

Examination Scheme:

Components	A	CT	H	V/S/O	EE
Weightage (%)	5	10	7	8	70

Text & References:

Text:

- Computer Networks - Andrew S Tanenbaum, 4th Edition. Pearson Education/PHI
- Data Communications and Networking – Behrouz A. Forouzan. Third Edition TMH.

References:

- Computer Communications and Networking Technologies –Michael A.Gallo, William M .Hancock - Thomson Publication.
- W. Stallings. Cryptography and Network Security: Principles and Practice, 2nd Edition, Prentice Hall, 1998.
- W. R. Stevens. TCP/IP Illustrated, Volume 1: The protocols, Addison Wesley, 1994.
- C. E. Perkins, B. Woolf, and S. R. Alpert. Mobile IP: Design Principles and Practices, Addison Wesley, 1997.

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COMPUTER GRAPHICS LAB

Course Code: NCE6706

Credit Units : 01

Software Required: Turbo C++

Course Contents:

Assignments will be provided for the following:

- Geometrical shapes based on graphics algorithms
- 2D Geometric transformation translation, rotation, scaling, reflection.
- Clipping
- Animation

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.



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ADVANCED COMPUTER NETWORKS LAB

Course Code: NCE6707

Credit Units : 01

Course Contents:

Various installations and connections of LAN, WAN, ETC

Working on NS2.

Socket Programming using C Language on Linux

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.



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MATLAB PROGRAMMING

Course Code: NCE6708

Credit Units : 02

Understanding The MATLAB Environment, Using the Help System in MATLAB, MATLAB Basics, Linear Algebra; Vectors and Matrices and various operations on them, M files; Scripts and User-defined functions, Plotting, Flow Control and Loops; For and While Loops, If and Case statements, structures, writing basic programs using the above, study of various toolboxes available in matlab and case study of any one tool box.


Recommended Software: MATLAB/Octave

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.




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SUMMER INTERNSHIP EVALUATION-II

Course Code: NCE6735

Credit Units : 03

Guidelines:

There are certain phases of every Intern's professional development that cannot be effectively taught in the academic environment. These facets can only be learned through direct, on-the-job experience working with successful professionals and experts in the field. The internship program can best be described as an attempt to institutionalize efforts to bridge the gap between the professional world and the academic institutions. Entire effort in internship is in terms of extending the program of education and evaluation beyond the classroom of a university or institution. The educational process in the internship course seeks out and focuses attention on many latent attributes, which do not surface in the normal classroom situations. These attributes are intellectual ability, professional judgment and decision-making ability, inter-disciplinary approach, skills for data handling, ability in written and oral presentation, sense of responsibility etc.

In order to achieve these objectives, each student will maintain a file (**Internship File**). The Internship File aims to encourage students to keep a personal record of their learning and achievement throughout the Programme. It can be used as the basis for lifelong learning and for job applications. Items can be drawn from activities completed in the course modules and from the workplace to demonstrate learning and personal development.

The File will assess the student's analytical skills and ability to present supportive evidence, whilst demonstrating understanding of their organization, its needs and their own personal contribution to the organization.

The **layout guidelines** for the Project & Seminar Report:

1. File should be in the following specification:

A4 size paper

Font: Arial (10 points) or Times New Roman (12 points)

Line spacing: 1.5

Top & bottom margins: 1 inch/ 2.5 cm

Left & right margins: 1.25 inches/ 3 cm

2. Report Layout: The report should contain the following components:

Front Page

Table of Content

Acknowledgement

Student Certificate

Company Profile (optional)

Introduction

Main Body

References / Bibliography

The File will include **five sections** in the order described below. The content and comprehensiveness of the main body and appendices of the report should include the following:

1. **The Title Page**--Title - An Internship Experience Report For (Your Name), name of internship organization, name of the Supervisor/Guide and his/her designation, date started and completed, and number of credits for which the report is submitted.

2. **Table of Content**--an outline of the contents by topics and subtopics with the page number and location of each section.

3. **Introduction**--short, but should include how and why you obtained the internship experience position and the relationship it has to your professional and career goals.

4. **Main Body**--should include but not be limited to daily tasks performed. Major projects contributed to, dates, hours on task, observations and feelings, meetings attended and their purposes, listing of tools and materials and their suppliers, and photographs if possible of projects, buildings and co-workers.

5. References / Bibliography --This should include papers and books referred to in the body of the report. These should be ordered alphabetically on the author's surname. The titles of journals preferably should not be abbreviated; if they are, abbreviations must comply with an internationally recognised system

ASSESSMENT OF THE INTERNSHIP FILE

The student will be provided with the Student Assessment Record (SAR) to be placed in front of the Internship File. Each item in the SAR is ticked off when it is completed successfully. The faculty will also assess each item as it is completed. The SAR will be signed by the student and by the faculty to indicate that the File is the student's own work. It will also ensure regularity and meeting the deadlines.

STUDENT ASSESSMENT RECORD (SAR)

1. Range of Research Methods used to obtain information

2. Execution of Research

3. Data Analysis

- Analyse Quantitative/ Qualitative information
- Control Quality

4. Draw Conclusions

Examination Scheme:

Components	V	S	R	FP
Weightage (%)	20	20	20	40

V – Viva, S – Synopsis, FP – Final Presentation, R - Report


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MOBILE COMPUTING

Course Code: NCE6710

Credit Units : 03

Course Objective:

The objective of this consortium is to shape and expand a full-scale and sound mobile computing system market. To achieve this, cooperation is required of interests related to communication (network), computer hardware/software, system integrators (including service providers), and the media.

Course Contents:

Module I: Introduction to Personal Communications Services (PCS)

PCS Architecture, Mobility management, Networks signaling.

Global System for Mobile Communication (GSM) system overview: GSM Architecture, Mobility management, Network signaling.

Module II: General Packet Radio Services (GPRS) & Wireless Application Protocol (WAP)

GPRS Architecture, GPRS Network Nodes.

Mobile Data Communication: WLANs (Wireless LANs) IEEE 802.11 standard, Mobile IP.

Wireless Application Protocol (WAP): The Mobile Internet standard, WAP Gateway and Protocols, wireless mark up Languages (WML).

Module III: Third Generation (3G) Mobile Services

Introduction to International Mobile Telecommunications 2000 (IMT 2000) vision, Wideband Code Division Multiple Access (W-CDMA), and CDMA 2000, Quality of services in 3G.

Wireless Local Loop(WLL): Introduction to WLL Architecture, wireless Local Loop Technologies.

Module IV: Global Mobile Satellite Systems

Global Mobile Satellite Systems; case studies of the IRIDIUM and GLOBALSTAR systems.

Module V: Enterprise Networks

Introduction to Virtual Networks, Blue tooth technology, Blue tooth Protocols. Advanced techniques in mobile computing.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

Text:

- “Wireless and Mobile Networks Architectures”, by Yi-Bing Lin & Imrich Chlamtac, John Wiley & Sons, 2001.
- “Mobile and Personal Communication systems and services”, by Raj Pandya, Prentice Hall of India, 2001.

References:

- “Guide to Designing and Implementing wireless LANs”, by Mark Ciampa, Thomson learning, Vikas Publishing House, 2001.
- “Wireless Web Development”, Ray Rischpater, Springer Publishing, 2000.
- “The Wireless Application Protocol”, by Sandeep Singhal, Pearson Education Asia, 2000.
- “Third Generation Mobile Telecommunication systems”, by P.Stavronlakis, Springer Publishers, 2001.

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NETWORK AND WIRELESS SECURITY

Course Code: NCE6802

Credit Units : 03

Course Contents:

Module-I: INTRODUCTION

Network concepts – Threats in networks – Network security controls – Importance of security – Threat models – Security concepts – Common mitigation methods

Why is Wireless Different? Introduction ,Protecting the Means Of Communication Protecting Privacy, Promoting Safety ,The Personal and the Public ,Shaking Up the Status Quo ,Understanding Wireless Forecasts ,Reasonable Degrees of Security, Regulatory Environments and Issues ,Security-Related Regulations ,Security Related Market Factors, Guidelines for Security Measures, Cellular Networks and Bearer Technologies ,First-Generation Wireless (1G), Second-Generation Wireless (2G), Spread Spectrum ,Code Division Multiple Access (CDMA) ,Time Division Multiple Scss (TDMA) ,Global System for Mobile Communications (GSM) ,Third-Generation Wireless (3G) ,Short Message Service (SMS) ,Fourth-Generation Wireless (4G)

Module-II: The Wireless Local Area Network (WLAN)

Wireless Transmission Media ,Infrared Systems ,Narrowband Radio Systems ,Wideband Radio Systems: SpreadSpectrum ,Frequency-Hopping Spread Spectrum (FHSS) ,Direct-Sequence Spread Spectrum (DSSS) ,WLAN Products and Standards—Today’s Leaders? ,802.11 Security? ,IEEE 802.11b ,Securing WLANs ,Eavesdropping ,Unauthorized Access ,Interference and Jamming ,Physical Threats ,Countermeasures ,Frequency-Hopping Spread Spectrum (FHSS), Direct-Sequence Spread Spectrum (DSSS) ,Infrared (IR) ,Narrowband ,The Infamous WEP ,Encryption ,Authentication ,Wired Equivalency Protocol Flaws Too Public ,Other Authentication Techniques ,Physical Security.

Module-III: Wireless Application Protocol(WAP)

Comparison of the TCP/IP, OSI, and WAP Models, How WAP Works ,The Security Status of WAP ,Viruses ,Authorization ,Non-repudiation ,Authentication ,Secure Sessions ,Security Products ,Securant Technologies ClearTrust Control ,WAP Security Architecture ,Marginal Security ,Wireless Access to the Internet ,Wireless Middleware

Module-IV: Wireless Transport Layer Security (WTLS)

Secure Socket Layer, Record Protocol, SSL Handshake Protocol ,Transport Layer Security, Advantages and Disadvantages of SSL/TLS ,Netscape ,Microsoft ,Entrust ,EAP-TLS ,Alternatives to SSL/TLS , IP Security (IPSec) ,Authentication Header Protocol (AH) ,Encapsulating Security Payload (ESP) ,Transport and Tunnel Modes, Secure Shell (SSH) ,SSH Transport Layer Protocol ,SSH Versus TLS Implementations ,Light Extensible Authentication Protocol (LEAP) ,Wireless Transport Layer Security and WAP ,Understanding Wireless Transport Layer Security ,WTLS Handshake Protocol ,WTLS Alert Protocol ,WTLS Change Cipher Protocol ,Pros and Cons of WTLS ,WTLS Vulnerabilities ,Implementations of WTLS

Module-V: Bluetooth Security

Bluetooth Basic Specifications ,Bluetooth Technology, Bluetooth Specification Development ,Design Decisions ,Piconets ,Bluetooth Security Architecture ,Scatternets ,The Bluetooth stack ,Security Functions at the Baseband Layer ,Security Functions of the Service Discovery Protocol ,Security Functions at the Link Layer ,Frequency-Hopping ,


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Channel Establishment ,Security Manager ,Authentication,Authentication with the SAFER1 Block Cipher ,Encryption ,Encryption Modes ,Key Length Negotiation ,Encryption With the E0 Stream Cipher ,Threats to Bluetooth Security ,Jamming ,Bluetooth holes

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

- Nichols and Lekka, “Wireless Security-Models, Threats and Solutions”, Tata McGraw – Hill, New Delhi, 2006.
- Charles P. Fleeger, "Security in Computing", Prentice Hall, New Delhi, 2009
- Merritt Maxim and David Pollino, "Wireless Security", Osborne/McGraw Hill, New Delhi, 2005.



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CYBER CRIME AND IT LAW

Course Code: NCE6803

Credit Units : 03

Course Contents:

Module-I: Power of Arrest Without Warrant Under the IT Act, 2000: A Critique

Crimes of this Millennium, Section 80 of the IT Act, 2000 – A Weapon or a Farce, Forgetting the Line Between Cognizable and Non-Cognizable Offences, Necessity of Arrest without Warrant from Any Place, Public or Otherwise, Checks and Balances Against Arbitrary Arrests, Arrest for “About to Commit” an Offence Under the IT Act: A Tribute to Draco, Arrest, But No Punishment!

Module-II: Cyber Crime and Criminal Justice: Penalties, Adjudication and Appeals Under the IT Act, 2000

Concept of ‘Cyber Crime’ and the IT Act, 2000, Hacking, Teenage Web vandals, Cyber Fraud and Cyber cheating, Virus on the Internet, Defamation, Harassment and E-mail Abuse, Cyber Pornography, Other IT Act Offences, Monetary Penalties, Adjudication and Appeals Under IT Act, 2000, Network Service Providers, Jurisdiction and cyber Crimes, Nature of Cyber Criminality, Strategies to Tackle Cyber Crime and Trends, Criminal Justice in India and Implications on Cyber Crime.

Module-III: Jurisdiction in the Cyber World

Questioning the Jurisdiction and Validity of the Present Law of Jurisdiction, Civil Law of Jurisdiction in India, Cause of Action, Jurisdiction and the Information Technology Act, 2000, Foreign Judgments in India, Place of Cause of Action in Contractual and IPR Disputes, Exclusion Clauses in Contracts, Abuse of Exclusion Clauses, Objection of Lack of Jurisdiction, Misuse of the Law of Jurisdiction, Legal Principles on Jurisdiction in the United States of America, Jurisdictional Disputes W.R.T. the Internet in the United States of America.

Module-IV: Battling Cyber Squatters and copyright Protection in the Cyber World

Concept of Domain Name and Reply to Cyber Squatters, Meta-Tagging, Legislative and Other Innovative Moves Against Cyber Squatting, The Battle Between Freedom and Control on the Internet, Works in Which Copyright Subsists and Meaning of Copyright, Copyright Ownership and Assignment, Licence of Copyright, Copyright Term and Respect for Foreign Works, Copyright Infringement, Remedies and Offences, Copyright Protection of Content on the Internet; Copyright Notice, Disclaimer and Acknowledgement, Downloading for Viewing Content on the Internet, Hyper-linking and Framing, Liability of ISPs for Copyright violations in the Cyber World: Legal Developments in the US, Napster and its Cousins: A Revolution on the Internet but a Crisis for Copyright Owners, Computer Software Piracy.

Module-V: Protection of Cyber Consumers in India

Are Cyber consumers Covered Under the Consumer Protection Act, Goods and Services, Consumer Complaint, Defect in Goods and Deficiency in Services, Restrictive and Unfair Trade Practices, Instances of Unfair Trade Practices, Reliefs Under CPA, Beware Consumers, Consumer Foras, Jurisdiction and Implications on Cyber Consumers in India, Applicability of CPA to Manufacturers, Distributors, Retailers and Service Providers Based in Foreign Lands Whose Goods are Sold or Services Provided to a consumer in India.


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Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

- “Cyber Law Simplified” , Vivek Sood, TMH, 2001
- “Cyber Security, Cyber Crime and Cyber Forensics: Applications and Perspectives” Raghu Santanam, M. Sethumadhavan, Information Science Reference
- Cyberlaw – The Indian Perspective By Pavan Duggal, Saakshar Law Publications.
- Jonathan Rosenoer, “Cyber Law: The law of the Internet”, Springer-Verlag, 1997



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CYBER CRIME INVESTIGATION & FORENSICS

Course Code: NCE6804

Credit Units : 03

Course Contents:

Module-I: Computer Forensics and Investigations as a Profession, Understanding

Computer Forensics ,Computer Forensics Versus Other Related Disciplines ,A Brief History of Computer Forensics, Understanding Case Law ,Developing Computer Forensics Resources ,Preparing for Computer Investigations, Understanding Law Enforcement Agency Investigations, Following the Legal Processes, Understanding Corporate Investigations, Establishing Company Policies, Displaying Warning Banners ,Designating an Authorized Requester, Conducting Security Investigations, Distinguishing Personal and Company Property ,Maintaining Professional Conduct.

Module-II: Understanding Computer Investigations

Preparing a Computer Investigation, An Overview of a Computer Crime ,An Overview of a Company Policy Violation ,Taking a Systematic Approach ,Assessing the Case ,Planning Your Investigation ,Securing Your Evidence ,Procedures for Corporate High-Tech Investigations, Employee Termination Cases, Internet Abuse Investigations-mail Abuse Investigations, Attorney-Client Privilege Investigations, Media Leak Investigations, Industrial Espionage Investigations, Interviews and Interrogations in High-Tech Investigations ,Understanding Data Recovery Workstations and Software, Setting Up Your Workstation for Computer Forensics ,Conducting an Investigation, Gathering the Evidence ,Understanding Bit-stream Copies ,Acquiring an Image of Evidence Media, Using ProDiscover Basic to Acquire a USB Drive ,Analyzing Your Digital Evidence, Completing the Case, Critiquing the Case

Module-III: Data Acquisition

Understanding Storage Formats for Digital Evidence, Raw Format, Proprietary Formats, Advanced Forensic Format ,Determining the Best Acquisition Method, Contingency Planning for Image Acquisitions ,Using Acquisition Tools ,Windows XP Write-Protection with USB Devices, Acquiring Data with a Linux Boot CD, Capturing an Image with ProDiscover Basic ,Capturing an Image with AccessData FTK Imager ,Validating Data Acquisitions ,Linux Validation Methods, Windows Validation Methods ,Performing RAID Data Acquisitions ,Understanding RAID ,Acquiring RAID Disks ,Using Remote Network Acquisition Tools ,Remote Acquisition with ProDiscover, Remote Acquisition with EnCase Enterprise , Remote Acquisition with R-Tools R-Studio ,Remote Acquisition with WetStone Livewire, Remote Acquisition with F-Response ,Remote Acquisition with Runtime Software ,Using Other Forensics Acquisition Tools, SnapBack DataArrest ,NTI SafeBack, DIBS USA RAID ,Look Investigator I imager ,ASRData SMART ,Australian Department of Defence PyFlag,

Module-IV: Processing Crime and Incident Scenes

Identifying Digital Evidence, Understanding Rules of Evidence ,Collecting Evidence in Private-Sector Incident Scenes, Processing Law Enforcement Crime Scenes ,Understanding Concepts and Terms Used in Warrants ,Preparing for a Search, Identifying the Nature of the Case, Identifying the Type of Computing System, Determining Whether You Can Seize a Computer, Obtaining a Detailed Description of the Location, Determining Who Is in Charge, Using Additional Technical Expertise ,Determining the Tools You Need ,Preparing the Investigation Team, Securing a Computer Incident or Crime Scene ,Seizing Digital Evidence at the Scene ,Preparing to Acquire Digital Evidence, Processing an Incident or Crime Scene ,Processing Data Centers with RAID Systems ,Using a Technical Advisor, Documenting Evidence in the Lab, Processing and Handling Digital Evidence ,Storing Digital Evidence, Evidence Retention and Media Storage Needs, Documenting Evidence ,Obtaining a Digital Hash,

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Reviewing a Case ,Sample Civil Investigation ,Sample Criminal Investigation ,Reviewing Background Information for a Case ,Identifying the Case Requirements, Planning the Investigation ,Conducting the Investigation: Acquiring Evidence with AccessData FTK

Module-V: Current Computer Forensics Tools,

Evaluating Computer Forensics Tool Needs ,Types of Computer Forensics Tools ,Tasks Performed by Computer Forensics Tools, Tool Comparisons ,Other Considerations for Tools ,Computer Forensics Software Tools, Command-Line Forensics Tools, UNIX/Linux Forensics Tools ,Other GUI Forensics Tools, Computer Forensics Hardware Tools, Forensic Workstations,

Using a Write-Blocker, Recommendations for a Forensic Workstation, Validating and Testing Forensics Software ,Using National Institute of Standards and Technology (NIST) Tools ,Using Validation Protocols

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Recommended Books:

- Nelson Phillips and Enfinger Steuart, “Computer Forensics and Investigations”, Cengage Learning, New Delhi, 2009.
- Kevin Mandia, Chris Prosise, Matt Pepe, “Incident Response and Computer Forensics “, Tata McGraw -Hill, New Delhi, 2006.
- Robert M Slade,” Software Forensics”, Tata McGraw - Hill, New Delhi, 2005.
- Bernadette H Schell, Clemens Martin, “Cybercrime”, ABC – CLIO Inc, California, 2004.
- ”Understanding Forensics in IT “, NIIT Ltd, 2005.



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INTRUSION DETECTION AND PREVENTION SYSTEM

Course Code: NCE6805

Credit Units : 03

Course Contents:

Module-I: Network Attacks: Attack Taxonomies, Probes: IPSweep and PortSweep, NMap, MScan, SAINT, Satan Privilege Escalation Attacks: Buffer Overflow Attacks, Misconfiguration Attacks, Race-condition Attacks, Man-in-the-Middle Attacks. Social Engineering Attacks. Denial of Service (DoS) and Distributed Denial of Service (DDoS) Attacks: Detection Approaches for DoS and DDoS Attacks, Prevention and Response for DoS and DDoS Attacks, Examples of DoS and DDoS Attacks. Worms Attacks: Modeling and Analysis of Worm Behaviors, Detection and Monitoring of Worm Attacks, Worms Containment, Examples of Well Known Worm Attacks. Routing Attacks: OSPF Attacks, BGP Attacks.

Module-II: Detection Approaches: Misuse Detection: Pattern Matching, Rule-based Techniques, State-based Techniques, Techniques based on Data Mining Anomaly Detection: Advanced Statistical Models, Rule based Techniques, Biological Models, Learning Models Specification-based Detection, Hybrid Detection

Module-III: Theoretical Foundation of Detection: Taxonomy of Anomaly Detection Systems, Fuzzy Logic, Bayes Theory, Artificial Neural Networks, Support Vector Machine (SVM), Evolutionary Computation, Association Rules, Clustering, Signal Processing Techniques Based Models, Comparative Study of Anomaly Detection Techniques.

Module-IV: Architecture and Implementation: Centralized, Distributed, Cooperative Intrusion Detection, Alert Management and Correlation: Data Fusion, Alert Correlation, Cooperative Intrusion Detection

Module-V: Evaluation Criteria & Intrusion Response:

Accuracy, Performance, Completeness, Timely Response, Adaptation and Cost-Sensitivity, Intrusion Tolerance and Attack Resistance, Test, Evaluation and Data Sets.

Response Type, Response Approach, Survivability and Intrusion Tolerance, case study of any commercial IDS.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Recommended Books:

- Ali A. Ghorbani, Wei Lu, "Network Intrusion Detection and Prevention: Concepts and Techniques", Springer, 2010.
- Carl Enrolf, Eugene Schultz, Jim Mellander, "Intrusion detection and Prevention", McGraw Hill, 2004
- Paul E. Proctor, "The Practical Intrusion Detection Handbook", Prentice Hall, 2001.
- Ankit Fadia and Mnu Zacharia, "Intrusion Alert", Vikas Publishing house Pvt., Ltd, 2007.
- Earl Carter, Jonathan Hogue, "Intrusion Prevention Fundamentals", Pearson Education, 2006.

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CRYPTOGRAPHY FOUNDATION LAB

Course Code: NCE6806

Credit Units : 01

Course Contents:

- Program to implement division theorem
- checking number is prime or composite using simple logic
- Implement Miller Rabin Primality Algorithm
- Implement Euclid and Extended Algorithm.
- Implement Chinese Remainder Theorem
- Implement Baby Step Giant Step Algorithm.
- Implement at least 2 algorithms for random number generation. One is Blum Blum Shub.
- Implement Modular Exponentiation Algorithm
- Implement algorithm for modular linear equation solver.
- Implement Fermat's and Euler's theorem.
- Implement Fermat's Factorization method.
- Few programs based on Probability Theory and theorems

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.



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WEB SECURITY LAB

Course Code: NCE6807

Credit Units : 01

Exercises related to SQL injection attacks, XSS attacks, writing java script files for launching and preventing XSS attacks, Stored and Reflected XSS Attacks, URL interpretation attack, input validation attack, buffer overflow attacks, impersonation attacks, password-based attacks, denial of service attacks, session hijacking

Use Apache Web Server or Xamp Server and create a temporary site for performing attacks.


Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.



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NETWORK & WIRELESS SECURITY LAB

Course Code: NCE6808

Credit Units : 01

Course Contents:

- Learn to install wine / virtual box/vmware or any other equivalent software on the host os.
- Perform an experiment to grab a banner with telnet and perform the task using netcat utility.
- Banner grabbing is a technique to determine which application or service is running on the specified port by attempting to make a connection to this host.
- Perform an experiment for port scanning with nmap, superscan or any other software.
- Using nmap 1)find open ports on a system 2) find the machines which are active 3)find the version of remote os on other systems 4) find the version of s/w installed on other system
- Perform an experiment on active and passive fingerprinting using xprobe2 and nmap.
- Perform an experiment to demonstrate how to sniff for router traffic by using the tool wireshark
- Perform an experiment how to use dumpsec.
- Perform an wireless audit of an access point / router and decrypt wep and wpa.
- Perform an experiment to sniff traffic using arp poisoning.
- Generating password hashes with openssl

Examination Scheme:

IA					EE	
A	PR	LR	V		PR	V
5	10	10	5		35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.



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RESEARCH METHODOLOGY AND TECHNICAL REPORT WRITING

Course Code: NCE6809

Credit Units : 02

Course Objectives:

The course will enhance scientific , technical and research writing skills and impart knowledge about various stages of research process, statistical analysis, statistical tests and their applications in statistical decision making.

Course Contents:

Module I: Introduction to research: Definition, motivation, need, objectives, significance and characteristics of research; types of research; steps in research process; planning a research proposal; literature review, web searching.

Module II: Population and sample, parameter and statistic, sampling and data collection, sampling design: steps, types, sample size, sampling methods, large and small samples, primary and secondary data, data processing and analysis. Sample surveys and questionnaire designing, scaling techniques.

Module III: Dependent and independent variables, univariate, bivariate and multivariate analysis, means-arithmetic, geometric and harmonic; measure of dispersion of data, standard deviation, variance, coefficient of variation and degree of freedom. Hypothesis testing: null hypothesis and alternate hypothesis, errors in hypothesis testing, significance and confidence levels, parametric tests and non-parametric tests, one-tailed and two-tailed tests, analysis of variance. Regression analysis and curve fitting, method of least-squares, explained and unexplained variations, coefficient of correlation, coefficient of determination.

Module IV: Technical/scientific/research report writing: structure and components of scientific reports, formats of dissertations, research report, report writing skills, report preparation, referencing , bibliography and footnotes. Making presentation-use of visual aids and PPTs. Publication of research papers, citations,. Intellectual property rights and copy rights, plagiarism, patents and patent laws, commercialization and ethical issues.

Examination Scheme:

Attendance	Assignment/Library consultation / Thesis writing	Class test	Final Exam	Total
5	15	10	70	100

Text Books:

- Blake, G. and Bly, R.W. 1993, The Elements of Technical Writing. MacMillan, New York
- Booth, V. 1981. Writing a Scientific Paper and Speaking at Scientific Meetings. The Biochemical Society, London
- Chawla,D and Sondhi, N. 2016, Research Methodology- Concepts and Cases. Vikas Publishing House Pvt Ltd. New Delhi
- Kothari, C.R.2008. Research Methodology- Methods and Techniques, 2nd.ed. New Age International Publishers, New Delhi.

Reference Books:

- Geode, Millian J.& Paul K. Hatl, Methods in Research, McGraw Hills, New Delhi.
- Montgomery, Douglas C.(2007), 5th Ed. Design and Analysis of Experiments, Wiley India.
- Panneerselvam, R.2009. Research Methodology, PHI Learning Pvt.Ltd., New Delhi-110001
- Ranjit Kumar 2009. Research Methodology- A step –by- step Guide for beginners; 2nd ed. Dorling Kindersley (India) Pvt. Ltd. Patpargang, Delhi- 110092

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MAJOR PROJECT

Course Code: NCE6837

Credit Units : 08

GUIDELINES FOR PROJECT FILE

Research experience is as close to a professional problem-solving activity as anything in the curriculum. It provides exposure to research methodology and an opportunity to work closely with a faculty guide. It usually requires the use of advanced concepts, a variety of experimental techniques, and state-of-the-art instrumentation.

Research is genuine exploration of the unknown that leads to new knowledge which often warrants publication. But whether or not the results of a research project are publishable, the project should be communicated in the form of a research report written by the student.

Sufficient time should be allowed for satisfactory completion of reports, taking into account that initial drafts should be critiqued by the faculty guide and corrected by the student at each stage.

The File is the principal means by which the work carried out will be assessed and therefore great care should be taken in its preparation.

In general, the File should be comprehensive and include

A short account of the activities that were undertaken as part of the project;

A statement about the extent to which the project has achieved its stated goals.

A statement about the outcomes of the evaluation and dissemination processes engaged in as part of the project;

Any activities planned but not yet completed as part of the project, or as a future initiative directly resulting from the project;

Any problems that have arisen that may be useful to document for future reference.

➤ Report Layout

The report should contain the following components:

➤ Title or Cover Page

The title page should contain the following information: Project Title; Student's Name; Course; Year; Supervisor's Name.

➤ Acknowledgements(optional)

Acknowledgment to any advisory or financial assistance received in the course of work may be given.

➤ Abstract

A good "Abstract" should be straight to the point; not too descriptive but fully informative. First paragraph should state what was accomplished with regard to the objectives. The abstract does not have to be an entire summary of the project, but rather a concise summary of the scope and results of the project

➤ Table of Contents

Titles and subtitles are to correspond exactly with those in the text.

➤ Introduction

Here a brief introduction to the problem that is central to the project and an outline of the structure of the rest of the report should be provided. The introduction should aim to catch the imagination of the reader, so excessive details should be avoided.

➤ Materials and Methods

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This section should aim at experimental designs, materials used. Methodology should be mentioned in details including modifications if any.

➤ **Results and Discussion**

Present results, discuss and compare these with those from other workers, etc. In writing these section, emphasis should be given on what has been performed and achieved in the course of the work, rather than discuss in detail what is readily available in text books. Avoid abrupt changes in contents from section to section and maintain a lucid flow throughout the thesis. An opening and closing paragraph in every chapter could be included to aid in smooth flow.

Note that in writing the various sections, all figures and tables should as far as possible be next to the associated text, in the same orientation as the main text, numbered, and given appropriate titles or captions. All major equations should also be numbered and unless it is really necessary never write in “point” form.

➤ **Conclusion**

A conclusion should be the final section in which the outcome of the work is mentioned briefly.

➤ **Future prospects**

➤ **Appendices**

The Appendix contains material which is of interest to the reader but not an integral part of the thesis and any problem that have arisen that may be useful to document for future reference.

➤ **References / Bibliography**

This should include papers and books referred to in the body of the report. These should be ordered alphabetically on the author's surname. The titles of journals preferably should not be abbreviated; if they are, abbreviations must comply with an internationally recognised system.

Examples

For research article

Voravuthikunchai SP, Lortheeranuwat A, Ninrprom T, Popaya W, Pongpaichit S, Supawita T. (2002) Antibacterial activity of Thai medicinal plants against enterohaemorrhagic *Escherichia coli* O157: H7. *Clin Microbiol Infect*, **8** (suppl 1): 116–117.

For book

Kowalski, M. (1976) Transduction of effectiveness in *Rhizobium meliloti*. SYMBIOTIC NITROGEN FIXATION PLANTS (editor P.S. Nutman IBP), **7**: 63–67

ASSESSMENT OF THE PROJECT FILE

Essentially, marking will be based on the following criteria: the quality of the report, the technical merit of the project and the project execution.

Technical merit attempts to assess the quality and depth of the intellectual efforts put into the project.

Project execution is concerned with assessing how much work has been put in.

The File should fulfill the following *assessment objectives*:

Range of Research Methods used to obtain information

Execution of Research

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Data Analysis

Analyse Quantitative/ Qualitative information
Control Quality

Draw Conclusions**Examination Scheme:**

Dissertation	50
Viva Voce	50
Total	100



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BIOMETRIC SYSTEMS AND BIOMETRIC IMAGE PROCESSING

Course Code: NCE6901

Credit Units : 03

Course Contents:

Module-I:

Introduction: Biometric fundamentals – Biometric technologies – Biometrics Vs traditional techniques – Characteristics of a good biometric system – Benefits of biometrics – Key biometric processes: verification, identification and biometric matching – Performance measures in biometric systems, FAR, FRR, FTE rate, EER and ATV rate, Applications of Biometric Systems, Security and Privacy Issues.

Physiological Biometrics : Leading technologies : Finger-scan – Facial-scan – Iris-scan – Voice-scan – components, working principles, competing technologies, strengths and weaknesses – Other physiological biometrics : Hand-scan, Retina-scan – components, working principles, competing technologies, strengths and weaknesses – Automated fingerprint identification systems.

Module-II:

Behavioral Biometrics: Leading technologies: Signature-scan – Keystroke scan – components, working principles, strengths and weaknesses.

Privacy and Standards in Biometrics: Assessing the Privacy Risks of Biometrics – Designing Privacy-Sympathetic Biometric Systems – Need for standards – different biometric standards.

Module-III:

Fundamentals of Image Processing: Digital Image representation - Fundamental steps in Image Processing Image Enhancement: The Spatial Domain Methods, The Frequency Domain Methods – Image Segmentation: Pixel Classification by Thresholding, Histogram Techniques, Smoothing and Thresholding - Gradient Based Segmentation: Gradient Image, Boundary Tracking, Laplacian Edge Detection.

Module-IV:

Fingerprint Biometrics: Fingerprint Patterns, Fingerprint Features, Fingerprint Image, width between two ridges - Fingerprint Image Processing - Minutiae Determination - Fingerprint Matching: Fingerprint Classification, Matching policies.

Module-V:

Iris Biometrics: Iris System Architecture, Definitions and Notations - Iris Recognition: Iris location, Doubly Dimensionless Projection, Iris code, Comparison - Coordinate System: Head Tilting Problem, Basic Eye Model, Searching Algorithm, Texture Energy Feature.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Recommended Books:

- Anil K Jain, Patrick Flynn, Arun A Ross, “Handbook of Biometrics”, Springer, 2008
- Anil K Jain, Arun A Ross, Karthik Nandakumar, “Introduction to Biometrics”, Springer, 2011
- Rafael C. Gonzalez, Richard E. Woods, Steven L. Eddins, “Digital Image Processing”, Pearson Education, New Delhi, 2009

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SOFTWARE VULNERABILITY ANALYSIS

Course Code: NCE6902

Credit Units : 04

Course Contents:

Module-I: Introduction to Software Security

It's All about the Software, Dealing with Widespread Security Failures, Bugtraq, CERT Advisories, RISKS Digest, Technical Trends Affecting Software Security, The ilities, What is Security?, Isn't That Just Reliability?, Penetrate and Patch Is Bad, On Art and Engineering, Security Goals, Prevention, Traceability and Auditing, Monitoring, Privacy and Confidentiality, Multilevel Security, Anonymity, Authentication, Integrity, Know Your Enemy: Common Software Security Pitfalls, Software Project Goals, Conclusion. **Managing Software Security Risk:** An Overview of Software Risk Management for Security, The Role of Security Personnel, Software Security Personnel in the Life Cycle, Deriving Requirements, Risk Assessment, Design for Security, Implementation, Security Testing, A dose of Reality, Getting People to Think about Security, Software Risk management in Practice, When Development Goes Astray, When Security Analysis Goes Astray, The Common Criteria.

Module-II: On Open Source and Closed Source

Security by Obscurity, Reverse Engineering, Code Obfuscation, Security for Shrink-Wrapped Software, Security by Obscurity Is No Panacea, The Flip Side: Open- Source Software, Is the "Many-Eyeballs Phenomenon" Real?. Why Vulnerability Detection Is Hard, Other Worries, On Publishing Cryptographic Algorithms, Two More Open-Source Fallacies, The Microsoft Fallacy, The Java Fallacy, An Example: GNU Mailman Security, More Evidence: Trojan Horses, To Open Source or Not to Open Source, Another Security Lesson from Buffer Overflows, Beating the Drum.

Guiding Principles for Software Security: Principle 1: Secure the Weakest Link, Principle 2: Practice Defense in Depth, Principle 3: Fail Securely, Principle 4: Follow the Principle of Least Privilege, Principle 5: Compartmentalize, Principle 6: Keep It Simple, Principle 7: Promote Privacy, Principle 8: Remember That Hiding Secrets is Hard, Principle 9: Be Reluctant to Trust, Principle 10: Use Your Community Resources Conclusion.

Module-III: Buffer Overflows & Access Control

What Is a Buffer Overflow?, Why Are Buffer Overflows a Security Problem?, Defending against Buffer Overflow, Major Gotchas, Internal Buffer Overflows, More Input Overflows, Other Risks, Tools That Can Help, Smashing Heaps and Stacks, Heap Overflows, Stack Overflows, Decoding the Stack, To Infinity ... and Beyond!, Attack Code, A UNIX Exploit, What About Windows?The UNIX Access Control Model, How UNIX Permissions Work, Modifying File Attributes, Modifying Ownership, The unask, The Programmatic Interface, Setuid Programming, Access Control in Windows NT, Compartmentalization, Fine-Grained Privileges.

Module-IV: NETWORKING

OSI Model, Sockets, Socket Functions, Socket Addresses, Network Byte Order, Internet Address Conversion, A Simple Server Example, A Web Client Example, A Tinyweb Server, Peeling Back the Lower Layers, Data-Link Layer, Network Layer, Transport Layer , Network Sniffing, Raw Socket Sniffer, libpcap Sniffer, Decoding the Layers, Active Sniffing, Denial of Service, SYN Flooding, The Ping of Death, Teardrop, Ping Flooding, Amplification Attacks, Distributed DoS Flooding, TCP/IP Hijacking, RST Hijacking, Continued Hijacking, Port Scanning, Stealth SYN Scan, FIN, X-mas, and Null Scans, Spoofing Decoys, Idle Scanning, Proactive Defense (shroud), Reach Out and Hack Someone, Analysis with GDB, Almost Only Counts with Hand Grenades, Port-Binding Shellcode.

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Module-V: SHELLCODE

Assembly vs. C, Linux System Calls in Assembly, The Path to Shellcode, Assembly Instructions Using the Stack, Investigating with GDB, Removing Null Bytes, Shell-Spawning Shellcode, A Matter of Privilege, And Smaller Still, Port-Binding Shellcode, Duplicating Standard File Descriptors, Branching Control Structures, Connect-Back Shellcode.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Recommended Books:

- “Building Secure Software: How to Avoid Security Problems the Right Way” John Viega, Gary R. Tata McGraw Hill
- Michael Howard, David LeBlanc, John Viega: 19 Deadly Sins of Software Security: Programming Flaws and How to Fix Them (Security One-off) (Addison-Wesley Professional Computing Series)
- Richard Sinn “ Software Security , Theory Programming and Practice” Cengage Learning



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APPLIED CRYPTOGRAPHY

Course Code: NCE6903

Credit Units : 03

Course Contents:

Module-I:

Introduction to security attacks, services and mechanism, Classical encryption techniques: substitution ciphers and transposition ciphers, cryptanalysis, steganography, Stream and block ciphers. Modern Block Ciphers: Block ciphers principles, Shannon's theory of confusion and diffusion, fiestal structure, Data encryption standard (DES), Strength of DES, Idea of differential cryptanalysis, block cipher modes of operations, Triple DES

Module-II:

Advanced Encryption Standard (AES) encryption and decryption, Analysis, Principals of public key crypto systems, RSA algorithm, security of RSA. Rabin cryptosystem, Elgamal cryptosystem, Elliptical Curve cryptography,

Module-III:

Message Authentication Codes: Authentication requirements, authentication functions, message authentication code, Random Oracle Model , hash functions, birthday attacks, security of hash functions, Secure hash algorithm (SHA),SHA-512, Whirlpool, Digital Signatures: Digital Signatures, Elgamal Digital Signature Techniques, Digital signature standards (DSS).

Module-IV:

Key Management and distribution: Symmetric key distribution, Diffie-Hellman Key Exchange, Public key distribution, X.509 Certificates, Public key Infrastructure. Entity authentication, Authentication Applications: Kerberos,

Module-V:

IP Security: Architecture, Authentication header, Encapsulating security payloads, combining security associations, key management. Introduction to Secure Socket Layer, Secure electronic transaction (SET).

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Recommended books:

- "Cryptography & Network Security", William Stallings, PHI
- "Cryptography & Network Security", Behrouz A. Forouzan, TMH
- "Cryptography & Network Security", Atuk Kahate, PHI



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BIOMETRIC IMAGE PROCESSING LAB

Course Code: NCE6904

Credit Units : 01

List of Exercises

Basic exercises on image loading, manipulation, edge finding, features extraction, face recognition, segmentation, fingerprint, iris, signature recognition.

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.



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APPLIED CRYPTOGRAPHY LAB

Course Code: NCE6905

Credit Units : 02

Course Contents:

- Program to implement Ceaser Cipher.
- Program to implement Ceaser Cipher for any value of shift parameter.
- Programs to implement Playfair cipher, affine cipher, vengere cipher.
- Program to implement Vernam Cipher.
- Program to implement Hill Cipher.
- Program to implement Rail fence and Columnar transposition cipher.
- Program to implement DES/AES/IDEA algorithm
- Program to implement RSA algorithm
- Program to implement Rabin Cryptosystem and Elgamal Cryptosystem.
- Program to implement Digital Signature using RSA/Elgamal.
- Implementation study of MD5/SHA-1.
- Programs to implement ECB/CBC/OFB modes of operation.

Software: C/C++/Python/Java

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.



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WEB APPLICATION & PENETRATION TESTING

Course Code: NCE6906

Credit Units : 03

Course Contents:

Module-I: Introduction to Web Applications and Security

The Web Application Architecture ,A Brief Word about HTML ,Transport: HTTP ,The Web Client ,The Web Server,The Web Application ,The Database ,Complications and Intermediaries ,The New Model: Web Services ,Potential Weak Spots ,The Methodology of Web Hacking ,Profile the Infrastructure ,Attack Web Servers ,Survey the Application,Attack the Authentication Mechanism ,Attack the Authorization Schemes , Perform a Functional Analysis,Exploit the Data Connectivity,Attack the Management Interfaces,Attack the Client,Launch a Denial-of-Service Attack Profiling: Server Discovery,Intuition ,Internet Footprinting, DNS Interrogation Ping,Discovery Using Port Scanning , Dealing with Virtual Servers, Service Discovery , Server Identification,Dealing with SSL.

Module-II: Hacking Web Servers

Common Vulnerabilities by Platform ,Apache,Microsoft Internet Information Server (IIS), Attacks Against IIS Components, Attacks Against IIS, Escalating Privileges on IIS, Netscape Enterprise Server , Other Web Server Vulnerabilities , Miscellaneous Web Server Hacking Techniques , Automated Vulnerability Scanning Software ,Whisker, Nikto , twwwwscan/arirang , Stealth HTTP Scanner, Typhon , WebInspect , AppScan , FoundScan Web Module , Denial of Service Against Web Servers,

Module-III: Surveying the Application

Documenting Application Structure , Manually Inspecting the Application , Statically and Dynamically Generated Pages, Directory Structure , Helper Files , Java Classes and Applets , HTML Comments and Content ,Forms, Query Strings , Back-End Connectivity , Tools to Automate the Survey, lynx , Wget,Teleport Pro, Black Widow, WebSleuth, Common Countermeasures , A Cautionary Note, Protecting Directories,Protecting Include Files, Miscellaneous Tips. Authentication: Authentication Mechanisms, HTTP Authentication: Basic and Digest, Forms-Based Authentication, Microsoft Passport, Attacking Web Authentication,Password Guessing, Session ID Prediction and Brute Forcing, Subverting Cookies,Bypassing SQL-Backed Login Forms,Bypassing Authentication.

Module-IV: Authorization

The Attacks, Role Matrix, The Methodology , Query String, POST Data , Hidden Tags, URI,HTTP Headers,Cookies, Final Notes,Case Study: Using Curl to Map Permissions, Apache Authorization, IIS AuthorizationAttacking Session State Management:Client-Side Techniques, Hidden Fields, The URL,HTTP Headers and Cookies, Server-Side Techniques, Server-Generated Session IDs, Session Database, SessionID Analysis, Content Analysis, Time Windows.

Module-V: Input Validation Attacks

Expecting the Unexpected, Input Validation EndGame, Where to Find Potential Targets,Bypassing Client-Side Validation Routines , Common Input Validation Attacks , Buffer Overflow, Canonicalization (dot-dot-slash),Script Attacks , Boundary Checking, Manipulating the Application , SQL Injection and Datastore Attacks,Command Execution, Common Side Effects,Common Countermeasures. Attacking Web Datastores: A SQL Primer,SQL Injection, Common Countermeasures. Web Client Hacking :The Problem of Client-Side Security,Attack Methodologies ,Active Content Attacks ,Java and JavaScript ,ActiveX,Cross-Site Scripting,Cookie Hijacking ,Case Study #: From the URL to the Command Line and Back,Case Study #: The Cross-Site Scripting Calendar

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Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Recommended Books:

- “Hacking Exposed Web Applications”, 3rd edition, JOEL SCAMBRAY, VINCENT LIU, CALEB SIMA.
- “The Web Application Hacker's Handbook Discovering and Exploiting Security Flaws” Dafydd Stuttard, Marcus Pinto
- Rich Bowen, Ken Coar, “Apache Cookbook”, O'Reilly



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MALWARE ANALYSIS IN NETWORK SECURITY

Course Code: NCE6907

Credit Units : 03

Course Contents:

Module-I: BASIC STATIC TECHNIQUES

Antivirus Scanning: A Useful First Step, Hashing: A Fingerprint for Malware, Finding Strings, Packed and Obfuscated Malware, Packing Files, Detecting Packers with PEiD, Portable Executable File Format, Linked Libraries and Functions, Static, Runtime, and Dynamic Linking, Exploring Dynamically Linked Functions with Dependency Walker, Imported Functions, Exported Functions, Static Analysis in Practice, PotentialKeylogger.exe: An Unpacked Executable, PackedProgram.exe: A Dead End, The PE File Headers and Sections, Examining PE Files with PEView, Viewing the Resource Section with Resource Hacker, Using Other PE File Tools, PE Header Summary

Module-II: VIRTUAL MACHINES & DYNAMIC ANALYSIS

The Structure of a Virtual Machine, Creating Your Malware Analysis Machine, Configuring VMware, Using Your Malware Analysis Machine, Connecting Malware to the Internet, Connecting and Disconnecting Peripheral Devices, Taking Snapshots, Transferring Files from a Virtual Machine, The Risks of Using VMware for Malware Analysis, Record/Replay: Running Your Computer in Reverse, Sandboxes: The Quick-and-Dirty Approach Using a Malware Sandbox, Sandbox Drawbacks, Running Malware, Monitoring with Process Monitor, The Procmon Display, Filtering in Procmon, Viewing Processes with Process Explorer, The Process Explorer Display, Using the Verify Option, Comparing Strings, Using Dependency Walker, Analyzing Malicious Documents, Comparing Registry Snapshots with Regshot, Faking a Network, Using ApateDNS, Monitoring with Netcat, Packet Sniffing with Wireshark, Using INetSim, Basic Dynamic Tools in Practice,

Module-III: RECOGNIZING C CODE CONSTRUCTS IN ASSEMBLY

Overview of working with IDA Pro, Global vs Local Variables, Disassembling Arithmetic Operations, Recognizing if Statements, Analyzing Functions Graphically with IDA Pro, Recognizing Nested if Statements, Recognizing Loops, Finding for Loops, Finding while Loops, Understanding Function Call Conventions, Cdecl, Stdcall, fastcall, Push vs Move, Analyzing switch Statements, If Style, Jump Table, Disassembling Arrays, Identifying Structs, Analyzing Linked List Traversal,

Module-IV: ANALYZING MALICIOUS WINDOWS PROGRAMS

The Windows API, Types and Hungarian Notation, Handles, File System Functions, Special Files, The Windows Registry, Registry Root Keys, Regedit, Programs that Run Automatically, Common Registry Functions, Analyzing Registry Code in Practice, Registry Scripting with reg Files, Networking APIs, Berkeley Compatible Sockets, The Server and Client Sides of Networking, The WinINet API, Following Running Malware, DLLs, Processes, Threads, Interprocess Coordination with Mutexes, Services, The Component Object Model, Exceptions: When Things Go Wrong, Kernel vs User Mode, The Native API,

Module-V: MALWARE BEHAVIOR & COVERT MALWARE LAUNCHING

Downloaders and Launchers, Backdoors, Reverse Shell, RATs, Botnets, RATs and Botnets Compared, Credential Stealers, GINA Interception, Hash Dumping, Keystroke Logging, Persistence Mechanisms, The Windows Registry, Trojanized System Binaries, DLL Load-Order Hijacking, Privilege Escalation, Using SeDebugPrivilege, Covering Its Tracks—User-Mode Rootkits, IAT Hooking, Inline Hooking, Launchers, Process Injection, DLL Injection, Direct Injection, Process Replacement, Hook Injection,

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Local and Remote Hooks, Keyloggers Using Hooks, Using SetWindowsHookEx, Thread Targeting, Detours, APC Injection, APC Injection from User Space, APC Injection from Kernel Space .

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Recommended Books:

- “Practical Malware Analysis” by Michael Sikorski and Andrew Honig
- “The Rootkit Arsenal: Escape and Evasion in the Dark Corners of the System” Second Edition by Reverend Bill Blunden
- “Rootkits: Subverting the Windows Kernel” by Jamie Butler and Greg Hoglund
- “Practical Reverse Engineering” by Dang, Gazet, Bachaalany



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WEB SECURITY

Course Code: NCE6908

Credit Units : 03

Course Contents:

Module-I: The E-Commerce Playground

Web Languages: The Babylon of the 21st Century, Languages of the Web, HTML, Dynamic HTML (DHTML).XML,XHTML,Perl,PHP,ColdFusion,Active Server Pages,CGI,Java. Web and Database Servers: Web Servers,Apache,Microsoft's Internet Information Server (IIS),Database Servers,Microsoft SQL Server, Oracle.

Module-II: Shopping Carts and Payment Gateways

Evolution of the Storefront,Electronic Shopping,Shopping Cart Systems,Scope and Lifetime of an Electronic Shopping Cart,Collecting, Analyzing, and Comparing Selected Components,Keeping Track of the Total Cost,Change of Mind,Processing the Purchase,Implementation of a Shopping Cart Application,Product Catalog,Session Management,Database Interfacing,Integration with the Payment Gateway,Examples of Poorly Implemented Shopping Carts,Carelllo Shopping Cart,DCShop Shopping Cart,Hassan Consulting's Shopping Cart,Cart32 and Several Other Shopping Carts,Processing Payments,Finalizing the Order,Method of Payment,Verification and Fraud Protection,Order Fulfillment and Receipt Generation,Overview of the Payment Processing System,Innovative Ways to Combat Credit Card Fraud,Order Confirmation Page,Payment Gateway Interface,Transaction Database Interface,Interfacing with a Payment Gateway—An Example,Payment System Implementation Issues,Integration,Temporary Information,SSL,Storing User Profiles,Vulnerabilities Caused by Poor Integration of Shopping Cart and Payment Gateway,PayPal—Enabling Individuals to Accept Electronic Payments,

Module-III: HTTP and HTTPS: The Hacking Protocols,Protocols of the Web,HTTP,HTTPS (HTTP over SSL).

URL: The Web Hacker's Sword: URL Structure,Web Hacker Psychology,URLs and Parameter Passing. URL Encoding, Meta-Characters,Specifying Special Characters on the URL String.,Meta-Characters and Input Validation,Unicode Encoding,The Acme Art, Inc. Hack,Abusing URL Encoding,Unicode Encoding and Code Red's Shell Code,Unicode Vulnerability,The Double-Decode or Superfluous Decode Vulnerability,HTML Forms,Anatomy of an HTML Form,Input Elements,Parameter Passing Via GET and POST,Case Study: Reconnaissance Leaks Corporate Assets.

Module-IV: Web: Under (the) Cover.

The Components of a Web Application,The Front-End Web Server,The Web Application Environment. The Database Server,Wiring the Components,The Native Application Processing Environment.,Web Server APIs and Plug-Ins,URL Mapping and Internal Proxying,Proxying with a Back-End Application Server.Examples. Connecting with the Database,The Craftiest Hack of Them All,Using Native Database APIs.Examples.

Using ODBC,Using JDBC,Specialized Web Application Servers,Identifying Web Application Components from URLs,The Basics of Technology Identification,Examples,More Examples,Advanced Techniques for Technology Identification,Examples,Identifying Database Servers,Countermeasures, Rule 1: Minimize Information Leaked from the HTTP Header,Rule 2: Prevent Error Information from Being Sent to the Browser.


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Module-V: Reading Between the Lines.

Information Leakage Through HTML, What the Browsers Don't Show You, Netscape Navigator—View | Page Source, Internet Explorer—View | Source, Clues to Look For, HTML Comments, Revision History, Developer or Author Details, Cross-References to Other Areas of the Web Application, Reminders and Placeholders, Comments Inserted by Web Application Servers, Old “Commented-Out” Code, Internal and External Hyperlinks, E-mail Addresses and Usernames, UBE, UCE, Junk Mail, and Spam, Keywords and Meta Tags, Hidden Fields, Client-Side Scripts, Automated Source Sifting Techniques, Using wget, Using grep, Sam Spade, Black Widow, and Teleport Pro.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Recommended Books:

- McClure, Stuart, Saumil Shah, and Shreeraj Shah. Web Hacking: attacks and defense. AddisonWesley. 2003.
- Garms, Jess and Daniel Somerfield. Professional Java Security. Wrox. 2001.



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DIGITAL WATERMARKING & STAGENOGRAPHY

Course Code: NCE6909

Credit Units : 03

Course Contents:

Module-I: Introduction Applications and Properties

Information Hiding, Steganography, and Watermarking , History of Watermarking , History of Steganography , Importance of Digital Watermarking , Importance of Steganography , Applications of Watermarking , Applications of Steganography Steganography for Dissidents, Steganography for Criminals , Properties of Watermarking Systems , Evaluating Watermarking Systems , Properties of Steganographic and Steganalysis Systems , Evaluating and Testing Steganographic Systems

Module-II: Models of Watermarking

Notation , Communications , Communication-Based Models of Watermarking , Geometric Models of Watermarking , Modeling Watermark Detection by Correlation
Watermarking with side information: Informed Embedding, Watermarking Using Side Information, Dirty-Paper Codes

Module-III: Practical Dirty-Paper Codes

Practical Considerations for Dirty-Paper Codes , Broad Approaches to Dirty-Paper Code Design , Implementing DM with a Simple Lattice Code , Typical Tricks in Implementing Lattice Codes
Coding with Better Lattices , Making Lattice Codes Survive Valumetric Scaling Dirty-Paper Trellis Codes

Watermark Security : Security Requirements , Watermark Security and Cryptography Some Significant Known Attacks

Module-IV: Steganography

Steganographic Communication , The Channel , The Building Blocks , Notation and Terminology , Information-Theoretic Foundations of Steganography , Cachin's Definition of Steganographic Security , Practical Steganographic Methods , Statistics Preserving Steganography , Model-Based Steganography
Masking Embedding as Natural Processing , Minimizing the Embedding Impact , Matrix Embedding, Nonshared Selection Rule,

Module-V: Steganalysis

Steganalysis Scenarios , Detection , Forensic Steganalysis , The Influence of the Cover Work on Steganalysis , Some Significant Steganalysis Algorithms , LSB Embedding and the Histogram Attack , Sample Pairs Analysis , Blind Steganalysis of JPEG Images Using Calibration, Blind Steganalysis in the Spatial Domain.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance



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Recommended Books:

- “Digital Watermarking and Steganography” Ingemar J. Cox, Matthew L. Miller, Jeffrey A. Bloom, Jessica Fridrich, Ton Kalker, , Morgan Kaufmann Publishers, New York, 2008.
- “Digital Watermarking”, Ingemar J. Cox, Matthew L. Miller, Jeffrey A. Bloom, Morgan Kaufmann Publishers, New York, 2003.
- “Techniques and Applications of Digital Watermarking and Content Protection”, Michael Arnold, Martin Schmucker, Stephen D. Wolthusen, Artech House, London, 2003.



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SUMMER INTERNSHIP EVALUATION-III

Course Code: NCE6935

Credit Units : 06

Guidelines:

There are certain phases of every Intern's professional development that cannot be effectively taught in the academic environment. These facets can only be learned through direct, on-the-job experience working with successful professionals and experts in the field. The internship program can best be described as an attempt to institutionalize efforts to bridge the gap between the professional world and the academic institutions. Entire effort in internship is in terms of extending the program of education and evaluation beyond the classroom of a university or institution. The educational process in the internship course seeks out and focuses attention on many latent attributes, which do not surface in the normal classroom situations. These attributes are intellectual ability, professional judgment and decision-making ability, inter-disciplinary approach, skills for data handling, ability in written and oral presentation, sense of responsibility etc.

In order to achieve these objectives, each student will maintain a file (**Internship File**). The Internship File aims to encourage students to keep a personal record of their learning and achievement throughout the Programme. It can be used as the basis for lifelong learning and for job applications. Items can be drawn from activities completed in the course modules and from the workplace to demonstrate learning and personal development.

The File will assess the student's analytical skills and ability to present supportive evidence, whilst demonstrating understanding of their organization, its needs and their own personal contribution to the organization.

The **layout guidelines** for the Project & Seminar Report:

1. File should be in the following specification:

A4 size paper

Font: Arial (10 points) or Times New Roman (12 points)

Line spacing: 1.5

Top & bottom margins: 1 inch/ 2.5 cm

Left & right margins: 1.25 inches/ 3 cm

2. Report Layout: The report should contain the following components:

Front Page

Table of Content

Acknowledgement

Student Certificate

Company Profile (optional)

Introduction

Main Body

References / Bibliography

The File will include **five sections** in the order described below. The content and comprehensiveness of the main body and appendices of the report should include the following:


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1. **The Title Page**--Title - An Internship Experience Report For (Your Name), name of internship organization, name of the Supervisor/Guide and his/her designation, date started and completed, and number of credits for which the report is submitted.
2. **Table of Content**--an outline of the contents by topics and subtopics with the page number and location of each section.
3. **Introduction**--short, but should include how and why you obtained the internship experience position and the relationship it has to your professional and career goals.
4. **Main Body**--should include but not be limited to daily tasks performed. Major projects contributed to, dates, hours on task, observations and feelings, meetings attended and their purposes, listing of tools and materials and their suppliers, and photographs if possible of projects, buildings and co-workers.
5. **References / Bibliography** --This should include papers and books referred to in the body of the report. These should be ordered alphabetically on the author's surname. The titles of journals preferably should not be abbreviated; if they are, abbreviations must comply with an internationally recognised system

ASSESSMENT OF THE INTERNSHIP FILE

The student will be provided with the Student Assessment Record (SAR) to be placed in front of the Internship File. Each item in the SAR is ticked off when it is completed successfully. The faculty will also assess each item as it is completed. The SAR will be signed by the student and by the faculty to indicate that the File is the student's own work. It will also ensure regularity and meeting the deadlines.

STUDENT ASSESSMENT RECORD (SAR)

5. Range of Research Methods used to obtain information

6. Execution of Research

7. Data Analysis

- Analyse Quantitative/ Qualitative information
- Control Quality

8. Draw Conclusions

Examination Scheme:

Components	V	S	R	FP
Weightage (%)	20	20	20	40

V – Viva, S – Synopsis, FP – Final Presentation, R - Report



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PROJECT-DISSERTATION-II

Course Code: NCE6037

Credit Units: 15

GUIDELINES FOR DISSERTATION

Research experience is as close to a professional problem-solving activity as anything in the curriculum. It provides exposure to research methodology and an opportunity to work closely with a faculty guide. It usually requires the use of advanced concepts, a variety of experimental techniques, and state-of-the-art instrumentation.

Research is genuine exploration of the unknown that leads to new knowledge which often warrants publication. But whether or not the results of a research project are publishable, the project should be communicated in the form of a research report written by the student.

Sufficient time should be allowed for satisfactory completion of reports, taking into account that initial drafts should be critiqued by the faculty guide and corrected by the student at each stage.

The File is the principal means by which the work carried out will be assessed and therefore great care should be taken in its preparation.

In general, the File should be comprehensive and include

A short account of the activities that were undertaken as part of the project;

A statement about the extent to which the project has achieved its stated goals.

A statement about the outcomes of the evaluation and dissemination processes engaged in as part of the project;

Any activities planned but not yet completed as part of the DISSERTATION, or as a future initiative directly resulting from the project;

Any problems that have arisen that may be useful to document for future reference.

➤ Report Layout

The report should contain the following components:

➤ **Title or Cover Page**

The title page should contain the following information: Project Title; Student's Name; Course; Year; Supervisor's Name.

➤ **Acknowledgements** (optional)

Acknowledgment to any advisory or financial assistance received in the course of work may be given.

➤ **Abstract**

A good "Abstract" should be straight to the point; not too descriptive but fully informative. First paragraph should state what was accomplished with regard to the objectives. The abstract does not have to be an entire summary of the project, but rather a concise summary of the scope and results of the project

➤ **Table of Contents**

Titles and subtitles are to correspond exactly with those in the text.

➤ **Introduction**

Here a brief introduction to the problem that is central to the project and an outline of the structure of the rest of the report should be provided. The introduction should aim to catch the imagination of the reader, so excessive details should be avoided.

➤ **Materials and Methods**

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This section should aim at experimental designs, materials used. Methodology should be mentioned in details including modifications if any.

➤ **Results and Discussion**

Present results, discuss and compare these with those from other workers, etc. In writing these section, emphasis should be given on what has been performed and achieved in the course of the work, rather than discuss in detail what is readily available in text books. Avoid abrupt changes in contents from section to section and maintain a lucid flow throughout the thesis. An opening and closing paragraph in every chapter could be included to aid in smooth flow.

Note that in writing the various sections, all figures and tables should as far as possible be next to the associated text, in the same orientation as the main text, numbered, and given appropriate titles or captions. All major equations should also be numbered and unless it is really necessary never write in “point” form.

➤ **Conclusion**

A conclusion should be the final section in which the outcome of the work is mentioned briefly.

➤ **Future prospects**

➤ **Appendices**

The Appendix contains material which is of interest to the reader but not an integral part of the thesis and any problem that have arisen that may be useful to document for future reference.

➤ **References / Bibliography**

This should include papers and books referred to in the body of the report. These should be ordered alphabetically on the author's surname. The titles of journals preferably should not be abbreviated; if they are, abbreviations must comply with an internationally recognised system.

Examples

For research article

Voravuthikunchai SP, Lortheeranuwat A, Ninrprom T, Popaya W, Pongpaichit S, Supawita T. (2002) Antibacterial activity of Thai medicinal plants against enterohaemorrhagic *Escherichia coli* O157: H7. *Clin Microbiol Infect*, **8** (suppl 1): 116–117.

For book

Kowalski, M. (1976) Transduction of effectiveness in *Rhizobium meliloti*. SYMBIOTIC NITROGEN FIXATION PLANTS (editor P.S. Nutman IBP), **7**: 63-67

ASSESSMENT OF THE DISSERTATION FILE

Essentially, marking will be based on the following criteria: the quality of the report, the technical merit of the project and the project execution.

Technical merit attempts to assess the quality and depth of the intellectual efforts put into the project.

Project execution is concerned with assessing how much work has been put in.

The File should fulfill the following *assessment objectives*:

Range of Research Methods used to obtain information

Execution of Research

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Data Analysis

Analyse Quantitative/ Qualitative information
Control Quality

Draw Conclusions

Examination Scheme:

Dissertation	50
Viva Voce	50
Total	100

ata, leading to production of a structured report.

Selecting the Dissertation Topic

It is usual to give you some discretion in the choice of topic for the dissertation and the approach to be adopted. You will need to ensure that your dissertation is related to your field of specialization.

Deciding this is often the most difficult part of the dissertation process, and perhaps, you have been thinking of a topic for some time.

It is important to distinguish here between ‘dissertation topic’ and ‘dissertation title’. The topic is the specific area that you wish to investigate. The title may not be decided until the dissertation has been written so as to reflect its content properly.

Few restrictions are placed on the choice of the topic. Normally we would expect it to be:

- relevant to business, defined broadly;
- related to one or more of the subjects or areas of study within the core program and specialisation stream;
- clearly focused so as to facilitate an in-depth approach, subject to the availability of adequate sources of information and to your own knowledge;
- of value and interest to you and your personal and professional development.

Planning the Dissertation

This will entail following:

- Selecting a topic for investigation.
- Establishing the precise focus of your study by deciding on the aims and objectives of the dissertation, or formulating questions to be investigated. Consider very carefully what is worth investigating and its feasibility.
- Drawing up initial dissertation outlines considering the aims and objectives of the dissertation. Workout various stages of dissertation
- Devising a timetable to ensure that all stages of dissertation are completed in time. The timetable should include writing of the dissertation and regular meetings with your dissertation guide.

The Dissertation plan or outline

It is recommended that you should have a dissertation plan to guide you right from the outset. Essentially, the dissertation plan is an outline of what you intend to do, chapter wise and therefore should reflect the aims and objectives of your dissertation.

There are several reasons for having a dissertation plan

- It provides a focus to your thoughts.
- It provides your faculty-guide with an opportunity, at an early stage of your work, to make constructive comments and help guide the direction of your research.
- The writing of a plan is the first formal stage of the writing process, and therefore helps build up your confidence.
- In many ways, the plan encourages you to come to terms with the reading, thinking and writing in a systematic and integrated way, with plenty of time left for changes.
- Finally, the dissertation plan generally provides a revision point in the development of your dissertation report in order to allow appropriate changes in the scope and even direction of your work as it progresses.

Keeping records

This includes the following:

- Making a note of everything you read; including those discarded.
- Ensuring that when recording sources, author's name and initials, date of publication, title, place of publication and publisher are included. (You may consider starting a card index or database from the outset). Making an accurate note of all quotations at the time you read them.
- Make clear what is a direct quotation and what is your paraphrase.

Dissertation format

All students must follow the following rules in submitting their dissertation.

- Front page should provide title, author, Name of degree/diploma and the date of submission.
- Second page should be the table of contents giving page references for each chapter and section.
- The next page should be the table of appendices, graphs and tables giving titles and page references.
- Next to follow should be a synopsis or abstract of the dissertation (approximately 500 words)
- Next is the 'acknowledgements'.
- Chapter I should be a general introduction, giving the background to the dissertation, the objectives of the dissertation, the rationale for the dissertation, the plan, methodological issues and problems. The limitations of the dissertation should also be hinted in this chapter.
- Other chapters will constitute the body of the dissertation. The number of chapters and their sequence will usually vary depending on, among others, on a critical review of the previous relevant work relating to your major findings, a discussion of their implications, and conclusions, possibly with a suggestion of the direction of future research on the area.
- After this concluding chapter, you should give a list of all the references you have used. These should be cross - references with your text. For articles from journals, the following details are required e.g.

Draper P and Pandyal K. 1991, The Investment Trust Discount Revisited, Journal of Business Finance and Accounting, Vol18, No6, Nov, pp 791-832.

For books, the following details are required:

Levi, M. 1996, International Financial Management, Prentice Hall, New York, 3rd Ed, 1996

- Finally, you should give any appendices. These should only include relevant statistical data or material that cannot be fitted into the above categories.

The Layout Guidelines for the Dissertation

- A4 size Paper
 - Font: Arial (10 points) or Times New Roman (12 points)
 - Line spacing: 1.5

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- Top and bottom margins: 1 inch/ 2.5 cm; left and right margins: 1.25 inches/ 3 cm

Guidelines for the assessment of the Dissertation

While evaluating the dissertation, faculty guide will consider the following aspects:

1. Has the student made a clear statement of the objective or objective(s).
2. If there is more than one objective, do these constitute parts of a whole?
3. Has the student developed an appropriate analytical framework for addressing the problem at hand.
4. Is this based on up-to-date developments in the topic area?
5. Has the student collected information / data suitable to the frameworks?
6. Are the techniques employed by the student to analyse the data / information appropriate and relevant?
7. Has the student succeeded in drawing conclusion form the analysis?
8. Do the conclusions relate well to the objectives of the project?
9. Has the student been regular in his work?
10. Layout of the written report.

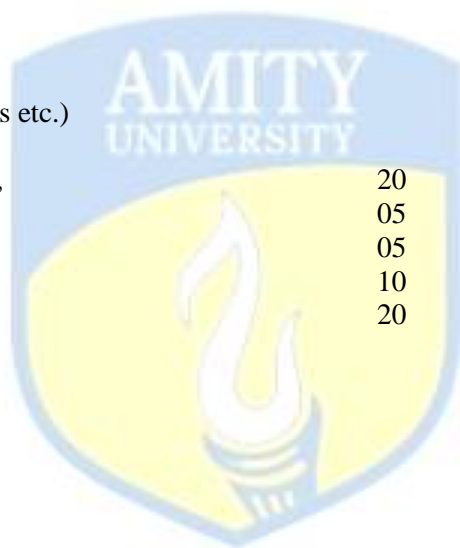
Assessment Scheme:

Continuous Evaluation:

(Based on Abstract, Regularity, Adherence to initial plan, Records etc.)

Final Evaluation:

Based on,
Contents & Layout of the Report,
Conceptual Framework,
Objectives & Methodology and
Implications & Conclusions
Viva & Presentation



40%

60%

20

05

05

10

20

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Bachelor of Science - Information Technology

FLEXILEARN

-Freedom to design your degree



Curriculum & Scheme of Examination

2022

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GURUGRAM

A handwritten signature in blue ink, appearing to read 'Anil'.

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DIGITAL ELECTRONICS

Course Code: IFT2112

Credit Units: 03

Course Objective:

An entry level course in digital electronics covering number systems, binary mathematics, digital codes, logic gates, Boolean algebra, Karnaugh maps, and combinational logic. Emphasis will be on circuit logic analysis and design of digital circuits. The student will explain the operation of digital logic gates and use Boolean algebra and Karnaugh mapping to express logic operations and minimize logic circuits in design. The student will construct, analyze combinational logic circuits & sequential circuits; create a truth table for standard digital logic gates; and add, subtract, multiply and divide using the binary numbering system. Student will also be able to understand about digital to analog conversion and vice versa.

Course Contents:

Module I: Number System

Decimal, Binary, Octal, Hexadecimal Number Systems and Conversion of the bases, Complements: r's complement, (r-1)'s complement, Binary codes: Grey code, BCD Code, Excess-3 code

Introduction to logic systems

Positive and negative logic, Logic functions - NOT, AND, OR, NOR, EX-OR, EX NOR

Truth tables Boolean algebra, De Morgan's theorems Standard forms for Logical Expressions - Sum of Products, Product of Sums Specification of Logical functions in terms of Minterms and Maxterms, Karnaugh Maps, Simplification of Logical functions, Introduction of "don't care" states.

Module II: Combinational Building Blocks

Multiplexers, De-multiplexers, Decoders, Encoders

Arithmetic circuits

Half Adders and Full Adders, Half Subtractor and Full Subtractor

Module III: Flip-flops

The RS latch, the clocked RS flip-flop, JK Flip Flop, the Master-Slave JK flip-flop, Delay and Toggle flip-flops

Flip-flops in counter circuits Asynchronous (ripple) Counters (UP/DOWN), Synchronous Counter design (UP/DOWN), Non Sequential Counting

Module IV: Shift Registers

Shift registers in general, Ring Counters, Johnson Counter

Introduction to Memory

Primary: RAM, Static RAM, Dynamic RAM, ROM, PROM, EAPROM, Secondary: Floppy Disk, Hard Disk, CDROM

Module V: Introduction to Logic Families, DACs and ADCs

Introduction to logic families-TTL, RTL, ECL, CMOS, DTL, IIL

Binary weighted resistor DAC, Resolution, linearity and settling time of DACs, Successive approximation ADC

Examination Scheme:

Components	CT1	A/C/Q	Attd	EE
Weightage (%)	15	10	5	70

Text & References:

Text:

- R.P Jain, Modern Digital Electronics, Tata Mcgraw Hill.

References:

- Malvino & Leach, Digital Electronics, Tata Mcgraw Hill, 2006, Edition 6.
- Floyd, Digital Fundamentals, Pearson, 2015.
- M.M Mano, Digital Logic and Computer Design, Pearson.

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IFT2114	COMPUTER FUNDAMENTALS AND TOOLS	L	T	P	C
Version 2017.1	Date of Approval: 14 June, 2017	3	0	0	3
Pre-requisites/Exposure	Basis of Computers				
Co-requisites	Nil				

Catalog Description

Examines key computational abstraction levels below modern high-level languages; number representation, assembly language, memory management, the operating-system process model, high-level machine architecture including the memory hierarchy, and how high-level languages are implemented. This course is aimed to provide a fundamental understanding of computer science for the students in their early stages of academic career. Various computer nomenclatures regarding to hardware and software are introduced in this course to develop an in-depth realization of several subjects and their significant roles in the field.

Course Objectives

The objective of this course is to

1. Give students an in-depth understanding of why computers are essential components in business, education and society.
2. Introduce the fundamentals of computing devices and reinforce computer vocabulary, particularly with respect to personal use of computer hardware and software, the Internet, networking and mobile computing.
3. Provide hands-on use of Microsoft Office 2013 applications Word, Excel, Access and PowerPoint.

Course Outcomes

On completion of this course, the students will be able to

CO1: Describe the usage of computers and why computers are essential components in business and society.

CO2: Utilize the Internet Web resources and evaluate on-line e-business system.

CO3: Solve common business problems using appropriate Information Technology applications and systems.

CO4: Identify categories of programs, system software and applications. Organize and work with files and folders.

CO5: Describe various types of networks standards and communication software.

Modules	Blooms level*	Number of hours
MODULE 1: Computer and its characteristics, application of computers, digital and analog computer, Generation of computers, Storage devices: primary storage devices (RAM,ROM,PROM,EPROM,EEPROM) , secondary storage devices(Floppy disk, Hard disk, optical disk, magnetic tapes), Input and output devices (keyboard, mouse, light pen, joystick, scanner, monitor, printers etc.)	L1, L2, L3	7
MODULE 2: Software and its types (System Software, Application Software, Firmware Software's) Computer Languages and its types (Machine Language,	L1, L2	8

Assembly Language, High Level Language: advantages and disadvantages of computer languages), Translators: Compiler, Linker, Interpreter, Number system and its types, conversion from one base to another and vice versa.		
MODULE 3: Word Processor and its features, Editing of Text, Find and Replace, Bullets and Numbering, Spell Checker, Grammar Checker, Auto Correct, Auto Complete, Auto Text, Header and footer, tables, mail merge, border and shading, page setup, printing.	L2, L3 and L4	7
MODULE 4: Spread sheet and its features, Entering Information in Worksheet, Editing Cell Entry, Moving and Copying Data, deleting or Inserting Cells, Rows and Columns, Custom Numeric Formats, Using Formulas and functions, Creating charts.	L2, L3, L4	7
MODULE 5: Presentation Software and its uses, steps for creating PowerPoint Presentation, PowerPoint Views, Assigning Slide Transitions, Using Preset Animations, Hiding Slides, Slide Show, Controlling the Slide Show with a Keyboard, Setting Slide Show Timings.	L3, L5 and L6	7

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

1. P.K Sinha & Priti Sinha, Computer Fundamentals, BPB Publications.
2. Peter Norton, Introduction to Computers, Tata Mcgraw Hill.

Reference Books

1. Suresh K. Basandra, Computer Systems Today, Galgotia Publications.
2. Joyce Coax, Joan Preppernau, Steve Lambert and Curtis Frye, 2007 Microsoft Office System step by step, Microsoft Press.
3. R.K. Taxali, PC Software for Windows, Tata Mcgraw Hill.
4. Alexix Leon, Mathewes Leon, Fundamentals of Information Technology, Vikas Publishing.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	1	3	--	1	1	--	--	--	--	--	--	2	3	1	--
CO2	1	2	--	1	--	--	--	--	--	--	3	--	3	1	--
CO3	1	3	--	1	1	--	--	--	--	--	3	2	3	1	--
CO4	1	--	1	3	1	--	--	--	3	--	--	2	3	1	--
CO5	1	1	1	2	--	2	3	--	--	--	--	--	3	1	--

1: strongly related, 2: moderately related and 3: weakly related

IFT2116	COMPUTER PROGRAMMING WITH C LANGUAGE	L	T	P	C
Version : 2017.1	Date of Approval: 14 th June, 2017	3	0	0	3
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

This course is aimed to provide a fundamental understanding of programming concepts. C Language is the language which used to write solution for the basic computational problem in the form of instructions and programs. The basic and advanced features of C Language including Data types, Operators, Conditional & Control Statements, Arrays, Strings, Structure & Union and File Handling will be introduced.

Course Objectives

The objective of this course is to

1. Equip the students with concepts of Programming through C Language
2. Provide an overview of advanced programming concepts like Structure, Union and File Handling

Course Outcomes

On completion of this course, the students will be able to

After the completion of course, the students will be able to,

- CO 1: Define the purpose and structure of C Program for programming; identify and distinguish various datatypes and operators for arithmetic, logical relational operations; solve the problems related to finding errors and output in program.
- CO 2: Describe conditional and control statement; apply if-else, Switch and loops to rewrite basic C program for problem solving.
- CO 3: Compare and contrast various Array types, its declaration and implementation; differentiate between Call by Value and Reference if Functions; apply the concepts to rewrite C Programs
- CO 4: Differentiate between various String Handling Functions; describe the concept of Pointers in C Language
- CO 5: Explain the concept of Structure and Union; apply the concept of File Handling to provide data storage support to the programs.

Modules	Blooms level*	Number of hours
Module I: Introduction to 'C' Language History of C, Introduction of C, Basic structure of C program, Concept of variables, constants and data types in C, Operators and expressions: Introduction, arithmetic, relational, Logical, Assignment, Increment and decrement operator, Conditional, bitwise operators, Expressions, Operator precedence and associatively. Managing Input and output Operation, formatting I/O.	L1, L2 and L3	6
Module II: Decision making and looping Decision making in program, Relational Logical operators example, if statements, if -else, nested if-else statements, Switch, case loop, Do-While, While, for loop and nesting of loop, continue and break , Storage types ,	L2 and L3	8

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predefined processor.		
Module III: Arrays and Functions One Dimensional Arrays, Arrays Manipulation, Sorting, Searching, Function declaration, example & calling a function. Passing Arguments, call by value and call by references, Recursive function, .Recursion.	L2, L3 and L4	7
Module IV: Pointers and String Pointers: Declaration, Pointer assignments, initialization, Pointers and Dynamic Memory Allocation, Array of Pointers, strings, string handler functions.	L2, L3 and L4	8
Module V: Structure Union & file handling Structure definition, Declaration, structure Assignments, Arrays in structure, Structure Arrays, Pointer Structure, Nested Structure, Arrays of Structure, Union declaration, assignments & example programs, Difference between structure & union, file handling and the related functions.	L2 and L3	7

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. E Balagurusamy, "Programming in ANSI C", Seventh Edition, Tata McGraw Hill Education private limited, July 2017.
2. Yashwant Kanetkar, "Let Us C", 16th Edition, BPB Publication, June 2017.

Reference Books

1. Brain W Kernighan and Dennis M Ritchie, "The C Programming Language", 2nd Edition, Pearson Publication, Jan 2015.
2. Byron Gottfried, "Programming with C", Third Edition, Tata McGraw Hill Education private limited, July 2017.
3. E Balagurusamy, "Computer Concepts & Programming in C", Seventh Edition, Tata McGraw Hill Education private limited, July 2011.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO1	1	2	--	2	--	--	--	--	--	--	--	--	1	--	2
CO2	1	1	2	2	--	--	--	--	--	--	--	--	1	--	2
CO3	1	1	2	3	--	--	--	--	--	--	--	--	1	--	2
CO4	1	1	2	2	3	--	--	--	--	--	--	--	1	--	2
CO5	1	1	2	2	3	--	--	--	--	--	--	--	1	--	2

1: strongly related, 2: moderately related and 3: weakly related

IFT2115	COMPUTER FUNDAMENTALS & TOOLS LAB	L	T	P	C
Version 2017.1	Date of Approval: 14 June,2017	0	0	2	1
Pre-requisites/Exposure	Knowledge of Computer				
Co-requisites	NIL				

Catalog Description

This course is aimed to provide a fundamental understanding of computer science for the students in their early stages of academic career. Various computer nomenclatures regarding hardware and software will be introduced for students to develop an in-depth realization of several subjects and their significant roles in the field. After this course, the students will be able to understand and apply the fundamental concepts of computer.

Course Objectives

The objective of this course is

1. Give students an in-depth understanding of why computers are essential components in business, education and society.
2. Introduce the fundamentals of computing devices and reinforce computer vocabulary, particularly with respect to personal use of computer hardware and software, the Internet, networking and mobile computing.
3. Provide hands-on use of Microsoft Office 2016 applications Word, Excel, Access and PowerPoint. Completion of the assignments will result in MS Office applications knowledge and skills.

Course Outcomes

On completion of this course, the students will be able to:

CO 1: Outline the usage of computers and why computers are essential components in business and society. Creating the folder and apply it where necessary.

CO 2: Identify the features of windows operating system. Determine the operations of taskbar of Windows and Set the wall paper, screen saver and date/time.

CO 3: State and demonstrate the use of word document and relate its applications with the day to day use of files.

CO 4: Identify and relate the concept of macros and mail merging. Design and work with files and folders.

CO 5: List the features of the excel document and apply and relate its calculation part with the real world. Design a document for resume writing.

Modules/Topics Covered**	Blooms level*	Number of hours
1. Create a new folder and do the following: <ol style="list-style-type: none"> a. Make a word document in it. b. Make an Excel document in it. c. Make a new folder in it d. Rename the initial folder e. Move the initial folder f. Copy the initial folder. g. Delete the initial folder 	L1, L3 and L5	4
2. Implement the various well known features of Windows operating system such as Notepad, WordPad, Paint, System tools, Entertainment etc. enclosed in Start→Programs→Accessories.	L1, L3	4

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3. Implement various display properties by right clicking on the Windows Desktop. 4. Explore the taskbar of Windows. 5. Set the wall paper and screen saver. 6. Set the date/time.		
7. Create a document and a. Put Bullets and Numbers b. Apply various Font parameters. c. Apply Left, Right, and Centre alignments. d. Apply hyperlinks. e. Insert pictures f. Insert ClipArt g. Show the use of WordArt h. Add Borders and Shading i. Show the use of Find and Replace. j. Apply header/footers	L1, L3, L5	4
8. Create any document and show the use of File→versions. 9. Create any document and show the difference between paste and paste special. 10. Create a document to show the use of Washout/Watermark. 11. Implement the concept of mail merge.	L1, L3, L5	4
12. Implement the concept of macros. 13. Implement the concept of importing a file/document. 14. Implement the concept of merging the documents.	L1, L3, L5	4
15. Create a student table and do the following: a. Insert new row and fill data b. Delete any existing row c. Resize rows and columns d. Apply border and shading e. Apply merging/splitting of cells f. Apply sort g. Apply various arithmetic and logical formulas. 16. Create your resume using General Templates.	L1, L3, L4, L5	4

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5:Synthesis, L6:Evaluation

*** Sample Programs provided are not limited to these only, can include others as desired.*

Text Books

- [1] P. S. Pradeep K. Sinha, Computer Fundamentals, BPB Publications, 2017.
[2] P. Norton, Introduction To Computers, Tata Mcgraw Hill Publishing Co Ltd, 2017.

Reference Book

- [1] S. K. Basandra, Computer Today, Galgotia Publications Pvt. Ltd., 2010.
[2] J. P. J. C. S. L. Curtis Frye, 2007 Microsoft Office System Step by Step (Step by Step (Microsoft)), Microsoft, 2007.
[3] R. Taxali, Pc Software For Windows Made Simple, Tata Mcgraw Hill Publishing Co Ltd, 2000.

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**Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination
Examination Scheme:**

IA					EE
Components	A	PR	LR	V	70
Weightage (%)	5	10	10	5	

Note: IA –Internal Assessment, A – Attendance, PR – Performance, LR – Lab Record, V – Viva, EE- External Exam

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	2	--	--	--	--	--	--	--	--	--	--	--	1	--	--
CO2	3	--	--	--	--	--	--	--	--	--	--	--	1	--	--
CO3	3	--	--	--	--	--	--	--	--	--	--	--	1	--	3
CO4	3	--	--	--	--	--	--	--	--	--	--	--	1	--	--
CO5	2	3	--	--	--	--	--	--	--	--	--	--	1	1	--

1: strongly related, 2: moderately related and 3: weakly related



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IFT2118	COMPUTER PROGRAMMING WITH C LANGUAGE LAB	L	T	P	C
Version 2017.1	Date of Approval: 14 June, 2017	0	0	2	1
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

The primary objective of this course is to understand all the components of C, including the C language, the C Preprocessor, and the C Standard Library. An understanding of some advanced practical issues, including memory management, testing and debugging, complex declarations and expression evaluation, building and using libraries, and evaluating tradeoffs, such as size vs. speed and speed vs. complexity. The ability to write C code and create and manipulate logical programs.

Course Objectives

The objective of this course is to

1. Equip the students with concepts of Programming through C Language
2. Provide an overview of advanced programming concepts like Structure, Union and File Handling

Course Outcomes

After the completion of course, the students will be able to,

CO 1: Demonstrate the use of various data types and operators in C programs; Solve various problems using conditional control statements (if-else, Switch case).

CO 2: Construct C programs related to problems involving the usage of loops, arrays and functions.

CO 3: Apply the concept of Pointers for efficient memory management and construct C programs using string handling functions.

CO 4: Demonstrate the use of Structure, Union and concept of File Handling to provide data storage support to the programs.

Modules	Blooms level*	Number of hours
LABORATORY SESSSION 1 OPERATORS, EXPRESSIONS and DECISION MAKING <ol style="list-style-type: none"> 1. Write a program to calculate simple interest and amount. 2. Write a program to swap two numbers using third variable. 3. Write a program to demonstrate Greatest of 3 nos and to print the given no in ascending order. 4. Write a program to check if the number is even or odd. 5. Write a program to perform arithmetic operations using Switch Case statement. 6. Write a program to calculate area of circle, rectangle, square and triangle using Switch Case statement. 	L3	5
LABORATORY SESSSION 2 LOOPING <ol style="list-style-type: none"> 1. Write a program to find factorial of given no using do while statement. 2. Write a program to print prime numbers up to 'n'. 	L3	6

3. Write a program to sum of n natural no. 4. Write a program to print Fibonacci series. 5. Write a program to reverse a number. 6. Write a program to print the following pattern using for loop 1 2 2 3 3 3 4 4 4 4 7. Write a program to print the following pattern using for loop A A B A B C A B C D		
LABORATORY SESSSION 3 ARRAYS and FUNCTIONS 1. Write a program to read nnum of students and 5 subjects marks. 2. Write a program to swap two numbers using call by value. 3. Write a program to convert all lower case to uppercase characters 4. Write a program to find the factorial of a number using recursion. 5. Write a program to print the add/product of two matrices of any order.	L3	5
LABORATORY SESSSION 4 POINTERS AND STRING 1. Write a program to perform operations on strings using string handling in-built functions (concatenation, reversal, copy etc.) 2. Write a program to swap two numbers using call by reference. 3. Write a program to perform dynamic memory allocation and deallocation. 4. Write a program to print elements of array using pointers.	L3	4
LABORATORY SESSSION 5 STRUCTURE,UNION & FILE HANDLING 1. WAP program to display student information by initializing structures. 2. WAP program to find the total salary of employee and employee details using structure. 3. Write a program to store and display information using Union. 4. Program to write data into file and read data from file.	L3	4

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. E Balagurusamy, "Programming in ANSI C", Seventh Edition, Tata McGraw Hill Education private limited, July 2017.
2. YashwantKanetkar, "Let Us C", 16th Edition, BPB Publication, June 2017.

Reference Books

1. Brain W Kernighan and Dennis M Ricchie, "The C Programming Language", 2nd Edition, Pearson Publication, Jan 2015.

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2. Byron Gottfried, "Programming with C", Third Edition, Tata McGraw Hill Education private limited, July 2017.
3. E Balagurusamy, "Computer Concepts & Programming in C", Seventh Edition, Tata McGraw Hill Education private limited, July 2011.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

IA				EE
A	PR	LR	V	70
5	10	10	5	

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS O 1	PS O 2	PS O 3
CO 1	1	2	--	2	--	--	--	--	--	--	--	--	1	--	2
CO 2	1	1	2	2	--	--	--	--	--	--	--	--	1	--	2
CO 3	1	1	2	3	--	--	--	--	--	--	--	--	1	--	2
CO 4	1	1	2	2	3	--	--	--	--	--	--	--	1	--	2

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IFT2202	INTRODUCTION TO DATABASE MANAGEMENT SYSTEMS	L	T	P	C
Version 2017.1	Date of Approval: 14 June, 2017	3	0	0	3
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

This course is to expose the students to the fundamentals & basic concepts in Data Base Management Systems. This course discusses architecture of Database Systems with concept of relational model & ER model. This course explains techniques for database design, Normalization and database recovery and protection.

Course Objectives

This objectives of the course is to expose the students to

1. The fundamentals & basic concepts in Data Base Management Systems.
2. Architecture of Database Systems with concept of relational model & ER model.
3. The techniques for database design, Normalization and database recovery and protection.

Course Outcomes

After completing the course, the student will be able to:

- CO1: Define and list the basic terminologies used in database
CO2: Explain and describe the relational model and relational algebra
CO3: Apply and construct the concepts used in modelling
CO4: Compare and illustrate different concurrency control protocols
CO5: Design the ER Model and SQL queries
CO6: Assess and interpret different issues associated with database systems

Modules	Blooms level*	Number of hours
MODULE 1: Introduction to DBMS Definition of DBMS, Data Independence, DBMS Architecture, Levels, Database Administrator, File System Approach Vs DBMS Approach, Advantages of Using a DBMS, Data Models, Schemas, and Instances.	L1, L2	8
MODULE 2: Relational Database & ER Model Relational System, Codd's Rule, Relational Model, Optimization, Tables and Views, Entity, Types of Entity, Weak Entity Attributes, Entity sets, Entity – Relationship Diagrams.	L1, L2, L3	7

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MODULE 3: Relational Model Objects Domains and Relations, Relations and predicates, Relational Data Integrity; Primary Key, Candidate Key, Foreign Key and their rules; Relational operators, Relational Algebra, Relational Calculus, SQL Language, Data definition, Data retrieval and update operations.	L1, L2, L3	8
MODULE 4: Database Design Definition Of Functional Dependencies, Process Of Normalization, First Normal Form, Second Normal Form, Third Normal Form. BoyceCodd Normal Form, Fourth Normal Form, Fifth Normal Form.	L3, L4	5
MODULE 5: Data Recovery & Protection Transaction ACID Properties ,Recovery- Transaction recovery, System recovery, Media Recovery, Concurrency Control Techniques Lost Update Problem , Dirty Read Problem, Locking, Dead Lock, Serializability; Security- Introduction.	L3, L4, L5, L6	8

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. Elmasari, Navathe, "Fundamentals of Database Systems", Addison Wesley.
2. Korth, Silbertz, Sudarshan, "Database Concepts". McGraw Hill.

Reference Books

1. Majumdar& Bhattacharya, "Database Management System", Tata McGraw Hill.
2. Date C J." An Introduction to Database Systems", Addison Wesley.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	1	--	--	--	--	--	--	--	--	--	--	--	1	--	--
CO2	1	1	--	--	--	--	--	--	--	--	--	--	1	--	--
CO3	1	1	1	1	--	--	--	--	--	--	--	--	1	--	--
CO4	1	--	--	1	--	--	--	--	--	--	--	--	1	--	--
CO5	1	1	1	1	1	--	--	--	--	--	--	--	1	--	--
CO6	1	-	-	-	1	--	--	--	--	--	--	--	1	--	--

1: strongly related, 2: moderately related and 3: weakly related

IFT2211	DATA STRUCTURE THROUGH C LANGUAGE	L	T	P	C
Version 2017.1	Date of Approval:14 June, 2017	3	0	0	3
Pre-requisites/Exposure	Hands on knowledge of C Programming				
Co-requisites	Basic concepts of C Programming				

Catalog Description

This course is an introduction to the use, design, and analysis of data structures in computer programs. The very commonly used data structures like arrays, stacks, queues, lists, trees, and graphs will be discussed in detail. Sorting and hashing are important topics in the study of algorithms. They are also closely related to the design of data structures. Several algorithms to implement these techniques are included in the syllabus.

Course Objectives

The objective of this course is to

1. Equip the students with the basic concepts of data structures and algorithms
2. Understand concepts about searching and sorting techniques
3. Understand basic concepts about stacks, queues, lists, trees and graphs

Course Outcomes

On completion of this course, the students will be able to

- CO 1: Explain fundamental data structures and algorithms and summarize their typical uses, strengths, and weaknesses; Address calculation, application of 1D and 2D arrays and various operations applied on arrays.
- CO 2: Explain Stack and Queue data structure, various types of Queues; Representation of stack and queue in memory; Applications of stack and queue.
- CO 3: Explain and compare link list with other linear data structure; Advantage, disadvantages, types, application and memory representation of link list.
- CO 4: Explain Binary search tree and its types. Applying in-order, pre-order and post order traversal to create the tree; application of tree in searching and storing huge amount of data.
- CO 5: Analyze and compare the complexity different searching and sorting algorithms. Evaluate algorithms and data structures in terms of time and memory complexity of basic operations.
- CO 6: Explain different types of graphs and their representation in memory. Applying BFS and DFS graph traversal scheme to find shortest path. Determine minimum spanning tree using Kruskal and Prim's method.

Modules	Blooms level*	Number of hours
MODULE 1: BASIC CONCEPTS AND ARRAY Definition Accessing the address of a variable, Declaring and initializing pointers. Accessing a variable through its pointer. Meaning of static and dynamic memory allocation. Memory allocation functions :malloc, calloc, free and realloc. Representation of arrays single and multi dimensional arrays. Address calculation using column and rows major ordering. Various operations on arrays, Application of arrays: matrix multi multiplication.	L1, L2 and L3	5
MODULE 2:	L2, L3	7

STACKS AND QUEUES Definition, Array representation of stack. Operations on stack: Infix, prefix and postfix notations. Conversion of an arithmetic expression from Infix to postfix. Evaluation of postfix expression using stacks. Definition, Array representation of Queue. Types of queue: Simple queue, circular queue, double ended queue (deque), priority queue, operations on all types of Queues.	and L4	
MODULE 3: LINKED LIST Definition, Components of linked list, Representation of linked list, Advantages and Disadvantages of linked list. Types of linked list : Singly linked list, Doubly linked list, Circular linked list and circular doubly linked list. Operations on singly linked list : creation, insertion, deletion, search and display (based on the different position as specified by the user). Linked representation of Stacks & Queues.	L2, L3 and L4	7
MODULE 4: TREES Definition : Tree, Binary tree, Complete binary tree, Binary search tree, Heap Tree terminology : Root, Node, Degree of a node and tree, Terminal nodes, Non terminal nodes, Siblings, Level, Edge, Path, depth, Parent node, ancestors of a node. Binary tree : Array representation of tree, Creation of binary tree. Traversal of Binary Tree: Preorder, Inorder and post order. Representation of trees and its application, Binary search tree: Insertion & deletion in BST. Height balanced (AVL) tree	L2, L3, L4 and L5	6
MODULE 5: SEARCHING, SORTING AND COMPLEXITY Searching: Sequential and binary search, Comparison between linear and binary search. Sorting: insertion, selection, bubble, quick, merge, heap sort.	L2, L3 and L4	5
MODULE 6: GRAPHS Graph representation: adjacency list, adjacency matrix. Types of Graphs: Directed & Undirected Graph . Traversal scheme: Depth first search, Breadth first search. Spanning tree: definition, minimal spanning tree algorithms.	L2, L3 and L4	6

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. Seymour Lipschutz , “**Data Structures**”, Schaum outlines, Revised 1st Edition
2. R.L. Kruse, B.P. Leary, C.L. Tondo, “**Data structure and program design in C**”, PHI
3. A.V. Aho, J. E. Hopcroft, and J. D. Ullman, “**Data Structures and Algorithms**”, 1st Edition, Pearson Education, Reprint 2003.

Reference Books

1. J. P. Tremblay and P. G. Sorenson, **Introduction to Data Structures with Applications**, McGraw – Hill Computer Science Series, Mc-Graw – Hill New York, 1984
2. Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, “**Algorithms**”, Prentice-Hall India (1999).
3. Yeddyiah Langsam, Moshe J. Augenstein, Aaron M. Tenenbaum, “**Data Structures Using C and C++**”, 2nd Edition, Prentice-Hall India

4. Mark Allen Weiss, "Data Structures and Algorithm analysis in C++", Addison Wesley (3rd Indian Reprint 2000).

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS O 1	PS O 2	PS O 3
CO 1	1	2	2	--	--	--	--	--	--	--	--	--	1	3	--
CO 2	1	--	2	3	--	--	--	--	--	--	--	--	1	3	--
CO 3	1	2	3	--	--	--	--	--	--	--	--	--	1	3	--
CO 4	1	2	1	--	--	--	--	--	--	--	--	--	1	3	--
CO 5	1	2	1	--	--	--	--	--	--	--	--	--	1	3	2
CO 6	1	1	2	2	--	--	--	--	--	--	--	--	1	3	2

1: strongly related, 2: moderately related and 3: weakly related



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IFT2217	WEB TECHNOLOGIES	L	T	P	C
Version 2017.1	Date of Approval: 14 June, 2017	3	0	0	3
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

This course is aimed to provide a fundamental understanding of web site creation. Hypertext Markup Language (HTML) is the language used for designing most basic web pages (static). The basic and advanced features of HTML including lists, images, hyperlinks, tables, frames and forms will be introduced. It will also provide an overview of Cascading Style Sheets (CSS) and Extensible Markup Language (XML) which can be used with HTML for better data organization and presentation of content on website.

Course Objectives

The objective of this course is to

1. Equip the students with concepts of website design through Hypertext Markup Language and basics of Javascript.
2. Provide an overview of Cascading Style Sheets and Extensible Markup Language for better management of website content.

Course Outcomes

After the completion of course, the students will be able to,

- CO 1: Define the purpose and structure of HTML for website development; identify and distinguish various HTML tags for background settings, text-formatting, HTML lists, image insertion and hyperlinks; prepare web page/website content using basic HTML tags and attributes.
- CO 2: Describe HTML table, its structure and attributes; Apply table, frameset and frame elements to web-site design.
- CO 3: Compare and contrast various form controls; design various kinds of form for user related information and apply front-level validations using Javascript.
- CO 4: Differentiate between Inline, Internal and external CSS; modify the website content presentation by incorporating Cascading style sheet properties to existing HTML files.
- CO 5: Demonstrate the use of XML document Type Declaration; differentiate between well-formed or Valid XML document.

Modules	Blooms level*	Number of hours
MODULE 1: INTRODUCTION TO HTML History of HTML, Structure of HTML, HTML Basic: Elements, Tags and Attributes. Adding Comments, Adding Title, HTML Background: using plain color, using image, Formatting Text : Paragraph, inserting line break, Heading Style, Bold text, Italicized text, Underlined text, Teletype text, Strikeout, Superscript, Subscript, Important text, Emphasized text, Inserted text, Deleted text, Larger text, Smaller text. Working with Text: Changing font Sizes and Colors. Creating List: Ordered List, Unordered List, Definition List, Nested List. Inserting image, Creating Hyper Text Links, Creating Image Links, Horizontal Rules, Marquee Tag. Address Tag.	L1, L2 and L3	10
MODULE 2:	L2 and	8

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TABLES AND FRAMES Tables: Creating Tables, Table Element, Adding Border, Adding Column Headings, Cellspacing and Cellpadding, Adding a Caption, Setting the table Width and Height, Add Row Headings, Aligning Cell contents, Setting Column Width, Centering a Table, Inserting Image, Rowspan, Colspan, Assigning Background Colors. Frames: Frameset Element, Frame Element, Noframes Element, Specifying Target, Inline Frames.	L3	
MODULE 3: FORMS AND VALIDATION Forms: Introduction to Forms, Form Elements, Text Field, Password Field, Label, Check Box, Radio Button, Selection List, Text Area, Button. Front level validations using JavaScript: Checking a Non-empty Text/Password Field, Restricting Length of Text/Password Field.	L4 and L5	8
MODULE 4: CASCADING STYLE SHEETS Overview of style sheets, Advantages, Different ways to use style sheet: External style sheet, Internal style sheet, Inline style sheet. Selectors: Element selector, Id selector, Class selector, Grouping selector. Adding style to a Document, Adding Comments in CSS.	L4 and L5	5
MODULE 5: XML Introduction to XML, XML Basics, XML Structure, XML Tags, XML Elements, XML Attributes, Adding Comments, XML Document Type Declaration: Internal DTD and External DTD. Well formed XML Documents and Valid XML Document	L3 and L4	5

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. Ivan Bayross, "HTML, DHTML, JavaScript, Perl, CGI", 4th revised edition, BPB Publication, 2010, New Delhi.
2. Uttam.K.Roy, "Web Technologies", Oxford University Press, 2011, New Delhi.

Reference Books

1. Thomas A. Powell, "HTML & XHTML: The Complete Reference", 4th Edition, Tata McGraw-Hill Publishing Company Limited, 2003, New Delhi.
2. Thomas A. Powell, "HTML & CSS: The Complete Reference", 5th Edition, Tata McGraw-Hill digital, 2010, New Delhi.
3. Heather Williamson, "XML: The Complete Reference", 1st edition, McGraw-Hill Osborne Media, 2001, New Delhi.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance



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CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	1	2	--	--	--	--	--	--	--	--	--	--	1	--	3
CO2	1	2	3	--	--	--	--	--	--	--	--	--	1	--	3
CO3	1	2	1	3	--	--	--	--	--	--	--	--	1	--	3
CO4	1	1	2	2	3	--	--	--	--	--	--	--	1	--	3
CO5	1	1	2	2	3	--	--	--	--	--	--	--	1	--	3

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IFT2219	COMPUTER ORGANIZATION AND ARCHITECTURE	L	T	P	C
Version 2017.1	Date of Approval: 14 June, 2017	3	0	0	3
Pre-requisites/Exposure	Basic Knowledge of Digital Electronics				
Co-requisites	Nil				

Catalog Description

The course provides a detailed description about Computer System and all its Components. The process of execution of an Instruction from the time it arrives till it is finished is explained. The organization of various Computer System Components such as Registers, Stack is mentioned. Further, the interaction of CPU with Memory and Input Output devices is also explained in detail. The course also provides an introduction to traditional Microprocessor Concept and Assembly Language Program.

Course Objectives

The objective of this course is:

1. To provide an overview of computer's architecture.
2. To understand how a computer is organized and what are its different components.

Course Outcomes

On completion of this course, the students will be able to

- CO 1: Explain the basic Computer System Architecture describing all the components; Memory, Input Output, CPU Registers, ALU and Control unit
- CO 2: Explain the Instruction Cycle and Distinguish among Memory Reference, Register Reference and Input Output Reference Instructions.
- CO 3: Explain the organization of CPU and method of executing instructions in parallel to increase CPU throughput.
- CO 4: Explain the interaction of CPU with Input Output Devices and Organization of Memory Section
- CO 5: Apply the concept of Microprocessor and rewrite various Assembly Language Scripts.

Modules	Blooms level*	Number of hours
MODULE 1: General Computer Architecture Block Diagram of typical Computer, Memory Section, Input/Output Section, CPU, Registers, Arithmetic Unit, Instruction handling Areas, Stacks Register Transfer Language and Micro operations: Register Transfer, Bus and Memory Transfer, Arithmetic Micro operations(Binary Adder, Binary Adder-subtractor, Binary increment, Arithmetic Circuit), Logic Micro operations, Shift Micro operations, Arithmetic Logic Shift Unit	L1, L2	5
MODULE 2: Basic Computer Organization and Design Instruction Codes, Stored program organization computer registers, common bus system, Timing and Control, Instruction Cycle, Memory Reference Instructions, Input Output Instructions and Interrupts	L1, L2	4
MODULE 3: Central Processing Unit	L2, L3 and L4	6

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General Register Organization, Stack Organization, Instruction Formats, Addressing Modes, RISC, CISC Pipelining and Vector Processing: Parallel Processing, Pipelining (General considerations), Arithmetic Pipeline, Instruction Pipeline, Vector Processing, Array Processors		
MODULE 4: Input Output Organization I/O Interface, Asynchronous Data Transfer, Modes of Transfer, Priority Interrupt, DMA, IOP, Serial Communication Memory Organization: Associative Memory (Hardware organization, Match logic), Cache Memory (associative mapping, Direct Mapping, Set Associative Mapping), Virtual Memory	L2, L3 and L4	6
MODULE 5: Introduction to Microprocessor Machine Language, Assembly Language, Assembler, High Level Language, Compiler, Interpreter, Internal Architecture 8085.	L2, L3	3

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

1. M Morris, R. Mano, "Computer System Architecture", 3rd Edition, Pearson Education New Delhi, 2017.
2. John D. Carpinelli's, "Computer Systems Organization & Architecture", 1st Edition, Pearson Education. New Delhi, 2002
3. John Hayes, "Computer Architecture and Organization", 3rd Edition, McGraw Hill Education, 2017.

Reference Books

1. William Stallings, "Computer Organization and Architecture", 10th Edition, Pearson Education, New Delhi, 2016.
2. P Chakraborty, "Computer Architecture & Organization", 1st Edition, Jaico Publishing House, 2006.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	1	--	--	--	--	--	--	--	--	--	--	--	2	3	--
CO2	1	2	--	--	--	--	--	--	--	--	--	--	2	3	--
CO3	1	1	3	3	--	--	--	--	--	--	--	--	1	3	--
CO4	1	2	3	3	--	--	--	--	--	--	--	--	3	--	--
CO5	1	2	2	3	--	--	--	--	--	--	--	--	3	--	--

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DISCRETE MATHEMATICAL STRUCTURE WITH APPLICATION TO CS

Course Code: IFT2222

Credit Units: 03

Course Objective:

The Objective of this course is to provide the fundamentals and the concepts of Discrete Mathematical Structures with Applications to Computer Sciences including Mathematical Logic, Boolean Algebra and its Applications, Switching circuit & Logic Gates, Graphs and Trees. Important theorems with constructive proofs, real life problems & graph theoretic algorithms to be covered with an aim of helping the students to understand the computational and algorithmic aspects of Mathematical Logic, Boolean Algebra, Graphs and Trees in the field of Computer sciences and its applications.

Course Contents:

Module I: Introduction

Permutation and Combination : Counting Techniques.

Relation: Type and compositions of relations, Pictorial representation of relations, closures of relations, Composite Relations, Equivalence relations.

Function: Types, Composition of function, Mathematical Induction, Discrete Numeric Function and Generating Functions

Module II: Mathematical Logic

Proposition, Propositional Calculus- Propositional Variables and Compound Propositions, Basic Logical Operations: -Conjunction, Disjunction, Negation, Conditional, Bi conditional. Compound Statements, Equivalence, Duality, Algebra of Statements, Valid and Invalid, Arguments, Tautologies, Contradiction, Contingency , Boolean Functions – Disjunctive Normal Form, Conjunctive Normal Form.

Duality Principle.

Module III: Graphs

Basic Terminology of Graphs , Handshaking Lemma , Sub graphs, and Union of Graphs , Connected graph, Disconnected graph, Null graph, Incidence matrix, Adjacency matrix, Degree of a graph, Directed Graph, Walk, Path, Circuit, Wheel, Eulerian graph, Hamiltonian graph, Planar graph , Kuratowski's graphs-I and II , Coloring , Bipartite Graph , Cyclic Graph.

Module IV: Trees

Tree, Properties of Tree, Spanning Tree, Fundamental Circuit, Cut-Set, Cut-Vertices. Binary Tree , Rooted Trees, Path length, Minimum Spanning Trees, Huffman Encoding.

Examination Scheme:

Components	CT1	A/C/Q	Attd	EE
Weightage (%)	15	10	5	70

Text & References:

Text:

- Kenneth H. Rosen, "Discrete Mathematics and its applications", TMH
- Elements of Discrete Mathematics: C.L. Liu, TMH, Edition 4.
- Graph Theory with Applications to Engineering and Computer Science: N. Deo

References:

- Discrete Mathematics: Harikishan & Shivraj Pundir, Pragati's Prakashans.



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IFT2216	DATA STRUCTURE THROUGH C LANGUAGE LAB		L	T	P	C
Version 2017.1	Date of Approval: 14 June, 2017		0	0	2	1
Pre-requisites/Exposure	Hands on knowledge of C Programming					
Co-requisites	Basic concepts of C Programming					

Catalog Description

The course is designed to develop skills to design and analyse simple linear and non- linear data structures like arrays, stacks, queues, lists, trees, and graphs. It strengthen the ability of the students to identify and apply the suitable data structure for the given real world problem. It enables them to gain knowledge in practical applications of data structures.

Course Objectives

The objective of this course is to

1. Equip the students to apply knowledge of basic concepts of data structures in solving complex problems.
2. Provide demonstration of the data structure concepts like stacks, queues, lists, trees, graphs and various searching and sorting techniques

Course Outcomes

On completion of this course, the students will be able to

- CO 1: Apply the knowledge of basic fundamentals of data structures in order to analyze the time and space efficiency of the data structure
- CO 2: Demonstrate the use and applications of Stack and Queue data structure along with various types of Queues.
- CO 3: Demonstrate and compare link list with other linear data structure; Advantage, disadvantages, types and application of link list.
- CO 4: Apply the knowledge of trees and heaps and demonstrate the application of tree in searching and storing huge amount of data.
- CO 5: Apply algorithm for solving problems like sorting, searching, insertion and deletion of data.
- CO 6: Demonstrate the usage of graphs and their applications of BFS and DFS to find shortest path.

Modules	Blooms level*	Number of hours
1. Sample programs of 1D and 2-D arrays (a) Write a program to insert an element at any position in an array (b) Write a program to perform addition of matrix for order 3*3 (c) Write a program to perform multiplication of matrix of any order	L1, L2 and L3	4
2. Sample Programs of stack and queues. (a) Write a program that perform the following function i) Create stack of integers. ii) PUSH operation on stack iii) POP operation on stack (b) Write a program that perform the following function i) Create Queue of integers. ii) Insert operation on Queue	L2, L3	4

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iii) Delete operation on Queue I Write a program that perform the following function i) Create Circular Queue of integers. ii) Insert operation on Circular Queue iii) Delete operation on Circular Queue		
3. Sample Programs of Linked List (a) Write a C program that perform the following: ii) Create a singly linked list of integers. ii) Delete a given integer from the above linked list. iii) Display the contents of the above list after deletion (b) Write a C program that performs the following: a) Create a doubly linked list of integers. b) Delete a given integer from the above doubly linked list. c) Display the contents of the above list after deletion	L2, L3 and L4	6
4. Sample Programs of trees (a) Write a C program that uses functions to perform the following: ii) Create a binary search tree of characters. ii) Traverse the above Binary search tree recursively in Postorder.	L2, L3, L4 and L5	2
5. Sample programs on sorting and searching (a) Write C programs for implementing the Bubble Sort (b) Write C programs for implementing the Selection Sort (c) Write C programs for implementing the Insertion Sort (d) Write a program to perform linear Search (e) Write a program to perform binary Search	L2, L3 and L4	6
6. Sample programs on graphs (a) Write C programs for implementing the graph traversal algorithms: Depth first traversal (b) Write C programs for implementing the graph traversal algorithms: Breadth first traversal	L3, L4 and L6	6

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. Seymour Lipschutz, "**Data Structures**", Schaum outlines, Revised 1st Edition
2. R.L. Kruse, B.P. Leary, C.L. Tondo, "**Data structure and program design in C**", PHI
3. A.V. Aho, J. E. Hopcroft, and J. D. Ullman, "**Data Structures and Algorithms**", 1st Edition, Pearson Education, Reprint 2003.

Reference Books

1. J. P. Tremblay and P. G. Sorenson, **Introduction to Data Structures with Applications**, McGraw – Hill Computer Science Series, Mc-Graw – Hill New York, 1984
2. Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, "**Algorithms**", Prentice-Hall India(1999).
3. YeddydyahLangsam, Moshe J.Augenstein, Aaron M. Tenen Baum, "**Data Structures Using C and C++**", 2nd Edition, Prentice-Hall India
4. Mark Allen Weiss, "**Data Structures and Algorithm analysis in C++**", Addison Wesley (3rd Indian Reprint 2000).

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

IA					EE
Components	A	PR	LR	V	70
Weightage (%)	5	10	10	5	

Note: IA –Internal Assessment, A – Attendance, PR – Performance, LR – Lab Record, V – Viva, EE- External Exam

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS O 1	PS O 2	PS O 3
CO 1	1	2	2	--	--	--	--	--	--	--	--	--	1	3	2
CO 2	1	--	2	3	--	--	--	--	--	--	--	--	1	3	--
CO 3	1	--	1	--	--	--	--	--	--	--	--	--	1	3	--
CO 4	1	2	1	--	--	--	--	--	--	--	--	--	1	3	--
CO 5	1	2	1	--	--	--	--	--	--	--	--	--	1	3	2
CO 6	1	1	2	2	--	--	--	--	--	--	--	--	1	3	2

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IFT2220	WEB TECHNOLOGIES LAB	L	T	P	C
Version 2017.1	Date of Approval: 14 June, 2017	-	-	2	1
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

This course is aimed to provide a fundamental understanding of web site creation. Hypertext Markup Language (HTML) is the language used for designing most basic web pages (static). The basic and advanced features of HTML including lists, images, hyperlinks, tables, frames and forms will be introduced. It will also provide an overview of Cascading Style Sheets (CSS) and Extensible Markup Language (XML) which can be used with HTML for better data organization and presentation of content on website.

Course Objectives

The objective of this course is to

1. Equip the students with concepts of website design through Hypertext Markup Language and basics of Javascript.
2. Provide an overview of Cascading Style Sheets and Extensible Markup Language for better management of website content.

Course Outcomes

After the completion of course, the students will be able to,

CO 1: Prepare web page/website content various HTML elements including tags and attributes for background settings, text-formatting, HTML lists, image insertion and hyperlinks, Moving content across screen.

CO 2: Apply table, frameset and frame elements to web-site design.

CO 3: Construct various kinds of forms to take user related information and apply front-level validations using Javascript.

CO 4: Design and modify the website content presentation by incorporating inline, internal and external Cascading style sheets to existing HTML files.

CO 5: Demonstrate the use of well-formed or Valid XML document.

Modules	Blooms level*	Number of hours
LABORATORY SESSION 1 INTRODUCTION TO HTML 1. Design a webpage to show various tags used for formatting text. 2. Design a webpage to show usage of various heading tags, font tag and background color. 3. Design a webpage to insert image as an inline element and in the background. 4. Design a webpage to show usage of ordered list, unordered list and definition list. 5. Design a webpage to show the use of hyperlink (Text & Image) and image map. 6. Design a webpage to show scrolling text and scrolling image using marquee tag.	L3	6
LABORATORY SESSION 2 TABLES AND FRAMES	L3	4

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1. Design a table using rowspan, colspan, cell padding, cell spacing, grouping, caption and border. 2. Divide a webpage into various frames (row or col wise) and populate them with web content.		
LABORATORY SESSION 3 FORMS AND VALIDATION 1. Create a log-in form/sign-up/feedback/registration form using various elements of form. 2. Write Javascript code to perform basic arithmetic operations, calculate factorial and other such functions using loops, if-else, switch etc. 3. Write javascript code to perform front-end validations (basic and data format validations) on HTML forms. 4. Prepare HTML code to perform form validations using HTML 5.0 elements.	L3	8
LABORATORY SESSION 4 CASCADING STYLE SHEETS 1. Apply Inline Cascading style sheet properties to enhance the appearance and outlook of webpage. 2. Modify the placement and styling of web page content (pictures, hyperlinks, images, videos, lists etc.) using Internal and/or External CSS file.	L3 and L5	4
LABORATORY SESSION 5 XML 1. Create an XML document for saving student details (Name, Enrollment number, Course, CGPA, and Contact No.)	L3	2

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. Ivan Bayross ,“HTML, DHTML, JavaScript, Perl, CGI”,4th revised edition, BPB Publication, 2010, New Delhi.
2. Uttam.K.Roy, “Web Technologies”, Oxford University Press, 2011, New Delhi.

Reference Books

1. Thomas A. Powell, “HTML & XHTML: The Complete Reference”, 4th Edition, Tata McGraw-Hill Publishing Company Limited, 2003, New Delhi.
2. Thomas A. Powell, “HTML & CSS: The Complete Reference”, 5th Edition, Tata McGraw-Hill digital, 2010, New Delhi.
3. Heather Williamson , “XML: The Complete Reference”, 1st edition, McGraw-Hill Osborne Media, 2001, New Delhi.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

IA				EE
A	PR	LR	V	70
5	10	10	5	

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO1	1	2	--	--	--	--	--	--	--	--	--	--	1	--	3
CO2	1	2	3	--	--	--	--	--	--	--	--	--	1	--	3
CO3	1	2	1	3	--	--	--	--	--	--	--	--	1	--	3
CO4	1	1	2	2	3	--	--	--	--	--	--	--	1	--	3
CO5	1	1	2	2	3	--	--	--	--	--	--	--	1	--	3

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IFT2223	INTRODUCTION TO DATABASE MANAGEMENT SYSTEM LAB	L	T	P	C
Version 2017.1	Date of Approval: 14 June 2017	0	0	2	1
Pre-requisites/Exposure	Basic Concepts of DBMS				
Co-requisites	Relational Algebra and Relational Calculus				

Catalog Description

This course is design to get students familiar with the basic concepts of SQL including DDL, DML and DCL statements. The course also explains the basic concepts of PL/SQL. Students will learn practical on Oracle software and hence can work on any RDBMS software.

Course Objectives

The objective of this course is

1. To make students familiar with the concepts and working of SQL.
2. Provide an overview of PL/SQL.

Course Outcomes

On completion of this course, the students will be able to

CO1. Illustrate SQL basic concepts like languages DDL, DML etc., data types and working.

CO2. Explain concepts of database creation, manipulation of data and data retrieval and apply them in real database applications.

CO3. Design and implement various data constraints on a database for a given problem.

CO4. Solve queries using concepts like joins, subqueries, aggregate functions, triggers etc.

CO5. Prepare PL/SQL blocks.

Modules	Blooms level*	Number of hours
Lab Session 1 Introduction of RDBMS, Oracle, SQL and data types.	L1 and L2	2
Lab Session 2 Basic concept of database creation and manipulation of data.	L1and L3	2
Lab Session 3 Working with SELECT query.	L1 and L3	2
Lab Session 4 To apply data constraints on a table-Primary Key, Not Null, Unique.	L1 and L3	2
Lab Session 5 Working with Foreign Key and Check Constraint.	L1 and L3	2
Lab Session 6 To implement the basic concept of Aggregate and Grouping Functions.	L1 and L3	2
Lab Session 7 To apply various set operators on data.	L1 and L3	2
Lab Session 8 Concept of Nested queries in database and its application in database.	L1 and L3	2
Lab Session 9	L1 and	2

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Implementation different types of JOINS in database.	L3	
Lab Session 10 Basic concepts of Triggers and Procedures and related queries.	L1 and L3	2
Lab Session 11 Introduction to PL/SQL and basic syntax.	L1 and L3	2
Lab Session 12 Write programs in PL/SQL Using Control Structures.	L3	2

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. Ivan Bayross , “SQL, PL/SQL the Programming Language of Oracle”, 4th Ed.,BPB Publications,2009.
2. Lynn Beighley, “Head First SQL”, 1st Ed., O'Reilly, 2007.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	1	2	--	--	--	--	--	--	--	--	--	--	1	--	-
CO2	1	-	2	--	--	3	--	--	--	--	--	2	1	--	2
CO3	1	-	1	--	--	3	--	--	--	--	--	2	1	--	2
CO4	1	-	2	--	--	--	--	--	--	--	--	--	1	--	2
CO5	1	-	2	--	--	--	--	--	2	--	--	--	1	--	--

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IFT2312	INTRODUCTION TO OBJECT ORIENTED PROGRAMMING WITH C++	L	T	P	C
Version 2017.1	Date of Approval: 14 June,2017	3	0	0	3
Pre-requisites/Exposure	Hands on knowledge of C Programming				
Co-requisites	Basic concepts of C Programming				

Catalog Description

This course is aimed at developing Programming skills using Object Oriented Technology in C++. This purpose of this subject is to improve the programming approach and development of software using OOPS technology. The Subject involves various concepts of Object Oriented Programming such as Classes, Objects, Polymorphism, Inheritance, Exception Handling etc. needed for a better approach towards software development.

Course Objectives

The objective of this course is

1. Perform object oriented programming to develop solutions to problems demonstrating usage of control structures, modularity, I/O. and other standard language constructs.
2. Demonstrate the application of object oriented programming in developing solutions to problems demonstrating usage of data abstraction, encapsulation, and inheritance.
3. Demonstrate ability to implement one or more patterns involving realization of an abstract interface and utilization of polymorphism in the solution of problems which can take advantage of dynamic dispatching, syntax and features .

Course Outcomes

On completion of this course, the students will be able to

CO 1: Explain the basic principles of object oriented programming approach; Differentiate it with procedural programming approach and also discuss difference between C and C++.

CO 2: Illustrate the different ways to define a member function inline and explain how the private members of a class can be accessed .Explain how the objects can be instantiated and destroyed with static data member.

CO 3: Explain the concept of inheritance, types and implementation with suitable examples; find out ambiguity problem in inheritance ; use the concept of overriding and constructors in inheritance.

CO 4: Explain polymorphism in detail and implement the concept of overloading in functions as well as in operators. Write the programs for virtual function and pointer with objects.

CO 5: Demonstrate the exception handling mechanism. Compare and contrast various formatted and unformatted i/o function in file handling.

Modules	Blooms level*	Number of hours
Module I: Overview of C++ What is Object Oriented Programming, Characteristics of OOP, Difference between C and C++. Basics:-Input/Output in C++ using cin/cout, Preprocessor Directives, Data Types-Integer, Float, character, Enumerations, library functions, comments, storage classes, manipulators, operators in C++, scope resolution operator , memory management operator. arrays and strings .	L1 and L2	5
Module II: Classes and objects Functions: Simple functions, passing arguments to functions, returning values	L1, L2 and L3	7

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from functions, reference arguments, returning by reference, Overloaded functions, Inline functions, friend function, Structures and class. Classes and objects: A simple class, C++ objects as physical objects, objects as function arguments, returning objects from functions, static class data, array as class data member, array of objects.		
Module III: Inheritance Inheritance, Types of Inheritance, access modes – public, private & protected, Abstract Classes, Ambiguity resolution using scope resolution operator and Virtual base class, Constructors, Types of constructors, Destructors.	L2, L3 and L4	8
Module IV: Polymorphism Polymorphism, Type of Polymorphism – Compile time and runtime, Function Overloading, Operator Overloading (Unary and Binary) Polymorphism by parameter, Pointer to objects, this pointer, Virtual Functions, pure virtual functions	L2, L3 and L4	8
Module V: Files and Exception Handling and I/O Files and Streams: streams, string I/O, character I/O, file pointer, error handling, command line arguments. formatted and Unformatted Input output, Introduction of Exception handling, Try Catch block, Rethrowing an Exception.	L2, L3 and L4	8

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text

- Programming with C++, Ravi Chandran, TMH Publisher.
- Object Oriented Programming with C++, E Balagurusamy, Tata McGraw Hill
- Programming in C++, John R Hubbard, SCHAUM's series.

References:

- The complete reference C++, Herbert Schildt, TMH Publisher.
- Turbo C++, Robert Lafore, Galgotia Publications.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/ Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO1	1	2	--	--	--	--	--	--	--	--	--	--	--	1	1
CO2	1	1	2	3	--	--	--	--	--	--	--	--	--	1	1
CO3	1	1	2	--	--	--	--	--	--	--	--	--	--	1	2
CO4	1	1	2	3	--	--	--	--	--	--	--	--	--	1	2
CO5	1	1	2	--	--	--	--	--	--	--	--	--	--	2	--

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IFT2314	OPERATING SYSTEM	L	T	P	C
Version 2017.1	Date of Approval: 14 June, 2017	3	0	0	3
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

To study and apply concepts relating to operating systems, such as concurrency and control of asynchronous processes, deadlocks, memory management, processor and disk scheduling, parallel processing, and file system organization and Demonstrate an understanding of the differences between processes and threads, the different process or thread synchronization methods and the, the different memory management techniques used in Operating Systems, the different I/O management techniques used in Operating Systems, the tradeoffs in design and implementation concepts used in the development of Operating Systems.

Course Objectives

The objective of this course is to

- Equip the students with the knowledge about categories of operating systems and their functions.
- Provide detailed knowhow about functions of operating system like process, memory and device management along with file system security and protection.

Course Outcomes

On completion of this course, the students will be able to

- CO1: Define and explain operating systems and their evolution also differentiate among its various types.
- CO2: Explain concepts of process and inter-process communication and synchronization. Identify solutions to detect, prevent and handle deadlocks occurring in the operating systems. Solve synchronization and CPU scheduling problems related to processes.
- CO3: Define and explain concepts of memory management like fragmentation, paging and segmentation. Solve problems related to memory management using page replacement algorithms.
- CO4: Describe the concepts of device management and list various disk allocation methods. Determine solutions for disk scheduling problems using available disk scheduling algorithms.
- CO5: State the concept of file and file system security, also distinguish among various file allocation methods.

Modules	Blooms level*	Number of hours
MODULE 1: INTRODUCTION AND SYSTEM STRUCTURE What is an operating system, History of OS, OS concepts, Types of OS, OS Structure, OS Operations. System calls, Types of System Calls, System Programs, OS Structure, Virtual Machines, System Boot	L1, L2 and L4	6
MODULE 2: PROCESS MANAGEMENT Process Concept, Process Scheduling, Scheduling Criteria, Scheduling Algorithms, Overview of Thread Scheduling and Multiprocessor scheduling, Operations on Processes, Interprocess communication with example. Client-server Communication, Overview of Multithreaded programming models	L1, L2 and L3	6

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MODULE 3: PROCESS COORDINATION Overview of Process Synchronization, Critical Section Problem, Semaphores, Classic problems. Deadlock- Prevention, Avoidance, Detection, Recovery, Algorithms	L1, L2 and L3	6
MODULE 4: MEMORY MANAGEMENT Memory Management Strategies-Introduction, Swapping, Contiguous Memory Allocation, Paging, Segmentation, Virtual Memory Management-Demand Paging, Thrashing, Page Replacement	L1, L2 and L3	6
MODULE 5: STORAGE MANAGEMENT Overview of File System, Access Methods, Directory and Disk Structures, File Sharing, Protection, Disk Scheduling, Disk Management, I/O hardware	L1 and L2	6
MODULE 6: PROTECTION AND SECURITY Goals and Principles of Protection, Access Matrix, Security Problem, Program Threats, System and Network Threats, Overview of Cryptography, Overview of User Authentication and Security Defense.	L1 and L2	6

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. Milenekovic, "Operating System Concepts", McGraw Hill
2. Silberschatz, P.B. Galvin "Operating System Concepts", John Willey & son

Reference Books

4. Dietel, "An introduction to operating system", Addison Wesley
5. Tannenbaum, "Operating system design and implementation", PHI
6. Operating System, A Modern Perspection, Gary Nutt, Pearson Edu. 2000
7. A. S Tanenbaum, Modern Operating System, 2nd Edition, PHI
8. Willam Stalling "Operating system" Pearson Education

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	CT1	A	Attd	EE
Weightage (%)	15	10	5	70

CT: Class Test, A: Assignment, Attd: Attendance , EE: End Semester Examination

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	1	2	--	--	--	--	--	--	--	--	--	--	1	--	--
CO2	1	2	3	--	--	--	--	--	--	--	--	--	2	--	--
CO3	1	2	3	--	--	--	--	--	--	--	--	--	2	--	--
CO4	1	2	3	--	--	--	--	--	--	--	--	--	1	--	--
CO5	1	--	2	--	--	--	--	--	--	--	--	--	1	--	--

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IFT2319	SOFTWARE ENGINEERING	L	T	P	C
Version 2017.1	Date of Approval: 14 June, 2017	3	0	0	3
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

The purpose of this course is to acquaint students with the concepts and methods available for software development in industrial environments. Students will be exposed to a variety of topics such as design notations, costing techniques, and testing methods, as well as to the tools, which are available to support software specification, design, testing, and maintenance.

Course Objectives

The objective of this course is to

1. Have knowledge of basic SW engineering methods and practices, and their appropriate application.
2. Describe software engineering layered technology and Process framework.
3. give a general understanding of software process models such as the waterfall and evolutionary models.
4. Understanding of the role of project management including planning, scheduling, risk management, etc.
5. Understanding on quality control and how to ensure good quality software.

Course Outcomes

On completion of this course, the students will have

- CO1. Basic knowledge and understanding of the analysis and design of complex systems.
CO 2. Ability to apply software engineering principles and techniques.
CO 3. Ability to develop, maintain and evaluate large-scale software systems.
CO 4. Knowledge to produce efficient, reliable, robust and cost-effective software solutions.
CO 5. Ability to work as an effective member or leader of software engineering teams.

Modules	Blooms level*	Number of hours
MODULE 1: Software Development Life Cycle Evolution of Software Engineering, Software Problems, Issues Involved in Software Engineering, Fundamental Qualities of a Software Product, Approaches to Software Engineering, Planning the development Process, Development/Product Life-Cycle Model, Kinds of Software Life-Cycle Model	L1, L2 and L3	8
MODULE 2: Project Management Project Management Concepts, Project Management Activities, Size Metrics. Software Requirement analysis and Specification, Cost Models.	L2, L3 and L6	10
MODULE 3: System Design Design Objectives, Design Principles, Effective Modular Design (Functional Independence, Coupling, and Cohesion), Design Tools and Techniques, Prototyping, Structured Programming.	L1, L3 and L4	10

MODULE 4: Coding Programming Practices, Verification, Monitoring and Control.	L1, L3 and L4	10
MODULE 5: Software Testing Testing Fundamentals, Test case design, Functional Testing, Structural Testing, Test Plan, Activities during testing, Unit System, Integration Testing, Software Maintenance.	L3, L4 and L6	10
MODULE 6: Software Reliability Concept of Software Reliability, Software Repair and Availability, Software Errors, Failure and Faults.	L3,L4,L6	05

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. Software Engineering, A Practitioner's Approach - Roger S. Pressman. Tata McGraw Hill.

Reference Books

1. U- An Integrated Approach to Software Engineering, PankajJalote., Narosa Publishing House
2. Software Engineering Concepts, Richard Fairley, Tata McGraw Hill

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PSO 1	PSO 2	PSO 3
CO1	1	2	--	--	--	--	--	--	--	--	--	1	3	--
CO2	1	--	2	3	--	--	--	--	--	--	--	1	2	--
CO3	1	2	3	3	3	--	--	--	--	--	--	--	1	2
CO4	1	1	2	--	--	--2	--	--	--	--	--	--	1	1
CO5	1	1	2	--	-2-	--	--	--	--	--	--	--	-	2

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IFT2321	FUZZY LOGIC	L	T	P	C
Version 2017.1	Date of Approval: 14 th June 2017	3	0	0	3
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

This course introduces the student to intelligent control theory, introduce Machine Intelligence and to understand Fuzzy Logic. Fuzzy logic is a tool that can be applied to ambiguous, complicated, complex or non-linear systems or problems which cannot be easily solved by classical techniques. This course discusses the fundamentals of fuzzy sets theory and fuzzy logic. In addition this course also introduces applications of fuzzy logic in several areas such as fuzzy control and fuzzy decision making.

Course Objectives

The objective of this course is:

1. To provide an overview of Fuzzy Set Theory and Fuzzy Logic.
2. To understand how Fuzzy Logic can help in solving Non Linear Problems

Course Outcomes

On completion of this course, the students will be able to

CO 1: Explain the concept of Crisp Sets and Fuzzy Sets. Apply the knowledge to solve various problems.

CO 2: Distinguish between Fuzzification and Defuzzification. Demonstrate various problems using Fuzzy Logic Methodology

CO 3: Distinguish between various properties of Classical and Fuzzy Sets and apply the concepts to prove the properties using numerical problems

CO 4: Explain the concepts of Fuzzy Operations and Fuzzy Arithmetic and solve various mathematical problem based on that

CO 5: Define and Summarize various applications if Fuzzy Logic in real world problem solving.

Modules	Blooms level*	Number of hours
Module I: Introduction Crisp sets: Overview, Fuzzy sets : Basic types and concepts,Characterstics and significance of paradigm shift, Fuzzy sets vs Crisp sets, Representation of fuzzy sets, Applications of fuzzy logic.	L1, L2 & L3	7
Module II: Fuzzy Logic Fuzzy logic introduction, basic concepts of fuzzy logic, linguistic variable, possibility distributions, fuzzy rules, fuzzy rule based inference system, fuzzy inference systems, defuzzification.	L1, L2 & L3	7
Module III: Fuzzy Sets Classical sets, set operation, fuzzy sets, representation of fuzzy sets, types of membership functions, designing membership functions, basic operations in fuzzy sets, introduction & features of membership functions, hedges, operations of fuzzy sets, properties of fuzzy sets.	L2, L3	8
Module IV: Fuzzy operations and Fuzzy arithmetic Types of operations, Fuzzy complements, Fuzzy intersection:t-norms, Fuzzy union:t-conorms,Combination of operations, Aggregation operation, Fuzzy	L2, L3	8

numbers , Linguistic variables,Airthmetic operations on intervals, Airthmetic operations on Fuzzy numbers, Lattice of Fuzzy numbers, Fuzzy equation.		
Module V : Applications Pattern recognition in fuzzy logic, Database and information retrieval in fuzzy logic, decision making in fuzzy logic, engineering applications and fuzzy logic, Fuzzy logic in Medicine and Economics.	L1, L2	6

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. George. j. klir , Bo Yuan , “Fuzzy sets and fuzzy logic theory and application”,ACM.
2. S.N.Sivanandam&S.N.Deepa, “Principles of soft computing”, 2nd Edition, John Wiley & Sons 2011.

Reference Books

1. Nguyen, Prasad, Walker, and Walker ,“A First Course in Fuzzy and Neural Control”, 1st Edition, Chapman and Hall/CRC, 2002.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	1	--	--	--	--	--	--	--	--	--	--	--	2	1	--
CO2	1	2	--	3	--	--	--	--	--	--	--	--	2	1	--
CO3	1	1	1	1	--	--	--	--	--	--	--	--	1	2	--
CO4	1	2	2	3	--	--	--	--	--	--	--	--	1	2	--
CO5	1	2	2	3	--	--	--	--	--	--	--	--	2	2	--

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IFT2323	ACCOUNTING AND FINANCIAL MANAGEMENT	L	T	P	C
Version 2017.1	Date of Approval: 14 th June 2017	3	0	0	3
Pre-requisites/ Exposure	Attitude and Aptitude for the accounts				
Co-requisites	General Awareness and reading of the financial statements and regular newspapers.				

Catalog Description

This course will be learnt by student of B.Sc - IT discipline is more useful who has a passion for seeking knowledge in financial accounting business and its related areas and may be in future work on accounting software's and the financial environment.

To develop intellectual formation on Accounting and Financial domain Environment - concept, significance, objectives, concepts and conventions of accounting which makes the accounting base, through the golden rules of the accounting and accounts.

The study of Journal and Ledger includes double entry system, recording of the transactions into books and creating Journal, cash books and posting the entries into the ledger. Understanding the various financial books such as purchase books, return book, sales books etc..used into day to day business transactions.

The importance of Preparation of Trial balance, Final Accounts including adjustments Trading account, Profit and Loss account. is analyzed from the perspective of a business firm. Other important dimensions which are into business environment are also studied in detail roles of Balance sheet and its assessment to make the accounts settled.

The role of banking and its instruments such as Cheque / Passbook/Deposit Sips etc along with the different types of bank's accounts and being make familiar to the student. The requirements of the reconciliations of bank statements are also explained.

The next domain of the subject includes in the accounting side is day to day operating fund's – Working Capital and its management. Various types and determinants of the working capital is important for the understanding of managing the operating funds.

Further to this, overview on the topics such as Cash management, Receivable management and capital budgeting along with its principles and techniques are been taught to students to make them familiar on the domain.

Finally, the impact of Financial Statements and the role of Ratio analysis in the accounting environment of a business firm is analyzed by understanding the importance of types of ratios and applying the concept to analyze the financial position of the statement.

Course Objectives

The objective of this course is :

- Develop the ability to use accounting concepts, principles, and frameworks to analyze and effectively communicate information to a variety of audiences. Outfit the students with the ability to study of basic accounting system by creating, recording and summarizing the accounting entries and converting them into the accounting statements..
- Furnish student the knowledge on financial acquaintance's and tools that are in direct connect with the Indian banking business operations.
- Prepare the student on accounting management tools by making them familiar of the various ways to analyze the effect of business transactions on an organization's accounting records and financial statements.
- Equip the students with the theoretical framework on the concept of financial statements in relationship to decision making using the financial tools and concepts for which data needed to solve a mixture of financial decision troubles. Develop the ability to use accounting information to solve a variety of business problems.

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Course Outcomes

On completion of this course, the students will be able to :-

- CO1:** *Outline* and *distinguish* various types of Account and Accounting related to general Business, *interpret* and *describe* the golden rules of the accounting on which process off accounting directly or indirectly depends on the accounting process, and able to *determine* and *predict* and develop the skill of recording financial transactions and preparation of reports in accordance with GAAP of business accounting records by *analyzing* the factors affecting at, which will help to *judge* and make *contrast* the various types of accounting books by *relating* with conceptual knowledge.
- CO2:** *Identify* the various entries that need to be recorded in the accounting records and their posting, *estimate* the impact of them on the business growth, in the form of either Gross /Net – Profit/Loss and the capability to *interpret* various business financial entireties and problem and challenges into domains accounting environment and *demonstrate* the skill to handle the issues related to trading account, manufacturing account, profit and loss account by *analyzing* and *summarizing* using principles and formats studied and generating the balance sheets to final positions of the company at that moment of time.
- CO3:** Acquire the knowledge of Indian Banking system associated into Indian business environment by *defining* and *describing* various banking terms. Able to *distinguish* between various banking instruments. *Explain* the importance of banking reconciliation statements. Recognize circumstances providing for increased exposure to errors and frauds
- CO4:** Identify and outline the needs and outcomes of the various accounting management tools by predicting and judging their scope for the financial business scenario. The knowledge of the Working capital also able to criticize and distinguish between various types of working capital, further able to determine and relate cash management process and receivable management which acts as major accounting tools for day to day operations of the organization. Capital Budgeting, the scope and various ways and interpreting the challenges attached with them.
- CO5:** Define and explain importance of Ratio analysis and its advantages and limitations to summarize the usefulness and functions of them and state the applications and advantages attached with them by analyzing the financial statements.

Modules	Blooms level*	Number of hours
MODULE 1: Overview of Accounting – Definition of Accounting, Its Objectives, Advantages and Limitation. Principles, Concepts and Conventions of Accounting, Double entry system, Recording of Transactions in subsidiary Books – Journal, Cash Book, sales Book, Purchase Book and Return Book. Posting into Ledger accounts	L1, L2, L3, L4 and L6	8
MODULE 2: Final Accounts Preparation of Trial balance, Final Accounts including adjustments Trading account, Profit and Loss account, Balance Sheet.	L1, L2, L3 and L4	8
Module 3: Banking Opening of different types of Banks Accounts, Cheque Book, Pass Book, Deposit slips, Bank Reconciliation Statements	L1 and L2	4
Module IV: Management Accounting Tools Definition of working Capital, Types of Working Capital, Determinants of working Capital, Cash Management and Receivables Management. Capital Budgeting: Principles and Techniques.	L1, L2, L3 and L5, L6	9
Module V: Analysis of Financial statements Ratio Analysis: Meaning, Advantages, limitations, types of ratios and their usefulness Statements of charges in the Financial Position on Cash basis.	L1 and L2	7

***Bloom's Level:**

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5:Synthesis, L6:Evaluation

Text & References:

Text:

- S.N. Maheshwari, Suneel K Maheswari and Sharad K Maheswari, Financial Accounting, Vikas Publications
- S.N. Maheshwari, Suneel K Maheswari and Sharad K Maheswari, Accounting for Management, Sultan Chand Publications

References:

- T.S Grewal, Book keeping,, S Chand Publishing
- Prasanna Chandra, Financial Management., Tata McGraw Hill
- IM Pandey, Financial Management., Vikas Publishing

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	Att	CT	RP	S/V/Q	HA/ CA	EE
Weightage (%)	5	10	8	4	3	70

Att: Attendance, CT: Class Test, RP : Research Paper Writing, S/V/Q: Seminar/Viva/Quiz, HA: Home Assignment, CA: Case Analysis, EE: End Semester Examination

, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	-	-	-	-	-	1	3	-	-	2	1	2	-	-	1
CO2	-	-	-	-	-	1	3	-	-	2	1	2	-	-	1
CO3	-	-	-	-	-	1	3	-	-	2	1	2	-	-	1
CO4	-	-	-	-	-	1	3	-	-	2	1	2	-	-	1
CO5	-	-	-	-	-	1	3	-	-	2	1	2	-	-	1

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IFT2315	OBJECT ORIENTED PROGRAMMING WITH C++ LAB	L	T	P	C
Version 2017.1	Date of Approval: 14 June,2017	0	0	2	1
Pre-requisites/Exposure	Hands on knowledge of C Programming				
Co-requisites	Basic concepts of C Programming				

Catalog Description

In this Lab course the object oriented programming using C++ is implemented and demonstrated. Concepts covered would enable them to create complex applications related to object oriented programming. The objective of this course is to explore and implement the various features of OOP such as inheritance, polymorphism, Exceptional handling using programming language C++.

Course Objectives

The objective of this course is to

1. Perform object oriented programming to develop solutions to problems demonstrating usage of control structures, modularity, I/O. and other standard language constructs.
2. Demonstrate the application of object oriented programming in developing solutions to problems demonstrating usage of data abstraction, encapsulation, and inheritance.
3. Demonstrate ability to implement one or more patterns involving realization of an abstract interface and utilization of polymorphism in the solution of problems which can take advantage of dynamic dispatching, syntax and features.

Course Outcomes

On completion of this course, the students will be able to

CO 1: Demonstrate the basic programming structure of C++ program;

CO 2: Illustrate the different ways to write a program for member function inline and explain how the private members of a class can be accessed. Demonstrate how the objects can be instantiated and destroyed with static data member?

CO 3: Demonstrate the concept of inheritance, types and implementation with suitable examples; find out ambiguity problem in inheritance; use the concept of overriding and constructors in inheritance.

CO 4: Demonstrate polymorphism in detail and implement the concept of overloading in functions as well as in operators. Write the programs for virtual function and pointer with objects.

CO 5: Demonstrate the exception handling mechanism. Compare and contrast various formatted and unformatted i/o function in file handling.

Modules/Topics Covered**	Blooms level*	Number of hours
1. Sample Programs for basic structure of program in C++ using Cout and Cin. a) WAP to print Fibonacci series of 'n' numbers, where n is given by the programmer. b) WAP to read a set of numbers in an array and to find the largest of them. c) WAP to sort a list of names in ascending order. d) WAP to sort an array of integers using functions. e) WAP to exchange contents of two variables using call by value and call by reference.	L3, L5	6
2. Sample Programs using concept of class and object. (a) WAP to maintain the student record which contains Roll number, Name, Marks1, Marks2, Marks3 as data member and getdata(), display() and	L3, L5	4

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setdata() as member functions. (b) WAP to add two complex numbers using friend function. (c) Write a program to exchange values between two classes using friend function. (d) Calculate area of different geometrical figures (circle, rectangle, square, triangle) using function overloading. (e) Create a class Complex for performing all arithmetic operations with complex numbers using inline function. (f) Write a class bank, containing data member: Name of Depositor, A/c type, Type of A/c, Balance amount. Member function: To assign initial value, To deposit an amount, to withdraw an amount after checking the balance (which should be greater than Rs. 500), To display name & balance.		
3. Sample Programs using inheritance. (a) Declare a class of vehicle. Derived classes are two-wheeler, three-wheeler & four-wheeler. Display the properties of each type of vehicle using member functions of classes. (b) Create two classes namely Employee and Qualification. Using multiple inheritance derive two classes Scientist and Manager. Take suitable attributes & operations. WAP to implement this class hierarchy. (c) Consider an example of book shop which sells books and video tapes. These two classes are inherited from base class called media. The media class has command data members such as title and publication. The Book class has data members for storing number of pages in a book and tape class has playing time in a tape. Each class will have member functions such as read() and show(). In the base class, these members have to be defined as virtual functions. Write a program to model the class hierarchy for book shop and process objects of these classes using pointers to base class.	L3, L5	6
4. Sample Programs using concepts of polymorphism. operator overloading (a) Write a program to Subtract two Complex numbers using operator overloading. (b) Write a program to add and multiply two time values by overloading + and * operators respectively. (c) Write a class string to compare two strings, overload (=) operator. (d) Write a program to compare age of two persons using this pointer. (e) write a program to implement the concept of pointer to object and pointer to derived class.	L3, L5	5
5. Sample Programs using exception handling and file handling. (a) Demonstrate the concept of exception handling for simple try catch block and multiple catch. (b) Write the programs using file handling.	L3, L5	4

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

**** Sample Programs provided are not limited to these only, can include others as desired.**

Text

- Programming with C++, Ravi Chandran, TMH Publisher.
- Object Oriented Programming with C++, E Balagurusamy, Tata McGraw Hill
- Programming in C++, John R Hubbard, SCHAUM's series.

References:

- The complete reference C++, Herbert Schildt, TMH Publisher.
- Turbo C++, Robert Lafore, Galgotia Publications.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination
Examination Scheme:

IA					EE
Components	A	PR	LR	V	70
Weightage (%)	5	10	10	5	

Note: IA –Internal Assessment, A – Attendance, PR – Performance, LR – Lab Record, V – Viva, EE- External Exam

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	2	1	--	--	--	--	--	--	--	--	--	--	2	1	--
CO2	1	1	--	--	--	--	--	--	--	--	--	--	1	1	--
CO3	2	1	2	--	--	--	--	--	--	--	--	--	1	1	--
CO4	1	3	2	--	--	--	--	--	--	--	--	--	2	1	--
CO5	1	3	--	--	--	--	--	--	--	--	--	--	1	1	--

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IFT2320	OPERATING SYSTEM LAB	L	T	P	C
Version 2017.1	Date of Approval: 14 June, 2017	0	0	2	1
Pre-requisites/Exposure	Basic knowledge of Operating System				
Co-requisites					

Catalog Description

This course introduces the UNIX operating system commands, shell programming. Explores the use of operating system utilities such as vi text editors, filters, process handling etc.

Course Objectives

The objective of this course is to

1. Provide knowledge of working on Unix OS.
2. Provide sound foundation of writing Shell scripts.
3. Implement features like piping, filters and redirection.

Course Outcomes

On completion of this course, the students will be able to

CO1: To implement various UNIX commands.

CO2: To demonstrate the use of Vi Editor and other editors of UNIX.

CO3: To write simple Shell scripts.

Modules	Blooms level*	Number of hours
1. UNIX structure, history, basic commands.	L1,L3	4
2. Working of Vi Editor and its commands.	L1,L3	4
Shell Script 1. Write a Shell Script that takes a search string and filename from the terminal & displays the results. 2. Write a Shell Script that takes pattern and filename as command line arguments and displays the results appropriately i.e. pattern found/pattern not found. 3. Write a Shell Script that accepts only three arguments from the command line. The first argument is the pattern string, the second argument is the filename in which the pattern is to be searched and the third argument is the filename in which the result is to be stored. 4. Write a Shell Script which creates the following menu and prompts for choice from user and runs the chosen command. Today's date Process of user List of files Quit to UNIX 5. Write a Shell Script that computes the factorial of a given number 6. Write a Shell Script that changes the extension of a group of files from txt to doc 7. Write a Shell Script that accepts both filename and a set of patterns as positional parameters to a script. 8. Write a Shell Script which will redirect the output of the date command without the time into a file.	L1,L3	16

<p>9. Write a Shell Script (using while loop) to execute endlessly (until terminated by user) a loop which displays contents of current directory, disk space status, sleep for 30 seconds and display the users currently logged in on the screen.</p> <p>10. Write a Shell Script that receives two filenames as arguments. It should check whether content of the two files is same or not. If they are same, second file should be deleted.</p> <p>11. If a number is input through the keyboard, WASS to calculate sum of its digits.</p> <p>12. Write a Shell Script which takes a command line argument of Kms and by default converts that number into meters. Also provide options to convert km to dm and km to cm.</p> <p>13. Write a Shell Script using for loop, which displays the message "Welcome to the UNIX System"</p> <p>14. Write a Shell Script to change the filename of all files in a directory from lower-case to upper-case.</p> <p>15. Write a Shell Script that examines each file in the current directory. Files whose names end in old are moved to a directory named old files and files whose names end in .c are moved to directory named cprograms.</p> <p>16. Write a Shell Script which searches all files in the given directory (to be taken as command line argument) for the file having the title (to be taken as command line argument), as the first line in the file.</p> <p>a) Display the contents of the searched file.</p> <p>b) In the end, print the file is ###, where ### is small-sized if total no. of lines is <50 ### is medium-sized if total no. of lines between 50&100 ### is large-sized.</p> <p>17. Write a shell script which reports names and sizes of all files in a directory (directory would be supplied as an argument to the shell script) whose size is exceeding 1000 bytes. The filenames should be printed in descending order of their sizes. The total number of such files should also be reported.</p> <p>18. Write a shell script to calculate and print the first m Fibonacci numbers.</p> <p>19. Write a shell script to compute the GCD and LCM of two numbers.</p> <p>20. Write a shell script to generate all combinations of 1, 2 and 3 using for loop.</p>		
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**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6:Evaluation

Text Books

1. "Unix Concepts and application" Das Sumitabha Tata Mcgraw Hill

Reference Books

1. "Unix Programming Environment" The Kernighan and Pike Prentice – Hall of India

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA –Internal Assessment, A- Attendance, LR – Lab Record, V – Viva, PR- Performance, EE- External Exam

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CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	1	--	1	--	--	--	--	--	--	--	--	--	1	--	--
CO2	1	--	1	--	--	--	--	--	--	--	--	--	1	--	--
CO3	1	--	1	--	--	--	--	--	--	--	--	--	1	--	--

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IFT2335	SUMMER INTERNSHIP EVALUATION-I	L	T	P	C
Version: 2017.1	Date of Approval: June 2017	0	0	0	3
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

The objective of this course is to provide practical training on some live projects that will increase capability to work on actual problem in industry. This training may undergo in an industrial environment or may be an in-house training on some latest software which is in high demand in market. This training will be designed such that it will useful for their future employment in industry.

Course Objectives

The objective of this course is to

1. Provide practical training on live projects
2. Increase technical capabilities on solving real life problems in company environment

Course Outcomes

On completion of this summer internship, the students will be able to:

CO1: Develop communication, interpersonal and other critical skills in the job interview process.

CO2: Design and develop software and hardware projects

CO3: Assess interests and abilities in their field of study.

CO4: Demonstrate excellent technical and communication skills to acquire employment contacts leading directly to a full-time job following graduation from college.

Text Books

As per topic of summer internship project is chosen and discussion with guide.

Reference Books

As per topic of summer internship project is chosen and discussion with guide.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:


Components	V	PPT	R	IM	EM
Weightage (%)	10	10	10	30	70

V – Viva, PPT-Power Point Presentation, R – Report, IP-Internal Marks, EM-External Marks

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	2	1	2	2	--	--	--	1	--	--	--	1	1	1	1
CO2	1	1	2	2	2	--	--	--	1	--	--	--	1	1	1	1
CO3	1	1	2	3	2	--	--	--	1	--	--	--	1	1	1	1
CO4	1	1	2	2	2	--	--	--	1	--	--	--	1	1	1	1

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IFT2413	DESIGN & ANALYSIS OF ALGORITHM	L	T	P	C
Version 2017.1	Date of Approval: 14 June, 2017	3	0	0	3
Pre-requisites/Exposure	Basic knowledge of Data Structure				
Co-requisites	Nil				

Catalog Description

The designing of algorithm is an important component of computer science. The objective of this course is to make students aware of various techniques used to evaluate the efficiency of a particular algorithm. Students eventually should learn to design efficient algorithm for a particular problem.

Course Objectives

The objective of this course is to

1. Analyze the asymptotic performance of algorithms.
2. Demonstrate a familiarity with major algorithms and data structures.
3. Apply important algorithmic design paradigms and methods of analysis.
4. Synthesize efficient algorithms in technical design situations.

Course Outcomes

On completion of this course, the students will be able to

CO1: Explain use of asymptotic notations and principles of Divide and Conquer algorithms and solve various problems using that strategy.

CO2: Explain principles of Greedy Algorithms and Dynamic Programming and apply the strategy to solve various problems.

CO3: Explain basic concepts of graphs and apply various design strategies to solve graph related problems.

CO4: Apply the various algorithms indifferent areas of Computer Science.

Modules	Blooms level*	Number of hours
Module I: Introduction Algorithm Design paradigms - motivation, concept of algorithmic efficiency, concept of running time, analysis of algorithms, Growth of Functions, Asymptotic Notations, Structure of divide-and-conquer algorithms, analysis of divide-and-conquer algorithms, example algorithms - Quick Sort, Merge Sort, Strassen Multiplication, Recurrences- Substitution Method, Recursion Tree Method, Iteration Method, Master's Method.	L1, L2 and L3	8
Module II: Advanced Design Techniques Greedy Algorithms - Introduction, elements of greedy strategy, Fractional Knapsack Problem, activity selection problem, Dynamic Programming - Overview, difference between dynamic programming and divide and conquer, Matrix Chain Multiplication, Longest Common Sub-sequence, 0/1 - Knapsack Problem. Difference between Greedy and Dynamic Programming Approach.	L2, L3 and L4	10
Module III: Graph Algorithms Representation of Graphs, Graph Traversal - BFS and DFS, Topological Sort, Strongly Connected Components.	L2, L3 and L4	10

Minimum Spanning Tree, Kruskal's Algorithm, Prim's Algorithm, , Single Source Shortest Paths, Dijkstra's Algorithm, Bellmanford Algorithm, All Pair Shortest Path Problem, Floyd Warshall's Algorithm.		
Module IV: Selected Topics Back tracking - Introduction, n-Queens Problem, NP-Completeness – Definition and examples of Class P, NP, NP-Hard and NP Complete, Polynomial reduction. Approximation Algorithms – Introduction, Performance Bounds, Example Problems – Vertex Cover Problem, Travelling Salesperson Problem. Randomized Algorithms. Application of algorithms in different areas of Computer Science.	L2, L3 and L4	8

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5:Synthesis, L6:Evaulluation

Text Books

1. T. H. Cormen, Leiserson, Rivest and Stein, "Introduction of Computer algorithm"
2. E. Horowitz, S. Sahni, and S. Rajsekar, "Fundamentals of Computer Algorithms," Galgotia Publication

Reference Books

1. Sara Basse, A. V. Gelder, "Computer Algorithms," Addison Wesley
2. J.E Hopcroft, J.D Ullman, "Design and analysis of algorithms", Addison Wesley
3. D. E. Knuth, "The art of Computer Program, Addison Wesley

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	15	5	5	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;

Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	1	2	--	--	--	--	--	--	--	--	--	--	1	3	--
CO2	1	--	2	3	--	--	--	--	--	--	--	--	1	3	--
CO3	1	2	3	3	--	--	--	--	--	--	--	--	1	3	--
CO4	1	1	2	--	--	--	--	--	--	--	--	--	1	3	--
CO5	1	1	2	--	--	--	--	--	--	--	--	--	1	--	--

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IFT2424	MULTIMEDIA & ITS APPLICATIONS	L	T	P	C
Version 2019.1	Date of Approval: 15 May, 2019	3	0	0	3
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

This course is intended to describe technical characteristics and performance of multimedia system and terminals. It will help in designing creative approach in application of multimedia devices, equipment and systems. . Also provide students to interpret and analyze measurement results obtained on the multimedia system and components. It provides to test multimedia communication systems and equipment in real conditions.

Course Objectives

The objective of the course is

1. to provide an overview of different multimedia technologies like audio and video including multimedia devices.
2. to include some practical sessions on these technologies.

Course Outcomes

After the completion of course, the students will be able to,

- CO1. Identify and Describe basic principles of multimedia communication systems and its application.
- CO2. Identify and define concepts of digital audio representation and processing using computer techniques and tools for creating and editing the Interactive multimedia applications.
- CO3. Identify and describe video technology including Raster Scanning Principles.
- CO4. Identify and describe video technology including Raster Scanning Principles, Sensors for T.V.Cameras, Color Fundamentals, color Video, Video Equipments and Worldwide Television Standards.
- CO5. Identify and describe Multimedia Devices, Presentation Services and the User Interface. Apply multimedia in different field of life.

Modules	Blooms level*	Number of hours
Module I: Introduction Introduction: Objectives – History of Multimedia – Its market – Content copyright – Resources for multimedia developers – Types of produces – Evaluation – Hardware Architecture – OS and Software – Multimedia Architecture – Software library – Drivers.	L1, L2 and L3	8
Module II: Digital Audio Representation and Processing Uses of audio in computer applications, digital representation of sound, transmission of digital sound, digital audio signal processing, digital audio and the computer.	L2 and L3	7
Module III: Video Technology Raster scanning principles, sensors for T.V. cameras, color fundamentals, color video, video equipment, worldwide television standards.	L4 and L5	7
Module IV: Digital Video and Image Compression Evaluating a compression system, redundancy and visibility, video compression techniques, the JPEG image compression standards, the MPEG motion video compression standard, DVI technologies, Time Based Media Representation and Delivery.	L4 and L5	5
Module V: Multimedia Devices, Presentation Services and the User Interface-		5

Introduction .Multimedia services and Window systems, client control of continuous media, device control, temporal co ordination and composition, hyper application.	L3 and L4	
Module VI: Application of Multimedia Intelligent multimedia system, desktop virtual reality, multimedia conferencing.	L3 and L4	4

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text & Reference Books

1. Multimedia systems John F. Koegal Buford Addison- Wesley

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS O 1	PS O 2	PS O 3
CO 1	1	--	3	--	--	--	--	--	--	1	--	1	--	2	3
CO 2	1	--	3	--	--	--	--	--	--	1	--	1	--	2	3
CO 3	1	--	--	--	--	--	--	--	--	1	--	1	--	2	3
CO 4	1	--	--	--	--	--	--	--	--	1	--	1	--	2	3
CO 5	1	--	--	--	--	--	--	--	--	1	--	1	--	2	3

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IFT2418	DATA COMMUNICATION AND COMPUTER NETWORKS	L	T	P	C
Version 2017.1	Date of Approval:14 June, 2017	3	0	-	3
Pre-requisites/Exposure	Basics of Computers				
Co-requisites					

Catalog Description

The goal is to acquaint the students with the basics of data communication and networking. A structured approach to explain how networks work from the inside out is being covered. The physical layer of networking, computer hardware and transmission systems have been explained. In-depth includes routing process, error detection techniques, noisy protocols and various applications of layers of OSI model.

Course Objectives

The objective of this course is to

1. To provide an overview of data communication and computer networks, network specific protocols, networking devices, OSI /TCP-IP Layer concepts.
2. To serve as a foundation for the study of advanced networking concepts.

Course Outcomes

On completion of this course, the students will be able to

CO1. State the functions of data component in communication, networking devices, characteristics of topologies and describe the functionality of layers in OSI model.

CO2. Explain parallel and serial transmission; Differentiate between periodic and aperiodic signals including data encoding techniques.

CO3. Illustrate the working and applications of guided and unguided media. Explain working of ISDN.

CO4. Explain flow control and error control protocols.

CO5. Compare and Contrast different routing algorithms; discuss the frame format of IPv4 and IPv6 with working of TCP protocol.

Modules	Blooms level*	Number of hours
MODULE 1: Introduction to Data Communication, Networks-protocols, advantages, disadvantages & applications, Line Configuration, topology, Transmission mode, Classification of networks. OSI Model, functionality of layers in OSI model, Protocols at each layer, encapsulation, peer-to-peer communication.	L1, L2	8
MODULE 2: Parallel & Serial Transmissions, Analog& Digital Signals, Periodic & Aperiodic Signals, Data encoding techniques-Digital data-digital signals, Digital data-Analog signals, Analog data- Digital signals, Analog data-Analog signals, Multiplexing.	L2, L3 and L4	8
MODULE 3: Transmission Media-Twisted Pair Cable, Coaxial Cable, Fiber-Optics Cable, Radio frequency Allocation, Terrestrial Microwave, Infrared rays, Satellite Communication, Cellular Telephony. Introduction to ISDN.	L3 and L4	6

MODULE 4: Framing, Switching, Types of Errors, Error Detection & Correction (VRC, LRC, CRC, Checksum, Hamming Code), Flow Control (Stop-and-wait & Sliding Window), Error Control (Stop & Wait ARQ, Sliding Window ARQ using Go-back n method and Selective-Reject), IEEE Standards-802.3, Token Bus (802.4), Token Ring (802.5), FDDI.	L2, L3 and L4	6
MODULE 5: Routing process, Routing Algorithms-Shortest Path Routing, Flooding, Distance Vector Routing, Link State Routing, Addressing-IPv4, IPv6, Internetworking, Connection-oriented Vs Connectionless protocols-TCP,UDP.	L2, L3 and L4	10

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Text Books

1. Data Communication and Networking by BehrouzForouzan,FourthEdition,TMH.
2. Computer Networks by A.S. Tanenbaum, Fifth Edition, Prentice Hall.

References Books

1. Data and Computer Communications by W. Stallings, Prentice Hall.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;

Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	1	2	--	--	--	--	--	--	--	--	--	--	--	1	--
CO2	1	2	3	--	--	--	--	--	--	--	--	--	--	1	--
CO3	1	1	2	3	3	--	--	--	--	--	--	--	--	1	--
CO4	1	1	2	3	--	--	--	--	--	--	--	--	--	1	--
CO5	1	1	2	3	--	--	--	--	--	--	--	--	--	1	2

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IFT2422	COMPUTER GRAPHICS	L	T	P	C
Version 2017.1	Date of Approval:14 June, 2017	3	-	-	3
Pre-requisites/Exposure	Basic Knowledge of C Programming				
Co-requisites	Nil				

Catalog Description

This course presents basic principles for the design, use and understanding of computer graphics systems. This course includes various standard algorithms and their complexity to draw graphics objects. This course also teaches the students about different algorithms for 2D /3D transformation, clipping operations on objects, hidden surface removal and detection.

Course Objectives

The objective of this course is to

1. Equip the students with mathematical concepts of graphics algorithms to draw Graphics objects using C language and standard algorithms.
2. Provide an overview of various 2D & 3D transformation, clipping operations, algorithms related to hidden surface detection and elimination and their implementation.

Course Outcomes

On completion of this course, the students will be able to

CO 1: Define various standards and components in development of computer graphics.

CO 2: Explain generation of graphics primitives and analyze their problems and solutions.

CO 3: Demonstrate solid filling using polygon fill algorithm with interior region testing methods.

CO 4: Apply 2D geometric transformations on 2D graphics objects with their practical implementation.

CO 5: Illustrate use of coordinate mapping and their transformation and analyze use of line and polygon clipping algorithms.

CO 6: Apply 3D geometric transformations on 3D objects with their practical implementation and assess logic behind visible surface detection algorithms with practical implementation of 3D transformations.

Modules	Blooms level*	Number of hours
Module I: Introduction of Graphics Development of Computer Graphics, Basic Graphics System and Standards. Graphics Devices: Raster and Random Scan Devices, Continual Refresh and Storage Displays, Display Processor, Color Display Techniques, Frame Buffer, Concepts in Raster Graphics and color generation.	L1, L2 and L3	6
Module II: Graphics Primitives Points, Pixels, Scan Conversion, Line Drawing Algorithms, Circle Drawing Algorithms, Anti-aliasing Technique, Methods of Character generator. Polygon Polygon representation, Polygon Filling algorithm, Inside/Outside Testing .	L1, L2 and L3	7
Module III: Transformation Scaling, Translation, Rotation, Composite Transformation , Fix point scaling , Rotation about arbitrary point, Reflection, Shears, Composite Transformation, Modeling and Coordinate Transformation	L2, L3 and L4	7

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Viewing: Interactive Picture Construction Techniques, Interactive Input/Output Devices		
Module IV: Segment Segment Table, Creating Deleting and Renaming a Segment, Visibility and Image Transformation Windowing and Clipping: Window, View-port, Line clipping, polygon clipping, Window to viewport transformation, polygon clipping using Sutherland Hodgman Algorithm.	L2, L3 and L4	8
Module V: 3-D Transformation and Visible surface detection 3-D Transformation: shearing, scaling, translation. Rotation, Homogeneous coordinates. Visible surface detection: Z - buffer algorithm, Scanline Visible surface detection algorithm, painter's algorithm, fractal and its Properties	L2, L3 and L4	8

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

1. Udit Agrawal, "Principles of Computer Graphics", 2nd Edition, Dhanpat Rai Publications, New Delhi, 2017.
2. Hughes, Van Dam, et al. "Computer Graphics Principles and Practice", 3rd Edition, Pearson, 2014.
3. Hearn and Baker, "Computer Graphics with OpenGL", 3rd Edition, Prentice Hall, 2004.

Reference Books

1. James D. Foley, Andries van Dam, Steven K. Feiner, John Hughes, "Computer Graphics: Principles and Practice", 2nd Edition, Pearson Education, 2007.
2. F.S. Hill, "Computer Graphics using OPENGL", 2nd edition, Pearson Education, 2003.
3. David F. Rogers; "Procedural Elements for Computer Graphics" TMH. Publications.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	1	3	1	--	--	--	--	--	--	--	--	--	2	--	2
CO2	1	1	1	--	--	--	--	--	--	--	--	--	2	--	2
CO3	1	1	1	3	2	--	--	--	--	--	--	--	1	3	1
CO4	1	1	2	2	2	--	--	--	--	--	--	--	2	--	1
CO5	1	3	2	1	1	--	--	--	--	--	--	--	2	3	2

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IFT2420	DATA COMMUNICATION AND COMPUTER NETWORKS LAB	L	T	P	C
Version 2017.1	Date of Approval :14 June, 2017	-	-	2	1
Pre-requisites/Exposure	Basics of CISCO router				
Co-requisites	NIL				

Catalog Description

The course familiarizes with the equipment applications and protocols installed in enterprise networks, with a focus on switched networks, IP Telephony requirements, and security. It also introduces advanced routing protocols such as Enhanced Interior Gateway Routing Protocol (EIGRP) and Open Shortest Path First (OSPF) Protocol. Hands-on exercises include configuration, installation, and troubleshooting.

Course Objectives

The objective of this course is to

1. Make the students understand configuration of routing protocols.
2. Provide a demonstration of troubleshooting of different protocols.

Course Outcomes

On completion of this course, the students will be able to

- CO1. Apply the knowledge of CISCO router to understand its basic configuration, Enterprise network and implement inter -VLAN routing.
- CO2. Demonstrate the configuration of OSPF and RIP protocol.
- CO3. Demonstrate the configuration of EIGRP and BGP protocol.
- CO4. Apply the knowledge of basic WAN connections using HDLC and PPP protocol.
- CO5. Demonstrate the standard and extended ACL on router.

Modules	Blooms level*	Number of hours
1. Drawing an Enterprise Network for Amity University showing its different campuses across the country. 2. Configuring all the devices (PCs, Servers, Switches) to create a LAN within campuses of the Enterprise Network. 3. Configuring Virtual LANs (VLANs) in an Enterprise Network. 4. Configuring Trunking and Inter-VLAN Routing in an Enterprise Network.	L3, L5	4
5.Implementing RIP (Routing Information Protocol) to enable communication between different LANs. 6. Implementing OSPF (Open Shortest Path First) to enable communication between different LANs.	L3, L5	2
7.Implement EIGRP (Interior Routing Protocol) to establish connectivity	L3, L5	2

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within domestic campuses of the Enterprise Network. 8. Implement BGP (Border Gateway Protocol) and Redistribution to establish connectivity between different campuses of the Enterprise Network.		
9. Configuring WAN connectivity using protocols-HDLC and PPP. 10. Implementing Frame-Relay to configure WAN service provider cloud.	L3, L5	2
11. Configuring Standard and Extended ACLs on a Router. 12. Troubleshooting Switching, Routing and ACL issues.	L3, L5	2

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. Data Communication and Networking by Behrouz Forouzan, Fourth Edition, TMH.
2. Computer Networks by A.S. Tanenbaum, Fifth Edition, Prentice Hall.

References Books

1. Data and Computer Communications by W. Stallings, Prentice Hall.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.
Software : Packet tracer.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	1	2	--	--	--	--	--	--	--	--	--	--	--	1	--
CO2	1	2	3	--	--	--	--	--	--	--	--	--	--	1	--
CO3	1	1	2	3	3	--	--	--	--	--	--	--	--	1	--
CO4	1	1	2	3	--	--	--	--	--	--	--	--	--	1	--
CO5	1	1	2	3	--	--	--	--	--	--	--	--	--	1	--

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IFT2421	DESIGN & ANALYSIS OF ALGORITHM LAB	L	T	P	C
Version 2017.1	Date of Approval: 14 June, 2017	0	0	2	1
Pre-requisites/Exposure	C Programming				
Co-requisites	Basic knowledge of Data Structure				

Catalog Description

This course is intended to implement the various algorithm strategies for solving the problems using programming language.

Course Objectives

The objective of this course is to

1. equip the students with implementation of various algorithms.
2. provide sound foundation of design strategies for problem solving.
3. measure and compare the performance of different algorithms.

Course Outcomes

On completion of this course, the students will be able to

CO1: Implement the concept of Divide and Conquer algorithms to solve various problems.

CO2: Demonstrate the use of Greedy Algorithms to solve various problems.

CO3: Apply the principle of Dynamic Programming to solve various problems.

CO4: Apply various design strategies to solve graph related problems.

Modules	Blooms level*	Number of hours
1. Programs on sorting algorithms using Divide and Conquer technique. <ul style="list-style-type: none"> To implement Merge Sort. To implement Quick Sort. 	L1,L3	2
2. Programs on algorithm based on Greedy Method. <ul style="list-style-type: none"> Implement Fractional knapsack. Demonstrate the Activity Selection Problem. 	L1,L3	4
3. Programs on algorithm based on Dynamic programming. <ul style="list-style-type: none"> Implement 0/1 Knapsack problem. Compute the minimum number of multiplication for given set of matrices using Matrix Chain Multiplication. Compute the length of longest common subsequence for given sequences using LCS. 	L1,L3	6
4. Programs on Graph Algorithms. <ul style="list-style-type: none"> Print all the nodes reachable from a given starting node in a digraph using BFS method. Check whether a given graph is connected or not using DFS Method. Find minimum spanning tree of a given graph using Prim's algorithm. Find minimum spanning tree of a given graph using Kruskal's algorithm. Implement Single Source Shortest Path problem using Dijkstra's algorithm. 	L1,L3	10

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**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. T. H. Cormen, Leiserson, Rivest and Stein, "Introduction of Computer algorithm"
2. E. Horowitz, S. Sahni, and S. Rajsekaran, "Fundamentals of Computer Algorithms," Galgotia Publication.

Reference Books

1. Sara Basse, A. V. Gelder, "Computer Algorithms," Addison Wesley
2. J.E Hopcroft, J.D Ullman, "Design and analysis of algorithms", Addison Wesley
3. D. E. Knuth, "The art of Computer Program, Addison Wesley

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

IA				EE
A	PR	LR	V	70
5	10	10	5	

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO1	1	--	1	--	--	--	--	--	--	--	--	--	1	--	--
CO2	1	--	1	--	--	--	--	--	--	--	--	--	1	--	--
CO3	1	--	1	--	--	--	--	--	--	--	--	--	1	--	--
CO4	1	--	1	--	--	--	--	--	--	--	--	--	1	--	--

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IFT2423	COMPUTER GRAPHICS LAB	L	T	P	C
Version 2017.1	Date of approval: 14 June, 2017	-	-	2	1
Pre-requisites/Exposure	Basic Knowledge of C Programming				
Co-requisites	Nil				

Catalog Description

This course presents basic principles for the design, use and understanding of computer graphics systems. This course includes various standard algorithms and their complexity to draw graphics objects. This course also teaches the students about different algorithms for 2D /3D transformation, clipping operations on objects, hidden surface removal and detection.

Course Objectives

The objective of this course is to

1. Equip the students with mathematical concepts of graphics algorithms to draw Graphics objects using C language and with standard algorithms.
2. Provide an overview of various 2D & 3D transformation, clipping operations, algorithms related to hidden surface detection and elimination and their implementation.

Course Outcomes

On completion of this course, the students will be able to

CO 1: Define various standards and components in development of computer graphics.


CO 2: Explain generation of graphics primitives and analyze their problems and solutions. Demonstrate solid filling in objects using polygon fill algorithm with interior region testing methods.

CO 3: Apply 2D geometric transformations on 2D graphics objects with their practical implementation.

CO4: Illustrate use of coordinate mapping and their transformation and analyze use of line and polygon clipping algorithms with their practical implementation.

CO 5: Apply 3D geometric transformations on 3D objects with their practical implementation and assess logic behind visible surface detection algorithms with practical implementation of 3D transformations. Illustrate use of fractal and iterated function system and analyze the use of illumination model in 3D graphics.

Modules	Blooms level*	Number of hours
Module I: Introduction of Graphics 1. Demonstrate the use of graphics library functions to draw various graphics objects. 2. Demonstrate the use of graphics library functions to draw pie chart. 3. Demonstrate the use of graphics library functions to draw bar chart on screen.	L3,L5	2


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<p>Module II: Graphics Primitives</p> <ol style="list-style-type: none"> 1. Demonstrate the use of DDA line drawing algorithm to draw line on the screen when $m \leq 1$ and $m > 1$. 2. Demonstrate the use of DDA line drawing algorithm to draw line on the screen when $m \leq 1$ and $m > 1$. 3. Demonstrate the use of Bresenham's line drawing algorithm to draw line on the screen when $m \leq 1$ and $m > 1$. 4. Demonstrate the use of circle drawing algorithm to draw circle on the screen. 5. Write a program to draw characters on screen using bitmap character generation method. 6. Write a program to fill a polygon using boundary fill algorithm. 7. Write a program to fill a polygon using flood fill algorithm. 	L3,L5	6
<p>Module III: Transformation</p> <ol style="list-style-type: none"> 1. Write a program to translate a triangle where translation factors are $t_x=20$ and $t_y=30$. 2. Write a program to rotate a triangle in clock-wise and anti-clock-wise direction where rotation angle is 300. 3. Write a program to scale a square where scaling factors are $S_x=2$ and $S_y=3$. 4. Write a program to reflect a triangle about X axis. 5. Demonstrate combine 2D transformation after applying translation, rotation and scaling transformations. 6. Write a program to demonstrate fix point scaling where scaling factors are $S_x=2$ and $S_y=3$. 	L3,L5	6
<p>Module IV: Segment</p> <ol style="list-style-type: none"> 1. Write a program to demonstrate line clipping algorithm to clip a line where line slop is $m \leq 1$. 2. Write a program to demonstrate window to viewport transformation and liner mapping of the object coordinates in viewport where size of viewport is half to the size of window. 3. Write a program to clip a polygon using Sutherland hodgeman polygon clipping algorithm. 	L3,L5	4
<p>Module V: 3-D Transformation and Visible surface detection</p> <ol style="list-style-type: none"> 1. Write a program to translate a 3D triangle where translation factors are $t_x=20$ and $t_y=30$. 2. Write a program to rotate a 3D triangle in clock-wise and anti-clock-wise direction where rotation angle is 300. 3. Write a program to scale a 3D square where scaling factors are $S_x=2$ and $S_y=3$. 4. Demonstrate combine 3D transformation after applying translation, rotation and scaling transformations. 5. Write a program to draw Bezier curve and spline curve on the screen with 4 control points. 6. Write a program to generate fractals using iterated function system. 	L3,L5	6

*Bloom's Level:

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

1. Udit Agrawal, "Principles of Computer Graphics", 2nd Edition, Dhanpat Rai Publications, New Delhi, 2017.
2. Hughes, Van Dam, et al. "Computer Graphics Principles and Practice", 3rd Edition, Pearson, 2014.
3. Hearn and Baker, "Computer Graphics with OpenGL", 3rd Edition, Prentice Hall, 2004.
4. Donald Hearn & M. Pauline Baker, "Computer Graphics C Version", Pearson Education, New Delhi, 2004.

Reference Books

1. James D. Foley, Andries van Dam, Steven K. Feiner, John Hughes, "Computer Graphics: Principles and Practice", 2nd Edition, Pearson Education, 2007.
2. F.S. Hill, "Computer Graphics using OPENGL", 2nd edition, Pearson Education, 2003.
3. David F. Rogers; "Procedural Elements for Computer Graphics" TMH. Publications.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

IA				EE
A	PR	LR	V	70
5	10	10	5	

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	1	3	1	--	--	--	--	--	--	--	--	--	2	--	2
CO2	1	1	1	--	--	--	--	--	--	--	--	--	2	--	2
CO3	1	1	1	3	2	--	--	--	--	--	--	--	1	3	1
CO4	1	1	2	2	2	--	--	--	--	--	--	--	2	--	1
CO5	1	3	2	1	1	--	--	--	--	--	--	--	2	3	2

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IFT2510	JAVA PROGRAMMING	L	T	P	C
Version 2017.1	Date of Approval: 14 June, 2017	3	0	0	3
Pre-requisites/Exposure	Basics of Programming				
Co-requisites	NIL				

Catalog Description

The objective is to impart programming skills used in this object oriented language java. The course explores all the basic concepts of core java programming like object, classes, data types, features, operators, control structures, interfaces, packages, applets, awt, swings and socket programming. The students are expected to learn it enough so that they can develop the basic applications as well as web solutions like creating applets etc.

Course Objectives

The objective of this course is to

1. Equip the students with the basic feature of contemporary java required in solving complex problems.
2. Provide a practical knowhow and implementation of java programming concepts like classes, objects, packages, swings, socket programming

Course Outcomes

On completion of this course, the students will be able to

- CO1: Define and explain concept of byte code and platform independence, demonstrate basic java based application development using operators, if-else, loops and arrays.
- CO2: Distinguish between various types of inheritances, polymorphisms and other concepts and able to solve complex programming problems involving class objects, inheritances, and packages
- CO3: Describe hierarchy of exception classes and thread life cycle along with demonstrate and design solutions for some simple and complex applications using exception and multithreading concepts.
- CO4: Explain event delegation model and describe AWT class hierarchy; Apply knowledge of event handling and AWT controls create some new dynamic graphical applications.
- CO5: Explain the architecture of applet and concept of swing package. Demonstrate applications based on java applets and swings.

Modules	Blooms level*	Number of hours
Module I: Java Basics Concepts of OOP, Features of Java, How Java is different from C++, Environmental setup, Basic syntax, Objects and classes, Basic Data Types, Variable Types, Modifier Types, Basic operators, Loop Control, Decision Making, Strings and Arrays, Methods, I/O.	L1, L2 and L3	6
Module II: Java Object Oriented Inheritance, Overriding, Polymorphism, Abstraction, Encapsulation, Interfaces, Packages, Exploring java.util package.	L2 and L3	7
Module III: Exception Handling and Threading Exception Hierarchy, Exception Methods, Catching Exceptions, Multiple catch Clauses, Uncaught Exceptions Java's Built-in Exception. Creating, Implementing and Extending thread, thread priorities, synchronization suspending, resuming and stopping Threads, Multi-threading.	L2, L3 and L5	8

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Module IV : Event Handling And AWT Event handling Mechanism, Event Model, Event Classes, Sources of Events, Event Listener Interfaces AWT: Working with Windows, AWT Controls, Layout Managers	L2, L3, L4 and L5	8
Module V: Java Advanced Applet Class, Architecture, Skeleton, Display Methods. Swings: Japplet, Icons, labels, Text Fields, Buttons, Combo Boxes. Socket Programming: Socket methods, Server Socket methods, Socket Client and Socket Server examples	L2 and L3	7

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text:

1. "JAVA The Complete Reference" by Patrick Naughton & Herbert Schild, 10th Edition, TMH
2. "Introduction to JAVA Programming a primer", E. Balaguruswamy, 4th Edition, TMH

References:

1. "Introduction to JAVA Programming" By Daniel/Young PHI
2. "Java Script", By Jeff Frentzen and Sobotka, Tata McGraw Hill, 1999

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	2	1	--	--	--	--	--	--	--	--	--	--	2	--	--
CO2	3	1	--	--	--	--	--	--	--	--	--	--	1	2	--
CO3	2	1	2	--	--	--	--	--	--	--	--	--	1	2	--
CO4	1	3	2	--	--	--	--	--	--	--	--	--	2	--	2
CO5	1	3	--	--	--	--	--	--	--	--	--	--	1	--	--

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COMPUTER ORIENTED NUMERICAL METHODS

Course Code: IFT2517

Credit Units: 03

Course Objective:

The objective of this course is to provide conceptual understanding of various numerical methods, in particular, with reference to numerical solution of non linear equations and system of linear equations, interpolation, numerical differentiation and integration and numerical solution of ordinary differential equations. Important theorems and different formulae for various numerical methods to be covered with an aim of helping the students to understand the fundamentals, concepts and practical use of these methods in the field of computer sciences and applications.

Course Contents:

Module I: Numeric Computation

Computer Arithmetic- Floating point numbers-operations, Normalization and their Consequences, Absolute, Relative and Percent Error.

Iterative Methods:- Zeros of a single Transcendental equations and Zeros of Polynomial Equations using Bisection, False Position, Newton-Raphson Methods, Convergence of Solution.

Module II: Simultaneous Linear Equations

Solution of Simultaneous Linear Equations. Direct Methods:- Gauss elimination method, Pivoting, Gauss-Jordan Method. Iterative methods:-Jacobi's Methods, Gauss-Seidal Method.

Module III: Polynomial Interpolation

Newtons divided difference, Forward and backward difference Formulae, Difference Tables, Lagrange's Method.

Module IV: Numerical Differentiation and Integration

Formula for first and second order derivatives using newton's- Forward and Backward formula, Numerical Integration, Newton-Cotes Formula: Trapezoidal rule, Simpson's 1/3rd rule, Simpson's 3/8th rule, Weddle's rule.

Module V: Numerical Solution of Differential Equations

Basic Terminology of Differential Equations, Picard's Method, Euler's method, Taylor's Series method, Runge-Kutta Methods, Predictor –Connector Method.

Examination Scheme:

Components	CT1	A/C/Q	Attd	EE
Weightage (%)	15	10	5	70


Text & References:

Text:

- Jain M.K, Jain R.K andIyenger, Numerical Methods for Scientific and Engineering Applications, New Age international publishers

References:

- Rajaraman V, Computer Oriented Numerical Methods. PHI Learning pvt ltd
- Krishnamuty, E.V., Sen, S.K, Computer Based Numerical Algorithms. East West Press 1976


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IFT2525	BASICS OF CLOUD COMPUTING	L	T	P	C
Version 2019.1	Date of Approval: 15 May, 2019	3	1	0	4
Pre-requisites/Exposure	General Networking and basics of virtualization				
Co-requisites	Nil				

Catalog Description

The course introduces the basic concepts and methods of Cloud computing and develops the concepts and skills necessary to build applications in Cloud environments. The course starts by explaining the concepts of cloud computing, cloud architecture, model and the concepts of Virtualization. It then explains how such ideas form the basis for creating Computing Clouds where the concept of resources is virtualized. Case studies are used to show how applications can be run in a Cloud and the principles of creating images to run in Clouds are explained. The programming skills for business models that underlie Cloud Computing are also presented.

Course Objectives

The objective of this course is to

1. Equip the students with concepts virtualization and Cloud
2. Provide an overview of security issues and various tools available in Cloud

Course Outcomes

On completion of this course, the students will be able to

- CO1: Explain and differentiate between different types of computing and also determine them with the upcoming Cloud Computing environment.
- CO 2: Identify the different layers in the architecture of Cloud and explain the different services, deployment models and types of virtualization available.
- CO 3: Explain the power of scalability and fault tolerant system and other features of cloud, analyzing the management of cloud in business.
- CO 4: Explain, apply and compare the various security issues and their solutions and policies for security in Cloud environment.
- CO 5: Analyze programming Models, its workings and comparing them with each other.

Modules	Blooms level*	Number of hours
MODULE 1: Overview of Client/Server Computing, Peer to Peer Computing, Distributed Computing, Col-laborative Computing, Cloud Computing; Behaviour of Cloud Computing; Pros and Cons of Cloud Computing.	L1, L2 ,L3	8
MODULE 2: Understanding of Cloud Architecture, Cloud Storage, Cloud Services; Types of Cloud service development; Software as a Service, Platform as a Service, Web Services, On Demand Com-puting; Virtualization: Fundamental concepts of compute storage, Network virtualization; Pros and Cons of Cloud Service Development; Case study with Cloud Services Development Service and Tools.	L1,L2, L3	8
MODULE 3: Introduction to Scalability and Fault Tolerance with Cloud Computing; Cloud	L1, L2 and L4	6

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Solutions; Cloud Ecosystems; Cloud Business Process Management; Portability and Interoperability.		
MODULE 4: Security Overview; Cloud Computing Security Challenges; Security Policy Implementation, Computer Intrusion Detection and Response, Virtualization Security Management and Virtual Threats; Cloud Security Controls; Cloud Computing Attacks; Cloud Security services; Secure Cloud Software requirements; Policy Implementation.	L2, L3 and L4	8
MODULE 5: Map Reduce; Hadoop ;Analyzing the data with Hadoop; Case Study on Google App Engine, Microsoft Azure and Hadoop.	L2, L4	6

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

- Kai Hwang, Geoffrey C Fox & Jack G Dongarra, “**Distributed and Cloud Computing, From Parallel Processing to the Internet of Things**”, Morgan Kaufmann Publishers, 2012.
- Michael Miller, “**Cloud Computing**”, Pearson, 2008.
- Anthony T. Velte, Toby J. Velte & Robert Elsenpeter, “**Cloud Computing- A practical Approach**”, McGraw Hill, Chennai, 2017.

Reference Books

1. John W. Rittinghouse and James F. Ransome, “**Cloud Computing: Implementation, Management, and Security**”, CRC Press, 2010
2. Toby Velte, Anthony Velte, Robert Elsenpeter, “**Cloud Computing, A Practical Approach**”, TMH, 2009.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	--	3	--	--	--	--	--	--	--	2	--	1	1	-	-
CO2	1	2	3	--	2	--	--	--	--	--	--	--	1	1	-	-
CO3	1	2	--	--	--	--	--	--	--	--	1	--	-	1	-	2
CO4	1	--	3	--	2	1	--	--	--	--	--	--	-	1	-	2
CO5	1	--	2	--	1	--	--	--	--	--	--	--		1	-	-

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IFT2522	LINUX	L	T	P	C
Version 2017.1	Date of Approval: 14 June 2017	2	0	0	2
Pre-requisites/Exposure	Basics of OS				
Co-requisites	Nil				

Catalog Description

The Objective of this course is to explore the idea of Linux platform to graduate students. The fundamentals concepts of Linux Operating System, commands and Shell Programming will be prepared by the students to work on Linux platform, which is the requirement of each industry and in academic. The syllabus will cover the study of scripting languages such as PERL, TCL/TK and BASH. Creation of programs in the Linux environment, the principles of scripting languages and usage of scripting languages in IC design flow.

Course Objectives

The objective of this course is

1. Ability to create and run scripts using Perl / TCL.
2. Ability to use Linux environment and write programs.

Course Outcomes

On completion of this course, the students will be able to

- CO1. Outline basics of UNIX OS and Linux security system.
- CO2. Describe Linux file system and related commands.
- CO3. Illustrate implementation of Linux networking concepts.
- CO4. Demonstrate Perl and Tcl/tk scripts.

Modules	Blooms level*	Number of hours
Module I: Introduction History of Operating System, Types of Operating Systems, History of Linux and Unix, UNIX Family, Unix System Architecture, Kernel, Shell: Types of shells, Files and Directories, Absolute Path and Relative Path, root and hierarchical file structure of Unix, telnet, Introduction to Linux server security and administration.	L1 and L2	6
Module II: Linux Basics Introduction to Linux, File System of the Linux, General usage of Linux kernel & basic commands, Linux users and group, Permissions for file, directory and users, Searching a file & directory, zipping and unzipping concepts.	L2 and L3	6
Module III: Linux Networking Introduction to Networking in Linux, Network basics & tools, File transfer protocol in Linux, Network file system, Domain Naming Services, Dynamic hosting configuration Protocol & Network information Services.	L1 and L3	6
Module IV: Perl Scripting and Tcl/tk Scripting Introduction to Perl Scripting, working with Simple Values, Lists and Hashes, Loops and Decisions, Regular Expressions; Data Structures, Control Flow Commands, Procedures and Scope, Eval, Working With UNIX, Reflection and Debugging, Script Libraries, Tk Fundamentals, Tk by Examples, The Pack Geometry Manager, Binding Commands to XEvents, Buttons and Menus, Simple Tk Widgets, Entry and Listbox Widgets Focus, Grabs and	L2, L3 and L4	6

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**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. Sumitabha Das, "UNIX: Concepts and Application", TMH, 4th Edition.
2. Kanetkar. "UNIX Shell Programming", BPB
3. Richard Petersen, "Linux: The Complete Reference", Mcgraw Hill Education, ISBN: 9780070222946, 0070222940, 6th Edition.

Reference Books

1. Red Hat Enterprise Linux 4: System Administration Guide Copyright 2005 Red Hat, Inc.
2. Randal K. Michael., "Mastering Unix Shell Scripting: Bash, Bourne, and Korn Shell Scripting for Programmers, System Administrators, and UNIX Gurus.", Wiley
3. James K L, "Linux: Learning the Essentials", Phi Learning Private Limited, ISBN: 9788120344754, 8120344758, Edition: 2011.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	1	--	2	--	--	--	--	--	--	--	--	--	1	--	-
CO2	1	2	1	--	--	--	--	--	--	--	--	--	-	1	-
CO3	1	2	1	--	--	3	--	--	--	--	--	--	1	1	-
CO4	1	1	--	--	--	3	--	--	--	--	--	--	1	--	2

1: strongly related, 2: moderately related and 3: weakly related



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IFT2511	JAVA PROGRAMMING LAB	L	T	P	C
Version 2017.1	Date of Approval: June, 2017	0	0	2	1
Pre-requisites/Exposure	Basics of Programming				
Co-requisites	NIL				

Catalog Description

In this Lab course the basic features of contemporary java are implemented and demonstrated. Problems or programs will be related to concepts of classes, objects, threads, packages, exception handling, applets, AWT control, swings and socket programming. Concepts covered would enable them to create basic and complex console and graphical based applications for desktop and Internet.

Course Objectives

The objective of this course is to

1. Equip the students to apply knowledge of various basic java features required in solving basic and complex problems.
2. Provide a demonstration of basic java programming concepts like classes, objects, threads, packages, exception handling, applets, AWT control, swings and socket programming

Course Outcomes

On completion of this course, the students will be able to

CO1: Apply the concepts learned of operators, if-else, loops and arrays to java based application development.

CO2: Demonstrate the use of various types of inheritances, polymorphisms, class objects, inheritances, packages and other concepts to basic and complex java programming problems.

CO3: Apply the knowledge of exception handling and multithreading concepts for some simple and complex applications.

CO4: Apply knowledge of event handling and AWT controls to create some new dynamic graphical applications.

CO5: Demonstrate graphical applications based on java applets, swings and event handling.

Modules/Topics Covered**	Blooms level*	Number of hours
Sample Programs using Objects and classes, Variable Types, Modifier Types, operators, Loops Decision Making, Strings and Arrays, 1. WAP to display "Hello, it's a first program in java". 2. WAP to find sum of two integers taken as input from user at runtime. 3. WAP to find sum of two float numbers taken as command line arguments 4. WAP to find changed case of entered character. 5. WAP to find maximum of 3 integer numbers taken as input from user at runtime. 6. WAP in java to find out the greatest out of ten numbers stored using arrays. 7. WAP to create class with "name" as String and "age" as integer data members. The class should have two methods to take input from user and display the data. 8. WAP to find factorial of a number using class and object.	L3, L5	6
Sample Programs using Inheritance, Overriding, Polymorphism, Interfaces,	L3, L5	4

Packages 1. WAP in java to illustrate the concept of interfaces. 2. WAP to create a package as MyPack having a class with three methods: max, fact and show. Use it in other folder with setting classpath and without setting class path. 3. Write a program in java to showcase uses of super keyword		
Sample Programs using exception handling and threads 1. Write a program to demonstrate the use of nesting of try-catch block 2. WAP in java to illustrate the concept of using multiple catch clauses to handle different types of exceptions. 3. WAP in java to create a user defined Exception and throw it explicitly. 4. Demonstrate thread using Thread class and Runnable interface 5. Demonstrate various thread methods using a program	L3, L5	6
Sample Programs using event handling and AWT controls 1. Write a program to display “hello” in different color where user clicks left mouse button and “world” where right mouse button is clicked. Use black background. 2. WAP in java to create a Frame and handle window-closing event implementing the WindowListener interface. 3. WAP to create an Applet having various different buttons, recognizing them using action command string method and handling click event generated by them. 4. WAP to create a frame and illustrate the concept of using an adapter class in place of interfaces for handling various mouse events generated over frame window. 5. WAP in java to create a frame with AWT controls (like label, push buttons, Checkbox, Checkbox Group) and handle various events generated by them. 6. WAP in java to create a frame with various AWT controls (like choice, list, TextField and Buttons) and handle the events thrown by them.	L3, L5	6
Sample Programs using applets, swings and stream socket 1. Write an applet which will display “HAPPY” and “DEEPAVALI” as: The word “HAPPY” will roll from top to bottom and “DEEPAVLI” from bottom to “top”. Both will run at the same speed and stop simultaneously at the center of the applet. 2. Write an applet to display last 32 shades of red, green and blue in equal sized square grid accompanied by appropriate labels like” Last 32 shades of Red/Green/Blue color”. Make use of BorderFactory to apply border for each individual shade. 3. Create an applet with one single button with caption “Click”. On clicking the button will open a new Frame with title “Factorial”. The frame will have two three controls :TextField, Label and button. On clicking button calculate the factorial entered in TextField control. 4. Create Java programs to demonstrate day time client and server. 5. Create java programs to create echo client and server	L3, L5	2

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

** Sample Programs provided are not limited to these only, can include others as desired.

Text:

- “JAVA The Complete Reference” by Patrick Naughton & Herbert Schild, 10th Edition, TMH
- “Introduction to JAVA Programming a primer”, E. Balaguruswamy, 4th Edition, TMH

References:

- “Introduction to JAVA Programming” By Daniel/Young PHI
- “Java Script”, By Jeff Frentzen and Sobotka, Tata McGraw Hill, 1999

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

IA					EE
Components	A	PR	LR	V	35
Weightage (%)	5	10	10	5	

Note: IA –Internal Assessment, A – Attendance, PR – Performance, LR – Lab Record, V – Viva, EE- External Exam

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO1	2	1	--	--	--	--	--	--	--	--	--	--	2	--	--
CO2	3	1	--	--	--	--	--	--	--	--	--	--	1	2	--
CO3	2	1	2	--	--	--	--	--	--	--	--	--	1	2	--
CO4	1	3	2	--	--	--	--	--	--	--	--	--	2	--	2
CO5	1	3	--	--	--	--	--	--	--	--	--	--	1	--	--

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IFT2523	LINUX LAB	L	T	P	C
Version 2017.1	Date of Approval: 14 June 2017	0	0	2	1
Pre-requisites/Exposure	Basic Concepts of OS				
Co-requisites					

Catalog Description

This course is designed to get students familiar with the advance concepts of Linux. The course provides familiarity to concepts like C Programming in Linux, Perl and TCL scripting. Students will learn practical on Linux and hence can work on any application based on Linux advanced concepts.

Course Objectives

The objective of this course is

1. To make students familiar with the advance concepts and working of Linux.
2. Provide an overview of Perl and TCL scripting.

Course Outcomes

On completion of this course, the students will be able to

- CO1. Illustrate Linux basic concepts like shell scripts and working.
CO2. Explain concepts of C programming in Linux and apply them in real applications.
CO3. Design and implement various Perl scripts for a given problem.
CO4. Work on TCL scripts.

Modules	Blooms level*	Number of hours
Lab Session 1-2 Review of UNIX Commands, Redirection, Piping and shell programming.	L1 and L2	4
Lab Session 3-5 Writing shell scripts.	L1 and L3	6
Lab Session 6-8 Writing Perl Script.	L1 and L3	6
Lab Session 9-10 To prepare C programs in Linux	L1 and L3	4
Lab Session 11-12 Working with Foreign Key and Check Constraint.	L1 and L3	4

*Bloom's Level:

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. Sumitabha Das, "UNIX: Concepts and Application", TMH.
2. Kanetkar. "UNIX Shell Programming", BPB
3. TCL Tutorial: <https://www.guru99.com/tcl-tutorial.html>
4. Randal L. Schwartz "Learning Perl: Making Easy Things Easy and Hard Things Possible", O'Reilly.


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Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination
Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.


CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	1	1	2	--	--	3	--	--	--	--	--	--	1	--	2
CO2	1	1	2	--	--	--	--	--	--	--	--	--	1	--	-
CO3	1	1	--	--	--	--	--	--	--	--	--	--	1	--	-
CO4	1	--	--	--	--	--	--	--	--	--	--	--	1	--	1

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IFT2535	SUMMER INTERNSHIP EVALUATION-II	L	T	P	C
Version: 2017.1	Date of Approval: June 2017	0	0	0	3
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

The objective of this course is to provide practical training on some live projects that will increase capability to work on actual problem in industry. This training may undergo in an industrial environment or may be an in-house training on some latest software which is in high demand in market. This training will be designed such that it will useful for their future employment in industry.

Course Objectives

The objective of this course is to

1. Provide practical training on live projects
2. Increase technical capabilities on solving real life problems in company environment

Course Outcomes

On completion of this summer internship, the students will be able to:

CO1: Develop communication, interpersonal and other critical skills in the job interview process.

CO2: Design and develop software and hardware projects

CO3: Assess interests and abilities in their field of study.

CO4: Demonstrate excellent technical and communication skills to acquire employment contacts leading directly to a full-time job following graduation from college.

Text Books

As per topic of summer internship project is chosen and discussion with guide.

Reference Books

As per topic of summer internship project is chosen and discussion with guide.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:


Components	V	PPT	R	IM	EM
Weightage (%)	10	10	10	30	70

V – Viva, PPT-Power Point Presentation, R – Report, IP-Internal Marks, EM-External Marks

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	2	1	2	2	--	--	--	1	--	--	--	1	1	1	1
CO2	1	1	2	2	2	--	--	--	1	--	--	--	1	1	1	1
CO3	1	1	2	3	2	--	--	--	1	--	--	--	1	1	1	1
CO4	1	1	2	2	2	--	--	--	1	--	--	--	1	1	1	1

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IFT2622	INTERNET OF THINGS	L	T	P	C
Version 2019.1	Date of Approval: 15 May, 2019	3	1	0	4
Pre-requisites/Exposure	Basic Networking Concepts				
Co-requisites	Nil				

Catalog Description

The Internet is evolving to connect people to physical things and also physical things to other physical things all in real time. It's becoming the Internet of Things (IoT). The course enables student to understand the basics of Internet of things and protocols. It introduces some of the application areas where Internet of Things can be applied. Students will learn about the working of Internet of Things.

Course Objectives

The objective of this course is to

1. Equip the students with concepts of internet-of-things
2. Provide an overview of designing iot devices

Course Outcomes

On completion of this course, the students will be able to

CO1: Explain key terms and trends around the Internet of Things along with its physical and logical design

CO2: Understand the potential and value of the Internet of Things and Smart Services.

CO3: Describe the technologies used for the Internet of Things and mobile devices, including (passive and active) sensors, the physical communications layer, communications protocols, programming frameworks,.

CO4: Design python programs and have hands on experience on python programming

CO5: Develop IoT application of moderate complexity for a well-used mobile platform.using python, raspberry Pi and arduino programming

Modules	Blooms level*	Number of hours
Module I: Introduction to Internet of Things Definition & characteristics of IoT, physical design of IoT-things in IoT, IoT protocols, logical design of IoT- IoT functional block, IoT communication models, IoT communication APIs, IoT enabling technologies-wireless sensor networks, cloud computing, big data analytics, communication protocols, embedded systems, IoT levels and deployment templates, IoT application	L1, L2	8
MODULE 2: IoT and M2M Introduction to M2M , difference between IoT and M2M, SDN (software defined networking) and NFV (Network Function Virtualization) and their applications for IoT.	L2, L3 and L4	8
MODULE 3: IoT system management with NETCONF-YANG Need for IoT systems management, SNMP and its limitations, Network Operator Requirements, Introduction to NETCONF and YANG.	L2, L3 and L4	8
MODULE 4: Developing Internet of Things IoT Design Methodology, Logical design using Python- Python data types & data structures, control flow, functions, modules, packages, classes, file handling, Python packages for IoTJSON, XML, HTTPLib, URLLib, SMTPLib, IoT end devices-building blocks, Introduction to Raspberry Pi.	L2, L3 and L4	12

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MODULE 5: Case Studies of IoT Home Automation- Smart Lighting, Home Intrusion Detection, Cities-Smart Parking	L2, L4	2
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**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

- Internet of Things: A Hands-On Approach by ArshdeepBahga, Vijay Madiseti.
- Designing the Internet of Things by Adrian McEwen, Hakim Cassimally

Reference Books

- From Machine-to-Machine to the Internet of Things: Introduction to a New Age by Jan Holler, VlasiosTsiatsis, Catherine Mulligan, Stefan Avesand, StamatisKarnouskos, David Boyle

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

CO, PO and PSO mapping

	P O 1	P O 2	P O 3	P O 4	P O 5	P O 6	P O 7	P O 8	P O 9	P O 10	P O 11	P O 12	PS O 1	PS O 2	PS O 3	PS O 4
CO 1	1	--	--	3	--	--	--	--	--	--	2	--	1	1	-	-
CO 2	1	--	1	2	--	--	--	--	--	--	--	--	-	1	-	-
CO 3	1	--	1	2	--	--	--	--	--	--	--	--	-	1	-	2
CO 4	1	--	--	2	--	--	--	--	--	--	--	--	1	1	-	2

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COMPUTER ORIENTED STATISTICAL & OPTIMIZATION METHODS

Course Code: IFT2616

Credit Units: 03

Course Objective:

The objective of this course is to expose students to the fundamentals and concepts of statistical and optimization methods, in particular, with reference to frequency distribution and measures of central tendency, measures of dispersion, skewness and kurtosis, theory of probability, linear programming problems, transportation, assignment and game problems. This course is designed with an aim of helping the students to understand important theorems, different formulae and practical applications of these statistical and optimization methods in the field of Computer Sciences and Applications.

Course Contents:

Module I

Collection of Data, Sampling and Sampling Designs, Classification and Tabulation of Data, Graphical representation of Data, Measures of Central Value, Measures of Dispersion. Moments, Skewness, Kurtosis, Correlation and Regression.

Module II: Probability

Classical Definition of Probability, Algebra of Events, Probability Axioms, Conditional Probability.

Probability Distributions: Discrete and Continuous Distributions, Binomial Distribution, Poisson distribution, Normal Distribution.

Module III: Linear Programming

Mathematical Formulation of Linear Programming models and its Graphical Solutions, Simplex Method, Charne's Big M method, Two Phase Method.

Module IV: Transportation Problem

General Transportation model, Starting basic Solutions:-North west Corner Method, Least Cost Method, Vogel's Approximation Method, Test of optimality, unbalanced Problem. Assignment Problems

Module V: Game Theory

Two-Person Zero Sum Games, Maximin-Minimax Principal, Pure Strategies, Mixed Strategies, Expected Pay off, Concept of Dominance, Graphical Solution of $m \times 2$ and $2 \times n$ Games.

Examination Scheme:

Components	CT1	A/C/Q	Attd	EE
Weightage (%)	15	10	5	70

Text & References:

Text:

- P.K. Gupta & Manmohan, Linear Programming and Theory of Games, S Chand & Sons Educational Publishers
- S.C Gupta & V.K. Kapoor, Fundamentals of Mathematical Statistics, S Chand & Sons Educational Publishers

References:

- Hogg, Probability and Statistical Inference, Prentice Hall Publication
- Alexander. M. Mood, Introduction to the Theory of Statistics, Tata McGraw Hill


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IFT2618	INTRODUCTION TO OPEN SOURCE TECHNOLOGIES (PHP, MYSQL)	L	T	P	C
Version 2017.1	Date of Approval: 14 th June 2017	3	0	0	3
Pre-requisites/Exposure	Basic Knowledge of HTML				
Co-requisites	Nil				

Catalog Description

The course includes the content about PHP and its Programming Concepts. It includes basic architecture of running a PHP Script. It also includes the concepts about Conditional, Control Statements, Array, Associative Array, String Functions and Concepts of Functions: Call by Value and Reference. The course also includes concepts related to Object Oriented Programming in PHP and website design support along with Database Support concepts which will be useful to design Backend for the website.

Course Objectives

The objective of this course is:

1. To provide a fundamental understanding of Dynamic Website Design in PHP.
2. To provide knowledge about various Frameworks build for Website Designing.

Course Outcomes

On completion of this course, the students will be able to

After completing the course, the students will be able to,

CO 1: Explain the basic concepts of PHP programming and apply it to rewrite PHP scripts using Strings and Functions

CO 2: Distinguish between various Conditional and Control Statements and rewrite PHP scripts based on the concepts

CO 3: Apply Object Oriented and Web Design concepts of PHP in order to prepare responsive web pages and websites

CO 4: Apply the concepts of Database and Database connectivity to prepare backend support for website.

CO 5: Compare and Contrast the behavior of various PHP frameworks and apply them to construct webpages and websites

Modules	Blooms level*	Number of hours
Module I: Introduction to Open Source and PHP programming Introduction to Open Sources Technologies, Introduction to PHP, installation and configuration, Advantages and Disadvantages of PHP, Client Side Scripting, Server Side Scripting, Variables, data types, various types of function, creating your own function, Strings in PHP, String Functions.	L1, L2	4
Module II: Operators, Loops, Array, Exception and Error Handling Operators, Conditions, Loops, Using for each, Creating and Using Arrays, Multidimensional Array, Associative Array. Error Handling in PHP, Errors and Exceptions, Exception class, try/catch block, throwing an exception, defining your own Exception subclass.	L1, L2	5
Module III: Classes, File system, Passing Information between pages Object oriented programming with Php, Working with Datetime, code re-use,	L2, L3	7

require (), include(), and the include_path; Understanding PHP file permissions, File reading and writing functions, File system functions, File uploads, Sending mail & use of email server. HTTP, GET arguments, POST arguments, Using Session in PHP, cookies, The setcookie() function, Deleting Cookies and Reading Cookies.		
Module IV: Working with database HTML Tables and Database tables, Databasemanipulation(Select, Insert, Update, Delete), validating User Input using Javascript. MYSQL, Introducing MySQL; database design concepts; the Structured Query Language (SQL); communicating with a MySQL backend via the PHP, MySQL API Building Database Applications, Developing PHP scripts for dynamic web page like feedback form, online admission form and online test.	L2, L3	5
Module V: Working with Frameworks Working with Mambo, Working with Joomla, Working with framework. Working with wordpress, Working with drupal, Use of Joomla in rapid development of website. Developing of simple website using joomla.	L2, L3 and L4	3

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. Steven Holzner "PHP : The Complete Reference", McGraw Hill Education, 2007.
2. Ivan Bayross, "Web enabled commercial Application Development using HTML, Javascript, DHTML and PHP", 4th Edition, BPB Publication, 2010.
3. Laura Thomson, "PHP and MySQL Web Development", 5th Edition, Pearson Education, 2016.

Reference Books

1. Robin Nixon, "Learning PHP, MySQL and Javascript", Shroff Publishers and Distributors private limited, 2015.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	1	3	1	--	--	--	--	--	--	--	--	--	2	--	2
CO2	1	1	1	--	--	--	--	--	--	--	--	--	2	--	2
CO3	1	1	1	3	2	--	--	--	--	--	--	--	1	3	1
CO4	1	1	2	2	2	--	--	--	--	--	--	--	2	--	1
CO5	1	3	2	1	1	--	--	--	--	--	--	--	2	3	2

1: strongly related, 2: moderately related and 3: weakly related

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IFT2620	INTRODUCTION TO OPEN SOURCE TECHNOLOGIES (PHP, MYSQL) LAB	L	T	P	C
Version 2017.1	Date of Approval: 14 th June 2017	0	0	2	1
Pre-requisites/Exposure	Basic Knowledge of HTML				
Co-requisites	Nil				

Catalog Description

The course includes PHP Programming Concepts. Conditional, Control Statements, Array, Associative Array, String Functions and Concepts of Functions: Call by Value and Reference are implemented. The course also includes concepts related to Object Oriented Programming in PHP and website design support along with Database Support concepts which will be useful to design Backend for the website.

Course Objectives

The objective of this course is:

1. To provide a fundamental understanding of Dynamic Website Design in PHP.
2. To provide knowledge about various Frameworks build for Website Designing.

Course Outcomes

On completion of this course, the students will be able to

- CO 1: Apply the basic concepts of PHP programming to rewrite PHP scripts using Strings and Functions
- CO 2: Demonstrate the concept of Conditional & Control Statements and 1 D, 2 D & Associative Array using PHP scripts
- CO 3: Apply Object Oriented and Web Design concepts of PHP in order to prepare responsive web pages and websites
- CO 4: Apply the concepts of Database and Database connectivity to prepare backend support for website.

Lab Sessions	Blooms level*	Number of hours
1. PHP Scripts on Basic Concepts <ul style="list-style-type: none"> • Write the process of installation of web server. • Write programs to print all details of your php server. Use phpinfo(). • Write a program to give demo of ECHO and PRINT command. • Write a program to implement the string functions. 	L1,L3	2
2. PHP Script on Conditional and Control Statements <ul style="list-style-type: none"> • Write a script to print Fibonacci series upto a given number. • Write a menu driven program to implement a calculator which performs only addition, subtraction, multiplication and division. The operation should happen based on user choice. • Write a script to calculate Factorial of a given number 	L1,L3	4
3. PHP Scripts on Arrays : 1D, 2D, Associative <ul style="list-style-type: none"> • Write a program sort ten number by using array. • Write a program to demonstrate the concept of associative array. 	L1,L3	4

<ul style="list-style-type: none"> Write a program to demonstrate the concept of multidimensional array. 		
4. PHP Scripts on Object Oriented Programming and File Handling Concepts <ul style="list-style-type: none"> Write a program to demonstrate the concept of Classes & objects. Write a php script including all the file handling functions. 	L1,L3	2
<ul style="list-style-type: none"> PHP Scripts on Webpage and Website Design Concepts Create a login form with two text fields called “login” and “password”. When user enters “Amity” as a user name and “university” as a password it should be redirected to a Welcome.HTML page or to Sorry.HTML in case of wrong username/password. Write a program to design login form in which find the greatest number amongst three numbers. WAP for Marksheet generation. Design a webpage for entering the student details with all the validations applied on it. Create a form with a text box asking to enter your favorite city with a submit button when the user enters the city and clicks the submit button another php page should be opened displaying “Welcometo the city”. 	L1,L3	6
5. PHP Scripts on Database Creation an Connectivity <ul style="list-style-type: none"> Create a database in MySql and connect that database from PHP. Write a program to Update, insert and delete the values of table in database. 	L1,L3	4

**Bloom’s Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. Steven Holzner “**PHP : The Complete Reference**”, McGraw Hill Education, 2007.
2. Ivan Bayross, “**Web enabled commercial Application Development using HTML, Javascript, DHTML and PHP**”, 4th Edition, BPB Publication, 2010.
3. Laura Thomson, “**PHP and MySQL Web Development**”, 5th Edition, Pearson Education, 2016.

Reference Books

1. Robin Nixon, “**Learning PHP, MySQL and Javascript**”, Shroff Publishers and Distributers private limited, 2015.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

PR: Practical, LR: Lab Record, V: Viva, EE: End Semester Examination, A: Attendance, IA: Internal Assessment



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CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	1	3	1	--	--	--	--	--	--	--	--	--	2	--	2
CO2	1	1	1	--	--	--	--	--	--	--	--	--	2	--	2
CO3	1	1	1	3	2	--	--	--	--	--	--	--	1	3	1
CO4	1	1	2	2	2	--	--	--	--	--	--	--	2	--	1

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IFT2604	DATA WAREHOUSING AND DATA MINING	L	T	P	C
Version 2017.1	Date of Approval: 14 June, 2017	3	0	0	3
Pre-requisites/Exposure	Introduction to Database Management System				
Co-requisites	Nil				

Catalog Description

In this course the concepts of Data warehouse and Data Mining are discussed in detail. The different data mining techniques such as clustering, classification, association are introduced. As a precursor to the study of data warehouse its architecture, types of OLAP Servers, and usage of OLAP are studied in detail. The concepts further enhances the concept of different attributes supported by data mining process, application of data mining in marketing, banking, retail sector and other areas are analyzed. .

Course Objectives

The objective of this course is to

1. Equip the students with concepts of data mining techniques namely classification, clustering and association.
2. Provide an overview of data warehouse which include the usage of OLAP ,its characteristics, OLAP architecture.

Course Outcomes

On completion of this course, the students will be able to

- CO1: Explain the concept of Datawarehouse,its characteristics,Metadata concepts and its importance, The schemas of Data warehouse with their application areas.
- CO2: Explain the architectural components of data warehouse and the challenges the data warehousing is facing.
- CO3: Explain the indexing of OLAP, the different OLAP operations performed on the data cube.
- CO4: Explain the concept of Data mining, its application and advantages
- CO5: Explain the concept of different data mining techniques like association, clustering and classification. The implement of these techniques on the different data sets.

Modules	Blooms level*	Number of hours
MODULE 1: Data Warehousing: Data Warehouse definition & Characteristics, The need for data ware housing, Operational and Informational Data Stores, Difference between Data warehouse and DBMS, Benefits of Data warehousing,Data mart, Meta Data, Conceptual Modeling of Data Warehouses: star schemas, Snowflake, Fact Constellations with example each.	L1 and L2	8
MODULE 2: Data Warehousing Components& Architecture Data Warehouse Architecture, Components of Data Warehouse Architecture, Data Warehousing Topologies, Meta Data, Components of Meta data, Mapping Meta Data. Challenges with Data Warehousing.	L2, L3 and L4	8
MODULE 3: On Line Analytical Processing (OLAP) Definition: OLAP, Difference between OLTP and OLAP, OLAP Server Architecture, OLAP Operations, Multi Relational &Multi Dimensional: MOLAP, ROLAP, OLAP Tools, Metadata Repository, Data Warehouse Back-End Tools and Utilities.	L2 and L3	10

MODULE 4: Data Mining Introduction to Data Mining, Applications, Limitations, Techniques, Association Rules: Apriori Algorithm, Classification: Decision Tree Cluster Analysis: Features, Types of Cluster Analysis Methods: Partitional, Hierarchical, Density Based, Grid based Methods, , Web Data Mining, Search Engine, Case Study, Limitations	L2, L3 and L4	10
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**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books:

1. Jiawei Han & Micheline Kamber, "Data Mining Concepts And Techniques", 3rd Edition, Morgan Kaufmann Publication, An Imprint of Elsevier, 2015.
2. Vipin Kumar, Pang Ning "Introduction to Data Mining", 3rd Edition, Pearson Publication, Chennai, 2016.
3. Mohammed, Wagner "Data Mining and Analysis", 4th Edition, Cambridge University Press, Brazil, 2018.

Reference Books:

1. Daneil, D. Larose "Data Mining and Predictive Analytics", 2nd Edition, John Wiley and Sons, Canada, 2015.
2. Paulraj "Data Warehousing Fundamental for IT Professional", 2nd Edition, John Wiley and Sons, Canada, 2010.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO1	1	2	--	--	--	--	--	--	--	--	--	--	1	--	--
CO2	1	1	2	3	--	--	--	--	--	--	--	--	1	--	--
CO3	1	2	3	--	--	--	--	--	--	--	--	--	1	--	--
CO4	1	1	2	--	--	--	--	--	--	--	--	--	1	3	--
CO5	1	1	2	3	--	--	--	--	--	--	--	--	1	3	--

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IFT2611	MOBILE COMPUTING	L	T	P	C
Version 2017.1	Date of Approval: 14 th June 2017	3	0	0	3
Pre-requisites/Exposure	Basic knowledge of Computer Networks				
Co-requisites	Nil				

Catalog Description

The objective of this consortium is to shape and expand a full-scale and sound mobile computing system market. To achieve this, cooperation is required of interests related to communication (network), computer hardware/software, system integrators (including service providers), and the media.

Course Objectives

The objective of this course is to

1. Give a general overview of the cellular technology and the associated terms and discuss the generations of the mobile technologies starting from 1G to 3G techniques.
2. Illustrate the GPRS and WAP model for 2G internet connectivity in detail.
3. Elaborate the third-generation mobile services
4. Describe the Global Mobile Satellite Systems in detail and basic architecture of Bluetooth technology and advanced topics in mobile computing.

Course Outcomes

On completion of this course, the students will be able to

CO1: Explain the basic concepts mobile technology, computing and basic architecture of PCS and GSM.

CO2: Describe the mobile networking Infrastructure through 2G technologies (GSM, GPRS, WAP).

CO3: Explain the basic concepts of 3G technologies (WCDMA, CDMA 2000) and WLL.

CO4: Discuss the working of mobile satellite systems like IRIDIUM and GLOBALSTAR.

CO5: Explain the concepts of Bluetooth technology, its working and protocols, virtual networks and enterprise networks.

Modules	Blooms level*	Number of hours
Module I: Introduction to Personal Communications Services (PCS) PCS Architecture, Mobility management, Networks signaling. Global System for Mobile Communication (GSM) system overview: GSM Architecture, Mobility management, Network signaling.	L1, L2 and L3	8
Module II: General Packet Radio Services (GPRS) & Wireless Application Protocol (WAP) GPRS Architecture, GPRS Network Nodes. Mobile Data Communication: WLANs (Wireless LANs) IEEE 802.11 standard, Mobile IP. Wireless Application Protocol (WAP): The Mobile Internet standard, WAP Gateway and Protocols, wireless mark up Languages (WML).	L1 and L2	10
Module III: Third Generation (3G) Mobile Services Introduction to International Mobile Telecommunications 2000 (IMT 2000) vision, Wideband Code Division Multiple Access (W-CDMA), and CDMA 2000, Quality of services in 3G.	L1 and L2	7

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Wireless Local Loop(WLL): Introduction to WLL Architecture, wireless Local Loop Technologies.		
Module IV: Global Mobile Satellite Systems Global Mobile Satellite Systems; case studies of the IRIDIUM and GLOBALSTAR systems.	L1 and L2	7
Module V: Enterprise Networks Introduction to Virtual Networks, Blue tooth technology, Blue tooth Protocols. Advanced techniques in mobile computing.	L1 and L2	4

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5:Synthesis, L6:Evaulluation

Text Books

1. "Wireless and Mobile Networks Architectures", by Yi-Bing Lin &ImrichChlamtac, John Wiley & Sons, 2001.
2. "Mobile and Personal Communication systems and services", by Raj Pandya, Prentice Hall of India, 2001.

Reference Books

1. "Wireless Web Development", Ray Rischpater, Springer Publishing, 2000.
2. "The Wireless Application Protocol", by Sandeep Singhal, Pearson Education Asia, 2000.
3. "Third Generation Mobile Telecommunication systems", by P.Stavronlakis, Springer Publishers, 2001.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:


Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	15	5	5	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	1	2	2	--	--	--	--	--	--	--	--	--	--	1	--
CO2	1	1	2	--	--	--	--	--	--	--	--	--	--	1	--
CO3	1	2	--	--	--	--	--	--	--	--	--	--	--	1	--
CO4	1	2	--	--	--	--	--	--	--	--	--	--	--	1	--
CO5	1	2	--	--	--	--	--	--	--	--	--	--	--	1	--

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IFT2619	E-COMMERCE	L	T	P	C
Version 2017.1	Date of Approval:14, June 2017	3	0	0	3
Pre-requisites/Exposure	Knowledge of basic computer				
Co-requisites	Nil				

Catalog Description

This course examines the evolution of enterprise resource planning (ERP) systems - from internally focused client/server systems to externally focused e-business. This class studies the types of issues that managers will need to consider in implementing cross-functional integrated ERP systems. The objective of this course is to make students aware of the potential and limitations of ERP systems. This objective will be reached through hands-on experience, case studies, lectures, guest speakers and a group project. The course would equip students with the basics of E-Commerce, technologies involved with it and various issues associated with.

Course Objectives

The objective of this course is to

1. Understand the students with the role of consultants, vendors and employees.
2. Provide an overview of various phases in ERP implementation and identify various technologies used in ERP.

Course Outcomes

On completion of this course, the students will be able to

- CO1: Describe the key features of Internet, Intranets and Extranets and explain how they relate to each other. Demonstrate an understanding of the foundations and importance of E-commerce and assess electronic payment systems.
- CO2: Understand concepts of reengineering, data mining, data warehousing and how they relate to ERP system implementations.
- CO3: Explain the challenges associated with implementing enterprise systems and their impacts on organizations.
- CO4: Describe the selection, acquisition and implementation of enterprise systems and demonstrate an ability to work independently and in a group.
- CO5: Identify and describe typical functionality in an ERP system.
- CO 6: Analyze the strategic options for ERP identification and adoption.

Modules	Blooms level*	Number of hours
MODULE 1: INTRODUCTION AND CONCEPTS: Networks and commercial transactions - Internet and other novelties; Networks and electronic transactions today, Model for commercial transactions; Internet environment - internet advantage, world wide web and other internet sales venues; Online commerce solutions. Security Technologies: Why is internet insecure? A brief introduction to Cryptography; Public key solution. Digital payment systems; First virtual internet payment system; cyber cash model Operational process of Digicash, Ecash Trail; Using Ecash; Smart cards; Electronic Data Interchange: Its basics; EDI versus Internet and EDI over Internet.	L1, L2 and L3	8
MODULE 2:	L1,L2	10

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INTRODUCTION ERP An Overview, Enterprise-An Overview, Benefits of ERP, ERP and Related Technologies, Business Process Reengineering (BPR), Data Warehousing, Data Mining, On-line Analytical Processing (OLAP), Supply Chain Management, Management Information systems (MIS), Decision support system (DSS), Executive Information systems (EIS). ERP – A Manufacturing Perspective Materials Requirement Planning (MRP), Bill of Material (Bom), Distribution Requirements Planning (DRP), JIT & Kanban, CAD/CAM, Product Data Management (PDM), Benefits of PDM, MTO, MTS, ATO, ETO, CTO.	and L3	
MODULE 3: ERP IMPLEMENTATION To be or not to be, ERP Implementation Lifecycle, Implementation Methodology, Not all Packages are Created Equal!, ERP Implementation-The Hidden Costs, Organizing the Implementation, Vendors, Consultants and Users, Contracts with Vendors, Consultants and Employees, Project Management and Monitoring, After ERP Implementation.	L1,L2 and L3	8
MODULE 4: THE BUSINESS MODULES Business Modules in an ERP Package, Finance, Manufacturing (Production), Human Resources, Plant Maintenance, Materials Management, Quality Management, Sales and Distribution	L1,L2 and L3	8
MODULE 5: THE ERP MARKET ERP Market Place, SAP AG, PeopleSoft, Baan Company, JD Edwards World Solutions Company, Oracle Corporation, QAD, System Software Associates, Inc. (SSA) ERP-Present and Future Turbo Charge the ERP System, Enterprise Integration Applications (EIA), ERP and E-Commerce, ERP and Internet, Future Directions in ERP, Appendices"	L2, L3 and L4	8
MODULE 6: BENEFITS OF ERP Time Reduction, Resource Utilization, Performance, Customer Satisfaction, Flexibility, Quality, Accuracy.	L1,L2 and L3	6

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Text Books

1. Alexis Leon, "**Enterprise Resource Planning**", 4th Edition, TMH, 2012.

Reference Books

1. Daniel E.O'Leary, "**Enterprise Resource Planning Systems**," Cambridge University Press, 2012.
2. Ellen Monk, Bret Wagner, "**Concepts in Enterprise resource planning**," Cengage learning, 4th edition, 2012.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

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A: Attendance, CT: Class Test, S/V/Q: Seminar/Viva/Quiz, HA: Home Assignment, EE: End Semester Examination

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO1	--	2	--	--	--	--	--	3	--	--	1	2	--	2	2
CO2	--	--	--	-	--	--	--	--	--	--	1	2	--	2	2
CO3	--	2	--	-	-	--	--	--	2	--	1	2	--	--	1
CO4	1	1	2	--	--	--	--	--	1	1	1	2	--	--	1
CO5	--	1	1	--	--	--	--	--	--	1	1	2	3	--	--
CO6	--	--	--	--	--	--	--	--	--	1	1	3	--	--	1

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IFT2621	CRYPTOGRAPHY & NETWORK SECURITY	L	T	P	C
Version 2017.1	Date of Approval: 14 June,2017	3	-	-	3
Pre-requisites/Exposure	Basic Mathematics				
Co-requisites	Nil				

Catalog Description

In this course the concepts of cryptography and network security are discussed in detail. Substitution and transposition techniques, symmetric and asymmetric cryptographic algorithms, their applications, differences will be introduced. As a precursor to the study of cryptography studies will be made on impact of various network and web security protocols. The concepts learnt in the studies of cryptography & network security will be applied in the studies and analysis of authentication, integrity and security related protocols.

Course Objectives

The objective of this course is to

1. Equip the students with concepts of cryptography & network security through problem solving and analytical approach.
2. Provide an overview of various network attacks and related security mechanism, various algorithms for modular arithmetic, symmetric and asymmetric cryptography and web and network security

Course Outcomes

On completion of this course, the students will be able to

CO1: Explain, describe and distinguish various security attacks; Describe and solve block and stream ciphers and its applications in cryptography; Solve problems based on substitution and transposition ciphers.

CO2: Explain the basic mathematics of cryptography; Solve problems of groups, modular arithmetic, gcd and inverse algorithm, chinese remainder theorem and its application in cryptography; Applying algorithms for solving problems in cryptography

CO3: Describing the concept of public key cryptosystems and its related algorithm; Explain and solve problems related to hash functions, digital signature and its applications in cryptography; Compare symmetric and asymmetric key cryptography.

CO4: Explain management, distribution, secure exchange of keys and authentication certificate and its applications in real life. Explain, compare various authentication protocols used in cryptography and network security, also solve problems based on these protocols.

CO5: Explain various security protocols: IPSec, SSL, TLS, SET; Describing malicious softwares and illustrating various design approaches to Firewall

Modules	Blooms level*	Number of hours
MODULE 1: Introduction to security attacks, services and mechanism, Classical encryption techniques: substitution ciphers and transposition ciphers, cryptanalysis, steganography, Stream and block ciphers. Modern Block Ciphers: Block ciphers principles, Shannon's theory of confusion and diffusion, fiestal structure, Data encryption standard (DES), Strength of DES, Idea of differential cryptanalysis, block cipher modes of operations, Triple DES	L1, L2 and L3	7
MODULE 2: Introduction to group, field, finite field of the form GF(p), modular arithmetic,	L1, L2, L3	6

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prime and relative prime numbers, Extended Euclidean Algorithm, Advanced Encryption Standard (AES) encryption and decryption, Fermat's and Euler's theorem, Primality testing, Chinese Remainder theorem, Discrete Logarithmic Problem, Principles of public key crypto systems, RSA algorithm, security of RSA.		
MODULE 3: Message Authentication Codes: Authentication requirements, authentication functions, message authentication code, hash functions, birthday attacks, security of hash functions, Secure hash algorithm (SHA) Digital Signatures: Digital Signatures, Elgamal Digital Signature Techniques, Digital signature standards (DSS).	L1, L2, L3 and L5	7
MODULE 4: Key Management and distribution: Symmetric key distribution, Diffie-Hellman Key Exchange, Public key distribution, X.509 Certificates, Public key Infrastructure. Authentication Applications: Kerberos	L1, L2 and L3	7
MODULE 5: IP Security: Architecture, Authentication header, Encapsulating security payloads, combining security associations, key management. Viruses and related threats, Firewalls	L1, L2	9

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Text Books

1. William Stallings, "Cryptography & Network Security", 4th Edition, Pearson Education, New Delhi, 2017.
2. Behrouz A. Forouzan, "Cryptography & Network Security", 2nd Edition, Tata McgrawHills, New Delhi, 2015

Reference Books

1. Douglas R. Stinsons, "Cryptography Theory and Practice", 3rd Edition, McMillan Publications, London, 2003
2. Atul Kahate, "Cryptography & Network Security", 3rd Edition, Tata McgrawHills, New Delhi, 2017

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	1	1	1	--	--	--	--	--	--	--	--	--	--	1	3
CO2	1	1	1	--	--	--	--	--	--	--	--	--	--	1	3
CO3	1	1	1	--	--	--	--	--	--	--	--	--	--	1	3
CO4	1	2	3	--	--	--	--	--	--	--	--	--	--	1	3
CO5	1	2	3	--	--	--	--	--	--	--	--	--	--	2	3

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IFT2637	MAJOR PROJECT/ DISSERTATION	L	T	P	C
Version: 2017.1	Date of Approval: 14 June, 2017	0	0	0	3
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

The objective of this course is to provide practical training on some live/demo projects that will increase capability to work on actual problem in industry. It will be an in house training on some latest software which is in high demand in market. This training will be designed such that it will be useful for their future employment in industry.

Course Objectives

The objective of this course is to

1. Provide practical training on live projects
2. Increase technical capabilities on solving real life problems in company environment

Course Outcomes

On completion of this summer internship, the students will be able to:

CO1: Demonstrate a sound technical knowledge of their selected project topic.

CO2: Design and develop engineering solutions to complex problems utilising a systems approach.

CO3: Analyse various approaches for solving a complex engineering problem using different tools and techniques

CO4: Demonstrate the knowledge, skills and attitudes of a professional engineer.

CO5: Apply technical skills and knowledge in completing the project.

Examination Scheme:


Components	S	PR1	PR2	PR3	V	E	R	FP
Weightage (%)	20	10	10	10	10	10	15	15

S-Synopsis, PR1-Progress Report-1, PR2- Progress Report-2, PR3- Progress Report-3, V – Viva, FP – Final Presentation, R – Report, E-Execution

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	2	--	--	--	--	--	--	1	--	--	--	--	--	1	1
CO2	1	1	--	--	--	--	--	--	1	--	--	--	--	--	1	1
CO3	1	1	--	--	--	--	--	--	1	--	--	--	--	--	1	1
CO4	1	1	--	--	--	--	--	--	1	--	--	--	--	--	1	1
CO5	1	1	--	--	--	--	--	--	1	--	--	--	--	--	1	1

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2022

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AIE6104	INTRODUCTION TO COMPUTERS AND PROGRAMMING IN C	L	T	P	C
Version: 2020.1	Date of Approval: July 2020	2	1	0	3
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

The objective of this course module is to acquaint the students with the basics of computers system, its components, data representation inside computer and to get them familiar with various important features of procedure-oriented programming language i.e. C.

Course Objectives

The objective of this course is to

1. Equip the students with concepts of Programming through C Language
2. Provide an overview of advanced programming concepts like Structure, Union and File Handling

Course Outcomes

On completion of this course, the students will be able to

After the completion of course, the students will be able to,

- CO 1: Define the purpose and structure of C Program for programming; identify and distinguish various datatypes and operators; conditional and control statement; Apply if-else, Switch and loops to rewrite basic C program for problem solving.
- CO 2: Compare and contrast various Array types, its declaration and implementation; differentiate between Call by Value and Reference if Functions; apply the concepts to rewrite C Programs
- CO 3: Differentiate between various String Handling Functions; describe the concept of Pointers in C Language
- CO 4: Explain the concept of Structure and Union; apply the concept of File Handling to provide data storage support to the programs.
- CO 5: Apply the concept of Computer Graphics using C programming concepts for implementing line drawing, circle drawing algorithms.

Modules	Blooms level*	Number of hours
Module I: Introduction Introduction to computer, history, von-Neumann architecture, memory system (hierarchy, characteristics, and types), H/W concepts (I/O Devices), S/W concepts (System S/W & Application S/W, utilities). Data Representation: Number systems, character representation codes, Binary, octal, hexadecimal and their interconversions. Binary arithmetic, floating point arithmetic, signed and unsigned numbers, Memory storage unit.	L1, L2 and L3	7
Module II: Programming in C History of C, Introduction of C, Basic structure of C program, Concept of variables, constants and data types in C, Operators and expressions: Introduction, arithmetic, relational, Logical, Assignment, Increment and decrement operator, Conditional, bitwise operators, Expressions, Operator precedence and associativity. Managing Input and output Operation, formatting I/O.	L2, L3 and L4	7

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Module III: Fundamental Features in C C Statements, conditional executing using if, else, nesting of if, switch and break Concepts of loops, example of loops in C using for, while and do-while, continue and break. Storage types (automatic, register etc.), predefined processor, Command Line Argument.	L2, L3 and L4	7
Module IV: Arrays and Functions One dimensional arrays and example of iterative programs using arrays, 2-D arrays Use in matrix computations. Concept of Sub-programming, functions Example of user defined functions. Function prototype, Return values and their types, calling function, function argument, function with variable number of argument, recursion.	L2 and L3	7
Module V: Advanced features in C Pointers, relationship between arrays and pointers Argument passing using pointers, Array of pointers. Passing arrays as arguments. Strings and C string library. Structure and Union. Defining C structures, Giving values to members, Array of structure, Nested structure, passing strings as arguments. File Handling.	L2, L3 and L4	8

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6:Evaluation

Text Books

1. E Balagurusamy, "Programming in ANSI C", Seventh Edition, Tata McGraw Hill Education private limited, July 2017.
2. Yashwant Kanetkar, "Let Us C", 16th Edition, BPB Publication, June 2017.

Reference Books

1. Brain W Kernighan and Dennis M Ritchie, "The C Programming Language", 2nd Edition, Pearson Publication, Jan 2015.
2. Byron Gottfried, "Programming with C", Third Edition, Tata McGraw Hill Education private limited, July 2017.
3. E Balagurusamy, "Computer Concepts & Programming in C", Seventh Edition, Tata McGraw Hill Education private limited, July 2011.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	2	--	2	--	--	--	--	--	--	--	--	1	--	1	--
CO2	1	1	2	2	--	--	--	--	--	--	--	--	1	--	1	--
CO3	1	1	2	3	--	--	--	--	--	--	--	--	1	--	1	--
CO4	1	1	2	2	3	--	--	--	--	--	--	--	1	--	1	--
CO5	1	1	2	2	3	--	--	--	--	--	--	--	1	--	1	--

1: strongly related, 2: moderately related and 3: weakly related

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AIE6106	PROGRAMMING IN C LAB	L	T	P	C
Version 2020.1	Date of Approval: July, 2020	0	0	2	1
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

The primary objective of this course is to understand all the components of C, including the C language, the C Preprocessor, and the C Standard Library. An understanding of some advanced practical issues, including memory management, testing, and debugging, complex declarations and expression evaluation, building and using libraries, and evaluating tradeoffs, such as size vs. speed and speed vs. complexity. The ability to write C code and create and manipulate logical programs.

Course Objectives

The objective of this course is to

1. Equip the students with concepts of Programming through C Language
2. Provide an overview of advanced programming concepts like Structure, Union and File Handling.

Course Outcomes

After the completion of course, the students will be able to,

CO 1: Demonstrate the use of various data types and operators in C programs; Solve various problems using conditional control statements (if-else, Switch case).

CO 2: Construct C programs related to problems involving the usage of loops, arrays and functions.

CO 3: Apply the concept of Pointers for efficient memory management and construct C programs using string handling functions.

CO 4: Demonstrate the use of Structure, Union and concept of File Handling to provide data storage support to the programs.

Modules	Blooms level*	Number of hours
LABORATORY SESSSION 1 OPERATORS, EXPRESSIONS and DECISION MAKING <ol style="list-style-type: none"> 1. Write a program to calculate simple interest and amount. 2. Write a program to swap two numbers using third variable. 3. Write a program to demonstrate Greatest of 3 nos and to print the given no in ascending order. 4. Write a program to check if the number is even or odd. 5. Write a program to perform arithmetic operations using Switch Case statement. 6. Write a program to calculate area of circle, rectangle, square and triangle using Switch Case statement. 	L3	5
LABORATORY SESSSION 2 LOOPING <ol style="list-style-type: none"> 1. Write a program to find factorial of given no using do while statement. 2. Write a program to print prime numbers up to 'n'. 3. Write a program to sum of n natural no. 4. Write a program to print Fibonacci series. 5. Write a program to reverse a number. 6. Write a program to print the following pattern using for loop 	L3	6

1 2 2 3 3 3 4 4 4 4 7. Write a program to print the following pattern using for loop A A B A B C A B C D		
LABORATORY SESSSION 3 ARRAYS and FUNCTIONS 1. Write a program to read n num of students and 5 subjects marks. 2. Write a program to swap two numbers using call by value. 3. Write a program to convert all lower case to uppercase characters 4. Write a program to find the factorial of a number using recursion. 5. Write a program to print the add/product of two matrices of any order.	L3	5
LABORATORY SESSSION 4 POINTERS AND STRING 1. Write a program to perform operations on strings using string handling in-built functions (concatenation, reversal, copy etc.) 2. Write a program to swap two numbers using call by reference. 3. Write a program to perform dynamic memory allocation and deallocation. 4. Write a program to print elements of array using pointers.	L3	4
LABORATORY SESSSION 5 STRUCTURE, UNION & FILE HANDLING 1. WAP program to display student information by initializing structures. 2. WAP program to find the total salary of employee and employee details using structure. 3. Write a program to store and display information using Union. 4. Program to write data into file and read data from file.	L3	4

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation*

Text Books

1. E Balagurusamy, "Programming in ANSI C", Seventh Edition, Tata McGraw Hill Education private limited, July 2017.
2. Yashwant Kanetkar, "Let Us C", 16th Edition, BPB Publication, June 2017.

Reference Books

1. Brain W Kernighan and Dennis M Ritchie, "The C Programming Language", 2nd Edition, Pearson Publication, Jan 2015.
2. Byron Gottfried, "Programming with C", Third Edition, Tata McGraw Hill Education private limited, July 2017.
3. E Balagurusamy, "Computer Concepts & Programming in C", Seventh Edition, Tata McGraw Hill Education private limited, July 2011.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

IA	EE
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A	PR	LR	V	70
5	10	10	5	

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	2	--	2	--	--	--	--	--	--	--	--	1	--	2	--
CO2	1	1	2	2	--	--	--	--	--	--	--	--	1	--	2	--
CO3	1	1	2	3	--	--	--	--	--	--	--	--	1	--	2	--
CO4	1	1	2	2	3	--	--	--	--	--	--	--	1	--	2	--

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AIE6204	OBJECT ORIENTED PROGRAMMING USING C++	L	T	P	C
Version 2020.1	Date of Approval: JULY 2020	2	1	0	3
Pre-requisites/Exposure	Hands on knowledge of C Programming				
Co-requisites	Basic concepts of C Programming				

Catalog Description

The objective of this course is to introduce object-oriented programming. To explore and implement the various features of OOP such as inheritance, polymorphism, Exceptional handling using programming language C++. After completing this course student can easily identify the basic difference between the programming approaches like procedural and object oriented.

Course Objectives

The objective of this course is

1. Equip the students with the basic features of C++ supporting object-oriented programming. Perform object oriented programming to develop solutions to problems demonstrating usage of control structures, modularity, I/O. and other standard language constructs.
2. Provide the overview of major object-oriented concepts to implement object oriented programs in C++ like encapsulation, inheritance and polymorphism, stream I/O, templates and operator overloading

Course Outcomes

On completion of this course, the students will be able to

- CO 1: Explain the basic principles of object-oriented programming approach; Differentiate it with procedural programming approach and also discuss difference between C and C++.
- CO 2: Illustrate the different ways to define a member function inline and explain how the private members of a class can be accessed. Explain how the objects can be instantiated and destroyed with static data member?
- CO 3: Explain the concept of inheritance, types and implementation with suitable examples; find out ambiguity problem in inheritance; use the concept of overriding and constructors in inheritance.
- CO 4: Explain polymorphism in detail and implement the concept of overloading in functions as well as in operators. Write the programs for virtual function and pointer with objects.
- CO 5: Explain the exception handling mechanism. Design the programs for class and function Template. Compare and contrast various formatted and unformatted i/o function in file handling.

Modules	Blooms level*	Number of hours
MODULE 1: INTRODUCTION Review of C, Difference between C and C++, Procedure Oriented and Object Oriented Approach. Basic Concepts: Objects, classes, Principles like Abstraction, Encapsulation, Inheritance and Polymorphism. Dynamic Binding, Message Passing. Characteristics of Object-Oriented Languages. Introduction to Object-Oriented Modeling techniques (Object, Functional and Dynamic Modeling).	L1 and L2	5
MODULE 2: CLASSES AND OBJECTS Abstract data types, Object & classes, attributes, methods, C++ class declaration, Local Class and Global Class, State identity and behaviour of an	L1, L2 and L3	7

object, Local Object and Global Object, Scope resolution operator, Friend Functions, Inline functions, Constructors and destructors, instantiation of objects, Types of Constructors, Static Class Data, Array of Objects, Constant member functions and Objects, Memory management Operators.		
MODULE 3: INHERITANCE Inheritance, Types of Inheritance, access modes – public, private & protected, Abstract Classes, Ambiguity resolution using scope resolution operator and Virtual base class, Aggregation, composition vs classification hierarchies, Overriding inheritance methods, Constructors in derived classes, Nesting of Classes	L2, L3 and L4	8
MODULE 4: POLYMORPHISM Polymorphism, Type of Polymorphism – Compile time and runtime, Function Overloading, Operator Overloading (Unary and Binary) Polymorphism by parameter, Pointer to objects, this pointer, Virtual Functions, pure virtual functions.	L2, L3 and L4	8
MODULE 5: STRINGS, FILES AND EXCEPTION HANDLING Manipulating strings, Streams and files handling, formatted and Unformatted Input output. Exception handling, Generic Programming – function template, class Template Standard Template Library: Standard Template Library, Overview of Standard Template Library, Containers, Algorithms, Iterators, Other STL Elements, The Container Classes, General Theory of Operation, Vectors.	L2, L3 and L4	8

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. A.R. Venugopal, Rajkumar, T. Ravishanker "Mastering C++", TMH, 1997
2. R. Lafore, "Object Oriented Programming using C++", BPB Publications, 2004.
3. E. Balagurusamy, "Object Oriented Programming with C++", Mc Graw Hill, 6th Edition, 2013.
4. Schildt Herbert, "C++: The Complete Reference", Wiley DreamTech, 2005.

Reference Book


1. Parsons, "Object Oriented Programming with C++", BPB Publication, 1999.
2. Steven C. Lawlor, "The Art of Programming Computer Science with C++", Vikas Publication, 2002.
3. Yashwant Kanethkar, "Object Oriented Programming using C++", BPB, 2004

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
A: Attendance


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CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS O 1	PS O 2	PS O 3	PS O 4
CO 1	1	2	--	--	--	--	--	--	--	--	--	--	1	--	2	--
CO 2	1	1	2	3	--	--	--	--	--	--	--	--	1	--	1	2
CO 3	1	1	2	--	--	--	--	--	--	--	--	--	1	--	2	2
CO 4	1	1	2	3	--	--	--	--	--	--	--	--	1	1	--	2
CO 5	1	1	2	--	--	--	--	--	--	--	--	--	1	1	--	1

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AIE6208	OBJECT ORIENTED PROGRAMMING USING C++ LAB	L	T	P	C
Version 2020.1	Date of Approval: JULY, 2020	0	0	1	1
Pre-requisites/Exposure	Turbo C++				
Co-requisites	NIL				

Catalog Description

The objective of this course is to introduce object-oriented programming. To explore and implement the various features of OOP such as inheritance, polymorphism, Exceptional handling using programming language C++. After completing this course student can easily identify the basic difference between the programming approaches like procedural and object oriented.

Course Objectives

The objective of this course is

1. Perform object-oriented programming to develop solutions to problems demonstrating usage of control structures, modularity, I/O. and other standard language constructs.
2. Demonstrate adeptness of object-oriented programming in developing solutions to problems demonstrating usage of data abstraction, encapsulation, and inheritance.
3. Demonstrate ability to implement one or more patterns involving realization of an abstract interface and utilization of polymorphism in the solution of problems which can take advantage of dynamic dispatching, syntax, features of, and how to utilize the Standard Template Library.

Course Outcomes

On completion of this course, the students will be able to

- CO 1: Define and identify the basic principles of object-oriented programming approach; Differentiate it with procedural programming approach.
- CO 2: Determine the different ways to define a member function inline and explain how the private members of a class can be accessed. Solve how the objects can be instantiated and destroyed with static data member?
- CO 3: Apply the concept of inheritance, types and implementation with suitable examples; find out ambiguity problem in inheritance; use the concept of overriding and constructors in inheritance.
- CO 4: Relate the concept polymorphism with overloading in detail and implement the concept of overloading in functions as well as in operators. Write the programs for virtual function and pointer with objects.
- CO 5: Determine the exception handling mechanism. Design the programs for class and function Template. Compare and contrast various formatted and unformatted i/o function in file handling.

Modules/Topics Covered**	Blooms level*	Number of hours
1. Sample Programs using objects and classes (a) Write a program to illustrate the concept of one class with two objects by taking student data. (b) Write a program to show the relationship of class and object to display roll no., grade and fee paid by student.	L1, L3, L5	4
2. Sample Programs for different use of private, public member variables and functions and friend functions (a) Write a program to define the member function outside and inside the class. (b) Write a program to read and display the information of N persons to illustrate the concept of array of objects.	L1, L3, L5	4

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(c) Write a program to add two numbers to illustrate the use of friend function.		
3. Sample Programs using constructors and destructors (a) Write a program to assign and copy values to illustrate the concept of parametrized and copy constructor. (b) Write a program to show the order of constructor and destructor.	L1, L3, L5	4
4. Sample Programs using operator overloading (a) Write a program to add two numbers using binary operator overloading. (b) Write a program to illustrate the assignment operator overloading.	L1, L3, L5	4
5. Sample Programs using inheritance in and accessing objects of different derived classes (a) Write a program to compute the marks explaining the concept of multiple inheritance. (b) Write a program to find the factorial of a number using inheritance.	L1, L3, L5	4
6. Sample Programs using polymorphism and virtual functions (using pointers) and File Handling (a) Write a program to find the volume of cylinder and cuboid using function overloading. (b) Write a program to reverse a string using pointers. (c) Write a program to explain the relationship of inheritance and virtual function. (d) Write a program to read the student name and fee paid using read() function from the file.	L1, L3, L4, L5	4

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

**** Sample Programs provided are not limited to these only, can include others as desired.**

Text Books

1. A.R. Venugopal, Rajkumar, T. Ravishanker "Mastering C++", TMH, 1997
2. R. Lafore, "Object Oriented Programming using C++", BPB Publications, 2004.
3. "Object Oriented Programming with C++" By E. Balagurusamy.
4. Schildt Herbert, "C++: The Complete Reference", Wiley DreamTech, 2005.

Reference Book

1. Parsons, "Object Oriented Programming with C++", BPB Publication, 1999.
2. Steven C. Lawlor, "The Art of Programming Computer Science with C++", Vikas Publication, 2002.
3. Yashwant Kanethkar, "Object Oriented Programming using C++", BPB, 2004

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

IA					EE
Components	A	PR	LR	V	70
Weightage (%)	5	10	10	5	

Note: IA –Internal Assessment, A – Attendance, PR – Performance, LR – Lab Record, V – Viva, EE- External Exam

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	3	1	2	--	--	--	--	--	--	--	--	--	2	--	--	--
CO2	3	1	2	--	--	--	--	--	--	--	--	--	1	2	--	--
CO3	2	1	2	--	--	--	--	--	--	--	--	--	1	2	--	--
CO4	2	1	2	--	--	--	--	--	--	--	--	--	1	2	--	--
CO5	2	1	2	--	--	--	--	--	--	--	--	--	1	2	--	--

1: strongly related, 2: moderately related and 3: weakly related

AIE6211	ENGINEERING GRAPHICS LAB	L	T	P	C
Version 2019.1	Date of Approval: July 14, 2019	0	0	4	2
Pre-requisites/Exposure	Concepts Mathematics (especially Trigonometry and Geometry)				
Co-requisites	Machine Drawing & CAD				

Catalog Description:

A freshman level course which provides the undergraduate engineering students with a background in descriptive geometry, orthographic projection, engineering drawing standards and annotation, computer-aided engineering graphics. The concepts of point, line and plane relationships in projection, multi-view engineering drawings, auxiliary and section views, basic dimensioning and annotation, engineering applications of drawings are also discussed.

Course Objective:

The objective of this course is to

- Equip the students with the in-depth knowledge of drawings of points, straight line, planes, cylinders, prisms, pyramids, parabola, ellipse etc.
- Draw different figures manually and will be capable of using various instruments involved in drawings.

Course Outcomes (COs):

At the end of the course, the student shall be able to:

CO 1 - Define and explain basic principles of projections of points and lines.


CO 2 - Define, describe and construct the different orientations and projections of planes.

CO 3 – Explain and construct the projections of solids and sectioning of solids in different orientations.

CO 4 - State and draw the concepts of development of surfaces and introduction to auto CAD.

CO 5 – Define and construct orthographic and isometric view of an object.

Modules	Blooms level*	Number of hours
Module I: Introduction Importance, significance and scope of engineering drawing, drawing instruments and their use, lettering, dimensioning, scales, sense of proportioning, different types of projections, B.I.S. Specifications.	L1 and L2	8


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Module II: Projection of points, lines and plane surface Principal planes, principles of orthographic projections, Projection of points in all quadrants, Projection methods - First angle & third angle projection, Projections of straight lines (first angle projection) inclined to both the planes, true lengths and traces, projection of planes, projection of planes in simple position and inclined to both the principal planes, auxiliary planes and views	L1, L2 and L3	12
Module III: Projection of solids & section of solids Projection of simple solids like prisms, pyramids, cylinder, cone and truncated solids when the axis is inclined to both of the principal planes, Sectioning of above solids in simple vertical position when the cutting plane is inclined to the one of the principal planes and perpendicular to the other, obtaining true shape of section	L1, L2 and L3	12
Module IV: Development of surfaces & Isometric projections Development of surfaces of simple and sectioned solids – Prisms, pyramids cylinders and cones, Principles of isometric projection, isometric scale, Isometric projections of simple solids and truncated solids, Prisms, pyramids, cylinders, cones, Conversion of Orthographic Views to Isometric Views and Vice-versa.	L1, L2 and L3	8
Module V: Introduction to CAD Introduction to CAD and use of its commands, practice of some 2D figures using CAD.	L1, L2 and L3	8

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	50	20

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

Text Books:

- PS Gill, 2013, Engineering Drawing, Kataria Publication.
- ND Bhatt, 2014, Engineering Drawing, Charotar publications.

References Books:

- N Sidheshwar, 2014 Machine Drawing Drawing, Tata McGraw Hill
- M.B. Shah & B.C. Rana, 2007, Engineering Drawing, Pearson Education.
- CADFolks, AutoCAD 2018 For Beginners, CreateSpace Independent Publishing Platform; 6 edition.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	2	--	--	--	--	--	--	--	--	--	--	1	--	--	--
CO2	1	2	--	--	--	--	--	--	--	--	--	--	1	--	--	--
CO3	1	2	--	--	--	--	--	--	--	--	--	--	1	--	--	--
CO4	1	2	--	--	--	--	--	--	--	--	--	--	1	--	--	--
CO5	1	2	--	--	--	--	--	--	--	--	--	--	1	--	--	--

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AIE6213	BASIC ELECTRICAL AND ELECTRONICS ENGINEERING LAB	L	T	P	C
Version 2019.1	Date of Approval: May 21, 2019	0	0	2	1
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

In this course, students will become familiar with basic electrical circuits. The students will learn practical aspects and implementation of theorems related to electrical circuits, law's related to flow of current, voltages, transformer and transistors.

Course Objectives

The objective of this course is to:

- Provide the overview of concept of flow of current/voltage of electrical circuits.
- Provide the basic knowledge about the concepts of electrical circuits and BJTs.

Course Outcomes

On completion of this course, the students will be able to:

- CO1. Explain the fundamental theorems and laws related to the electrical circuits and experimentally verify the basic circuit theorems
- CO2. Explain the working principle and estimate the performance of single phase transformers.
- CO3. Understand 3 phase balanced and unbalanced, star and delta connected supply and load and to measure power in 3 phase circuits
- CO4. Able to design circuit with Bipolar Junction Transistor in CB, CE & CC configurations

Modules	Blooms level*	Number of hours
Lab Session 1: Network Analysis Techniques & Theorems <ol style="list-style-type: none"> To verify KVL & KCL in the given network. To verify Superposition Theorem. To verify Maximum Power Transfer Theorem. To verify Reciprocity Theorem. To determine and verify R_{Th}, V_{Th}, R_N, I_N in a given network. 	L1, L2 and L3	6
Lab session II: Transformers and transistors <ol style="list-style-type: none"> To perform open circuit & short circuit test on a single-phase transformer. To perform regulation, ratio & polarity test on a single-phase transformer. To obtain the characteristics of a transistor under common base (CB) and common emitter (CE) configuration. 	L1, L2 and L3	3
Lab session III: Alternating Current Circuits <ol style="list-style-type: none"> To study transient response of a given RLC Circuit. To measure power & power factor in a three phase circuit by two wattmeter method. To measure power & power factor in a three phase load using three ammeter & three voltmeter method. 	L1, L2 and L3	3

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

Text Books

- V K Mehta and Rohit Mehta, Principles of Electrical Engineering and Electronics, 3rd edition, S. Chand Publications, 2014, New Delhi
- D. P. Kothari and I. J. Nagrath, Theory and Problem of Basic Electrical Engineering, PHI Learning Pvt. Ltd., 2015, New Delhi.
- J B Gupta, Electrical Science, S K Kataria and Sons, 2015, New Delhi.

Reference Books

- R J Smith and R C Dorf, Circuits Devices and Systems, 5th Edition, John Wiley
- B.L. Thareja, Basic Electronics, 5th edition, S. Chand Publishing, 2011, New Delhi
- V. Del Toro, Electrical Engineering fundamentals, PHI, 2016
- Mahmood Nahvi, Joseph Edminister, Electric Circuits, 7th edition, McGraw-Hill Education, 2017

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	1	2	--	--	--	--	--	--	--	--	--	--	1	-	-
CO2	1	1	2	3	--	--	--	--	--	--	--	--	1	-	-
CO3	1	1	3	3	-	--	--	--	--	--	--	--	1	-	-
CO4	1	1	2	--	--	--	--	--	--	--	--	--	1	-	-

1: strongly related, 2: moderately related and 3: weakly related



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AIE6302	DATABASE MANAGEMENT SYSTEMS	L	T	P	C
Version 2020.1	Date of Approval: July, 2020	3	1	0	4
Pre-requisites/Exposure	Computer Fundamentals and Mathematics Set Theory				
Co-requisites	Nil				

Catalog Description

This course is design to get students familiar with the fundamentals & basic concepts in Data Base Management Systems and their use. This course discusses architecture of Database Systems with concept of different types of available database model, concurrency techniques and new applications of the DBMS. The techniques for database design, normalization, database recovery and protection will enable students to work easily and efficiently on real databases.

Course Objectives

The objective of this course is

1. To make students familiar with the fundamental and necessary concepts of DBMS.
2. Provide an overview of normalization, concurrency techniques and database recovery with examples.

Course Outcomes

On completion of this course, the students will be able to

CO1. Differentiate between traditional data processing system and database management system and understand characteristics and applications of DBMS in real world.

CO2. Explain and use different data models such as Entity Relationship Model, Network, and Relational Model etc.

CO3. Solve queries using relational algebra, relational calculus and SQL.

CO4. Illustrate normalization concepts and apply them in real database applications.

CO5. Explain database concurrency techniques and recovery mechanisms.

Modules	Blooms level*	Number of hours
Module I: Introduction Concept and goals of DBMS, Database Languages, Database Users, Database Abstraction. Basic Concepts of ER Model, Relationship sets, Keys, Mapping, Design of ER Model.	L1, L2 and L6	9
Module II: Hierarchical model & Network Model Concepts, Data definition, Data manipulation and implementation. Network Data Model, DBTG Set Constructs, and Implementation	L1 and L2	9
Module III: Relational Model Relational database, Relational Algebra, Relational & Tuple Calculus.	L1 and L3	10
Module IV: Relational Database Design and Query Language SQL, QUEL, QBE, Normalization using Functional Dependency, Multivalued dependency and Join dependency.	L2, L3 and L4	10
Module V: Concurrency Control and New Applications Transaction basics: ACID property, Lifecycle of Transaction, Why Concurrency Control, Schedule, Serializability, Lock Based Protocols, Time	L2, L3 and L4	10

Stamped Based Protocols, Deadlock Handling, Crash Recovery. Distributed Database, Objective Oriented Database, Multimedia Database, Data Mining, Digital Libraries.		
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**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation*

Text Books

1. Korth, Silberschatz, "Database System Concepts", TMH, 4th Ed., 2000.
2. Elmsari and Navathe, "Fundamentals of Database Systems", A. Wesley, 6th Ed., 2004

Reference Books

1. Date C. J., "An Introduction to Database Systems", Narosa Publishing, 7th Ed., 2004

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	2	--	--	--	--	--	--	--	--	--	--	1	--	-	-
CO2	1	1	2	3	--	--	--	--	--	--	--	--	1	--	--	--
CO3	1	2	2	3	--	--	--	--	--	--	--	--	1	2	--	--
CO4	--	1	2	--	--	2	--	3	--	--	--	--	1	1	-	-
CO5	1	1	3	--	--	--	--	--	2	--	--	--	1	--	-	3

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AIE6307	DATABASE MANAGEMENT SYSTEMS LAB	L	T	P	C
Version 2020.1	Date of Approval: July, 2020	0	0	2	1
Pre-requisites/Exposure	Basic Concepts of DBMS				
Co-requisites	Relational Algebra and Relational Calculus				

Catalog Description

This course is designed to get students familiar with the basic concepts of SQL including DDL, DML and DCL statements. The course also explains the basic concepts of PL/SQL. Students will learn practical on Oracle software and hence can work on any RDBMS software in future.

Course Objectives

The objective of this course is

1. To make students familiar with the concepts and working of SQL.
2. Provide an overview of PL/SQL.

Course Outcomes

On completion of this course, the students will be able to

CO1. Illustrate SQL basic concepts like languages DDL, DML etc., data types and working.

CO2. Explain concepts of database creation, manipulation of data and data retrieval and apply them in real database applications.

CO3. Design and implement various data constraints on a database for a given problem.

CO4. Solve queries using concepts like joins, subqueries, aggregate functions, triggers etc.

CO5. Prepare PL/SQL blocks.

Modules	Blooms level*	Number of hours
Lab Session 1 Introduction of RDBMS, Oracle, SQL and data types.	L1 and L2	2
Lab Session 2 Basic concept of database creation and manipulation of data.	L1 and L3	2
Lab Session 3 Working with SELECT query.	L1 and L3	2
Lab Session 4 To apply data constraints on a table-Primary Key, Not Null, Unique.	L1 and L3	2
Lab Session 5 Working with Foreign Key and Check Constraint.	L1 and L3	2
Lab Session 6 To implement the basic concept of Aggregate and Grouping Functions.	L1 and L3	2
Lab Session 7 To apply various set operators on data.	L1 and L3	2
Lab Session 8 Concept of Nested queries in database and its application in database.	L1 and L3	2
Lab Session 9 Implementation different types of JOINS in database.	L1 and L3	2

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Lab Session 10 Basic concepts of Triggers and Procedures and related queries.	L1 and L3	2
Lab Session 11 Introduction to PL/SQL and basic syntax.	L1 and L3	2
Lab Session 12 Write programs in PL/SQL Using Control Structures.	L3	2

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1.Ivan Bayross , “SQL, PL/SQL the Programming Language of Oracle”, 4th Ed., BPB Publications,2009.

2.Lynn Beighley, “Head First SQL”, 1st Ed., O'Reilly, 2007.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	2	--	--	--	--	--	--	--	--	--	--	1	--	-	-
CO2	1	-	2	--	--	3	--	--	--	--	--	2	1	--	1	-
CO3	1	-	1	--	--	3	--	--	--	--	--	2	1	1	2	-
CO4	1	-	2	--	--	--	--	--	--	--	--	--	1	1	--	--
CO5	1	-	2	--	--	--	--	--	2	--	--	--	1	1	--	-

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AIE6303	OPERATING SYSTEMS	L	T	P	C
Version 2020.1	Date of Approval: July 2020	3	0	0	3
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

In this course Operating System, its generic types, characteristics and functions are discussed in detail. Concepts covered would enable students to identify various categories of operating systems, with details about concepts of process management and scheduling. Contents will be helpful in identifying deadlocks in the system and designated approaches used to prevent, handle or recover from them. Further it covers the concepts of managing memory, devices and mechanisms for providing security to system and files using operating system.

Course Objectives

The objective of this course is to

1. Equip the students with the knowledge about categories of operating systems and their functions.
2. Provide detailed knowhow about functions of operating system like process, memory and device management along with file system security and protection.

Course Outcomes

On completion of this course, the students will be able to

- CO1: Define and explain operating systems and their evolution, also differentiate among its various types.
- CO2: Explain concepts of process and inter-process communication and synchronization. Identify solutions to detect, prevent and handle deadlocks occurring in the operating systems. Solve synchronization and CPU scheduling problems related to processes.
- CO3: Define and explain concepts of memory management like fragmentation, paging and segmentation. Solve problems related to memory management using page replacement algorithms.
- CO4: Describe the concepts of device management and list various disk allocation methods. Determine solutions for disk scheduling problems using available disk scheduling algorithms.
- CO5: State the concept of file and file system security, also distinguish among various file allocation methods.

Modules	Blooms level*	Number of hours
MODULE 1: INTRODUCTION TO OPERATING SYSTEM Operating system and function, Evolution of operating system, Batch, Interactive, multiprogramming, Time Sharing and Real Time System, multiprocessor system, Distributed system, System protection. Operating System structure, Operating System Services, System Program and calls	L1, L2 and L4	6
MODULE 2: PROCESS MANAGEMENT Process concept, State model, process scheduling, job and process synchronization, structure of process management, Threads Interprocess Communication and Synchronization: Principle of Concurrency, Producer Consumer Problem, Critical Section problem, Semaphores, Hardware Synchronization, Critical Regions, Conditional critical region,	L1, L2 and L3	12

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Monitor, Inter Process Communication. CPU Scheduling: Job scheduling functions, Process scheduling, Scheduling Algorithms, Non-Preemptive and preemptive Strategies, Algorithm Evaluation, Multiprocessor Scheduling. Deadlock: System Deadlock Model, Deadlock Characterization, Methods for handling deadlock, Prevention strategies, Avoidance and Detection, Recovery from deadlock combined approach		
MODULE 3: MEMORY MANAGEMENT Single Contiguous Allocation: H/W support, S/W support, Advantages and disadvantages, Fragmentation, Paging, Segmentation, Virtual memory concept, Demand paging, Performance, Paged replaced algorithm, Allocation of frames, Thrashing, Cache memory, Swapping, Overlays	L1, L2 and L3	7
MODULE 4: DEVICE MANAGEMENT Principles of I/O hardware, Device controller, Device Drivers, Memory mapped I/O, Direct Access Memory, Interrupts, Interrupt Handlers, Application I/O interface, I/O Scheduling, Buffering, Caching, Spooling, Disk organization, Disk space management, Disk allocation Method, Disk Scheduling, Disk storage	L1, L2 and L3	7
MODULE 5: FILE SYSTEM AND PROTECTION AND SECURITY File Concept, File Organization and Access Mechanism, File Directories, Basic file system, File Sharing, Allocation method, Free space management. Policy Mechanism, Authentication, Internal excess Authorization	L1 and L2	4

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. Milenecovic, "Operating System Concepts", McGraw Hill
2. Silberschatz, P.B. Galvin "Operating System Concepts", John Willey & son

Reference Books

1. Dietel, "An introduction to operating system", Addison Wesley
2. Tannenbaum, "Operating system design and implementation", PHI
3. Operating System, A Modern Perspection, Gary Nutt, Pearson Edu. 2000
4. A. S Tanenbaum, Modern Operating System, 2nd Edition, PHI
5. Willam Stalling "Operating system" Pearson Education

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	2	--	--	--	--	--	--	--	--	--	--	1	2	--	--
CO2	1	2	3	--	--	--	--	--	--	--	--	--	1	2	--	--
CO3	1	2	3	--	--	--	--	--	--	--	--	--	1	2	--	--
CO4	1	2	3	--	--	--	--	--	--	--	--	--	1	2	--	--
CO5	1	--	2	--	--	--	--	--	--	--	--	--	1	--	--	--

1: strongly related, 2: moderately related and 3: weakly related

AIE6308	UNIX PROGRAMMING LAB	L	T	P	C
Version 2020.1	Date of Approval: JULY 2020	0	0	2	1
Pre-requisites/Exposure	Basic knowledge of Operating System				
Co-requisites					

Catalog Description

This course introduces the UNIX operating system commands, shell programming. Explores the use of operating system utilities such as vi text editors, filters, process handling etc.

Course Objectives

The objective of this course is to

1. Provide knowledge of working on Unix.
2. Provide sound foundation of writing Shell scripts.
3. Implement features like piping, filters and redirection.

Course Outcomes

On completion of this course, the students will be able to

CO1: To implement various Unix commands.

CO2: To demonstrate the use of Vi Editor and other editors of UNIX.

CO3: To write simple Shell scripts.

Modules	Blooms level*	Number of hours
1. UNIX structure, history, basic commands.	L1,L3	10
2. Working of Vi Editor and its commands.	L1,L3	4
3. Shell Script <ol style="list-style-type: none"> Write shell script to find largest among three numbers. Write shell script to print multiplication table of any number. Write a shell script that copies multiple files into directory. Write a shell script to find number of words and characters in a given file. Write a shell script to find the sum, the average and the product of the four integers entered. Write a shell script to calculate the factorial of a number. Write a shell script to generate Fibonacci series. Write a shell script that computes the gross salary of employee. Write a shell script that takes a command –line argument and reports on whether it is directory, a file, or something else. Write a shell script which receives two file names as arguments. It should check whether the two file contents are same or not. If they are same then second file should be deleted. Write a shell script to calculate gcd of two numbers. Write a shell script to concatenate two strings and find the length of the resultant string. 	L1,L3	10

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5:Synthesis, L6:Evaluation

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Text Books

1. “Unix Concepts and application” Das Sumitabha Tata Mcgraw Hill

Reference Books

1. “Unix Programming Environment” The Kernighan and Pike Prentice – Hall of India

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

IA				EE
A	PR	LR	V	70
5	10	10	5	

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

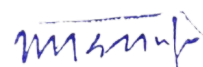
CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	--	1	--	--	--	--	--	--	--	--	--	1	1	--	--
CO2	1	--	1	--	--	--	--	--	--	--	--	--	1	1	--	--
CO3	1	--	1	--	--	--	--	--	--	--	--	--	1	1	--	--

1: strongly related, 2: moderately related and 3: weakly related



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AIE6304	DATA STRUCTURES USING C	L	T	P	C
Version:2020.1	Date of Approval: JULY, 2020	3	1	0	4
Pre-requisites/Exposure	Basic Knowledge of C++ Programming				
Co-requisites	Nil				

Catalog Description

This course covers the design, analysis, and implementation of data structures and algorithms to solve engineering problems using C programming language. Topics include elementary data structures, (including arrays, stacks, queues, and lists), advanced data structures (including trees and graphs), the algorithms used to manipulate these structures, and their application to solving practical engineering problems. At the end of this course student will gain knowledge about different kinds of file structures and their related operations.

Course Objectives

The objective of this course is to

1. Equip the students with knowledge of algorithms, different types of data structures and analysis of space and time complexity.
2. Provide an overview of various algorithms of data structures like stack and queues and related operations and implementation.
3. Provide an overview of dynamic Data Structure like linked list and its related operations, algorithms and programs. Demonstrate practical use of dynamic data structure to solve engineering problems.
4. Equip the students with knowledge of algorithms and operations related to tree and graph data structures and their practical applications.
5. Provide an overview of Sorting, Searching and file structures and its related algorithms and techniques.

Course Outcomes

On completion of this course, the students will be able to


CO 1:Identify operations on array, multidimensional, string and their implementation and analyze space and time complexity of algorithms.

CO 2: Explain various algorithms and operations of data structures like stack and queues and analyze complexity of each operation.

CO 3: Explain dynamic data structures and various algorithms and operations of data structures like linked list and their applications in computer science.

CO 4: Illustrate the algorithms and operations related to tree and graph data structures, their practical applications and analyze complexity of algorithm associated with each operations.

CO5: Explain Sorting, Searching and file organization and its related techniques.


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Modules	Blooms level*	Number of hours
Module I: Introduction to Data structures Data structures: Definition, Types. Algorithm design, Complexity, Time-Space Tradeoffs. Use of pointers in data structures. Array Definition and Analysis, Representation of Linear Arrays in Memory, Traversing of Linear Arrays, Insertion and Deletion, Single Dimensional Arrays, Two Dimensional Arrays, Multidimensional Arrays, Function Associated with Arrays, Character String in C, Character String Operations, Arrays as parameters, Implementing One Dimensional Array, Sparse matrix.	L1, L2	7
Module II: Introduction to Stacks and queue Stack: Definition, Array representation of stacks, Operations Associated with Stacks- Push & Pop, Polish expressions, Conversion of infix to postfix, infix to prefix (and vice versa), Application of stacks recursion, polish expression and their compilation, conversion of infix expression to prefix and postfix expression, Tower of Hanoi problem. Queue: Definition, Representation of Queues, Operations of queues- QInsert, QDelete, Priority Queues, Circular Queue, Deque.	L1, L2, L3, L4	8
Module III: Dynamic Data Structure Linked list: Introduction to Singly linked lists: Representation of linked lists in memory, Traversing, Searching, Insertion into, Deletion from linked list, doubly linked list, circular linked list, generalized list. Applications of Linked List-Polynomial representation using linked list and basic operation. Stack and queue implementation using linked list.	L1, L3 and L4	7
Module IV: Trees and Graphs Trees: Basic Terminology, Binary Trees and their representation, expression evaluation, Complete Binary trees, extended binary trees, Traversing binary trees, Searching, Insertion and Deletion in binary search trees, General trees, AVL trees, Threaded trees, B trees. Graphs: Terminology and Representations, Graphs & Multigraphs, Directed Graphs, Sequential representation of graphs, Adjacency matrices, Transversal Connected Component and Spanning trees.	L1, L3 and L5	7
Module V: Sorting and Searching and file structures Sorting: Insertion Sort, Bubble sort, Selection sort, Quick sort, two-way Merge sort, Heap sort, Partition exchange sort, Shell sort, Sorting on different keys, External sorting. Searching: Linear search, Binary search File structures: Physical storage media, File Organization, Linked organization of file, Inverted file, Organization records into blocks, Sequential blocks, Hash function, Indexing & Hashing, Multilevel indexing, Tree Index, Random file, Primary Indices, Secondary Indices, B tree index files.	L1, L4, L5	7

*Bloom's Level:

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

1. Horowitz and Sahani, — Fundamentals of Data structures, Galgotia Publications.
2. R.L. Kruse, B.P. Leary, C.L. Tondo, — Data structure and program design in C, PHI
3. Data structures and algorithms – Schaum Series.
4. File Structures An object-Oriented Approach with C++ by Michael J. Folk, Bill Zoellick, Breg Riccardi, Published by Addison Wesley (1st ISE Reprint, 1999).

Reference Books

1. J. P. Tremblay and P. G. Sorenson, Introduction to Data Structures with Applications, McGraw – Hill

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- Algorithms by Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Published by Prentice-Hall
- India(1999).
- Data Structures Using C and C++ second edition by Yeddiyah Langsam, Moshe J. Augenstein, Aaron M. Tenenbaum, Published by Prentice-Hall India
- Data Structures and Algorithm analysis in C++ by Mark Allen Weiss, Published by Addison Wesley (3rd Indian Reprint 2000).
- Data Structures – R. S. Salaria

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	1	2	1	--	--	--	--	--	--	--	--	--	2	--	--
CO2	1	2	2	--	--	--	--	--	--	--	--	--	2	2	1
CO3	1	2	2	1	--	--	--	--	--	--	--	--	2	2	1
CO4	1	2	2	1	--	--	--	--	--	--	--	--	2	2	1
CO5	1	2	2	1	--	--	--	--	--	--	--	--	2	2	2

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AIE6305	DATA STRUCTURES USING C LAB	L	T	P	C
Version 2020.1	Date of Approval: JULY 2020	0	0	2	1
Pre-requisites/Exposure	Basic Knowledge of C Programming				
Co-requisites	Nil				

Catalog Description

This course covers the design, analysis, and implementation of data structures and algorithms to solve engineering problems using C programming language. Topics include elementary data structures, (including arrays, stacks, queues, and lists), advanced data structures (including trees and graphs), the algorithms used to manipulate these structures, and their application to solving practical engineering problems. At the end of this course student will gain knowledge about different kinds of file structures and their related operations.

Course Objectives

The objective of this course is to

1. Equip the students with knowledge of algorithms, different types of data structures and analysis of space and time complexity.
2. Provide an overview of various algorithms of data structures like stack and queues and related operations and implementation.
3. Provide an overview of dynamic Data Structure like linked list and its related operations, algorithms and programs. Demonstrate practical use of dynamic data structure to solve engineering problems.
4. Equip the students with knowledge of algorithms and operations related to tree and graph data structures and their practical applications.
5. Provide an overview of Sorting, Searching and file structures and its related algorithms and techniques.

Course Outcomes

On completion of this course, the students will be able to

CO 1: Identify operations and their implementation on array and multidimensional, string and estimation space and time complexity.

CO 2: Explain various algorithm and operations of data structures like stack and queues and analyze complexity of each operation.

CO 3: Explain dynamic data structures and various algorithms and operations of data structures like linked list and their applications in computer science.

CO 4: Illustrate the algorithms and operations related to tree and graph data structures, their practical applications and analyze complexity of algorithm associated with each operations.

CO5: Explain Sorting, Searching and file organization and its related techniques.



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Modules	Blooms level*	Number of hours
Module I: Introduction to Data structures <ol style="list-style-type: none"> Write a program to copy one string into another without using library functions. Write a program to demonstrate array and linked list implementation of sparse matrix. Write a program to multiply two 2D matrix. 	L3,L5	2
Module II: Introduction to Stacks and queue <ol style="list-style-type: none"> Write a program to implement push and pop operations on the stack. Write a program to demonstrate conversion of infix to postfix. Write a program to implement simple queue and perform insertion and deletion operation on it. Write a program to implement circular queue and perform insertion and deletion operation on it. Write a program to implement dqueue and perform insertion and deletion operations on it. Write a program to implement priority queue and perform insertion and deletion operation on it. 	L3,L5	4
Module III: Dynamic Data Structure <ol style="list-style-type: none"> Write a program to implement singly linked list and perform following operations on it. <ul style="list-style-type: none"> Insertion at end Insertion at last Insertion at desired place. Write a program to implement singly linked list and perform following operations on it. <ul style="list-style-type: none"> Deletion at end Deletion at last Deletion at desired place. Write a program to implement doubly linked list and perform following operations on it. <ul style="list-style-type: none"> Insertion at end Insertion at last Insertion at desired place. Write a program to implement singly linked list and perform addition of two polynomials. 	L3,L5	4
Module IV: Trees and Graphs <ol style="list-style-type: none"> Write a program to calculate in order, preorder and post order traversal on binary tree. Write a program to construct binary search tree and perform following operations on it. <ul style="list-style-type: none"> Deletion of element Insertion of elements. Write a program to construct binary search tree and search an element in it. Write a program to implement kruskal's algorithm to find out minimum spanning tree. 	L3,L5	6
Module V: Sorting and Searching and file structures	L3,L5	8

1. Write program to implement insertion sort.		
2. Write a program to search an element in array using binary search.		
3. Write a program to implement merge sort.		
4. Write a program to implement quick sort.		
5. Write a program to implement heap sort.		

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

1. Horowitz and Sahani, — Fundamentals of Data structures, Galgotia Publications.
2. R.L. Kruse, B.P. Leary, C.L. Tondo, —Data structure and program design in C, PHI
3. Data structures and algorithms – Schaum Series.
4. File Structures an Object-Oriented Approach with C++ by Michael J. Folk, Bill Zoellick, Greg Riccardi, Published by Addison Wesley (1st ISE Reprint, 1999).

Reference Books

1. J. P. Tremblay and P. G. Sorenson, Introduction to Data Structures with Applications, McGraw – Hill.
2. Algorithms by Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Published by Prentice-Hall India (1999).
3. Data Structures Using C and C++ second edition by Yeddydyah Langsam, Moshe J. Augenstein, Aaron M. Tenenbaum, Published by Prentice-Hall India
4. Data Structures and Algorithm analysis in C++ by Mark Allen Weiss, Published by Addison Wesley (3rd Indian Reprint 2000).
5. Data Structures – R. S. Salaria

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	1	2	1	--	--	--	--	--	--	--	--	--	2	--	--
CO2	1	2	2	--	--	--	--	--	--	--	--	--	2	2	1
CO3	1	2	2	1	--	--	--	--	--	--	--	--	2	2	1
CO4	1	2	2	1	--	--	--	--	--	--	--	--	2	2	1
CO5	1	2	2	1	--	--	--	--	--	--	--	--	2	2	2

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AIE6313	DIGITAL ELECTRONICS	L	T	P	C
Version 2020.1	Date of Approval: JULY, 2020	2	0	0	2
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

This course explores the theory and operation of the basic building blocks of digital electronics which includes combinational and sequential circuits. This course also explains the logic families and data convertors. The concepts learnt in the studies of sequential circuits will be applied in the design and analysis of Melay and Moore machines.

Course Objectives

The objective of this course is to

1. Provide the basic knowledge of digital logic levels and application of knowledge to understand combinational and sequential circuits.
2. Explain the operation of logic family and data convertors.

Course Outcomes

On completion of this course, the students will be able to

CO1: Explain the difference between analog and digital signal; Describe the Boolean algebra; Analyze the SOP & POS form of Boolean function; Solve k-map and tabulation method to simplify the logical function; Apply universal gates to implement the given logic.

CO2: Define the multiplexer and decoder; Explain the adder & subtractor; Apply multiplexer to design Boolean function; Analyze the difference between decoder and encoder.

CO3: Define flip flops; Compare combinational and sequential circuits; Describe shift registers; Design counters and synchronous sequential circuits.

CO4: Explain the logic families; Compare the RTL, DTL, TTL and ECL logic families.

CO5: Define data convertors; Explain analog to digital convertor and digital to analog convertor.

Modules	Blooms level*	Number of hours
MODULE 1: BOOLEAN FUNCTIONS Analog & digital signals, AND, OR, NOT, NAND, NOR & XOR gates, Boolean algebra, Standard representation of logical functions, K-map representation and simplification of logical function, don't care conditions, XOR & XNOR simplifications of K-maps, Tabulation method.	L1,L2 and L3	6
MODULE 2: COMBINATIONAL CIRCUITS Adders, Subtractors, Multiplexer, de-multiplexer, decoder & encoder, code converters, Comparators, decoder / driver for display devices, Implementation of logic functions using multiplexer / de-multiplexer.	L1, L2,L3 and L4	6
MODULE 3: SEQUENTIAL CIRCUITS Flip-flops: SR, JK, D & T flip flops – Truth table, Excitation table, Conversion of flip-flops, race around condition, Master Slave flip flop, Shift registers: SIPO, PISO, PIPO, SIPO, Bi-directional; Counters: ripple & synchronous counters – up / down; Synchronous Sequential circuit: design procedure.	L1, L2,L4 and L5	8

MODULE 4: LOGIC FAMILIES RTL, DTL, TTL, ECL.	L2 and L4	2
MODULE 5: DATA CONVERTERS ADC – successive approximation, linear ramp, dual slope; DAC – Binary Weighted, R-2R ladder type.	L1 and L2	2

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. Anand Kumar, "Fundamentals of Digital Circuits", 2nd Edition, Prentice-Hall, 2004
2. Moris Mano, "Digital Design", 2nd Edition, Pearson Education, 2007.
3. R.P. Jain, "Modern Digital Electronics", 2nd Edition, Tata McGraw Hill, 2003

Reference Books

1. Thomas L. Floyd, "Digital Fundamentals", 11th Edition, Pearson Education, 2015
2. Malvino and Leech, "Digital Principles & Applications", 1st Edition, Tata McGraw Hill, 1993

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS O 1	PS O 2	PS O 3	PSO 4
CO 1	1	2	1	--	--	--	--	--	--	--	--	--	1	--	--	--
CO 2	1	2	1	2	--	--	--	--	--	--	--	--	1	2	--	3
CO 3	1	2	1	2	--	--	--	--	--	--	--	--	1	--	--	3
CO 4	2	3	3	3	--	--	--	--	--	--	--	--	1	--	--	--
CO 5	2	3	3	3	--	--	--	--	--	--	--	--	1	--	--	3

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AIE6314	DIGITAL ELECTRONICS LAB	L	T	P	C
Version 2020.1	Date of Approval: July 2020	0	0	2	1
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

In this Lab course the combination and sequential circuits are designed, and their functionality is verified using truth table. Concepts covered would enable them to create complex circuits related to digital design. The objective of this course is to explore and implement the various features of digital logic using basic logic gates.

Course Objectives

The objective of this course is to

1. Provide a basic knowledge of digital logic levels and application of knowledge to understand digital electronics circuits.
2. Equip with understanding of different combinational and sequential circuits.

Course Outcomes

On completion of this course, the students will be able to

- CO 1: Demonstrate the basic concept of logic gates;
CO 2: Illustrate the adder and subtractors.
CO 3: Demonstrate the code convertors.
CO 4: Demonstrate the combinational and sequential circuits.

Modules/Topics Covered**	Blooms level*	Number of hours
1. To verify the truth tables of NOT, OR, AND, NOR, NAND, XOR, XNOR gates.	L3, L5	2
2. To obtain half adder, full adder using gates and verify their truth tables.	L3, L5	2
3. To obtain half subtractor, full subtractor using gates and verify their truth tables.	L3, L5	2
4. To implement control circuit using multiplexer.	L3, L5	2
5. To convert BCD code into excess 3 code and verify the truth table.	L3, L5	2
6. To verify the truth tables of RS, D, JK and T flip- flops.	L3, L5	2
7. To implement and verify 3-bit bi-directional shift register.	L3, L5	2
8. To design and study asynchronous/ripple counter.	L3, L5	2
9. To design and study synchronous counter.	L3, L5	2
10. To design and study a sequence detector.	L3, L5	2

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

- Anand Kumar, "Fundamentals of Digital Circuits", 2nd Edition, Prentice-Hall, 2004
- Moris Mano, "Digital Design", 2nd Edition, Pearson Education, 2007.
- R.P. Jain, "Modern Digital Electronics", 2nd Edition, Tata Mcgraw Hill, 2003

Reference Books

- Thomas L. Floyd, "Digital Fundamentals", 11th Edition, Pearson Education, 2015
- Malvino and Leech, "Digital Principles & Applications", 1st Edition, Tata McGraw Hill, 1993


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Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination**Examination Scheme:**

IA					EE
Components	A	PR	LR	V	70
Weightage (%)	5	10	10	5	

Note: IA –Internal Assessment, A – Attendance, PR – Performance, LR – Lab Record, V – Viva, EE- External Exam

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS O 1	PS O 2	PS O 3	PS O 4
CO 1	3	1	--	--	--	--	--	--	--	--	--	--	1	--	--	3
CO 2	3	1	--	--	--	--	--	--	--	--	--	--	1	--	--	3
CO 3	3	1	--	--	--	--	--	--	--	--	--	--	1	--	--	3
CO 4	2	1	--	--	--	--	--	--	--	--	--	--	1	--	--	3

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AIE6311	ELECTRONIC DEVICES & CIRCUITS	L	T	P	C
Version:2020.1	Date of Approval: July 2020	2	0	0	2
Pre-requisites/Exposure	Elementary Resistive Circuit, Theorems and Analysis Techniques: KCL, KVL, Nodal & Mesh Analysis, Thevenin & Norton Equivalents, Maximum Power Transfer.				
Co-requisites	Semiconductor Physics				

Catalog Description

This is the first course in Electronics and Communication Engineering, to educate and explain the methods used for biasing circuits in a graphical analysis of non-linear electronic circuits and also includes small signal transistor models, parameters and their frequency responses. Following this, analyzing different types of feedback amplifiers, and power amplifiers using transistor and designing of different electronic circuits are included in the course. This course also considers the mathematical modeling of active solid state devices their analysis and design of single state circuits. Topics covered include the study of device characteristics and applications of p-n-junction diodes, bipolar junction transistors, and field effect transistors.

Course Objectives

The objective of this course is to

1. build from basic knowledge of Semiconductor Physics to an understanding of basic devices and their models
2. familiarize the student with the analysis and design of basic transistor amplifier circuits, feedback amplifiers and wave shaping circuits
3. build a foundation for Analog Electronics-II, Digital Circuits and Systems I & II, VLSI design and analog CMOS IC Design.

Course Outcomes

On completion of this course, the students will be able to

- CO1. explain different types of diodes and demonstrate wave shaping circuits
CO2. explain operating principal of Bipolar Junction Transistor, its properties, biasing techniques and stability
CO3. describe low and high frequency transistor amplifiers along with single and multi-stage amplifier
CO4. explain operating principal of JFET, MOSFET, its properties, and biasing techniques
CO5. solve and analyse different negative feedback amplifiers configurations
CO6. describe and outline power amplifiers and their application.

Modules	Blooms level*	Number of hours
Module I: Semiconductor Diode and Diode Circuits		
Different types of diodes: Zener, Schottky, LED. Zener as voltage regulator, Diffusion capacitance, Drift capacitance, the load line concept, half wave, full wave rectifiers, clipping and clamping circuits.	L1 L2 & L3	6
Module II: Bipolar Junction Transistor		
Bipolar junction transistor: Introduction, Transistor, construction, transistor operations, BJT characteristics, load line, operating point, leakage currents, saturation and cut off mode of operations. Bias stabilization: Need for stabilization, fixed Bias, emitter bias, self bias, bias stability with respect to variations in I_{CO} , V_{BE} & β , Stabilization factors, thermal stability.	L1 L2 & L3	9

Module III: Small signal Analysis of transistor and Multistage Amplifier Hybrid model for transistors at low frequencies, Analysis of transistor amplifier using h parameters, emitter follower, Miller's theorem, THE CE amplifier with an emitter resistance, Hybrid π model, Hybrid π Conductances and Capacitances, CE short circuit current gain, CE short circuit current gain with R_L Multistage amplifier: Cascading of Amplifiers, Coupling schemes(RC coupling and Transformer coupling)	L2 & L3	6
Module IV: Field Effect Transistors Field effect transistor (JFET, MOSFET): volt-ampere characteristics, small signal model –common drain, common source, common gate, operating point, MOSFET, enhancement and -depletion mode, Common source amplifier, Source follower	L1, L2 & L3	5
Module V: Feedback Amplifiers Feedback concept, Classification of Feedback amplifiers, Properties of negative Feedback amplifiers, Impedance considerations in different Configurations, Examples of analysis of feedback Amplifiers.	L1, L2, L3 & L4	6
Module VI: Power amplifiers Power dissipation in transistors, difference with voltage amplifiers, Amplifier classification (Class A, Class B, Class C, Class AB) class AB push pull amplifier, collector efficiency of each, cross over distortion.	L1 & L2	4

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. Jacob Millman, Christos Halkias, Chetan Parikh, Millman's Integrated Electronics, McGraw Hill Education, 2nd Edition, New Delhi
2. Sanjeev Gupta, Electronic Devices and Circuits, Dhanpat Rai Publications, 2010
3. Theraja B.L., Sedha R.S, Principles of Electronic Devices and Circuits, S Chand & Company, First Edition, New Delhi, 2002

Reference Books

1. Robert L. Boylestad: Electronic Devices and Circuits, Pearson Education, 11th Edition, 2013
2. Robert F. Pierret, Semiconductor Device Fundamentals, Pearson Education, 1st Edition, 2006
3. Nagrath I.J, Electronics: Analog and Digital, Prentice Hall India Learning Private Limited, Second Edition, 2013

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	2	3	--	--	--	--	--	--	--	--	3	1	--	--	3
CO2	1	2	--	--	--	--	--	--	--	--	--	3	1	3	--	3
CO3	1	2	3	--	--	--	--	--	--	--	--	--	1	-	--	--
CO4	1	2	--	--	--	--	--	--	--	--	--	3	1	3	--	3
CO5	1	2	3	--	--	--	--	--	--	--	--	3	1	--	--	3
CO6	1	3	--	--	--	--	--	--	--	--	--	3	1	--	--	3

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AIE6310	E-COMMERCE AND ERP	L	T	P	C
Version 2020.1	Date of Approval: JULY 2020	3	0	0	3
Pre-requisites/Exposure	Knowledge of basic computer				
Co-requisites	Nil				

Catalog Description

This course examines the evolution of enterprise resource planning (ERP) systems - from internally focused client/server systems to externally focused e-business. This class studies the types of issues that managers will need to consider in implementing cross-functional integrated ERP systems. The objective of this course is to make students aware of the potential and limitations of ERP systems. This objective will be reached through hands-on experience, case studies, lectures, guest speakers and a group project. The course would equip students with the basics of E-Commerce, technologies involved with it and various issues associated with.

Course Objectives

The objective of this course is to

1. Understand the students with the role of consultants, vendors and employees.
2. Provide an overview of various phases in ERP implementation and identify various technologies used in ERP.

Course Outcomes

On completion of this course, the students will be able to

- CO1: Describe the key features of Internet, Intranets and Extranets and explain how they relate to each other. Demonstrate an understanding of the foundations and importance of E-commerce and assess electronic payment systems.
- CO2: Understand concepts of reengineering, data mining, data warehousing and how they relate to ERP system implementations.
- CO3: Explain the challenges associated with implementing enterprise systems and their impacts on organizations.
- CO4: Describe the selection, acquisition and implementation of enterprise systems and demonstrate an ability to work independently and in a group.
- CO5: Identify and describe typical functionality in an ERP system.
- CO 6: Analyze the strategic options for ERP identification and adoption.

Modules	Blooms level*	Number of hours
MODULE 1: INTRODUCTION AND CONCEPTS: Networks and commercial transactions - Internet and other novelties; Networks and electronic transactions today, Model for commercial transactions; Internet environment - internet advantage, world wide web and other internet sales venues; Online commerce solutions. Security Technologies: Why is internet insecure? A brief introduction to Cryptography; Public key solution. Digital payment systems; First virtual internet payment system; cyber cash model Operational process of Digicash, Ecash Trail; Using Ecash; Smart cards; Electronic Data Interchange: Its basics; EDI versus Internet and EDI over Internet.	L1, L2 and L3	8

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MODULE 2: INTRODUCTION ERP An Overview, Enterprise-An Overview, Benefits of ERP, ERP and Related Technologies, Business Process Reengineering (BPR), Data Warehousing, Data Mining, On-line Analytical Processing (OLAP), Supply Chain Management, Management Information systems (MIS), Decision support system (DSS), Executive Information systems (EIS). ERP – A Manufacturing Perspective Materials Requirement Planning (MRP), Bill of Material (Bom), Distribution Requirements Planning (DRP), JIT & Kanban, CAD/CAM, Product Data Management (PDM), Benefits of PDM, MTO, MTS, ATO, ETO, CTO.	L1,L2 and L3	10
MODULE 3: ERP IMPLEMENTATION To be or not to be, ERP Implementation Lifecycle, Implementation Methodology, Not all Packages are Created Equal!, ERP Implementation-The Hidden Costs, Organizing the Implementation, Vendors, Consultants and Users, Contracts with Vendors, Consultants and Employees, Project Management and Monitoring, After ERP Implementation.	L1,L2 and L3	8
MODULE 4: THE BUSINESS MODULES Business Modules in an ERP Package, Finance, Manufacturing (Production), Human Resources, Plant Maintenance, Materials Management, Quality Management, Sales and Distribution	L1,L2 and L3	8
MODULE 5: THE ERP MARKET ERP Market Place, SAP AG, PeopleSoft, Baan Company, JD Edwards World Solutions Company, Oracle Corporation, QAD, System Software Associates, Inc (SSA) ERP-Present and Future Turbo Charge the ERP System, Enterprise Integration Applications (EIA), ERP and E-Commerce, ERP and Internet, Future Directions in ERP, Appendices"	L2, L3 and L4	8
MODULE 6: BENEFITS OF ERP Time Reduction, Resource Utilization, Performance, Customer Satisfaction, Flexibility, Quality, Accuracy.	L1,L2 and L3	6

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Text Books

1.Alexis Leon, “**Enterprise Resource Planning**”, 4th Edition, TMH,2012.

Reference Books

1. Daniel E.O’Leary, “**Enterprise Resource Planning Systems,**” Cambridge University Press, 2012.
2. Ellen Monk, Bret Wagner, “**Concepts in Enterprise resource planning,**” Cengage learning, 4th edition, 2012.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination


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Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

A: Attendance, CT: Class Test, S/V/Q: Seminar/Viva/Quiz, HA: Home Assignment, EE: End Semester Examination

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS O 1	PS O 2	PS O 3	PS O 4
CO 1	--	2	--	--	--	--	--	3	--	--	1	2	--	1	2	--
CO 2	--	--	--	-	--	--	--	--	--	--	1	2	--	1	2	--
CO 3	--	2	--	-	-	--	--	--	2	--	1	2	--	--	1	--
CO 4	1	1	2	--	--	--	--	--	1	1	1	2	--	--	1	--
CO 5	--	1	1	--	--	--	--	--	--	1	1	2	3	--	--	2
CO 6	--	--	--	--	--	--	--	--	--	1	1	3	--	--	1	--

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AIE6404	ARTIFICIAL INTELLIGENCE	L	T	P	C
Version 2020.1	Date of Approval: July 2020	3	0	0	3
Pre-requisites/Exposure	Exposure to data structure and programming and an ability to discuss algorithms is the only pre-requisite.				
Co-requisites	Nil				

Catalog Description

Introduction to computational models of thought and construction of intelligent information systems. Topics include search algorithms, data dependencies and truth-maintenance systems, approaches to knowledge representation, automated deduction, reasoning under uncertainty, and machine learning. The field of Robotics is a multi-disciplinary as robots are amazingly complex system comprising mechanical, electrical, electronic H/W and S/W and issues germane to all these.

Course Objectives

The objective of this course is to

1. Provide an overview of problem solving skills methods using Artificial Intelligence.
2. Equip the students with the study of programming languages that is used to develop an Intelligence System.

Course Outcomes

On completion of this course, the students will be able to

- CO1: Explain how Artificial Intelligence enables capabilities that are beyond conventional technology, for example, chess-playing computers, self-driving cars, robotic vacuum cleaners and Understand the various searching techniques.
- CO2: Attain the capability to represent various real life problem domains using logic based techniques and use this to perform inference or planning.
- CO3: Acquire the knowledge of real world Knowledge representation. Apply concept Natural Language processing to problems leading to understanding of cognitive computing.
- CO4: Use different machine learning techniques to design AI machine and Write algorithms and implement programs in 'Prolog' language.
- CO5: Explain some of the more advanced topics of AI such as Robotics and Explain what constitutes "Artificial" Intelligence and how to identify systems with Artificial Intelligence.

Modules	Blooms level*	Number of hours
MODULE 1: PROBLEM SOLVING AND SCOPE OF AI Introduction to Artificial Intelligence. Applications- Games, theorem proving, natural language processing, vision and speech processing, robotics, expert systems. AI techniques- search knowledge, abstraction. PROBLEM SOLVING State space search; Production systems, search space control: depth-first, breadth-first search. Heuristic search - Hill climbing, best-first search, branch and bound. Problem Reduction, Constraint Satisfaction End, Means-End Analysis. LA* Algorithm, L(AO*) Algorithm.	L1, L2, L3 and L4	10
MODULE 2:	L1, L2	6

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KNOWLEDGE REPRESENTATION Knowledge Representation issues, first order predicate calculus, Horn Clauses, Resolution, Semantic Nets, Frames, Partitioned Nets, Procedural Vs Declarative knowledge, Forward Vs Backward Reasoning.	and L4	
MODULE 3: UNDERSTANDING NATURAL LANGUAGES Introduction to NLP, Basics of Syntactic Processing, Basics of Semantic Analysis, Basics of Parsing techniques, context free and transformational grammars, transition nets, augmented transition nets, Shanks Conceptual Dependency, Scripts, Basics of grammar free analyzers, Basics of sentence generation, and Basics of translation.	L1, L2 and L4	7
MODULE 4: EXPERT SYSTEM Need and justification for expert systems, knowledge acquisition, Case studies: MYCIN, R1 LEARNING Concept of learning, learning automation, genetic algorithm, learning by inductions, neural nets. Programming Language: Introduction to programming Language, LISP and PROLOG. HANDLING UNCERTAINTIES Non-monotonic reasoning, Probabilistic reasoning, use of certainty factors, Fuzzy logic.	L1, L2, L4 and L5	7
MODULE 5: INTRODUCTION TO ROBOTICS Fundamentals of Robotics, Robot Kinematics: Position Analysis, Dynamic Analysis and Forces, Robot Programming languages & systems: Introduction, the three levels of robot programming, requirements of a robot programming language, problems peculiar to robot programming languages.	L1, L2 and L3	6

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. E. Rich and K. Knight, "Artificial intelligence", TMH, 2nd ed., 1992.
2. N.J. Nilsson, "Principles of AI", Narosa Publ. House, 1990.
3. John J. Craig, "Introduction to Robotics", Addison Wesley publication.
4. Richard D. Klafter, Thomas A. Chmielewski, Michael Negin, "Robotic Engineering – An integrated approach", PHI Publication.
5. Tsuneo Yoshikawa, "Foundations of Robotics", PHI Publication

Reference Books

1. D.W. Patterson, "Introduction to AI and Expert Systems", PHI, 1992.
2. Peter Jackson, "Introduction to Expert Systems", AWP, M.A., 1992.
3. R.J. Schalkoff, "Artificial Intelligence - an Engineering Approach", McGraw Hill Int. Ed., Singapore, 1992.
4. M. Sasikumar, S. Ramani, "Rule Based Expert Systems", Narosa Publishing House, 1994.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	3	--	1	1	--	--	--	--	--	--	2	1	2	--	--
CO2	1	2	--	1	--	--	--	--	--	--	3	--	2	1	--	2
CO3	1	3	--	1	1	--	--	--	--	--	3	2	--	--	1	2
CO4	1	--	1	3	1	--	--	--	3	--	--	2	2	1	--	--
CO5	1	1	1	2	--	2	3	--	--	--	--	--	--	1	2	--

1: strongly related, 2: moderately related and 3: weakly related



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AIE6406	ARTIFICIAL INTELLIGENCE LAB	L	T	P	C
Version 2020.1	Date of Approval: July, 2020	0	0	2	1
Pre-requisites/Exposure	Basic Concepts of C and C++				
Co-requisites	Nil				

Catalog Description

PROLOG programs tell the computer what to do (declarative programming) rather than how to do it (procedural programming). PROLOG does this by making deductions and derivations, instigated by user-defined queries, from facts and rules stored in a database. The module teaches PROLOG as a practical programming tool, useful in solving various interesting problems especially in the Artificial Intelligence domain.

Course Objectives

The objective of this course is to

1. Provide an overview of a programming paradigm: programming by means of logic (also known as logic programming)
2. Provide an experience with development of AI application using PROLOG.

Course Outcomes

On completion of this course, the students will be able to

CO1: Use the basic knowledge of PROLOG programming in order to write simple PROLOG programs and explore more sophisticated PROLOG code on their own.

CO2: Use Prolog for developing artificial intelligence applications.

Modules/Topics Covered**	Blooms level*	Number of hours
1: INTRODUCTION TO PROLOG- SIMPLE FACTS, FACTS WITH ARGUMENTS. PROBLEM STATEMENT 1: <ul style="list-style-type: none"> Convert the following into Prolog Equivalent: It is raining. This is a book. PROBLEM STATEMENT 2: <ul style="list-style-type: none"> Convert the following into Prolog Equivalent: <ol style="list-style-type: none"> 1. The cakes are delicious. 2. Priya relishes coffee. 3. Edwin plays badminton. 	L1 and L3	4
2: DEFINING VARIABLES, MATCHING AND BACKTRACKING. PROBLEM STATEMENT 3: <ul style="list-style-type: none"> Convert the sentences into Prolog Equivalent and answer the following questions: <ol style="list-style-type: none"> 1. Sun rises in east. 2. Dovey is a good girl. 3. Dora likes books. 4. Chin is an intelligent student? Query 1: Who is a good girl? Query 2: Dora likes What? PROBLEM STATEMENT 4: <ul style="list-style-type: none"> Consider the following facts: 	L1, L3 and L5	4

1. parent (pam, bob). 2. parent (tom, bob). 3. parent (bob, ann). 4. parent (tom, liz). Query: Who is the parent of Whom? Or Find X and Y such that X is the parent of Y.		
3: RULES. PROBLEM STATEMENT 5: <ul style="list-style-type: none"> Consider the given knowledge. Represent the knowledge into the PROLOG equivalence and answer the question using rules. Joy is father of Jay. Jay is father of Sam. Sam is brother of Sue. Alvin is father of Ali. Sim is mother of Sam. Sis is mother of Alvin. Question: Who are Sue's parent?	L1, L3 and L5	2
4: INPUT AND OUTPUT PREDICATES. PROBLEM STATEMENT 6: <ul style="list-style-type: none"> Write a code to print a message on the screen. Write a program to perform addition of two numbers. 	L1 and L3	2
5: CONTROL STRUCTURES AND RECURSION. PROBLEM STATEMENT 7: <ul style="list-style-type: none"> Write a code in PROLOG to design a calculator. PROBLEM STATEMENT 8: <ul style="list-style-type: none"> Write a code in PROLOG to find the largest number among two numbers. Write a code in PROLOG to find the largest number among three numbers. PROBLEM STATEMENT 9: <ul style="list-style-type: none"> Write a code in PROLOG to find the factorial of a number. PROBLEM STATEMENT 10: <ul style="list-style-type: none"> Write a code in PROLOG to print the Fibonacci series. 	L1, L3 and L5	8
6: Data Structure and Operations. PROBLEM STATEMENT 11: <ul style="list-style-type: none"> Create a LIST of 10 elements and print Head and Tail. Write a code in PROLOG to concatenate two strings. PROBLEM STATEMENT 12: <ul style="list-style-type: none"> Write a code in PROLOG to search an item from a given LIST. 	L1 and L3	4

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

*** Sample Programs provided are not limited to these only, can include others as desired.*

Text Books

- 1.E. Rich and K. Knight, "Artificial intelligence", TMH, 2nd ed., 1992.
- 2.Bratko, "PROLOG Programming for A.I", 3rd Ed Ed., Addison Wesley, 2001.

Reference Books

1. D.W. Patterson, "Introduction to AI and Expert Systems", PHI, 1992.
2. R.J. Schalkoff, "Artificial Intelligence - an Engineering Approach", McGraw Hill Int. Ed., Singapore, 1992.

Examination Scheme:

IA					EE
Components	A	PR	LR	V	70
Weightage (%)	5	10	10	5	

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	--	--	--	2	1	--	--	--	--	--	--	3	--	1	--	--
CO2	--	--	1	2	--	3	--	--	2	--	3	--	--	1	2	--

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AIE6414	DATA COMMUNICATION & COMPUTER NETWORKS	L	T	P	C
Version : 2020.1	Date of Approval: July 2020	3	0	0	3
Pre-requisites/Exposure	Basics of Computers				
Co-requisites	NIL				

Catalog Description

The objective is to acquaint the students with the basics of data communication and networking. A structured approach to explain how networks work from the inside out is being covered. The physical layer of networking, computer hardware and transmission systems have been explained. In-depth application coverage includes email, the domain name system; the World Wide Web (both client- and server-side); and multimedia (including voice over IP).

Course Objectives

The objective of this course is to

1. To provide an overview of data communication and computer networks, network specific protocols, networking devices, OSI /TCP-IP Layer concepts.
2. To familiarize with the basic taxonomy and terminology of computer networking area.
3. To experience the designing and managing of communication protocols while getting a good exposure to the TCP/IP protocol suite.

Course Outcomes

On completion of this course, the students will be able to

CO1. State the functions of data component in communication, networking devices, characteristics of topologies and describe the functionality of layers in OSI model.

CO2. Explain Error correction and detection techniques; Differentiate between different type of protocols used at data link layer.

CO3. Describe channel allocation problem and illustrate the working and applications of different wireless LANs and WANs standards

CO4. Compare and Contrast different routing algorithms; discuss the frame format of IPv4 and IPv6

CO5. Compare and contrast different transport layer protocols and explain various protocols used at application layer.



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Modules	Blooms level*	Number of hours
Module I: Introduction Introduction to computer networks, evolution of computer networks and its uses, reference models, example networks The physical layer: Theoretical basis for data communication, transmission media, wireless transmission, telecom infrastructure, PSTN, communication satellites, mobile telephone system	L1, L2	8
Module II: The data link layer Data link layer design issues, error detection and correction, data link protocols, sliding window protocols, example of data link protocols-HDLC, PPP Access	L2, L3 and L4	8
Module III: Medium access layer Channel allocation problem, multiple access protocols, ALOHA, CSMA/CD, CSMA/CA, IEEE Standard 802 for LAN and MAN, Bridges, Wireless LANs. Introduction to wireless WANs: Cellular Telephone and Satellite Networks, SONET/SDH, Virtual-Circuit Networks: Frame Relay and ATM.	L2, L3	9
Module IV: The network layer Network layer concepts, design issues, static and dynamic routing algorithms, shortest path routing, flooding, distance vector routing, link state routing, distance vector routing, multicast routing, congestion control and quality of service, internetworking, Ipv4	L2, L3 and L4	6
Module VI: The transport layer The transport services, elements of transport protocols, TCP and UDP. The application layer: Brief introduction to presentation and session layer, DNS, E-mail, WWW	L2, L3 and L4	6

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5:Synthesis, L6:Evaluation

Text & References:


Text:

1. Computer networks: Tanenbaum, Andrew S, Prentice Hall
2. Data communication & Networking: Forouzan, B. A.

References:

1. Computer network protocol standard and interface: Uysell, Black
2. Data and Computer Communications, Seventh Edition (7th.) William Stallings Publisher: Prentice Hall
3. Computer Networking: A Top-Down Approach Featuring the Internet (3rd Edition) by James F. Kurose

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination


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Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	2	--	--	--	--	--	--	--	--	--	--	1	3	--	--
CO2	1	2	3	--	--	--	--	--	--	--	--	--	1	1	--	--
CO3	1	1	2	3	3	--	--	--	--	--	--	--	1	2	--	--
CO4	1	1	2	3	--	--	--	--	--	--	--	--	1	1	2	---
CO5	1	1	2	3	--	--	--	--	--	--	--	--	1	2	1	---

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AIE6415	DATA COMMUNICATION AND COMPUTER NETWORKS LAB	L	T	P	C
Version 2020.1	Date of Approval: July 2020	0	0	2	1
Pre-requisites/Exposure					
Co-requisites	Nil				

Catalog Description

The objective is to acquaint the students with the basics of data communication and networking. A structured approach to explain how networks work from the inside out is being covered. The physical layer of networking, computer hardware and transmission systems have been explained. In-depth application coverage includes email, the domain name system; the World Wide Web (both client- and server-side), routing protocols and data link layer protocols.

Course Objectives

The objective of this course is to

1. Equip the students with concepts of data communication and networking.
2. Provide an overview of various protocols and their configurations using networking devices and servers.

Course Outcomes

On completion of this course, the students will be able to

CO 1: Demonstrate the use of Command Line Interface (CLI) and other features and Cisco Packet Tracer; describe and distinguish networking devices and transmission media.

CO 2: Apply various application layer protocols capability on server device including DNS, DHCP, HTTP, SMTP and POP.

CO 3: Construct network topology and operate routing protocols (RIP, OSPF and EIGRP) for end-to-end connectivity.

CO 4: Illustrate the use of data link protocols-HDLC and PPP; determine network connectivity issues and fix them.

Modules	Blooms level*	Number of hours
LABORATORY SESSION 1 THE PHYSICAL LAYER 1. Introduction to different types of transmission media and cables. 2. Introduction to various networking devices and equipment. 3. Construct network topology and understand configuration of devices using Cisco Packet Tracer (tool).	L2, L3	6
LABORATORY SESSION 2 THE APPLICATION LAYER 1. Configuration of Domain Name System (DNS) server using Cisco Packet Tracer. 2. Configuration of Dynamic Host Configuration Protocol (DHCP) server using Cisco Packet Tracer. 3. Configuration of mail server using Cisco Packet Tracer. 4. Configuration of web server using Cisco Packet Tracer.	L3	6
LABORATORY SESSION 3		

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THE NETWORK LAYER 1. Configure Routing Information Protocol (RIP) using Cisco Packet Tracer. 2. Configure Open Shortest Path First (OSPF) routing protocol using Cisco Packet Tracer. 3. Configure Enhanced Interior Gateway Routing Protocol (EIGRP) using Cisco Packet Tracer.	L3	6
LABORATORY SESSION 4 DATA LINK LAYER 1. Configure and Analyze the working of data link control protocols-HDLC and PPP access. 2. Configure PPP security protocols-PAP and CHAP using Cisco Packet Tracer. 3. Determine various issues in network connectivity and communication using troubleshooting commands.	L3,L4	6

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. Cisco Networking Academy Programme CCNA 3 & 4 Lab Companion, 3rd Edition, Pearson Education, 2003.

Reference Books

1. Scott Empson, CCNA Routing and Switching portable command guide, 3rd Edition, Cisco Press, 2016.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	2	--	--	--	--	--	--	--	--	--	--	1	3	--	--
CO2	1	2	3	--	--	--	--	--	--	--	--	--	1	3	--	--
CO3	1	1	2	3	--	--	--	--	--	--	--	--	1	3	--	--
CO4	1	1	2	3	3	--	--	--	--	--	--	--	1	3	--	--
CO5	1	1	2	3	3	--	--	--	--	--	--	--	1	3	--	--

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AIE6411	ARTIFICIAL NEURAL NETWORK	L	T	P	C
Version 2020.1	Date of Approval: July 2020	2	-	-	2
Pre-requisites/Exposure	Basic Knowledge of Brain functioning				
Co-requisites	Nil				

Catalog Description

The course provides introduction to neural network and a deep insight into the basics of brain & its functioning basics of various neural models & neural schema used for learning. With this course students would be able to know the basics of each introductory feature of human brain and its features which would prove to be very helpful throughout their degree and would prove helpful in understanding other related subjects also.

Course Objectives

The objective of this course is to

1. Equip the students with concepts of learning of brain problem solving techniques and develop proficiency in creating neural structures using the MATLAB.
2. Provide an overview of various control statements, data structures, packages related to image addition, graphics, different types of neural models.

Course Outcome

On completion of this course, the students will be able to

CO 1: Define Artificial Neural Network & its similarity to biological neural network and explain its application in our day to day life.

CO 2: Analyze ANN learning, Error correction learning, Hebbian learning, Competitive learning and Boltzman Learning.

CO 3: Implement simple perceptron, Perceptron Learning rule, modified perceptron learning rule, feed forward neural network & feedback Neural Network.

CO 4: Explain self-organizing Map, Hopfield network, Adaptive resonance theory and its various learning rules.

CO 5: Analyze memory-based learning, Associative learning, Bi-directional learning and Auto associative learning.

Modules	Blooms level*	Number of hours
Module-I Artificial Neural Networks (ANN) and biological neural networks, supervised and unsupervised learning rules, neural network applications	L1, L2 and L3	6
Module-II Unsupervised learning:- Hebbian learning and competitive learning. Supervised learning:- Back propagation algorithms, Learning rule:- Delta learning rule, Widrow-Hoff learning rule, Winner-Take-All learning rule	L1, L2 and L3	6
Module-III Feed forward neural network, feed backward neural network, Perceptron and its learning law, single-layer perceptron, multi-layer perceptron.	L2, L3 and L4	6
Module-IV Self organizing networks: Kohonen algorithm, Hopfield Networks: Hopfield network algorithm, Adaptive resonance theory: Network and learning rules.	L2, L3 and L4	6

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Module V Associative memory, auto-associative memory, bi-directional associative memory.	L2, L3 and L4	6
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**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Book:

- o Kenji Suzuki (ed.) - InTech , 2013
- o Todd Troyer - University of Texas at San Antonio, 2005.

Reference Book:

- MATLAB 2017 Book released by MATWORS

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1												1			
CO2	1												1		1	
CO3		1	2										1			
CO4		1	2	1									1		1	
CO5			2										1			

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AIE6412	ARTIFICIAL NEURAL NETWORK LAB	L	T	P	C
Version 2020.1	Date of Approval: July 2020	0	0	1	1
Pre-requisites/Exposure	Basics of MATLAB				
Co-requisites	NIL				

Catalog Description

In this Lab course first student should learn about advanced level of software used for easy calculation and toolbox used for software like MATLAB.

Course Objectives

The objective of this course is to

1. Make the students apply knowledge of various neural models required for solving complex problems.
2. Provide a demonstration of different types of image processing techniques through MATLAB toolbox.

Course Outcomes

On completion of this course, the students will be able to

CO1: Acquiring knowledge of Basics of High-end calculation software and need in Computer Science & engineering

CO2: Demonstrate the All preliminary functions in MATLAB

CO3: Apply the knowledge of all the basics function and toolbox knowledge of MATLAB

CO4: Demonstrate the Neural Network model in MATLAB

CO5: Demonstrate usage of applications involving with Image processing & Its Toolbox used by MATLAB

Modules/Topics Covered**	Blooms level*	Number of hours
1. Introduction of MATLAB (a) Basic Variable declaration & its operation (b) Function use & its application	L3, L5	4
2. Sample Programs in MATLAB (a) Basic use of Matrix and Graph Plotting (b) Different type of graph plotting with use of different -2 type of data	L3, L5	6
3. Sample Programs using MATLAB functions (a) Create a basic program MATLAB using functions (b) Use of basic function Image processing (c) Practice on Basic function of Image processing tool box.	L3, L5	6
4. Sample programs of ANN functions (a) Practice on ANN toolbox function in MATLAB (b) Write a program for training a small network in MATLAB	L3, L5	6
5. Sample Programs using ANN tool box & Image processing toolbox (a) Demonstrate the use of ANN tool box & Image processing toolbox and write a program after combining it.	L3, L5	2

*Bloom's Level:

L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

** Sample Programs provided are not limited to these only, can include others as desired.

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Text Books

1. Kenji Suzuki (ed.) - InTech , 2013
2. Todd Troyer - University of Texas at San Antonio , 2005

Reference Books

1. MATLAB 2017 Book released by MATWORS.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination**Examination Scheme:**

IA					EE
Components	A	PR	LR	V	70
Weightage (%)	5	10	10	5	

Note: IA –Internal Assessment, A – Attendance, PR – Performance, LR – Lab Record, V – Viva, EE- External Exam

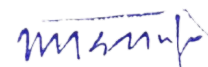
CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	2	1	--	--	--	--	--	--	--	--	--	--	2	--	--	--
CO2	3	1	--	--	--	--	--	--	--	--	--	--	1	2	--	--
CO3	2	1	2	--	--	--	--	--	--	--	--	--	1	2	--	--
CO4	1	3	2	--	--	--	--	--	--	--	--	--	2	--	2	--
CO5	1	3	--	--	--	--	--	--	--	--	--	--	1	--	--	--

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AIE6407	COMMUNICATION SYSTEM	L	T	P	C
Version 2020.1	Date of Approval: July, 2020	2	0	0	2
Pre-requisites/Exposure	Signal and System				
Co-requisites					

Catalog Description

The purpose of this course is to introduce students to the basic principles of the design and analysis of modern communication systems. It will provide a thorough study of both analog and digital modulation and demodulation schemes. The performance analysis of various techniques based on requirements of noise and bandwidth will also be explained. It also introduces the students to the information theory and coding for basic understanding of mobile communication system.

Course Objectives

The objective of this course is to

1. Provide a thorough introduction to analog and digital communications
2. Provide in depth study of various modulation and demodulation techniques.
3. Introduce students to basics of information theory and coding for applications in mobile communication.

Course Outcomes

On completion of this course, the students will be able to

CO1. Define and Distinguish analog and digital communication systems.

CO2. Differentiate modulation and demodulation techniques of AM and FM systems and compare them in terms of Bandwidth and noise.

CO3. Distinguish and categorize various digital modulation techniques.

CO4. Describe Information theory and coding for applications in mobile communication system by solving different encoding problems.

Modules	Blooms level*	Number of hours
MODULE I: INTRODUCTION Communication Process, Source of Information, base-band and pass-band signals, Review of Fourier transforms, Random variables, different types of PDF, need of modulation process, analog versus digital communications	L1 and L2	4
MODULE II: AMPLITUDE MODULATION Amplitude modulation with full carrier, suppressed carrier systems, single side band transmission, switching modulators, synchronous detection, envelope detection, effect of frequency and phase errors in synchronous detection, comparison of various AM systems, vestigial side band transmission.	L1, L2, L3 and L4	8
MODULE III: ANGLE MODULATION Narrow and wide band FM, BW calculations using Carson rule, Direct & Indirect FM generations, phase modulation, Demodulation of FM signals,	L1, L2, L3 and L4	9

noise reduction using pre & de-emphasis.		
MODULE IV: PULSE MODULATION Pulse amplitude, width & position modulation, generation & detection of PAM, PWM & PPM, Comparison of frequency division and time division multiplexed systems. Basics of Digital Communications: ASK, PSK, FSK, QPSK basics & waveform with brief mathematical introduction	L1, L2, L3 and L4	6
MODULE V: NOISE Different types of noise, noise calculations, equivalent noise band width, noise figures, effective noise temperature, noise figure.	L1 and L2	4
MODULE VI: INTRODUCTION TO INFORMATION THEORY Measurement of Information, mutual, Shannon's theorem, Source coding, channel coding and channel capacity theorem, Huffman code	L1, L2 and L3	5

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. B. P. Lathi and Zhi Ding, "Modern Digital and Analog Communication Systems", Fourth Edition, Oxford University Press, 2009
2. Wayne Tomasi, "Electronic Communication systems", 5th edition, Pearson Education, 2008

Reference Books

1. Simon Haykin, "Communication Systems", Third Edition, John Wiley & Sons, 2007
2. Taub and schilling, "Principles of Communication Systems", Third Edition, TMH, 2008

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	--	--	--	--	2	--	--	--	--	--	--	1	--	1	--
CO2	1	3	2	--	--	2	--	--	--	--	--	--	1	--	1	--
CO3	1	3	2	--	--	2	--	--	--	--	--	--	1	--	1	--
CO4	1	2	2	--	--	3	--	--	--	--	--	--	1	--	1	--

1: strongly related, 2: moderately related and 3: weakly related


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AIE6408	COMMUNICATION SYSTEMS LAB	L	T	P	C
Version 2020.1	Date of Approval: JULY 2020	0	0	2	1
Pre-requisites/Exposure	Signal and System				
Co-requisites	Nil				

Catalog Description

To impart knowledge on Amplitude Modulation and Angle modulation principles, generation, and its types. Also, to understand the basic concepts of pulse modulation techniques like PCM and PSK.

Course Objectives

The objective of this course is to

1. To provide the basic skills required to understand, develop, and design of various engineering applications involving analog communication theory. To provide basic laboratory exposures for communication principles and applications.

Course Outcomes

On completion of this course, the students will be able to

CO1: Study the carrier modulation techniques like AM and FM modulation.

CO2: Study digital carrier modulation techniques using amplitude shift keying and Frequency shift keying.

CO3: Demonstrate various pulse modulation techniques (PCM), DM, ASK, DPSK and QPSK.

List of Experiments:

Modules	Blooms level*	Number of hours
1. To study the sampling and reconstruction of a given signal. 2. To study amplitude modulation and demodulation. 3. To study frequency modulation and demodulation. 4. To study time division multiplexing.	L1, L2	8
5. To study pulse amplitude modulation. 6. To study delta and adaptive delta modulation and demodulation. 7. To study carrier modulation techniques using amplitude shift keying and Frequency shift keying.	L3 and L4	10
8. To study carrier modulation techniques using binary phase shift keying and differential shift keying. 9. To study pulse code modulation & differential pulse code modulation as well as relevant demodulations. 10. To study quadrature phase shift keying & quadrature amplitude modulation.	L2, L4	10

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	2													2	
CO2	2	2			2										2	
CO3	2										2				2	

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AIE6417	WEB DESIGNING TECHNOLOGIES	L	T	P	C
Version: 2020.1	Date of Approval: JULY 2020	2	0	0	2
Pre-requisites/Exposure	knowledge of Internet fundamentals				
Co-requisites	NIL				

Catalog Description

The objective of this course is to introduce the basic concepts of HTML5 and CSS3. To explore and implement the various concepts of website design using HTML with the concept of the tags, script, and code that create web pages. To understand how the web and web pages work and web pages styles using CSS3. After completing this course students can easily develop static web sites and style them using CSS3.

Course Objectives

The objective of this course is

1. Understand the advanced features of HTML5 which includes images, links, tables, frames and forms etc and gives an overview of CSS3 which is used to add style to the web pages.
2. Demonstrate the application of HTML5 in developing solutions to web site creation and understanding how CSS will affect web page creation.
3. Design a responsive web site using HTML5 and CSS3.

Course Outcomes

On completion of this course, the students will be able to

CO 1: Explain the basic concepts of HTML, structure of HTML. Apply the different tags for images, hypertext and lists in web pages.


CO 2: Illustrate the different ways to use styles in web pages using CSS? Apply CSS style sheets for formatting text in web pages.

CO 3: Explain the layout of CSS style and describe how to add audio and video in html web pages.

CO 4: Demonstrate the use of Table and frames in web pages and setting properties for tables and frames.

CO 5: Explain the writing scripts in web pages and publishing Webpages on web.

Modules	Blooms level*	Number of hours
Module I History of HTML, Basic HTML Structure, Creating title, Creating header and footer, Adding Comments, Formatting Text, Specifying time, Indicating citations/references, quotes, abbreviations, pre-formatted text, Inserting Images, Creating Image Links, Scaling images with the browser, setting icons for web page, Creating hypertext, anchor tag, Creating List, Creating Definition List, Creating Hyper Text Links, Creating Link Lists.	L2 and L3	8


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Module II CSS building blocks, working with style sheets, Creating different types of style sheets- External , embedded and inline style sheets, defining selectors , Selecting on basis of class and id, selecting elements based on the attributes, combining selectors, Formatting text with styles, setting font properties.	L3 and L4	7
Module III CSS: Layout with style, changing the background color, setting border, changing the cursor, style sheets for mobile to desktop, working with web fonts, creating forms, organizing the form elements. Adding audio , video and other multi-media .	L2 and L3	7
Module IV Tables and frames, Creating Tables, Table Element, Adding Border, Adding Column Headings, Adding Spacing and Padding, Adding a Caption, Setting the table Width and Height, Add Row Headings, Aligning Cell contents, Setting Column Width, Centering a Table, Inserting and Image, Spanning Columns, Spanning Rows Assigning Background Colors, Frame Elements, Creation of Frame Based Pages.	L3	7
Module V: Working with scripts : Loading an external script, testing & debugging web pages, publishing your web page on the web.	L2	7

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books:

1. HTML HTML5 and CSS3, Seventh Edition: Visual QuickStart Guide ,Elizabeth Castro and Bruce Hyslop.
2. HTML, XHTML and CSS Bible, Steven M. Schefar, Wiley Publishing, Inc.

Reference Books:

1. HTML & CSS: The Complete Reference, Fifth Edition ,Thomas A. Powell, Tata McGraw Hill.
2. HTML5: Up and Running ,Mark Pilgrim, O'Reilly Media, Inc.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS O 1	PS O 2	PS O 3	PS O 4
CO 1	--	--	1	--	1	--	--	--	--	1	--	--	1	--	--	--
CO 2	--	--	2	--	2	--	--	--	--	1	--	--	1	--	--	--
CO 3	--	--	1	--	1	--	--	--	--	2	--	--	1	--	--	--
CO 4	--	--	2	--	1	--	--	--	--	2	--	--	1	--	--	--
CO 5	--	--	1	--	2	--	--	--	2	1	--	--	1	1	--	2

1: strongly related, 2: moderately related and 3: weakly related

AIE6418	WEB DESIGNING TECHNOLOGIES LAB	L	T	P	C
Version: 2020.1	Date of Approval: JULY 2020	0	0	2	1
Pre-requisites/Exposure	knowledge of Internet fundamentals				
Co-requisites	NIL				

Catalog Description

The objective of this course is to introduce the basic concepts of HTML5 and CSS3. To explore and implement the various concepts of website design using HTML with the concept of the tags, script, and code that create web pages. To understand how the web and web pages work and web pages styles using CSS3. After completing this course students can easily develop static web sites and style them using CSS3.

Course Objectives

The objective of this course is

1. Understand the advanced features of HTML5 which includes images, links, tables, frames and forms etc and gives an overview of CSS3 which is used to add style to the web pages.
2. Demonstrate the application of HTML5 in developing solutions to web site creation and understanding how CSS will affect web page creation.
3. Design a responsive web site using HTML5 and CSS3.

Course Outcomes

On completion of this course, the students will be able to

- CO 1: Explain the basic concepts of HTML, structure of HTML. Apply the different tags for images, hypertext and lists in web pages.
- CO 2: Illustrate the different ways to use styles in web pages using CSS? Apply CSS style sheets for formatting text in web pages.
- CO 3: Explain the layout of CSS style and describe how to add audio and video in html web pages.
- CO 4: Demonstrate the use of Table and frames in web pages and setting properties for tables and frames.
- CO 5: Explain the writing scripts in web pages and publishing Webpages on web.

Modules	Blooms level*	Number of hours
Module I Programs based on : <ul style="list-style-type: none"> • Basic HTML Structure, Creating title, Creating header and footer, Adding Comments, • Formatting Text, Specifying time, Indicating citations/references, quotes, abbreviations, • pre-formatted text, Inserting Images, Creating Image Links, Scaling images with the browser, • setting icons for web page, Creating hypertext, anchor tag, Creating List, • Creating Definition List, Creating Hyper Text Links, Creating Link Lists. 	L2 and L3	6

Module II & Module III Programs based on: <ul style="list-style-type: none"> • CSS style sheets, Creating different types of style sheets- External , embedded and inline style sheets, • Selection on basis of class and id, selecting elements based on the attributes, combining selectors, • Formatting text with styles, setting font properties. • Changing the background color, setting border, changing the cursor, style sheets for mobile to desktop, • working with web fonts, creating forms, organizing the form elements. Adding audio , video and other multi-media . 	L2,L3 and L4	4
Module IV Programs based on: <ul style="list-style-type: none"> • Tables and frames, Creating Tables, Table Element, Adding Border, Adding Column Headings, • Adding Spacing and Padding, Adding a Caption, Setting the table Width and Height, Add Row Headings, • Aligning Cell contents, Setting Column Width, Centering a Table, Inserting and Image, • Spanning Columns, Spanning Rows Assigning Background Colors, • Frame Elements, Creation of Frame Based Pages. 	L3	4
Module V: Programs based on Working with scripts : Loading an external script, testing & debugging web pages, publishing your web page on the web.	L2	1

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books:

1. HTML HTML5 and CSS3, Seventh Edition: Visual QuickStart Guide ,Elizabeth Castro and Bruce Hyslop.
2. HTML, XHTML and CSS Bible, Steven M. Schefar, Wiley Publishing, Inc.

Reference Books:


1. HTML & CSS: The Complete Reference, Fifth Edition ,Thomas A. Powell, Tata McGraw Hill.
2. HTML5: Up and Running ,Mark Pilgrim, O'Reilly Media, Inc.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/ Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance


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CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS O 1	PS O 2	PS O 3	PS O 4
CO 1	--	--	1	--	1	--	--	--	--	1	--	--	1	--	--	--
CO 2	--	--	2	--	2	--	--	--	--	1	--	--	1	--	--	--
CO 3	--	--	1	--	1	--	--	--	--	2	--	--	1	--	--	--
CO 4	--	--	2	--	1	--	--	--	--	2	--	--	1	--	--	--
CO 5	--	--	1	--	2	--	--	--	2	1	--	--	1	1	--	2

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AIE6502	COMPUTER ARCHITECTURE	L	T	P	C
Version 2020.1	Date of Approval: JULY 2020	3	0	0	3
Pre-requisites/Exposure	Logic Gates				
Co-requisites	nil				

Catalog Description

Computer architecture is concerned with the structure and behavior of the various functional modules of the computer and how they interact to provide the processing needs of the user. It includes basic register transfer language and computer organization and design. Complete insight on the working of CPU, Memory and I/O communication will be provided. Pipelining and related topics will also be discussed.

Course Objectives

The objective of this course is to

1. Equip the students with concepts of computer architectures and their modules.
2. Provide an overview of various algorithms used and hardware implementation computer.

Course Outcomes

On completion of this course, the students will be able to

- CO1. Explain about Register transfer language and various micro operations of arithmetic logic unit.
CO2. Explain about the organization of computer modules and their details.
CO3. Explain in details of central processing unit like general purpose register, accumulator etc. and computer arithmetic.
CO4. Explain memory organization of computer and their interconnections. Details of direct memory access.
CO5. Explain parallel processing and pipeline techniques.

Modules	Blooms level*	Number of hours
Module I: Register Transfer Language Register Transfer, Bus and Memory Transfers, Arithmetic Micro-operations, Logic Micro-operations, Shift Micro-operations, Arithmetic Logic shift Unit.	L1, L2 and L3	10
Module II: Basic Computer Organizations and Design Instruction Codes, Computer Registers, Computer Instructions, Timing and Control, Instruction Cycle, Memory-Reference Instructions, Input-Output and Interrupt, Design of Accumulator Logic. Hardwired and Microprogrammed control: Control Memory, Address Sequencing, Design of Control Unit	L1,L2	9
Module III: Central Processing Unit Introduction, General Register Organization, Stack Organization, Instruction representation, Instruction Formats, Instruction type, Addressing Modes, Data Transfer and Manipulation, Program Control, Reduced Instruction Set Computer RISC and CISC Computer Arithmetic: Introduction, Addition and Subtraction Algorithm, Multiplication Algorithms, Booth Multiplication, Division Algorithms, Floating-Point Arithmetic Operations	L1,L2, L3	10
Module IV: Memory and Intersystem Communication and Input output organisation	L1,L2, L3.	10

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Memory: Memory types and organization Memory Hierarchy, Main Memory, Auxiliary Memory, Associative Memory, Cache Memory with mapping techniques, Virtual Memory, Memory Management Hardware Intrasystem communication and I/O: Peripheral Devices, Input-Output Controller and I/O driver, IDE for hard disk, I/O port and Bus concept, Bus cycle, Synchronous and asynchronous transfer, Modes of Transfer, DMA, DMA Transfer, DMA Controller, I/O Processor, CPU-IOP Communication		
Module V: Pipelining, Vector Processing and Multiprocessors Parallel Processing, Pipelining, Arithmetic Pipeline, Instruction Pipeline, RISC Pipeline Multiprocessors: Characteristics of Multiprocessors	L1 and L2	9

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation*

Text Book:

1. Morris Mano, Computer System Architecture, 3rd Edition – 1999, Prentice-Hall of India Private Limited.
2. Harry & Jordan, Computer Systems Design & Architecture, Edition 2000, Addison Wesley, Delhi.

References Books:

1. William Stallings, Computer Organization and Architecture, 4th Edition-2000, Prentice-Hall of India Private Limited.
2. Kai Hwang-McGraw-Hill, Advanced Computer Architecture.
3. John D. Carpinelli, Computer system Organization & Architecture, Edition 2001, Addison Wesley, Delhi
4. M. Morris Mano and Charles, Logic and Computer Design Fundamentals, 2nd Edition Updated, Pearson Education, ASIA.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	ATT	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

ATT: Attendance, CT: Class Test, S/V/Q: Seminar/Viva/Quiz, HA: Home Assignment, EE: End Semester Examination.

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO1	1	2	3	3	--	--	--	--	--	--	--	--	2	1	--
CO2	1	--	--	--	--	--	--	--	--	--	--	--	--	2	--
CO3	1	2	3	3	--	--	--	--	--	--	--	--	2	1	--
CO4	1	2	3	3	--	--	--	--	--	--	--	--	2	1	--
CO5	1	--	--	--	--	--	--	--	--	--	--	--	--	1	--

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AIE6503	JAVA PROGRAMMING	L	T	P	C
Version 2020.1	Date of Approval: JULY 2020	3	0	0	3
Pre-requisites/Exposure	Basics of Programming				
Co-requisites	NIL				

Catalog Description

The objective is to impart programming skills used in this object-oriented language java. The course explores all the basic concepts of core java programming like object, classes, data types, features, operators, control structures, interfaces, packages, applets, awt, swings and socket programming. The students are expected to learn it enough so that they can develop the basic applications as well as web solutions like creating applets etc.

Course Objectives

The objective of this course is to

1. Equip the students with the basic feature of contemporary java required in solving complex problems.
2. Provide a practical knowhow and implementation of java programming concepts like classes, objects, packages, swings, socket programming.

Course Outcomes

On completion of this course, the students will be able to

- CO1: Define and explain concept of byte code and platform independence, demonstrate basic java-based application development using operators, if-else, loops and arrays.
- CO2: Distinguish between various types of inheritances, polymorphisms and other concepts and able to solve complex programming problems involving class objects, inheritances, and packages.
- CO3: Describe hierarchy of exception classes and thread life cycle along with demonstrate and design solutions for some simple and complex applications using exception and multithreading concepts.
- CO4: Explain event delegation model and describe AWT class hierarchy; Apply knowledge of event handling and AWT controls create some new dynamic graphical applications.
- CO5: Explain the architecture of applet and concept of swing package. Demonstrate applications based on java applets and swings.

Modules	Blooms level*	Number of hours
Module I: Java Basics Concepts of OOP, Features of Java, How Java is different from C++, Environmental setup, Basic syntax, Objects and classes, Basic Data Types, Variable Types, Modifier Types, Basic operators, Loop Control, Decision Making, Strings and Arrays, Methods, I/O.	L1, L2 and L3	6
Module II: Java Object Oriented Inheritance, Overriding, Polymorphism, Abstraction, Encapsulation, Interfaces, Packages, Exploring java.util package.	L2 and L3	7
Module III: Exception Handling and Threading Exception Hierarchy, Exception Methods, Catching Exceptions, Multiple catch Clauses, Uncaught Exceptions Java's Built-in Exception. Creating, Implementing and Extending thread, thread priorities, synchronization suspending, resuming and stopping Threads, Multi-threading.	L2, L3 and L5	8

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Module IV: Event Handling And AWT Event handling Mechanism, Event Model, Event Classes, Sources of Events, Event Listener Interfaces, AWT: Working with Windows, AWT Controls, Layout Managers	L2, L3, L4 and L5	8
Module V: Java Advanced Applet Class, Architecture, Skeleton, Display Methods. Swings: Japplet, Icons, labels, Text Fields, Buttons, Combo Boxes. Socket Programming: Socket methods, Server Socket methods, Socket Client and Socket Server examples.	L2 and L3	7

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text:

1. "JAVA The Complete Reference" by Patrick Naughton & Herbert Schild, 10th Edition, TMH
2. "Introduction to JAVA Programming a primer", E. Balaguruswamy, 4th Edition, TMH

References:

1. "Introduction to JAVA Programming" By Daniel/Young PHI
2. "Java Script", By Jeff Frentzen and Sobotka, Tata McGraw Hill, 1999

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	2	1	--	--	--	--	--	--	--	--	--	--	2	--	--	--
CO2	3	1	--	--	--	--	--	--	--	--	--	--	1	2	--	--
CO3	2	1	2	--	--	--	--	--	--	--	--	--	1	2	--	--
CO4	1	3	2	--	--	--	--	--	--	--	--	--	2	--	2	--
CO5	1	3	--	--	--	--	--	--	--	--	--	--	1	--	--	--

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AIE6507	JAVA PROGRAMMING LAB	L	T	P	C
Version 2020.1	Date of Approval: JULY 2020	0	0	2	1
Pre-requisites/Exposure	Basics of Programming				
Co-requisites	NIL				

Catalog Description

In this Lab course the basic features of contemporary java are implemented and demonstrated. Problems or programs will be related to concepts of classes, objects, threads, packages, exception handling, applets, AWT control, swings and socket programming. Concepts covered would enable them to create basic and complex console and graphical based applications for desktop and Internet

Course Objectives

The objective of this course is to

1. Equip the students to apply knowledge of various basic java features required in solving basic and complex problems.
2. Provide a demonstration of basic java programming concepts like classes, objects, threads, packages, exception handling, applets, AWT control, swings and socket programming

Course Outcomes

On completion of this course, the students will be able to

- CO1: Apply the concepts learned of operators, if-else, loops and arrays to java based application development.
- CO2: Demonstrate the use of various types of inheritances, polymorphisms, class objects, inheritances, packages and other concepts to basic and complex java programming problems.
- CO3: Apply the knowledge of exception handling and multithreading concepts for some simple and complex applications.
- CO4: Apply knowledge of event handling and AWT controls to create some new dynamic graphical applications.
- CO5: Demonstrate graphical applications based on java applets, swings and event handling.

Modules/Topics Covered**	Blooms level*	Number of hours
5. Sample Programs using Objects and classes, Variable Types, Modifier Types, operators, Loops Decision Making, Strings and Arrays, (a) WAP to display "Hello, it's a first program in java". (b) WAP to find sum of two integers taken as input from user at runtime. (c) WAP to find sum of two float numbers taken as command line arguments (d) WAP to find changed case of entered character. (e) WAP to find maximum of 3 integer numbers taken as input from user at runtime. (f) WAP in java to find out the greatest out of ten numbers stored using arrays. (g) WAP to create class with "name" as String and "age" as integer data members. The class should have two methods to take input from user and display the data. (h) WAP to find factorial of a number using class and object.	L3, L5	6

6. Sample Programs using Inheritance, Overriding, Polymorphism, Interfaces, Packages a. WAP in java to illustrate the concept of interfaces. b. WAP to create a package as MyPack having a class with three methods: max, fact and show. Use it in other folder with setting classpath and without setting class path. c. Write a program in java to showcase uses of super keyword	L3, L5	4
1. Sample Programs using exception handling and threads a) Write a program to demonstrate the use of nesting of try-catch block b) WAP in java to illustrate the concept of using multiple catch clauses to handle different types of exceptions. c) WAP in java to create a user defined Exception and throw it explicitly. d) Demonstrate thread using Thread class and Runnable interface e) Demonstrate various thread methods using a program	L3, L5	6
(a) Sample Programs using event handling and AWT controls (b) Write a program to display "hello" in different color where user clicks left mouse button and "world" where right mouse button is clicked. Use black background. (c) WAP in java to create a Frame and handle window-closing event implementing the WindowListener interface. (d) WAP to create an Applet having various different buttons, recognizing them using action command string method and handling click event generated by them. (e) WAP to create a frame and illustrate the concept of using an adapter class in place of interfaces for handling various mouse events generated over frame window. (f) WAP in java to create a frame with AWT controls (like label, push buttons, Checkbox, Checkbox Group) and handle various events generated by them. (g) WAP in java to create a frame with various AWT controls (like choice, list, TextField and Buttons) and handle the events thrown by them.	L3, L5	6
7. Sample Programs using applets, swings and stream socket a) . Write an applet which will display "HAPPY" and "DEEPAVALI" as: The word "HAPPY" will roll from top to bottom and "DEEPAVALI" from bottom to "top" . Both will run at the same speed and stop simultaneously at the center of the applet. b) Write an applet to display last 32 shades of red, green and blue in equal sized square grid accompanied by appropriate labels like "Last 32 shades of Red/Green/Blue color". Make use of BorderLayout to apply border for each individual shade. c) Create an applet with one single button with caption "Click". On clicking the button will open a new Frame with title "Factorial". The frame will have two three controls :TextField, Label and button. On clicking button calculate the factorial entered in TextField control. d) Create Java programs to demonstrate day time client and server e) Create java programs to create echo client and server	L3, L5	2

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

** Sample Programs provided are not limited to these only, can include others as desired.

Text:

1. “JAVA The Complete Reference” by Patrick Naughton & Herbert Schild, 10th Edition, TMH
2. “Introduction to JAVA Programming a primer”, E. Balaguruswamy, 4th Edition, TMH

References:

1. “Introduction to JAVA Programming” By Daniel/Young PHI .
2. “Java Script”, By Jeff Frentzen and Sobotka, Tata McGraw Hill, 1999

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination
Examination Scheme:

IA					EE
Components	A	PR	LR	V	35
Weightage (%)	5	10	10	5	

Note: IA –Internal Assessment, A – Attendance, PR – Performance, LR – Lab Record, V – Viva, EE- External Exam

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	2	1	--	--	--	--	--	--	--	--	--	--	2	--	--	--
CO2	3	1	--	--	--	--	--	--	--	--	--	--	1	2	--	--
CO3	2	1	2	--	--	--	--	--	--	--	--	--	1	2	--	--
CO4	1	3	2	--	--	--	--	--	--	--	--	--	2	--	2	--
CO5	1	3	--	--	--	--	--	--	--	--	--	--	1	--	--	--

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AIE6509	ADVANCED DATA STRUCTURES & ALGORITHMS LAB	L	T	P	C
Version 2020.1	Date of Approval: JULY 2020	0	0	2	1
Pre-requisites/Exposure	Application of Data Structures				
Co-requisites	Nil				

Catalog Description

Designing an algorithm is an important component of computer science. The objective of this course is to make students aware of various techniques used to evaluate the efficiency of a particular algorithm. Students eventually should learn to design efficient algorithm for a particular program.

Course Objectives

The objective of this course is to

1. Equip the students with the concepts of complexity and analysis of algorithms.
2. Provide an understanding of different techniques used in designing algorithms for a variety of problems.
3. Equip the students with the concepts of complexity classes of different problems.

Course Outcomes

On completion of this course, the students will be able to

CO1: State and explain the meaning of algorithm, analysis and design; apply the algorithmic concepts to analyze a given algorithm and compute its time complexity.

CO2: Explain and apply the concept of Divide and Conquer approach in designing algorithms; analyze a divide and conquer algorithm; explain and apply the concept of Greedy approach in designing algorithms for optimization problems.

CO3: Explain and apply the concept of Dynamic Programming in designing algorithms for optimization problems; compare and contrast the Dynamic Programming with Greedy approach and Divide and Conquer approach.

CO4: State and explain Elementary Graph Algorithms; explain and apply the concept of Branch & Bound and Backtracking in designing algorithms for different problems.

CO5: Define and explain the concept of computational complexity, Polynomially Bounded Algorithms, Class NP, Class NP Hard and Class NP Complete.

Modules	Blooms level*	Number of hours
MODULE 1: Implementation of the following algorithms: <ul style="list-style-type: none"> • Insertion Sort • Bubble Sort • Counting Number of Inversions 	L1, L2, L3, and L4	3
MODULE 2: Implementation of the following algorithms: <ul style="list-style-type: none"> • Binary Search (Divide & Conquer) • Merge Sort (Divide & Conquer) • Quick Sort (Divide & Conquer) • Strassen's Matrix Multiplication (Divide & Conquer) • Graph Representation Graph Searching 	L1, L2, and L3, and L4	5
MODULE 3:	L1, L2,	6

Implementation of the following algorithms: <ul style="list-style-type: none"> Breadth First Search Depth First Search Strongly Connected Components Topological Sort Fractional Knapsack Problem (Greedy Approach) 	L3, and L4	
MODULE 4: Implementation of the following algorithms: <ul style="list-style-type: none"> Kruskal's Algorithm. (Greedy Approach) Prim's Algorithm (Greedy Approach) Dijkstra's Algorithm (Greedy Approach) Bellmanford Algorithm (Greedy Approach) 	L1, L2, L3, and L4	6
MODULE 5: <ul style="list-style-type: none"> 0/1-Knapsack Problem (Dynamic programming) Matrix Chain Multiplication (Dynamic programming) N-Queens Problem (Backtracking) 	L1 and L2	6

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books:

1. T. H. Cormen, Leiserson, Rivest and Stein, "Introduction of Computer algorithm, MIT Press, ISBN-(ISBN: 978-0262033848)
2. E. Horowitz, S. Sahni, and S. Rajsekar, "Fundamentals of Computer Algorithms," Galgotia Publication

Reference Books

1. Sara Basse, A. V. Gelder, "Computer Algorithms," Pearson.
2. J.E Hopcroft, J.D Ullman, "Design and analysis of algorithms," Addison-Wesley

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	1	1	1	1	1	--	--	--	--	--	--	1	1	3	2
CO2	1	1	1	1	1	1	--	--	--	--	--	--	1	1	3	2
CO3	1	1	1	1	1	1	--	--	--	--	--	--	1	1	3	2
CO4	1	1	1	1	1	1	--	--	--	--	--	--	1	1	3	2
CO5	1	1	2	2	3	3	--	--	--	--	--	--	1	1	3	2

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AIE6515	MICROPROCESSOR	L	T	P	C
Version 2020.1	Date of Approval: JULY 2020	2	1	0	3
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

This course deals with the systematic study of the architecture and programming issues of 8085-microprocessor family. Explanation of microprocessor in terms of ALP and timing diagrams, Memory System Design & I/O Interfacing, peripheral devices and advance Pentium Processors.

Course Objectives

The objective of this course is to

1. Equip with concepts of microprocessor and interfacing with peripheral devices.
2. Provide an overview of advance microprocessors.

Course Outcomes

On completion of this course, the students will be able to

CO1: Describe the architecture of 8085 microprocessor.

CO2: Describe assembly language programming and show timing diagram for 8085 microprocessors.

CO3: Explain the input output interfacing with peripheral devices and design of memory system for 8085 microprocessors.

CO4: Describe the architecture of 8086 microprocessor and compare with 8085 microprocessors.

CO5: Explain the working principles and architecture of 8087, 80x86 and Pentium processors.

Modules	Blooms level*	Number of hours
Module I: Introduction to Microcomputer Systems Introduction to Microprocessors and microcomputers, Study of 8-bit Microprocessor, 8085 pin configuration, Internal Architecture and operations, interrupts, Stacks and subroutines, various data transfer schemes.	L1 and L2	8
Module II: ALP and timing diagrams Introduction to 8085 instruction set, advance 8085 programming, Addressing modes, Counters and time Delays, Instruction cycle, machine cycle, T-states, timing diagram for 8085 instruction.	L2 and L3	10
Module III: Memory System Design & I/O Interfacing Interfacing with 8085. Interfacing with input/output devices (memory mapped, peripheral I/O), Cache memory system. Study of following peripheral devices 8255, 8253, 8257, 8255, 8251.	L1 and L5	10
Module IV: Architecture of 16-Bit Microprocessor Difference between 8085 and 8086, Block diagram and architecture of 8086 family, pin configuration of 8086, Minimum mode & Maximum mode Operation. Internal architecture of 8086, Bus Interface Unit, Register Organization, Instruction Pointer, Stack & Stack pointer, merits of memory segmentation, Execution Unit, Register Organization.	L1 and L2	10

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Module V: Pentium Processors .Internal architecture of 8087, Operational overview of 8087, Introduction to 80186, 80286, 80386 & 80486 processors, Pentium processor.	L1 and L2	10

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. Ramesh. S. Gaonkar, "Microprocessor architecture Programming and Application with 8085" Penram International Publishing, 4th Edition
2. B. Ram, "Fundamentals of microprocessors and microcomputer" Dhanpat Rai, 5th Edition.

Reference Books

1. M. Rafiqzaman, "Microprocessor Theory and Application" PHI – 10th Indian Reprint.
2. Naresh Grover, "Microprocessor comprehensive studies Architecture, Programming and Interfacing" Dhanpat Rai, 2003.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	2	3												1	1	
CO2	1	2	3		3									3	1	3
CO3			1		2						3	3		2	1	3
CO4	1	2	3												1	3
CO5	1	2	3												1	3

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AIE6517	MICROPROCESSOR LAB	L	T	P	C
Version: 2020.1	Date of Approval: JULY 2020	0	0	2	1
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

This course focuses on the systematic study of the Architecture and programming of microprocessor family and its applications. The objectives of this course are:

1. To introduce students with the architecture operation and instruction set of 8085 and 8086 microprocessors.
2. To familiarize the students with the programming and interfacing of 8085 and 8086 microprocessors.
3. To provide the basic knowledge of the microprocessor needed to develop the embedded system based products as a solution to real time problems.

Course Outcomes

On completion of this course, the students will be able to

CO1. Set up programming strategies and select proper mnemonics and run their program on the training boards

CO2. Develop assembly language programs for various problems keeping in mind technical issues and evaluate possible causes of discrepancy in practical experimental observations in comparison.

CO3. Understand the concepts related to I/O and memory interfacing and design interfacing circuits with 8085 by making use of different peripheral devices.

Modules	Blooms level*	Number of hours
Lab Session 1: ALP using 8085: <ol style="list-style-type: none"> 1. Write at least three different programs for addition of two 8 bit numbers assuming carry may or may not be generated. 2. Write at least three different programs for subtraction of two 8 bit numbers assuming borrow may or may not be generated. 3. Write two different programs for 16 bit addition, one using instruction DAD and another without using instruction DAD. 4. Write assembly language program for 8 bit multiplication and division. 	L2, L3, L4	4
Lab Session II: To study, understand, interface and two peripheral devices with 8085.	L4, L5, L6	2
Lab session III: Any three programs using 8085 based on block of data.	L4	1
Lab session IV: ALP using 8086: <ol style="list-style-type: none"> 1. Write an ALP to add list of 10 given numbers. 2. Write an ALP to sum the numbers from 1-100. 3. Write an ALP to count negative numbers from a given list of 10 numbers. 4. Write an ALP to check number of vowels in a given string. 	L2, L3, L4	5

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. Douglas Hall, Microprocessor and Interfacing:, Tata McGraw Hill, 2017
2. Gaonkar R. S , Microprocessor Architecture, Programming and Applications, Wiley

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Reference Books

1. Yu Cheng Liu & Glen A. Gibson, Microcomputer Systems: 8086/8088 family Architecture, Programming and Design, PHI Publication, 2016.
 2. Ram B., Fundamentals of Microprocessors and Microcomputers, Dhanpat Rai & Sons, 2017
- Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	2	--	--	--	--	--	--	--	--	--	--	3	2	1	
CO2	1	1	2	3	--	--	--	--	--	--	--	--	3	2	1	1
CO3	-	-	-	1	2	3	--	--	--	--	--	--		2	2	1

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AIE6508	PYTHON PROGRAMMING LAB	L	T	P	C
Version 2020.1	Date of Approval: JULY 2020	0	0	2	1
Pre-requisites/Exposure	Hands on knowledge of C and C++ Programming				
Co-requisites	Basic concepts of OOP Programming				

Catalog Description

The course is designed to provide an introduction to the Python programming language. The focus of the course is to provide students with an introduction to programming, I/O, and visualization using the Python programming language.

Course Objectives

The objective of this course is

1. Equip the students with the basic feature of python required in solving complex problems and build GUI applications
2. Provide a practical knowledge of implementation/demonstration of python programming concepts like of lists, tuples, dictionaries, Object Oriented Programming concepts in Python, Strings and Files in Python.

Course Outcomes

On completion of this course, the students will be able to

- CO 1: Demonstrate the basics of python programming using if-else, loops and List, Dictionary, tuples.
- CO 2: Demonstrate the concept of inheritances, polymorphisms and other concepts and able to solve complex programming problems involving class objects.
- CO 3: Demonstrate the ability to write database applications in Python
- CO 4: Demonstrate Files Handling in Python.
- CO 5: Demonstrate database operation and GUI applications in python.

Modules	Blooms level*	Number of hours
<ol style="list-style-type: none"> 1. Write a program which will find all such numbers which are divisible by 7 but are not a multiple of 5, between 2000 and 3200 (both included). The numbers obtained should be printed in a comma-separated sequence on a single line. 2. Create a program that asks the user to enter their name and their age. Print out a message addressed to them that tells them the year that they will turn 100 years old. 3. Define a function max() that takes two numbers as arguments and returns the largest of them. Use the if-then-else construct available in Python. (It is true that Python has the max() function built in, but writing it yourself is nevertheless a good exercise.) 4. Define a function max_of_three() that takes three numbers as arguments and returns the largest of them. 	L1, L2 and L3	4
<ol style="list-style-type: none"> 5. Define a function that computes the length of a given list or string. (It is true that Python has the len() function built in, but writing it yourself is nevertheless a good exercise.) 6. Write a function that takes a character (i.e. a string of length 1) and returns True if it is a vowel, False otherwise. 7. Write a function translate() that will translate a text into "rövarspråket" (Swedish for "robber's language"). That is, double every consonant and place an occurrence of "o" in between. For 	L2 and L3	6

<p>example, <code>translate("this is fun")</code> should return the string "tothohisosisosfofunon".</p> <p>8. Define a function <code>sum()</code> and a function <code>multiply()</code> that sums and multiplies (respectively) all the numbers in a list of numbers. For example, <code>sum([1, 2, 3, 4])</code> should return 10, and <code>multiply([1, 2, 3, 4])</code> should return 24.</p> <p>9. Define a function <code>reverse()</code> that computes the reversal of a string. For example, <code>reverse("I am testing")</code> should return the string "gnitset ma I".</p>		
<p>10. Ask the user for a number. Depending on whether the number is even or odd, print out an appropriate message to the user</p> <p>11. Take a list, say for example this one: <code>a = [1, 1, 2, 3, 5, 8, 13, 21, 34, 55, 89]</code> and write a program that prints out all the elements of the list that are less than 5.</p> <p>12. Create a program that asks the user for a number and then prints out a list of all the divisors of that number. (If you don't know what a divisor is, it is a number that divides evenly into another number. For example, 13 is a divisor of 26 because $26 / 13$ has no remainder.)</p> <p>13. Take two lists, say for example these two: <code>a = [1, 1, 2, 3, 5, 8, 13, 21, 34, 55, 89]</code> <code>b = [1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13]</code> and write a program that returns a list that contains only the elements that are common between the lists (without duplicates). Make sure your program works on two lists of different sizes.</p>	L2, L3, L4 and L5	4
<p>14. Ask the user for a string and print out whether this string is a palindrome or not. (A palindrome is a string that reads the same forwards and backwards.)</p> <p>15. Let's say I give you a list saved in a variable: <code>a = [1, 4, 9, 16, 25, 36, 49, 64, 81, 100]</code>. Write one line of Python that takes this list <code>a</code> and makes a new list that has only the even elements of this list in it.</p> <p>16. Make a two-player Rock-Paper-Scissors game. (Hint: Ask for player plays (using input), compare them, print out a message of congratulations to the winner, and ask if the players want to start a new game)</p> <p>Remember the rules:</p> <ul style="list-style-type: none"> • Rock beats scissors • Scissors beats paper • Paper beats rock 	L2, L3 and L4	4
<p>14. Write a program that asks the user how many Fibonacci numbers to generate and then generates them. Take this opportunity to think about how you can use functions. Make sure to ask the user to enter the number of numbers in the sequence to generate. (Hint: The Fibonacci sequence is a sequence of numbers where the next number in the sequence is the sum of the previous two numbers in the sequence. The sequence looks like this: 1, 1, 2, 3, 5, 8, 13, ...)</p> <p>15. Write a program (function!) that takes a list and returns a new list that contains all the elements of the first list minus all the duplicates.</p> <p>16. Write a function that takes an ordered list of numbers (a list where the elements are in order from smallest to largest) and another number. The function decides whether or not the given number is inside the list and returns (then prints) an appropriate boolean.</p>	L2, L3 and L4	1

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Text Books

1. Michael Urban and Joel Murach, Python Programming, Shroff/Murach, 2016
2. Mark Lutz, Programming Python, O`Reilly, 4th Edition, 2010
3. Patrick Naughton & Herbert Schild ,”JAVA The Complete Reference”, 10thEdition , TMH

Reference Book

4. Daniel/Young , Introduction to JAVA Programming” , PHI.
5. Jeff Frentzen and Sobotka, “Java Script”, Tata McGraw Hill,1999.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/ Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS O 1	PS O 2	PS O 3	PS O 4
CO 1	2	1	--	--	--	--	--	--	--	--	--	--	1	2	--	--
CO 2	3	1	--	--	--	--	--	--	--	--	--	--	1	1	--	--
CO 3	1	3	2	--	--	--	--	--	--	--	--	--	1	2	3	--
CO 4	1	3	2	--	--	--	--	--	--	--	--	--	1	1	--	--
CO 5	1	3	--	--	--	--	--	--	--	--	--	--	1	2	--	1

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AIE6535	SUMMER INTERNSHIP EVALUATION-I	L	T	P	C
Version: 2020.1	Date of Approval: JULY 2020	0	0	0	3
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

The objective of this course is to provide practical training on some live projects that will increase capability to work on actual problem in industry. This training may undergo in an industrial environment or may be an in-house training on some latest software which is in high demand in market. This training will be designed such that it will useful for their future employment in industry.

Course Objectives

The objective of this course is to

1. Provide practical training on live projects
2. Increase technical capabilities on solving real life problems in company environment

Course Outcomes

On completion of this summer internship, the students will be able to:

CO1: Develop communication, interpersonal and other critical skills in the job interview process.

CO2: Design and develop software and hardware projects

CO3: Assess interests and abilities in their field of study.

CO4: Demonstrate excellent technical and communication skills to acquire employment contacts leading directly to a full-time job following graduation from college.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	2	1	2	2	--	--	--	1	--	--	--	1	1	1	1
CO2	1	1	2	2	2	--	--	--	1	--	--	--	1	1	1	1
CO3	1	1	2	3	2	--	--	--	1	--	--	--	1	1	1	1
CO4	1	1	2	2	2	--	--	--	1	--	--	--	1	1	1	1

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VHDL PROGRAMMING

Course Code: AIE6512

Credit Units: 02

Course Objective:

VHDL is commonly used as a design-entry language for field-programmable gate arrays and application-specific integrated circuits in electronic design automation of digital circuits. The course aims to discuss the syntax of the language to model a digital system.

Course Contents:

Module I

Fundamental VHDL Units, LIBRARY Declarations, ENTITY, ARCHITECTURE, Introductory Examples, Specification of combinational systems using VHDL, Introduction to VHDL, Basic language element of VHDL, Behavioural Modeling, Data flow modeling, Structural modeling, Subprograms and overloading, VHDL description of gates.

Module II

Data Types; Pre-Defined Data Types, User-Defined Data Types, Subtypes, Arrays, Port Array, Records, Signed and Unsigned Data Types, Data Conversion

Module III: Sequential codes

PROCESS: Signals and Variables, IF, WAIT, CASE, LOOP, CASE versus IF, CASE versus WHEN, Bad Clocking, Using Sequential Code to Design Combinational Circuits
Description and design of sequential circuits using VHDL,

Module IV

Standard combinational modules, Design of a Serial Adder with Accumulator, State Graph for Control Network, design of a Binary Multiplier, Multiplication of a Signed Binary Number, Design of a Binary Divider.

Module V

Micro programmed Controller, Structure of a micro programmed controller, Basic component of a micro system, memory subsystem. Overview of PAL, PLA, FPGA, CPLD.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

Text & References:

Text:

3. J. Bhaskar, "A VHDL Primer", Addison Wesley, 1999.
4. Volnei A. Padroni, "Circuit Design with VHDL."
5. M. Ercegovac, T. Lang and L.J. Moreno, "Introduction to Digital Systems", Wiley, 2000
6. C. H. Roth, "Digital System Design using VHDL", Jaico Publishing, 2001

References:

- VHDL Programming by Examples by Douglas L. Perry, TMH, 2000
- Hardware Description Languages by Sumit Ghose, PHI, 2000
- The Designer Guide to VHDL by P.J. Ashendern; Morgan Kaufmann Pub. 2000
- Digital System Design with VHDL by Mark Zwolinski; Prentice Hall Pub. 1999
- Designing with FPGA & CPLDs by Zeidman; CMP Pub. 1999
- HDL Chip Design by Douglas J. Smith; Doone Pub. 2001

VHDL PROGRAMMING LAB

Course Code: AIE6513

Credit Units : 01

Software Required: Mentor Graphics

Topics covered in lab will include:

- Designing Basic Gates.
- Designing Combinational circuits like adder, multiplexer, PLA
- Designing Sequential Circuits like flip-flops, counters, registers.

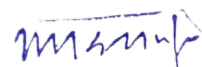
Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.



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AIE6518	ADVANCED WEB DESIGNING TECHNOLOGIES	L	T	P	C
Version 2020.1	Date of Approval: JULY 2020	0	0	2	1
Pre-requisites/Exposure	Knowledge of Internet fundamentals				
Co-requisites	NIL				

Catalog Description

This course is aimed to provide a fundamental understanding of JavaScript and two of its related library: Bootstrap and React for dynamic web site client side scripting. Javascript is a famous scripting language for client side. The bootstrap and react libraries are rich API for creating dynamic websites. The course builds strong foundation for client-side scripting for creating dynamic websites

Course Objectives

The objective of this course is

1. Equip the students with basic and advanced features of javascript and bootstrap library to create dynamic web sites
2. Provide an overview of basic features of react library to design dynamic websites.

Course Outcomes

On completion of this course, the students will be able to

CO1: Explain basic concepts of java scripts and apply them to create basic scripts

CO2: Explain the fundamentals of client side scripting ,document object model and apply them to create dynamic websites.

CO3: Apply basic APIs of bootstrap library to create dynamic websites

CO4: Demonstrate bootstrap java plugins and its use in designing sample websites.

CO5: Explain and apply react APIs in client side scripting

Modules	Blooms level*	Number of hours
Module 1: Basics Introduction to JavaScript, JavaScript Core Features—Overview, Data Types and Variables, Operators, Expressions, and Statements, Functions, Objects, Array, Date, Math, and Type-Related Objects, Regular Expressions	L2 and L3	8
Module 2: Fundamental of Client-Side JavaScript JavaScript Object Models, The Standard Document Object Model, Event Handling, Controlling Windows and Frames, Handling Documents, Form Handling, Dynamic Effects: Rollovers, Positioning, and Animation, Navigation and Site Visit Improvements, Browser and Capabilities Detection Advanced Topics: JavaScript and Embedded Objects, Remote JavaScript, JavaScript and XML	L2 and L3	7
Module 3: Introduction to Bootstrap (Part 1) Bootstrap Scaffolding: What Is Bootstrap?, Bootstrap File Structure, Basic HTML template, Global Styles Default: Grid System, Basic Grid HTML, Offsetting Columns, Nesting Column, Fluid Grid System, Container Layouts Bootstrap CSS: Typography, Code, Tables, Bootstrap Layout Components: Dropdown Menus, Button Groups, Buttons with Dropdowns, Navigation Elements, Navbar, Breadcrumbs Pagination, Labels, Badges, Typographic Elements	L2 and L3	7

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Module 4: Introduction to Bootstrap (Part 2) Bootstrap JavaScript Plugins: Overview, Transitions ,Modal ,Dropdown, Scrollspy, Toggleable Tabs, Tooltips, Popover	L2and L3	7
Module 5: The React Library Writing Your First React App, Thinking in React, Server Communication, JSX and the Virtual DOM, Advanced Components, Forms in React.	L2 and L3	7

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books:

1. "Javascript: The Complete Reference", Thomas Powell ,Fritz Schneider,Oreilly, 2004.
2. "Bootstrap", Jake Spurlok, Orielly, 2013.
3. "Full Stack React", Anthony Accamozo, Fullstack, 2017.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/ Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS O 1	PS O 2	PS O 3	PS O 4
CO 1	--	1	1	--	1	--	--	--	--	1	--	--	1	--	--	--
CO 2	--	1	2	--	2	--	--	--	--	1	--	--	1	--	--	--
CO 3	--	1	1	--	1	--	--	--	--	2	--	--	1	--	--	--
CO 4	--	1	2	--	1	--	--	--	--	2	--	--	1	--	--	--
CO 5	--	1	1	--	2	--	--	--	2	1	--	--	1	1	--	2

1: strongly related, 2: moderately related and 3: weakly related

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AIE6519	ADVANCED WEB DESIGNING TECHNOLOGIES LAB	L	T	P	C
Version 2020.1	Date of Approval: JULY 2020	0	0	2	1
Pre-requisites/Exposure	Knowledge of Internet fundamentals				
Co-requisites	NIL				

Catalog Description

This course is aimed to provide a fundamental understanding of JavaScript and two of its related library: Bootstrap and React for dynamic web site client side scripting. Javascript is a famous scripting language for client side. The bootstrap and react libraries are rich API for creating dynamic websites. The course builds strong foundation for client-side scripting for creating dynamic websites

Course Objectives

The objective of this course is

1. Equip the students with basic and advanced features of javascript and bootstrap library to create dynamic web sites
2. Provide an overview of basic features of react library to design dynamic websites.

Course Outcomes

On completion of this course, the students will be able to

CO1: Explain basic concepts of java scripts and apply them to create basic scripts

CO2: Explain the fundamentals of client side scripting ,document object model and apply them to create dynamic websites.

CO3: Apply basic APIs of bootstrap library to create dynamic websites

CO4: Demonstrate bootstrap java plugins and its use in designing sample websites.

CO5: Explain and apply react APIs in client side scripting

Modules	Blooms level*	Number of hours
Module 1: Basics Programs based on: <ul style="list-style-type: none"> JavaScript Core Features—Overview, Data Types and Variables, Operators, Expressions, and Statements, Functions, Objects, Array, Date, Math, Type-Related Objects, Regular Expressions 	L2 and L3	2
Module 2: Fundamental of Client-Side JavaScript Programs based on: <ul style="list-style-type: none"> JavaScript Object Models, The Standard Document Object Model, Event Handling, Controlling Windows and Frames, Handling Documents, Form Handling, Dynamic Effects: Rollovers, Positioning, and Animation, Navigation and Site Visit Improvements, Browser and Capabilities Detection Advanced Topics: JavaScript and Embedded Objects, Remote JavaScript, JavaScript and XML 	L2 and L3	3
Module 3: Introduction to Bootstrap (Part 1) Programs based on:	L2 and L3	3

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<ul style="list-style-type: none"> • Bootstrap File Structure, Basic HTML template, Global Styles • Default: Grid System, Basic Grid HTML, Offsetting Columns, Nesting Column, Fluid Grid System, Container Layouts • Typography, Code, Tables, • Dropdown Menus, Button Groups, Buttons with Dropdowns, Navigation Elements, Navbar, • Breadcrumbs Pagination, Labels, Badges, Typographic Elements 		
Module 4: Introduction to Bootstrap (Part 2) Programs based on: <ul style="list-style-type: none"> • Transitions ,Modal ,Dropdown, • Scrollspy, Toggleable Tabs, • Tooltips, Popover 	L2and L3	2
Module 5: The React Library <ul style="list-style-type: none"> • Writing Your First React App, • Thinking in React, Server Communication, • JSX and the Virtual DOM, • Advanced Components, • Forms in React. 	L2 and L3	2

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books:

1. "Javascript: The Complete Reference", Thomas Powell ,Fritz Schneider,Oreilly, 2004.
2. "Bootstrap", Jake Spurlok, Orielly, 2013.
3. "Full Stack React", Anthony Accamozo, Fullstack, 2017.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/ Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS O 1	PS O 2	PS O 3	PS O 4
CO 1	--	1	1	--	1	--	--	--	--	1	--	--	1	--	--	--
CO 2	--	1	2	--	2	--	--	--	--	1	--	--	1	--	--	--
CO 3	--	1	1	--	1	--	--	--	--	2	--	--	1	--	--	--
CO 4	--	1	2	--	1	--	--	--	--	2	--	--	1	--	--	--
CO 5	--	1	1	--	2	--	--	--	2	1	--	--	1	1	--	2

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AIE6603	ADVANCED JAVA PROGRAMMING	L	T	P	C
Version 2020.1	Date of Approval: JULY 2020	3	0	0	3
Pre-requisites/Exposure	Basics of Java Programming				
Co-requisites	NIL				

Catalog Description

In this course the advanced features of contemporary java are discussed in detail. Concepts covered would enable them to handle complex programs relating to managing data and processes over the network. Discussion will be on relating to concepts of remote method invocation to working with swings architecture. Further practical implementation of database connectivity and using them in servlet and jsp based applications will be made.

Course Objectives

The objective of this course is to

1. Equip the students with the advanced feature of contemporary java required in solving complex problems.
2. Provide a practical knowhow and implementation of advanced java programming concepts like database programming with servlets and jsp.

Course Outcomes

On completion of this course, the students will be able to

- CO1: Define and explain concept of an Remote method invocation application, demonstrate swing based application developed using concepts of remote method invocation
- CO2: Distinguish between various java and open database connectivity drivers and able to solve complex programming problems involving database interaction.
- CO3: Describe servlet and its lifecycle, along with demonstrate and design solutions for some complex dynamic web applications using servlets.
- CO4: Explain jsp scripting and Differentiate between processing of servlets and jsp scripting pages. Apply knowledge of servlets and jsp scripting to create some new dynamic web applications.
- CO5: Explain the architecture of Model View Controller and struts. Demonstrate applications based on java beans and struts.

Modules	Blooms level*	Number of hours
MODULE 1: DISTRIBUTED COMPUTING Introduction to Java RMI, RMI services, RMI client, Running client and server, Introduction of Swing, Swing Components, Look and Feel for Swing Components, Introduction to Multimedia Programming.	L1, L2 and L3	6
MODULE 2: DATABASE CONNECTIVITY ODBC and JDBC Drivers, Connecting to Database with the java.sql Package, Using JDBC Terminology, JDBC with mysql, postgresql. .	L2 and L3	7
MODULE 3: SERVLET PROGRAMMING Introduction to Servlets, Servlet Life Cycle, Servlet based Applications, Servlet and HTML.Filters, jdbc with servelets, session Management techniques in detail.	L2, L3 and L5	8

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MODULE 4: JSP PROGRAMMING JSP: Introduction to JSP, JSP implicit objects, JSP based Applications, Java. Net. Login & Logout Example, jdbc with jsp.	L2, L3, L4 and L5	8
MODULE 5: J2EE WEB APPLICATION The Model-View-Controller Architecture What is Struts, Struts Tags, Creating Beans, Other Bean Tags, Bean Output, Creating HTML Forms, The Action Form class The Action class, Simple Struts: a simple Struts application; Introduction to EJB.	L2 and L3	7

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation*

Text Books

1. J. Jaworski, Java 1.2 Unleashed, Techmedia – SAMS, 1998, United States
2. S. Allamaraju, Professional Java Server Programming, Wrox Press Limited, 2001, United States.
3. J. Goodwill and B. Morgan, Developing Java Servlets, Techmedia – SAMS, 2017, United States

Reference Books

1. D. Flanagan, J. Parley, W. Crawford and K. Magnusson, Java Enterprise in a nutshell - A desktop Quick reference, O'REILLY, 2003, USA.
2. S. Ausbury and S. R. Weiner, Developing Java Enterprise Applications, John Wiley and Sons, 2001, USA.
3. J. Hunder and W. Crawford, Java Servlet Programming, O'REILLY, 2002, USA

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	2	1	--	--	--	--	--	--	--	--	--	--	2	--	--	--
CO2	3	1	--	--	--	--	--	--	--	--	--	--	1	2	--	--
CO3	2	1	2	--	--	--	--	--	--	--	--	--	1	2	--	--
CO4	1	3	2	--	--	--	--	--	--	--	--	--	2	--	2	--
CO5	1	3	--	--	--	--	--	--	--	--	--	--	1	--	--	--

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AIE6608	ADVANCED JAVA PROGRAMMING LAB	L	T	P	C
Version 2020.1	Date of Approval: JULY2020	0	0	2	1
Pre-requisites/Exposure	Basics of Java and Advanced Java Programming				
Co-requisites	NIL				

Catalog Description

In this Lab course the advanced features of contemporary java are implemented and demonstrated. Concepts covered would enable them to create complex applications related to data management. Problems or programs will be related to concepts of remote method invocation, swings, servlets, jsp and java beans.

Course Objectives

The objective of this course is to

1. Make the students apply knowledge of various advanced java features required in solving complex problems.
2. Provide a demonstration of advanced java programming concepts like database programming with servlets, jsp and creating java beans.

Course Outcomes

On completion of this course, the students will be able to

- CO1: Apply the knowledge of swings architecture and remote method invocation used to provide solution to distributed computing problems
- CO2: Demonstrate the use of JDBC connectivity along with swings based architecture, thereby handling data management.
- CO3: Apply the knowledge of servlets and server programming to construct dynamic web applications using web servers.
- CO4: Demonstrate the differences between creating and deploying dynamic web applications using jsp concepts and servlets.
- CO5: Demonstrate usage of applications involving java beans and jdbc programming to handle data management.

Modules/Topics Covered**	Blooms level*	Number of hours
1.Sample Programs using swings architecture and remote method invocation (a) Write a program using swings creating tabbed panes and menu over a frame and handle their associated events (b) Write a program using swings List control containing list of cities, allowing the user to choose any one of them and display using event handing. (c) Demonstrate an application showcasing the use of remote method invocation(RMI) for designing a distributed application. (d) Create an application using concepts of RMI to depict a client server based interaction.	L3, L5	6
2.Sample Programs using JDBC and swings (a) Create an application demonstrating the use of swings, having a menu over a frame and jdbc programming to perform insert and select operations by handling menu related events. (b) Create an application using swings, having a design providing features for iterating over a dataset performing operations like forward,	L3, L5	4

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backward, start and end with help of jdbc programming.		
(c) Sample Programs using servlets with jdbc, html and swings 3. Create an application using servlets to perform redirection based on validating user data entered through a web form. 4. Design an application to fetch data from database using servlets and display it using its post method. 5. Demonstrate the process of writing cookies using a servlet and display a message after writing. 6. Write a program to create a session object for the username fetched from user using a servlet, further access that session value on another servlet invoked by redirection.	L3, L5	6
7. Sample Programs using JSP with jdbc, html and swings (a) Write a program using jsp to demonstrate the features of jsp elements used to declare, define and display sum of two integers. (b) Create an application using jsp to calculate and display the greatest out of two integers using if else statements. Integer numbers should be entered using a web form. (c) Demonstrate with a jsp program mechanism to retrieve checkbox data accessed using multiple value parameters fetching approach. (d) Write a program to demonstrate the use of jsp forward action tag used with parameters and processed using another jsp page.	L3, L5	6
8. Sample Programs using jsp, java beans and swings (a) Demonstrate the use of jsp include action tag for including an html and another jsp page in initial jsp resource. (b) Write a program creating Java bean class and setting its properties using required jsp action tags. Output should also display the retrieved property values.	L3, L5	2

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

*** Sample Programs provided are not limited to these only, can include others as desired.*

Text Books

1. J. Jaworski, Java 1.2 Unleashed, Techmedia – SAMS, 1998, United States
2. S. Allamaraju, Professional Java Server Programming, Wrox Press Limited, 2001, United States
3. J. Goodwill and B. Morgan, Developing Java Servlets, Techmedia – SAMS, 2017, United States

Reference Books

1. D. Flanagan, J. Parley, W. Crawford and K. Magnusson, Java Enterprise in a nutshell – A desktop Quick reference, O'REILLY, 2003, USA
2. S. Ausbury and S. R. Weiner, Developing Java Enterprise Applications, John Wiley and Sons, 2001, USA
3. J. Hunder and W. Crawford, Java Servlet Programming, O'REILLY, 2002, USA

Modes of Evaluation: Lab Record /Viva- Via /Performance/Written Examination Examination Scheme:

IA					EE
Components	A	PR	LR	V	70
Weightage (%)	5	10	10	5	

Note: IA –Internal Assessment, A – Attendance, PR – Performance, LR – Lab Record, V – Viva, EE- External Exam

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CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	2	1	--	--	--	--	--	--	--	--	--	--	2	--	--	--
CO2	3	1	--	--	--	--	--	--	--	--	--	--	1	2	--	--
CO3	2	1	2	--	--	--	--	--	--	--	--	--	1	2	--	--
CO4	1	3	2	--	--	--	--	--	--	--	--	--	2	--	2	--
CO5	1	3	--	--	--	--	--	--	--	--	--	--	1	--	--	--

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AIE6604	ADVANCE DATABASE MANAGEMENT SYSTEM	L	T	P	C
Version 2020.1	Date of Approval: JULY 2020	3	0	0	3
Pre-requisites/Exposure	Basic knowledge of DBMS				
Co-requisites	NIL				

Catalog Description

The objective of this course is to expose the students to the implementation techniques of database system. This course explains techniques for query processing and optimization with transaction and concurrency control techniques.

Course Objectives

The objective of this course is to

- To understand the basic concepts and terminology related to DBMS and Relational Database Design
- To design and understand Distributed, parallel and object oriented Databases.
- To understand advanced DBMS techniques to handle and optimize queries in database.

Course Outcomes

On completion of this course, the students will be able to

CO1. Understand the basics of database management system and implementation of relational database.

CO2. Knowhow of the file organization, Query Optimization, Transaction management, and database administration techniques.

CO3. Understand and design Distributed, parallel and object oriented Databases models and possible methods of proving them.

Modules	Blooms level*	Number of hours
MODULE 1: Relational Database Integrity Constraints revisited, Extended ER diagram, Relational Algebra & Calculus, Functional, Multivalued and Join Dependency, Normal Forms, Rules about functional dependencies.	L1, L2 and L3	8
MODULE 2: Query Processing and Optimization Valuation of Relational Operations, Transformation of Relational Expressions, Indexing and Query Optimization, Limitations of Relational Data Model, Null Values and Partial Information. Objected Oriented and Object Relational Databases Modeling Complex Data Semantics, Specialization, Generalization, Aggregation and Association, Objects, Object Identity, Equality and Object Reference, Architecture of Object Oriented and Object Relational Databases	L1,L2,L3	9
MODULE 3: Parallel and Distributed Databases Distributed Data Storage – Fragmentation & Replication, Location and Fragment Transparency Distributed Query Processing and Optimization, Distributed Transaction Modeling and concurrency Control, Distributed	L1, L2 and L3	10

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Deadlock, Commit Protocols, Design of Parallel Databases, and Parallel Query Evaluation. Advanced Transaction Processing Nested and Multilevel Transactions, Compensating Transactions and Saga, Long Duration Transactions, Weak Levels of Consistency, Transaction Work Flows, Transaction Processing Monitors.		
MODULE 4: Multimedia databases, Databases on the Web and Semi-Structured Data , Case Study: Oracle Xi	L1, L2	9

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. Elmars, Navathe, Somayajulu, Gupta, "Fundamentals of Database Systems", 4th Edition, Pearson Education, 2007
2. Garcia, Ullman, Widom, "Database Systems, The complete book", Pearson Education, 2007
3. R. Ramakrishnan, "Database Management Systems", McGraw Hill International Editions, 1998

Reference Books

1. Date, Kannan, Swaminathan, "An Introduction to Database Systems", 8th Edition Pearson Education, 2007
2. Singh S.K., "Database System Concepts, design and application", Pearson Education, 2006.
3. Silberschatz, Korth, Sudarshan, "Database System Concepts", McGraw Hill, 6th Edition, 2006
4. W. Kim, "Modern Database Systems", 1995, ACM Press, Addison – Wesley,
5. D. Maier, "The Theory of Relational Databases", 1993, Computer Science Press, Rockville, Maryland
6. Ullman, J. D., "Principals of database systems", Galgotia publications, 1999
7. Oracle Xi Reference Manual
8. Dietrich, and Urban, "An Advanced Course in Database Systems", Pearson, 2008.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS O 1	PS O 2	PS O 3	PSO 4
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CO 2	2	2	3	-	--	--	--	--	--	--	--	--	2	1	-	-
CO 3	2	-	3	-	-	--	--	--	--	--	--	--	2	1	-	-

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AIE6609	ADVANCE DATABASE MANAGEMENT SYSTEM LAB	L	T	P	C
Version 2020.1	Date of Approval: JULY2020	0	0	1	1
Pre-requisites/Exposure	Basic knowledge of DBMS				
Co-requisites	Nil				

Catalog Description

The objective of this course is to expose the students to the implementation techniques of database system. This course explains techniques for query processing and optimization with transaction and concurrency control techniques.

Course Objectives

The objective of this course is

1. Equip the students with the different issues involved in the design and implementation of a database system.
2. Provide a practical knowledge of implementation/demonstration of data manipulation language to query, update, and manage a database.

Course Outcomes

On completion of this course, the students will be able to

CO1. Demonstrate and analyze and apply common SQL statements including DDL, DML and DCL statements to perform different operations.

CO2. Demonstrate and Apply different types of constraints on the database.

CO3. Design different views of tables for different users and to apply embedded and nested queries.

CO4. Design and implement a database for a given problem according to well known design principles that balance data retrieval performance with data consistency.

Modules	Blooms level*	Number of hours
Module1: 1. Introduction to SQL and understand basic commands 2. Understand various DDL and DML commands. 3. To understand joins in SQL.	L1,L2 and L3	4
Module 2: 1. To understand constraints SQL 2. Wild cards and aggregate functions in SQL 3. To understand and execute procedures and views in SQL	L2 and L3	6
Module 3: 1. To understand and execute triggers in SQL 2. To develop a database application to demonstrate the representation of multi valued attributes and use of nested tables to represent complex objects. Write suitable queries	L2, L3, L4 and L5	4
Module 4: 1. To understand and execute Indexes in SQL	L2, L3 and L4	4
Module 5: 1. To understand the concept of Exception handling in SQL 2. Query Evaluation Plans 3. Concurrency and Transactions	L2, L3 and L4	1

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**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. Abraham Silberschatz, Henry F. Korth, S. Sudharshan, "Database System Concepts", 6th edition, Tata McGraw Hill, 2011
2. Ramez Elmasri, Shamkant B. Navathe, "Fundamentals of Database Systems", 4th Edition, Pearson/Addison Wesley, 2007

Reference Book

1. Database System Concepts by A. Silberschatz, H.F. Korth and S. Sudarshan, 3rd edition, 1997, McGrawHill, International Edition.
2. Introduction to Database Management system by Bipin Desai, 1991, Galgotia Pub.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/ Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS O 1	PS O 2	PS O 3	PS O 4
CO 1	2	1	--	--	--	--	--	--	--	--	--	--	1	2	--	--
CO 2	3	1	--	--	--	--	--	--	--	--	--	--	1	1	--	--
CO 3	1	3	2	--	--	--	--	--	--	--	--	--	1	2	3	--
CO 4	1	3	2	--	--	--	--	--	--	--	--	--	1	1	--	--
CO 5	1	3	--	--	--	--	--	--	--	--	--	--	1	2	--	1

1: strongly related, 2: moderately related and 3: weakly related

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AIE6605	DIGITAL COMPUTER ORGANIZATION	L	T	P	C
Version 2020.1	Date of Approval: JULY 2020	3	0	0	3
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

The Objective of this course is to expose the students to the fundamentals and the concepts of Digital & Computer Organization and Representation of Information and Basic Building Blocks, Basic Organization, Memory Organization, Input-Output Organization, Processor Organization etc. This course is designed to understand the concepts of Computer Organization for Research & Development as well as for application.

Course Objectives

The objective of this course is to

- An understanding of a machine's instruction set architecture (ISA) including basic instruction fetch and execute cycles, instruction formats, control flow, and operand addressing modes.

Course Outcomes

On completion of this course, the students will be able to

CO1. Understand and Interpret the functional architecture of computing systems.

CO2. Identify, compare and assess issues related to ISA, memory, control and I/O functions.

CO3. Understand the general concepts in digital logic design, including logic elements, and their use in combinational and sequential logic circuit design.

CO4. Design and analyze solutions in the area of computer architecture.

Modules	Blooms level*	Number of hours
MODULE 1: Representation of Information and Basic Building Blocks Overview of Computer hardware generation, Number Systems, Binary, Octal, Hexadecimal, Character Codes (BCD, ASCII, EBCDIC), Logic gates, Boolean algebra, K-map Simplification, Half adder, Full adder, Decoders, Multiplexes, Binary Counters, Flip/Flops, Registers, Counters (Synchronous & Asynchronous), ALU, Micro-Operation, ALU-chip, Faster Algorithm and Implementation (multiplication & Division).	L1, L2 and L3	7
MODULE 2: Basic Organization Von Neumann Machine (IAS Computer), Operational flow chart (Fetch, Execute), Instruction Cycle, Organization of Central Processing Unit, Hardwired and Micro programmed control unit, Single Organization, General Register Organization, Stack Organization, Addressing Modes, Instruction Formats, Data transfer & Manipulation, I/O organization, Bus Architecture, Programming Registers.	L1,L2,L3	8
MODULE 3: Memory Organization Memory hierarchy, Main Memory (RAM/ROM chips), Auxiliary memory, Associative memory, Virtual memory, Cache memory, Memory management hardware, hit/miss ratio, Magnetic disk and its performance, Magnetic Tapes etc.	L1, L2 and L3	8

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MODULE 4: Input-Output organization Peripheral devices, I/O interface, Direct memory access, Modes of transfer, Priority Interrupt, I/O Processors, Serial Communication, Asynchronous data transfer, Strobe Control, Handshaking, I/O Controllers.	L1, L2	7
MODULE 5: Processor Organization Basic Concept of 8/16-bit microprocessor (8085/8086), Assembly Instruction Set, Assembly Language Program of 8085/8086: Addition of two numbers, Subtraction, Block Transfer, Find greatest number, Table search, Numeric manipulation, Introductory Concept of pipeline, Flynn's Classification, Parallel Architectural classification.	L2,L4	6

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. M. Moris Mano, "Computer Systems Architecture", 4th Edition, Pearson/PHI, ISBN:10:0131755633
2. Carl Hamacher, Zvonko Vranesic, Safwat Zaky, "Computer Organization", 5 th Edition, McGraw Hill

Reference Books

1. Computer Organization: Vrsarie, Zaky&Hamacher (TMH Publication).
2. Tannenbaum, "Structured Computer Organization", PHI.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS O 1	PS O 2	PS O 3	PSO 4
CO 1	2	-	3	--	--	--	--	--	--	--	--	--	2	1	-	-
CO 2	2	2	3	-	--	--	--	--	--	--	--	--	2	1	2	-
CO 3	2	-	3	-	-	--	--	--	--	--	--	--	2	1	2	-
CO 4	2	-	3	-	-	--	--	--	--	--	--	--	2	1		-

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AIE6614	SOFTWARE ENGINEERING	L	T	P	C
Version 2019.1	Date of Approval: 15 May 2019	3		0	3
Pre-requisites/Exposure	Basic Knowledge of software development				
Co-requisites	Nil				

Catalog Description

In this course the concepts of Software development are discussed in detail. Various models of SDLC are introduced along with its application. Students will be able to apply these concepts in real time software project development.

Course Objectives

The objective of this course is to

1. Gain the knowledge of how Analysis, Design, Implementation, Testing and Maintenance processes are conducted in a software project.
2. Apply their foundations in software engineering to adapt to readily changing environments using the appropriate theory, principles and processes.

Course Outcomes

On completion of this course, the students will be able to

CO1: Apply current theories, models, and techniques that provide a basis for the software lifecycle.

CO2: Enable the students to apply a systematic application of scientific knowledge in creating and building cost effective software solutions to business and other types of problems.

CO3: Be able to elicit, analyze and specify software requirements through a productive working relationship with various stakeholders of a software development.

CO4: Be able to evaluate the impact of potential solutions to software engineering problems in a global society, using the knowledge of contemporary issues and emerging software engineering trends, models, tools, and techniques.

CO5: Work as an individual and as part of a multidisciplinary team to design, develop and deliver quality software.

Modules	Blooms level*	Number of hours
MODULE 1: Introduction Software life cycle models: Waterfall, Prototype, Evolutionary and Spiral models, Overview of Quality Standards like ISO 9001, SEI-CMM	L1, L2 and L4	5
MODULE 2: Software Metrics and Project Planning Size Metrics like LOC, Token Count, Function Count, Design Metrics, Data Structure Metrics, Information Flow Metrics. Cost estimation, static, Single and multivariate models, COCOMO model, Putnam Resource Allocation Model, Risk management.	L2, L3 and L6	7
MODULE 3: Software Requirement Analysis, design and coding Problem Analysis, Software Requirement and Specifications, Behavioural and non-behavioural requirements, Software Prototyping Cohesion & Coupling, Classification of Cohesiveness & Coupling, Function Oriented Design, Object Oriented Design, User Interface Design Top-down and bottom-up Structured programming, Information hiding.	L2, L3 and L5	8

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MODULE 4: Software Reliability, Testing and Maintenance Failure and Faults, Reliability Models: Basic Model, Logarithmic Poisson Model, Software process, Functional testing: Boundary value analysis, Equivalence class testing, Structural testing: path testing, Data flow and mutation testing, unit testing, integration and system testing, Debugging, Testing Tools, & Standards. Management of maintenance, Maintenance Process, Maintenance Models, Reverse Engineering, Software RE-engineering	L2, L3 and L4, L6	10
MODULE 5: UML Introduction to UML, Use Case Diagrams, Class Diagram: State Diagram in UML, Activity Diagram in UML, Sequence Diagram in UML, Collaboration Diagram in UML, Domain, Component Diagram and Deployment Diagram	L3, L4, L5	6

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Text Books:

1. K. K. Aggarwal & Yogesh Singh, "Software Engineering", 2nd Ed, New Age International, 2005.
2. R. S. Pressman, "Software Engineering – A practitioner's approach", 5th Ed., McGraw Hill Int. Ed., 2001.

Reference Books:

1. R. Fairley, "Software Engineering Concepts", Tata McGraw Hill, 1997.
2. P. Jalote, "An Integrated approach to Software Engineering", Narosa, 1991.
3. Stephen R. Schach, "Classical & Object -Oriented Software Engineering", IRWIN, 1996.
4. James Peter, W. Pedrycz, "Software Engineering", John Wiley & Sons.
5. Sommerville, "Software Engineering", Addison Wesley, 1999.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O 1	PS O 2	PS O 3	PSO 4
CO 1	--	1	2	--	--	--	--	--	--	--	--	--	1	--	--	--
CO 2	1	--	2	3	--	--	--	--	--	--	4	--	1	2	--	--
CO 3	--	1	--	--	--	--	--	--	--	2	3	--	-	1	2	--
CO 4	-	1	-	--	2	--	--	--	--	--	--	--	2	1	--	--
CO 5	--	--	1	--	--	--	--	--	2	--	--	--	--	--	--	1

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AIE6616	SOFTWARE ENGINEERING LAB	L	T	P	C
Version 2017.1	Date of Approval: 15 May 2019	0	0	1	1
Pre-requisites/Exposure	Basics of Software Engineering				
Co-requisites	NIL				

Catalog Description

The course provides introduction to the fundamental's principles of software engineering. The organization broadly based on the classical analysis-design-implementation framework. Software Engineering is the systematic approach to the development, operation, maintenance, and retirement of software. Rational Rose Enterprise Edition software is used to serve the objectives. Students will be able to design models according to user requirement.

Course Objectives

The objective of this course is to

1. The basic objective of Software Engineering is to develop methods and procedures for software development that can scale up for large systems and that can be used to consistently produce high-quality software at low cost and with a small cycle time.
2. Apply basic techniques of modeling computer systems.

Course Outcomes

On completion of this course, the students will be able to

CO1: collect requirements and prepare their scenarios

CO2: Construct various UML models (including use case diagrams, class diagrams, interaction diagrams, state chart diagrams, activity diagrams, and implementation diagrams) using the appropriate notation

CO3: Demonstrate the role and function of each UML model in developing objectoriented software.

CO4: Recognize the difference between various object relationships: inheritance, association, whole-part, and dependency relationships.

Modules/Topics Covered**	Blooms level*	Number of hours
1. Introduction to Rational Rose Enterprise Edition tool and SRS (c) Explain features and characteristics of Rational Rose tool along with screenshots. (d) Create Software requirement specification document for Website application of educational institute.	L1, L2	4
2. Concept of UML and Use case diagram (c) Design Use case Diagram of ATM machine (d) Show dependencies and relationships through Use case diagram of Banking Management System	L1, L3	4
3. Class Diagrams and object diagram concepts (d) Design class diagram of Flight Reservation system (e) Design class diagram of student Management system (f) Design object diagram of courier service system (g) Design object diagram of Train Reservation system	L3, L1	8
4. Sequence, Activity, Collaboration, State chart diagram concepts (h) Design Activity diagram of Library Management system	L3, L1	8

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(i) Design Sequence diagram of Food Ordering system		
(j) Design Collaboration diagram of Hotel Management system		
(k) Design State chart diagram of Turing Machine		
.		

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

**** Sample Programs provided are not limited to these only, can include others as desired.**

Text Books

1.Rambugh,Grady Booch, Unified Modeling Language User Guide, Pearson Education 1998.

2.K.K. agrawal,Yogesh Singh, Software Engineering,

Reference Books

1. Martin Fowler,UML distilled:A Brief Guide to the Standard Object Modeling Language,Addison Wesley,1997.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

IA					EE
Components	A	PR	LR	V	70
Weightage (%)	5	10	10	5	

Note: IA –Internal Assessment, A – Attendance, PR – Performance, LR – Lab Record, V – Viva, EE- External Exam

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	--	1	2	3	4	--	--	--	--	--	--	--	1	--	--	--
CO2	--	--	1	2	3	--	--	--	--	--	--	--	1	2	--	--
CO3	--	1	2	3	--	--	--	--	--	4	--	--	-	2	3	--
CO4	--	1	2	3	--	--	--	--	4	--	--	--	3	--	1	2

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AIE6637	MINOR PROJECT-I	L	T	P	C
Version: 2019.1	Date of Approval: 15 May 2019	0	0	0	2
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

The objective of this course is to provide practical training on some live/demo projects that will increase capability to work on actual problem in industry. It will be an in house training on some latest software which is in high demand in market. This training will be designed such that it will be useful for their future employment in industry.

Course Objectives

The objective of this course is to

1. Provide practical training on live projects
2. Increase technical capabilities on solving real life problems in company environment

Course Outcomes

On completion of this minor project, the students will be able to:

CO1: Demonstrate a sound technical knowledge of their selected project topic.

CO2: Design and develop engineering solutions to complex problems utilising a systems approach.

CO3: Analyse various approaches for solving a complex engineering problem using different tools and techniques

CO4: Demonstrate the knowledge, skills and attitudes of a professional engineer.

CO5: Apply technical skills and knowledge in completing the project.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	2	--	--	--	--	--	--	1	--	--	--	--	--	1	1
CO2	1	1	--	--	--	--	--	--	1	--	--	--	--	--	1	1
CO3	1	1	--	--	--	--	--	--	1	--	--	--	--	--	1	1
CO4	1	1	--	--	--	--	--	--	1	--	--	--	--	--	1	1
CO5	1	1	--	--	--	--	--	--	1	-	-	-	--	--	1	1

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AIE6612	VLSI DESIGN	L	T	P	C
Version 2020.1	Date of Approval: JULY 2020	3	0	0	0
Pre-requisites/Exposure	Basics of semiconductor and analog electronics				
Co-requisites	Nil				

Catalog Description

This course deals with basic theories and techniques of digital VLSI design in CMOS technology. It covers the fundamental concepts and structures of designing digital VLSI systems which include CMOS devices and circuits, standard CMOS fabrication process, CMOS design rules, static and dynamic logic structures, CMOS chip layout, simulation and testing, low power techniques, design tools and methodologies and Stick Diagrams.

Course Objectives

The objective of this course is to

- Provide a deep understanding of the concepts, techniques and design of complex digital VLSI circuits.
- Apply mathematical methods and circuit analysis models to analyse CMOS digital circuits, and their logic components.

Course Outcomes

On completion of this course, the students will be able to

CO1.Explain the characteristics of Basic VLSI components.

CO2. Apply the knowledge of various CMOS inverters to compare their performance.

CO3. To design and realize basic combinational and sequential functions using CMOS logic.

CO4. Design circuit Layout and Stick diagrams of CMOS logics.

Modules	Blooms level*	Number of hours
Module I: Devices and the wire Dynamic and transient behavior of Diode, Diffusion capacitance, SPICE Diode model, MOSFET basic, depletion and enhancement device. MOSFET static behavior, Threshold voltage and its dependence on V_{SB} MOSFET Operation in resistive and saturation region, channel length modulation, Velocity saturation and its impact on sub micron devices, sub threshold conduction, Model for manual analysis, Equivalent resistance for MOSFET in (velocity) saturated region, comparison of equations for PMOS and NMOS. Dynamic behavior, Channel capacitance in different regions of operation, junction capacitance, Level 1 SPICE models for MOS transistors. The Wire, Interconnect parameters: resistance, capacitance and Inductance, Lumped RC model, Elmore Delay.	L1, L2	8
Module II: CMOS Inverter VTC of an ideal inverter, Switching Model of the CMOS inverter: NMOS /PMOS discharge and charge, VTC of CMOS inverter : PMOS and NMOS operation in various regions including velocity saturation, Switching threshold, $(W/L)_p/(W/L)_n$ ratio for setting desired V_M with and without velocity saturation, Noise Margins, buffer. Ratioed logic: Pseudo NMOS inverter and PMOS to NMOS ratio for performance, tri-state inverter, Resistive load inverter. Load Capacitance calculations: fan out capacitance, self capacitance	L3, L4	8

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calculations: Miller effect, wire capacitance; Improving delay calculation with input slope, Propagation delay: first order analysis, analysis from a design perspective, sizing a chain of inverters for minimum delay, choosing optimum number of stages, Power, Energy and Energy Delay: Dynamic power consumption, Static power, Glitches and power dissipation due to direct path currents, power and delay trade off, Transistor sizing for energy minimization.		
Module III: Combinational circuits CMOS LOGIC: Good 0 and Poor 0, series and parallel N and P switches, Two and Higher input NAND and NOR gates, Functions of the type $(AB+C(D+E))$ and their complements, XOR and XNOR gates, 2 input Multiplexer, Full Adder; Transistor sizing in CMOS logic for optimal delay, Pseudo NMOS NAND NOR and other gates and the transistor sizing, Introduction to DSVCL logic, CPL AND/NAND, OR/NOR, XOR/XNOR gates, Logical effort, Electrical Effort, Branching effort, Examples of sizing Combinational logic chains for minimum delay, Pass-transistor logic, pass gate configurations for NMOS and PMOS, 2 input and 4 input MUX, XOR, XNOR and implementation of general functions like $AB+AB*C+A*C^*$, Robust and Efficient PTL Design, Delay of Transmission Gate chain. Dynamic CMOS design: Pre-charge and Evaluation, charge leakage, bootstrapping, charge sharing, Cascading Dynamic Gates, DOMINO Logic, Optimization of Domino Logic Gates, simple example circuit implementations of DOMINO logic.	L2,L3,L4	10
Module IV: Sequential Logic circuits Principle of bistability, NAND and NOR based SR latch, and clocked SR Latch, JK latch, example of master slave flip flop, CMOS D latch, , MUX based Latches, master slave edge triggered register, Static Timing Analysis – setup, hold time, clock skew, clock period, non ideal clocks, clock overlap, C2MOS register, TSPCR Register, Schmitt Trigger, Pipelining and NORA CMOS	L2,L3,L4	5
Module V: Layout Design Rules Introduction to CMOS Process technology, Latch up and its prevention Layout of CMOS inverter, CMOS NAND and NOR gates, Concept of Euler path, and stick diagrams for functions like $(AB+E+CD)^*$.	L2,L3,L4	5

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. **Jan M Rabaey**, Digital Integrated Circuits ,Second Edition, Pearson.
2. **David Hodges**, Analysis and Design of Digital ICs, McGraw Hill
3. **Sung-MoKang**, CMOS Digital ICs,third edition,2008

Reference Books

1. **WesteNiel and Harris**, CMOS VLSI design.A Circuits And Systems Perspective, 3/E,Pearson
2. **Weste and Eshragian**, Principles of CMOS VLSI Design: a systems perspective, Addison-Wesley Publishing Company, 01-Jan-1993

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

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CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS O 1	PS O 2	PS O 3	PS O 4
CO 1	1	3	--	--	--	--	--	--	--	--	--	--	2	1	-	-
CO 2	3	1	3	--	1	--	--	--	--	--	--	2	2	1	-	2
CO 3	3	2	1	2	--	--	--	--	--	--	--	2	2	1	-	2
CO 4	2	2	1	-	--	--	--	--	--	--	--	--	2	1	-	-

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AIE6613	VLSI DESIGN LAB	L	T	P	C
Version 2020.1	Date of Approval: JULY 2020	0	0	2	1
Pre-requisites/Exposure	Hands on knowledge of analog electronics				
Co-requisites	Basic concepts of Digital electronics				

Catalog Description

In this Lab course the designing of VLSI circuits using Mentor Graphics software are implemented and demonstrated. Concepts covered would enable them to create complex applications related to VLSI design. The objective of this course is to explore and implement the various features of VLSI design and analyze the dc and transient analysis.

Course Objectives

The objective of this course is to

Provide a deep understanding of CMOS logic using Mentor Graphics tool.

Analyze, design concepts of different combinational and sequential circuits and their simulation.

Course Outcomes

On completion of this course, the students will be able to

CO 1: Demonstrate the basic concept of MOSFET;

CO 2: Illustrate the static and switching characteristics of inverters using CMOS with varying capacitance, width and channel Length of CMOS using Mentor Graphics tool.

CO 3: Demonstrate and create models of moderately sized CMOS circuits that realize specified digital functions using Mentor graphics Tool.

CO 4: Demonstrate the layout and stick diagrams using Mentor graphics Tool.

CO 5: Demonstrate the power consumption during transient analysis.

Modules/Topics Covered**	Blooms level*	Number of hours
1. MOSFET characteristics with varying VGS for both pmos and nmos.	L3, L5	2
2. Effect on VTC of CMOS inverter with variation of W and L.	L3, L5	2
3. Transient analysis of CMOS inverter with varying capacitive load, W and L. Rise time, fall time power dissipation, propagation delay calculation of CMOS inverter with the variation of capacitive load, W and L.	L3, L5	4
4. NOR and NAND gate - Transient analysis	L3, L5	2
5. XOR/XNOR gate - Transient analysis	L3, L5	2
6. 2:1 MUX and XOR gate with P.T.L.- Transient analysis	L3, L5	2
7. D type latch and flip flop - Transient analysis	L3, L5	2
8. 3 input NAND gate implementation with DOMINO (precharge and evaluation).	L3, L5	2
9. 4 inverter chain to derive capacitive load.	L3, L5	2

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L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text

1. Neil Weste and K. Eshragian, "Principles of CMOS VLSI Design: A System Perspective," 2nd edition, Pearson Education (Asia) Pvt. Ltd., 2000.

2. D.A Pucknell and Eshraghain, "Basic VLSI Design", PHI, India, 1995.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination
Examination Scheme:

IA					EE
Components	A	PR	LR	V	70
Weightage (%)	5	10	10	5	

Note: IA –Internal Assessment, A – Attendance, PR – Performance, LR – Lab Record, V – Viva, EE- External Exam

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	3	1	--	--	--	--	--	--	--	--	--	--	2	1	--	--
CO2	3	1	--	--	--	--	--	--	--	--	--	--	1	1	--	--
CO3	3	1	--	--	--	--	--	--	--	--	--	--	1	1	--	--
CO4	3	1	--	--	--	--	--	--	--	--	--	--	2	1	--	--
CO5	3	1	--	--	--	--	--	--	--	--	--	--	1	1	--	--

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AIE6617	OPEN SOURCE TECHNOLOGIES	L	T	P	C
Version :2020.1	Date of Approval: JULY 2020	2	0	0	2
Pre-requisites/Exposure	Basic Knowledge of HTML				
Co-requisites	Nil				

Catalog Description

The course includes the content about PHP and its Programming Concepts. It includes basic architecture of running a PHP Script. It also includes the concepts about Conditional, Control Statements, Array, Associative Array, String Functions and Concepts of Functions : Call by Value and Reference. The course also includes concepts related to Object Oriented Programming in PHP and website design support along with Database Support concepts which will be useful to design Backend for the website.

Course Objectives

The objective of this course is:

1. To provide a fundamental understanding of Dynamic Website Design in PHP.
2. To provide knowledge about various Frameworks build for Website Designing.

Course Outcomes

On completion of this course, the students will be able to

After completing the course, the students will be able to,

CO 1: Explain the basic concepts of PHP programming and write PHP scripts using Strings and functions

CO 2: Explain and write PHP scripts based on Conditional statements, control statements and Arrays.

CO 3: Apply Object Oriented and Web Design concepts of PHP in order to create responsive web pages and websites

CO 4: Apply the concepts of Database and Database connectivity in order to provide backend support to website to make them Dynamic in nature

CO 5: Demonstrate the website designing process on various PHP Frameworks.

Modules	Blooms level*	Number of hours
Module I: Introduction to Open Source and PHP programming Introduction to Open Sources Technologies, Introduction to PHP, installation and configuration, Advantages and Disadvantages of PHP, Client Side Scripting, Server Side Scripting, Variables, data types, various types of function, creating your own function, Strings in PHP, String Functions.	L1, L2 and L3	4
Module II: Operators, Loops, Array, Exception and Error Handling Operators, Conditions, Loops, Using for each, Creating and Using Arrays, Multidimensional Array, Associative Array. Error Handling in PHP, Errors and Exceptions, Exception class, try/catch block, throwing an exception, defining your own Exception subclass.	L1, L2, L3	5
Module III: Classes, File system, Passing Information between pages Object oriented programming with Php, Working with Datetime, code re-use, require (), include(), and the include_path; Understanding PHP file permissions, File reading and writing functions, File system functions, File uploads, Sending mail & use of email server.	L2, L3 and L4	7

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HTTP, GET arguments, POST arguments, Using Session in PHP, cookies, The setcookie() function, Deleting Cookies and Reading Cookies.		
Module IV: Working with database HTML Tables and Database tables, Databasemanipulation(Select, Insert, Update, Delete), validating User Input using Javascript. MYSQL, Introducing MySQL; database design concepts; the Structured Query Language (SQL); communicating with a MySQL backend via the PHP, MySQL API Building Database Applications, Developing PHP scripts for dynamic web page like feedback form, online admission form and online test.	L2, L3 and L4	5
Module V: Working with Frameworks Working with Mambo, Working with Joomla, Working with framework. Working with wordpress, Working with drupal, Use of Joomla in rapid development of website. Developing of simple website using joomla.	L2, L3 and L4	3

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. Steven Holzner "PHP : The Complete Reference", Mc Graw Hill Education, 2007.
2. Ivan Bayross, "Web enabled commercial Application Development using HTML, Javascript, DHTML and PHP", 4th Edition, BPB Publication, 2010.
3. Laura Thomson, "PHP and MySQL Web Development", 5th Edition, Pearson Education, 2016.

Reference Books

1. Robin Nixon, "Learning PHP, MySQL and Javascript", Shroff Publishers and Distributors private limited, 2015.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	1	3	1	--	--	--	--	--	--	--	--	--			
CO2	1	1	1	--	--	--	--	--	--	--	--	--			
CO3	1	1	1	3	2	--	--	--	--	--	--	--			
CO4	1	1	2	2	2	--	--	--	--	--	--	--			
CO5	1	3	2	1	1	--	--	--	--	--	--	--			

1: strongly related, 2: moderately related and 3: weakly related



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AIE6618	OPEN SOURCE TECHNOLOGIES LAB	L	T	P	C
Version 2020.1	Date of Approval: JULY 2020	0	0	2	1
Pre-requisites/Exposure	Basic Knowledge of HTML				
Co-requisites	Nil				

Catalog Description

The course includes PHP Programming Concepts. Conditional, Control Statements, Array, Associative Array, String Functions and Concepts of Functions: Call by Value and Reference are implemented. The course also includes concepts related to Object Oriented Programming in PHP and website design support along with Database Support concepts which will be useful to design Backend for the website.

Course Objectives

The objective of this course is:

1. To provide a fundamental understanding of Dynamic Website Design in PHP.
2. To provide knowledge about various Frameworks build for Website Designing.

Course Outcomes

On completion of this course, the students will be able to

CO 1: Apply the basic concepts of PHP programming to rewrite PHP scripts using Strings and Functions

CO 2: Demonstrate the concept of Conditional & Control Statements and 1 D, 2 D & Associative Array using PHP scripts

CO 3: Apply Object Oriented and Web Design concepts of PHP in order to prepare responsive web pages and websites

CO 4: Apply the concepts of Database and Database connectivity to prepare backend support for website.

Lab Sessions	Blooms level*	Number of hours
1. PHP Scripts on Basic Concepts <ul style="list-style-type: none"> • Write the process of installation of web server. • Write programs to print all details of your php server. Use phpinfo(). • Write a program to give demo of ECHO and PRINT command. • Write a program to implement the string functions. 	L1,L3	2
2. PHP Script on Conditional and Control Statements <ul style="list-style-type: none"> • Write a script to print Fibonacci series upto a given number. • Write a menu driven program to implement a calculator which performs only addition, subtraction, multiplication and division. The operation should happen based on user choice. • Write a script to calculate Factorial of a given number 	L1,L3	4
3. PHP Scripts on Arrays: 1D, 2D, Associative <ul style="list-style-type: none"> • Write a program sort ten number by using array. • Write a program to demonstrate the concept of associative array. • Write a program to demonstrate the concept of multidimensional array. 	L1,L3	4

4. PHP Scripts on Object Oriented Programming and File Handling Concepts <ul style="list-style-type: none"> Write a program to demonstrate the concept of Classes & objects. Write a php script including all the file handling functions. 	L1,L3	2
PHP Scripts on Webpage and Website Design Concepts <ul style="list-style-type: none"> Create a login form with two text fields called “login” and “password”. When user enters “Amity” as a user name and “university” as a password it should be redirected to a Welcome.HTML page or toSorry.HTML in case of wrong username/password. Write a program to design login form in which find the greatest number amongst three numbers. WAP for Marksheet generation. Design a webpage for entering the student details with all the validations applied on it. Create a form with a text box asking to enter your favorite city with a submit button when the user enters the city and clicks the submit button another php page should be opened displaying “Welcometo the city”. 	L1,L3	6
5. PHP Scripts on Database Creation aConnectivity <ul style="list-style-type: none"> Create a database in MySql and connect that database from PHP. Write a program to Update, insert and delete the values of table in database. 	L1,L3	4

**Bloom’s Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5:Synthesis, L6:Evaluation

Text Books

- Steven Holzner “PHP : The Complete Reference”, Mc Graw Hill Education, 2007.
- Ivan Bayross, “Web enabled commercial Application Development using HTML, Javascript, DHTML and PHP”, 4th Edition, BPB Publication, 2010.
- Laura Thomson, “PHP and MySQL Web Development”, 5th Edition, Pearson Education, 2016.

Reference Books

- Robin Nixon, “Learning PHP, MySQL and Javascript”, Shroff Publishers and Distributers private limited, 2015.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

PR: Practical, LR: Lab Record, V: Viva, EE: End Semester Examination, A: Attendance, IA: Internal Assessment

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	3	1	--	--	--	--	--	--	--	--	--	2	--	2	--
CO2	1	1	1	--	--	--	--	--	--	--	--	--	2	--	2	--
CO3	1	1	1	3	2	--	--	--	--	--	--	--	1	3	1	2
CO4	1	1	2	2	2	--	--	--	--	--	--	--	2	--	1	2

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AIE6619	DATA MINING	L	T	P	C
Version 2020.1	Date of Approval: JULY 2020	3	0	0	3
Pre-requisites/Exposure	Concept of Database and Data Mining				
Co-requisites	Nil				

Catalog Description

Data Mining serve as one of the most important courses for postgraduate students, since it builds computational abilities, inferential thinking, and practical skills for tackling core data scientific challenges. The students will get a comprehensive understanding of different data mining techniques that can be used for prediction and for discovering patterns, be prepared to select the right technique for a given data problem and will be able to create a general-purpose analytic process.

Course Objectives

The objective of this course is to

- Provide students with an in-depth knowledge of data mining. To introduce students to basic applications, concepts, and techniques of data mining.
- Develop skills for using recent data mining software to solve practical problems and prediction in a variety of disciplines and
- Gain experience doing independent study and research.

Course Outcomes

On completion of this course, the students will be able to

CO 1: Explain concepts of Data mining, predictive analytics and analyses architecture of data mining. Differentiate between supervised and unsupervised methods

CO 2: Apply classification techniques on different data sets and solve cost –benefit analysis numerical. Analyze decision tree methods.

CO 3: Implement various clustering algorithm on different data sets and describe these algorithms.

CO 4: Prepare data representation for market basket analysis and determine the usefulness of association rules. Interpret supervised and unsupervised learning methods.

CO 5: Predict market trends and outline different factors associated mail marketing.

Course Content

Modules	Bloom's level	Number of Hours
Module I Data Preparation An introduction to data mining and predictive analytics, Data Pre-processing Exploratory Data Analysis, Dimension- Reduction Methods.	L1, L2	8
Module II Classification k- Nearest Neighbour Algorithm, Decision Trees, Model Evaluation Technique, Cost –Benefit Analysis Using Data Driven Cost.	L1, L2, L3	7
Module III Clustering Hierarchical and k- Means Clustering, Kohonen Networks, Birch Clustering, Measuring Cluster Goodness.	L1, L2, L3, L4	8

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Module IV Association Rules Affinity Analysis and Market Basket Analysis, Data Representation for Market Basket Analysis, Support, Confidence, Frequent Item sets, and the a Priori Property, How Does a Priori Algorithm Work? Generating Frequent Item sets, Generating Association Rules, Extension from Flag Data to General Categorical Data, Information-Theoretic Approach: Generalized Rule Induction Method, J-Measure, Association Rules are Easy to do Badly, how can we Measure the Usefulness of Association Rules? Do Association Rules Represent Supervised or Unsupervised Learning?	L1, L2, L3, L6	9
Module IV Case Study: Predicting Response to Direct Mail Marketing Business Understanding, Data Preparation, and Eda, Clustering and Principal Components Analysis, Modelling and Evaluation for Performance and Interpretability, Modelling and Evaluation for High Performance.	L2, L3, L4, L5	8

***Bloom's Level:**

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

1. Daniel T. Larose, Chantal D. Larose, "Data Mining and Predictive Analytics", John Wiley & Sons, Inc., Hoboken, New Jersey, 2015.
2. Jiawei Han and Micheline Kamber, "Data mining: concepts and techniques", Morgan Kaufmann, Second Edition, 2006.

Reference Books

1. Alex Berson, Data Warehousing, Data Mining, and Olap, Tata McGraw Hill, 2014.
2. Markus Hofmann, Ralf Klinkenberg, "Rapid-Miner: Data Mining Use Cases and Business Analytics Applications", Chapman and Hall/CRC, 2016.
3. George M Marakas, Modern Data Warehousing, Mining & Visualization Core Concepts, Pearson Education.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	2	--	--	--	--	--	--	--	--	--	--	1	2	2	3
CO2	1	1	2	--	--	--	--	--	--	--	--	--	1	2	3	3
CO3	1	2	3	3	3	--	--	--	--	--	--	--	1	2	2	2
CO4	1	1	2	--	--	3	--	--	--	--	--	3	1	1	2	3
CO5	1	1	2	--	--	2	--	--	--	--	--	3	1	3	2	1

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AIE6702	COMPUTER GRAPHICS	L	T	P	C
Version: 2020.1	Date of Approval: JULY 2020	3	-	-	3
Pre-requisites/Exposure	Basic Knowledge of C++ Programming				
Co-requisites	Nil				

Catalog Description

This course covers understanding of software and hardware related to computer graphics systems. Topics include an introduction to the basic concepts, 2-D and 3-D modeling and transformations, viewing transformations, clipping, color filling, projections, rendering techniques, visible surface detection and elimination algorithms, graphical software packages and graphics systems. Students will use a standard computer graphics API to reinforce concepts and study fundamental computer graphics algorithms. Last module covers elementary image processing techniques and various library function in C to build animations.

Course Objectives

The objective of this course is to

1. Equip the students with fundamental concepts of graphics system and standards.
2. Equip the students with mathematical concepts of graphics algorithms to draw objects using C language.
3. Provide an overview of various 2D & 3D transformation, clipping operations, algorithms related to hidden surface detection and elimination and their implementation.
4. Provide an overview of various elementary image processing techniques and basic library function in C to create animation sequence.

Course Outcomes

On completion of this course, the students will be able to

- CO 1: Explain applications of computer graphics and define various standards and components in development of computer graphics.
- CO 2: Explain generation of graphics primitives and analyze their problems and solutions. Demonstrate solid filling algorithms. Demonstrate polygon clipping and line clipping algorithm and analyze their problems and solutions.
- CO 3: Apply 2D geometric transformations on 2D graphics objects with their practical implementation. Illustrate use of window to viewport transformation in computer graphics.
- CO4: Apply 3D geometric transformations on 3D objects with their practical implementation.
- CO 5: Illustrate the use of 3D object modeling, Visible Surface detection and elimination algorithm and analyze their problems and solutions.

Modules	Blooms level*	Number of hours
Module I: Introduction to Graphics and Graphics Hardware System Application of computer graphics, Video Display Devices, Raster Scan Display, Random Scan Display, Input Devices, Graphic Software and graphics standards, Numerical based on Raster and Random scan display, Frame buffer, Display processor.	L1, L2	5
Module II: Output Primitives and Clipping operations Algorithms for drawing 2D Primitives lines (DDA and Bresenham's line algorithm), circles (Bresenham's and midpoint circle algorithm), ellipses (midpoint ellipse algorithm), Antialiasing and filtering techniques. Line	L2, L3, L4	6

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clipping (cohen-sutherland algorithm), Curve clipping algorithm, and polygon clipping with Sutherland Hodgeman algorithm, Area fill algorithms for various graphics primitives: Scanline fill algorithm, boundary fill algorithm, flood fill algorithm, Polygon representation, various method of Polygon Inside test: Even-Odd method, winding number method, Character generation techniques.		
Module III: 2D Geometric transformation 2D Transformation: Basic transformation, Translation, Rotation, Rotation relative to an arbitrary point, scaling, Matrix Representations and Homogeneous coordinates, window to viewport transformation.	L3 and L4	6
Module IV: 3D Geometric transformation 3D Concepts: Parallel projection and Perspective projection, 3D Transformations, composite 3D transformation, co-ordinate transformation, Inverse transformation	L3 and L5	7
Module V: object modelling and Visible Surface detection fractal geometry methods, fractal dimensions, Geometric construction of deterministic self-similar fractals, Iterated function system to generate fractals. Bezier curves and Bezier surfaces, Bspline curves and surfaces, Visible surface detection method: Basic illumination, diffuse reflection, specular reflection, shadows. Ray tracing method, Depth-buffer method, A-buffer method, Depth-sorting method (painter's algorithm), Binary search partition method, Scan line method,	L4, L5	7
Module VI: Introduction to multimedia Design of animation sequences, Computer Animation languages, Elementary filtering techniques and elementary Image Processing techniques, graphics library functions used in animation design	L2, L3, L5	5

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

1. Udit Agrawal, "Principles of Computer Graphics", 2nd Edition, Dhanpat Rai Publications, New Delhi, 2017.
2. Hughes, Van Dam, et al. "Computer Graphics Principles and Practice", 3rd Edition, Pearson, 2014.
3. Hearn and Baker, "Computer Graphics with OpenGL", 3rd Edition, Prentice Hall, 2004.
4. Donald Hearn & M. Pauline Baker, "Computer Graphics C Version", Pearson Education, New Delhi, 2004.

Reference Books

1. James D. Foley, Andries van Dam, Steven K. Feiner, John Hughes, "Computer Graphics: Principles and Practice", 2nd Edition, Pearson Education, 2007.
2. F.S. Hill, "Computer Graphics using OPENGL", 2nd edition, Pearson Education, 2003.
3. David F. Rogers; "Procedural Elements for Computer Graphics" TMH. Publications.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

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CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2		PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	1	—		-	--	--	--	--	--	--	--	--	--	2	--	2
CO2	1	1		1	--	--	--	--	--	--	--	--	--	2	--	2
CO3	1	1		1	3	--	--	--	--	--	--	--	--	1	3	1
CO4	1	1		2	2	--	1	--	--	--	--	--	--	2	--	1
CO5	1	3		2	1	1	2	--	--	--	--	--	--	2	3	2
CO6	1	2		3	--	1	2	--	--	--	--	--	--	2	3	2

1: strongly related, 2: moderately related and 3: weakly related



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AIE6706	COMPUTER GRAPHICS LAB	L	T	P	C
Versionn: 2020.1	Date of Approval: JULY 2020	0	0	2	1
Pre-requisites/Exposure	Basic Knowledge of C++ Programming				
Co-requisites	Nil				

Catalog Description

This course covers understanding of software and hardware related to computer graphics systems. Topics include an introduction to the basic concepts, 2-D and 3-D modeling and transformations, viewing transformations, clipping, color filling, projections, rendering techniques, visible surface detection and elimination algorithms, graphical software packages and graphics systems. Students will use a standard computer graphics API to reinforce concepts and study fundamental computer graphics algorithms. Last module covers elementary image processing techniques and various library function in C to build animations.

Course Objectives

The objective of this course is to

1. Equip the students with fundamental concepts of graphics system and standards.
2. Equip the students with mathematical concepts of graphics algorithms to draw objects using C language.
3. Provide an overview of various 2D & 3D transformation, clipping operations, algorithms related to hidden surface detection and elimination and their implementation.
4. Provide an overview of various elementary image processing techniques and basic library function in C to create animation sequence.

Course Outcomes

On completion of this course, the students will be able to

CO 1: Explain applications of computer graphics and define various standards and components in development of computer graphics.

CO 2: Explain generation of graphics primitives and analyze their problems and solutions. Demonstrate solid filling algorithms. Demonstrate polygon clipping and line clipping algorithm and analyze their problems and solutions.

CO 3: Apply 2D geometric transformations on 2D graphics objects with their practical implementation. Illustrate use of window to viewport transformation in computer graphics.

CO4: Apply 3D geometric transformations on 3D objects with their practical implementation.

CO 5: Illustrate the use of 3D object modeling, Visible Surface detection and elimination algorithms and analyze their problems and solutions.

CO 6: Explain Elementary filtering techniques and elementary Image Processing techniques. Apply C++graphics library functions to design animation sequence.

Modules	Blooms level*	Number of hours
Module I: Introduction to Graphics and Graphics Hardware System <ol style="list-style-type: none"> 1. Demonstrate the use of graphics library functions to draw various graphics objects. 2. Demonstrate the use of graphics library functions to draw pie chart. 3. Demonstrate the use of graphics library functions to draw bar chart on screen. 	L3,L5	2

Module II: Output Primitives and Clipping operations <ol style="list-style-type: none"> 1. Demonstrate the use of DDA line drawing algorithm to draw line on the screen when $m \leq 1$ and $m > 1$. 2. Demonstrate the use of DDA line drawing algorithm to draw line on the screen when $m \leq 1$ and $m > 1$. 3. Demonstrate the use of Bresenham's line drawing algorithm to draw line on the screen when $m \leq 1$ and $m > 1$. 4. Demonstrate the use of circle drawing algorithm to draw circle on the screen. 5. Write a program to draw characters on screen using bitmap character generation method. 6. Write a program to fill a polygon using boundary fill algorithm. 7. Write a program to fill a polygon using flood fill algorithm. 8. Write a program to demonstrate line clipping algorithm to clip a line where line slope is $m \leq 1$. 	L3,L5	6
Module III: 2D Geometric transformation <ol style="list-style-type: none"> 1. Write a program to translate a triangle where translation factors are $t_x=20$ and $t_y=30$. 2. Write a program to rotate a triangle in clock-wise and anti-clock-wise direction where rotation angle is 300. 3. Write a program to scale a square where scaling factors are $S_x=2$ and $S_y=3$. 4. Write a program to reflect a triangle about X axis. 5. Demonstrate combine 2D transformation after applying translation, rotation and scaling transformations. 6. Write a program to demonstrate fix point scaling where scaling factors are $S_x=2$ and $S_y=3$. 7. Write a program to demonstrate window to viewport transformation and linear mapping of the object coordinates in viewport where size of viewport is half to the size of window. 	L3,L5	6
Module IV: 3D Geometric transformation <ol style="list-style-type: none"> 1. Write a program to translate a 3D triangle where translation factors are $t_x=20$ and $t_y=30$. 2. Write a program to rotate a 3D triangle in clock-wise and anti-clock-wise direction where rotation angle is 300. 3. Write a program to scale a 3D square where scaling factors are $S_x=2$ and $S_y=3$. 4. Demonstrate combine 3D transformation after applying translation, rotation and scaling transformations. 	L3,L5	4
Module V: Object modelling and Visible Surface detection <ol style="list-style-type: none"> 1. Write a program to draw Bezier curve on the screen with 4 control points. 2. Write a program to draw spline curve on screen using 6 control points. 3. Write a program to implement fractal objects using Iterated Function System. 	L3,L5	3
Module VI: Introduction to multimedia <ol style="list-style-type: none"> 1. Create animation Sequence using C++ Graphics Library Function. 2. Write a program to generate histogram of an image. 	L3,L5	3

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

1. Udit Agrawal, "Principles of Computer Graphics", 2nd Edition, Dhanpat Rai Publications, New Delhi, 2017.
2. Hughes, Van Dam, et al. "Computer Graphics Principles and Practice", 3rd Edition, Pearson, 2014.
3. Hearn and Baker, "Computer Graphics with OpenGL", 3rd Edition, Prentice Hall, 2004.
4. Donald Hearn & M. Pauline Baker, "Computer Graphics C Version", Pearson Education, New Delhi, 2004.

Reference Books

1. James D. Foley, Andries van Dam, Steven K. Feiner, John Hughes, "Computer Graphics: Principles and Practice", 2nd Edition, Pearson Education, 2007.
2. F.S. Hill, "Computer Graphics using OPENGL", 2nd edition, Pearson Education, 2003.
3. David F. Rogers; "Procedural Elements for Computer Graphics" TMH. Publications.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	1	–	–	–	–	–	–	–	–	–	–	–	2	–	2
CO2	1	1	1	–	–	–	–	–	–	–	–	–	2	–	2
CO3	1	1	1	3	–	–	–	–	–	–	–	–	1	3	1
CO4	1	1	2	2	–	1	–	–	–	–	–	–	2	–	1
CO5	1	3	2	1	1	2	–	–	–	–	–	–	2	3	2
CO6	1	2	3	–	1	2	–	–	–	–	–	–	2	3	2

1: strongly related, 2: moderately related and 3: weakly related



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AIE6704	ADVANCED COMPUTER NETWORKS	L	T	P	C
Version 2020.1	Date of Approval: JULY 2020	3	0	0	3
Pre-requisites/Exposure	Basics of Computer Network				
Co-requisites	Nil				

Catalog Description

Advanced Computer Networks provides the knowledge of computer networks and related current research topics. This course illustrates the OSI and TCP-IP layers, services, devices, cables, protocols, network security, network performance parameters etc. This course focuses on advanced computer network concepts in theory as well as in real life applications in networking.

Course Objectives

The objective of this course is to

- Equip the students with the advanced networking concepts.
- Explain the different techniques of error detection and correction methods used at various layers.
- Provide an overview of various algorithms involved in advanced computer networks at OSI and TCP-IP Layers.

Course Outcomes

On completion of this course, the students will be able to

CO1: Explain the concept of reference model, wireless Ethernet standards, protocols and applications of networks.

CO2: Describe network Layer design issues, routing algorithms, IP addressing.

CO3: State Multicasting issues and multicast routing protocol. Describe mobile IP and its use in Multicasting.

CO4: State transport and application layers and explain services, protocols, performance parameters in these layers. Also describe DNS, Email and www with applications of each in computer network.

CO5: State network security and describe various types of computer network security, the digital signature, security algorithms. Explain the social issues related to network security and web security.

Modules	Blooms level*	Number of hours
MODULE 1: Uses computer networks, Reference Models, TCP/IP suite of protocols, MAC protocols for high-speed LANS, MANs, and wireless LANs. (For example, FDDI, DQDB, HIPPI, Gigabit Ethernet, Wireless Ethernet, etc.)Fast access technologies. (For example, ADSL, Cable Modem, etc.)	L1, L2	6
MODULE 2: Network Layer Design Issues, Routing Algorithms, Congestion Control Algorithms, Quality of Service, Internet Working, Network Layer in Internet. IPv6 basic protocol, extensions and options, support for QoS, security, etc., Changes to other protocols, Application Programming Interface for IPv6.	L2, L3	8
MODULE 3: Mobile IP, IP Multicasting. Multicast routing protocols, address assignments, session discovery, etc.	L1, L2	8
MODULE 4: The Transport Protocol: The Transport Service, Elements of transport	L1, L2, and L3	8

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protocol, a simple Transport Protocol, Internet Transport Protocols UDP, Internet Transport Protocols TCP, TCP extensions for high-speed networks, transaction-oriented applications Performance Issues. The Application Layer: DNS-(Domain Name System), Electronic Mail, World Wide Web Multimedia.		
MODULE 5: Overview of network security, Secure-HTTP, SSL, ESP, Key distribution protocols. Digital signatures, digital certificates-mail Security, Web security, Social Issues..	L1, L2	6

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

1. William Stallings, Cryptography & Network Security: Principles and Practices, Prentice Hall, 2005, (ISBN: 978-0131873162).

Reference Books

1. Behrouz A. Forouzan, Cryptography & Network Security, McGraw-Hill, 2007, USA. (ISBN: 0073327530 9780073327532).
2. Douglas R. Stinson, Chapman and Hall, Cryptography Theory & Practice, CRC Press, 2005.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	-	-	-	-	--	--	--	--	--	--	--	1	--	-	--
CO2	1	-	-	-	3	--	3	--	--	--	--	--	1	--	-	--
CO3	1	-	-	-	3	--	3	--	--	--	--	--	2	1	-	--
CO4	1	-	-	--	2	--	2	--	3	--	--	--	2	1	-	--
CO5	1	-	-	-	1	-	1	--	2	--	--	--	1	2	-	--

1: strongly related, 2: moderately related and 3: weakly related

AIE6707	ADVANCED COMPUTER NETWORKS LAB	L	T	P	C
Version 2020.1	Date of Approval: JULY 2020	0	0	1	1
Pre-requisites/Exposure	Basics of Computer Networks				
Co-requisites	Nil				

Catalog Description

Advanced Computer Networks Lab provides the knowledge of various installations & connections of LAN, WAN, etc, study of Cisco Packet Tracer Tool and its implementations, simulation of flow-control protocols such as Sliding Window, Stop & Wait with help of programming languages. This course focuses on real-life applications in networking and its software implementation in the laboratory.

Course Objectives

The objective of this course is to

- Equip the students with the advanced networking concepts.
- Explain the different techniques of error detection and correction methods used at various layers.
- Provide an overview of various algorithms involved in advanced computer networks at OSI and TCP-IP Layers.

Course Outcomes

On completion of this course, the students will be able to

CO1: Understand fundamental underlying principles of computer networking

CO2: Understand details and functionality of CISCO router

CO3: Demonstrate and configure details and functionality of DHCP server

CO4: Analyze performance of various communication protocols.

CO5: Compare routing algorithms

Modules	Blooms level*	Number of hours
MODULE 1: 1. Configuration and logging to a CISCO Router and introduction to the basic user Interfaces. Introduction to the basic router configuration and basic commands. 2. Configuration of IP addressing for a given scenario for a given set of topologies.	L1, L2	2
MODULE 2: 1. Configure a DHCP Server to serve contiguous IP addresses to a pool of four IP devices with a default gateway and a default DNS address. Integrate the DHCP server with a BOOTP demon to automatically serve Windows and Linux OS Binaries based on client MAC address	L2, L3	2
MODULE 3: 1. Configure, implement and debug the following: Use open source tools for debugging and diagnostics. a. ARP/RARP protocols b. RIP routing protocols c. BGP routing	L1, L2	3

d. OSPF routing protocols e. Static routes (check using netstat)		
MODULE 4: <ol style="list-style-type: none"> 1. Configure DNS: Make a caching DNS client, and a DNS Proxy; implement reverse DNS and forward DNS, using TCP dump/Wireshark characterise traffic when the DNS server is up and when it is down. 2. Configure FTP Server on a Linux/Windows machine using a FTP client/SFTP client characterise file transfer rate for a cluster of small files 100k each and a video file of 700mb. Use a TFTP client and repeat the experiment 	L1, L2, and L3	3
MODULE 5: <ol style="list-style-type: none"> 1. Configure a mail server for IMAP/POP protocols and write a simple SMTP client in C/C++/Java client to send and receive mails. 2. Implement Open NMS+ SNMPD for checking Device status of devices in community MIB of a linux PC. Using yellow pages and NIS/NFS protocols implement Network Attached Storage Controller (NAS). Extend this to serve a windows client using SMB. Characterise the NAS traffic using wireshark. 	L1, L2	3

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

1. William Stallings, Cryptography & Network Security: Principles and Practices, Prentice Hall, 2005, (ISBN: 978-0131873162).

Reference Books

2. Behrouz A. Forouzan, Cryptography & Network Security, McGraw-Hill, 2007, USA. (ISBN: 0073327530 9780073327532).
3. Douglas R. Stinson, Chapman and Hall, Cryptography Theory & Practice, CRC Press, 2005.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	-	-	-	-	--	--	--	--	--	--	--	1	--	-	--
CO2	1	-	-	-	3	--	3	--	--	--	--	--	1	--	-	--
CO3	1	-	-	-	3	--	3	--	--	--	--	--	1	2	2	--
CO4	1	-	-	--	2	--	2	--	3	--	--	--	2	1	-	--
CO5	1	-	-	-	1	-	1	--	2	--	--	--	2	1	-	--

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AIE6713	CRYPTOGRAPHY & NETWORK SECURITY	L	T	P	C
Version 2020.1	Date of Approval: JULY 2020	2	1	0	3
Pre-requisites/Exposure	Basic Mathematics				
Co-requisites	Nil				

Catalog Description

In this course the concepts of cryptography and network security are discussed in detail. Substitution and transposition techniques, symmetric and asymmetric cryptographic algorithms, their applications, differences will be introduced. As a precursor to the study of cryptography studies will be made on impact of various network and web security protocols. The concepts learnt in the studies of cryptography & network security will be applied in the studies and analysis of authentication, integrity and security related protocols.

Course Objectives

The objective of this course is to

1. Equip the students with concepts of cryptography & network security through problem solving and analytical approach.
2. Provide an overview of various network attacks and related security mechanism, various algorithms for modular arithmetic, symmetric and asymmetric cryptography and web and network security

Course Outcomes

On completion of this course, the students will be able to

CO1: Explain, describe and distinguish various security attacks; Describe and solve block and stream ciphers and its applications in cryptography; Solve problems based on substitution and transposition ciphers.

CO2: Explain the basic mathematics of cryptography; Solve problems of groups, modular arithmetic, gcd and inverse algorithm, chinese remainder theorem and its application in cryptography; Applying algorithms for solving problems in cryptography

CO3: Describing the concept of public key cryptosystems and its related algorithm; Explain and solve problems related to hash functions, digital signature and its applications in cryptography; Compare symmetric and asymmetric key cryptography.

CO4: Explain management, distribution, secure exchange of keys and authentication certificate and its applications in real life. Explain, compare various authentication protocols used in cryptography and network security, also solve problems based on these protocols.

CO5: Explain various security protocols: IPsec, SSL, TLS, SET; Describing malicious software's and illustrating various design approaches to Firewall.

Modules	Blooms level*	Number of hours
MODULE 1: Introduction to security attacks, services and mechanism, Classical encryption techniques: substitution ciphers and transposition ciphers, cryptanalysis, steganography, Stream and block ciphers. Modern Block Ciphers: Block ciphers principles, Shannon's theory of confusion and diffusion, fiestal structure, Data encryption standard (DES), Strength of DES, Idea of differential cryptanalysis, block cipher modes of operations, Triple DES	L1, L2 and L3	7
MODULE 2: Introduction to group, field, finite field of the form $GF(p)$, modular	L1, L2, L3	6

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arithmetic, prime and relativeprime numbers, Extended Euclidean Algorithm,Advanced Encryption Standard (AES) encryption and decryption, Fermat's and Euler's theorem, Primality testing, Chinese Remainder theorem, DiscreteLogarithmic Problem,Principals of public key crypto systems, RSA algorithm, security of RSA.		
MODULE 3: Message Authentication Codes: Authentication requirements, authentication functions, messageauthentication code, hash functions, birthday attacks, security of hash functions, Secure hash-algorithm (SHA)Digital Signatures: Digital Signatures, Elgamal Digital Signature Techniques, Digital signaturestandards (DSS).	L1,L2, L3 and L5	7
MODULE 4: Key Management and distribution: Symmetric key distribution, Diffie-Hellman Key Exchange, Public key distribution, X.509 Certificates, Public key Infrastructure. Authentication Applications: Kerberos	L1, L2 and L3	7
MODULE 5: IP Security: Architecture, Authentication header, Encapsulating security payloads, combining security associations, key management. Viruses and related threats, Firewalls	L1, L2	9

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. William Stallings, "Cryptography & Network Security", 4th Edition, Pearson Education, New Delhi, 2017.
2. Behrouz A. Forouzan, "Cryptography & Network Security", 2nd Edition, Tata McGraw Hills, New Delhi, 2015

Reference Books

1. Douglas R. Stinson, "Cryptography Theory and Practice", 3rd Edition, McMillan Publications, London, 2003
2. Atul Kahate, "Cryptography & Network Security", 3rd Edition, Tata McGraw Hills, New Delhi, 2017

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS O 1	PS O 2	PS O 3	PS O 4
CO 1	1	1	1	--	--	--	--	--	--	--	--	--	1	1	3	-
CO 2	1	1	1	--	--	--	--	--	--	--	--	--	1	1	3	-
CO 3	1	1	1	--	-	--	--	--	--	--	--	--	1	1	3	-
CO 4	1	2	3	--	--	--	--	--	--	--	--	--	1	1	3	-
CO 5	1	2	3	--	--	--	--	--	--	--	--	--	2	2	3	-

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AIE6714	SYSTEM PROGRAMMING AND COMPILER CONSTRUCTION	L	T	P	C
Version 2020.1	Date of Approval: JULY 2020	3	1	0	4
Pre-requisites/Exposure	Fundamental concept of computer architecture and operating system and theory of automata				
Co-requisites	Basics of programming languages				

Catalog Description

This course includes the concept of system programming and compiler construction in which all the system applications and programming concepts will be discussed. All the phases of compiler construction will be discussed in detail with some brief description of context free grammar. Using Basic Parsing Techniques efficient Parsers can be constructed with the help of error detection and recovery techniques.

Course Objectives

The objective of this course is to

1. Equip the students with concepts of system programming and working of system utilities.
2. Provide an overview of estimation of performance of compiler design in real time compilation with error handling techniques during compilation.

Course Outcomes

On completion of this course, the students will be able to

- CO 1: Describe the basics of compiler design and its co-relation with the subject computation theory of automation in terms of lexical analyzer.
- CO 2: Explain the working of assembler and macro processor with all the phases of it. And also describe the concept of loader and other system utilities of system software at the time of program translation.
- CO 3: Explain and differentiate the construction of parser through top-down and bottom up parsing techniques.
- CO 4: Explain and analyze the automatic construction of different parsing table which do not allow any ambiguity and backtracking in the given grammar.
- CO 5: Explain the process of syntax analyzer and identify any error occurs in this phase and also generate the three-address code the given grammar and the postfix translation.

Modules	Blooms level*	Number of hours
MODULE 1: Introduction Phases, FSM & RE's and their application to Lexical Analysis, Implementation of Lexical Analysers, The Syntactic specification of Languages: CFG, Derivation and Parse Trees, Capabilities of CFG.	L1 and L2	4
MODULE 2: System Programming Editors: Introduction to system Programming Line editor, Full screen editor and multi window editor, First pass and second pass of assembler and their algorithms. Assemblers for CISC Machines: case study x85 & x86 machines. Bootstrapping for compilers, Introduction to. Design of a compiler in C++ as Prototype. Basic Macro Processor functions- Macro definition & expansion – Macro Processor Algorithm & Data Structures, conditional – Macro Expansion, Keyword Macro Parameters, Macro with in Macro Implementation, Linkers and Loaders Concept of linking. Case study of Linker in x86 machines. Loading of various loading schemes. Booting	L1 and L2	11

techniques and sub-routines.		
MODULE 3: Basic Parsing Techniques Parsers, Shift Reduce Parsing, Operator precedence parsing, topdown Parsing, Predictive Parsers.	L2, L3 and L4	9
MODULE 4: Automatic Construction of efficient Parsers LR Parsers, the canonical collection of LR(0) items, constructing SLR Parsing Tables, Constructing canonical LR Parsing tables and LALR parsing tables, An Automatic Parser Generator, Implementation of LR parsingTables, Constructing LALR sets of items.	L2, L3 and L4	8
MODULE 5: Syntax Directed Translation Syntax directed Translation Schemes, Implementation of Syntax directed translators, Intermediate Code, Postfix notation, Parse Trees and Syntax Trees, Three address Code, Quadruple & Triples, Translation of Assignment Statements, Postfix Translation.	L2 and L3	9
MODULE 6: Error detection and Recovery Lexical phase errors, syntax phase errors, semantic errors Code Optimization: Loop optimization, the DAG representation of basic blocks, value numbers and Algebraic Laws, Global Data – Flow Analysis.	L1, L2 and L3	7

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. Alfred V. Aho, Ravi Sethi & J.D. Ullman, "Compiler Design", Addison Wesley
2. Ullman, Principles of Compiler Design, Narosa publications.
3. Donovan J.J., Systems Programming, New York, Mc-Graw Hill, 1972.

Reference Books

1. Dhamdhare, D.M., Introduction to Systems Software, Tata Mc-Graw Hill 1996.
2. D.M. Dhamdhare, "Compiler Construction – Principles & Practice", Macmillan India Ltd.
3. Holub, "Compiler Design in C", PHI.
4. Tremblay K.P & Sorenson P.G., "The Theory and practice of Compiler writing" McGraw Hill

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

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CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS O 1	PS O 2	PS O 3	PS O 4
CO 1	1	--	--	--	--	--	--	--	--	--	--	--	1	--	--	--
CO 2	1	--	2	--	--	--	--	--	--	--	--	--	--	1	--	--
CO 3	--	--	1	--	--	--	--	--	--	--	--	--	--	2	1	--
CO 4	--	--	1	2	--	--	--	--	--	--	--	--	--	2	1	--
CO 5	--	--	1	--	--	--	--	--	--	--	--	--	2	1	--	
CO 6	2	2	3	--	--	--	--	--	--	--	--	--	2	1	--	3

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AIE6716	SYSTEM PROGRAMMING & COMPILER CONSTRUCTION LAB	L	T	P	C
Version 2020.1	Date of Approval: JULY 2020	0	0	2	1
Pre-requisites/Exposure	concept of pointer and file handling of C/C++ programming languages				
Co-requisites	NIL				

Catalog Description

In this Lab course the concept of system programming and compiler construction are implemented and demonstrated. Concepts covered would enable them to create and solve complex problems. Problems or programs will be related to concepts of assembler, macro processor, text editor and parser.

Course Objectives

The objective of this course is to

- 1.
2. Make the students apply knowledge of various system programming concepts such as assembler, macro processor and text editor.
3. Provide a demonstration of compiler concepts like parsing techniques and implementation.

Course Outcomes

On completion of this course, the students will be able to

CO1: Apply the knowledge of regular languages and context free grammar.

CO2: Demonstrate the use of lexical analyzer and concept of editors.

CO3: Apply the knowledge of compiler design to convert the given expression into acceptable form of compiler.

CO4: Demonstrate the concept of assemble and macro-processor and their calling and expansion.

CO5: Demonstrate and apply the knowledge of compiler parsing techniques to construct parse tree for the given expression.

Modules/Topics Covered**	Blooms level*	Number of hours
1. Sample Programs using the theory of computation concepts of regular language. (a) WAP to check whether string is accepted or not for entered grammar. (b) WAP to convert NFA to DFA. (c) WAP to convert Regular Expression to NFA.	L3, L5	6
2. Sample Programs using context free grammar and editors (a) WAP to find no of Tokens in an expression. (b) Write a program to implement Text Editor.	L3, L5	4
3. Sample Programs using the notation conversion and their usage in parsing. (a) WAP to convert Infix to Postfix notation. (b) WAP to convert Infix to Prefix notation.	L3, L5	2
4. Sample Programs using the concept of assemble and macro processor (a) Write a program to implement Assembler Pass one and Pass two. (b) Write a program to implement Macro-processor.	L3, L5	4
5. Sample Programs using the compiler parsing techniques (a) WAP to implement symbol table.	L3, L5	6

(b) WAP calculate FIRST and FOLLOW of a grammar.		
(c) WAP to implement shift reduce parser.		

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

*** Sample Programs provided are not limited to these only, can include others as desired.*

Text Books

1. Alfred V. Aho, Ravi Sethi & J.D. Ullman, "Compiler Design", Addison Wesley
2. Ullman, Principles of Compiler Design, Narosa publications.
3. Donovan J.J., Systems Programming, New York, Mc-Graw Hill, 1972.

Reference Books

1. Dhamdhere, D.M., Introduction to Systems Software, Tata Mc-Graw Hill 1996.
2. D.M. Dhamdhere, "Compiler Construction – Principles & Practice", Macmillan India Ltd.
3. Holub, "Compiler Design in C", PHI.
4. Tremblay K.P & Sorenson P.G., "The Theory and practice of Compiler writing" McGraw Hill

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

IA					EE
Components	A	PR	LR	V	70
Weightage (%)	5	10	10	5	

Note: IA –Internal Assessment, A – Attendance, PR – Performance, LR – Lab Record, V – Viva, EE- External Exam

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS O 1	PS O 2	PS O 3	PS O 4
CO 1	2	1	--	--	--	--	--	--	--	--	--	--	1	--	--	--
CO 2	2	1	--	--	--	--	--	--	--	--	--	--	2	1	--	--
CO 3	2	3	1	--	--	--	--	--	--	--	--	--	3	2	1	--
CO 4	3	1	2	--	--	--	--	--	--	--	--	--	2	--	1	--
CO 5	--	3	1	--	--	--	--	--	--	--	--	--	3	2	3	--

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AIE6708	MATLAB PROGRAMMING	L	T	P	C
Version 2020.1	Date of Approval: JULY 2020	0	0	4	2
Pre-requisites/Exposure	C Programming				
Co-requisites	Basic knowledge of Programming				

Catalog Description

The objective of this course is to expose the students to the implementation techniques of Mat Lab Programming.

Course Objectives

The objective of this course is to

1. To understand the basic concepts and terminology related to Mat Lab.
2. Application of Mat Lab in field of Signal Processing and Control systems.

Course Outcomes

On completion of this course, the students will be able to

- CO1. Understand the basics of Matlab programming environment.
- CO2. Analysis of given LTI System and verifying its physical reliability and stability properties.
- CO3. Waveform synthesis using Laplace Transforms and z-transform of a given signal and system.

Modules	Blooms level*	Number of hours
1. To write a MATLAB program to perform some basic operation on matrices such as addition, subtraction, multiplication. 2. To write a "MATLAB" Program to generate various signals and sequences, such as unit impulse, unit step, unit ramp, sinusoidal, square, saw tooth, triangular, sinc signals. 3. To performs operations on signals and sequences such as addition, multiplication, scaling, shifting, folding, computation of energy and average power. 4. Write a program for finding even and odd parts of sequences Using MATLAB Software & program for finding real and imaginary parts of sequences Using MATLAB Software.	L1, L2 and L3	8
5. Write a program to find the out put with linear convolution operation Using MATLAB Software 6. Write a program to compute auto correlation and cross correlation between signals and Sequences. 7. Write a program to compute linearity and time invariance properties of a given continuous /discrete System.	L1,L2,L3	6
8. Write a program to Unit Step And Sinusoidal Response Of The Given LTI System And Verifying Its physical reliability and stability properties. 9. Write a program to demonstrate Gibbs Phenomenon using MATLAB. 10. Write a program to obtain Fourier Transform and Inverse Fourier Transform of a given signal / sequence and to plot its Magnitude and Phase Spectra 11. Write a program to perform waveform synthesis using Laplace Transforms of a given signal.	L1, L2 and L3	8

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12. Write a program to locating the zeros and poles and plotting the pole zero maps in s-plane and z-plane 13. for the given transfer function. 14. Write a program to Generate Gaussian Noise and to Compute its Mean, M.S. Values, Skew, kurtosis, 15. PS and PDF 16. Write a program to demonstrate Sampling Theorem and aliasing effect using MATLAB. 17. Write a program for removal of noise by auto correlation/cross correlation.	L1, L4	12
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**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

Amos Gilat, "MATLAB: An Introduction with Applications", Wiley; Fourth edition (2012)4ed.

Reference Books

1. Bansal, Goel and Sharma, MATLAB and its Applications in Engineering" Pearson Education India; Second edition (1 March 2016).

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS O 1	PS O 2	PS O 3	PSO 4
CO 1	2	1	--	--	--	--	--	--	--	--	--	--	1	2	--	--
CO 2	3	1	--	--	--	--	--	--	--	--	--	--	1	1	--	--
CO 3	1	3	2	--	--	--	--	--	--	--	--	--	1	2	3	--

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AIE6735	SUMMER INTERNSHIP EVALUATION-II	L	T	P	C
Version: 2020.1	Date of Approval: JULY 2020	0	0	0	3
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

The objective of this course is to provide practical training on some live projects that will increase capability to work on actual problem in industry. This training may undergo in an industrial environment or may be an in-house training on some latest software which is in high demand in market. This training will be designed such that it will useful for their future employment in industry.

Course Objectives

The objective of this course is to

1. Provide practical training on live projects
2. Increase technical capabilities on solving real life problems in company environment

Course Outcomes

On completion of this summer internship, the students will be able to:

CO1: Develop communication, interpersonal and other critical skills in the job interview process.

CO2: Design and develop software and hardware projects


CO3: Assess interests and abilities in their field of study.

CO4: Demonstrate excellent technical and communication skills to acquire employment contacts leading directly to a full-time job following graduation from college.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	2	1	2	2	--	--	--	1	--	--	--	1	1	1	1
CO2	1	1	2	2	2	--	--	--	1	--	--	--	1	1	1	1
CO3	1	1	2	3	2	--	--	--	1	--	--	--	1	1	1	1
CO4	1	1	2	2	2	--	--	--	1	--	--	--	1	1	1	1

1: strongly related, 2: moderately related and 3: weakly related


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AIE6737	MINOR PROJECT-II	L	T	P	C
Version: 2020.1	Date of Approval: JULY 2020	0	0	0	2
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

The objective of this course is to provide practical training on some live/demo projects that will increase capability to work on actual problem in industry. It will be an in house training on some latest software which is in high demand in market. This training will be designed such that it will be useful for their future employment in industry.

Course Objectives

The objective of this course is to

1. Provide practical training on live projects
2. Increase technical capabilities on solving real life problems in company environment

Course Outcomes

On completion of this minor project, the students will be able to:

CO1: Demonstrate a sound technical knowledge of their selected project topic.

CO2: Design and develop engineering solutions to complex problems utilising a systems approach.

CO3: Analyse various approaches for solving a complex engineering problem using different tools and techniques


CO4: Demonstrate the knowledge, skills and attitudes of a professional engineer.

CO5: Apply technical skills and knowledge in completing the project.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	2	--	--	--	--	--	--	1	--	--	--	--	--	1	1
CO2	1	1	--	--	--	--	--	--	1	--	--	--	--	--	1	1
CO3	1	1	--	--	--	--	--	--	1	--	--	--	--	--	1	1
CO4	1	1	--	--	--	--	--	--	1	--	--	--	--	--	1	1
CO5	1	1	--	--	--	--	--	--	1	-	-	-	--	--	1	1

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AIE6710	MOBILE COMPUTING	L	T	P	C
Version 2020.1	Date of Approval: JULY 2020	3	0	0	3
Pre-requisites/Exposure	Basic Networking				
Co-requisites	Nil				

Catalog Description

The objective of this consortium is to shape and expand a full-scale and sound mobile computing system market. To achieve this, cooperation is required of interests related to communication (network), computer hardware/software, system integrators (including service providers), and the media.

Course Objectives

The objective of this course is to

1. Give a general overview of the cellular technology and the associated terms and discuss the generations of the mobile technologies starting from 1G to 3G techniques.
2. Illustrate the GPRS and WAP model for 2G internet connectivity in detail.
3. Elaborate the third-generation mobile services
4. Describe the Global Mobile Satellite Systems in detail and basic architecture of Bluetooth technology and advanced topics in mobile computing.

Course Outcomes

On completion of this course, the students will be able to

CO1: Explain the basic concepts mobile technology, computing and basic architecture of PCS and GSM.

CO2: Describe the mobile networking Infrastructure through 2G technologies (GSM, GPRS, WAP).

CO3: Explain the basic concepts of 3G technologies (WCDMA, CDMA 2000) and WLL.

CO4: Discuss the working of mobile satellite systems like IRIDIUM and GLOBALSTAR.

CO5: Explain the concepts of Bluetooth technology, its working and protocols, virtual networks and enterprise networks.

Modules	Blooms level*	Number of hours
Module I: Introduction to Personal Communications Services (PCS) PCS Architecture, Mobility management, Networks signalling. Global System for Mobile Communication (GSM) system overview: GSM Architecture, Mobility management, Network signalling.	L1, L2 and L3	8
Module II: General Packet Radio Services (GPRS) & Wireless Application Protocol (WAP) GPRS Architecture, GPRS Network Nodes. Mobile Data Communication: WLANs (Wireless LANs) IEEE 802.11 standard, Mobile IP. Wireless Application Protocol (WAP): The Mobile Internet standard, WAP Gateway and Protocols, wireless mark up Languages (WML).	L1,L2	10
Module III: Third Generation (3G) Mobile Services Introduction to International Mobile Telecommunications 2000 (IMT 2000) vision, Wideband Code Division Multiple Access (W-CDMA), and CDMA	L1, L2	7

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2000, Quality of services in 3G. Wireless Local Loop (WLL): Introduction to WLL Architecture, wireless Local Loop Technologies.		
Module IV: Global Mobile Satellite Systems Global Mobile Satellite Systems; case studies of the IRIDIUM and GLOBALSTAR systems.	L1, L2	7
Module V: Enterprise Networks Introduction to Virtual Networks, Blue tooth technology, Blue tooth Protocols. Advanced techniques in mobile computing.	L1, L2	4

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. "Wireless and Mobile Networks Architectures", by Yi-Bing Lin & Imrich Chlamtac, John Wiley & Sons, 2001.
2. "Mobile and Personal Communication systems and services", by Raj Pandya, Prentice Hall of India, 2001.

Reference Books

1. "Wireless Web Development", Ray Rischpater, Springer Publishing, 2000.
2. "The Wireless Application Protocol", by Sandeep Singhal, Pearson Education Asia, 2000.
3. "Third Generation Mobile Telecommunication systems", by P.Stavronlakis, Springer Publishers, 2001.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	2	2	--	--	--	--	--	--	--	--	--	1	-	3	-
CO2	1	1	2	--	--	--	--	--	--	--	--	--	1	-	3	--
CO3	1	2	-	--	-	--	--	--	--	--	--	--	1	-	--	--
CO4	1	2	-	--	--	--	--	--	--	--	--	--	1	-	--	--
CO5	1	2	3	--	--	--	--	--	--	--	--	--	1	2	--	--

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AIE6717	ROBOTIC PROCESS AUTOMATION DESIGN & DEVELOPMENT	L	T	P	C
Version 2020.1	Date of Approval: JULY 2020	3	0	0	3
Pre-requisites/Exposure	Basic Networking Concepts				
Co-requisites	Nil				

Catalog Description

This course aims at providing knowledge of basic concepts of Robotic Process Automation to University students. It further builds on these concepts and introduces key RPA Design and Development strategies and methodologies specifically in context of UiPath products. The student undergoing the course shall develop the competence to design and develop a robot for a defined process.

Course Objectives

The objective of this course is to

1. Equip the students with concepts of robotic process automation
2. Provide an overview of designing with uipath software.

Course Outcomes

On completion of this course, the students will be able to

- CO1: Explain key terms and trends around the robotic process automation along with its physical and logical design
- CO2: Understand the potential and value of the robotic process automation .
- CO3: Describe the technologies used for the robotic process automation and mobile devices, including (passive and active) sensors, the physical communications layer, communications protocols, programming frameworks,.
- CO4: Design programs and have hands on experience on uipath software
- CO5: Develop RPA programs of moderate complexity for a well-used robotic automation process using uipath.

Modules	Bloom s level*	Numbe r of hours
Module 1: Programming Basic and Recap Programming Concepts Basics I - Understanding the application, Basic Web Concepts, Protocols, Email Clients, Data Structures, Data Tables, Algorithms, Software Processes, Software Design, SDLC. Programming Concepts Basics 2 - Scripting, Net Framework, Net Fundamentals, XML, Control structures and functions, XML, HTML, CSS, Variables& Arguments.	L1, L2	8
Module II: RPA Concepts RPA Basics - History of Automation, what is RPA, RPA vs Automation, Processes & Flowcharts, Programming Constructs in RPA, What Processes can be Automated, Types of Bots, Workloads which can be automated. RPA Advanced Concepts - Standardization of processes, RPA Development methodologies, Difference from SDLC, Robotic control flow architecture, RPA business case, RPA Team, Process Design Document/Solution Design Document, Industries best suited for RPA, Risks & Challenges with RPA, RPA and emerging ecosystem	L2, L3 and L4	8

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Module III: UiPath Introduction & Basics Introduction to UiPath- Installing UiPath Studio community edition, The User Interface, Keyboard Shortcuts, About Updating, About Automation Projects, Introduction to Automation Debugging, Managing Activation Packages, Reusing Automations Library, Installing the Chrome Extension, Installing the Firefox Extension, Connecting your project to a source control system, Activities Guide. Variables, Control Flow Data Manipulation- Data Manipulation Introduction, Scalar variables, collections and Tables, Text Manipulation, Data Manipulation, Gathering and Assembling Data. Recording and Advanced UI Interaction - Recording Introduction, Basic and Desktop Recording, Web Recording, Input/Output Methods, Screen Scraping, Data Scraping, Scraping advanced techniques. Selectors.	L2, L3 and L4	8
Module IV: UiPath Advanced Automation concepts and techniques Image, Text & Advanced Citrix Automation- Introduction to Image & Text Automation, Image based automation, Keyboard based automation, Information Retrieval, Advanced Citrix Automation challenges, Best Practices, using tab for Images, Starting Apps. Excel Data Tables & PDF - Data Tables in RPA, Excel and Data Table basics, Data Manipulation in excel, Extracting Data from PDF, extracting a single piece of data, Anchors, Using anchors in PDF. Email Automation- Email Automation, Incoming Email automation, Sending Email automation	L2, L3 and L4	12

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

"Learning Robotic Process Automation" By Alok Mani Tripathi, Packt Publications, 1st Edition, 2018

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	--	--	3	--	--	--	--	--	--	2	--	1	1	-	-
CO2	1	--	1	2	--	--	--	--	--	--	--	--	-	1	-	-
CO3	1	--	1	2	--	--	--	--	--	--	--	--	-	1	-	2
CO4	1	--	--	2	--	--	--	--	--	--	--	--	1	1	-	2

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AIE6718	RESPONSIVE WEB DESIGN	L	T	P	C
Version : 2020.1	Date of Approval: JULY 2020	2	0	0	2
Pre-requisites/Exposure	knowledge of website design				
Co-requisites	NIL				

Catalog Description

This course is aimed to provide a fundamental understanding of JavaScript and two of its related library: Bootstrap and React for dynamic web site client side scripting. Javascript is a famous scripting language for client side. The bootstrap and react libraries are rich API for creating dynamic websites. The course builds strong foundation for client-side scripting for creating dynamic websites

Course Objectives

The objective of this course is

1. Equip the students with basic and advanced features of javascript and bootstrap library to create dynamic web sites
2. Provide an overview of basic features of react library to design dynamic websites.

Course Outcomes

On completion of this course, the students will be able to

CO1: Define the and explain concept of responsive web design and responsive content.

CO2 Explain HTML and CSS contents for responsive websties; Design and Create responsive websites using html, css and media queries.

CO3: Explain the concept of responsive workflow and working with responsive web design tools; Creating responsive websites that work on variety of devices.

CO4: Designing responsive websites using the concepts of typography, navigation and header layout; Evaluating performance of responsive websites .

Modules	Blooms level*	Number of hours
Module 1: Foundations of responsive design What Is Responsive Design?: Just the Basics ,A Short History, Why Responsive Design Responsive Content: Content Strategy ,Managing Content, Developing Content, Content Parity, Content Governance, Adaptive Content	L2 and L3	8
Module 2: Creating Responsive Websites HTML for Responsive Sites: Working with HTML, Basic Page Structure Viewport, Structural Elements, Creating a Page, Clean and Semantic HTML CSS for Responsive Sites: How CSS Works, Versions of CSS, Where CSS Goes, The Cascade, Using the Cascade, Comments, Organizing Your Stylesheet, The Box Model, display, Positioning, float and clear, Basic Styles Media Queries: What's a Media Query? Media Query Structure, Using Media Queries in Stylesheet Links, Other Ways to Use Media Queries, What We Can Query, Browser Support, Breakpoints, Design Ranges, Designing Responsively, Using Media Queries, Two-Column Layout, Setting a Maximum Width, How to Choose Breakpoints Images: Ways to Display Images, Alt Text, Image File Formats, Optimizing Images, Content Images, Background Images Responsive Images	L2 and L3	8

Module 3: Working Responsively Responsive Workflow: Strategy and Planning, Content Before Layout Thinking About Layout, Prototypes, Visual Design, Responsive Design Tools, Selling Responsive Design, Working with Clients Mobile and Beyond: User Experience , Device-Agnostic Design, Focusing on Mobile First, Do What You Can, Types of Devices, Touch, Screen Size, Accessibility (Universal Design), Deciding Which Devices to Support Why Use Real Devices for Testing, Testing	L2 and L3	8
Module 4: Designing Responsive Websites Typography: Start with HTML, Typefaces, Using Fonts, Sizing Text, Line Length, Whitespace, Margins and Padding, Changing Typeface for Screen Size Navigation and Header Layout: Responsive Navigation , Branding, Navigation Links, Navigation Patterns, Header Performance: Why Performance Matters, Performance as Design ,How Web Pages Are Loaded and Rendered, Measuring Performance Cleaning Up Your Code, Minimizing HTTP Requests, Server Stuff JavaScript, CSS, Hosting, Conditionally Loading Content, Reflows and Repaints, RESS	L2and L3	12

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books:

1. "Learning Responsive Web Design A Beginner's Guide", Clarissa Peterson, Orielly, 2014

Reference Books:

1. "Responsive Web Design with HTML5 and CSS3", Ben Frain, Packt, 2012
2. "Responsive Web Design by Example", Farhaan Hussain, Packt, 2017

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/ Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS O 1	PS O 2	PS O 3	PS O 4
CO 1	--	1	1	--	1	--	--	--	--	1	--	--	1	--	--	--
CO 2	--	1	2	--	2	--	--	--	--	1	--	--	1	--	--	--
CO 3	--	1	1	--	1	--	--	--	--	2	--	--	1	--	--	--
CO 4	--	1	2	--	1	--	--	--	--	2	--	--	1	--	--	--

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AIE6719	RESPONSIVE WEB DESIGN LAB	L	T	P	C
Version : 2020.1	Date of Approval: JULY 2020	0	0	2	1
Pre-requisites/Exposure	Knowledge of website design				
Co-requisites	NIL				

Catalog Description

This course is aimed to provide a fundamental understanding of JavaScript and two of its related library: Bootstrap and React for dynamic web site client side scripting. Javascript is a famous scripting language for client side. The bootstrap and react libraries are rich API for creating dynamic websites. The course builds strong foundation for client-side scripting for creating dynamic websites

Course Objectives

The objective of this course is

1. Equip the students with basic and advanced features of javascript and bootstrap library to create dynamic web sites
2. Provide an overview of basic features of react library to design dynamic websites.

Course Outcomes

On completion of this course, the students will be able to

CO1: Define the and explain concept of responsive web design and responsive content.

CO2 Explain HTML and CSS contents for responsive websties; Design and Create responsive websites using html, css and media queries.

CO3: Explain the concept of responsive workflow and working with responsive web design tools; Creating responsive websites that work on variety of devices.

CO4: Designing responsive websites using the concepts of typography, navigation and header layout; Evaluating performance of responsive websites .

Modules	Blooms level*	Number of hours
Module 1: Foundations of responsive design Programs based on: <ul style="list-style-type: none"> • Content Strategy ,Managing Content, • Developing Content, Content Parity, • Content Governance, Adaptive Content 	L2 and L3	3
Module 2: Creating Responsive Websites Programs based on: <ul style="list-style-type: none"> • Working with HTML, Basic Page Structure Viewport, Structural Elements, Creating a Page, Clean and Semantic HTML • The Cascade, Using the Cascade, Comments, Organizing Your Stylesheet, The Box Model, display, Positioning, float and clear, Basic Styles • Media Query Structure, Using Media Queries in Stylesheet Links, Other Ways to Use Media Queries, • What We Can Query, Browser Support, Breakpoints, Design Ranges, Designing Responsively, Using Media Queries, Two-Column Layout, Setting a Maximum • Width, How to Choose Breakpoints Images: Ways to Display Images, Alt Text, Image File Formats, Optimizing Images, Content 	L2 and L3	3

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Images, Background Images Responsive Images		
Module 3: Working Responsively Programs based on: <ul style="list-style-type: none"> • Responsive Workflow, Visual Design, Responsive Design Tools, Selling Responsive Design, Working with Clients • Mobile and Beyond: User Experience , Device-Agnostic Design, Focusing on Mobile First, Do What You Can, • Types of Devices, Touch, Screen Size, Accessibility (Universal Design), Deciding Which Devices to Support Why Use Real Devices for Testing, Testing 	L2 and L3	3
Module 4: Designing Responsive Websites <ul style="list-style-type: none"> • Typography: Start with HTML, Typefaces, Using Fonts, Sizing Text, Line Length, Whitespace, Margins and Padding, • Changing Typeface for Screen Size • Navigation and Header Layout: Responsive Navigation , Branding, Navigation Links, Navigation Patterns, Header • Performance: Why Performance Matters, Performance as Design ,How Web Pages Are Loaded and Rendered, • Measuring Performance Cleaning Up Your Code, Minimizing HTTP Requests, Server Stuff JavaScript, CSS, Hosting, Conditionally Loading Content, Reflows and Repaints, RESS 	L2and L3	3

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books:

1. "Learning Responsive Web Design A Beginner's Guide", Clarissa Peterson, Orielly, 2014

Reference Books:

1. "Responsive Web Design with HTML5 and CSS3", Ben Frain, Packt, 2012
2. "Responsive Web Design by Example", Farhaan Hussain, Packt, 2017

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/ Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS O 1	PS O 2	PS O 3	PS O 4
CO 1	--	1	1	--	1	--	--	--	--	1	--	--	1	--	--	--
CO 2	--	1	2	--	2	--	--	--	--	1	--	--	1	--	--	--
CO 3	--	1	1	--	1	--	--	--	--	2	--	--	1	--	--	--
CO 4	--	1	2	--	1	--	--	--	--	2	--	--	1	--	--	--

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AIE6809	RESEARCH METHODOLOGY AND TECHNICAL REPORT WRITING	L	T	P	C
Version 2020.1	Date of Approval: JULY 2020	2	0	0	2
Pre-requisites/Exposure	NIL				
Co-requisites	NIL				

Catalogue Description

This course deals with types of research, significance and characteristics and planning a research proposal, population and sample, parameter and statistic, sampling and data collection, sampling design: steps, types, sample size, sampling methods. It deals with univariate, bivariate and multivariate analysis, measure of dispersion of data, standard deviation, variance, coefficient of variation and degree of freedom. Hypothesis testing: parametric tests and non-parametric tests, regression analysis and curve fitting, method of least-squares, explained and unexplained variations, coefficient of correlation of determination. The course also deals with technical/scientific/research report writing: referencing and bibliography and footnotes. Publication of research papers, citations, intellectual property rights and copy rights, plagiarism, patent and patent laws, commercialization and ethical issues.

Course Objectives

The objective of this course is to:

1. Deals with types of research, significance and characteristics and planning a research proposal and to enhance scientific and technical writing and research skills.
2. Impart knowledge about various stages of research process, statistical analysis and tools & their applications in decision making by hypothesis testing and regression analysis.
3. It also deals with intellectual property rights and copy rights, plagiarism, patent and patent laws, commercialization and ethical issues.

Course Outcomes

On completion of this course, the students will be able to:

- CO1. Classify different research types, explain steps in research process and planning research proposal.
- CO2. Describe sampling methods, sampling steps and design, carry out data processing and analysis.
- CO3. Explain hypothesis testing, parametric and non-parametric tests, carry out regression analysis, curve fitting.
- CO4. Demonstrate technical and scientific report writing skills, describe plagiarism, patent laws and intellectual property rights.

Course Content

Modules	Blooms level*	Number of hours
Module I: Introduction and Research Planning Introduction to research: Definition, motivation, need, objectives, significance and characteristics of research; types of research; steps in research process; planning a research proposal; literature review, web searching.	L1, L2	4
Module II: Sampling Methods Measurement scales, population and sample, parameter and statistic, sampling and data collection, sampling design: steps, types, sample size,	L1, L2, L3	5

sampling methods, data processing and analysis. Sampling surveys and questionnaire designing, primary and secondary data.		
Module III: Hypothesis Testing and Regression Analysis Univariate, bivariate and multivariate analysis, means-arithmetic, geometric and harmonic; measure of dispersion of data, standard deviation, variance, coefficient of variation and degree of freedom. Hypothesis testing: kinds errors in hypothesis testing, significance and confidence levels, parametric tests and non-parametric tests, one-tailed and two-tailed tests, analysis of variance. Regression analysis and curve fitting, method of least-squares, explained and unexplained variations, coefficient of correlation of determination.	L1, L3, L4	10
Module IV: Technical Report Writing and Plagiarism Technical/scientific/research report writing: structure and components of scientific reports, formats of dissertations, research report, report writing skills, report preparation, referencing and bibliography and footnotes. Publication of research papers, citations, making presentation-use of visual aids and PPTs. Intellectual property rights and copy rights, plagiarism, patent and patent laws, commercialization and ethical issues.	L1, L3, L4	5

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books:

- Blake, G. and Bly, R.W. The Elements of Technical Writing. MacMillan, New York, 1993.
- Chawla, D and Sondhi, N. Research Methodology- Concepts and Cases. Vikas Publishing House PVT LTD. New Delhi, 2016.
- Kothari, C.R. Research Methodology- Methods and Techniques, 2nd.ed. New Age International Publishers, New Delhi. 2008.

Reference Books:

- Montomery, Douglas C, Design and Analysis of Experiments, 5th Ed, Wiley India.2005.
- Panneerselvam, R.2009. Research Methodology, PHI Learning Pvt.Ltd., New Delhi, 2009
- Ranjit Kumar 2009. Research Methodology- A step –by- step Guide for beginners; 2nd ed. Dorling Kindersley (India) Pvt. Ltd, Delhi, 2009.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

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CO, PO and PSO mapping

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CO2	1	3	1	3	3	-	-	-	-	-	-	1	3	1	2	-
CO3	1	3	1	-	-	-	-	-	-	-	-	1	3	3	2	-
CO4	1	3	2	-	3	-	-	-	-	-	-	1	3	1	2	3
CO5	2	1	1	-	-	-	-	-	-	-	-	1	3	1	2	-

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AIE6837	MAJOR PROJECT	L	T	P	C
Version: 2020.1	Date of Approval: JULY 2020	0	0	0	8
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

The objective of this course is to provide practical training on some live/demo projects that will increase capability to work on actual problem in industry. It will be an in house training on some latest software which is in high demand in market. This training will be designed such that it will be useful for their future employment in industry.

Course Objectives

The objective of this course is to

1. Provide practical training on live projects
2. Increase technical capabilities on solving real life problems in company environment

Course Outcomes

On completion of this summer internship, the students will be able to:

CO1: Demonstrate a sound technical knowledge of their selected project topic.

CO2: Design and develop engineering solutions to complex problems utilising a systems approach.

CO3: Analyse various approaches for solving a complex engineering problem using different tools and techniques


CO4: Demonstrate the knowledge, skills and attitudes of a professional engineer.

CO5: Apply technical skills and knowledge in completing the project.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	2	--	--	--	--	--	--	1	--	--	--	--	--	1	1
CO2	1	1	--	--	--	--	--	--	1	--	--	--	--	--	1	1
CO3	1	1	--	--	--	--	--	--	1	--	--	--	--	--	1	1
CO4	1	1	--	--	--	--	--	--	1	--	--	--	--	--	1	1
CO5	1	1	--	--	--	--	--	--	1	-	-	-	--	--	1	1

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RBE6801	FUNDAMENTALS OF ROBOTIC SYSTEM AND ROBOT PROGRAMMING	L	T	P	C
Version 2020.1	Date of Approval: JULY 2020	3	0	0	3
Pre-requisites/Exposure	Basic knowledge of control system and programming				
Co-requisites	Nil				

Catalog Description

Enlighten the students about the fundamentals of robotic systems make them to understand the basics of robot, robot transformations and sensors, micro/nano robotic systems and to program them for functioning.

Course Objectives

The objective of this course is to

1. Equip the students with the basic knowledge and designing of robotics.
2. Implement their concept in robotics and design robot for various applications of engineering.

Course Outcomes

On completion of this course, the students will be able to

CO1: Explain and Understand the design and functionality of robots

CO2: Describe the control system with the help of sensor and robot transformations.

CO3: Understand and robot cell design and implement in micro/nano robotics system

CO4: Explain and Understand the robotic programming language and use in design of robot.

Modules	Blooms level*	Number of hours
MODULE 1: INTRODUCTION Robot anatomy-Definition, law of robotics, History and Terminology of Robotics-Accuracy and repeatability of Robotics-Simple problems-Specifications of Robot-Speed of Robot-Robot joints and links-Robot classifications-Architecture of robotic systems-Robot Drive systems-Hydraulic, Pneumatic and Electric system.	L1 and L2	5
MODULE 2: END EFFECTORS AND ROBOT CONTROLS Mechanical grippers-Slider crank mechanism, Screw type, Rotary actuators, cam type-Magnetic grippers-Vacuum grippers-Air operated grippers-Gripper force analysis-Gripper design-Simple problems-Robot controls-Point to point control, Continuous path control, Intelligent robot-Control system for robot joint-Control actions-Feedback devices-Encoder, Resolver, LVDT-Motion Interpolations-Adaptive control.	L1, L2 and L3	7
MODULE 3: ROBOT TRANSFORMATIONS AND SENSORS Robot kinematics-Types- 2D, 3D Transformation-Scaling, Rotation, Translation- Homogeneous coordinates, multiple transformation-Simple	L1 and L2	5

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problems. Sensors in robot – Touch sensors-Tactile sensor – Proximity and range sensors – Robotic vision sensor-Force sensor-Light sensors, Pressure sensors.		
MODULE 4: ROBOT CELL DESIGN AND MICRO/NANO ROBOTICS SYSTEM Robot work cell design and control-Sequence control, Operator interface, Safety monitoring devices in Robot-Mobile robot working principle, actuation using MATLAB, NXT Software Introductions-Robot applications- Material handling, Machine loading and unloading, assembly, Inspection, Welding, Spray painting and undersea robot. Micro/Nanorobotics system overview-Scaling effect-Top down and bottom up approach- Actuators of Micro/Nano robotics system-Nanorobot communication techniques-Fabrication of micro/nano grippers-Wall climbing micro robot working principles-Biomimetic robot-Swarm robot-Nanorobot in targeted drug delivery system.	L1, L2, L3, L4 and L5	8
MODULE 5: BASICS OF ROBOT PROGRAMMING Robot programming-Introduction-Types- Flex Pendant- Lead through programming, Coordinate systems of Robot, Robot controller- major components, functions-Wrist Mechanism-Interpolation-Interlock commands- Operating mode of robot, Jogging-Types, Robot specifications- Motion commands, end effectors and sensors commands.	L1, L2 and L3	5
MODULE 6: VAL, VAL-II, RAPID AND AML LANGUAGE Robot Languages-Classifications, Structures- VAL- language commands motion control, hand control, program control, pick and place applications, palletizing applications using VAL, Robot welding application using VAL program-WAIT, SIGNAL and DELAY command for communications using simple applications. RAPID- language basic commands- Motion Instructions-Pick and place operation using Industrial robot- manual mode, automatic mode, subroutine command based programming. Move-master command language- Introduction, syntax, simple problems. VAL-II programming-basic commands, applications- Simple problem using conditional statements-Simple pick and place applications-Production rate calculations using robot. AML Language-General description, elements and functions, Statements, constants and variables-Program control statements-Operating systems, Motion, Sensor commands-Data processing.	L1, L2 and L3	6

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

1. Craig. J. J. "Introduction to Robotics mechanics and control", Addison- Wesley, 1999.

Reference Books

1. S.R. Deb, Robotics Technology and flexible automation, Tata McGraw-Hill Education., 2009
2. Mikell P Groover & Nicholas G Odrey, Mitchel Weiss, Roger N Nagel, Ashish Dutta, Industrial Robotics, Technology programming and Applications, McGraw Hill, 2012
3. Richard D. Klafter, Thomas .A, Chri Elewski, Michael Negin, Robotics Engineering an Integrated Approach, Phi Learning., 2009.
4. Deb. S. R. "Robotics technology and flexible automation", Tata McGraw Hill publishing company limited, 1994

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6. Mikell. P. Groover, "Industrial Robotics Technology", Programming and Applications, McGraw Hill Co, 1995.
7. Klafter. R.D, Chmielewski.T.A. and Noggin's., "Robot Engineering : An Integrated Approach", Prentice Hall of India Pvt. Ltd.,1994.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	2	1	2	1	3	--	--	--	--	--	--	-	1	2	-
CO2	1	1	2	1	1	--	--	--	--	--	--	--	1	--	-	3
CO3	1	2	1	1	1	3	--	--	--	--	--	--	1	2	-	-
CO4	1	2	2	2	3	3	--	--	--	--	--	--	-	--	2	3

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RBE6802	ADVANCED CONTROL SYSTEMS & DRIVES FOR ROBOTS	L	T	P	C
Version 2020.1	Date of Approval: JULY 2020	3	0	0	3
Pre-requisites/Exposure	Basic concepts of control system				
Co-requisites					

Catalog Description

This course provides comprehensive and insight knowledge of Digital control systems. Objective of the course is to provide the students the core knowledge of Stability theory of Digital systems and State Variable analysis of Digital System

Course Objectives

The objective of this course is to

- Equip the students with concepts of basic control system and its stability.
- Provide a thorough understanding of control system model by considering standard examples.
- Give an insight of state variable methods for control systems.

Course Outcomes

On completion of this course, the students will be able to

CO1: Explain the fundamentals of a digital control system.

CO2: Apply the standard methods to check the stability of a control system.

CO3: Design model for digital control system for an application with given requirements.

CO4: Analyze the analog and digital control systems using state variable method.

Modules	Blooms level*	Number of hours
Module 1: Introduction Configuration of the basic Digital Control Systems, types of sampling operations, Sample and Hold operations, Sampling theorem, Basic discrete time signals.	L1,L2,L4	12
Module 2: Stability Methods Mapping between s-plane and z-plane, stability methods: Modified Routh Criterion, Jury's method, modified Schur-Cohn criterion.	L3	6
Module 3: Models Of Digital Control Systems Digital temperature control System, Digital position control system, stepping motors and their control. Design of Digital compensator using frequency response plots.	L5	6
Module 4: Control Systems Analysis Using State Variable Methods State variable representation, conversion of state variable models to transfer function and vice-versa, Eigen values and eigen vectors, Solution of state equations, Concepts of controllability and observability.	L3	6
Module 5: State Variable Analysis Of Digital Control Systems State variable description of digital control systems, conversion of state variable models to pulse transfer function and vice versa, solution of state difference equations, controllability and observability.	L3	6

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**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. M. Gopal, Digital Control and State Variable Methods, 4th edition, Tata Mc-Graw-Hill.
2. K.Ogata, Discrete Time Control Systems, Pearson Education, (Singapore) (Thomson Press India).
3. B.C Kuo, Digital Control Systems, Prentice Hall.

Reference Books

1. I.J. Nagrath & M.Gopal, Control System Engg., John Wiley & sons.
2. K.K. Aggarwal, Control System Analysis and Design, Khanna Publishers.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS O 1	PS O 2	PS O 3	PS O 4
CO 1	1	2	--	--	--	--	--	--	--	--	--	--	1	--	--	--
CO 2	1	--	--	2	--	--	--	--	--	--	--	--	1	--	--	3
CO 3	--	--	1	--	3	--	--	--	--	--	--	--	3	1	--	--
CO 4	2	1	2	--	3	--	--	--	--	--	--	--	1	--	--	

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RBE6803	MICROPROCESSOR AND INTERFACING	L	T	P	C
Version 2020.1	Date of Approval: JULY 2020	3	0	0	3
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

This course deals with the systematic study of the Architecture and programming issues of microprocessor family and its applications. The aim of this course is

1. To introduce students with the architecture and operation of typical microprocessors.
2. To familiarize the students with the programming and interfacing of microprocessors
3. To provide expertise in designing the embedded system based products as a solution to real time problems.

Course Outcomes

On completion of this course, the students will be able to

CO1. Explain the architecture, pin configuration, addressing modes, control words of various microprocessors and Interfacing ICs

CO2. Develop the assembly language program using 8085 and 8086 using stacks & subroutines, procedures, segments, interrupts and interfacing.

CO3. Analyze assembly language programs; select appropriate assemble into machine across assembler utility of a microprocessor and solve various automation based problems of power system.

CO4. Design circuitry to the Microprocessor I/O ports in order to interface the processor to external devices so as to provide solutions real-world control problems

Modules	Blooms level*	Number of hours
Module I: Microprocessor Intel 8085 - Introduction, register structure, memory Addressing, Addressing Modes, Instruction Set, Timing Methods, CPU Pins and Associated Signals, Instruction timing and execution. programming I/O. Interrupt System, DMA, SID & SOD lines, Instruction set, 8085 based system design.	L1, L2, L3, L4	8
Module II: Intel 8086 Introduction, Architecture, Addressing modes, instruction set, memory management, assembler dependent instructions, Input/Output, system design using 8086.	L2, L3, L4	7
Module III: Pentium Processors Internal Architecture of 8087, operational overview of 8087, Introduction to 80186, 80286, 80386 & 80486 processors and Pentium Processors.	L2, L3	6
Module IV: Peripheral Interfacing Parallel versus serial transmission, synchronous and asynchronous serial data transmission. Interfacing of hexadecimal keyboard and display unit, interfacing of cassette recorders and parallel, serial interface standards. Study of Peripheral Devices 8255, 8253, 8257, 8251, 8259	L3, L4, L5, L6	7
Module V: Microprocessor applications to Power Engineering Protective Relaying: over-current, impedance, MHO, reactance, bi-directional relays. Measurements: Frequency, power angle & power factor, Voltage and	L4, L5, L6	8

Current, KVA, KW, & KVAR, maximum demand. Resistance, Reactance, Temperature Controls.		
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**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

- Douglas Hall, Microprocessor and Interfacing:, Tata McGraw Hill, 2017
- Gaonkar R. S , Microprocessor Architecture, Programming and Applications, Wiley

Reference Books

- Yu Cheng Liu & Glen A. Gibson, Microcomputer Systems: 8086/8088 family Architecture, Programming and Design, PHI Publication, 2016.
- Ram B., Fundamentals of Microprocessors and Microcomputers, Dhanpat Rai & Sons, 2017

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	2	--	--	--	--	--	--	--	--	--	--	1			
CO2	1	1	2	3	--	--	--	--	--	--	--	--	1	2		
CO3	-	-	-	1	2	3	--	--	--	--	--	--		1	2	
CO4	-	-	-	1	--	2	--	--	2	3	3	--		2	1	3

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RBE6804	KINEMATICS AND DYNAMICS OF ROBOTS	L	T	P	C
Version 2020.1	Date of Approval: JULY 2020	3	0	0	3
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

This course deals with the systematic study of the Architecture and programming issues of robotic moments and design. The aim of this course is

1. To introduce students with the architecture and operation of robots.
2. To familiarize the students with the programming and interfacing of Robots
3. To provide expertise in designing the embedded system and kinematics of a robot based on real time problems.

Course Outcomes

On completion of this course, the students will be able to

CO1. Explain the architecture, kinematic analysis for axis in Robot Design.

CO2. Understand the Workspace, Analysis And trajectory planning

CO3. Understand the Dynamic Moments and Mathematical modeling of various forces in Moments of robotic machine

CO4. Design a robot with understanding of dynamic kinematics.

Modules	Blooms level*	Number of hours
Module I: Introduction Introduction, position and orientation of objects, objects coordinate frame Rotation matrix, Euler angles Roll, pitch and yaw angles coordinate Transformations, Joint variables and position of end effectors, Dot and cross products, coordinate frames, Rotations, Homogeneous coordinates	L1, L2, L3, L4	7
Module II: Direct Kinematics Link coordinates D-H Representation, The ARM equation. Direct kinematic analysis for Four axis, SCARA Robot and three, five and six axis Articulated Robots.	L2, L3, L4	6
Module III: Inverse Kinematics The inverse kinematics problem, General properties of solutions. Tool configuration, Inverse kinematics of four axis SCARA robot and three and five axis, Articulated robot.	L2, L3	6
Module IV: Workspace Analysis And Trajectory Planning Workspace Analysis, work envelope of a Four axis SCARA robot and five axis articulated robot workspace fixtures, the pick and place operations, Joint space technique - continuous path motion, Interpolated motion, straight line motion and Cartesian space technique in trajectory planning.	L3, L4, L5, L6	8
Module V: Manipulator Dynamics Introduction, Lagrange's equation kinetic and potential energy. Link inertia Tensor, link Jacobian Manipulator inertia tensor. Gravity, Generalized forces, Lagrange-Euler Dynamic model, Dynamic model of a Two-axis planar robot, Newton Euler formulation, Lagrange - Euler formulation, problems.	L4, L5, L6	9

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text & References:

1. Robert J. Schilling, Fundamentals of Robotics Analysis and Control, PHI Learning., 2009.
2. Richard D. Klafter, Thomas .A, Chri Elewski, Michael Negin, Robotics Engineering an Integrated Approach, Phi Learning., 2009.
3. P.A. Janaki Raman, Robotics and Image Processing An Introduction, Tata Mc Graw Hill Publishing company Ltd., 1995.
4. Francis N-Nagy Andras Siegler, Engineering foundation of Robotics, Prentice Hall Inc., 1987.
5. Bernard Hodges, Industrial Robotics, Second Edition, Jaico Publishing house, 1993.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO4
CO1	1	-	--	--	--	2	--	--	--	--	--	--	1			
CO2	1	1	-	-	2	--	--	3	--	--	--	--	1	2		
CO3	1	-	-	2	-	3	--	--	--	--	--	--		1	2	3
CO4	-	-	-	1	--	2	--	--	2	-	3	--		2	1	3

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RBE6806	FUNDAMENTAL OF ROBOTICS SYSTEM AND ROBOT PROGRAMMING LAB	L	T	P	C
Version 2020.1	Date of Approval: JULY 2020	0	0	2	1
Pre-requisites/Exposure					
Co-requisites	Nil				

Catalog Description

The objective of this course is to enlighten the students about the fundamentals of robotic systems. To understand the basics of robot, Robot Transformations and Sensors, Micro/Nano robotic systems and to program them for functioning.

Course Objectives

The objective of this course is to

1. Equip the students with the basic knowledge and designing of robotics.
2. Implement their concept in robotics and design robot for various applications of engineering.

Course Outcomes

On completion of this course, the students will be able to

CO1: Understand and be able to apply a variety of techniques to solve problems in areas such as robot control and navigation

CO2: program a robot to perform a specified task (e.g obstacle avoidance or wall following) in a target environment.

CO3: Understand how simulations of robots work, where they can be useful and where they can break down.

Modules	Blooms level*	Number of hours
Lab Session 1: Study of different types of robots based on configuration and application.	L1, L2 and L3	4
Lab Session 2: Study of different type of links and joints used in robots	L1, L2, L3 and L4	4
Lab Session 3: Study of components of robots with drive system and end effectors.	L1, L2, L3 and L4	4
Lab Session 4 Determination of maximum and minimum position of links.	L3 and L4	2
Lab Session 5 Verification of transformation (Position and orientation) with respect to gripper and world coordinate system	L3 and L4	4
Lab Session 6 Estimation of accuracy, repeatability and resolution.	L3 and L4	2
Lab Session 7 Robot programming exercises	L1, L2, L3 and L4	4

*Bloom's Level:

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text & References:**Text:-**

1. Craig, J. J. "Introduction to Robotics mechanics and control", Addison- Wesley, 1999.

References:-

1. S.R. Deb, Robotics Technology and flexible automation, Tata McGraw-Hill Education., 2009
2. Mikell P Groover & Nicholas G Odrey, Mitchel Weiss, Roger N Nagel, Ashish Dutta, Industrial Robotics, Technology programming and Applications, McGraw Hill, 2012
3. Richard D. Klafter, Thomas .A, Chri Elewski, Michael Negin, Robotics Engineering an Integrated Approach, Phi Learning.,
4. 2009.
5. Deb. S. R. "Robotics technology and flexible automation", Tata McGraw Hill publishing company limited, 1994
6. Mikell. P. Groover, "Industrial Robotics Technology", Programming and Applications, McGraw Hill Co, 1995.
7. Klafter. R.D, Chmielewski.T.A. and Noggin's., "Robot Engineering : An Integrated Approach", Prentice Hall of India Pvt. Ltd., 1994.

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	1	--	3	--	--	--	--	--	--	--	--	1	1	--	3
CO2	2	2	--	3	1	--	--	--	--	--	--	--	1	1	--	3
CO3	2	--	--	--	--	1	3	--	--	--	--	--	2	1	--	3

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RBE6807	ADVANCED CONTROL SYSTEMS & DRIVES FOR ROBOTS LAB	L	T	P	C
Version 2020.1	Date of Approval: JULY 2020	0	0	2	1
Pre-requisites/Exposure	Basic Concepts of Control Systems				
Co-requisites					

Catalog Description

This course is designed to get students an understanding of the basic concepts of control systems and its major applications. The course also includes some interdisciplinary applications like digital electronics and mechanical devices. Students will perform practical on hardware kit as well as on software.

Course Objectives

The objective of this course is to

1. Make students demonstrate the concepts of control systems.
2. Apply the concepts of control systems in various applications.

Course Outcomes

On completion of this course, the students will be able to

CO1. Practically verify the theoretical concepts of control systems.

CO2. Design various digital logic gates using programmable logic controller.

CO3. Analyse and explain the response of Process Control Simulator, Magnetic amplifier, Synchros, Servomotor and compensators.

Modules	Blooms level*	Number of hours
Lab Session 1 Determination of Transfer functions of an Electrical System	L3	1
Lab Session 2 Time Response Characteristics of a Second order System (Typical RLC network).	L3 and L4	1
Lab Session 3 Characteristics of Synchros: (a) Synchro transmitter characteristics. (b) Implementation of error detector using synchro pair	L3 and L4	2
Lab Session 4 Determination of Magnetic Amplifier Characteristics with different possible connections.	L3 and L4	2
Lab Session 5 Process Control Simulator: (a) To determine the time constant and transfer function of first order process. (b) To determine the time response of closed loop second order process with Proportional Control. (c) To determine the time response of closed loop second order process with Proportional Integral Control. (d) To determine the time response of closed loop second order process with Proportional Integral-Derivative Control. (e) To determine the effect of disturbances on a process.	L3 and L4	6
Lab Session 6 To study the compensation of the second order process by using: (a) Lead Compensator. (b) Lag Compensator. (c) Lead- Lag Compensator	L3 and L4	2
Lab Session 7	L3 and	2

Realization of AND, OR, NOT gates, other derived gates and ladder logic on Programmable Logic Controller with computer interfacing.	L5	
Lab Session 8 To determination of AC servomotor Characteristics	L3 and L4	2
Lab Session 9 To study the position control of DC servomotor with P, PI control actions.	L3	2
Lab Session 10 Analog Computer: (a) To examine the operation of potentiometer and adder. (b) To examine the operation of integrator	L3	2
Lab Session 11 To solve a second order differential equation.	L3	2

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. M. Gopal, Digital Control and State Variable Methods, 4th edition, Tata Mc-Graw-Hill.
2. K.Ogata, Discrete Time Control Systems, Pearson Education, (Singapore) (Thomson Press India).
3. B.C Kuo, Digital Control Systems, Prentice Hall.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	--	--	--	2	--	--	--	--	--	--	2	1	--	-	-
CO2	1	-	3	--	2	--	--	--	--	--	--	2	1	3	--	-
CO3	1	-	2	--	2	--	--	--	--	--	--	2	1	3	--	3

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RBE6808	MICROPROCESSOR & INTERFACING LAB	L	T	P	C
Version 2020.1	Date of Approval: JULY 2020	0	0	2	1
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

This course deals with the systematic study of the Architecture and programming issues of microprocessor family and its applications. The aim of this course is to give the students detailed knowledge of the above microprocessor needed to develop the systems using.

Course Objectives

The objective of this course is to

1. To expose students to the operation of typical microprocessor trainer kit.
2. Learn the design aspects of I/O and Memory Interfacing circuits.
3. To provide solid foundation on interfacing the external devices to the processor according to the user requirements to create novel products and solutions for the real time problems

Course Outcomes

On completion of this course, the students will be able to

CO1: Developing of assembly level programs and providing the basics of the processors

CO2: write programs like ASCII conversion, searching and sorting elements, reverse given string and compute nCr .

CO3: Understand the concepts related to I/O and memory interfacing

Modules	Blooms level*	Number of hours
Lab Session 1: To load the numbers 49H and 53H in memory location 9510 & 9511.	L3 and L4	2
Lab Session 2: Respectively and add the contents of memory location 9601.	L3 and L4	2
Lab Session 3: To write the Assembly Language Programming for 8 bit addition with and without carry.	L3 and L4	2
Lab Session 4 To write the Assembly Language Programming for 8 bit subtraction with and without borrow.	L1, L2, and L3	2
Lab Session 5 To write the Assembly Language Programming for 8 bit Multiplication and Division.	L1, L2, and L3	2
Lab Session 6 To write the Assembly Language Programming for sorting an array of numbers in Ascending & Decending order.	L3 and L4	2
Lab Session 7 To write the Assembly Language Programming with Additional Instructions.	L3 and L4	2
Lab Session 8 To write and execute a program using Stacks.	L3 and L4	2

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Lab Session 9 To study and program the programmable Peripheral interface (8255 board).	L1, L2 and L3	2
Lab Session 10 To study and program the programmable interval timer (8253 board).	L1, L2, L3 and L4	2
Lab Session 11 To study and program the programmable DMA Controller (8257 board).	L1, L2, L3 and L4	2
Lab Session 12 i) To study and program the programmable Interrupt Controller (8259 board). ii) To study of programmable Serial Communication interface (8251 board).	L1, L2, L3 and L4	2

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text & References:

1. Rafiquzzaman, M. Theory & Applications PHI Publications 1993.
2. Gaonkar R. S. Microprocessor Architecture, Programming and Applications John Wiley 1989.
3. Ram B. Fundamentals of Microprocessors and Microcomputers, Dhanpat Rai & Sons 1995.
4. Liu Yu Cheng and Gibson, G.A. PHI 1992.
5. Leventhal, L.A. Introduction to Microprocessors: Software, Hardware, Programming.

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	2	3	2	2	--	1	--		--	--	--	--	1		--	--
CO2	1	1	1	2	--	--	--	2	--	--	--	3	1	2	--	--
CO3	1	2	2	3	--	--	-	--	--	--	--	--		2	1	3



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RBE6809	DIGITAL IMAGE PROCESSING	L	T	P	C
Version: 2020.1	Date of Approval: JULY 2020	2	0	0	2
Pre-requisites/Exposure	Basics of Computer Graphics				
Co-requisites	NIL				

Catalog Description

This course gives students an insight into the basics of Image Processing along with visualization of real concept of Image processing. Concepts covered would enable students to define and differentiate among various types of image refinement. Further they would be able to gain insights about various Image restoration and modification technique.

Course Objectives

Processing color and grayscale images or other two-dimensional signals has become an important tool for research and investigation in many areas of science and engineering. Digital Image Processing is designed to give professionals and students a powerful collection of fundamental and advanced image processing tools on the desktop. Digital Image Processing takes full advantage of the computational technology of Mathematica.

Course Outcomes

On completion of this course, the students will be able to

CO1: Define and explain introductory part of Digital Image Processing

CO2: List out the Image Enhancement techniques in the Spatial Domain

CO3: Explain concepts of Image Enhancement in the Frequency Domain

CO4: Describe the architecture Image Compression

CO5: Explain the basics of Representation and Description

Modules	Blooms level*	Number of hours
MODULE 1: Introduction and Digital Image Fundamentals The origins of Digital Image Processing, Examples of Fields that Use Digital Image Processing, Fundamentals Steps in Image Processing, Elements of Digital Image Processing Systems, Image Sampling and Quantization, Some basic relationships like Neighbors, Connectivity, Distance Measures between pixels, Linear and Non Linear Operations.	L1 and L2	8
MODULE 2: Image Enhancement in the Spatial Domain Some basic Gray Level Transformations, Histogram Processing, Enhancement Using Arithmetic and Logic operations, Basics of Spatial Filters, Smoothing and Sharpening Spatial Filters, Combining Spatial Enhancement Methods.	L2 and L3	8
MODULE 3: Image Enhancement in the Frequency Domain Introduction to Fourier Transform and the frequency Domain, Smoothing and Sharpening Frequency Domain Filters, Homomorphism Filtering.	L1 and L2	10
MODULE 4: Image Compression	L2 and L3	12

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Coding, Interpixel and Psychovisual Redundancy, Image Compression models, Elements of Information Theory, Error free comparison, Lossy compression, Image compression standards. Image Segmentation Detection of Discontinuities, Edge linking and boundary detection, Threshold, Region Oriented Segmentation, Motion based segmentation.		
MODULE 5: Representation and Description Representation, Boundary Descriptors, Regional Descriptors, Use of Principal Components for Description, Introduction to Morphology, Some basic Morphological Algorithms. Object Recognition Patterns and Pattern Classes, Decision-Theoretic Methods, Structural Methods.	L2 and L3	10

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

Text:

- Rafael C. Gonzalez & Richard E. Woods, "Digital Image Processing", 2nd edition, Pearson Education.
- A. K. Jain, "Fundamental of Digital Image Processing", PHI.

References:

- Rosefield Kak, "Digital Picture Processing",
- W.K. Pratt, "Digital Image Processing",

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

A: Attendance, CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO 3	PSO 4
CO 1	1	2	--	--	--	--	--	--	--	--	--	--	1	--	--	--
CO 2	1	--	2	--	--	--	--	--	--	--	--	--	1	2	--	--
CO 3	3	--	1	--	2	--	--	--	--	--	--	--	1	3	2	--
CO 4	3	--	2	--	1	--	--	--	--	--	--	--	1	--	2	--
CO 5	3	--	2	--	1	--	--	--	--	--	--	--	1	--	2	--

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RBE6810	DIGITAL IMAGE PROCESSING LAB	L	T	P	C
Version 2020.1	Date of Approval: JULY 2020	0	0	2	1
Pre-requisites/Exposure	Basics of MATLAB				
Co-requisites	NIL				

Catalog Description

In this Lab course first student should learn about advanced level of software used for easy calculation and toolbox used for software like MATLAB.

Course Objectives

The objective of this course is to

1. Make the students apply knowledge of various Image processing & pattern recognition required for solving complex problems.
2. Provide a demonstration of different types of image processing techniques through MATAB toolbox.

Course Outcomes

On completion of this course, the students will be able to

CO1: Acquiring knowledge of Basics of High-end calculation software and need in Computer Science & engineering

CO2: Demonstrate the All preliminary functions in MATLAB

CO3: Apply the knowledge of all the basics function and toolbox knowledge of MATLAB

CO4: Demonstrate the Use of MATLAB in image Processing

CO5: Demonstrate usage of applications involving with Image processing & Recognition Its Toolbox used by MATLAB

Modules/Topics Covered**	Blooms level*	Number of hours
1. Introduction of MATLAB (e) Basic Variable deceleration & its operation (f) Function use & its application	L3, L5	4
2. Sample Programs in MATLAB (e) Basic use of Matrix and Graph Plotting (f) Different type of graph plotting with use of different -2 type of data	L3, L5	6
3. Sample Programs using MATLAB functions (l) Create a basic program MATLAB using functions (m) Use of basic function Image processing (n) Practice on Basic function of Image processing tool box.	L3, L5	6
4. Sample programs of ANN functions (c) Practice on Pattern Recognition functions in MATLAB (d) Write a program for training a small network in MATLAB	L3, L5	6
5. Sample Programs using ANN toolbox & Image processing toolbox (b) Demonstrate the use of ANN tool box & Image processing toolbox and write a program after combining it.	L3, L5	2

*Bloom's Level:

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

** Sample Programs provided are not limited to these only, can include others as desired.

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Text Books**Text & References:**

- Rafael C. Gonzalez & Richard E. Woods, "Image Processing Using MATLAB", 2nd edition, Pearson Education.
- "Pattern classifications", Richard O. Duda, Peter E. Hart, David G. Stork. Wiley student edition, Second Edition

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination**Examination Scheme:**

IA					EE
Components	A	PR	LR	V	70
Weightage (%)	5	10	10	5	

Note: IA –Internal Assessment, A – Attendance, PR – Performance, LR – Lab Record, V – Viva, EE- External Exam

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	2	1	--	--	--	--	--	--	--	--	--	--	2	--	--	--
CO2	3	1	--	--	--	--	--	--	--	--	--	--	1	2	--	--
CO3	2	1	2	--	--	--	--	--	--	--	--	--	1	2	--	--
CO4	1	3	2	--	--	--	--	--	--	--	--	--	2	--	2	--
CO5	1	3	--	--	--	--	--	--	--	--	--	--	1	--	--	--

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RBE6811	DOT NET PROGRAMMING	L	T	P	C
Version:2020.1	Date of Approval: JULY 2020	3	0	0	3
Pre-requisites/Exposure	C#.NET, HTML and CSS				
Co-requisites	Nil				

Catalog Description

This course provides knowledge regarding Creating Dynamic Web Pages with the help of ASP.NET framework. Various topics

Course Objectives

The objective of this course is to

1. Equip the students with concepts of ASP.NET web applications including State management, Web Controls and ADO.NET.
2. Provide knowledge to develop secure ASP.NET web applications using C#.NET programming language.

Course Outcomes

On completion of this course, the students will be able to

CO1: Explain the components of .NET framework and create basic ASP.NET web page.

CO2: Use various standard and advance web controls for developing ASP.NET dynamic web pages and also create custom controls.

CO3: Establish database connectivity and perform various operations on database through ASP.NET web pages.

CO4: Maintain states at client and server site both.

CO5: Develop and use web services.

Modules	Blooms level*	Number of hours
MODULE 1: .NET FRAMEWORK .NET Framework and its features CLR, MSIL,CTS, .NET class library, .NET Languages, CTS, assemblies, manifest, and metadata, What is ASP.NET?, Difference between ASP and ASP.NET	L1, L2	4
MODULE 2: WEB CONTROLS Standard Controls, Validation controls, Adv. Controls, Custom Controls	L2, L3 and L4	14
MODULE 3: ADO.NET ADO.NET,ADO.NET Architecture Data Adapters, Datasets, Command, Data Reader Data Reader Data bind Controls Displaying data in data grid XML in ADO.NET	L2, L3 and L4	7
MODULE 4: SECURITY ASP.NET applications : Security, Error Handling	L2 and L3	2
MODULE 5: STATE MANAGEMENT State Management : View State, Session State, Web Services	L2, L3 and L4	5

*Bloom's Level:

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

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Text Books

1. Stephen Walther, ASP.NET Unleashed, SAMS Publication
2. Matthew MacDonald, Beginning with ASP.NET 4.5 in C#, Apress Publications

Reference Books

1. Imar Spaanjaars, Beginning with ASP.NET 4.5.1 in C# and VB, Worx Publication
2. Jesse Liberty, Dan Hurwitz, Programming ASP.NET, O'Reilly.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;

Att: Attendance

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	3	--	--	--	--	--	--	--	--	--	--	--	2	3	--	--
CO2	2	2	1	2	1	--	--	--	--	--	--	--	2	2	3	--
CO3	2	2	1	2	2	--	--	--	--	--	--	--	2	2	3	--
CO4	2	1	1	2	1	--	--	--	--	--	--	--	2	2	2	--
CO5	2	1	1	2	2	--	--	--	--	--	--	--	2	2	2	--

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RBE6812	DOT NET PROGRAMMING LAB	L	T	P	C
Version 2020.1	Date of Approval: JULY 2020	0	0	1	1
Pre-requisites/Exposure	C#.NET, HTML and CSS				
Co-requisites	Nil				

Catalog Description

This lab course covers development of Web applications using ASP.NET. The concepts are designed to impart the knowledge of ASP.NET framework concepts at implementation level. The major topic covered includes theme, state management, web controls and database connectivity using ADO.NET and web services.

Course Objectives

The objective of this course is to

1. Equip the students with concepts of ASP.NET web applications including State management, Web Controls and ADO.NET.
2. Provide knowledge to develop secure ASP.NET web applications using C#.NET programming language.

Course Outcomes

On completion of this course, the students will be able to

CO1: Use various standard and advance web controls for developing ASP.NET dynamic web pages and also create custom controls.

CO2: Maintain states at client and server site both.

CO3: Establish database connectivity and perform various operations on database through ASP.NET web pages.

CO4: Develop and use web services.

Modules	Blooms level*	Number of hours
1. Basics of ASP.NET Page a) Write a program to implement C#.NET class with properties and methods. b) Design a Login Page, which displays a Welcome Page on successful Login and an error message in case of invalid Id/Password. c) Design a form and apply themes (design time and dynamically).	L1, L2	4
2. State Management a) Implement state management for Login page which move to welcome page when credentials are correct. The welcome page displays a welcome message along with the user Id. b) Implement various state management methods using a suitable web form.		2
3. Built-in Controls, Custom Controls a) Design any web form and apply various validation controls. b) Create a web form which can work in Hindi and English language both. c) Design a web form to upload an image to server. d) Design a custom control, Numeric Textbox, which should accept only integer value for a particular range. The range should be customizable.	L2, L3 and L4	6
4. ADO.NET a) Create any database table and apply basic operations (Insert/Delete/Update) on it using ASP.NET application. b) Implement various methods of execution of SQL command. c) Display data in a Grid and perform basic database operations.	L2, L3 and L4	4

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5. Security, Web Services a) Develop any web application to illustrate SQL Injection attack and redesign it to prevent the attack. b) Develop a web application to illustrate XSS attack and redesign it to prevent the attack	L2 and L3	2
6. Web Application Create a small web application having some application.	L2, L3 and L4	6

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. Stephen Walther, ASP.NET Unleashed, SAMS Publication
2. Matthew MacDonald, Beginning with ASP.NET 4.5 in C#, Apress Publications

Reference Books

1. Imar Spaanjaars, Beginning with ASP.NET 4.5.1 in C# and VB, Worx Publication
2. Jesse Liberty, Dan Hurwitz, Programming ASP.NET, O'Reilly.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO 3	PSO 4
CO 1	2	1	--	--	--	--	--	--	--	--	--	--	2	2	2	--
CO 2	2	1	--	--	--	--	--	--	--	--	--	--	2	2	2	--
CO 3	1	1	--	--	--	--	--	--	--	--	--	--	2	1	1	--
CO 4	1	1	--	--	--	--	--	--	--	--	--	--	2	1	1	--

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RBE6813	ADVANCED ROBOTIC PROCESS AUTOMATION DESIGN & DEVELOPMENT	L	T	P	C
Version 2020.1	Date of Approval: JULY 2020	3	0	0	3
Pre-requisites/Exposure	Basic Networking Concepts				
Co-requisites	Nil				

Catalog Description

This course aims at providing knowledge of basic concepts of Robotic Process Automation to University students. It further builds on these concepts and introduces key RPA Design and Development strategies and methodologies specifically in context of UiPath products. The student undergoing the course shall develop the competence to design and develop a robot for a defined process.

Course Objectives

The objective of this course is to

1. Equip the students with concepts of robotic process automation
2. Provide an overview of designing with uipath software.

Course Outcomes

On completion of this course, the students will be able to

CO1: Explain key terms and trends around the robotic process automation along with its physical and logical design

CO2: Understand the potential and value of the robotic process automation.

CO3: Describe the technologies used for the robotic process automation and mobile devices, including (passive and active) sensors, the physical communications layer, communications protocols, programming frameworks.

CO4: Design programs and have hands on experience on uipath software

CO5: Develop RPA programs of moderate complexity for a well-used robotic automation process using uipath.

Modules	Blooms level*	Number of hours
Module 1: Exception handling and Best Practices Debugging and Exception Handling- Debugging Tools, Strategies for solving issues, Catching errors. Project Organization- Concept of project organization, Best practices, Avoiding pitfalls, Invoke Activity.	L1, L2	8
Module II: Introduction to Orchestrator Orchestrator, Tenants, Authentication, Users, Roles, Robots, Environments, Queues & Transactions, Schedules.	L2, L3 and L4	8
Module III: merging and Future Trends in IT Artificial Intelligence, Machine Learning, Agent awareness, Natural Language Processing Computer Vision	L2, L3 and L4	8
Module IV: Capstone Project Real life case studies which can be used to apply the concepts learnt during the course. The projects shall test student's skills right from process transformation and documentation to the design and development of the actual robot	L2, L3 and L4	12

*Bloom's Level:

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

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Text Books

- "Learning Robotic Process Automation" By Alok Mani Tripathi, Packt Publications, 1st Edition, 2018

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

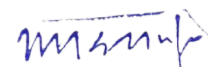
CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	--	--	3	--	--	--	--	--	--	2	--	1	1	-	-
CO2	1	--	1	2	--	--	--	--	--	--	--	--	-	1	-	-
CO3	1	--	1	2	--	--	--	--	--	--	--	--	-	1	-	2
CO4	1	--	--	2	--	--	--	--	--	--	--	--	1	1	-	2

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MLE6802	DATA MINING AND PREDICTIVE ANALYSIS	L	T	P	C
Version 2020.1	Date of Approval: JULY 2020	3	0	0	3
Pre-requisites/Exposure	Concept of Database and Data Mining				
Co-requisites					

Course Objectives

The objective of this course is to

- Provide students with an in-depth knowledge of data mining. To introduce students to basic applications, concepts, and techniques of data mining.
- Develop skills for using recent data mining software to solve practical problems and prediction in a variety of disciplines and
- Gain experience doing independent study and research.

Course Outcomes

On completion of this course, the students will be able to

CO 1: Explain concepts of Data mining, predictive analytics and analyses architecture of data mining. Differentiate between supervised and unsupervised methods

CO 2: Apply classification techniques on different data sets and solve cost –benefit analysis numerical. Analyze decision tree methods.

CO 3: Implement various clustering algorithm on different data sets and describe these algorithms.

CO 4: Prepare data representation for market basket analysis and determine the usefulness of association rules. Interpret supervised and unsupervised learning methods.

CO 5: Predict market trends and outline different factors associated mail marketing.

Catalog Description

Data Mining and Predictive analytics serve as one of the most important courses for postgraduate students, since it builds computational abilities, inferential thinking, and practical skills for tackling core data scientific challenges. The students will get a comprehensive understanding of different data mining techniques that can be used for prediction and for discovering patterns, be prepared to select the right technique for a given data problem and will be able to create a general-purpose analytic process.

Course Content

Modules	Bloom's level	Number of Hours
Module I Data Preparation An introduction to data mining and predictive analytics, Data Pre-processing Exploratory Data Analysis, Dimension- Reduction Methods.	L1, L2	8
Module II Classification k- Nearest Neighbour Algorithm, Decision Trees, Model Evaluation Technique, Cost –Benefit Analysis Using Data Driven Cost.	L1, L2, L3	7
Module III Clustering Hierarchical and k- Means Clustering, Kohonen Networks, Birch Clustering, Measuring Cluster Goodness.	L1, L2, L3	8

Module IV Association Rules Affinity Analysis and Market Basket Analysis, Data Representation for Market Basket Analysis, Support, Confidence, Frequent Item sets, and the a Priori Property, How Does a Priori Algorithm Work? Generating Frequent Item sets, Generating Association Rules, Extension from Flag Data to General Categorical Data, Information-Theoretic Approach: Generalized Rule Induction Method, J-Measure, Association Rules are Easy to do Badly, how can we Measure the Usefulness of Association Rules? Do Association Rules Represent Supervised or Unsupervised Learning?	L1, L2, L3	9
Module IV Case Study: Predicting Response to Direct Mail Marketing Business Understanding, Data Preparation, and Eda, Clustering and Principal Components Analysis, Modelling and Evaluation for Performance and Interpretability, Modelling and Evaluation for High Performance.	L2, L3, L4, L5	8

***Bloom's Level:**

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

1. Daniel T. Larose, Chantal D. Larose, "Data Mining and Predictive Analytics", John Wiley & Sons, Inc., Hoboken, New Jersey, 2015.
2. Jiawei Han and Micheline Kamber, "Data mining: concepts and techniques", Morgan Kaufmann, Second Edition, 2006.

Reference Books

1. Alex Berson, Data Warehousing, Data Mining, and Olap, Tata McGraw Hill.
2. Markus Hofmann, Ralf Klinkenberg, "Rapid-Miner: Data Mining Use Cases and Business Analytics Applications", Chapman and Hall/CRC, 2016.
3. George M Marakas, Modern Data Warehousing, Mining & Visualization Core Concepts, Pearson Education.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	2	--	--	--	--	--	--	--	--	--	--	3	--	--	--
CO2	1	1	2	--	--	--	--	--	--	--	--	--	--	--	3	--
CO3	1	2	3	3	3	--	--	--	--	--	--	--	3	--	--	--
CO4	1	1	2	--	--	3	--	--	--	--	--	3	--	2	--	--
CO5	1	1	2	--	--	2	--	--	--	--	--	-3	1	--	--	--

1: strongly related, 2: moderately related and 3: weakly related

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MLE6803	DATA WAREHOUSING AND MULTIDIMENSIONAL MODELING	L	T	P	C
Version 2020.1	Date of Approval: JULY 2020	3	0	0	3
Pre-requisites/Exposure	Basic Knowledge of Database				
Co-requisites	Nil				

Catalog Description

In this course the concepts of basic concepts of Multi-dimensional database are discussed in detail. As a precursor to the study of the course it provide an in depth understanding of basic concepts of data warehouse which includes its architecture, data warehouse operations, data marts, metadata. The concept further enhances the understanding of advance concepts that cover the slowly and rapidly changing dimensions, indexes in OLAP and concept hierarchies. It also include the different application of data warehouse

Course Objectives

The objective of this course is to

1. Equip the students with concepts of Multi-dimensional database, its need and various applications.
2. It provides an overview of some basic concepts in data warehouse such as its architecture, OLAP applications, and metadata. It also includes some advance concepts such as OLAP hierarchies, OLAP changing dimensions.

3. Course Outcomes

On completion of this course, the students will be able to

CO1: Explain the concept of Multi-dimensional database and its importance.

CO2: Analyse the fundamental concept of data warehouse which include OLAP operations, architecture.

CO 3: Explain the different types of dimensions that exist in data warehouse.

CO4: Explain the advance concepts of data warehouse which include OLAP indexing.

Modules	Blooms level*	Number of hours
MODULE 1: Introduction: Multidimensional Data Management, Multidimensional History, Related Terminology	L1 and L2	8
MODULE 2: Fundamental Concepts : Cubes ,Dimensions, Facts, Measures, Relational Representations, Star Schemas, Snowflake Schemas, Data Warehouses And Data Marts, Multidimensional Modelling Process, Analysis And Querying ,Roll Up, Drill Down, Drill Out, Slicing And Dicing, Drill Across, Pivot Tables, Ranking, Multi-Dimensional Querying in MDX and SQL, Graphical Querying and Visualizations .	L1, L2 and L3	8
MODULE 3: Advance Concepts Slowly Changing Dimensions, The Problem, Solutions, Other Special Kinds Of Dimensions, Mini dimensions, Outriggers, Degenerate Dimensions, Junk Dimensions, Time Dimensions, Data Quality Dimensions, Advanced Hierarchies, Parent-Child Hierarchies, Unbalanced Hierarchies, Non Covering Hierarchies , Non –Strict Hierarchies, Multiple Hierarchies And Parallel Hierarchies.	L2, L3 and L4	10

MODULE 4: Module IV: Implementation Issues Materialized Views, Indexing, Indexing Overview, Bitmap Indices, Join Indices, Query Processing, OLAP Implementations, Extract-Transform-Load.	L3, L4 and L5	10
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**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books:

1. Jiawei Han & Micheline Kamber, "Data Mining Concepts And Techniques", 3rd Edition, Morgan Kaufmann Publication, An Imprint of Elsevier, 2015.
2. Vipin Kumar, Pang Ning "Introduction to Data Mining", 3rd Edition, Pearson Publication, Chennai, 2016.
3. Mohammed, Wagner "Data Mining and Analysis", 4th Edition, Cambridge University Press, Brazil, 2018.

Reference Books:

1. Daneil, D. Larose "Data Mining and Predictive Analytics", 2nd Edition, John Wiley and Sons, Canada, 2015.
2. Paulraj "Data Warehousing Fundamental for IT Professional", 2nd Edition, John Wiley and Sons, Canada, 2010.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS O 1	PS O 2	PS O 3	PS O 4
CO 1	1	2	3	--	--	--	-	--	--	--	--	--	-	--	-	-
CO 2	1	--	2	-	--	--	--	--	--	--	--	--	-	--	--	--
CO 3	1	2	2	--	--	--	--	--	--	--	--	--	--	--	--	--
CO 4	1	1	2	--	--	--	3	--	--	--	--	--	--	--	--	--

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MLE6808	R PROGRAMMING Lab	L	T	P	C
Version 2020.1	Date of Approval: JULY 2020	0	0	4	2
Pre-requisites/Exposure	Basic knowledge of statistics				
Co-requisites	Nil				

Catalog Description

This lab will provide a basic introduction to the R programming Language and the use of R to perform basic statistics and programming tasks. The main objectives of this lab is to impart the students with the knowledge of R Programming, Machine Learning using R Mining from streaming Data, Mining from Distributed Data.

Course Objectives

The objective of this course is

1. To make students familiar with R Programming Language and its concepts.
2. Equip the students with knowledge of R Programming, Machine Learning using R Mining from streaming Data, Mining from Distributed Data.

Course Outcomes

On completion of this course, the students will be able to

CO1. Install and configure R Studio and R packages.

CO2. Explain concepts of Structured Data, data types, data structures and Use R for mathematical operations

CO3. Describe the use of R functions, control statements, Loop constructs and apply to iterate functions across data.

CO4. Understand basic regular expressions graphics. Use of R for descriptive statistics and inferential statistics

CO5. Predict/Score new data using models, understand basic non-linear functions in models and how to link data, statistical methods.

Modules	Blooms level*	Number of hours
Lab Session 1 Installation & Configuration steps of R Studio. <ul style="list-style-type: none"> • use of the R interactive environment • Expand R by installing R packages • Explore and understand how to use the R documentation. 	L1 and L2	2
Lab Session 2-3 Read Structured Data into R from various sources <ul style="list-style-type: none"> • Understand the different data types in R • Understand the different data structures in R • Understand how to use dates in R • Use R for mathematical operations 	L1and L3	4
Lab Session 4-5 <ul style="list-style-type: none"> • Use of vectorised calculations • Write user-defined R functions • Use control statements • Write Loop constructs in R 	L1 and L3	4

<ul style="list-style-type: none"> Use Apply to iterate functions across data 		
Lab Session 6-8 Reshape data to support different analyses <ul style="list-style-type: none"> Understand split-apply-combine (group-wise operations) in R Deal with missing data Manipulate strings in R Understand basic regular expressions in R Understand base R graphics 	L1 and L3	6
Lab Session 9-10 Focus on GGplot2 graphics for R <ul style="list-style-type: none"> Be familiar with trellis (lattice) graphics Use R for descriptive statistics Use R for inferential statistics Write multivariate models in R 	L1 and L3	4
Lab Session 11-12 <ul style="list-style-type: none"> Understand confounding and adjustment in multivariate models Understand interaction in multivariate models Predict/Score new data using models Understand basic non-linear functions in models Understand how to link data, statistical methods, and actionable questions 	L1 and L3	6

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

- Torsten Hothorn and Brian S. Everitt, "A Handbook of Statistical Analyses Using R", Chapman and Hall/CRC, 2006.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	2	--	--	3	--	--	--	--	--	--	--	--	1	1	-
CO2	1	-	--	--	2	--	--	--	--	--	--	2	--	1	1	-
CO3	1	-	1	--	--	--	--	--	--	--	--	2	--	1	1	-
CO4	1	-	2	--	--	--	--	--	--	--	--	--	--	1	1	--
CO5	1	-	2	--	--	--	--	--	--	--	--	--	--	1	--	-

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MLE6804	BIG DATA TECHNOLOGIES	L	T	P	C
Version 2020	Date of Approval: JULY 2020	3	0	0	3
Pre-requisites/Exposure	Basics of DBMS and SQL				
Co-requisites	Nil				

Catalog Description

This course brings together several key big data technologies used for storage, analysis and manipulation of data. It also introduces the students the key concepts of Hadoop framework, MapReduce, Pig, Hive, and No-SQL. Students will learn to work on Hadoop platform. The concepts learnt will make students capable of working on big data projects easier.

Course Objectives

The objective of this course is

1. To make students familiar with big data technologies.
2. Provide an overview of Hadoop architecture and its working with other open source technologies.

Course Outcomes

On completion of this course, the students will be able to

- CO1. Explain importance and applications of Big Data Analytics.
- CO2. Differentiate among analytics technologies.
- CO3. Demonstrate architecture of Hadoop and Mapreduce framework.
- CO4. Illustrate Hadoop installation process and commands.
- CO5. Introduce concepts of Hive and Pig.

Modules	Blooms level*	Number of hours
Module I: Introduction to Big Data Big Data and its Importance – Four V's of Big Data – Drivers for Big Data – Introduction to Big Data Analytics – Big Data Analytics applications.	L1 and L2	5
Module II: Big Data Technologies Hadoop's Parallel World – Data discovery – Open source technology for Big Data Analytics – cloud and Big Data – Predictive Analytics – Mobile Business Intelligence and Big Data – Crowd Sourcing Analytics – Inter- and Trans-Firewall Analytics - Information Management.	L2 and L5	4
Module III: Processing Big Data Integrating disparate data stores - Mapping data to the programming framework - Connecting and extracting data from storage - Transforming data for processing - Subdividing data in preparation for Hadoop Map Reduce.	L1 and L3	8
Module IV: Hadoop Map Reduce Employing Hadoop Map Reduce - Creating the components of Hadoop Map Reduce jobs - Distributing data processing across server farms –Executing Hadoop Map Reduce jobs - Monitoring the progress of job flows - The Building Blocks of Hadoop Map Reduce - Distinguishing Hadoop daemons - Investigating the Hadoop Distributed File System Selecting appropriate execution modes: local, pseudo-distributed, fully distributed.	L2, L3 and L4	9
Module V Big Data Tools and Techniques Installing and Running Pig – Comparison with Databases – Pig Latin – User-Define Functions – Data Processing Operators – Installing and Running Hive	L2 and L3	10

– Hive QL – Tables – Querying Data – User- Defined Functions – Oracle Big Data.		
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**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. Michael Minelli, Michehe Chambers, Ambiga Dhiraj, "Big Data, Big Analytics: Emerging Business Intelligence and Analytic Trends for Today's Business", 1st Edition, Wiley CIO Series, 2013.
2. Tom White, "Hadoop: The Definitive Guide", 3rd Edition, O'reilly, 2012.
3. Arvind Sathi, "Big Data Analytics: Disruptive Technologies for Changing the Game", 1st Edition, IBM Corporation, 2012.
4. Bill Franks, "Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with Advanced Analytics", 1st Edition, Wiley and SAS Business Series, 2012.

Reference Books

1. Anil Maheshwari, "Big Data", McGraw Hill
2. Mayank Bhushan, "Big Data and Hadoop- Learn by Example", BPB Publications

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	--	2	--	--	--	--	--	--	--	--	--	1	--	2	-
CO2	1	2	--	3	3	--	--	--	--	--	--	--	1	--	2	-
CO3	1	--	1	2	--	--	--	--	--	--	--	--	1	--	2	-
CO4	1	1	2	--	--	2	--	--	--	--	3	--	-	--	1	3
CO5	1	--	1	--	1	3	--	--	--	--	3	--	1	-	-	-

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MLE6806	DATA MINING AND PREDICTIVE ANALYTICS LAB	L	T	P	C
Version 2020.1	Date of Approval: JULY 2020	0	0	2	1
Pre-requisites/Exposure	Basic knowledge of Database				
Co-requisites	NIL				

Catalog Description

Data Mining and Predictive analytics serve as one of the most important courses for postgraduate students, since it builds computational abilities, inferential thinking, and practical skills for tackling core data scientific challenges. The students will get a comprehensive understanding of different data mining techniques that can be used for prediction and for discovering patterns, be prepared to select the right technique for a given data problem and will be able to create a general-purpose analytic process.

Course Objectives

The objective of this course is to

- Provide students with an in-depth knowledge of data mining. To introduce students to basic applications, concepts, and techniques of data mining.
- Develop skills for using recent data mining software to solve practical problems and prediction in a variety of disciplines and
- Gain experience doing independent study and research.

Course Outcomes

On completion of this course, the students will be able to

CO 1: Explain concepts of Data mining, predictive analytics and analyses architecture of data mining. Differentiate between supervised and unsupervised methods

CO 2: Apply classification techniques on different data sets and solve cost –benefit analysis numerical. Analyze decision tree methods.

CO 3: Implement various clustering algorithm on different data sets and describe these algorithms.

CO 4: Prepare data representation for market basket analysis and determine the usefulness of association rules. Interpret supervised and unsupervised learning methods.

CO 5: Predict market trends and outline different factors associated mail marketing.

Modules/Topics Covered**	Blooms level*	Number of hours
1. To understand the basic features of Data Warehousing.	L1, L2	2
2. Explore WEKA Data Mining/Machine Learning Toolkit (a) Downloading and/or installation of WEKA data mining toolkit. (b) Understand the features of WEKA tool kit such as Explorer, Knowledge flow interface, Experimenter, command-line interface. (c) Navigate the options available in the WEKA (deselect attributes panel, preprocess panel, classify panel, cluster panel, associate panel and visualize). (d) Study the ARFF file format.	L2, L3, L5	2
3. To understand the working of datasets in WEKA & to perform demonstration of preprocessing on dataset weather.arff .	L3, L4, L5	2
4. To apply Numeric Transform (data preprocessing step) on Iris Dataset.	L3, L4, L5	2

5. To understand the importance of CSV data and then load student academic record (CSV format) in Weka.	L3, L4, L5	2
6. To understand the concept of discretization and to perform discretization on the dataset airline.arff.	L3, L4, L5	2
7. To create Training, Validation and Test dataset for iris.arff.	L3, L4, L5	2
8. To perform decision tree classification using J48 algorithm on weather.arff	L3, L4, L5	2
9. To apply Apriori technique on the dataset and to generate association rules.	L3, L4, L5	2
10. (a) Demonstration of classification rule process on dataset student.arff using j48 algorithm. (b) Demonstration of classification rule process on dataset employee.arff using j48 algorithm.	L3, L4, L5	2
11. Demonstration of classification rule process on dataset employee.arff using naïve bayes algorithm	L3, L4, L5	4

***Bloom's Level:** L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation.

** Sample Programs provided are not limited to these only, can include others as desired.

Text Books

1. Bostjan Kaluza, "Instant Weka How-to", Packt Publishing Limited, 2013.
2. Daniel T. Larose, Chantal D. Larose, "Data Mining and Predictive Analytics", John Wiley & Sons, Inc., Hoboken, New Jersey, 2015.
3. Jiawei Han and Micheline Kamber, "Data mining: concepts and techniques", Morgan Kaufmann, Second Edition, 2006.

Reference Books

4. Yuan Mei Yu, Data Mining and Machine Learning: WEKA Applied Technology and Practice (Chinese Edition) Paperback 2014.
5. Alex Berson, Data Warehousing, Data Mining, and Olap, Tata McGraw Hill, 2014.
6. Markus Hofmann, Ralf Klinkenberg, "Rapid-Miner: Data Mining Use Cases and Business Analytics Applications", Chapman and Hall/CRC, 2016.
7. George M Marakas, Modern Data Warehousing, Mining & Visualization Core Concepts, Pearson Education.

Modes of Evaluation: Performance/Viva/ Lab Record/Written Examination

Examination Scheme:

IA					EE
Components	A	PR	LR	V	70
Weightage (%)	5	10	10	5	

Note: IA –Internal Assessment, A – Attendance, PR – Performance, LR – Lab Record, V – Viva, EE- External Exam

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	2	--	--	--	--	--	--	--	--	--	--	1	2	2	3
CO2	1	1	2	--	--	--	--	--	--	--	--	--	1	2	3	3
CO3	1	2	3	3	3	--	--	--	--	--	--	--	1	2	2	2
CO4	1	1	2	--	--	3	--	--	--	--	--	3	1	1	2	3
CO5	1	1	2	--	--	2	--	--	--	--	--	3	1	3	2	1

1: strongly related, 2: moderately related and 3: weakly related

MLE6807	DATA WAREHOUSING AND MULTIDIMENSIONS MODELLING LAB	L	T	P	C
Version 2020.1	Date of Approval: JULY 2020	0	0	2	1
Pre-requisites/Exposure	Basic Knowledge of Database				
Co-requisites	NIL				

Catalog Description

In this Lab course Data warehousing and Multidimensional modeling programs are implemented and demonstrated using a SQL Server and ETL Tools. The Concepts that are covered would enable them to analyze the working of ETL tools and enable them to understand the following topics namely SQL Statements, SQL Built-in Functions, PL/SQL Cursors , Exception handling, Procedure, Functions, Trigger and concurrency control. Programs will be related to concepts of understanding the working of ETL tools on multidimensional data.

Course Objectives

The objective of this course is to

1. Make the students apply knowledge of Database by analyzing the different database concepts in SQL Server.
2. Provide a demonstration of ETL tools to organize the data sets.

Course Outcomes

On completion of this course, the students will be able to

CO1: Apply the knowledge of transaction processing to gain analysis on different data sets through concurrency control mechanism.

CO2: Demonstrate the use of SQL Built-in Functions, PL/SQL Cursors, Exception handling and Procedures.

CO3: To implement the different warehousing concepts on the given ETL tools.

CO4: Demonstrate the working of basic SQL statements and triggers.

Modules/Topics Covered**	Blooms level*	Number of hours
1. To understand the basic of SQL statements (g) Perform the following SQL statements on the table that perform the following query on the database <ul style="list-style-type: none"> • Create, update ,alter and delete a record • Joins and constraints on the table. • Wild card operators. 	L1,L3,L4	4
2. Sample Programs to execute the concept of Procedures (g) Preliminary introduction of Procedures their Syntax and usage (h) Write a procedural program to find out minimum of two numbers. (i) Write a program to print the reverse of a number using looping construct in PL/SQL Procedures. (j) Write a procedural program to find out the factorial of number.	L3, L4,L5	4
3. Sample Programs to implement the concept of Triggers (a) Preliminary introduction of Triggers their Syntax and usage (b) Create a Trigger on Employee record that automatically updates the salary of an Employee after each financial year. (c) Create a Trigger for the following events:	L3, L4,L5	4

<ul style="list-style-type: none"> • Deletion of a record • Updating of a record • Insertion of a new record. 		
4. Sample Programs to implement the concept of Cursors and Exception Handling. (a) Write a program to demonstrate the concept of Cursors in PL/SQL (b) Write a program that handles an exception that incurred in the given program.	L3,L4, L5	6
5. To perform demonstration to understand the working of ETL tools (c) Preliminary introduction of ETL Tools their features and importance. (d) Perform validation on the data set by applying the ETL tools. (e) Perform the following operations using ETL tools <ul style="list-style-type: none"> • Source to target mapping • Data checks on source data • Packages and schema validation • Data verification in the target system • Data integrity and quality checks in the target system 	L4,L5,L6	6

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

*** Sample Programs provided are not limited to these only, can include others as desired.*

Text Books:

- Jiawei Han & Micheline Kamber, "Data Mining Concepts And Techniques", 3rd Edition, Morgan Kaufmann Publication, An Imprint of Elsevier, 2015.
- Vipin Kumar, Pang Ning "Introduction to Data Mining", 3rd Edition, Pearson Publication, Chennai, 2016.
- Mohammed, Wagner "Data Mining and Analysis", 4th Edition, Cambridge University Press, Brazil, 2018.

Reference Books:

- Daneil, D. Larose "Data Mining and Predictive Analytics", 2nd Edition, John Wiley and Sons, Canada, 2015.
- Paulraj "Data Warehousing Fundamental for IT Professional", 2nd Edition, John Wiley and Sons, Canada, 2010.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O 1	PS O 2	PS O 3	PS O 4
CO 1	2	1	3	--	--	--	--	--	--	--	--	--	2	1	--	--
CO 2	2	1	3	--	--	--	--	--	--	--	--	--	2	1	--	--
CO 3	1	1	2	--	1	--	--	--	--	--	--	--	2	1	--	--
CO 4	2	1	3	--	--	--	--	--	--	--	--	--	2	1	--	--

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AIE6935	SUMMER INTERNSHIP EVALUATION-III	L	T	P	C
Version 2020.1	Date of Approval: JULY 2020	0	0	0	6
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

The objective of this course is to provide practical training on some live projects that will increase capability to work on actual problem in industry. This training may undergo in an industrial environment or may be an in-house training on some latest software which is in high demand in market. This training will be designed such that it will useful for their future employment in industry.

Course Objectives

The objective of this course is to

1. Provide practical training on live projects
2. Increase technical capabilities on solving real life problems in company environment

Course Outcomes

On completion of this summer internship, the students will be able to:

CO1: Develop communication, interpersonal and other critical skills in the job interview process.

CO2: Design and develop software and hardware projects


CO3: Assess interests and abilities in their field of study.

CO4: Demonstrate excellent technical and communication skills to acquire employment contacts leading directly to a full-time job following graduation from college.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	2	1	2	2	--	--	--	1	--	--	--	1	1	1	1
CO2	1	1	2	2	2	--	--	--	1	--	--	--	1	1	1	1
CO3	1	1	2	3	2	--	--	--	1	--	--	--	1	1	1	1
CO4	1	1	2	2	2	--	--	--	1	--	--	--	1	1	1	1

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AIE6937	PROJECT DISSERTATION-I	L	T	P	C
Version 2020.1	Date of Approval: JULY 2020	0	0	0	5
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

The objective of this course is to provide practical training on some live/demo projects that will increase capability to work on actual problem in industry. It will be an in house training on some latest software which is in high demand in market. This training will be designed such that it will be useful for their future employment in industry.

Course Objectives

The objective of this course is to

1. Provide practical training on live projects
2. Increase technical capabilities on solving real life problems in company environment

Course Outcomes

On completion of this summer internship, the students will be able to:

CO1: Demonstrate a sound technical knowledge of their selected project topic.

CO2: Design and develop engineering solutions to complex problems utilising a systems approach.

CO3: Analyse various approaches for solving a complex engineering problem using different tools and techniques

CO4: Demonstrate the knowledge, skills and attitudes of a professional engineer.

CO5: Apply technical skills and knowledge in completing the project.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	2	--	--	--	--	--	--	1	--	--	--	--	--	1	1
CO2	1	1	--	--	--	--	--	--	1	--	--	--	--	--	1	1
CO3	1	1	--	--	--	--	--	--	1	--	--	--	--	--	1	1
CO4	1	1	--	--	--	--	--	--	1	--	--	--	--	--	1	1
CO5	1	1	--	--	--	--	--	--	1	-	-	-	--	--	1	1

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RBE6901	AUTOMATION IN MANUFACTURING SYSTEMS	L	T	P	C
Version 2020.1	Date of Approval: JULY 2020	3	0	0	3
Pre-requisites/Exposure	Production system, Manufacturing System				
Co-requisites	Automation in production and manufacturing system				

Catalog Description:

In this course the concepts and procedure for Automation of Manufacturing systems and the technology behind the automation of a manufacturing system and concepts of computer aided manufacturing are discussed in detail. The concepts of computer aided process planning (CAPP), Hardware components for automation, group technology (GT), cellular manufacturing, automated guided vehicle system, flexible manufacturing system (FMS), Automated inspection and just in time are also discussed in detail.

Course Objectives:

The overall objective of this course is

1. To equip the students with basic and essential concepts of Automation in manufacturing system to usually increases production rate and labor productivity.
2. To provide high caliber engineering students with an in-depth understanding of cellular manufacturing, flexible manufacturing system (FMS) and computer aided process planning.

Course Outcomes (COs):

At the end of the course, the student shall be able to:

- CO1 - Define and describe the basic fundamentals of Automation in manufacturing system, computer aided manufacturing and computer integrated manufacturing.
- CO2 – State, explain and demonstrate computer aided process planning, automated production lines and assembly systems.
- CO3 – Outline, interpret and apply concepts of group technology and cellular manufacturing.
- CO4 – Define, explain and apply knowledge of flexible manufacturing systems and industrial robotics in industries.

Modules	Blooms level*	Number of hours
Module I Over view of Manufacturing and Automation: Production systems, Automation in production systems, Automation principles and strategies, Manufacturing operations, production facilities. Basic elements of an automated system, levels of automation; Hardware components for automation and process control, programmable logic controllers and personal computers.	L1 and L2	7
Module II Material Handling And Identification Technologies: Material handling, equipment, Analysis. Storage systems, performance and location strategies, Automated storage systems, AS/RS, types. Automatic identification methods, Barcode technology, RFID	L1, L2, and L3	6
Module III Manufacturing Systems And Automated Production Lines: Manufacturing systems: components of a manufacturing system, Single station manufacturing cells; Manual Assembly lines, line balancing Algorithms, Mixed model Assembly lines, Alternative Assembly systems.	L1, L2 and L3	8

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Automated production lines, Applications, Analysis of transfer lines		
Module IV Automated Assembly Systems: Fundamentals, Analysis of Assembly systems. Cellular manufacturing, part families, cooling, production flow analysis. Group Technology and flexible Manufacturing systems, Quantitative Analysis.	L1, L2 and L3	9
Module V Quality Control And Support Systems: Quality in Design and manufacturing, inspection principles and strategies, Automated inspection, contact Vs non contact, CMM. Manufacturing support systems. Quality function deployment, computer aided process planning, concurrent engineering, shop floor control, just in time and lean production.	L1, L2 and L3	6

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

Text books:

1. Mikell.P.Groover (2008), Automation, Production Systems and Computer Integrated Manufacturing, Prentice Hall of India.
2. N. Viswanandham, Y. Narhari "Performance Modeling of Automated Manufacturing Systems" Prentice-Hall.

Reference books:

1. M. Groover (2003), CAD/CAM Pearson Education; 1 edition.
2. S J Martin (1974), Numerical control of Machine Tools, Butterworth-Heinemann.
3. P N Rao (2017), CAD/CAM: Principles and Applications, Tata McGraw Hill Education; 3 editions.
4. Chang, Wysk & Wang (2005), Computer Aided Manufacturing, Prentice Hall of India.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	2	--	--	--	--	--	--	--	--	--	--	--	1	2	--
CO2	1	2	--	--	--	--	--	--	--	--	--	--	--	1	2	--
CO3	1	2	--	--	--	--	--	--	--	--	--	--	--	1	2	--
CO4	1	2	--	--	--	--	--	--	--	--	--	--	--	1	2	--

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RBE6902	ROBOTIC SENSORS, VISIONS AND HARDWARE IMPLEMENTATION	L	T	P	C
Version 2020.1	Date of Approval: JULY 2020	3	0	0	3
Pre-requisites/Exposure	Knowledge of basics of Artificial Intelligence concepts, Sensors and basic Robotics hardware required.				
Co-requisites	Nil				

Catalog Description

Robotics sensors find many applications in the areas of robotics, visions, Artificial Intelligence, pattern recognition, controls etc. Robotics sensors offer fundamentally different types of high capable sensors. Many image processing techniques are learnt. These robotics hardware design, architecture, mapping and localization can be applied to many complicated problems of Artificial Intelligence and other applications in Real World Computing. This course provides a comprehensive treatment of robotics sensors, visions and robotics hardware required.

Course Objectives:

The objective of this course is to

1. Introduces the basics of Robot visions and image processing sensors.
2. It deals with actual hardware implementation of robots

Course Outcomes:

On completion of this course, the students will be able to

CO1: Understand the principles of smart sensors and transducers, need and usage of sensors.

CO2: comparison various visions in robotics robotic functions, robotic views and robotic parts in simulations.

CO3: Understand concept of image processing techniques which can be applied to robotic perception, robotic movements, dynamics and controls of robotic movement, with which they can be able to apply the conceptual things to the robotic software architecture and applications.

CO4: Get thorough knowledge in robotics orientation and feature extraction.

CO5: Design multicontrolled sensors robot assembly.

Modules	Blooms level*	Number of hours
MODULE 1: SENSORS IN ROBOTICS An Introduction to sensors and Transducers, History and definitions, Smart Sensing, AI sensing, Need of sensors in Robotics. Position sensors – optical, non-optical, Velocity sensors, Accelerometers, Proximity Sensors – Contact, non-contact, Range Sensing, touch and Slip Sensors, Force and Torque Sensors. Different sensing variables – smell, Heat or Temperature, Humidity, Light, Speech or Voice recognition Systems, Tele-presence and related technologies.	L1, L2	4
MODULE 2: VISIONS IN ROBOTICS The Nature of Vision- Robot vision – Need, Applications - image acquisition –illumination techniques- Point sensor, line sensor, planar sensor, camera transfer characteristic, Raster scan, Image capture time, volume sensors, Image representation, picture coding techniques. Robot Control through Vision sensors, Robot vision locating position, Robot guidance with vision system, End effector camera Sensor.	L1, L2, L3 and L4	10
MODULE 3: ELEMENTS OF IMAGE PROCESSING TECHNIQUES	L1, L3,	5

Discretization, Neighbours of a pixel-connectivity- Distance measures - pre-processing Neighbourhood averaging, Median filtering. Smoothing of binary Images- Image Enhancement- Histogram Equalization-Histogram Specification –Local Enhancement-Edge detection- Gradient operator-Laplace operators-Thresholding-Morphological image processing.	L4 and L5	
MODULE 4:OBJECT ORIENTATION AND FEATURE EXTRACTION Image segmentation- Edge linking-Boundary detection-Region growing-Region splitting and merging- Boundary Descriptors-Freeman chain code-Regional Descriptors- recognition-structural methods- Recognition procedure, mahalanobic procedure.	L1, L2, L3, and L4	7
MODULE 5:COLLISIONS FRONTS ALGORITHM Introduction, skeleton of objects. Gradients, propagation, Definitions, propagation algorithm, Thinning Algorithm, Skeleton lengths of Top most objects.	L2, L3, L4 and L5	5
MODULE 6:MULTISENSORS CONTROLLED ROBOT ASSEMBLY Control Computer, Vision Sensor modules, Software Structure, Vision Sensor software, Robot programming, Handling, Gripper and Gripping methods, accuracy – A Case study.	L2, L3, L4 and L5	5

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text & References:-

1. Paul W Chapman, "Smart Sensors", an Independent Learning Module Series, 1996.
2. Richard D. Klafter, Thomas .A, Chri Elewski, Michael Negin, Robotics Engineering an Integrated Approach, Phi Learning., 2009.
3. John Iovice, "Robots, Androids and Animatrons", Mc Graw Hill, 2003.
4. K.S. Fu, R.C. Gonzalez, C.S.G. Lee, "Robotics – Control Sensing, Vision and Intelligence", Tata McGraw-Hill Education, 2008.
5. Mikell P Groover & Nicholas G Odrey, Mitchel Weiss, Roger N Nagel, Ashish Dutta, Industrial Robotics, Technology programming and Applications, Tata McGraw-Hill Education, 2012.
6. Sabrie Soloman, Sensors and Control Systems in Manufacturing, McGraw-Hill Professional Publishing, 2nd Edition, 2009.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	3	--	1	--	--	--	--	--	--	--	--	1	--	2	--
CO2	1	3	--	2	--	--	--	2	--	--	--	--	1	2	--	1
CO3	1	2	2	4	--	--	--	--	--	--	--	--	1	1	--	--
CO4	1	2	2	2	--	--	--	--	--	--	--	--	1	2	--	--
CO5	1	3	2	1	--	--	--	--	--	--	--	--	1	1	--	4

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RBE6903	PATTERN RECOGNITION & IMAGE PROCESSING	L	T	P	C
Version 2020.1	Date of Approval: JULY 2020	3	0	0	3
Pre-requisites/Exposure	Basics of Digital Image Processing				
Co-requisites	NIL				

Catalog Description

This course gives students an insight into the basics of Image Processing along with Pattern Recognition. Concepts covered would enable students to define and differentiate among various types of image refinement. Further they would be able to gain insights about various Image restoration and modification technique.

Course Objectives

This course covers the theory and methods for learning from data, with an emphasis on pattern classification. Digital Image Processing is designed to give professionals and students a powerful collection of fundamental and advanced image processing tools on the desktop.

Course Outcomes

On completion of this course, the students will be able to

CO1: Define and explain introductory part of Pattern recognition Concepts & Bayesian decision theory

CO2: List out the Univariate and Multivariate density

CO3: Explain concepts of Un-supervised learning and clustering

CO4: Describe the Image Fundamentals and Transforms

CO5: Explain the basics of Image Segmentation and Edge Detection

Modules	Blooms level*	Number of hours
MODULE 1: Introduction of Pattern recognition and Bayesian Decision Theory Machine perception, pattern recognition example, pattern recognition systems, the design cycle, learning and adaptation Introduction, continuous features – two categories classifications, minimum error-rate classification- zero-one loss function, classifiers, discriminant functions, and decision surfaces	L1 and L2	8
MODULE 2: Normal density Univariate and multivariate density, discriminant functions for the normal density-different cases, Bayes decision theory – discrete features, compound Bayesian decision theory and context	L2 and L3	8
MODULE 3: Un-supervised learning and clustering Introduction, mixture densities and Identifiability, maximum likelihood estimates, application to normal mixtures, K-means clustering. Data description and clustering, similarity measures, criteria function for clustering	L1 and L2	10
MODULE 4: Image Fundamentals and Transforms Elements of visual perception – Image sampling and quantization, Basic relationship between pixels, Some basic grayscale transformations, Introduction to Fourier Transform and DFT, Properties of 2D Fourier	L2 and L3	12

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Transform, FFT, Separable Image Transforms, Walsh, Hadamard, Discrete Cosine Transform, Haar, Slant, Karhunen, Loeve transforms.		
MODULE 5: Image Segmentation and Edge Detection Region Operations, Crack Edge Detection, Edge Following, Gradient operators, Compass and laplace operators. Threshold detection methods, optimal thresholding, multispectral thresholding, thresholding in hierarchical data structures; edge based image segmentation- edge image thresholding, edge relaxation, border tracing, border detection,	L2 and L3	10

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

Text & References:

Text:

1. "Fundamentals of speech Recognition", Lawrence Rabiner, Biing – Hwang Juang Pearson education.
2. "Pattern classifications", Richard O. Duda, PeterE. Hart, David G. Stroke. Wiley student edition, Second Edition.
3. R.C Gonzalez and R.E. Woods, "Digital Image Processing", Addison Wesley.

References:

1. "Pattern Recognition and Image Analysis" – Earl Gose, Richard John baugh, Steve Jost
2. A.K.Jain, "Fundamentals of Digital Image Processing", Prentice Hall of India.
3. "Digital Image Processing"– M. Anji Reddy, BS Publications.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

A: Attendance, CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO 3	PSO 4
CO 1	1	2	--	--	--	--	--	--	--	--	--	--	1	--	--	--
CO 2	1	--	2	--	--	--	--	--	--	--	--	--	1	2	--	--
CO 3	3	--	1	--	2	--	--	--	--	--	--	--	1	3	2	--
CO 4	3	--	2	--	1	--	--	--	--	--	--	--	1	--	2	--
CO 5	3	--	2	--	1	--	--	--	--	--	--	--	1	--	2	--

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RBE6905	PATTERN RECOGNITION AND IMAGE PROCESSING LAB	L	T	P	C
Version 2020.1	Date of Approval: JULY 2020	0	0	1	1
Pre-requisites/Exposure	Basics of MATLAB				
Co-requisites	NIL				

Catalog Description

In this Lab course first student should learn about advanced level of software used for easy calculation and toolbox used for software like MATLAB.

Course Objectives

The objective of this course is to

- Make the students apply knowledge of various Image processing & pattern recognition required for solving complex problems.
- Provide a demonstration of different types of image processing techniques through MATLAB toolbox.

Course Outcomes

On completion of this course, the students will be able to

CO1: Acquiring knowledge of Basics of High-end calculation software and need in Computer Science & engineering

CO2: Demonstrate the All preliminary functions in MATLAB

CO3: Apply the knowledge of all the basics function and toolbox knowledge of MATLAB

CO4: Demonstrate the Use of MATLAB in image Processing

CO5: Demonstrate usage of applications involving with Image processing & Recognition Its Toolbox used by MATLAB

Modules/Topics Covered**	Blooms level*	Number of hours
6. Introduction of MATLAB (h) Basic Variable declaration & its operation (i) Function use & its application	L3, L5	4
7. Sample Programs in MATLAB (k) Basic use of Matrix and Graph Plotting (l) Different type of graph plotting with use of different -2 type of data	L3, L5	6
8. Sample Programs using MATLAB functions (o) Create a basic program MATLAB using functions (p) Use of basic function Image processing (q) Practice on Basic function of Image processing tool box.	L3, L5	6
9. Sample programs of ANN functions (e) Practice on Pattern Recognition functions in MATLAB (f) Write a program for training a small network in MATLAB	L3, L5	6
10. Sample Programs using ANN toolbox & Image processing toolbox (f) Demonstrate the use of ANN tool box & Image processing toolbox and write a program after combining it.	L3, L5	2

*Bloom's Level:

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

** Sample Programs provided are not limited to these only, can include others as desired.

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Text Books**Text & References:**

- Rafael C. Gonzalez & Richard E. Woods, “Image Processing Using MATLAB”, 2nd edition, Pearson Education.
- “Pattern classifications”, Richard O. Duda, Peter E. Hart, David G. Stork. Wiley student edition, Second Edition

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination**Examination Scheme:**

IA					EE
Components	A	PR	LR	V	70
Weightage (%)	5	10	10	5	

Note: IA –Internal Assessment, A – Attendance, PR – Performance, LR – Lab Record, V – Viva, EE- External Exam

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	2	1	--	--	--	--	--	--	--	--	--	--	2	--	--	--
CO2	3	1	--	--	--	--	--	--	--	--	--	--	1	2	--	--
CO3	2	1	2	--	--	--	--	--	--	--	--	--	1	2	--	--
CO4	1	3	2	--	--	--	--	--	--	--	--	--	2	--	2	--
CO5	1	3	--	--	--	--	--	--	--	--	--	--	1	--	--	--

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RBE6904	ROBOTICS SENSORS, VISION AND HARDWARE IMPLEMENTATION LAB	L	T	P	C
Version 2020.1	Date of Approval: JULY 2020	0	0	2	1
Pre-requisites/Exposure	MATLAB and concepts of Artificial Intelligence				
Co-requisites	Nil				

Catalog Description

Robotics sensors find many applications in the areas of robotics, visions, Artificial Intelligence, pattern recognition, controls etc. Robotics sensors offer fundamentally different types of high capable sensors. Many image processing techniques are learnt. These robotics hardware design, architecture, mapping and localization can be applied to many complicated problems of Artificial Intelligence and other applications in Real World Computing. This course provides a comprehensive treatment of robotics sensors, visions and robotics hardware required.

Course Objectives

The objective of this course is to

1. To become familiar with basics of robot visions, image processing sensors.
2. Understand and analyse concepts of hardware implementations in robotics.

Course Outcomes

On completion of this course, the students will be able to

CO1: Understand the principles of smart sensors and transducers, need and usage of sensors.

CO2: comparison various visions in robotics robotic functions, robotic views and robotic parts in simulations.

CO3: Understand concept of image processing techniques which can be applied to robotic perception, robotic movements, dynamics and controls of robotic movement, with which they can be able to apply the conceptual things to the robotic software architecture and applications.

CO4: Get thorough knowledge in robotics orientation and feature extraction.

Modules	Blooms level*	Number of hours
Lab Session 1:Generation in robot languages Learning of robot language structure, on line and offline programming	L3 and L4	2
Lab Session 2:Cartesian Trajectories Study of Joint space planning, Cartesian trajectories, path primitives, coordinate systems used to determine the positions of TCP and direction of tools	L3 and L4	4
Lab Session 3:Basic Syntax Learning of RAPID i.e. data objects, expression, function. WAIT, SIGNAL AND DELAY command.	L3 and L4	6
Lab Session 4:Routine and subroutine Write subroutine, task module, input-output interrupts, priority interrupts, and task modules. Study of built-in subroutines in RAPID.	L1, L2, and L3	2
Lab Session 5:optical sensors To study Photodiodes, phototransistors and photo resistors based sensors, light-to-light detectors, Infrared sensors (thermal, PIR, AFIR, thermopiles).	L1, L2, and L3	4
Lab Session 6: Magnetic and Electromagnetic Sensors and Actuators Study on Motors as actuators (linear, rotational, stepping motors), magnetic	L3 and L4	2

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valves, inductive sensors (eddy current, LVDT, RVDT, Proximity, switches), Hall Effect sensors, Magneto resistive sensors.		
Lab Session 7: Mechanical Sensors Accelerometers, Force sensors (strain gauges, tactile sensors), Pressure sensors (semiconductor, piezo resistive, capacitive, VRP).	L3 and L4	2
Lab Session 8: Industrial Networks and Fields Bus Types of bus – DN, PB, ProfiNet, Eth/IP Interfacing to Controller: Connecting sensors to controller directly or through fieldbus. Configuration of digital, group, and analog IO. Use of instructions and logic. Strobing and handshaking with PLC as master, Encoder and Resolvers.	L1, L2, and L3	2
Lab Session 9: PLC Various hardware types of PLC (CPU and I/O modules). Centralized configuration of PLC. On-line with PLC (using serial port). Various languages and its over-view. Sample program down-load, Task configuration. Configuration of IP address & sample program download. Decentralized configuration of PLC (Profibus protocol). Configuration I/O modules on Profibus protocol. Mod-bus configuration (Master & Slave configuration). Mod-bus RTU (Remote Telemetry Unit) and Mod-bus TCP/IP communication with PC based software.	L2, L3, and L4	2

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text & References:-

1. Paul W Chapman, "Smart Sensors", an Independent Learning Module Series, 1996.
2. Richard D. Klafter, Thomas .A, Chri Elewski, Michael Negin, Robotics Engineering an Integrated Approach, Phi Learning., 2009.
3. John Iovice, "Robots, Androids and Animatrons", Mc Graw Hill, 2003.
4. K.S. Fu, R.C. Gonzalez, C.S.G. Lee, "Robotics – Control Sensing, Vision and Intelligence", Tata McGraw-Hill Education, 2008.
5. Mikell P Groover & Nicholas G Odrey, Mitchel Weiss, Roger N Nagel, Ashish Dutta, Industrial Robotics, Technology programming and Applications, Tata McGraw-Hill Education, 2012.
6. Sabrie Soloman, Sensors and Control Systems in Manufacturing, McGraw-Hill Professional Publishing, 2nd Edition, 2009.

Examination Scheme:

IA					EE
Components	A	PR	LR	V	70
Weightage (%)	5	10	10	5	

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	2	3	--	--	--	--	3	--	--	--	--	1	2	--	--
CO2	1	--	2	2	--	--	--	3	--	--	--	--	1	2	--	--
CO3	1	2	2	3	--	--	3	--	--	--	--	--	1	--	--	3

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RBE6905	PATTERN RECOGNITION AND IMAGE PROCESSING LAB	L	T	P	C
Version 2020.1	Date of Approval: JULY 2020	0	0	1	1
Pre-requisites/Exposure	Basics of MATLAB				
Co-requisites	NIL				

Catalog Description

In this Lab course first student should learn about advanced level of software used for easy calculation and toolbox used for software like MATLAB.

Course Objectives

The objective of this course is to

1. Make the students apply knowledge of various Image processing & pattern recognition required for solving complex problems.
2. Provide a demonstration of different types of image processing techniques through MATLAB toolbox.

Course Outcomes

On completion of this course, the students will be able to

CO1: Acquiring knowledge of Basics of High-end calculation software and need in Computer Science & engineering

CO2: Demonstrate the All preliminary functions in MATLAB

CO3: Apply the knowledge of all the basics function and toolbox knowledge of MATLAB

CO4: Demonstrate the Use of MATLAB in image Processing

CO5: Demonstrate usage of applications involving with Image processing & Recognition Its Toolbox used by MATLAB

Modules/Topics Covered**	Blooms level*	Number of hours
11. Introduction of MATLAB (j) Basic Variable declaration & its operation (k) Function use & its application	L3, L5	4
12. Sample Programs in MATLAB (m) Basic use of Matrix and Graph Plotting (n) Different type of graph plotting with use of different -2 type of data	L3, L5	6
13. Sample Programs using MATLAB functions (r) Create a basic program MATLAB using functions (s) Use of basic function Image processing (t) Practice on Basic function of Image processing tool box.	L3, L5	6
14. Sample programs of ANN functions (g) Practice on Pattern Recognition functions in MATLAB (h) Write a program for training a small network in MATLAB	L3, L5	6
15. Sample Programs using ANN toolbox & Image processing toolbox (g) Demonstrate the use of ANN tool box & Image processing toolbox and write a program after combining it.	L3, L5	2

*Bloom's Level:

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

** Sample Programs provided are not limited to these only, can include others as desired.

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Text Books**Text & References:**

- Rafael C. Gonzalez & Richard E. Woods, “Image Processing Using MATLAB”, 2nd edition, Pearson Education.
- “Pattern classifications”, Richard O. Duda, Peter E. Hart, David G. Stork. Wiley student edition, Second Edition

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination**Examination Scheme:**

IA					EE
Components	A	PR	LR	V	70
Weightage (%)	5	10	10	5	

Note: IA –Internal Assessment, A – Attendance, PR – Performance, LR – Lab Record, V – Viva, EE- External Exam

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	2	1	--	--	--	--	--	--	--	--	--	--	2	--	--	--
CO2	3	1	--	--	--	--	--	--	--	--	--	--	1	2	--	--
CO3	2	1	2	--	--	--	--	--	--	--	--	--	1	2	--	--
CO4	1	3	2	--	--	--	--	--	--	--	--	--	2	--	2	--
CO5	1	3	--	--	--	--	--	--	--	--	--	--	1	--	--	--

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RBE6906	OPTIMIZATION TECHNIQUES	L	T	P	C
Version 2020.1	Date of Approval: JULY 2020	3	0	0	3
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

The purpose of this course is to develop a knowledge in the field of optimization techniques their basic concepts, principles. linear programming and queuing theory.

Course Objectives

After successful completion of the course, student will be able to understand importance of optimization of industrial process management, apply basic concepts of mathematics to formulate an optimization problem, analyse and appreciate variety of performance measures for various optimization problems.

Course Outcomes

On completion of this course, the students will be able to

CO1: Understand importance of optimization of industrial process management.

CO2: Apply basic concepts of mathematics to formulate an optimization problem

CO3: Analyse and appreciate variety of performance measures for various optimization problems

CO4: Use classical optimization techniques and numerical methods of optimization

CO5: Apply knowledge of optimization to formulate and solve engineering problems

Modules	Blooms level*	Number of hours
MODULE 1: INTRODUCTION Introduction to optimization – adequate and optimum design – principles of optimization – statement of an optimization problem – classification – formulation of objective function, design constraints.	L1, L2	4
MODULE 2: CLASSICAL OPTIMIZATION TECHNIQUES Single variable optimization –multivariable optimization with no constraints – exhaustive search, Fibonacci method, golden selection, Random, pattern and gradient search methods – Interpolation methods: quadratic and cubic, direct root method.	L1, L2, L3 and L5, L6	12
MODULE 3: MULTIVARIABLE – UNCONSTRAINED AND CONSTRAINED OPTIMIZATION Direct search methods – descent methods – conjugate gradient method. Indirect methods – Transformation techniques, penalty function method	L1, L3 and L4	8
MODULE 4: NON – TRADITIONAL OPTIMIZATION TECHNIQUES Genetic Algorithms -steady state algorithm, fitness scaling, inversion. Genetic programming:- Genetic Algorithm in problem solving, Implementing a Genetic Algorithm:- computer implementation, operator (reproduction, crossover and Mutation, Fitness Scaling, Coding, Discretization). Knowledge based techniques in Genetic Algorithm. Advanced operators and techniques in genetic search:-Dominance, Diploidy and Abeyance. Inversion and other reordering operators, Niche and speciation and Tabu search methods.	L1, L3, and L4	10
MODULE 5: OPTIMUM DESIGN OF MACHINE Desirable and undesirable effects – functional requirement – material and geometrical parameters – Design of simple axial, transverse loaded members	L3 and L4	2

for minimum cost and minimum weight.

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text & References:

1. Rao, S.S., "Optimization – Theory and Applications", Wiley Eastern, New Delhi, 1978
2. Fox, R.L., Optimization Methods for Engineering Design, Addition – Wesley, Reading, Mass, 1971.
3. Wilde, D.J., "Optimum Seeking Methods", Prentice Hall, Englewood Cliffs, New Jersey, 1964

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	3	--	1	--	--	--	--	--	--	--	--	1	--	2	--
CO2	1	3	--	2	--	--	--	--	--	--	--	--	1	2	--	1
CO3	1	2	2	4	--	--	--	--	--	--	--	--	1	1	--	--
CO4	1	2	2	2	--	--	--	--	--	--	--	--	1	2	--	--
CO5	1	3	2	1	--	--	--	--	--	--	--	--	1	1	--	4

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RBE6908	NEURAL NETWORK AND FUZZY LOGIC	L	T	P	C
Version 2020.1	Date of Approval: JULY 2020	3	0	0	3
Pre-requisites/Exposure	Linear algebra, advanced calculus, discrete mathematics, Boolean algebra or equivalent.				
Co-requisites	Nil				

Catalog Description

Fuzzy sets and fuzzy logic find many applications in the areas of stability theory, pattern recognition, controls etc. Neural Networks offer fundamentally alternative approaches to procedural programming. These systems proved their applicability to the problems where there are missing data or information or the problems which could not be defined in an algorithm. The integration of fuzzy systems and neural networks gives a tremendous potential which can be applied to many complicated problems of Artificial Intelligence and other applications in Real World Computing. This course provides a comprehensive treatment of neural network architectures and learning algorithms, with an in-depth look at problems in data mining and in knowledge discovery.

Course Objectives

The objective of this course is to

1. Introduces the basics of Neural Networks and essentials of Artificial Neural Networks with Single Layer and Multilayer Feed Forward Networks.
2. It deals with Associate Memories and introduces Fuzzy sets and Fuzzy Logic system component

Course Outcomes

On completion of this course, the students will be able to

CO1: Understand the principles of neural networks and fuzzy Logic fundamentals.

CO2: compare analysis between human and computer, Artificial Neural Networks models, characteristics of ANN's learning strategies, learning rules and basics of fuzzy logic.

CO3: Understand concept of classical and fuzzy sets, fuzzification and defuzzification, with which they can be able to apply the conceptual things to the real world electrical and electronics problems and applications.

CO4: Get thorough knowledge in biological neuron and artificial neurons.

CO5: Design the required and related systems

Modules	Blooms level*	Number of hours
MODULE 1: Basic neural computation models: Network and node properties. Inference and learning algorithms. Unsupervised learning: Signal hebbian learning and competitive learning. Supervised learning: Back propagation algorithms.	L1, L2	4
MODULE 2: Self organizing networks: Kohonen algorithm, bi-directional associative memories. Hopfield Networks: Hopfield network algorithm. Adaptive resonance theory: Network and learning rules. Neural network applications.	L1, L2, L3 and L4	10
MODULE 3: Fuzzy Sets: Operations and properties. Fuzzy Relations: Cardinality, Operations and properties.	L1, L3, L4 and L5	6

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Value Assignments: Cosine amplitude and max-min method. Fuzzy classification: Cluster analysis and validity, Fuzzy e-means clustering, hardening the Fuzzy e-partition.		
MODULE 4: Fuzzification, Membership value assignments: Inference, rank ordering and angular Fuzzy sets, defuzzification methods, fuzzy logic, approximate reasoning. Fuzzy –based systems: Canonical rule forms, decomposition of compound rules, likelihood and truth qualification, aggregation of Fuzzy rules, graphical techniques of inference.	L1, L2, L3, and L4	9
MODULE 5: OPTIMUM DESIGN OF MACHINE Non linear simulation using Fuzzy rule-based systems, Fuzzy associative memories. Decision making under Fuzzy states and Fuzzy actions. Fuzzy grammar and syntactic recognition. General Fuzzy logic controllers, special forms of Fuzzy logic control system models, examples of Fuzzy control system design and control problems, industrial applications.	L2, L3, L4 and L5	7

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text & References:

1. Limin Fu. "Neural Networks in Computer Intelligence" McGraw Hill, 1995.
2. Freeman J. A., and Skapura D. Mu. "Neural Networks Algorithms applications and Programming Techniques", Addison Wesley New York, 1991.
3. Timoty J. Ross, "Fuzzy Logic with Engineering Applications", McGraw Hill 1997.
4. Bart Kosho "Neural Network and Fuzzy Systems", Prentice Hall of India, 1994

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	3	--	1	--	--	--	--	--	--	--	--	1	--	2	--
CO2	1	3	--	2	--	--	--	2	--	--	--	--	1	2	--	1
CO3	1	2	2	4	--	--	--	--	--	--	--	--	1	1	--	--
CO4	1	2	2	2	--	---	--	--	--	--	--	--	1	2	--	--
CO5	1	3	2	1	--	--	--	--	--	--	--	--	1	1	--	4

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RBE6909	NEURAL NETWORK AND FUZZY LOGIC LAB	L	T	P	C
Version 2020.1	Date of Approval: JULY 2020	0	0	2	1
Pre-requisites/Exposure	C/C++/MATLAB				
Co-requisites	Nil				

Catalog Description

Neural Networks offer fundamentally alternative approaches to procedural programming. Fuzzy sets and fuzzy logic find many applications in the areas of stability theory, pattern recognition, controls etc. These systems proved their applicability to the problems where there are missing data or information or the problems which could not be defined in an algorithm.

Course Objectives

The objective of this course is to

1. To become familiar with neural networks learning algorithms from available examples and give design methodologies for artificial neural networks.
2. Understand and analyse concepts of fuzzy set and use fuzzy set operations to implement current computing techniques used in fuzzy computing.

Course Outcomes

On completion of this course, the students will be able to

CO1: Understand the difference between learning and programming and explore practical applications of Neural Networks (NN).

CO2: To analyse and appreciate the applications which can use fuzzy logic.

CO3: Understand the efficiency of a hybrid system and how Neural Network and fuzzy logic can be hybridized to form a Neuro-fuzzy network and its various applications and they will be able to design inference systems

Modules	Blooms level*	Number of hours
Lab Session 1: Write a program to implement single layer perception algorithm.	L3 and L4	2
Lab Session 2: Write a program to implement back propagation learning algorithm	L3 and L4	4
Lab Session 3: Design multilayer feed forward network using back-propagation algorithm	L3 and L4	6
Lab Session 4 Study of fuzzy inference system	L1, L2, and L3	2
Lab Session 5 To study fuzzy logic controller using fuzzy logic toolbox	L1, L2, and L3	4
Lab Session 6 Write a program to implement SDPTA	L3 and L4	2
Lab Session 7 Write a program to implement RDPTA	L3 and L4	2
Lab Session 8 To Study various defuzziification techniques	L1, L2, and L3	2
Lab Session 9 Write a program to implement of fuzzy set operation	L2, L3, and L4	2

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text & References:

1. Limin Fu. "Neural Networks in Computer Intelligence" McGraw Hill, 1995.
2. Freeman J. A., and Skapura D. Mu. "Neural Networks Algorithms applications and Programming Techniques", Addison Wesley New York, 1991.

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	2	3	--	--	--	--	3	--	--	--	--	1	2	--	--
CO2	1	--	2	2	--	--	--	3	--	--	--	--	1	2	--	--
CO3	1	2	2	3	--	--	3	--	--	--	--	--	1	--	--	3

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RBE6910	DECISION MAKING SYSTEM	L	T	P	C
Version 2020.1	Date of Approval: JULY 2020	3	0	0	3
Pre-requisites/Exposure	Basic Networking Concepts				
Co-requisites	Nil				

Catalog Description

To develop semantic-based and context-aware systems to acquire, organize process, share and use the knowledge embedded in multimedia content. Research will aim to maximize automation of the complete knowledge lifecycle and achieve semantic interoperability between Web resources and services. The field of Robotics is a multi disciplinary as robots are amazingly complex system comprising mechanical, electrical, electronic H/W and S/W and issues germane to all these.

Course Objectives

The objective of this course is to

1. To provide an overview of problem solving skills methods using decision making systems .
2. To serve as a foundation for the study of programming languages that is used to develop an Intelligence System

Course Outcomes

On completion of this course, the students will be able to

CO1. Understand the concept of artificial intelligence.

CO2. Differentiate between linear and non-linear problems and Learn various problem solving techniques using neural networks

CO3. Understand the concept of fuzzy logic and apply to various problems

CO4. Able to learn concepts of genetic algorithm

Modules	Blooms level*	Number of hours
Module I: Soft Computing Introduction of soft computing, soft computing vs. hard computing, various types of soft computing techniques, applications of soft computing. Artificial Intelligence : Introduction, Various types of production systems, characteristics of production systems, breadth first search, depth first search techniques, other Search Techniques like hill Climbing, Best first Search, A* algorithm, AO* Algorithms and various types of control strategies. Knowledge representation issues, Propositional and predicate logic, monotonic and non monotonic reasoning, forward Reasoning, backward reasoning, Weak & Strong Slot & filler structures, NLP.	L1, L2	12
Module II: Neural Network Structure and Function of a single neuron: Biological neuron, artificial neuron, definition of ANN, Taxonomy of neural net, Difference between ANN and human brain, characteristics and applications of ANN, single layer network, Perceptron training algorithm, Linear separability, Widrow & Hebb's learning rule/Delta rule, ADALINE, MADALINE, AI v/s ANN. Introduction of MLP, different activation functions, Error back propagation algorithm, derivation of BBPA, momentum, limitation, characteristics and application of EBPA	L2, L3 and L4	10
Module III	L2, L3	8

Counter propagation network, architecture, functioning & characteristics of counter Propagation network, Hopfield/ Recurrent network, configuration, stability constraints, associative memory, and characteristics, limitations and applications. Hopfield v/s Boltzman machine. Adaptive Resonance Theory: Architecture, classifications, Implementation and training. Associative Memory.	and L4	
Module IV: Fuzzy Logic Fuzzy set theory, Fuzzy set versus crisp set, Crisp relation & fuzzy relations, Fuzzy systems: crisp logic, fuzzy logic, introduction & features of membership functions, Fuzzy rule base system : fuzzy propositions, formation, decomposition & aggregation of fuzzy rules, fuzzy reasoning, fuzzy inference systems, fuzzy decision making & Applications of fuzzy logic.	L2, L3 and L4	7
Module V: Genetic algorithm Fundamentals, basic concepts, working principle, encoding, fitness function, reproduction, Genetic modeling: Inheritance operator, cross over, inversion & deletion, mutation operator, Bitwise operator, Generational Cycle, Convergence of GA, Applications & advances in GA, Differences & similarities between GA & other traditional methods.	L2, L4	3

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books & References:

1. S, Rajasekaran & G.A. Vijayalakshmi Pai, Neural Networks, Fuzzy Logic & Genetic Algorithms, Synthesis & Applications, PHI Publication.
2. S.N. Sivanandam & S.N. Deepa, Principles of Soft Computing, Wiley Publications
3. Rich E and Knight K, Artificial Intelligence, TMH, New Delhi.
4. Bose, Neural Network fundamental with Graph , Algo.& Appl, TMH
5. Kosko: Neural Network & Fuzzy System, PHI Publication
6. Klir & Yuan, Fuzzy sets & Fuzzy Logic: Theory & Appli., PHI Pub.
7. Hagen, Neural Network Design, Cengage Learning

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	--	--	3	--	--	--	--	--	--	2	--	--	2	--	--
CO2	1	--	1	2	--	--	--	--	--	--	--	--	1	--	1	2
CO3	1	--	1	2	--	--	--	--	--	--	--	--	--	--	--	3
CO4	1	--	--	2	--	--	--	--	--	--	--	--	1	--	2	--
CO5	1	--	2	3	--	--	--	--	--	--	--	--	1	2	--	--
CO6	1	--	--	--	2	3	--	--	--	--	--	--	--	--	2	--

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RBE6911	DECISION MAKING SYSTEM LAB	L	T	P	C
Version 2020.1	Date of Approval: JULY2020	0	0	2	1
Pre-requisites/Exposure	C/C++/MATLAB				
Co-requisites	Nil				

Catalog Description

This lab course covers development and designing of implementing basic neural networks, fuzzy systems, and optimization algorithms concepts and their relations. It aims to develop the concepts and techniques and foster the students' abilities in designing and implementing soft computing based solutions for real-world and engineering problems.

Course Objectives

The objective of this course is to

1. Equip the students with concepts of Soft Computing which includes Neural networks, Fuzzy logic and genetic algorithms.
2. Provide knowledge to develop Soft computing programs in Matlab.

Course Outcomes

On completion of this course, the students will be able to

CO1: Implement various neural networks using MATLAB.

CO2: Illustrate use of fuzzy in real applications.

CO3: Apply genetic algorithm to basic problems.

Modules	Blooms level*	Number of hours
Lab Session 1: Study of Biological Neural Network	L1 , L2 and L3	2
Lab Session 2: Study of Artificial Neural Network	L1, L2 and L3	1
Lab Session 3: Write a program of Perceptron Training Algorithm.	L3 and L4	2
Lab Session 4 Write a program to implement Hebb's Rule	L3, and L4	2
Lab Session 5 Write a program to implement of Delta Rule.	L3, and L3	2
Lab Session 6 Write a program to implement back propagation learning algorithm.	L3 and L4	2
Lab Session 7 Study of fuzzy inference system	L1, L2 and L3	1
Lab Session 8 To study fuzzy logic controller using fuzzy logic toolbox	L1, L2, L3 and L4	2
Lab Session 9 Write a program to implement SDPTA	L3 and L4	2

Lab Session 10 Write a program to implement RDPTA	L3 and L4	2
Lab Session 11 To Study various defuzziification techniques	L1, L2, L3 and L4	1
Lab Session 12 Write a program to implement of fuzzy set operation	L3 and L4	2
Lab Session 13 Study of genetic algorithm	L1, L2, L3 and L4	1
Lab Session 14 Study of Genetic programming and solve a real life problem	L1, L2, L3, and L4	2

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text & References:

1. Limin Fu. "Neural Networks in Computer Intelligence" McGraw Hill, 1995.
2. Freeman J. A., and Skapura D. Mu. "Neural Networks Algorithms applications and Programming Techniques", Addison Wesley New York, 1991.
3. S, Rajasekaran & G.A. Vijayalakshmi Pai, Neural Networks, Fuzzy Logic & Genetic Algorithms, Synthesis & Applications, PHI Publication.
4. S.N. Sivanandam & S.N. Deepa, Principles of Soft Computing, Wiley Publications
5. Rich E and Knight K, Artificial Intelligence, TMH, New Delhi.

Examination Scheme:


IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	2	3	--	--	--	--	3	--	--	--	--	1	2	--	--
CO2	1	--	2	2	--	--	--	3	--	--	--	--	1	2	--	--
CO3	1	--	3	2	--	3	3	--	--	--	--	--	1	--	--	3

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MLE6901	PATTERN RECOGNITION & IMAGE PROCESSING	L	T	P	C
Version 2020.1	Date of Approval: JULY 2020	3	0	0	3
Pre-requisites/Exposure	Basics of Digital Image Processing				
Co-requisites	NIL				

Catalog Description

This course gives students an insight into the basics of Image Processing along with Pattern Recognition. Concepts covered would enable students to define and differentiate among various types of image refinement. Further they would be able to gain insights about various Image restoration and modification technique.

Course Objectives

This course covers the theory and methods for learning from data, with an emphasis on pattern classification. Digital Image Processing is designed to give professionals and students a powerful collection of fundamental and advanced image processing tools on the desktop.

Course Outcomes

On completion of this course, the students will be able to

CO1: Define and explain introductory part of Pattern recognition Concepts & Bayesian decision theory

CO2: List out the Univariate and Multivariate density

CO3: Explain concepts of Un-supervised learning and clustering

CO4: Describe the Image Fundamentals and Transforms

CO5: Explain the basics of Image Segmentation and Edge Detection

Modules	Blooms level*	Number of hours
MODULE 1: Introduction of Pattern recognition and Bayesian Decision Theory Machine perception, pattern recognition example, pattern recognition systems, the design cycle, learning and adaptation Introduction, continuous features – two categories classifications, minimum error-rate classification- zero-one loss function, classifiers, discriminant functions, and decision surfaces	L1 and L2	8
MODULE 2: Normal density Univariate and multivariate density, discriminant functions for the normal density-different cases, Bayes decision theory – discrete features, compound Bayesian decision theory and context	L2 and L3	8
MODULE 3: Un-supervised learning and clustering Introduction, mixture densities and Identifiability, maximum likelihood estimates, application to normal mixtures, K-means clustering. Data description and clustering, similarity measures, criteria function for clustering	L1 and L2	10
MODULE 4: Image Fundamentals and Transforms Elements of visual perception – Image sampling and quantization, Basic relationship between pixels, Some basic grayscale transformations, Introduction to Fourier Transform and DFT, Properties of 2D Fourier	L2 and L3	12

Transform, FFT, Separable Image Transforms, Walsh, Hadamard, Discrete Cosine Transform, Haar, Slant, Karhunen, Loeve transforms.		
MODULE 5: Image Segmentation and Edge Detection Region Operations, Crack Edge Detection, Edge Following, Gradient operators, Compass and laplace operators. Threshold detection methods, optimal thresholding, multispectral thresholding, thresholding in hierarchical data structures; edge based image segmentation- edge image thresholding, edge relaxation, border tracing, border detection,	L2 and L3	10

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

Text & References:

Text:

- “Fundamentals of speech Recognition”, Lawrence Rabiner, Biing – Hwang Juang Pearson education.
- “Pattern classifications”, Richard O. Duda, PeterE. Hart, David G. Stroke. Wiley student edition, Second Edition.
- R.C Gonzalez and R.E. Woods, “Digital Image Processing”, Addison Wesley.

References:

- “Pattern Recognition and Image Analysis” – Earl Gose, Richard John baugh, Steve Jost
- A.K.Jain, “Fundamentals of Digital Image Processing”, Prentice Hall of India.
- “Digital Image Processing”– M. Anji Reddy, BS Publications.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

A: Attendance, CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO 3	PSO 4
CO 1	1	2	--	--	--	--	--	--	--	--	--	--	1	--	--	--
CO 2	1	--	2	--	--	--	--	--	--	--	--	--	1	2	--	--
CO 3	3	--	1	--	2	--	--	--	--	--	--	--	1	3	2	--
CO 4	3	--	2	--	1	--	--	--	--	--	--	--	1	--	2	--
CO 5	3	--	2	--	1	--	--	--	--	--	--	--	1	--	2	--

1: strongly related, 2: moderately related and 3: weakly related

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MLE6904	PATTERN RECOGNITION AND IMAGE PROCESSING LAB	L	T	P	C
Version 2019.1	Date of Approval: 15 May 2019	0	0	1	1
Pre-requisites/Exposure	Basics of MATLAB				
Co-requisites	NIL				

Catalog Description

In this Lab course first student should learn about advanced level of software used for easy calculation and toolbox used for software like MATLAB.

Course Objectives

The objective of this course is to

1. Make the students apply knowledge of various Image processing & pattern recognition required for solving complex problems.
2. Provide a demonstration of different types of image processing techniques through MATLAB toolbox.

Course Outcomes

On completion of this course, the students will be able to

CO1: Acquiring knowledge of Basics of High-end calculation software and need in Computer Science & engineering

CO2: Demonstrate the All preliminary functions in MATLAB

CO3: Apply the knowledge of all the basics function and toolbox knowledge of MATLAB

CO4: Demonstrate the Use of MATLAB in image Processing

CO5: Demonstrate usage of applications involving with Image processing & Recognition Its Toolbox used by MATLAB

Modules/Topics Covered**	Blooms level*	Number of hours
16. Introduction of MATLAB (l) Basic Variable declaration & its operation (m) Function use & its application	L3, L5	4
17. Sample Programs in MATLAB (o) Basic use of Matrix and Graph Plotting (p) Different type of graph plotting with use of different -2 type of data	L3, L5	6
18. Sample Programs using MATLAB functions (u) Create a basic program MATLAB using functions (v) Use of basic function Image processing (w) Practice on Basic function of Image processing tool box.	L3, L5	6
19. Sample programs of ANN functions (i) Practice on Pattern Recognition functions in MATLAB (j) Write a program for training a small network in MATLAB	L3, L5	6
20. Sample Programs using ANN toolbox & Image processing toolbox (h) Demonstrate the use of ANN tool box & Image processing toolbox and write a program after combining it.	L3, L5	2

*Bloom's Level:

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

** Sample Programs provided are not limited to these only, can include others as desired.

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Text Books**Text & References:**

- Rafael C. Gonzalez & Richard E. Woods, “Image Processing Using MATLAB”, 2nd edition, Pearson Education.
- “Pattern classifications”, Richard O. Duda, Peter E. Hart, David G. Stork. Wiley student edition, Second Edition

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination**Examination Scheme:**

IA					EE
Components	A	PR	LR	V	70
Weightage (%)	5	10	10	5	

Note: IA –Internal Assessment, A – Attendance, PR – Performance, LR – Lab Record, V – Viva, EE- External Exam

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	2	1	--	--	--	--	--	--	--	--	--	--	2	--	--	--
CO2	3	1	--	--	--	--	--	--	--	--	--	--	1	2	--	--
CO3	2	1	2	--	--	--	--	--	--	--	--	--	1	2	--	--
CO4	1	3	2	--	--	--	--	--	--	--	--	--	2	--	2	--
CO5	1	3	--	--	--	--	--	--	--	--	--	--	1	--	--	--

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MLE6902	NEURAL NETWORK AND FUZZY LOGIC	L	T	P	C
Version 2020.1	Date of Approval: JULY 2020	3	0	0	3
Pre-requisites/Exposure	Linear algebra, advanced calculus, discrete mathematics, Boolean algebra or equivalent.				
Co-requisites	Nil				

Catalog Description

Fuzzy sets and fuzzy logic find many applications in the areas of stability theory, pattern recognition, controls etc. Neural Networks offer fundamentally alternative approaches to procedural programming. These systems proved their applicability to the problems where there are missing data or information or the problems which could not be defined in an algorithm. The integration of fuzzy systems and neural networks gives a tremendous potential which can be applied to many complicated problems of Artificial Intelligence and other applications in Real World Computing. This course provides a comprehensive treatment of neural network architectures and learning algorithms, with an in-depth look at problems in data mining and in knowledge discovery.

Course Objectives

The objective of this course is to

1. Introduces the basics of Neural Networks and essentials of Artificial Neural Networks with Single Layer and Multilayer Feed Forward Networks.
2. It deals with Associate Memories and introduces Fuzzy sets and Fuzzy Logic system component

Course Outcomes

On completion of this course, the students will be able to

CO1: Understand the principles of neural networks and fuzzy Logic fundamentals.

CO2: compare analysis between human and computer, Artificial Neural Networks models, characteristics of ANN's learning strategies, learning rules and basics of fuzzy logic.

CO3: Understand concept of classical and fuzzy sets, fuzzification and defuzzification, with which they can be able to apply the conceptual things to the real world electrical and electronics problems and applications.

CO4: Get thorough knowledge in biological neuron and artificial neurons.

CO5: Design the required and related systems

Modules	Blooms level*	Number of hours
MODULE 1: Basic neural computation models: Network and node properties. Inference and learning algorithms. Unsupervised learning: Signal hebbian learning and competitive learning. Supervised learning: Back propagation algorithms.	L1, L2	4
MODULE 2: Self organizing networks: Kohonen algorithm, bi-directional associative memories. Hopfield Networks: Hopfield network algorithm. Adaptive resonance theory: Network and learning rules. Neural network applications.	L1, L2, L3 and L4	10
MODULE 3: Fuzzy Sets: Operations and properties. Fuzzy Relations: Cardinality, Operations and properties. Value Assignments: Cosine amplitude and max-min method.	L1, L3, L4 and L5	6

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Fuzzy classification: Cluster analysis and validity, Fuzzy e-means clustering, hardening the Fuzzy e-partition.		
MODULE 4: Fuzzification, Membership value assignments: Inference, rank ordering and angular Fuzzy sets, defuzzification methods, fuzzy logic, approximate reasoning. Fuzzy –based systems: Canonical rule forms, decomposition of compound rules, likelihood and truth qualification, aggregation of Fuzzy rules, graphical techniques of inference.	L1, L2, L3, and L4	9
MODULE 5: OPTIMUM DESIGN OF MACHINE Non linear simulation using Fuzzy rule-based systems, Fuzzy associative memories. Decision making under Fuzzy states and Fuzzy actions. Fuzzy grammar and syntactic recognition. General Fuzzy logic controllers, special forms of Fuzzy logic control system models, examples of Fuzzy control system design and control problems, industrial applications.	L2, L3, L4 and L5	7

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text & References:

- Limin Fu. "Neural Networks in Computer Intelligence" McGraw Hill, 1995.
- Freeman J. A., and Skapura D. Mu. "Neural Networks Algorithms applications and Programming Techniques", Addison Wesley New York, 1991.
- Timothy J. Ross, "Fuzzy Logic with Engineering Applications", McGraw Hill 1997.
- Bart Kosko "Neural Network and Fuzzy Systems", Prentice Hall of India, 1994

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	3	--	1	--	--	--	--	--	--	--	--	1	--	2	--
CO2	1	3	--	2	--	--	--	2	--	--	--	--	1	2	--	1
CO3	1	2	2	4	--	--	--	--	--	--	--	--	1	1	--	--
CO4	1	2	2	2	--	--	--	--	--	--	--	--	1	2	--	--
CO5	1	3	2	1	--	--	--	--	--	--	--	--	1	1	--	4

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MLE6905	NEURAL NETWORK AND FUZZY LOGIC LAB	L	T	P	C
Version 2020.1	Date of Approval: JULY 2020	0	0	2	1
Pre-requisites/Exposure	C/C++/MATLAB				
Co-requisites	Nil				

Catalog Description

Neural Networks offer fundamentally alternative approaches to procedural programming. Fuzzy sets and fuzzy logic find many applications in the areas of stability theory, pattern recognition, controls etc. These systems proved their applicability to the problems where there are missing data or information or the problems which could not be defined in an algorithm.

Course Objectives

The objective of this course is to

1. To become familiar with neural networks learning algorithms from available examples and give design methodologies for artificial neural networks.
2. Understand and analyse concepts of fuzzy set and use fuzzy set operations to implement current computing techniques used in fuzzy computing.

Course Outcomes

On completion of this course, the students will be able to

CO1: Understand the difference between learning and programming and explore practical applications of Neural Networks (NN).

CO2: To analyse and appreciate the applications which can use fuzzy logic.

CO3: Understand the efficiency of a hybrid system and how Neural Network and fuzzy logic can be hybridized to form a Neuro-fuzzy network and its various applications and they will be able to design inference systems

Modules	Blooms level*	Number of hours
Lab Session 1: Write a program to implement single layer perception algorithm.	L3 and L4	2
Lab Session 2: Write a program to implement back propagation learning algorithm	L3 and L4	4
Lab Session 3: Design multilayer feed forward network using back-propagation algorithm	L3 and L4	6
Lab Session 4 Study of fuzzy inference system	L1, L2, and L3	2
Lab Session 5 To study fuzzy logic controller using fuzzy logic toolbox	L1, L2, and L3	4
Lab Session 6 Write a program to implement SDPTA	L3 and L4	2
Lab Session 7 Write a program to implement RDPTA	L3 and L4	2
Lab Session 8 To Study various defuzziification techniques	L1, L2, and L3	2
Lab Session 9 Write a program to implement of fuzzy set operation	L2, L3, and L4	2

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**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text & References:

- Limin Fu. "Neural Networks in Computer Intelligence" McGraw Hill, 1995.
- Freeman J. A., and Skapura D. Mu. "Neural Networks Algorithms applications and Programming Techniques", Addison Wesley New York, 1991.

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	2	3	--	--	--	--	3	--	--	--	--	1	2	--	--
CO2	1	--	2	2	--	--	--	3	--	--	--	--	1	2	--	--
CO3	1	2	2	3	--	--	3	--	--	--	--	--	1	--	--	3



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MLE6903	NATURAL LANGUAGE PROCESSING	L	T	P	C
Version 2020.1	Date of Approval: JULY 2020	3	0	0	3
Pre-requisites/Exposure	Basics of Python				
Co-requisites	Nil				

Catalog Description

In this course general introduction including the use of state automata for language processing and syntax including a basic parse for natural language processing are discussed in detail. Basic features like regular expressions, Text Normalization, Edit Distance, n-gram model and advanced feature like feature structures and realistic parsing methodologies, part of speech tagging will be introduced. The concepts learnt in the studies of natural language processing will be applied in jupyter notebook using python for developing small to medium level applications.

Course Objectives

The objective of this course is to

- Equip the students with concepts of natural language processing through problem solving and practical approach.
- Provide an overview of various tools in the field of natural language processing to gain practical understanding of the concepts.

Course Outcomes

On completion of this course, the students will be able to

CO1: Explain, knowledge in speech recognition, models and algorithms; Explain regular expressions and solve related problems; Explain and solve problems related to lemmatization and stemming, minimum edit distance.

CO2: Explain language models and compare their performance on datasets; Solve some problems on naïve bayes algorithm.

CO3: Explain logistic regression, similarity, language modelling and solve problems based on them.

CO4: Describe ANN and Part of speech tagging; Solve problems based on them.

CO5: Describe RNN models and distinguish between simple ANN and RNN;

Modules	Blooms level*	Number of hours
MODULE 1: Knowledge in Speech and Language Processing ,Ambiguity ,Models and Algorithms Language, Thought, and Understanding ,The State of the Art and The Near-Term Future Some Brief History, Regular Expressions, Words ,Corpora,Text Normalization ,Minimum Edit Distance	L1, L2 ,L3	7



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MODULE 2: Evaluating Language Models, Generalization and Zeros, Smoothing, Kneser-Ney Smoothing, The Web and Stupid Backoff, Advanced: Perplexity's Relation to Entropy, Naive Bayes Classifiers, Training the Naive Bayes Classifier, Worked example, Optimizing for Sentiment Analysis, Naive Bayes for other text classification tasks, Naive Bayes as a Language Model, Evaluation: Precision, Recall, F-measure, Test sets and Cross-validation, Statistical Significance Testing Advanced: Feature Selection.	L1,L2, L3	8
MODULE 3: Classification: the sigmoid, Learning in Logistic Regression, The cross-entropy loss function, Gradient Descent, Regularization, Multinomial logistic regression, Interpreting models, Advanced: Deriving the Gradient Equation, Lexical Semantics, Vector Semantics, Words and Vectors, Cosine for measuring similarity, TF-IDF: Weighing terms in the vector, Applications of the tf-idf vector model, Optional: Pointwise Mutual Information (PMI), Word2vec, Visualizing Embeddings, Semantic properties of embeddings, Bias and Embeddings, Evaluating Vector Models.	L1,L2, L3	8
MODULE 4: Units, The XOR problem, Feed-Forward Neural Networks, Training Neural Nets, Neural Language Models, (Mostly) English Word Classes, The Penn Treebank Part-of-Speech Tagset, Part-of-Speech Tagging, HMM Part-of-Speech Tagging, Maximum Entropy Markov Models, Bidirectionality, Part-of-Speech Tagging for Other Languages.	L1, L2 and L3	6
MODULE 5: Simple Recurrent Networks, Applications of RNNs, Deep Networks: Stacked and Bidirectional RNNs, Managing Context in RNNs: LSTMs and GRUs, Words, Characters and Byte-Pairs.	L1, L2,L3	7

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text & References:

1. Daniel Jurafsky & James H.Martin, "Speech and Language Processing", 2nd Edition, Pearson Education, 2009.
2. James Allen, "Natural Language Understanding", 2nd Edition, Pearson Education, 2008.
3. Manning, Christopher D and Hinrich Schütze, "Foundations of Statistical Natural Language Processing", Cambridge, 1st Edition, MA: MIT Press, 1999.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

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CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	1	1	--	--	--	--	--	--	--	--	--	1	1	3	-
CO2	1	1	1	--	--	--	--	--	--	--	--	--	1	1	3	-
CO3	1	1	1	--	-	--	--	--	--	--	--	--	1	1	3	-
CO4	1	2	3	--	--	--	--	--	--	--	--	--	1	1	3	-
CO5	1	2	3	--	--	--	--	--	--	--	--	--	2	2	3	-

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MLE6906	HADOOP LAB	L	T	P	C
Version 2020.1	Date of Approval: JULY 2020	0	0	4	2
Pre-requisites/Exposure	Basic Concepts of DBMS				
Co-requisites	Relational Algebra and Relational Calculus				

Catalog Description

This course brings together several key big data technologies used for storage, analysis and manipulation of data. It also introduces the students the key concepts of Hadoop framework, MapReduce, Pig, Hive, and No-SQL. Students will learn to work on Hadoop platform. The concepts learnt will make students capable of working on big data projects easier.

Course Objectives

The objective of this course is

- To make students familiar with big data technologies.
- Provide an overview of Hadoop architecture and its working with other open source technologies.

Course Outcomes

On completion of this course, the students will be able to

CO1. Install and configure Hadoop and various tools like Pig, Hive etc.

CO2. Explain concepts of files and directories in HDFS and apply them in real database applications.

CO3. Design and implement mapreduce programs for a given problem.

CO4. Solve queries using concepts of Hive and Pig.

CO5. Perform operations using HBase.

Modules	Blooms level*	Number of hours
Lab Session 1 1. Installation & Configuration steps of Hadoop	L1 and L2	2
Lab Session 2-3 1. Working with HDFS commands :mkdir, rmdir, rm, mv, ls, du, put, rm-r, cat, tail etc 2. Working with vi editor	L1and L3	4
Lab Session 4-5 Working with Java Map Reduce : Map Class, Reduce Class, Drier Class, map side joins, reduce side joins	L1 and L3	4
Lab Session 6-8 1. Working with Hive : Queries for Hive : Create table, describe database, describe table, describe extended table, describe formatted table, drop table, drop database, display table, where clause 2. Commands : Load Files on table : Load from HDFS, load from local 3. Command :CTAS Create table as select 4. Queries to create external tables 5. Working with commands like : Order by, group by, like, upper, lower, max, min	L1 and L3	6

Lab Session 9-10 1. Working with PIG : Order by, group by, co group, like, upper, lower, Joins, Union, Cartesian, Product, Pig Scripts	L1 and L3	4
Lab Session 11-12 Working with HBase : Start the hbase, data insert, modify, multiple version insertion, describe, delete truncate, drop etc. Working with Foreign Key and Check Constraint.	L1 and L3	6

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. Jeffrey Aven, "SAMS Teach Yourself Hadoop in 24 Hours", 1st Ed., Pearson ,2017.
2. Tom White, "Hadoop: The Definitive Guide", 3rd Edition, O'reilly, 2012.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	2	--	--	3	--	--	--	--	--	--	--	--	1	1	-
CO2	1	-	--	--	2	--	--	--	--	--	--	2	--	1	1	-
CO3	1	-	1	--	--	--	--	--	--	--	--	2	--	1	1	-
CO4	1	-	2	--	--	--	--	--	--	--	--	--	---	1	1	--
CO5	1	-	2	--	--	--	--	--	--	--	--	--	--	1	--	-

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MLE6907	DESCRIPTIVE ANALYSIS	L	T	P	C
Version 2020.1	Date of Approval: JULY 2020	3	0	0	3
Pre-requisites/Exposure					
Co-requisites	Nil				

Catalog Description

This course introduces some elementary statistical methods of analysis of data and compute various measurements of central tendency, dispersion, skewness and kurtosis. Also discusses computation of the correlation coefficient from ungrouped bivariate data and interpret them and analyse data pertaining to attributes and to interpret results.

Course Objectives

The objective of this course is to

1. Equip the students with concepts of descriptive statistics through problem solving and practical approach.
2. Provide an overview of various tools in the field of statistics to gain practical understanding of the concepts.

Course Outcomes

On completion of this course, the students will be able to

CO1: Explain data sampling and solve related problems; Explain and solve problems related to discrete frequency distribution and continuous frequency distribution.

CO2: Explain data samples and compare their performance on datasets

CO3: Explain regression modelling and solve problems based on them.

CO4: Describe Concept of central tendency of statistical data and solve problems based on them.

CO5: Describe Concept of dispersion and distinguish between concepts of central tendency of statistical data

Modules	Blooms level*	Number of hours
MODULE 1: Definitions: Webster's and Secrist's definition of Statistics, Importance of Statistics, Scope of Statistics: In the field of Industry, Biological Sciences, Medical Sciences, Economics Sciences, Social, Sciences, Management Sciences, Agriculture, Insurance, Actuarial Science, Education and Psychology.	L1, L2, L3	4
MODULE 2: Types of characteristics: Attributes: Nominal scale, ordinal scale. Variables: Interval scale, ratio scale, discrete and continuous variables, Types of data: Primary data, Secondary data, Notion of a statistical population: Finite population, infinite population, homogeneous population and heterogeneous population. Notion of sample, random sample and non-random sample, Methods of sampling: Simple random sampling with and without replacement (SRSWR and SRWOR) stratified random sampling, systematic sampling, cluster sampling and two-stage sampling.	L1, L2, L3	6
MODULE 3: Classification: Raw data and its classification, Discrete frequency distribution, Sturge's rule, continuous frequency distribution, inclusive and exclusive methods of classification, Open end classes, cumulative frequency	L1, L2, L3	6

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distribution and relative frequency distribution, Graphical Presentation of Data: Histogram, frequency curve, frequency polygon, ogive curves, stem and leaf chart, Check sheet, Parato diagram, Examples and Problems.		
MODULE 4: Concept of central tendency of statistical data, Arithmetic Mean (A.M.), combined mean of a number of groups, merits and demerits, Geometric Mean (G.M.), Harmonic Mean (H.M.), Weighted Mean, Weighted A.M., G.M. and H.M. , Mode, Median, Empirical relation between mean, median and mode, Order relation between arithmetic mean, geometric mean, harmonic mean.	L1, L2 and L3	6
MODULE 5: Concept of dispersion, characteristics of good measure of dispersion, Range, Mean deviation, Mean square definition, Variance and standard deviation, Combined variance, Combined standard deviation, generalization for n groups, Measures of dispersion for comparison: coefficient of range, coefficient of quartile deviation and coefficient of mean deviation, coefficient of variation.	L1, L2,L3	6
MODULE 6: Concept of skewness of frequency distribution, positive skewness, negative skewness, symmetric frequency distribution, Bowley's coefficient of skewness, interpretation using Box plot, Karl Pearson's coefficient of skewness, Measures of skewness based on moments (β_1, γ_1), Concepts of kurtosis, leptokurtic, mesokurtic and platykurtic frequency distributions, Measures of kurtosis based on moments, (β_2, γ_2).	L1, L2 ,L3	4
MODULE 7: Bivariate data, bivariate frequency distribution, Concept of correlation between two variables, positive correlation, negative correlation, Scatter diagram, conclusion about the type of correlation from scatter diagram, Covariance between two variables, Karl Pearson's coefficient of correlation, Spearman's rank correlation coefficient, In case of ties, compute Karl Pearson's correlation coefficient between ranks. Regression: lines of regression, fitting of lines of regression by the least squares method, interpretation of slope and intercept. 9.2 Regression coefficient (byx, bxy), Effect of change of origin and scale, Angle between the two lines of regression, Mean residual sum of squares , Residual plot and its interpretation.	L1, L2 ,L3	4

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text & References:

1. Goon A.M.,Gupta M. K., Dasgupta B.(1998): Fundamentals of Statistics (V-1),World Press.
2. Miller and Fruend: Modern Elementary Statistics.
3. Snedecor and Cochran: Statistical Methods, Oxford and IBH Publishers.
4. Mukhopadhyay, P: Mathematical Statistics (1996), New Central Book Agency, Calcutta.
5. Introduction to Mathematical Statistics, Ed. 4 (1989), MacMillan Publishing Co. New York.
6. Gupta and Kapoor: Fundamentals of Mathematical Statistics, Sultan Chand and Sons, New Delhi.
7. Neil Weiss: Introductory Statistics: Pearson Publishers.


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Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	1	1	--	--	--	--	--	--	--	--	--	1	1	3	-
CO2	1	1	1	--	--	--	--	--	--	--	--	--	1	1	3	-
CO3	1	1	1	--	-	--	--	--	--	--	--	--	1	1	3	-
CO4	1	2	3	--	--	--	--	--	--	--	--	--	1	1	3	-
CO5	1	2	3	--	--	--	--	--	--	--	--	--	2	2	3	-

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MLE6908	OPTIMIZATION TECHNIQUES	L	T	P	C
Version 2020.1	Date of Approval: JULY 2020	3	0	0	3
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

The purpose of this course is to develop a knowledge in the field of optimization techniques their basic concepts, principles. linear programming and queuing theory.

Course Objectives

After successful completion of the course, student will be able to understand importance of optimization of industrial process management, apply basic concepts of mathematics to formulate an optimization problem, analyse and appreciate variety of performance measures for various optimization problems.

Course Outcomes

On completion of this course, the students will be able to

CO1: Understand importance of optimization of industrial process management.

CO2: Apply basic concepts of mathematics to formulate an optimization problem

CO3: Analyse and appreciate variety of performance measures for various optimization problems

CO4: Use classical optimization techniques and numerical methods of optimization

CO5: Apply knowledge of optimization to formulate and solve engineering problems

Modules	Blooms level*	Number of hours
MODULE 1: INTRODUCTION Introduction to optimization – adequate and optimum design – principles of optimization – statement of an optimization problem – classification – formulation of objective function, design constraints.	L1, L2	4
MODULE 2: CLASSICAL OPTIMIZATION TECHNIQUES Single variable optimization –multivariable optimization with no constraints – exhaustive search, Fibonacci method, golden selection, Random, pattern and gradient search methods – Interpolation methods: quadratic and cubic, direct root method.	L1, L2, L3 and L5, L6	12
MODULE 3: MULTIVARIABLE – UNCONSTRAINED AND CONSTRAINED OPTIMIZATION Direct search methods – descent methods – conjugate gradient method. Indirect methods – Transformation techniques, penalty function method	L1, L3 and L4	8
MODULE 4: NON – TRADITIONAL OPTIMIZATION TECHNIQUES Genetic Algorithms -steady state algorithm, fitness scaling, inversion. Genetic programming:- Genetic Algorithm in problem solving, Implementing a Genetic Algorithm:- computer implementation, operator (reproduction, crossover and Mutation, Fitness Scaling, Coding, Discretization). Knowledge based techniques in Genetic Algorithm. Advanced operators and techniques in genetic search:-Dominance, Diploidy and Abeyance. Inversion and other reordering operators, Niche and speciation and Tabu search methods.	L1, L3, and L4	10
MODULE 5: OPTIMUM DESIGN OF MACHINE Desirable and undesirable effects – functional requirement – material and geometrical parameters – Design of simple axial, transverse loaded members	L3 and L4	2

for minimum cost and minimum weight.

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text & References:

1. Rao, S.S., "Optimization – Theory and Applications", Wiley Eastern, New Delhi, 1978
2. Fox, R.L., Optimization Methods for Engineering Design, Addition – Wesley, Reading, Mass, 1971.
3. Wilde, D.J., "Optimum Seeking Methods", Prentice Hall, Englewood Cliffs, New Jersey, 1964

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	3	--	1	--	--	--	--	--	--	--	--	1	--	2	--
CO2	1	3	--	2	--	--	--	--	--	--	--	--	1	2	--	1
CO3	1	2	2	4	--	--	--	--	--	--	--	--	1	1	--	--
CO4	1	2	2	2	--	--	--	--	--	--	--	--	1	2	--	--
CO5	1	3	2	1	--	--	--	--	--	--	--	--	1	1	--	4



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MLE6909	SOCIAL NETWORK DATA ANALYTICS	L	T	P	C
Version 2020.1	Date of Approval: JULY 2020	3	0	0	3
Pre-requisites/Exposure	Basis of Database and Networking				
Co-requisites					

Catalog Description

This course gives an introduction to social network analysis, with a focus on modelling. It provides an overview of research questions connected to social networks, and of descriptive measures, models, and methods of analysis that can be used to analyze empirical social network data. It helps to understand the online interactive demonstrations and hands-on analysis of real-world data sets.

Course Objectives

The objective of this course is to

- To provide students effective data-driven intelligence to improve their decisions making and systematically estimate the expected impact on relevant performance objectives
- To equip the students with data-driven intelligence tools, the basics of data mining techniques and develop a data-analytical approach to problem-solving with their application

Course Outcomes

On completion of this course, the students will be able to

CO1. Know the basic notation and terminology used in network science

CO2. Be able to visualize, summarize and compare networks.

CO3. Learn the basic principles behind network analysis algorithms

CO4. Develop practical skills of network analysis in R programming language

CO5: Be capable of analysing real work networks

Course Content

Modules	Bloom's level	Number of Hours
Module I Introduction Overview: Social network data-Formal methods- Paths and Connectivity- Graphs to represent social relations-Working with network data- Network Datasets-Strong and weak ties - Closure, Structural Holes, and Social Capital.	L1, L2	6
Module II Community Discovery in Social Networks: Applications, Methods and Engineering Trends Introduction, Communities in Context, Core Methods, Quality Functions, The Kernighan-Lin (KL) Algorithm, Agglomerative/Divisive Algorithms, Spectral Algorithms, Multi-Level Graph Portioning, Markov Clustering. Other Approaches, Emerging Fields and Problems, Community Discovery in Dynamic Networks, Community Discovery in Heterogeneous Networks, Community Discovery in Directed Networks, Coupling Content and Relationship Information for Community Discovery,	L1, L2, L3	7

Module III Information Networks and the World Wide Web The Structure of the Web- World Wide Web- Information Networks, Hypertext, and Associative Memory- Web as a Directed Graph, Bow-Tie Structure of the Web- Link Analysis and Web Search, Searching the Web: Ranking, Link Analysis using Hubs and Authorities- Page Rank- Link Analysis in Modern Web Search, Applications, Spectral Analysis, Random Walks, and Web Search.	L1, L2, L3	5
Module IV Node Classifications in Social Networks Introduction, Problem Formulation, Representing Data As A Graph, The Node Classification Problem, Methods Using Local Classifiers, Iterative Classification Method, Random Walk Based Methods, Label Propagation, Graph Regularization, Adsorption, Applying Node Classification To Large Social Networks, Basic Approaches, Second-Order Methods, Implementation Within Map-Reduce, Inference Using Graphical Models, Metric Labelling, Spectral Partitioning, Graph Clustering, Variations on Node Classification	L1, L2, L3	6
Module V Data and Text Mining in Social Media Data Mining In Nutshell, Social Media, Motivations For Data Mining In Social Media, Data Mining Methods For Social Media, Data Representation, Data Mining- A Process, Social Networking Sites: Illustrative Examples, Related Efforts, Ethnography And Netnography, Event Maps, Text Mining: Keyword Search, Query Semantics And Answer Ranking, Keyword Search over Xml and Relational Data, Keyword Search Over Graph Data, Classification Algorithms, Clustering Algorithms, Transfer Learning in Heterogeneous Networks.	L1, L3, L4	6
Module VI Overview of Social Tagging Introduction, Problems With Metadata Generation and Fixed Taxonomies, Tags: Why And What?, Different User Tagging Motivations, Kinds Of Tags, Linguistic Classifications Of Tags, Game-Based Tagging, Tag Generation Models, Tagging System Design, Tag Analysis, Tagging Distributions, Identifying Tag Semantics, Tags Versus Keywords, Visualization Of Tags, Tag Clouds For Browsing/Search, Tag Selection For Tag Clouds, Tag Hierarchy Generation, Tag Cloud Display Formats, Tag Evolution Visualization.	L1, L2	6

***Bloom's Level:**

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

1. Easley and Kleinberg, "Networks, Crowds, and Markets: Reasoning about a highly connected world", Cambridge Univ. Press, 2010.
2. Charu C. Aggarwal, "Social Network Data Analytics", Springer, 2011.
3. Robert A. Hanneman and Mark Riddle, "Introduction to social network methods", University of California, 2005.

Reference Books

1. Jure Leskovec, Anand Rajaraman, and Jeffrey D. Ullman, "Mining of Massive Datasets", Cambridge University Press, 2nd edition, 2014.
2. Wasserman, S., & Faust, K, "Social Network Analysis: Methods and Applications", Cambridge University Press; 1st edition, 1994.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination



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Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance


CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	2	--	--	--	--	--	--	--	--	--	--	1	3	1	1
CO2	1	--	2	3	--	--	--	--	--	--	--	--	1	3	1	2
CO3	1	1	2	3	3	--	--	--	--	--	--	--	1	2	1	2
CO4	1	1	3	--	--	--	--	--	--	--	--	--	1	2	1	1
CO5	1	2	2	--	--	--	--	--	--	--	--	--	1	1	1	1

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MLE6910	AGENT BASED INTELLIGENT SYSTEMS	L	T	P	C
Version 2020.1	Date of Approval: JULY 2020	3	0	0	3
Pre-requisites/Exposure	Basics of Python				
Co-requisites	Nil				

Catalog Description

This course provides students basic knowledge of employing intelligent agents in solving complex problems and gives the awareness of the building blocks of agents and working of different types of agents. It also analyses the reasons for uncertainty and ability to design agents to handle them.

Course Objectives

The objective of this course is to

1. Equip the students with the knowledge of intelligent agents in solving complex problems.
2. Provide an overview of Building Agents, Knowledge Based Agents, Planning Agents and Higher Level Agents.

Course Outcomes

On completion of this course, the students will be able to

CO1: Explain the concept of knowledge intelligent agents and use in solving complex problems.

CO2: Describe the concept of Concepts for Building Agents and Knowledge Based Agents.

CO3: Explain the concept of Planning Agents and Higher Level Agents.

CO4: Describe the concept of Agents and Uncertainty and Higher Level Agents.

Modules	Blooms level*	Number of hours
MODULE 1: Definitions – History – Hybrid Intelligent Agents – Agents vs Multi Agent Systems– Structure – Environment – Basic Problem Solving Agents – Complex Problem Solving Agents – Formulating Search Strategies – Intelligent Search.	L1, L2, L3	7
MODULE 2: Situated Agents: Actions and Percepts - Proactive and Reactive Agents: Goals and Events- Challenging Agent Environments: Plans and Beliefs - Social Agents - Agent Execution Cycle.	L1,L2, L3	8
MODULE 3: Knowledge Representation – Logic – First Order Logic – Reflex Agent – Building a Knowledge Base – General Ontology – Interference – Logical Recovery.	L1,L2, L3	7
MODULE 4: Situational Calculus – Representation of Planning – Partial Order Planning – Practical Planners– Conditional Planning - Preplanning Agents.	L1, L2 and L3	5
MODULE 5: Acting under uncertainty – Probability – Baye's Rule – Belief Networks – Utility Theory - Decision Network- Value of Information – Decision Theoretic Agent Design.	L1, L2,L3	5

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MODULE 6: Learning Agents – General Model – Inductive Learning – Learning Decision Tree – Reinforcement Learning – Knowledge in Learning – Communicative Agents – Types of Communicative Agents – Future of AI.	L1, L2 and L3	4
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**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text & References:

1. Stuart Russell and Peter Norvig, "Artificial Intelligence: A Modern Approach", 3rd Edition, Prentice Hall, 2010.
2. Lin Padgham, Michael Winikoff, "Developing Intelligent Agent Systems: A Practical Guide", 1st Edition, John Wiley & Sons, 2004.
3. ZiliZhang, Chengqi Zhang, "Agent-Based Hybrid Intelligent Systems: An Agent- Based Framework for Complex Problem Solving", 1st Edition, Springer-Verlag New York, LLC , 2004.
4. Ngooc Thanh Nguyaaen, Lakhmi C. Jain, "Intelligent Agents in the Evolution of Web and Applications", 4th Edition, Springer, 2009.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	1	1	--	--	--	--	--	--	--	--	--	1	1	3	-
CO2	1	1	1	--	--	--	--	--	--	--	--	--	1	1	3	-
CO3	1	1	1	--	-	--	--	--	--	--	--	--	1	1	3	-
CO4	1	2	3	--	--	--	--	--	--	--	--	--	1	1	3	-
CO5	1	2	3	--	--	--	--	--	--	--	--	--	2	2	3	-

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AIE6037	PROJECT DISSERTATION-II	L	T	P	C
Version 2020.1	Date of Approval: JULY 2020	0	0	0	15
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

The objective of this course is to provide practical training on some live/demo projects that will increase capability to work on actual problem in industry. It will be an in house training on some latest software which is in high demand in market. This training will be designed such that it will be useful for their future employment in industry.

Course Objectives

The objective of this course is to

1. Provide practical training on live projects
2. Increase technical capabilities on solving real life problems in company environment

Course Outcomes

On completion of this summer internship, the students will be able to:

CO1: Demonstrate a sound technical knowledge of their selected project topic.

CO2: Design and develop engineering solutions to complex problems utilising a systems approach.

CO3: Analyse various approaches for solving a complex engineering problem using different tools and techniques


CO4: Demonstrate the knowledge, skills and attitudes of a professional engineer.

CO5: Apply technical skills and knowledge in completing the project.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	2	--	--	--	--	--	--	1	--	--	--	--	--	1	1
CO2	1	1	--	--	--	--	--	--	1	--	--	--	--	--	1	1
CO3	1	1	--	--	--	--	--	--	1	--	--	--	--	--	1	1
CO4	1	1	--	--	--	--	--	--	1	--	--	--	--	--	1	1
CO5	1	1	--	--	--	--	--	--	1	-	-	-	--	--	1	1

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Curriculum & Scheme of Examination

2022

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INTRODUCTION TO COMPUTERS AND PROGRAMMING IN C

Course Code: DSE6104

Credit Units: 03

Course Objective:

The objective of this course module is to acquaint the students with the basics of computers system, its components, data representation inside computer and to get them familiar with various important features of procedure oriented programming language i.e. C.

Course Contents:

Module I: Introduction

Introduction to computer, history, von-Neumann architecture, memory system (hierarchy, characteristics and types), H/W concepts (I/O Devices), S/W concepts (System S/W & Application S/W, utilities). Data Representation: Number systems, character representation codes, Binary, octal, hexadecimal and their interconversions. Binary arithmetic, floating point arithmetic, signed and unsigned numbers, Memory storage unit.

Module II: Programming in C

History of C, Introduction of C, Basic structure of C program, Concept of variables, constants and data types in C, Operators and expressions: Introduction, arithmetic, relational, Logical, Assignment, Increment and decrement operator, Conditional, bitwise operators, Expressions, Operator precedence and associativity. Managing Input and output Operation, formatting I/O.

Module III: Fundamental Features in C

C Statements, conditional executing using if, else, nesting of if, switch and break Concepts of loops, example of loops in C using for, while and do-while, continue and break. Storage types (automatic, register etc.), predefined processor, Command Line Argument.

Module IV: Arrays and Functions

One dimensional arrays and example of iterative programs using arrays, 2-D arrays Use in matrix computations.

Concept of Sub-programming, functions Example of user defined functions. Function prototype, Return values and their types, calling function, function argument, function with variable number of argument, recursion.

Module V: Advanced features in C

Pointers, relationship between arrays and pointers Argument passing using pointers, Array of pointers. Passing arrays as arguments.

Strings and C string library.

Structure and Union. Defining C structures, Giving values to members, Array of structure, Nested structure, passing strings as arguments.

File Handling.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

Text:

- "ANSI C" by E Balagurusamy
- Yashwant Kanetkar, "Let us C", BPB Publications, 2nd Edition, 2001.
- Herbert Schildt, "C: The complete reference", Osbourne Mcgraw Hill, 4th Edition, 2002.
- K. R. Raman, "Computer Programming in C", Prentice Hall of India, 1995.

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References:

- Kernighan & Ritchie, “C Programming Language”, The (Ansi C Version), PHI, 2nd Edition.
- J. B Dixit, “Fundamentals of Computers and Programming in ‘C’.
- P.K. Sinha and Priti Sinha, “Computer Fundamentals”, BPB publication.



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PROGRAMMING IN C LAB

Course Code: DSE6106

Credit Units: 01

Software Required: Turbo C

Course Contents:

- C program involving problems like finding the nth value of cosine series, Fibonacci series. Etc.
- C programs including user defined function calls
- C programs involving pointers, and solving various problems with the help of those.
- File handling

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.



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ENGINEERING GRAPHICS LAB

Course Code: DSE6211

Credit Units: 01

Course Objective:

This course will provide students concepts on the drawings of different curves like straight line, parabola, ellipse etc. After completion of this course, students will be able to draw different figures manually and will be capable of using various instruments involved in drawings.

Course Contents:

Module I: General

Importance, Significance and scope of engineering drawing, Lettering, Dimensioning, Scales, Sense of proportioning, Different types of projections, Orthographic Projection, B.I.S. Specifications.

Module II: Projections of Point and Lines

Introduction of planes of projection, Reference and auxiliary planes, projections of points and Lines in different quadrants, traces, inclinations, and true lengths of the lines, projections on Auxiliary planes, shortest distance, intersecting and non-intersecting lines.

Module III: Planes other than the Reference Planes

Introduction of other planes (perpendicular and oblique), their traces, inclinations etc., Projections of points and lines lying in the planes, conversion of oblique plane into auxiliary Plane and solution of related problems.

Module IV: Projections of Plane Figures

Different cases of plane figures (of different shapes) making different angles with one or both reference planes and lines lying in the plane figures making different given angles (with one of both reference planes). Obtaining true shape of the plane figure by projection.

Module V: Projection of Solids

Simple cases when solid is placed in different positions, Axis faces and lines lying in the faces of the solid making given angles.

Module VI: Development of Surface

Development of simple objects with and without sectioning. Isometric Projection

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

Text & References:

- M.B. Shah & B.C. Rana, Engineering Drawing, Pearson Education, 2007
- PS Gill, Engineering Drawing, Kataria Publication
- ND Bhatt, Engineering Drawing, Charotar publications
- N Sidheshwar, Engineering Drawing, Tata McGraw Hill
- CL Tanta, Mechanical Drawing, “Dhanpat Rai”

OBJECT ORIENTED PROGRAMMING USING C++

Course Code: DSE6204

Credit Units: 03

Course Objective:

The objective of this module is to introduce object oriented programming. To explore and implement the various features of OOP such as inheritance, polymorphism, Exceptional handling using programming language C++. After completing this course student can easily identify the basic difference between the programming approaches like procedural and object oriented.

Course Contents:

Module I: Introduction

Review of C, Difference between C and C++, Procedure Oriented and Object Oriented Approach. Basic Concepts: Objects, classes, Principals like Abstraction, Encapsulation, Inheritance and Polymorphism. Dynamic Binding, Message Passing. Characteristics of Object-Oriented Languages. Introduction to Object-Oriented Modeling techniques (Object, Functional and Dynamic Modeling).

Module II: Classes and Objects

Abstract data types, Object & classes, attributes, methods, C++ class declaration, Local Class and Global Class, State identity and behaviour of an object, Local Object and Global Object, Scope resolution operator, Friend Functions, Inline functions, Constructors and destructors, instantiation of objects, Types of Constructors, Static Class Data, Array of Objects, Constant member functions and Objects, Memory management Operators.

Module III: Inheritance

Inheritance, Types of Inheritance, access modes – public, private & protected, Abstract Classes, Ambiguity resolution using scope resolution operator and Virtual base class, Aggregation, composition vs classification hierarchies, Overriding inheritance methods, Constructors in derived classes, Nesting of Classes.

Module IV: Polymorphism

Polymorphism, Type of Polymorphism – Compile time and runtime, Function Overloading, Operator Overloading (Unary and Binary) Polymorphism by parameter, Pointer to objects, this pointer, Virtual Functions, pure virtual functions.

Module V: Strings, Files and Exception Handling

Manipulating strings, Streams and files handling, formatted and Unformatted Input output. Exception handling, Generic Programming – function template, class Template Standard Template Library: Standard Template Library, Overview of Standard Template Library, Containers, Algorithms, Iterators, Other STL Elements, The Container Classes, General Theory of Operation, Vectors.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

Text & References:

Text:

- A.R. Venugopal, Rajkumar, T. Ravishanker “Mastering C++”, TMH, 1997
- R. Lafore, “Object Oriented Programming using C++”, BPB Publications, 2004.
- “Object Oriented Programming with C++” By E. Balagurusamy.
- Schildt Herbert, “C++: The Complete Reference”, Wiley DreamTech, 2005.

References:

- Parsons, “Object Oriented Programming with C++”, BPB Publication, 1999.
- Steven C. Lawlor, “The Art of Programming Computer Science with C++”, Vikas Publication, 2002.
- Yashwant Kanethkar, “Object Oriented Programming using C++”, BPB, 2004

OBJECT ORIENTED PROGRAMMING USING C++ LAB

Course Code: DSE6208

Credit Units: 01

Software Required: Turbo C++

Course Contents:

- Creation of objects in programs and solving problems through them.
- Different use of private, public member variables and functions and friend functions.
- Use of constructors and destructors.
- Operator overloading
- Use of inheritance in and accessing objects of different derived classes.
- Polymorphism and virtual functions (using pointers).
- File handling.

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

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BASICS OF ELECTRICAL & ELECTRONICS ENGINEERING LAB

Course Code: DSE6213

Credit Units: 01

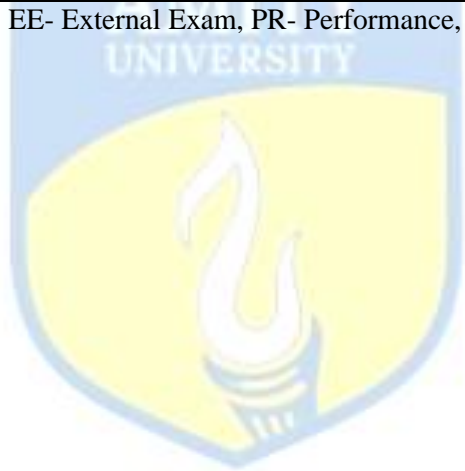
List of Experiments:

1. To verify KVL & KCL in the given network.
2. To verify Superposition Theorem.
3. To verify Maximum Power Transfer Theorem.
4. To verify Reciprocity Theorem.
5. To determine and verify R_{Th} , V_{Th} , R_N , I_N in a given network.
6. To perform open circuit & short circuit test on a single-phase transformer.
7. To study transient response of a given RLC Circuit.
8. To perform regulation, ratio & polarity test on a single-phase transformer.
9. To measure power & power factor in a three phase circuit by two wattmeter method.
10. To measure power & power factor in a three phase load using three ammeter & three voltmeter method.

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

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Haryana-122413


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Manesar Gurgaon-122413

DATABASE MANAGEMENT SYSTEMS

Course Code: DSE6302

Credit Units: 04

Course Objective:

The objective of this course is to get students familiar with Databases and their use. They can identify different types of available database model, concurrency techniques and new applications of the DBMS.

Course Contents:

Module I: Introduction

Concept and goals of DBMS, DBMS Architecture, Database Languages, Database Users, Database Abstraction.

Basic Concepts of ER Model: Entity Type, Entity Set, Relationship type, Relationship sets, Constraints: Cardinality Ratio and Participation Constraint, Keys, Mapping, Design of ER Model

Module II: Hierarchical model & Network Model

Concepts, Data definition, Data manipulation and implementation.

Network Data Model, DBTG Set Constructs, and Implementation

Module III: Relational Model

Relational database, Relational Algebra, Relational Calculus, Tuple Calculus.

Module IV: Relational Database Design and Query Language

SQL, QUEL, QBE, Normalization using Functional Dependency, 1NF, 2NF, 3NF, BCNF, Multivalued dependency and Join dependency.

Module V: Concurrency Control and New Applications

Transaction basics: ACID property, Lifecycle of Transaction, Why Concurrency Control, Schedule, Serializability, Lock Based Protocols, Time Stamped Based Protocols, Deadlock Handling, Crash Recovery. Distributed Database, Objective Oriented Database, Multimedia Database, Data Mining, Digital Libraries.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

Text & References:

Text:

- Korth, Silberschatz, "Database System Concepts", 4th Ed., TMH, 2000.
- Steve Bobrowski, "Oracle & Architecture", TMH, 2000

References:

- Date C. J., "An Introduction to Database Systems", 7th Ed., Narosa Publishing, 2004
- Elmsari and Navathe, "Fundamentals of Database Systems", 4th Ed., A. Wesley, 2004
- Ullman J. D., "Principles of Database Systems", 2nd Ed., Galgotia Publications, 1999.

OPERATING SYSTEMS

Course Code: DSE6303

Credit Units: 03

Course Objective:

Operating Systems serve as one of the most important courses for undergraduate students, since it provides the students with a new sight to envision every computerized systems especially general purpose computers. Therefore, the students are supposed to study, practice and discuss on the major fields discussed in the course to ensure the success of the education process. The outcome of this course implicitly and explicitly affects the abilities the students to understand, analyze and overcome the challenges they face with in the other courses and the real world.

Course Contents:

Module I: Introduction to operating system

Operating system and function, Evolution of operating system, Batch, Interactive, multiprogramming, Time Sharing and Real Time System, multiprocessor system, Distributed system, System protection. Operating System structure, Operating System Services, System Program and calls.

Module II: Process Management

Process concept, State model, process scheduling, job and process synchronization, structure of process management, Threads, Inter-process Communication and Synchronization: Principle of Concurrency, Producer Consumer Problem, Critical Section problem, Semaphores, Hardware Synchronization, Critical Regions, Conditional critical region, Monitor, Inter Process Communication.

CPU Scheduling: Job scheduling functions, Process scheduling, Scheduling Algorithms, Non Preemptive and preemptive Strategies, Algorithm Evaluation, Multiprocessor Scheduling.

Deadlock: System Deadlock Model, Deadlock Characterization, Methods for handling deadlock, Prevention strategies, Avoidance and Detection, Recovery from deadlock combined approach.

Module III: Memory Management

Single Contiguous Allocation: H/W support, S/W support, Advantages and disadvantages, Fragmentation, Paging, Segmentation, Virtual memory concept, Demand paging, Performance, Paged replaced algorithm, Allocation of frames, Thrashing, Cache memory, Swapping, Overlays

Module IV: Device management

Principles of I/O hardware, Device controller, Device Drivers, Memory mapped I/O, Direct Access Memory, Interrupts, Interrupt Handlers, Application I/O interface, I/O Scheduling, Buffering, Caching, Spooling,

Disk organization, Disk space management, Disk allocation Method, Disk Scheduling, Disk storage.

Module V: File System and Protection and security

File Concept, File Organization and Access Mechanism, File Directories, Basic file system, File Sharing, Allocation method, Free space management.

Policy Mechanism, Authentication, Internal excess Authorization.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

Text & References:

Text:

- MileneKovic, "Operating System Concepts", McGraw Hill
- Abraham Silberschatz, P.B. Galvin "Operating System Concepts", John Willey & son

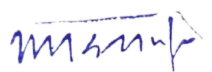
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References:

- Dietel, “An introduction to operating system”, Addison Wesley
- Tannenbaum, “Operating system design and implementation”, PHI
- Operating System, A Modern Perspective, Gary Nutt, Pearson Edu. 2000
- A. S Tanenbaum, Modern Operating System, 2nd Edition, PHI.
- William Stalling “ Operating system” Pearson Education
- B. W. Kernighan & R. Pike, “The UNIX Programming Environment” Prentice Hall of India, 2000
- Sumitabha Das “ Your UNIX The ultimate guide” Tata McGraw Hill
- “Design of UNIX Operating System “ The Bach Prentice – Hall of India



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DATA STRUCTURES USING C

Course Code: DSE6304

Credit Units: 04

Course Objective:

Data structure deals with organizing large amount of data in order to reduce space complexity and time requirement. This course gives knowledge of algorithms, different types of data structures and the estimation space and time complexity.

Course Contents:

Module I: Introduction to Data structures

Data structures: Definition, Types. Algorithm design, Complexity, Time-Space Trade- offs. Use of pointers in data structures. Array Definition and Analysis, Representation of Linear Arrays in Memory, Traversing of Linear Arrays, Insertion And Deletion, Single Dimensional Arrays, Two Dimensional Arrays, Multidimensional Arrays, Function Associated with Arrays, Character String in C, Character String Operations, Arrays as parameters, Implementing One Dimensional Array, Sparse matrix.

Module II: Introduction to Stacks and queue

Stack: Definition, Array representation of stacks, Operations Associated with Stacks- Push & Pop, Polish expressions, Conversion of infix to postfix, infix to prefix (and vice versa), Application of stacks recursion, polish expression and their compilation, conversion of infix expression to prefix and postfix expression, Tower of Hanoi problem.

Queue: Definition, Representation of Queues, Operations of queues- QInsert, QDelete, Priority Queues, Circular Queue, Deque.

Module III: Dynamic Data Structure

Linked list: Introduction to Singly linked lists: Representation of linked lists in memory, Traversing, Searching, Insertion into, Deletion from linked list, doubly linked list, circular linked list, generalized list. Applications of Linked List-Polynomial representation using linked list and basic operation. Stack and queue implementation using linked list.

Module IV: Trees and Graphs

Trees: Basic Terminology, Binary Trees and their representation, expression evaluation, Complete Binary trees, extended binary trees, Traversing binary trees, Searching, Insertion and Deletion in binary search trees, General trees, AVL trees, Threaded trees, B trees.

Graphs: Terminology and Representations, Graphs & Multigraphs, Directed Graphs, Sequential representation of graphs, Adjacency matrices, Transversal Connected Component and Spanning trees.

Module V: Sorting and Searching and file structures

Sorting: Insertion Sort, Bubble sort, Selection sort, Quick sort, two-way Merge sort, Heap sort, Partition exchange sort, Shell sort, Sorting on different keys, External sorting.

Searching: Linear search, Binary search, File structures: Physical storage media, File Organization, Linked organization of file, Inverted file, Organization records into blocks, Sequential blocks, Hash function, Indexing & Hashing, Multilevel indexing, Tree Index, Random file, Primary Indices, Secondary Indices, B tree index files.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

Text & References:

Text:

- Horowitz and Sahani, "Fundamentals of Data structures", Galgotia publications
- Tannenbaum, "Data Structures", PHI
- R.L. Kruse, B.P. Leary, C.L. Tondo, "Data structure and program design in C" PHI
- Data structures and algorithms" – Schaum Series.

DATA STRUCTURES USING C LAB

Course Code: DSE6305

Credit Units: 01

Software Required: Turbo C++

Assignment will be provided for following:

- Practical application of sorting and searching algorithm.
- Practical application of various data structure like linked list, queue, stack, tree

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.



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DATA COMMUNICATION AND COMPUTER NETWORKS LAB

Course Code: DSE6415

Credit Units: 01

Equipments Required:

Switch Network Cables, Patch Chord- Fiber optical and twisted pair cable, LAN cards, RJ-45 connectors etc.

Platforms required: Linux Server

Course Contents:

- Introduction and Installation of Linux
- Administrating Linux
- Setting up a Local Area Network
- Connecting to the Internet
- Setting up Print Server
- Setting up File Server
- Setting up Mail Server
- Setting up FTP Server
- Setting up Web Server
- Setting up MySQL Database Server

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

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DATABASE MANAGEMENT SYSTEMS LAB

Course Code: DSE6307

Credit Units: 01

Software Required: Oracle 9i

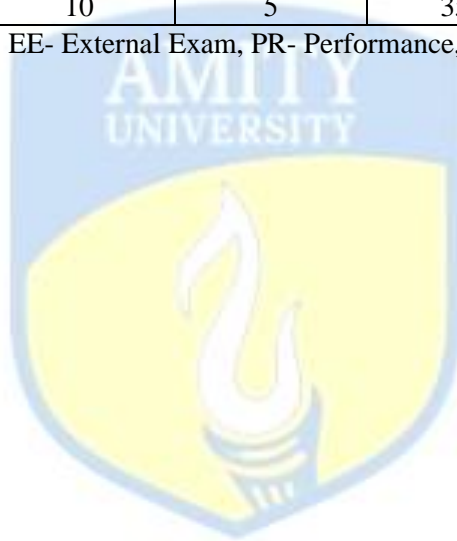
Topics covered in lab will include:

- Database Design
- Data Definition (SQL)
- Data Retrieval (SQL)
- Data Modification (SQL)
- Views
- Triggers and Procedures
- PL\SQL

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

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UNIX PROGRAMMING LAB

Course Code: DSE6308

Credit Units: 01

Software Required: UNIX SCO

Assignments will be provided for the following

- Introduction to UNIX Commands
- Introduction to vi editor
- Programming in shell script
- Introduction to programming in C Shell

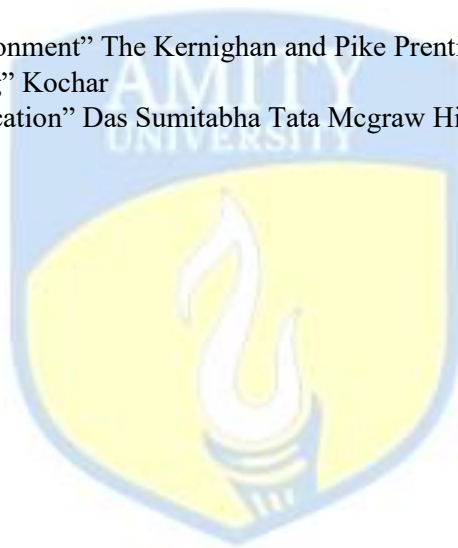
Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

Text & References:

- “Unix Programming Environment” The Kernighan and Pike Prentice – Hall of India
- “Unix –Shell Programming” Kochar
- “ Unix Concepts and application” Das Sumitabha Tata Mcgraw Hill



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E-COMMERCE AND ERP

Course Code: DSE6310

Credit Units: 03

Course Objective:

This course examines the evolution of enterprise resource planning (ERP) systems - from internally focused client/server systems to externally focused e-business. This class studies the types of issues that managers will need to consider in implementing cross-functional integrated ERP systems. The objective of this course is to make students aware of the potential and limitations of ERP systems. This objective will be reached through hands-on experience, case studies, lectures, guest speakers and a group project. The course would equip students with the basics of E-Commerce, technologies involved with it and various issues associated with.

Course Contents:

Module I: Introduction E-commerce and ERP

E-commerce and its types, EDI and its basics, Digital payment systems, Enterprise-An Overview, Benefits of ERP, ERP and Related Technologies-Business Process Reengineering (BPR), Data Warehousing, Data Mining, On-line Analytical Processing (OLAP), Supply Chain Management, Management Information systems (MIS), Decision support system (DSS), Executive Information systems (EIS). ERP – A Manufacturing Perspective Materials Requirement Planning (MRP), Bill of Material (Bom), Distribution Requirements Planning (DRP), JIT & Kanban, CAD/CAM, Product Data Management (PDM), Benefits of PDM, MTO, MTS, ATO, ETO, CTO.

Module II: ERP Modules

Business Modules in an ERP Packag- Finance, Manufacturing (Production), Human Resources, Plant Maintenance, Materials Management, Quality Management, Sales and Distribution.

Module III: Benefits of ERP

Time Reduction, On time shipment, Improved Resource Utilization, Performance, Customer Satisfaction, Flexibility, information accuracy and decision making capability, reduction in quality costs, Accuracy.

Module IV: ERP Implementation

ERP Implementation Lifecycle, Implementation Methodology, In-house implementation-Pros and cons, Vendors, Consultants and Users and their roles, Project Management and Monitoring after ERP Implementation.

Module V: The ERP Market and Future Directions

ERP Market Place- SAP AG, PeopleSoft, Baan Company, JD Edwards World Solutions Company, Oracle Corporation, QAD, System Software Associates, Inc. (SSA).Future directions in ERP.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

Text & References:

Text:

- Alexis Leon, "Enterprise Resource Planning", Tata McGraw Hill 2001
- Bajaj, Kamlesh K. and Nag, Debjani, E-Commerce: The Cutting Edge of Business, Tata McGraw-Hill Publishing Company

References:

- Loshin, Pete and Murphy, Paul, *Electronic Commerce*, Second edition, 1990, Jaico Publishing House, Mumbai.
- S. Sadagopan, "Enterprise Resource Planning", Tata McGraw Hill 2000

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ELECTRONIC DEVICES & CIRCUITS

Course Code: DSE6311

Credit Units: 02

Course Objective:

This course builds from basic knowledge of Semiconductor Physics to an understanding of basic devices and their models. This course builds a foundation for courses on VLSI design and analog CMOS IC Design.

Course Contents:

Module I: Semiconductor physics: Mobility & conductivity, Charge densities in a semiconductor, Fermi dirac distribution, carrier concentration and Fermi levels in semiconductor, generation and recombination of charges, diffuse and continuity equations, Hall effect.

Module II: Semiconductor Diode and Diode Circuits

Junction diode, Diode as circuit element, Different types of diodes: Zener, Schottky, LED. Zener as voltage regulator, Diffusion capacitance, Drift capacitance, the load line concept, half wave, full wave rectifiers, clipping and clamping circuits.

Module III: Bipolar Junction Transistor

Bipolar junction transistor: Introduction, Transistor, construction, transistor operations, BJT characteristics, load line, operating point, leakage currents, saturation and cut off mode of operations. Bias stabilization: Need for stabilization, fixed Bias, emitter bias, self bias, bias stability with respect to variations in I_{CO} , V_{BE} & β , Stabilization factors, thermal stability.

Module IV: Small signal Analysis of transistor and Multistage Amplifier

Hybrid model for transistors at low frequencies, Analysis of transistor amplifier using h parameters, emitter follower, Miller's theorem, THE CE amplifier with an emitter resistance, Hybrid π model, Hybrid π Conductances and Capacitances, CE short circuit current gain, CE short circuit current gain with R_L Multistage amplifier: Cascading of Amplifiers, Coupling schemes (RC coupling and Transformer coupling)

Module V: Field Effect Transistors

Field effect transistor (JFET, MOSFET): volt-ampere characteristics, small signal model –common drain, common source, common gate, operating point, MOSFET, enhancement and -depletion mode, Common source amplifier, Source follower

Module VI: Feedback Amplifiers

Feedback concept, Classification of Feedback amplifiers, Properties of negative Feedback amplifiers, Impedance considerations in different Configurations, Examples of analysis of feedback Amplifiers.

Module VII: Power Amplifiers

Power dissipation in transistors, difference with voltage amplifiers, Amplifier classification (Class A, Class B, Class C, Class AB) class AB push pull amplifier, collector efficiency of each, cross over distortion.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

Text & References:

- Robert F. Pierret: Semiconductor Device Fundamentals, Pearson Education.
- Millman and Halkias: Electronic Devices and circuits, Tata McGraw.
- Boylestad: Electronic Devices and Circuits, Pearson Education.

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DIGITAL ELECTRONICS

Course Code: DSE6313

Credit Units: 02

Course Objective:

This course is an introduction to the basic principles of digital electronics. At the conclusion of this course, the student will be able to quantitatively identify the fundamentals of computers, including number systems, logic gates, logic and arithmetic subsystems, and integrated circuits. They will gain the practical skills necessary to work with digital circuits through problem solving and hands on laboratory experience with logic gates, encoders, flip-flops, counters, shift registers, adders, etc. The student will be able to analyze and design simple logic circuits using tools such as Boolean Algebra and Karnaugh Mapping, and will be able to draw logic diagrams.

Course Contents:

Module I: Boolean Functions

Analog & digital signals, AND, OR, NOT, NAND, NOR & XOR gates, Boolean algebra, Standard representation of logical functions, K-map representation and simplification of logical function, don't care conditions, XOR & XNOR simplifications of K-maps, Tabulation method.

Module II: Combinational Circuits

Adders, Subtractors, Multiplexer, de-multiplexer, decoder & encoder, code converters, Comparators, decoder / driver for display devices, Implementation of logic functions using multiplexer / de-multiplexer,.

Module III: Sequential Circuits

Flip-flops: SR, JK, D & T flip flops – Truth table, Excitation table, Conversion of flip-flops, race around condition, Master Slave flip flop, Shift registers: SIPO, PISO, PIPO, SIPO, Bi-directional; Counters: ripple & synchronous counters – up / down; Synchronous Sequential circuit: design procedure.

Module IV: Logic families

Logic families: RTL, DTL, TTL, ECL

Module V: Data Converters

Data converters: ADC – successive approximation, linear ramp, dual slope; DAC – Binary Weighted, R-2R ladder type

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

- Moris Mano: Digital Circuits Systems
- R. P. Jain: Digital Logic & Circuits
- Thomas L. Floyd: Digital Fundamentals
- Malvino and Leech: Digital Principles & Applications

ARTIFICIAL INTELLIGENCE

Course Code: DSE6404

Credit Units: 03

Course Objective:

To develop semantic-based and context-aware systems to acquire, organize process, share and use the knowledge embedded in multimedia content. Research will aim to maximize automation of the complete knowledge lifecycle and achieve semantic interoperability between Web resources and services. The field of Robotics is a multi disciplinary as robots are amazingly complex system comprising mechanical, electrical, electronic H/W and S/W and issues germane to all these.

Course Contents:

Module I: Problem solving and Scope of AI

Introduction to Artificial Intelligence. Applications- Games, theorem proving, natural language processing, vision and speech processing, robotics, expert systems. AI techniques- search knowledge, abstraction.

Problem Solving

State space search; Production systems, search space control: depth-first, breadth-first search. Heuristic search - Hill climbing, best-first search, branch and bound. Problem Reduction, Constraint Satisfaction End, Means-End Analysis. LA* Algorithm, L(AO*) Algorithm.

Module II: Knowledge Representation

Knowledge Representation issues, first order predicate calculus, Horn Clauses, Resolution, Semantic Nets, Frames, Partitioned Nets, Procedural Vs Declarative knowledge, Forward Vs Backward Reasoning.

Module III: Understanding Natural Languages

Introduction to NLP, Basics of Syntactic Processing, Basics of Semantic Analysis, Basics of Parsing techniques, context free and transformational grammars, transition nets, augmented transition nets, Shanks Conceptual Dependency, Scripts ,Basics of grammar free analyzers, Basics of sentence generation, and Basics of translation..

Module IV

Expert System: Need and justification for expert systems, knowledge acquisition, Case studies: MYCIN, R1

Learning: Concept of learning, learning automation, genetic algorithm, learning by inductions, neural nets. **Programming Language:** Introduction to programming Language, LISP and PROLOG.

Handling Uncertainties: Non-monotonic reasoning, Probabilistic reasoning, use of certainty factors, Fuzzy logic.

Module V: Introduction to Robotics

Fundamentals of Robotics, Robot Kinematics: Position Analysis, Dynamic Analysis and Forces, Robot Programming languages & systems: Introduction, the three levels of robot programming, requirements of a robot programming language, problems peculiar to robot programming languages.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

Text & References:

Text:

- E. Rich and K. Knight, "Artificial intelligence", TMH, 2nd ed., 1992.
- John Nilsson, "Principles of AI", Narosa Publ. House, 1990.
- John J. Craig, "Introduction to Robotics", Addison Wesley publication

- Richard D. Klafter, Thomas A. Chmielewski, Michael Negin, “Robotic Engineering – An integrated approach”, PHI Publication
- Tsuneo Yoshikawa, “Foundations of Robotics”, PHI Publication

References:

- D.W. Patterson, “Introduction to AI and Expert Systems”, PHI, 1992.
- Peter Jackson, “Introduction to Expert Systems”, AWP, M.A., 1992.
- R.J. Schalkoff, “Artificial Intelligence - an Engineering Approach”, McGraw Hill Int. Ed., Singapore, 1992.
- M. Sasikumar, S. Ramani, “Rule Based Expert Systems”, Narosa Publishing House, 1994.



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DIGITAL ELECTRONICS LAB

Course Code: DSE6314

Credit Units: 01

List of Experiments:

1. To verify the truth tables of OR, AND, NOR, NAND, EX-OR, EX-NOR gates.
2. To obtain half adder, full adder and subtractor using gates and verify their truth tables.
3. To verify the truth tables of RS, JK and D flip- flops.
4. To design and study a binary counter.
5. To design and study synchronous counter.
6. To design and study ripple counter.
7. To convert BCD number into excess 3 form
8. To design and study a decade counter.
9. To design and study a sequence detector.
10. To implement control circuit using multiplexer.

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

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ARTIFICIAL INTELLIGENCE LAB

Course Code: DSE6406

Credit Units: 01

Course Contents:

Assignments will be provided for the following:

- Programming in Prolog
- Programming for Robotics

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.



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COMMUNICATION SYSTEMS

Course Code: DSE6407

Credit Units: 02

Course Objective:

The purpose of this course is to provide a thorough introduction to analog and digital communications with an in depth study of various modulation techniques, Random processes are discussed, and information theory is introduced.

Course Contents:

Module I: Introduction

Communication Process, Source of Information, Communication channels, base-band and pass-band signals, Review of Fourier transforms, Random variables, different types of PDF, need of modulation process, primary communication resources, analog versus digital communications

Module II: Amplitude modulation

Amplitude modulation with full carrier, suppressed carrier systems, single side band transmission, switching modulators, synchronous detection, envelope detection, effect of frequency and phase errors in synchronous detection, comparison of various AM systems, vestigial side band transmission.

Module III: Angle Modulation

Narrow and wide band FM, BW calculations using Carlson rule, Direct & Indirect FM generations, phase modulation, Demodulation of FM signals, noise reduction using pre & de-emphasis.

Module IV: Pulse Modulation

Pulse amplitude, width & position modulation, generation & detection of PAM, PWM & PPM, Comparison of frequency division and time division multiplexed systems, Basics of digital communications: ASK, PSK, FSK, QPSK basics & waveform with brief mathematical introduction

Module V: Noise

Different types of noise, noise calculations, equivalent noise band width, noise figures, effective noise temperature, noise figure.

Module VI: Introduction to Information Theory

Measurement of Information, mutual, Shannon's theorem, Source coding, channel coding and channel capacity theorem, Huffman code

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

Text & References:

Text:

- B. P. Lathi: "Modern analog & digital communication", OXFORD Publications
- Wayne Tomasi: "Electronic Communication systems", Pearson Education, 5th edition

References:

- Simon Haykin, "Communication Systems", John Wiley & Sons, 1999, Third Edition.
- Taub and schilling, "Principles of Communication Systems" TMH

COMMUNICATION SYSTEMS LAB

Course Code: DSE6408

Credit Units: 01

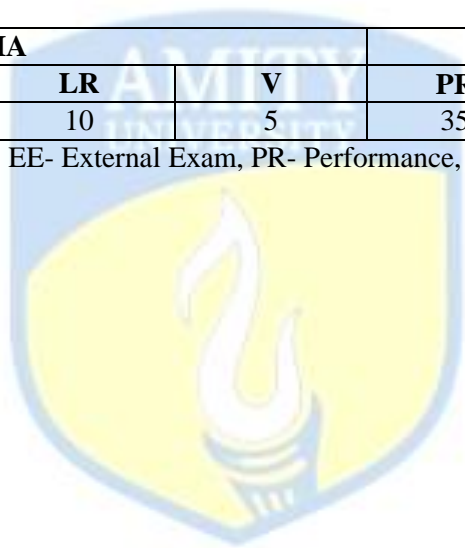
List of Experiments:

- To study the sampling and reconstruction of a given signal.
- To study amplitude modulation and demodulation.
- To study frequency modulation and demodulation.
- To study time division multiplexing.
- To study pulse amplitude modulation.
- To study delta and adaptive delta modulation and demodulation.
- To study carrier modulation techniques using amplitude shift keying and Frequency shift keying.
- To study carrier modulation techniques using binary phase shift keying and differential shift keying.
- To study pulse code modulation & differential pulse code modulation as well as relevant demodulations.
- To study quadrature phase shift keying & quadrature amplitude modulation.

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.



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OPEN SOURCE TECHNOLOGIES

Course Code: DSE6617

Credit Units: 02

Course Objective:

This course is aimed to provide a fundamental understanding of dynamic web site creation. PHP is the language used for development of most common web sites. Syllabus includes basic and advanced features of PHP which includes detailed introduction of PHP and MYSQL, Arrays, Loops and variables etc. It also gives an overview open source framework like JOOMLA, ZEND etc.

Course Contents:

Module I: Introduction to Open Source and PHP programming

Introduction to Open Sources Technologies, Introduction to PHP, installation and configuration, Advantages and Disadvantages of PHP, Client Side Scripting, Server Side Scripting, Variables, data types, various types of function, creating your own function, Strings in PHP, String Functions.

Module II: Operator, Loops, Array, Exception and Error Handling

Operators, Conditions, Loops, Using for each, Creating and Using Arrays, Multidimensional Array, Associative Array.

Error Handling in PHP, Errors and Exceptions, Exception class, try/catch block, throwing an exception, defining your own Exception subclass.

Module III: Classes, File system, Passing Information between pages

Object oriented programming with PHP, Working with Datetime, code re-use, require (), include(), and the include_path; Understanding PHP file permissions, File reading and writing functions, File system functions, File uploads, Sending mail & use of email server.

HTTP, GET arguments, POST arguments, Using Session in PHP, cookies, The setcookie() function, Deleting Cookies and Reading Cookies.

Module IV: Working with database

HTML Tables and Database tables, Database manipulation (Select, Insert, Update, Delete), validating User Input using Javascript.

MYSQL, Introducing MySQL; database design concepts; the Structured Query Language (SQL); communicating with a MySQL backend via the PHP, MySQL API Building Database Applications, Developing PHP scripts for dynamic web page like feedback form, online admission form and online test.

Module V: Working with Frameworks

Working with Mambo, Working with Joomla, Working with framework. Working with wordpress, Working with drupal, Use of Joomla in rapid development of website. Developing of simple website using Joomla.

Examination Scheme:

Components	CT1	A/C/Q	ATTD.	EE
Weightage (%)	15	10	5	70

Text & References:

Text:

- Beginning PHP, Apache, MySQL Web Development, Michael K. Glass, Yann Le Scouarnec, Elizabeth Narnmore, Gary Mailer, Jeremy Stolz, Jason Gerner, published by Wiley, wrox
- PHP, MySQL and Apache Julie C Meloni Pearson Education ISBN : 81-297-0443-9

References:

- The Complete Reference PHP, by Steven Holzner, Tata McGraw-Hill Publication
- Beginning PHP and MYSQL, by W. Jason Gilmore, Apress Publication

OPEN SOURCE TECHNOLOGIES LAB

Course Code: DSE6618

Credit Units: 01


Course Contents:

1. Write the process of installation of web server.
2. Write programs to print all details of your php server. Use phpinfo().
3. Write a program to give demo of ECHO and PRINT command.
4. Write a program to implement the string functions.
5. Write a program to print Fibonacci series upto a given number using recursion.
6. Write a menu driven program to implement a calculator which performs only addition, subtraction, multiplication and division. The operation should happen based on user choice.
7. Write a program sort ten number by using array.
8. Write a program to demonstrate the concept of associative array.
9. Write a program to demonstrate the concept of multidimensional array.
10. Write a program to demonstrate the concept of Classes & objects.
11. Create a login form with two text fields called "login" and "password". When user enters "Amity" as a user name and "university" as a password it should be redirected to a Welcome.HTML page or to Sorry.HTML in case of wrong username/password.
12. How to work with sessions in PHP?
13. Introduction to Mysql creating databases, tables, using command line and gui interface, phpmyadmin
14. How to connect to MySQL using PHP ? Write programs for insertion, deletion updates and other sql queries. Design front end using html, css and write php scripts for processing of data. Try all different methods of connecting from php to MySQL
15. Make a small project with mysql and php to perform CRUD operations. Use Session also.
16. Create a form with a text box asking to enter your favorite city with a submit button when the user enters the city and clicks the submit button another php page should be opened displaying "Welcometo the city".
17. Write a program to design login form in which find the greatest number amongst three numbers.
18. WAP for Marksheet generation.
19. Design a webpage for entering the student details with all the validations applied on it.
20. Write a php script to print current date and time.
21. Write a pp script to use include and require functions.
22. Write a php script including all the file handling functions.
23. Design a website using Wordpress /Joomla/Drupal
24. Introduction to Laravel frame work and one simple project.

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.


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ARTIFICIAL NEURAL NETWORK

Course Code: DSE6411

Credit Units: 02

Course Objective:

Aim of this course is to introduce the students fundamentals concepts of Neural network and its various application in computer science.

Module I:-

Artificial Neural Networks (ANN) and biological neural networks, supervised and unsupervised learning rules, neural network applications.

Module II:-

Unsupervised learning:- Hebbian learning and competitive learning. Supervised learning:- Back propagation algorithms,

Learning rule:-

Delta learning rule, Widrow-Hoff learning rule, Winner-Take-All learning rule.

Module III:-

Feed forward neural network, feed backward neural network, Perceptron and its learning law, single-layer perceptron, multi-layer perceptron.

Module IV:-

Self organizing networks: Kohonen algorithm, Hopfield Networks: Hopfield network algorithm, Adaptive resonance theory: Network and learning rules.

Module V:-

Associative memory, auto-associative memory, bi-directional associative memory.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

Text Book:

- Kenji Suzuki (ed.) - InTech , 2013
- Todd Troyer - University of Texas at San Antonio , 2005

ARTIFICIAL NEURAL NETWORK LAB

Course Code: DSE6412

Credit Units: 01

Course Objective

The aim of this lab to gain the practical knowledge of basic neuron models and learning algorithms.

Lab Assignment

To study some basic neuron models and learning algorithms by using Matlab's neural network toolbox


Examination Scheme

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.



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SOFTWARE ENGINEERING

Course Code: DSE6614

Credit Units: 03

Course Objective:

The basic objective of Software Engineering is to develop methods and procedures for software development that can scale up for large systems and that can be used to consistently produce high-quality software at low cost and with a small cycle time. Software Engineering is the systematic approach to the development, operation, maintenance, and retirement of software. The course provides a thorough introduction to the fundamentals principles of software engineering. The organization broadly be based on the classical analysis-design-implementation framework.

Course Contents:

Module I: Introduction

Software life cycle models: Waterfall, Prototype, Evolutionary and Spiral models, Overview of Quality Standards like ISO 9001, SEI-CMM

Module II: Software Metrics and Project Planning

Size Metrics like LOC, Token Count, Function Count, Design Metrics, Data Structure Metrics, Information Flow Metrics. Cost estimation, static, Single and multivariate models, COCOMO model, Putnam Resource Allocation Model, Risk management.

Module III: Software Requirement Analysis, design and coding

Problem Analysis, Software Requirement and Specifications, Behavioural and non-behavioural requirements, Software Prototyping Cohesion & Coupling, Classification of Cohesiveness & Coupling, Function Oriented Design, Object Oriented Design, User Interface Design Top-down and bottom-up Structured programming, Information hiding,

Module IV: Software Reliability, Testing and Maintenance

Failure and Faults, Reliability Models: Basic Model, Logarithmic Poisson Model, Software process, Functional testing: Boundary value analysis, Equivalence class testing, Structural testing: path testing, Data flow and mutation testing, unit testing, integration and system testing, Debugging, Testing Tools, & Standards. Management of maintenance, Maintenance Process, Maintenance Models, Reverse Engineering, Software RE-engineering

Module V: UML

Introduction to UML, Use Case Diagrams, Class Diagram: State Diagram in UML Activity Diagram in UML Sequence Diagram in UML Collaboration Diagram in UML, Domain, Component Diagram and Deployment Diagram

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

Text & References:

Text:

- K. K. Aggarwal & Yogesh Singh, "Software Engineering", 2nd Ed, New Age International, 2005.
- R. S. Pressman, "Software Engineering – A practitioner's approach", 5th Ed., McGraw Hill Int. Ed., 2001.

References:

Prof. (Dr.) Anil R. Fairley, "Software Engineering Concepts", Tata McGraw Hill, 1997.
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P. Jalote, "An Integrated approach to Software Engineering", Narosa, 1991.

- Stephen R. Schach, “Classical & Object Oriented Software Engineering”, IRWIN, 1996.
- James Peter, W. Pedrycz, “Software Engineering”, John Wiley & Sons.
- Sommerville, “Software Engineering”, Addison Wesley, 1999.



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COMPUTER ARCHITECTURE

Course Code: DSE6502

Credit Units: 04

Course Objective:

This course deals with computer architecture as well as computer organization and design. Computer architecture is concerned with the structure and behaviour of the various functional modules of the computer and how they interact to provide the processing needs of the user. Computer organization is concerned with the way the hardware components are connected together to form a computer system. Computer design is concerned with the development of the hardware for the computer taking into consideration a given set of specifications.

Course Contents:

Module I: Register Transfer Language

Register Transfer, Bus and Memory Transfers, Arithmetic Micro-operations, Logic Micro-operations, Shift Micro-operations, Arithmetic Logic shift Unit.

Module II: Basic Computer Organizations and Design

Instruction Codes, Computer Registers, Computer Instructions, Timing and Control, Instruction Cycle, Memory-Reference Instructions, Input-Output and Interrupt, Design of Accumulator Logic. Hardwired and Microprogrammed control: Control Memory, Address Sequencing, Design of Control Unit

Module III: Central Processing Unit

Introduction, General Register Organization, Stack Organization, Instruction representation, Instruction Formats, Instruction type, Addressing Modes, Data Transfer and Manipulation, Program Control, Reduced Instruction Set Computer RISC and CISC. Computer Arithmetic: Introduction, Addition and Subtraction Algorithm, Multiplication Algorithms, Booth Multiplication, Division Algorithms, Floating-Point Arithmetic Operations

Module IV: Memory and Intrasystem Communication and Input output organisation

Memory: Memory types and organization Memory Hierarchy, Main Memory, Auxiliary Memory, Associative Memory, Cache Memory with mapping techniques, Virtual Memory, Memory Management Hardware, **Intrasystem communication and I/O:** Peripheral Devices, Input-Output, Controller and I/O driver, IDE for hard disk, I/O port and Bus concept, Bus cycle, Synchronous and asynchronous transfer, Modes of Transfer, DMA, DMA Transfer, DMA Controller, I/O Processor, CPU-IOP Communication

Module V: Introduction to Pipelining and Multi-Processor

Parallel Processing, Pipelining, Arithmetic Pipeline, Instruction Pipeline, RISC Pipeline, Multiprocessors: Characteristics of Multiprocessors

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

Text:

- Morris Mano, Computer System Architecture, 3rd Edition – 1999, Prentice-Hall of India Private Limited.
- Harry & Jordan, Computer Systems Design & Architecture, Edition 2000, Addison Wesley, Delhi.

References:

Prof. (Dr.) Anil Kumar Stalling, Computer Organization and Architecture, 4th Edition-2000, Prentice-Hall of India Private Limited.

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- Kai Hwang-McGraw-Hill, Advanced Computer Architecture.
- Kai Hwang & Faye a Briggs, McGrew Hill, inc., Computer Architecture & Parallel Processing.
- John D. Carpinelli, Computer system Organization & Architecture, Edition 2001, Addison Wesley, Delhi
- John P Hayes, McGraw-Hill Inc, Computer Architecture and Organization.
- M. Morris Mano and Charles, Logic and Computer Design Fundamentals, 2nd Edition Updated, Pearson Education, ASIA.
- Hamacher, "Computer Organization," McGraw hill.
- Tennenbaum," Structured Computer Organization," PHI
- B. Ram, "Computer Fundamentals architecture and organization," New age international Gear C. w., "Computer Organization and Programming, McGraw hill



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JAVA PROGRAMMING

Course Code: DSE6503

Credit Units: 03

Course Objective:

The objective is to impart programming skills used in this object oriented language java. The course explores all the basic concepts of core java programming. The students are expected to learn it enough so that they can develop the web solutions like creating applets etc.

Course Contents:

Module I: Java Basics

Concepts of OOP, Features of Java, How Java is different from C++, Environmental setup, Basic syntax, Objects and classes, Basic Data Types, Variable Types, Modifier Types, Basic operators, Loop Control, Decision Making, Strings and Arrays, Methods, I/O.

Module II: Java Object Oriented

Inheritance, Overriding, Polymorphism, Abstraction, Encapsulation, Interfaces, Packages, Exploring java.util package.

Module III: Exception Handling and Threading

Exception Hierarchy, Exception Methods, Catching Exceptions, Multiple catch Clauses, Uncaught Exceptions Java's Built-in Exception.

Creating, Implementing and Extending thread, thread priorities, synchronization suspending, resuming and stopping Threads, Multi-threading.

Module IV : Event Handling And AWT

Event handling Mechanism, Event Model, Event Classes, Sources of Events, Event Listener Interfaces, AWT: Working with Windows, AWT Controls, Layout Managers

Module V: Java Advanced

AppletClass, Architecture, Skeleton, Display Methods., Swings: Japplet, Icons, labels, Text Fields, Buttons, Combo Boxes., Socket Programming: Socket methods, Server Socket methods, Socket Client and Socket Server examples.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

Text & References:

Text:

- JAVA The Complete Reference by Patrick Naughton & Herbert Schild, TMH
- Introduction to JAVA Programming a primer, Balaguruswamy.

References:

- "Introduction to JAVA Programming" Daniel/Young PHI
- Jeff Frentzen and Sobotka, "Java Script", Tata McGraw Hill, 1999

SOFTWARE ENGINEERING LAB

Course Code: DSE6616

Credit Units: 01

Software Required: Rational Rose

Assignments will be provided for the following:

- Use of Rational Rose for visual modeling.
- Creating various UML diagrams such as use case, sequence, collaboration, activity, state diagram, and class diagrams.

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.



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JAVA PROGRAMMING LAB

Course Code: DSE6507

Credit Units: 01

Software Required: JDK1.3

Assignments will be provided for the following:

- Java programs using classes & objects and various control constructs such as loops etc, and data structures such as arrays, structures and functions
- Java programs for creating Applets for display of images and texts.
- Programs related to Interfaces & Packages.
- Input/Output and random files programs in Java.
- Java programs using Event driven concept.
- Programs related to network programming.

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.



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ADVANCE DATA STRUCTURES AND ALGORITHM LAB

Course Code: DSE6509

Credit Units: 01

Programs based on Implementation of Graphs using Adjacency Matrix, Linked List , implementation of graph algorithms like BFS,DFS, Minimum Spanning Tree, Binary Search Tree, Knapsack Problem using Greedy Algorithm, Dynamic Programming, Shortest Path Algo (Dijkstra's), Implementing B-Tree,AVL Tree ,Red Black Tree. Implementing Sets, Dictionaries, Priority Queue using Heap.

Recommended Software: Java/C++/C/Python

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

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PYTHON PROGRAMMING LAB

Course Code: DSE6508

Credit Units: 01

Course Contents:

- Setting up python on Windows/Linux/Mac
- First program in python
- Programs related to basic input/output.
- Programs related to variables, strings, numbers
- Programs related to Lists and Tuples
- Programs related to Functions
- Programs related to If Statements
- Programs related to While Loops and Input
- Programs related to Basic Terminal Apps
- Programs related to Dictionaries
- Programs related to Classes
- Programs related to Exceptions
- Programs related to GUI programming
- Using Word, Excel, PDF files in python.
- Web programming in python,
- Case study of application areas of python.

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.


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SUMMER INTERNSHIP EVALUATION-I

Course Code: DSE6535

Credit Units: 03

Course Objective:

The objective of this course is to provide practical training on some live projects that will increase capability to work on actual problem in industry. This training may undergo in an industrial environment or may be an in house training on some latest software which is in high demand in market. This training will be designed such that it will useful for their future employment in industry.

Examination Scheme:

Feedback from industry/work place	20
Training Report	40
Viva	15
Presentation	25
Total	100



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VHDL PROGRAMMING

Course Code: DSE6512

Credit Units: 02

Course Objective:

VHDL is commonly used as a design-entry language for field-programmable gate arrays and application-specific integrated circuits in electronic design automation of digital circuits. The course aims to discuss the syntax of the language to model a digital system.

Course Contents:

Module I

Fundamental VHDL Units, LIBRARY Declarations, ENTITY, ARCHITECTURE, Introductory Examples, Specification of combinational systems using VHDL, Introduction to VHDL, Basic language element of VHDL, Behavioural Modeling, Data flow modeling, Structural modeling, Subprograms and overloading, VHDL description of gates.

Module II

Data Types; Pre-Defined Data Types, User-Defined Data Types, Subtypes, Arrays, Port Array, Records, Signed and Unsigned Data Types, Data Conversion

Module III: Sequential codes

PROCESS: Signals and Variables, IF, WAIT, CASE, LOOP, CASE versus IF, CASE versus WHEN, Bad Clocking, Using Sequential Code to Design Combinational Circuits
Description and design of sequential circuits using VHDL,

Module IV

Standard combinational modules, Design of a Serial Adder with Accumulator, State Graph for Control Network, design of a Binary Multiplier, Multiplication of a Signed Binary Number, Design of a Binary Divider.

Module V

Micro programmed Controller, Structure of a micro programmed controller, Basic component of a micro system, memory subsystem. Overview of PAL, PLA, FPGA, CPLD.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

Text & References:

Text:

- J. Bhaskar, "A VHDL Primer", Addison Wesley, 1999.
- Volnei A. Padroni, "Circuit Design with VHDL."
- M. Ercegovic, T. Lang and L.J. Moreno, "Introduction to Digital Systems", Wiley, 2000
- C. H. Roth, "Digital System Design using VHDL", Jaico Publishing, 2001

References:

- VHDL Programming by Examples by Douglas L. Perry, TMH, 2000
- Hardware Description Languages by Sumit Ghose, PHI, 2000
- The Designer Guide to VHDL by P.J. Ashendern; Morgan Kaufmann Pub. 2000
- Digital System Design with VHDL by Mark Zwolinski; Prentice Hall Pub. 1999
- Designing with FPGA & CPLDs by Zeidman; CMP Pub. 1999
- HDL Chip Design by Douglas J. Smith; Doone Pub. 2001

VHDL PROGRAMMING LAB

Course Code: DSE6513

Credit Units: 01

Software Required: Mentor Graphics

Topics covered in lab will include:

- Designing Basic Gates.
- Designing Combinational circuits like adder, multiplexer, PLA
- Designing Sequential Circuits like flip-flops, counters, registers.

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.



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MICROPROCESSOR

Course Code: DSE6515

Credit Units: 03

Course Objective:

This course deals with the systematic study of the Architecture and programming issues of 8085-microprocessor family. The aim of this course is to give the students basic knowledge of the above microprocessor needed to develop the systems using it.

Course Contents:

Module I: Introduction to Microcomputer Systems

Introduction to Microprocessors and microcomputers, Study of 8 bit Microprocessor, 8085 pin configuration, Internal Architecture and operations, interrupts, Stacks and subroutines, various data transfer schemes.

Module II: ALP and timing diagrams

Introduction to 8085 instruction set, advance 8085 programming, Addressing modes, Counters and time Delays, Instruction cycle, machine cycle, T-states, timing diagram for 8085 instruction.

Module III: Memory System Design & I/O Interfacing

Interfacing with 8085. Interfacing with input/output devices (memory mapped, peripheral I/O), Cache memory system. Study of following peripheral devices 8255, 8253, 8257, 8255, 8251.

Module IV: Architecture of 16-Bit Microprocessor

Difference between 8085 and 8086, Block diagram and architecture of 8086 family, pin configuration of 8086, Minimum mode & Maximum mode Operation. Internal architecture of 8086, Bus Interface Unit, Register Organization, Instruction Pointer, Stack & Stack pointer, merits of memory segmentation, Execution Unit, Register Organization.

Module V: Pentium Processors

Internal architecture of 8087, Operational overview of 8087, Introduction to 80186, 80286, 80386 & 80486 processors, Pentium processor.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

Text & References:

Text:

- Ramesh. S. Gaonkar, "Microprocessor architecture Programming and Application with 8085" Penram International Publishing, 4th Edition
- B. Ram, "Fundamentals of microprocessors and microcomputer" Dhanpat Rai, 5th Edition.]
- Douglas V Hall.

References:

- M. Rafiquzzaman, "Microprocessor Theory and Application" PHI – 10th Indian Reprint.
- Naresh Grover, "Microprocessor comprehensive studies Architecture, Programming and Interfacing" Dhanpat Rai, 2003.
- Gosh, "0000 to 8085" PHI.

SYSTEM PROGRAMMING AND COMPILER CONSTRUCTION

Course Code: DSE6714

Credit Units: 03

Course Objective:

This course provides knowledge to design various system programs.

Course Contents:

Module I: Introduction

Definition, Evolution, Components, Editors: Introduction to system Programming Line editor, Full screen editor and multi window editor. Case study MS-Word, DOS Editor and vi editor.

Module II: Assemblers

First pass and second pass of assembler and their algorithms. Assemblers for CISC Machines: case study x85 & x86 machines.

Module III: Compilers & Macro Processor

Introduction to various translators. Various phases of compiler. Bootstrapping for compilers, Introduction to. Design of a compiler in C++ as Prototype. Basic Macro Processor functions- Macro definition & expansion – Macro Processor Algorithm & Data Structures, conditional – Macro Expansion, Keyword Macro Parameters, Macro with in Macro Implementation, case study MASM and ANSI C Macro language.

Module IV: Debuggers, Loaders and Linkers

Introduction to various debugging techniques. Case study:- Debugging in Turbo C++ IDE. Linkers and Loaders Concept of linking. Case study of Linker in x86 machines. Loading of various loading schemes.

Module V: Operating System

Booting techniques and sub-routines. Design of kernel and various management for OS. Design of Shell and other utilities, (Overview of Unix OS, Difference Between Unix and Linux, Commands in Unix.)-changes made

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

Text & References:

Text:

- Donovan J.J., Systems Programming, New York, Mc-Graw Hill, 1972.
- Dhamdhare, D.M., Introduction to Systems Software, Tata Mc-Graw Hill 1996.

References:

- Aho A.V. and J.D. Ullman Principles of compiler Design Addison Wesley/ Narosa 1985.

ADVANCED JAVA PROGRAMMING

Course Code: DSE6603

Credit Units: 03

Course Objective:

The objective is to equip the students with the advanced feature of contemporary java which would enable them to handle complex programs relating to managing data and processes over the network. The major objective of this course is to provide a sound foundation to the students on the concepts, precepts and practices, in a field that is of immense concern to the industry and business.

Course Contents:

Module I: Distributed Computing

Introduction to Java RMI, RMI services, RMI client, Running client and server, Introduction of Swing, Swing Components, Look and Feel for Swing Components, Introduction to Multimedia Programming.

Module II: Database Connectivity

ODBC and JDBC Drivers, Connecting to Database with the java.sql Package, Using JDBC Terminology, JDBC with mysql, postgresql.

Module III: Servlet Programming

Introduction to Servlets, Servlet Life Cycle, Servlet based Applications, Servlet and HTML.Filters, jdbc with servlets, session Management techniques in detail.

Module IV: JSP Programming

JSP: Introduction to JSP, JSP implicit objects, JSP based Applications, Java. Net. Login & Logout Example, jdbc with jsp.

Module V: JEE Web Application

The Model-View-Controller Architecture What is Struts, Struts Tags, Creating Beans, Other Bean Tags, Bean Output, Creating HTML Forms, The Action Form class The Action class, Simple Struts: a simple Struts application; Introduction to EJB.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

Text:

- Java 2 Unleashed (Techmedia – SAMS), Jamie Jaworski
- Professional Java Server Programming (a Press), Allamaraju
- Developing Java Servlets (Techmedia – SAMS), James Goodwill sing Java 1.2 Special Edition (PHI), Webber

References:

- David Flanagan, Jim Parley, William Crawford & Kris Magnusson, Java Enterprise in a nutshell - A desktop Quick reference - O'REILLY, 2003
- Stephen Ausbury and Scott R. Weiner, Developing Java Enterprise Applications, Wiley-2001
- Jaison Hunder & William Crawford, Java Servlet Programming, O'REILLY, 2002
- Dietal and Deital, "JAVA 2" PEARSON publication

ADVANCE DATABASE MANAGEMENT SYSTEM

Course Code: DSE6604

Credit Units: 03

Course Objective:

The objective of this course is to expose the students to the implementation techniques of database system. This course explains techniques for query processing and optimization with transaction and concurrency control techniques

Course Contents:

Module I: Relational Databases

Integrity Constraints revisited, Extended ER diagram, Relational Algebra & Calculus, Functional, Multivalued and Join Dependency, Normal Forms, Rules about functional dependencies.

Module II: Query Processing and Optimization

Valuation of Relational Operations, Transformation of Relational Expressions, Indexing and Query Optimization, Limitations of Relational Data Model, Null Values and Partial Information.

Object Oriented and Object Relational Databases

Modeling Complex Data Semantics, Specialization, Generalization, Aggregation and Association, Objects, Object Identity, Equality and Object Reference, Architecture of Object Oriented and Object Relational Databases

Module III: Parallel and Distributed Databases

Distributed Data Storage – Fragmentation & Replication, Location and Fragment

Transparency Distributed Query Processing and Optimization, Distributed Transaction Modeling and concurrency Control, Distributed Deadlock, Commit Protocols, Design of Parallel Databases, Parallel Query Evaluation.

Advanced Transaction Processing

Nested and Multilevel Transactions, Compensating Transactions and Saga, Long Duration Transactions, Weak Levels of Consistency, Transaction Work Flows, Transaction Processing Monitors.

Module IV

Multimedia databases, Databases on the Web and Semi-Structured Data

Case Study: Oracle Xi

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

Text:

- Elmars, Navathe, Somayajulu, Gupta, "Fundamentals of Database Systems", 4th Edition, Pearson Education, 2007
- Garcia, Ullman, Widom, "Database Systems, The complete book", Pearson Education, 2007
- R. Ramakrishnan, "Database Management Systems", McGraw Hill International Editions, 1998

References:

- Date, Kannan, Swaminathan, "An Introduction to Database Systems", 8th Edition Pearson Education, 2007
- Singh S.K., "Database System Concepts, design and application", Pearson Education, 2006.
- Silberschatz, Korth, Sudarshan, "Database System Concepts", McGraw Hill, 6th Edition, 2006
- W. Kim, "Modern Database Systems", 1995, ACM Press, Addison – Wesley,
- D. Maier, "The Theory of Relational Databases", 1993, Computer Science Press, Rockville, Maryland
- Ullman, J. D., "Principals of database systems", Galgotia publications, 1999
- Oracle Xi Reference Manual
- Dietrich and Urban, "An Advanced Course in Database Systems", Pearson, 2008.

DIGITAL COMPUTER ORGANIZATION

Course Code: DSE6605

Credit Units: 03

Course Objective:

The Objective of this course is to expose the students to the fundamentals and the concepts of Digital & Computer Organization and Representation of Information and Basic Building Blocks, Basic Organization, Memory Organization, Input-Output Organization, Processor Organization etc. This course is designed to understand the concepts of Computer Organization for Research & Development as well as for application.

Course Contents:

Module I: Representation of Information and Basic Building Blocks

Number Systems, Binary, Octal, Hexadecimal, Character Codes (BCD, ASCII, EBCDIC), Logic gates, Boolean algebra, K-map Simplification, Half adder, Full adder, Decoders, Multiplexes, Binary Counters, Flip/Flops: SR FF, JK FF, Master Slave FF, T and D FF, Registers: Parallel and Serial Registers, Counters (Synchronous & Asynchronous), ALU, Micro-Operation, ALU-chip.

Module II: Basic Organization

Von Neumann Machine (IAS Computer), Operational flow chart (Fetch, Execute), Instruction Cycle, Organization of Central Processing Unit, Hardwired and Micro programmed control unit, Single Organization, General Register Organization, Stack Organization, Addressing Modes, Instruction Formats, Data transfer & Manipulation, I/O organization, Bus Architecture, Programming Registers.

Module III: Memory Organization

Memory hierarchy, Main Memory (RAM/ROM chips) with mapping, Auxiliary memory, Associative memory and its mapping, Virtual memory, Cache memory with mapping techniques, Memory management hardware.

Module IV: Input-Output organization

Peripheral devices, I/O interface, Direct memory access, Modes of transfer, Priority Interrupt, I/O Processors, Serial Communication, Asynchronous data transfer, Strobe Control, Handshaking, I/O Controllers, CPU-IOP Communication.

Module V: Processor Organization

Introductory Concept of pipeline, Flynn's Classification, Parallel processing. RISC and CISC characteristics, arithmetic pipeline with example.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

Text:

- Computer System Architecture: M. Mano (PHI Publication)
- William Stallings, "Computer Organization & Architecture", Pearson education Asia.
- B. Ram, "Computer Fundamental Architecture & Organization" New Age.

References:

- Computer Organization: Vransie, Zaky & Hamacher (TMH Publication).
- Tannenbaum, "Structured Computer Organization", PHI.

MICROPROCESSOR LAB

Course Code: DSE6517

Credit Units: 01

Course Contents:

- To load the numbers 49H and 53H in the memory location 9510 and 9511 respectively and add the contents of memory location 9601
- To write assembly language programming for 8 bit addition with and without carry.
- To write assembly language programming for 8 bit subtraction with and without borrow.
- To write assembly language programming for 8 bit multiplication and division.
- To write assembly language programming for sorting an array of numbers in ascending and descending order.
- To write assembly language programming with additional instructions.
- To write and execute a program using stacks.
- To study and program the programmable peripheral interface (8255) board.
- To study and program the programmable interval timer (8253) board.
- To study and program the programmable DMA controller (8257) board.
- To study and program the programmable interrupt controller (8259) board.

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.


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SYSTEM PROGRAMMING AND COMPILER CONSTRUCTION LAB

Course Code: DSE6716

Credit Units: 01

Software Required: Turbo C++

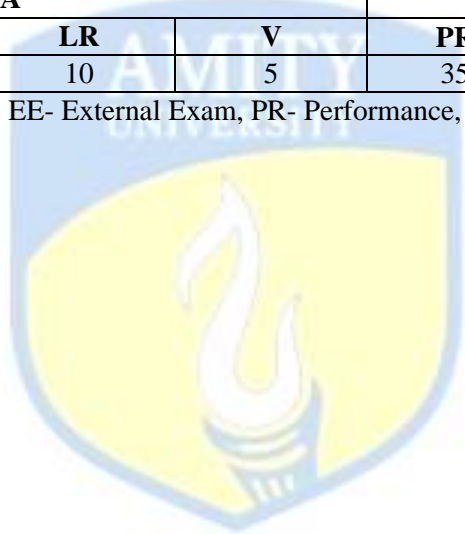
Assignment will be provided for following:

- WAP to determine the length of the machine instructions.
- WAP to differentiate between symbols, literals and tokens.
- WAP to implement Symbol table.
- WAP to implement base table.
- WAP to find the relative addresses.
- Design a macro to perform add operation.
- On the basis of above program display the values of PC, LC and IR.
- Perform programming on loader based programme.
- Perform programming on linker based programme.
- Perform Programming on editor based programme.

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.



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ADVANCED JAVA PROGRAMMING LAB

Course Code: DSE6608

Credit Units: 01

Programming Language: Java

1. WAP to display label on a frame with the help of JFrame
2. WAP to display six buttons on a panel using JFrame.
3. WAP. To display an image and a string in a label on the JFrame.
4. WAP that implement a JApplet that display a simple label
5. WAP that implement a JApplet and display the following frame
 - a. Customer name
 - b. Customer number
 - c. Age
 - d. Address
6. WAP to access a table Product Master from MS-Access using Java code.
7. WAP that implement a simple servlet program.
8. WAP for authentication, which validate the login-id and password by the servlet code.
9. WAP to connecting a database using user-id and password.
10. WAP to insert data into the database using the prepared statement.
11. WAP to read data from the database using the ResultSet.
12. WAP to read data send by the client (HTML page) using servlet.
13. WAP to include a HTML page into a JSP page.
14. WAP to handle the JSPEException.
15. WAP to read data send by a client (HTML page) using JSP.

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

ADVANCE DATABASE MANAGEMENT SYSTEM LAB

Course Code: DSE6609

Credit Units: 01

Programs should be based on following topics:

Quick Review of Simple SQL Statements, SQL Built-in Functions, Primary Key, Foreign Key, Normalization, Joins View, Union. **Emphasis** on PL/SQL, Cursors 8. Exception handling, Procedure, Functions, Trigger, concurrency control, transaction processing. Introduction to SQLite. Recommended Software: PostgreSQL, MySQL, Oracle.

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

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CRYPTOGRAPHY AND NETWORK SECURITY

Course Code: DSE6713

Credit Units: 03

Course Objective:

The objective here is to acquaint the students with the application of networking. Detail description of the various TCP/IP protocols and the working of ATM and its performance, Network security and authentication, and various algorithms related to it has been dealt, to get a practical approach.

Course Contents:

Module I: Advanced TCP/IP

TCP Services, TCP format and connection management, Encapsulation in IP, UDP Services, Format and Encapsulation in IP, IP Services, Header format and addressing, Fragmentation and reassembly, Migration to IPv6, Protocols: BOOTP, DHCP, ICMP, IGMP; Internet Routing Protocols: OSPF, RIP, EIGRP, BGP.

Module II: High Speed Networks

Packet Switching Networks; Frame Relay Networks; Asynchronous Transfer Mode (ATM); ATM protocol Architecture; ATM logical connections; ATM cells; ATM Service categories; ATM Adaptation Layer; QoS in ATM and Frame Relay

Module III: High Speed LANs

LAN Ethernet, fast Ethernet, gigabit Ethernet, FDDI, DSL, ADSL

Module IV: Wireless communication

Wireless networks, wireless channels, channel access, network architecture, IEEE 802.11, Bluetooth, Satellite Networks.

Module V: Network Security and Management

Principles of cryptography, Authentication, integrity, key distribution and certification, Access control and Firewalls, attacks and counter measures, security in many layers. Infrastructure for network management, The internet standard management framework, SMI, MIB, SNMP, Security and administration.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

Text:

- William Stallings, "High-Speed Networks and Internets, Performance and Quality of Service", Pearson Education.
- High performance communication networks by: J. Walrand & Pravin Varaiya, Morgan Kaufman, 1999.
- Internetworking with TCP/IP Vol.1: Principles, Protocols, and Architecture (4th Edition) by Douglas E. Comer
- ATM networks: Concepts, Protocols, Applications by: Handel, Addison Wesley.
- Cryptography & Networks Security Stallings, William 3rd edition

References:

- Computer networks: Tanenbaum, Andrew S, Prentice Hall
- Data communication & networking: Forouzan, B. A.
- Computer network protocol standard and interface Uysless, Black

VLSI DESIGN

Course Code: DSE6612

Credit Units: 02

Course Objective:

In the recent years, IC manufacturing technology has gone through dramatic evolution and changes, continuously scaling to ever smaller dimensions. This scaling has a double impact on the design of ICs. First, the complexity of the designs that can be put on a single die has increased dramatically which led to new design methodologies. At the same time, this plunge into deep submicron space causes devices to behave differently and brings challenging issues to forefront. This course along with the course of Digital Circuits and Systems II and Analog CMOS IC design will give you many of the basic essentials to work in the area of Circuit Design. Since this course takes the latest trends in the industry into account, you will find yourself at a definite edge.

Course Contents:

Module I: Devices and the wire

Diode, dynamic and transient behaviour-diffusion capacitance, SPICE diode model.

MOSFET STATIC BEHAVIOUR: Threshold voltage and its dependence on V_{SB} MOSFET Operation in resistive and saturation region, channel length modulation, Velocity saturation and its impact on sub micron devices, sub threshold conduction, Model for manual analysis, Equivalent resistance for MOSFET in (velocity) saturated region, comparison of equations for PMOS and NMOS, depletion and enhancement device

DYNAMIC BEHAVIOUR: Channel capacitance in different regions of operation, junction capacitance, Level 1 SPICE MODELS for MOS transistors

The Wire: Interconnect parameters: resistance, capacitance and Inductance, Lumped RC model, Elmore Delay

Module II: CMOS Inverter

VTC of an ideal inverter, Switching Model of the CMOS inverter: nMOS /pMOS discharge and charge, VTC of CMOS inverter: PMOS AND NMOS operation in various regions including velocity saturation, Switching threshold, $(W/L)_p/(W/L)_n$ ratio for setting desired V_M with and without velocity saturation, Noise Margins, buffer

Ratioed logic: Pseudo NMOS inverter and PMOS to NMOS ratio for performance, tristate inverter, Resistive load inverter.

Load Capacitance calculations: fan out capacitance, self capacitance calculations: Miller effect, wire capacitance; Improving delay calculation with input slope, Propagation delay: first order analysis, analysis from a design perspective, sizing a chain of inverters for minimum delay, choosing optimum number of stages

Power, Energy and Energy Delay: Dynamic power consumption, Static power, Glitches and power dissipation due to direct path currents, power and delay trade off, Transistor sizing for energy minimization

Module III: Combinational circuits

CMOS LOGIC: Good 0 and poor 0, Good 1 and poor 1, series and parallel N and P switches, 2 and Higher input NAND and NOR gates, Functions of the type $(AB+C(D+E))$ and their complements, XOR and XNOR gates, 2 input Multiplexer, Full Adder; Transistor sizing in CMOS logic for optimal delay,

Pseudo NMOS NAND NOR and other gates and the transistor sizing, Introduction to DSVCL logic, CPL AND/NAND, OR/NOR, XOR/XNOR gates

Logical effort, Electrical Effort, Branching effort, Examples of sizing Combinational logic chains for minimum delay. Pass-transistor logic, pass gate configurations for nmos and pmos, 2 input and 4 input MUX, XOR, XNOR and implementation of general functions like $AB+AB^*C+A^*C^*$, Robust and Efficient PTL Design, Delay of Transmission Gate chain

Dynamic CMOS design: Precharge and Evaluation, charge leakage, bootstrapping, charge sharing, Cascading Dynamic Gates, DOMINO Logic, Optimization of Domino Logic Gates, simple example circuit implementations of DOMINO logic

Module IV: Sequential Logic circuits

Principle of Bistability, NAND and NOR based SR latch, and clocked SR Latch, JK latch, example of master slave flip flop, CMOS D latch, MUX based Latches, master slave edge triggered register, non ideal clocks, clock overlap, C2MOS register, TSPCR Register, Schmitt Trigger, Pipelining and NORA CMOS

Module V: Layout Design Rules

Introduction to CMOS Process technology, Layout of CMOS inverter, CMOS NAND and NOR gates, Concept of Euler path, and stick diagrams for functions like $(AB+E+CD)^*$

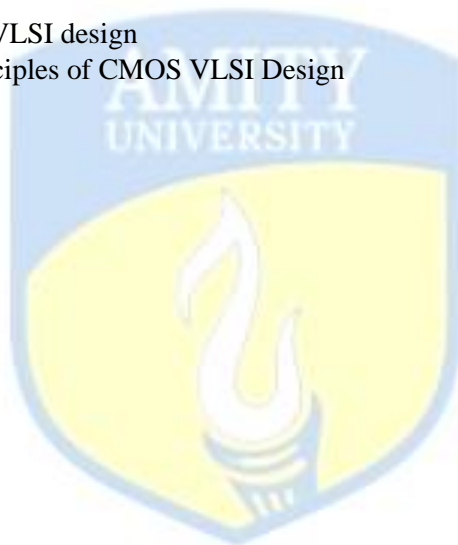
Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

Text & References:

- Jan M Rabaey: Digital Integrated Circuits
- David Hodges et al: Analysis and Design of Digital ICs
- Kang: CMOS Digital ICs
- Weste and Harris: CMOS VLSI design
- Weste and Eshragian: Principles of CMOS VLSI Design



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VLSI DESIGN LAB

Course Code: DSE6613

Credit Units: 01

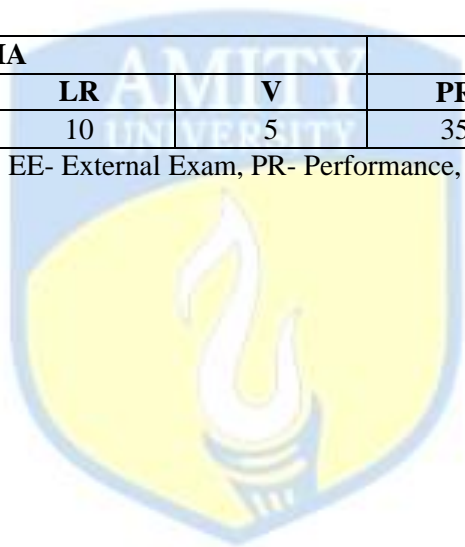
Course Contents:


- Using Design architect and simulate V vs time for CMOS inverter using same W/L ratio for PMOS and NMOS.
- Design and simulate again by Sizing PMOS to NMOS appropriately and repeat experiment 1
- Design and simulate V vs t for 2 input NAND and Nor gates.
- Design and Simulation for general CMOS functions
- One bit full adder simulation
- 2:1 MUX using pass transistor logic
- Other functions using pass transistor logic
- Layout of CMOS inverter
- Layout of NAND and NOR gates
- Design and Simulation SR latch using NAND and NOR representations
- Design and simulate D flip flop

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.




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DATA MINING

Course Code: DSE6619

Credit Units: 03

Course Objective:

The objective of this course is to introduce students to Data Warehousing & Data mining technologies that will help To Inspect, Control and Secure Information through Databases.

Course Contents:

Module I: Introduction to Data Warehousing

The need for data ware housing, Operational & Informational Data Stores, Data Warehouse definition & Characteristics, Data Warehouse role & Structure, The cost of warehousing data, Foundation & Roots of Data,

Module II: Data Warehousing Components& Architecture:

Stores, warehouses and marts, Data warehouse database, Sourcing, acquisition, clean up & transformation tools, meta data, Access tools, Data ware house administration & management,. operational & External Database layer, Information access layer, data access layer, metadata layer, process management layer, Application messaging layer, Physical DW layer, Data staging layer.

Module III: Building a Data Warehouse:

Business, Design, Technical & Implementation Considerations, DW project plan. Overview of Mapping the DW to Multiprocessor Architecture, & DBMS Schemas for Decision Support.

Module IV: Metadata and OLAP:

METADATA: Definition, repository, management & trends.

OLAP: Need, guidelines, Multi Relational & Multi-Dimensional: MOLAP, ROLAP, OLAP Tools.

Module V: Data Mining & Visualization:

Techniques to mine the data, Market Basket analysis, Measuring data mining effectiveness, embedding data mining to business process, current limitations and challenges in DM.

Introduction to EIS, The future of Data Mining, Warehousing & Virtualization, Applications: PowerBuilder, Forte. Technical Exposure to Data Mining

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

TEXT BOOKS:

- Alex Berson, Data Warehousing, Data Mining, and Olap, Tata McGraw Hill.
- George M Marakas, Modern Data Warehousing, Mining & Visualization Core Concepts, Pearson Education.

References:

- (Berry, Michael)Data Mining Techniques.
- (Sharma, Gajendra)Data Mining, Data Warehousing and OLAP.
- (Gupta, GK) Data Mining with Case Studies.
- (Han & Kamber)Data Mining: Concepts and Techniques.
- (Paulraj Ponniah) Datawarehousing Fundamentals.

COMPUTER GRAPHICS

Course Code: DSE6702

Credit Units: 03

Course Objective:

The objective of the course is to provide the understanding of the fundamental graphical operations and the implementation on computer, the mathematics behind computer graphics, including the use of spline curves and surfaces. It gives the glimpse of recent advances in computer graphics, user interface issues that make the computer easy, for the novice to use.

Course Contents:

Module I: Introduction to Graphics and Graphics Hardware System

Application of computer graphics, Video Display Devices, Raster Scan Display, Random Scan Display, Input Devices, Graphic Software and graphics standards, Numerical based on Raster and Random scan display, Frame buffer, Display processor.

Module II: Output Primitives and Clipping operations

Algorithms for drawing 2D Primitives lines (DDA and Bresenham's line algorithm), circles (Bresenham's and midpoint circle algorithm), Antialiasing and filtering techniques. Line clipping (cohen-sutherland algorithm), Curve clipping algorithm, and polygon clipping with Sutherland Hodgeman algorithm, Area fill algorithms for various graphics primitives: Scanline fill algorithm, boundary fill algorithm, flood fill algorithm, Polygon representation, various method of Polygon Inside test: Even-Odd method, winding number method, Character generation techniques.

Module III: 2D Geometric transformation

2D Transformation: Basic transformation, Translation, Rotation, Rotation relative to an arbitrary point, scaling, Matrix Representations and Homogeneous coordinates, window to viewport transformation.

Module IV: 3D Geometric transformation

3D Concepts: Parallel projection and Perspective projection, 3D Transformations, composite 3D transformation, co-ordinate transformation, Inverse transformation

Module V: Object modeling and Visible Surface detection

fractal geometry methods, fractal dimensions, Geometric construction of deterministic self-similar fractals, Iterated function system to generate fractals. Bezier curves and Bezier surfaces, Bspline curves and surfaces, Visible surface detection method: Basic illumination, diffuse reflection, specular reflection, shadows. Ray tracing method, Depth-buffer method, A-buffer method, Depth-sorting method (painter's algorithm), Binary search partition method, Scan line method,

Module VI: Introduction to multimedia

Design of animation sequences, Computer Animation languages, Elementary filtering techniques and elementary Image Processing techniques, graphics library functions used in animation design

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

Text:

- Foley et. al., "Computer Graphics Principles & practice", 2nd ed. AWL, 2000.
- D. Hearn and P. Baker, "Computer Graphics", Prentice Hall, 1986.

- R. Plastock and G. Kalley, “Theory and Problems of Computer Graphics”, Schaum’s Series, McGraw Hill, 1986

References:

- R.H. Bartels, J.C. Beatty and B.A. Barsky, “An Introduction to Splines for use in Computer Graphics and Geometric Modeling”, Morgan Kaufmann Publishers Inc., 1987.
- C.E. Leiserson, T.H. Cormen and R.L. Rivest, “Introduction to Algorithms”, McGraw-Hill Book Company, 1990.
- W. Newman and R. Sproul, “Principles of Interactive Computer Graphics, McGraw-Hill, 1973.
- F.P. Preparata and M.I. Shamos, “Computational Geometry: An Introduction”, Springer-Verlag New York Inc., 1985.
- D. Rogers and J. Adams, “Mathematical Elements for Computer Graphics”, MacGraw-Hill International Edition, 1989
- David F. Rogers, “Procedural Elements for Computer Graphics”, McGraw Hill Book Company, 1985.
- Alan Watt and Mark Watt, “Advanced Animation and Rendering Techniques”, Addison-Wesley, 1992



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ADVANCED COMPUTER NETWORKS

Course Code: DSE6704

Credit Units: 03

Course Objective:

The objective of the course is to provide thorough understanding & in-depth knowledge of concepts in computer networks Such as Internet protocols and routing, local area networks, wireless communications and networking, performance analysis, congestion control, TCP, network address translation, multimedia over IP, switching and routing, mobile IP, multicasting, IPv6. Peer-to-peer networking, network security, and other current research topics. A focus will be placed on wireless networking, reflecting rapid advances in this area. This course motivates the students to explore current research areas in the same field.

Course Contents:

Module I : Introduction to Networks

Networking introduction, Reference Models, TCP/IP, OSI, Addressing, Protocol Layering, Transmission impairment, performance, Switching, Transmission Media, Introduction to MAC, Channel allocation, MAC protocol classification for LAN's, MAN's, MAC protocols for Adhoc N/ws, MAC Protocol for WLAN's(adhoc and sensor n/ws), Introduction to Ethernet protocol (Fast, Gigabit and standard Ethernet).

Module II: Network Layer

Network Layer Design Issues, Routing Algorithms, Congestion Control Algorithms, Quality of Service, Internet Working, Network Layer in Internet.

IPv6 basic protocol, extensions and options, support for QoS, security, etc., Changes to other protocols, Application Programming Interface for IPv6.

Module III : Mobile IP

Mobile IP, IP Multicasting. Multicast routing protocols, address assignments, session discovery, etc.

Module IV : Transport Layer and Application Layer

The Transport Protocol: The Transport Service, Elements of transport protocol, a simple Transport Protocol, Internet Transport Protocols UDP, Internet Transport Protocols TCP, TCP extensions for high-speed networks, transaction-oriented applications Performance Issues.

The Application Layer: DNS-(Domain Name System), Electronic Mail, World Wide Web Multimedia.

Module V : Network Security

Overview of network security, Secure-HTTP, SSL, ESP, Key distribution protocols. Digital signatures, digital certificates-mail Security, Web security, Social Issues.

Examination Scheme:

Components	A	CT	H	V/S/O	EE
Weightage (%)	5	10	7	8	70

Text & References:

Text:

- Computer Networks - Andrew S Tanenbaum, 4th Edition. Pearson Education/PHI
- Data Communications and Networking – Behrouz A. Forouzan. Third Edition TMH.

References:

- Computer Communications and Networking Technologies –Michael A.Gallo, William M .Hancock - Thomson Publication.
- W. Stallings. Cryptography and Network Security: Principles and Practice, 2nd Edition, Prentice Hall, 1998.
- W. R. Stevens. TCP/IP Illustrated, Volume 1: The protocols, Addison Wesley, 1994.
- C. E. Perkins, B. Woolf, and S. R. Alpert. Mobile IP: Design Principles and Practices, Addison Wesley, 1997.

COMPUTER GRAPHICS LAB

Course Code: DSE6706

Credit Units: 01

Software Required: Turbo C++

Course Contents:

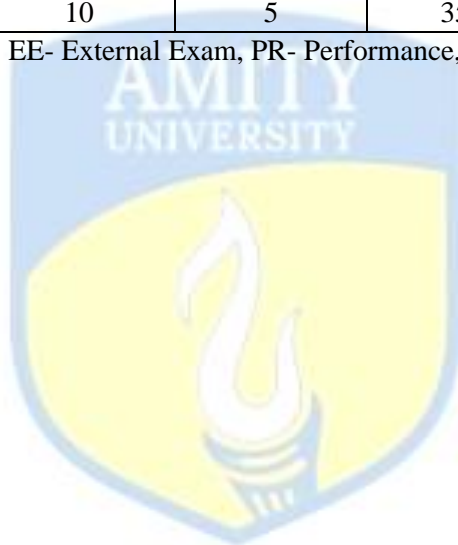
Assignments will be provided for the following:

- Geometrical shapes based on graphics algorithms
- 2D Geometric transformation translation, rotation, scaling, reflection.
- Clipping
- Animation

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

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ADVANCED COMPUTER NETWORKS LAB

Course Code: DSE6707

Credit Units: 01

Course Contents:

Various installations and connections of LAN, WAN, ETC

Working on NS2.


Socket Programming using C Language on Linux

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.




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MATLAB PROGRAMMING

Course Code: DSE6708

Credit Units: 02

Understanding The MATLAB Environment, Using the Help System in MATLAB, MATLAB Basics, Linear Algebra; Vectors and Matrices and various operations on them, M files; Scripts and User-defined functions, Plotting, Flow Control and Loops; For and While Loops, If and Case statements, structures, writing basic programs using the above, study of various toolboxes available in matlab and case study of any one tool box.

Recommended Software: MATLAB/Octave

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.



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Haryana-122413

Registrar
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Manesar Gurgaon-122413

SUMMER INTERNSHIP EVALUATION-II

Course Code: DSE6735

Credit Units: 03

Guidelines:

There are certain phases of every Intern's professional development that cannot be effectively taught in the academic environment. These facets can only be learned through direct, on-the-job experience working with successful professionals and experts in the field. The internship program can best be described as an attempt to institutionalize efforts to bridge the gap between the professional world and the academic institutions. Entire effort in internship is in terms of extending the program of education and evaluation beyond the classroom of a university or institution. The educational process in the internship course seeks out and focuses attention on many latent attributes, which do not surface in the normal classroom situations. These attributes are intellectual ability, professional judgment and decision-making ability, inter-disciplinary approach, skills for data handling, ability in written and oral presentation, sense of responsibility etc.

In order to achieve these objectives, each student will maintain a file (**Internship File**). The Internship File aims to encourage students to keep a personal record of their learning and achievement throughout the Programme. It can be used as the basis for lifelong learning and for job applications. Items can be drawn from activities completed in the course modules and from the workplace to demonstrate learning and personal development.

The File will assess the student's analytical skills and ability to present supportive evidence, whilst demonstrating understanding of their organization, its needs and their own personal contribution to the organization.

The **layout guidelines** for the Project & Seminar Report:

1. File should be in the following specification:

A4 size paper

Font: Arial (10 points) or Times New Roman (12 points)

Line spacing: 1.5

Top & bottom margins: 1 inch/ 2.5 cm

Left & right margins: 1.25 inches/ 3 cm

2. Report Layout: The report should contain the following components:

Front Page

Table of Content

Acknowledgement

Student Certificate

Company Profile (optional)

Introduction

Main Body

References / Bibliography

The File will include **five sections** in the order described below. The content and comprehensiveness of the main body and appendices of the report should include the following:

1. **The Title Page**--Title - An Internship Experience Report For (Your Name), name of internship organization, name of the Supervisor/Guide and his/her designation, date started and completed, and number of credits for which the report is submitted.

2. **Table of Content**--an outline of the contents by topics and subtopics with the page number and location of each section.

3. **Introduction**--short, but should include how and why you obtained the internship experience position and the relationship it has to your professional and career goals.

4. **Main Body**--should include but not be limited to daily tasks performed. Major projects contributed to, dates, hours on task, observations and feelings, meetings attended and their purposes, listing of

tools and materials and their suppliers, and photographs if possible of projects, buildings and co-workers.

5. References / Bibliography --This should include papers and books referred to in the body of the report. These should be ordered alphabetically on the author's surname. The titles of journals preferably should not be abbreviated; if they are, abbreviations must comply with an internationally recognised system

ASSESSMENT OF THE INTERNSHIP FILE

The student will be provided with the Student Assessment Record (SAR) to be placed in front of the Internship File. Each item in the SAR is ticked off when it is completed successfully. The faculty will also assess each item as it is completed. The SAR will be signed by the student and by the faculty to indicate that the File is the student's own work. It will also ensure regularity and meeting the deadlines.

STUDENT ASSESSMENT RECORD (SAR)

1. Range of Research Methods used to obtain information

2. Execution of Research

3. Data Analysis

- Analyse Quantitative/ Qualitative information
- Control Quality

4. Draw Conclusions

Examination Scheme:

Components	V	S	R	FP
Weightage (%)	20	20	20	40

V – Viva, S – Synopsis, FP – Final Presentation, R - Report

MOBILE COMPUTING

Course Code: DSE6710

Credit Units: 03

Course Objective:

The objective of this consortium is to shape and expand a full-scale and sound mobile computing system market. To achieve this, cooperation is required of interests related to communication (network), computer hardware/software, system integrators (including service providers), and the media.

Course Contents:

Module I: Introduction to Personal Communications Services (PCS)

PCS Architecture, Mobility management, Networks signaling.

Global System for Mobile Communication (GSM) system overview: GSM Architecture, Mobility management, Network signaling.

Module II: General Packet Radio Services (GPRS) & Wireless Application Protocol (WAP)

GPRS Architecture, GPRS Network Nodes.

Mobile Data Communication: WLANs (Wireless LANs) IEEE 802.11 standard, Mobile IP.

Wireless Application Protocol (WAP): The Mobile Internet standard, WAP Gateway and Protocols, wireless mark up Languages (WML).

Module III: Third Generation (3G) Mobile Services

Introduction to International Mobile Telecommunications 2000 (IMT 2000) vision, Wideband Code Division Multiple Access (W-CDMA), and CDMA 2000, Quality of services in 3G.

Wireless Local Loop(WLL): Introduction to WLL Architecture, wireless Local Loop Technologies.

Module IV: Global Mobile Satellite Systems

Global Mobile Satellite Systems; case studies of the IRIDIUM and GLOBALSTAR systems.

Module V: Enterprise Networks

Introduction to Virtual Networks, Blue tooth technology, Blue tooth Protocols. Advanced techniques in mobile computing.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

Text:

- “Wireless and Mobile Networks Architectures”, by Yi-Bing Lin & Imrich Chlamtac, John Wiley & Sons, 2001.
- “Mobile and Personal Communication systems and services”, by Raj Pandya, Prentice Hall of India, 2001.

References:

- “Guide to Designing and Implementing wireless LANs”, by Mark Ciampa, Thomson learning, Vikas Publishing House, 2001.
- “Wireless Web Development”, Ray Rischpater, Springer Publishing, 2000.
- “The Wireless Application Protocol”, by Sandeep Singhal, Pearson Education Asia, 2000.
- “Third Generation Mobile Telecommunication systems”, by P.Stavronlakis, Springer Publishers, 2001.

DATA MINING AND PREDICTIVE ANALYTICS

Course Code: DSE6802

Credit Units: 03

Course Objective: This course introduces the topics of Data Mining, and Data Analytics by providing a basic, practical foundation that allows the students to participate in Data Analytics projects. The course incorporates an introduction to the Data Analytics lifecycle, Machine Learning (ML), Data Mining algorithms and computational paradigms that allow computers to find patterns and regularities in databases, perform prediction and forecasting, and generally improve their performance through interaction with data.

Course Contents:

Module I: Data Preparation

An introduction to data mining and predictive analytics, Data Pre-processing Exploratory Data Analysis, Dimension- Reduction Methods.

Module II: Classification

k- Nearest Neighbour Algorithm, Decision Trees, Model Evaluation Technique, Cost –Benefit Analysis Using Data Driven Cost.

Module III: Clustering

Hierarchical and k- Means Clustering, Kohonen Networks, Birch Clustering, Measuring Cluster Goodness.

Module IV: Association Rules

Affinity Analysis and Market Basket Analysis, Data Representation for Market Basket Analysis, Support, Confidence, Frequent Item sets, and the a Priori Property, How Does a Priori Algorithm Work ? Generating Frequent Item sets, Generating Association Rules, Extension from Flag Data to General Categorical Data, Information-Theoretic Approach: Generalized Rule Induction Method, *J*-Measure, Association Rules are Easy to do Badly, How can we Measure the Usefulness of Association Rules? Do Association Rules Represent Supervised or Unsupervised Learning?

Module V: Case Study: Predicting Response to Direct Mail Marketing

Business Understanding, Data Preparation, and Eda, Clustering and Principal Components Analysis, Modelling and Evaluation for Performance and Interpretability, Modelling and Evaluation for High Performance.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

- Daniel T. Larose, Chantal D. Larose, “Data Mining and Predictive Analytics”, John Wiley & Sons, Inc., Hoboken, New Jersey, 2015.
- Thomas W. Miller, “Modelling Techniques in Predictive Analytics”, Pearson FT Press, 2013.
- Markus Hofmann, Ralf Klinkenberg, “Rapid-Miner: Data Mining Use Cases and Business Analytics Applications”, Chapman and Hall/CRC, 2016

DATA WAREHOUSING AND MULTIDIMENSIONS MODELLING

Course Code: DSE6803

Credit Units: 03

Course Objective:

This course focuses on the fundamentals of data warehousing and multidimensional Modelling. Data warehouse development life cycle, Data warehouse analysis, CUBE, ROLL UP and STAR queries, Data Warehouse Design - Massive de-normalisation, STAR schema design, Data ware house Architecture, OLAP, ROLAP and MOLAP, concepts of Fact and dimension table are the major areas of coverage of this course. This course also deals with the issues while implementing the multidimensional models

Course Contents:

Module I: Introduction

Multidimensional Data Management, Multidimensional History, Related Terminology,

Module II: Fundamental Concepts

Cubes ,Dimensions, Facts, Measures, Relational Representations, Star Schemas, Snowflake Schemas, Data Warehouses And Data Marts, Multidimensional Modelling Process, Analysis And Querying ,Roll Up, Drill Down, Drill Out, Slicing And Dicing, Drill Across, Pivot Tables, Ranking, Multi-Dimensional Querying in MDX and SQL, Graphical Querying and Visualizations .

Module III: Advance Concepts

Slowly Changing Dimensions, The Problem, Solutions, Other Special Kinds Of Dimensions, Mini dimensions, Outriggers, Degenerate Dimensions, Junk Dimensions, Time Dimensions, Data Quality Dimensions, Advanced Hierarchies, Parent-Child Hierarchies, Unbalanced Hierarchies, Non Covering Hierarchies , Non –Strict Hierarchies, Multiple Hierarchies And Parallel Hierarchies.

Module IV: Implementation Issues

Materialized Views, Indexing, Indexing Overview, Bitmap Indices, Join Indices, Query Processing, OLAP Implementations, Extract-Transform-Load.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

Text & References:

- Christian S. Jensen, Christian Thomsen, and Professor Torben Pedersen, “Multidimensional Databases and Data Warehousing”, Morgan & Claypool Publisher, 2010.
- Ralph Kimball, Margy Ross, "The Data Warehouse Toolkit: The Definitive Guide", 3rd Edition, John Wiley & Sons, 2013.
- Len Silverston, Paul Agnew, “The Data Model Resource Book: Volume 3: Universal Patterns for Data Modeling”, John Wiley & Sons., 2009.

DATABASE AND KNOWLEDGE BASE SYSTEM

Course Code: DSE6804

Credit Units: 03

Course Objective:

This course discusses design methodology for databases to verify their structural correctness and implements databases. It also provides applications software primarily in the relational model using querying languages, primarily SQL, and other database supporting software applying the theory behind various database models and query languages implementing security and integrity policies relating to databases and preparation for data analytics working in group settings to design and implementing database projects.

Course Contents:

Module I: Introduction

Database Languages, Object-Base Systems, Knowledge-base Systems, History and Perspective, Data Models for Database Systems: Data Models, The Entity-relationship Model, The Relational Data Model, Operations in the Relational Data Model, The Network Data Model, The Hierarchical Data Model, An Object-Oriented Model, Logic as a Data Model: The Datalog Data Model, Evaluating Non- recursive Rules, Computing the Meaning of Recursive Rules, Incremental Evaluation of Least Fixed Points, Negations in Rule Bodies, Relational Algebra and Logic, Relational Calculus, Tuple Relational Calculus.

Module II: Relational Query and Object-Oriented Database Language

ISBL: A “Pure” Relational Algebra Language, QUEL: A Tuple Relational Calculus Language, Query-by-Example: A DRC Language, Data Definition in QBE, The Query Language SQL, Data Definition in SQL, The DBTG Data Definition language, The DBTG Query Language, The DBTG Database Modification Commands, Data Definition in IMS, A Hierarchical Data Manipulation Language, Data Definition in OPAL, Data Manipulation in OPAL

Module III: Physical Data Organization and Design of Relational Databases

The Physical Data Model, The Heap Organization, Hashed Files, Indexed Files, B-trees, Files with a Dense Index, Secondary Indices, Data Structures in DBTG Databases, Data Structures for Hierarchies, Data Structures for Relations, A Search Tree Structure, Functional Dependencies, Lossless-Join Decomposition, Normalization, Generalized Dependencies.

Module IV: Transaction Management

Basic Concepts, A Simple Transaction Model, The Two-phase Locking Protocol, a Model with Read and write-Locks, Lock Modes, A Read-Only, Write-Only Model, Concurrency for Hierarchically Structured Items, Handling Transaction Failures, Aggressive and Conservative Protocols, Recovery From Crashes, Timestamp-based Concurrency Control.

Module V: Distributed Database Management

Distributed Databases, Distributed Locking, Distributed Two-phase Locking, Distributed Commitment, A Nonblocking Commit Protocol, Timestamp-based, Distributed Concurrency, Recovery of Nodes, Distributed Deadlocks.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

- Jeffrey D. Ullman “Principles of Database and Knowledge-Base Systems”, Vol. 1, Computer Science Press, USA, 1988.
- Avi Silberschatz, Henry F. Korth and S. Sudarshan, “Database System Concepts”, Mcgraw Hill Education, 2000.
- Ngoc Thanh Nguyen, Edward Szczerbicki, “Intelligent Systems for Knowledge Management”, Springer-verlag Gmbh, 2009.

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BIG DATA TECHNOLOGIES

Course Code: DSE6805

Credit Units: 03

Course Objective:

This course brings together several key big data technologies used for storage, analysis and manipulation of data. It also introduces the students the key concepts of Hadoop framework, MapReduce, Pig, Hive, and No-SQL. Students will prepare a sample project in Hadoop.

Course Contents:

Module I: Introduction to Big Data

Big Data and its Importance – Four V's of Big Data – Drivers for Big Data – Introduction to Big Data Analytics – Big Data Analytics applications.

Module II: Big Data Technologies

Hadoop's Parallel World – Data discovery – Open source technology for Big Data Analytics – cloud and Big Data – Predictive Analytics – Mobile Business Intelligence and Big Data – Crowd Sourcing Analytics – Inter- and Trans-Firewall Analytics - Information Management.

Module III: Processing Big Data

Integrating disparate data stores - Mapping data to the programming framework - Connecting and extracting data from storage - Transforming data for processing - Subdividing data in preparation for Hadoop Map Reduce.

Module IV: Hadoop Map Reduce

Employing Hadoop Map Reduce - Creating the components of Hadoop Map Reduce jobs - Distributing data processing across server farms –Executing Hadoop Map Reduce jobs - Monitoring the progress of job flows - The Building Blocks of Hadoop Map Reduce - Distinguishing Hadoop daemons - Investigating the Hadoop Distributed File System Selecting appropriate execution modes: local, pseudo-distributed, fully distributed.

Module V: Big Data Tools and Techniques

Installing and Running Pig – Comparison with Databases – Pig Latin – User- Define Functions – Data Processing Operators – Installing and Running Hive – Hive QL – Tables – Querying Data – User-Defined Functions – Oracle Big Data.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

- Michael Minelli, Michehe Chambers, “Big Data, Big Analytics: Emerging Business Intelligence and Analytic Trends for Today's Business”, 1st Edition, Ambiga Dhiraj, Wiely CIO Series, 2013.
- Tom White, “Hadoop: The Definitive Guide”, 3rd Edition, O'reilly, 2012.
- Arvind Sathi, “Big Data Analytics: Disruptive Technologies for Changing the Game”, 1st Edition, IBM Corporation, 2012.
- Bill Franks, “Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with Advanced Analytics”, 1st Edition, Wiley and SAS Business Series, 2012.

RESEARCH METHODOLOGY AND TECHNICAL REPORT WRITING

Course Code: DSE6809

Credit Units: 02

Course Objectives:

The course will enhance scientific, technical and research writing skills and impart knowledge about various stages of research process, statistical analysis, statistical tests and their applications in statistical decision making.

Course Contents:

Module I: Introduction to research: Definition, motivation, need, objectives, significance and characteristics of research; types of research; steps in research process; planning a research proposal; literature review, web searching.

Module II: Population and sample, parameter and statistic, sampling and data collection, sampling design: steps, types, sample size, sampling methods, large and small samples, primary and secondary data, data processing and analysis. Sample surveys and questionnaire designing, scaling techniques.

Module III: Dependent and independent variables, univariate, bivariate and multivariate analysis, means-arithmetic, geometric and harmonic; measure of dispersion of data, standard deviation, variance, coefficient of variation and degree of freedom. Hypothesis testing: null hypothesis and alternate hypothesis, errors in hypothesis testing, significance and confidence levels, parametric tests and non-parametric tests, one-tailed and two-tailed tests, analysis of variance. Regression analysis and curve fitting, method of least-squares, explained and unexplained variations, coefficient of correlation, coefficient of determination.

Module IV: Technical/scientific/research report writing: structure and components of scientific reports, formats of dissertations, research report, report writing skills, report preparation, referencing, bibliography and footnotes. Making presentation-use of visual aids and PPTs. Publication of research papers, citations,. Intellectual property rights and copy rights, plagiarism, patents and patent laws, commercialization and ethical issues.

Examination Scheme:

Attendance	Assignment/Library consultation / Thesis writing	Class test	Final Exam	Total
5	15	10	70	100

Text Books:

- Blake, G. and Bly, R.W. 1993, The Elements of Technical Writing. MacMillan, New York
- Booth, V. 1981. Writing a Scientific Paper and Speaking at Scientific Meetings. The Biochemical Society, London
- Chawla, D and Sondhi, N. 2016, Research Methodology- Concepts and Cases. Vikas Publishing House Pvt Ltd. New Delhi
- Kothari, C.R. 2008. Research Methodology- Methods and Techniques, 2nd.ed. New Age International Publishers, New Delhi.

Reference Books:

- Geode, Millian J. & Paul K. Hatl, Methods in Research, McGraw Hills, New Delhi.
- Montgomery, Douglas C. (2007), 5th Ed. Design and Analysis of Experiments, Wiley India.
- Panneerselvam, R. 2009. Research Methodology, PHI Learning Pvt. Ltd., New Delhi-110001
- Ranjit Kumar 2009. Research Methodology- A step-by-step Guide for beginners; 2nd ed. Dorling Kindersley (India) Pvt. Ltd. Patpargang, Delhi- 110092

APPLIED STATISTICAL ANALYSIS LAB

Course Code: DSE6806

Credit Units: 01

Programs should be based on following topics:

Quick Review of interpretation of mathematical models such as formulas, graphs, tables, and schematics, and draw inferences from them;

Representation of mathematical information symbolically, visually, numerically, and verbally;

Use of arithmetic, algebraic, geometric, and statistical methods to solve problems;

Estimation and check answers to mathematical problems in order to determine reasonableness,

Identification of alternatives, and select optimal results; and recognize the limitations of mathematical and statistical models.


Recommended Software: SPSS (IBM).

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.




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DATA MINING AND PREDICTIVE ANALYTICS LAB

Course Code: DSE6807

Credit Units: 01

Course Objective:

- To analyse the data using statistical methods.
- To understand and demonstrate data mining using any open source data mining tool.

Recommended Software: ORANGE, Rapid Miner

List of Experiments

1. Data Analysis- Getting to know the Data (Using ORANGE, Rapid Miner)
 - Parametric - Means, T-Test, Correlation
 - Prediction for numerical outcomes - Linear regression
 - Correlation analysis
 - Preparing data for analysis
 - Pre-processing techniques
2. Data Mining (Using ORANGE, Rapid Miner or any open source data mining tool)
 - Implement clustering algorithm
 - Implement classification using
 - Decision tree
 - Back propagation
 - Visualization methods.

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

DATA WAREHOUSING AND MULTIDIMENSIONS MODELLING LAB

Course Code: DSE6808

Credit Units: 01

Programs should be based on following topics:

Quick Review SQL Statements, SQL Built-in Functions, **Emphasis** on PL/SQL, Cursors 8. Exception handling, Procedure, Functions, Trigger, concurrency control, transaction processing. Introduction to ETL Tools: Talend Open Source Data Integrator, Scriptella, KETL
Pentaho Data Integrator - Kettle, Jaspersoft ETL, GeoKettle, CloverETL, HPCC Systems

Recommended Software: SQL Server, ETL Tools (Open Source)

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.



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MAJOR PROJECT

Course Code: DSE6837

Credit Units: 08

GUIDELINES FOR PROJECT FILE

Research experience is as close to a professional problem-solving activity as anything in the curriculum. It provides exposure to research methodology and an opportunity to work closely with a faculty guide. It usually requires the use of advanced concepts, a variety of experimental techniques, and state-of-the-art instrumentation.

Research is genuine exploration of the unknown that leads to new knowledge which often warrants publication. But whether or not the results of a research project are publishable, the project should be communicated in the form of a research report written by the student.

Sufficient time should be allowed for satisfactory completion of reports, taking into account that initial drafts should be critiqued by the faculty guide and corrected by the student at each stage.

The File is the principal means by which the work carried out will be assessed and therefore great care should be taken in its preparation.

In general, the File should be comprehensive and include

A short account of the activities that were undertaken as part of the project;

A statement about the extent to which the project has achieved its stated goals.

A statement about the outcomes of the evaluation and dissemination processes engaged in as part of the project;

Any activities planned but not yet completed as part of the project, or as a future initiative directly resulting from the project;

Any problems that have arisen that may be useful to document for future reference.

➤ **Report Layout**

The report should contain the following components:

➤ **Title or Cover Page**

The title page should contain the following information: Project Title; Student's Name; Course; Year; Supervisor's Name.

➤ **Acknowledgements**(optional)

Acknowledgment to any advisory or financial assistance received in the course of work may be given.

➤ **Abstract**

A good "Abstract" should be straight to the point; not too descriptive but fully informative. First paragraph should state what was accomplished with regard to the objectives. The abstract does not have to be an entire summary of the project, but rather a concise summary of the scope and results of the project

➤ **Table of Contents**

Titles and subtitles are to correspond exactly with those in the text.

➤ **Introduction**

Here a brief introduction to the problem that is central to the project and an outline of the structure of the rest of the report should be provided. The introduction should aim to catch the imagination of the reader, so excessive details should be avoided.

➤ **Materials and Methods**

This section should aim at experimental designs, materials used. Methodology should be mentioned in details including modifications if any.

➤ **Results and Discussion**

Present results, discuss and compare these with those from other workers, etc. In writing these section emphasis should be given on what has been performed and achieved in the course of the work, rather than discuss in detail what is readily available in text books. Avoid abrupt changes in

contents from section to section and maintain a lucid flow throughout the thesis. An opening and closing paragraph in every chapter could be included to aid in smooth flow.

Note that in writing the various sections, all figures and tables should as far as possible be next to the associated text, in the same orientation as the main text, numbered, and given appropriate titles or captions. All major equations should also be numbered and unless it is really necessary never write in “point” form.

➤ **Conclusion**

A conclusion should be the final section in which the outcome of the work is mentioned briefly.

➤ **Future prospects**

➤ **Appendices**

The Appendix contains material which is of interest to the reader but not an integral part of the thesis and any problem that have arisen that may be useful to document for future reference.

➤ **References / Bibliography**

This should include papers and books referred to in the body of the report. These should be ordered alphabetically on the author's surname. The titles of journals preferably should not be abbreviated; if they are, abbreviations must comply with an internationally recognised system.

Examples

For research article

Voravuthikunchai SP, Lortheeranuwat A, Ninprom T, Popaya W, Pongpaichit S, Supawita T. (2002) Antibacterial activity of Thai medicinal plants against enterohaemorrhagic *Escherichia coli* O157: H7. *Clin Microbiol Infect*, **8** (suppl 1): 116–117.

For book

Kowalski, M. (1976) Transduction of effectiveness in *Rhizobium meliloti*. SYMBIOTIC NITROGEN FIXATION PLANTS (editor P.S. Nutman IBP), **7**: 63-67

ASSESSMENT OF THE PROJECT FILE

Essentially, marking will be based on the following criteria: the quality of the report, the technical merit of the project and the project execution.

Technical merit attempts to assess the quality and depth of the intellectual efforts put into the project.

Project execution is concerned with assessing how much work has been put in.

The File should fulfill the following *assessment objectives*:

Range of Research Methods used to obtain information

Execution of Research

Data Analysis

Analyse Quantitative/ Qualitative information

Control Quality

Draw Conclusions

Examination Scheme:

Dissertation	50
Viva Voce	50
Total	100

DESCRIPTIVE ANALYSIS

Course Code: DSE6901

Credit Units: 03

Course Objective:

This course introduces some elementary statistical methods of analysis of data and compute various measurements of central tendency, dispersion, skewness and kurtosis. Also discusses computation of the correlation coefficient from ungrouped bivariate data and interpret them and analyse data pertaining to attributes and to interpret results.

Course Contents:

Module I: Introduction to Statistics:

Definitions: Webster's and Secrist's definition of Statistics, Importance of Statistics, Scope of Statistics: In the field of Industry, Biological Sciences, Medical Sciences, Economics Sciences, Social, Sciences, Management Sciences, Agriculture, Insurance, Actuarial Science, Education and Psychology.

Module II: Population and Sample

Types of characteristics: Attributes: Nominal scale, ordinal scale. Variables: Interval scale, ratio scale, discrete and continuous variables, Types of data: Primary data, Secondary data, Notion of a statistical population: Finite population, infinite population, homogeneous population and heterogeneous population. Notion of sample, random sample and non-random sample, Methods of sampling: Simple random sampling with and without replacement (SRSWR and SRWOR) stratified random sampling, systematic sampling, cluster sampling and two-stage sampling.

Module III: Presentation of Data

Classification: Raw data and its classification, Discrete frequency distribution, Sturge's rule, continuous frequency distribution, inclusive and exclusive methods of classification, Open end classes, cumulative frequency distribution and relative frequency distribution, Graphical Presentation of Data: Histogram, frequency curve, frequency polygon, ogive curves, stem and leaf chart, Check sheet, Parato diagram, Examples and Problems.

Module IV: Measures of Central Tendency

Concept of central tendency of statistical data, Arithmetic Mean (A.M.), combined mean of a number of groups, merits and demerits, Geometric Mean (G.M.), Harmonic Mean (H.M.), Weighted Mean, Weighted A.M., G.M. and H.M. , Mode, Median, Empirical relation between mean, median and mode, Order relation between arithmetic mean, geometric mean, harmonic mean.

Module V: Measures of Dispersion

Concept of dispersion, characteristics of good measure of dispersion, Range, Mean deviation, Mean square definition, Variance and standard deviation, Combined variance, Combined standard deviation, generalization for n groups, Measures of dispersion for comparison: coefficient of range, coefficient of quartile deviation and coefficient of mean deviation, coefficient of variation.

Module VI: Skewness and Kurtosis

Concept of skewness of frequency distribution, positive skewness, negative skewness, symmetric frequency distribution, Bowley's coefficient of skewness, interpretation using Box plot, Karl Pearson's coefficient of skewness, Measures of skewness based on moments (β_1 , γ_1), Concepts of kurtosis, leptokurtic, mesokurtic and platykurtic frequency distributions, Measures of kurtosis based on moments, (β_2 , γ_2).

Module VII: Correlation & Regression

Bivariate data, bivariate frequency distribution, Concept of correlation between two variables, positive correlation, negative correlation, Scatter diagram, conclusion about the type of correlation from scatter diagram, Covariance between two variables, Karl Pearson's coefficient of correlation,

Spearman's rank correlation coefficient, In case of ties, compute Karl Pearson's correlation coefficient between ranks. Regression: lines of regression, fitting of lines of regression by the least squares method, interpretation of slope and intercept. 9.2 Regression coefficient (byx, bxy), Effect of change of origin and scale, Angle between the two lines of regression, Mean residual sum of squares, Residual plot and its interpretation.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

Text and References :

- Goon A.M., Gupta M. K., Dasgupta B. (1998): Fundamentals of Statistics (V-1), World Press.
- Miller and Freund: Modern Elementary Statistics.
- Snedecor and Cochran: Statistical Methods, Oxford and IBH Publishers.
- Mukhopadhyay, P: Mathematical Statistics (1996), New Central Book Agency, Calcutta.
- Introduction to Mathematical Statistics, Ed. 4 (1989), MacMillan Publishing Co. New York.
- Gupta and Kapoor: Fundamentals of Mathematical Statistics, Sultan Chand and Sons, New Delhi.
- Neil Weiss: Introductory Statistics: Pearson Publishers.



Anil

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LEARNING AND REASONING WITH BAYESIAN NETWORKS

Course Code: DSE6902

Credit Units: 04

Course Objective:

This course provides an in-depth exposition of knowledge representation, reasoning, and machine learning under uncertainty using the framework of Bayesian networks. Both theoretical underpinnings and practical considerations will be covered, with a special emphasis on constructing and learning graphical models, and on various exact and approximate inference algorithms.

Course Contents:

Module I: Introduction

Reasoning about beliefs using Logic and Probability Propositional Logic, Probability Calculus and Bayesian Reasoning, Bayesian Networks, Syntax and Semantics, Building Bayesian Networks.

Module II: Bayesian Networks Inference

Inference by variable elimination, Inference by Factor Elimination (Jointree), Compiling Bayesian Networks, Complexity of probabilistic inference, compiling bayesian networks.

Module III: Approximate Inference

Inference by Belief Propagation: Algorithm, Iterative belief propagation, semantics of IBP, Join graphs, edge-detection semantics, Approximate Inference by Stochastic Sampling: Simulating a Bayesian network, direct sampling, expectations, estimating a conditional probability, Markov chain simulation.

Module IV: Learning: The Maximum Likelihood Approach

Introduction, estimating parameters from complete data, estimating parameters from incomplete data, learning network structure, searching for network structure.

Module V: Learning: The Bayesian Approach

Introduction, Meta Networks, Learning with Discrete Parameter Sets, Learning with Continuous Parameter Sets, Learning Network Structure

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

- Adnan Darwiche, Modelling and Reasoning with Bayesian Networks. Cambridge University Press 2009
- Richard E. Neapolitan, "Learning Bayesian networks", Prentice Hall Series in Artificial Intelligence, 2004.
- Timo Koski, John Noble, "Bayesian Networks: An Introduction", Wiley series in Probability and Statistics, 2009.
- Finn V. Jensen and Thomas Nielsen. Bayesian Networks and Decision Graphs. Springer 2007.

SOCIAL NETWORK DATA ANALYTICS

Course Code: DSE6903

Credit Units: 03

Course Objective:

This course gives an introduction to social network analysis, with a focus on modelling. It provides an overview of research questions connected to social networks, and of descriptive measures, models, and methods of analysis that can be used to analyse empirical social network data. It helps to understand the online interactive demonstrations and hands-on analysis of real-world data sets

Course Contents:

Module I: Introduction

Overview: Social network data-Formal methods- Paths and Connectivity-Graphs to represent social relations-Working with network data- Network Datasets-Strong and weak ties - Closure, Structural Holes, and Social Capital.

Module II: Community Discovery in Social Networks: Applications, Methods and Engineering Trends

Introduction, Communities In Context, Core Methods, Quality Functions, The Kernighan-Lin (KL) Algorithm, Agglomerative/Divisive Algorithms, Spectral Algorithms, Multi-Level Graph Portioning, Markov Clustering. Other Approaches, Emerging Fields and Problems, Community Discovery in Dynamic Networks, Community Discovery in Heterogeneous Networks, Community Discovery in Directed Networks, Coupling Content and Relationship Information for Community Discovery,

Module III: Information Networks and the World Wide Web

The Structure of the Web- World Wide Web- Information Networks, Hypertext, and Associative Memory- Web as a Directed Graph, Bow-Tie Structure of the Web- Link Analysis and Web Search, Searching the Web: Ranking, Link Analysis using Hubs and Authorities- Page Rank- Link Analysis in Modern Web Search, Applications, Spectral Analysis, Random Walks, and Web Search. Module IV

Module IV: Node Classifications in Social Networks

Introduction, Problem Formulation, Representing Data As A Graph, The Node Classification Problem, Methods Using Local Classifiers, Iterative Classification Method, Random Walk Based Methods, Label Propagation, Graph Regularization, Adsorption, Applying Node Classification To Large Social Networks, Basic Approaches, Second-Order Methods, Implementation Within Map-Reduce, Inference Using Graphical Models, Metric Labelling, Spectral Partitioning, Graph Clustering, Variations on Node Classification.

Module V: Data and Text Mining In Social Media

Data Mining In Nutshell, Social Media, Motivations For Data Mining In Social Media, Data Mining Methods For Social Media, Data Representation, Data Mining- A Process, Social Networking Sites: Illustrative Examples, Related Efforts, Ethnography And Netnography, Event Maps, Text Mining: Keyword Search, Query Semantics And Answer Ranking, Keyword Search over Xml and Relational Data, Keyword Search Over Graph Data, Classification Algorithms, Clustering Algorithms, Transfer Learning in Heterogeneous Networks.

Module VI: Overview of Social Tagging

Introduction, Problems With Metadata Generation and Fixed Taxonomies, Tags: Why And What?, Different User Tagging Motivations, Kinds Of Tags, Linguistic Classifications Of Tags, Game-Based Tagging, Tag Generation Models, Tagging System Design, Tag Analysis, Tagging Distributions, Identifying Tag Semantics, Tags Versus Keywords, Visualization Of Tags, Tag Clouds For Browsing/Search, Tag Selection For Tag Clouds, Tag Hierarchy Generation, Tag Cloud Display Formats, Tag Evolution Visualization.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

Text & References:

- Easley and Kleinberg, “Networks, Crowds, and Markets: Reasoning about a highly connected world”, Cambridge Univ. Press, 2010.
- Charu C. Aggarwal, “Social Network Data Analytics”, Springer, 2011.
- Robert A. Hanneman and Mark Riddle, “Introduction to social network methods”, University of California, 2005.
- Jure Leskovec, Anand Rajaraman, and Jeffrey D. Ullman, “Mining of Massive Datasets”, Cambridge University Press, 2 edition, 2014.
- Wasserman, S., & Faust, K, “Social Network Analysis: Methods and Applications”, Cambridge University Press; 1 edition, 1994.



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R PROGRAMMING LAB

Course Code: DSE6904

Credit Units: 01

Course Objective:

This lab will provide a basic introduction to the R programming Language and the use of R to perform basic statistics and programming tasks. The main objectives of this lab is to impart the students with the knowledge of R Programming, Machine Learning using R Mining from streaming Data, Mining from Distributed Data.

R Programming Objective

- Master the use of the R interactive environment
- Expand R by installing R packages
- Explore and understand how to use the R documentation
- Read Structured Data into R from various sources
- Understand the different data types in R
- Understand the different data structures in R
- Understand how to use dates in R
- Use R for mathematical operations
- Use of vectorised calculations
- Write user-defined R functions
- Use control statements
- Write Loop constructs in R
- Use Apply to iterate functions across data
- Reshape data to support different analyses
- Understand split-apply-combine (group-wise operations) in R
- Deal with missing data
- Manipulate strings in R
- Understand basic regular expressions in R
- Understand base R graphics
- Focus on GGplot2 graphics for R
- Be familiar with trellis (lattice) graphics
- Use R for descriptive statistics
- Use R for inferential statistics
- Write multivariate models in R
- Understand confounding and adjustment in multivariate models
- Understand interaction in multivariate models
- Predict/Score new data using models
- Understand basic non-linear functions in models
- Understand how to link data, statistical methods, and actionable questions


Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.



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HADOOP LAB

Course Code: DSE6905

Credit Units: 02

Course Objective:

- To provide an overview of several key technologies used in manipulating, storing, and analysing big data.
- To understand the fundamentals of Hadoop.
- To apply the learning specific problems in various domains.

Recommended Tools

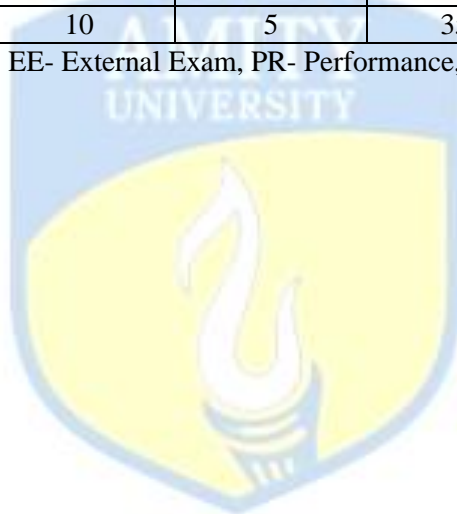
Big Data Tools and Technology [Learning and Demonstration of Big Data Ecosystem]

- Hadoop
- HBase
- NoSQL
- Hive
- Pig

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.



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WEB TECHNOLOGY

Course Code: DSE6906

Credit Units: 03

Course Objectives:

This course provides knowledge on Core technologies that are needed for the web like HTML and XML and facilitate how to build XML applications with DTD and style sheets that span multiple domains ranging from finance to vector graphics to genealogy for use with legacy browsers.

Course Contents:

MODULE I: Introduction

HTML Common tags, Cascading Style sheets - Introduction to Java Scripts - Objects in Java Script - Dynamic HTML with Java Script.

MODULE II: Vbscript Language Elements

Constants - Variables and Data Types - Mathematical Operations – Logical Operators - Looping and Decision Structures - VBScript Functions and Objects: Data Conversion Functions - Mathematical Functions - Data Formatting Functions - Text Manipulation Functions - Data and Time Functions - Built-in Objects.

MODULE III: ASP Fundamentals

Using Server – Side Includes- Learning the SSI Directives – Creating Modular ASP Code -Using the Request Object: Using Form Information - Using QueryString Information – Using Server Variables - Using the Response Object: Create Output – Managing Output – Managing the Connection.

MODULE IV: Using Cookies

Introduction to Cookies: Cookies and Your Browser – Creating a Cookie – Modifying and removing Cookies – Tracking Preferences with Cookies Using the Application, Session and Server Objects: The application Object – The Session Object – The Server Object – Using the global .asa file - Active Data Objects Essentials: Microsoft's Universal Data Access Strategy – The Connection Object – The Record set and Field Objects – The Command and Parameter Objects – Using the Errors Collection.

MODULE V: Introducing XML

XML: The Life of an XML documents - Related technologies- First XML Document: Hello XML – Exploring the Simple XML Document – Assigning Meaning to XML Tags – Writing a Style Sheet for an XML Document – Attaching a Style Sheet to an XML Document – Style Languages: CSS Style Sheets, CSS Layouts, CSS Text Styles.

MODULE VI: Attributes, Empty Tags & XSL

Attributes – Attributes versus Elements – Empty Elements and Empty Element Tags – XSL-DTDs and Validity: Document Type Definitions – Element Declarations – DTD Files – Document Type Declarations – Validating Against a DTD-Element Declaration - Entity Declarations: What Is an Entity – Internal General Entities – External General Entities – Internal Parameter Entities – External Parameter Entities – Building a Document from Places-Attribute Declaration: What is an Attribute – Declaring Attributes in DTDs – Declaring Multiple Attributes – Specifying Default Values for Attributes – Attribute Types – Predefined Attributes – A DTD for Attribute- Based Baseball Statistics.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

- Dave Mercer, “ASP 3.0 Beginners Guide”, Tata McGraw-Hill Edition, Sixth reprint, 2004.
- Prof. (Dr.) Anil Kumar Kamal, “Web Technology”, 1st Edition, Tata McGraw - Hill, 2001.

SERVICE ORIENTED ARCHITECTURE

Course Code: DSE6907

Credit Units: 03

Course Objective:

The subject gives an introduction to the fundamentals and issues relating to Service Oriented Architecture and bring out the importance of service orientation and web services. It also teaches appropriate tools as technique on how to build the Service Oriented Architecture with web services.

Course Contents:

Module I: Introduction

Basic definition - Fundamentals of SOA - Characteristics and misperceptions about SOA-Benefits and pitfalls of SOA.

Module II: Evolution of SOA

The evolution of SOA - Web service and primitive SOA - The extension of SOA - Web service extension.

Module III: Web Service and Contemporary SOA

Message Exchange Pattern- Service Activity- Coordination- Atomic Transaction- Business Activity-Orchestration – Choreography- Addressing- Reliable Messaging- Correlation and Policies- Meta data Exchange- Security- Notification and Eventing.

Module IV: Principles of Service Orientation

Principles of service orientation -Building SOA-Planning and Analysis- SOA delivery strategies - Service Oriented Analysis Introduction -Service Modelling of Service Oriented Analysis.

Module V: Service Oriented Design

Introduction to service oriented design - WSDL related XML Schema language Basics - WSDL Language Basics - SOAP Language Basics - Service interface design tools - Steps to composing SOA - Consideration for choosing service layers, positioning core SOA standards and choosing SOA extension – Service design and business process design.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

- Thomas Erl, “Service Oriented Architecture, Concepts, Technology and Design”, Pearson Education, 2009.
- Shankar Kambhampaty, “Service Oriented Architecture for Enterprise Architecture for Enterprise Application”, 1st Edition, Wiley Publication, 2008.

NATURAL LANGUAGE PROCESSING

Course Code: DSE6908

Credit Units: 03

Course Objective:

This course provides a general introduction including the use of state automata for language processing and syntax including a basic parse. It explains advanced feature like feature structures and realistic parsing methodologies. It also gives concepts of remotes processing and detail information about a typical natural language processing applications.

Course Contents:

Module-I: Introduction

Introduction: Knowledge in speech and language processing - Ambiguity - Models and Algorithms - Language, Thought and Understanding- Regular Expressions and automata: Regular expressions - Finite-State automata. Morphology and Finite-State Transducers: Survey of English morphology - Finite-State Morphological parsing - Combining FST lexicon and rules - Lexicon- Free FSTs: The porter stammer - Human morphological processing.

Module-II: Syntax Analysis

Word classes and part-of-speech tagging: English word classes - Tagsets for English - Part-of-speech tagging - Rule-based part-of-speech tagging - Stochastic part-of-speech tagging - Transformation-based tagging – Other issues - Context-Free Grammars for English: Constituency - Context-Free rules and trees - Sentence-level constructions - The noun phrase - Coordination - Agreement - The verb phrase and sub categorization – Auxiliaries - Spoken language syntax - Grammars equivalence and normal form - Finite- State and Context-Free grammars - Grammars and human processing. Parsing with Context-Free Grammars: Parsing as search - A Basic Top-Down parser - Problems with the basic Top-Down parser - The early algorithm - Finite-State parsing methods.

MODULE-III: Advanced Features and Syntax

Features and Unification: Feature structures - Unification of feature structures
- Features structures in the grammar - Implementing unification - Parsing with unification constraints
- Types and Inheritance. Lexicalized and Probabilistic
Parsing: Probabilistic context-free grammar - Problems with PCFGs -
Probabilistic lexicalized CFGs - Dependency Grammars - Human parsing.

MODULE-IV: Semantic

Representing Meaning: Computational desiderata for representations – Meaning structure of language
- First order predicate calculus - Some linguistically relevant concepts - Related representational approaches – Alternative approaches to meaning. Semantic Analysis: Syntax-Driven semantic analysis - Attachments for a fragment of English - Integrating semantic analysis into the early parser - Idioms and compositionality - Robust semantic analysis. Lexical semantics: relational among lexemes and their senses - WordNet: A database of lexical relations - The Internal structure of words - Creativity and the lexicon.

MODULE-V: Natural Language Generation

Introduction to language generation - Architecture for generation – Surface realization - Discourse planning - Other issues- Machine Translation: Language similarities and differences - The transfer metaphor - The interlingua idea: Using meaning - Direct translation - Using statistical techniques – Usability and system development.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;

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Text & References:

- Daniel Jurafsky & James H.Martin, “Speech and Language Processing”, 2nd Edition, Pearson Education, 2009.
- James Allen, "Natural Language Understanding", 2nd Edition, Pearson Education, 2008.
- Manning, Christopher D and Hinrich Schütze, “Foundations of Statistical Natural Language Processing”, Cambridge, 1st Edition, MA: MIT Press, 1999.



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AGENT BASED INTELLIGENT SYSTEMS

Course Code: DSE6909

Credit Units: 03

Course Objective:

This course provides students basic knowledge of employing intelligent agents in solving complex problems and gives the awareness of the building blocks of agents and working of different types of agents. It also analyses the reasons for uncertainty and ability to design agents to handle them.

Course Contents:

Module I: Introduction

Definitions – History – Hybrid Intelligent Agents – Agents vs Multi Agent Systems– Structure – Environment – Basic Problem Solving Agents – Complex Problem Solving Agents – Formulating Search Strategies – Intelligent Search.

Module II: Concepts for Building Agents

Situated Agents: Actions and Percepts - Proactive and Reactive Agents: Goals and Events- Challenging Agent Environments: Plans and Beliefs - Social Agents - Agent Execution Cycle.

Module III: Knowledge Based Agents

Knowledge Representation – Logic – First Order Logic – Reflex Agent – Building a Knowledge Base – General Ontology – Inference – Logical Recovery.

Module IV: Planning Agents

Situational Calculus – Representation of Planning – Partial Order Planning – Practical Planners– Conditional Planning - Preplanning Agents.

Module V: Agents and Uncertainty

Acting under uncertainty – Probability – Baye's Rule – Belief Networks – Utility Theory - Decision Network- Value of Information – Decision Theoretic Agent Design.

Module VI: Higher Level Agents

Learning Agents – General Model – Inductive Learning – Learning Decision Tree – Reinforcement Learning – Knowledge in Learning – Communicative Agents – Types of Communicative Agents – Future of AI.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

Text and References:

- Stuart Russell and Peter Norvig, "Artificial Intelligence: A Modern Approach", 3rd Edition, Prentice Hall, 2010.
- Lin Padgham, Michael Winikoff, "Developing Intelligent Agent Systems: A Practical Guide", 1st Edition, John Wiley & Sons, 2004.
- Zili Zhang, Chengqi Zhang, "Agent-Based Hybrid Intelligent Systems: An Agent- Based Framework for Complex Problem Solving", 1st Edition, Springer-Verlag New York, LLC , 2004.
- Ngooc Thanh Nguyaaen, Lakhmi C. Jain, "Intelligent Agents in the Evolution of Web and Applications", 4th Edition, Springer, 2009.

SUMMER INTERNSHIP EVALUATION-III

Course Code: DSE6935

Credit Units: 06

Guidelines:

There are certain phases of every Intern's professional development that cannot be effectively taught in the academic environment. These facets can only be learned through direct, on-the-job experience working with successful professionals and experts in the field. The internship program can best be described as an attempt to institutionalize efforts to bridge the gap between the professional world and the academic institutions. Entire effort in internship is in terms of extending the program of education and evaluation beyond the classroom of a university or institution. The educational process in the internship course seeks out and focuses attention on many latent attributes, which do not surface in the normal classroom situations. These attributes are intellectual ability, professional judgment and decision-making ability, inter-disciplinary approach, skills for data handling, ability in written and oral presentation, sense of responsibility etc.

In order to achieve these objectives, each student will maintain a file (**Internship File**). The Internship File aims to encourage students to keep a personal record of their learning and achievement throughout the Programme. It can be used as the basis for lifelong learning and for job applications. Items can be drawn from activities completed in the course modules and from the workplace to demonstrate learning and personal development.

The File will assess the student's analytical skills and ability to present supportive evidence, whilst demonstrating understanding of their organization, its needs and their own personal contribution to the organization.

The **layout guidelines** for the Project & Seminar Report:

1. File should be in the following specification:

A4 size paper

Font: Arial (10 points) or Times New Roman (12 points)

Line spacing: 1.5

Top & bottom margins: 1 inch/ 2.5 cm

Left & right margins: 1.25 inches/ 3 cm

2. Report Layout: The report should contain the following components:

Front Page

Table of Content

Acknowledgement

Student Certificate

Company Profile (optional)

Introduction

Main Body

References / Bibliography

The File will include **five sections** in the order described below. The content and comprehensiveness of the main body and appendices of the report should include the following:

1. **The Title Page**--Title - An Internship Experience Report For (Your Name), name of internship organization, name of the Supervisor/Guide and his/her designation, date started and completed, and number of credits for which the report is submitted.

2. **Table of Content**--an outline of the contents by topics and subtopics with the page number and location of each section.

3. **Introduction**--short, but should include how and why you obtained the internship experience position and the relationship it has to your professional and career goals.

4. **Main Body**--should include but not be limited to daily tasks performed. Major projects contributed to, dates, hours on task, observations and feelings, meetings attended and their purposes, listing of

tools and materials and their suppliers, and photographs if possible of projects, buildings and co-workers.

5. References / Bibliography --This should include papers and books referred to in the body of the report. These should be ordered alphabetically on the author's surname. The titles of journals preferably should not be abbreviated; if they are, abbreviations must comply with an internationally recognised system

ASSESSMENT OF THE INTERNSHIP FILE

The student will be provided with the Student Assessment Record (SAR) to be placed in front of the Internship File. Each item in the SAR is ticked off when it is completed successfully. The faculty will also assess each item as it is completed. The SAR will be signed by the student and by the faculty to indicate that the File is the student's own work. It will also ensure regularity and meeting the deadlines.

STUDENT ASSESSMENT RECORD (SAR)

5. Range of Research Methods used to obtain information

6. Execution of Research

7. Data Analysis

- Analyse Quantitative/ Qualitative information
- Control Quality

8. Draw Conclusions

Examination Scheme:

Components	V	S	R	FP
Weightage (%)	20	20	20	40

V – Viva, S – Synopsis, FP – Final Presentation, R - Report

PROJECT-DISSERTATION-II

Course Code: DSE6037

Credit Units: 15

GUIDELINES FOR DISSERTATION

Research experience is as close to a professional problem-solving activity as anything in the curriculum. It provides exposure to research methodology and an opportunity to work closely with a faculty guide. It usually requires the use of advanced concepts, a variety of experimental techniques, and state-of-the-art instrumentation.

Research is genuine exploration of the unknown that leads to new knowledge which often warrants publication. But whether or not the results of a research project are publishable, the project should be communicated in the form of a research report written by the student.

Sufficient time should be allowed for satisfactory completion of reports, taking into account that initial drafts should be critiqued by the faculty guide and corrected by the student at each stage.

The File is the principal means by which the work carried out will be assessed and therefore great care should be taken in its preparation.

In general, the File should be comprehensive and include

A short account of the activities that were undertaken as part of the project;

A statement about the extent to which the project has achieved its stated goals.

A statement about the outcomes of the evaluation and dissemination processes engaged in as part of the project;

Any activities planned but not yet completed as part of the DISSERTATION, or as a future initiative directly resulting from the project;

Any problems that have arisen that may be useful to document for future reference.

➤ Report Layout

The report should contain the following components:

➤ **Title or Cover Page**

The title page should contain the following information: Project Title; Student's Name; Course; Year; Supervisor's Name.

➤ **Acknowledgements** (optional)

Acknowledgment to any advisory or financial assistance received in the course of work may be given.

➤ **Abstract**

A good "Abstract" should be straight to the point; not too descriptive but fully informative. First paragraph should state what was accomplished with regard to the objectives. The abstract does not have to be an entire summary of the project, but rather a concise summary of the scope and results of the project

➤ **Table of Contents**

Titles and subtitles are to correspond exactly with those in the text.

➤ **Introduction**

Here a brief introduction to the problem that is central to the project and an outline of the structure of the rest of the report should be provided. The introduction should aim to catch the imagination of the reader, so excessive details should be avoided.

➤ **Materials and Methods**

This section should aim at experimental designs, materials used. Methodology should be mentioned in details including modifications if any.

➤ **Results and Discussion**

Present results, discuss and compare these with those from other workers, etc. In writing these section emphasis should be given on what has been performed and achieved in the course of the work, rather than discuss in detail what is readily available in text books. Avoid abrupt changes in

contents from section to section and maintain a lucid flow throughout the thesis. An opening and closing paragraph in every chapter could be included to aid in smooth flow.

Note that in writing the various sections, all figures and tables should as far as possible be next to the associated text, in the same orientation as the main text, numbered, and given appropriate titles or captions. All major equations should also be numbered and unless it is really necessary never write in “point” form.

➤ **Conclusion**

A conclusion should be the final section in which the outcome of the work is mentioned briefly.

➤ **Future prospects**

➤ **Appendices**

The Appendix contains material which is of interest to the reader but not an integral part of the thesis and any problem that have arisen that may be useful to document for future reference.

➤ **References / Bibliography**

This should include papers and books referred to in the body of the report. These should be ordered alphabetically on the author's surname. The titles of journals preferably should not be abbreviated; if they are, abbreviations must comply with an internationally recognised system.

Examples

For research article

Voravuthikunchai SP, Lortheeranuwat A, Ninprom T, Popaya W, Pongpaichit S, Supawita T. (2002) Antibacterial activity of Thai medicinal plants against enterohaemorrhagic *Escherichia coli* O157: H7. *Clin Microbiol Infect*, **8** (suppl 1): 116–117.

For book

Kowalski, M. (1976) Transduction of effectiveness in *Rhizobium meliloti*. SYMBIOTIC NITROGEN FIXATION PLANTS (editor P.S. Nutman IBP), **7**: 63-67

ASSESSMENT OF THE DISSERTATION FILE

Essentially, marking will be based on the following criteria: the quality of the report, the technical merit of the project and the project execution.

Technical merit attempts to assess the quality and depth of the intellectual efforts put into the project.

Project execution is concerned with assessing how much work has been put in.

The File should fulfill the following *assessment objectives*:

Range of Research Methods used to obtain information

Execution of Research

Data Analysis

Analyse Quantitative/ Qualitative information

Control Quality

Draw Conclusions

Examination Scheme:

Dissertation	50
Viva Voce	50
Total	100

data, leading to production of a structured report.

Selecting the Dissertation Topic

It is usual to give you some discretion in the choice of topic for the dissertation and the approach to be adopted. You will need to ensure that your dissertation is related to your field of specialization.

Deciding this is often the most difficult part of the dissertation process, and perhaps, you have been thinking of a topic for some time.

It is important to distinguish here between 'dissertation topic' and 'dissertation title'. The topic is the specific area that you wish to investigate. The title may not be decided until the dissertation has been written so as to reflect its content properly.

Few restrictions are placed on the choice of the topic. Normally we would expect it to be:

- relevant to business, defined broadly;
- related to one or more of the subjects or areas of study within the core program and specialisation stream;
- clearly focused so as to facilitate an in-depth approach, subject to the availability of adequate sources of information and to your own knowledge;
- of value and interest to you and your personal and professional development.

Planning the Dissertation

This will entail following:

- Selecting a topic for investigation.
- Establishing the precise focus of your study by deciding on the aims and objectives of the dissertation, or formulating questions to be investigated. Consider very carefully what is worth investigating and its feasibility.
- Drawing up initial dissertation outlines considering the aims and objectives of the dissertation. Workout various stages of dissertation
- Devising a timetable to ensure that all stages of dissertation are completed in time. The timetable should include writing of the dissertation and regular meetings with your dissertation guide.

The Dissertation plan or outline

It is recommended that you should have a dissertation plan to guide you right from the outset. Essentially, the dissertation plan is an outline of what you intend to do, chapter wise and therefore should reflect the aims and objectives of your dissertation.

There are several reasons for having a dissertation plan

- It provides a focus to your thoughts.
- It provides your faculty-guide with an opportunity, at an early stage of your work, to make constructive comments and help guide the direction of your research.
- The writing of a plan is the first formal stage of the writing process, and therefore helps build up your confidence.
- In many ways, the plan encourages you to come to terms with the reading, thinking and writing in a systematic and integrated way, with plenty of time left for changes.
- Finally, the dissertation plan generally provides a revision point in the development of your dissertation report in order to allow appropriate changes in the scope and even direction of your work as it progresses.

Keeping records

This includes the following:

- Making a note of everything you read; including those discarded.
- Ensuring that when recording sources, author's name and initials, date of publication, title, place of publication and publisher are included. (You may consider starting a card index or database from the outset). Making an accurate note of all quotations at the time you read them.
- Make clear what is a direct quotation and what is your paraphrase.

Dissertation format

All students must follow the following rules in submitting their dissertation.

- Front page should provide title, author, Name of degree/diploma and the date of submission.
- Second page should be the table of contents giving page references for each chapter and section.
- The next page should be the table of appendices, graphs and tables giving titles and page references.
- Next to follow should be a synopsis or abstract of the dissertation (approximately 500 words)
- Next is the 'acknowledgements'.
- Chapter I should be a general introduction, giving the background to the dissertation, the objectives of the dissertation, the rationale for the dissertation, the plan, methodological issues and problems. The limitations of the dissertation should also be hinted in this chapter.
- Other chapters will constitute the body of the dissertation. The number of chapters and their sequence will usually vary depending on, among others, on a critical review of the previous relevant work relating to your major findings, a discussion of their implications, and conclusions, possibly with a suggestion of the direction of future research on the area.
- After this concluding chapter, you should give a list of all the references you have used. These should be cross - references with your text. For articles from journals, the following details are required e.g.

Draper P and Pandyal K. 1991, The Investment Trust Discount Revisited, Journal of Business Finance and Accounting, Vol18, No6, Nov, pp 791-832.

For books, the following details are required:

Levi, M. 1996, International Financial Management, Prentice Hall, New York, 3rd Ed, 1996

- Finally, you should give any appendices. These should only include relevant statistical data or material that cannot be fitted into the above categories.

The Layout Guidelines for the Dissertation

- A4 size Paper
- Font: Arial (10 points) or Times New Roman (12 points)
- Line spacing: 1.5
- Top and bottom margins: 1 inch/ 2.5 cm; left and right margins: 1.25 inches/ 3 cm

Guidelines for the assessment of the Dissertation

While evaluating the dissertation, faculty guide will consider the following aspects:

1. Has the student made a clear statement of the objective or objective(s).
2. If there is more than one objective, do these constitute parts of a whole?
3. Has the student developed an appropriate analytical framework for addressing the problem at hand.
4. Is this based on up-to-date developments in the topic area?
5. Has the student collected information / data suitable to the frameworks?
6. Are the techniques employed by the student to analyse the data / information appropriate and relevant?
7. Has the student succeeded in drawing conclusion form the analysis?
8. Do the conclusions relate well to the objectives of the project?
9. Has the student been regular in his work?
10. Layout of the written report.

Assessment Scheme:

Continuous Evaluation:

40%

(Based on Abstract, Regularity, Adherence to initial plan, Records etc.)

Final Evaluation: Based on,

60%

Contents & Layout of the Report,

20

Conceptual Framework,

05

Objectives & Methodology and	05
Implications & Conclusions	10
Viva & Presentation	20



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BME2104	INTRODUCTION TO COMPUTERS AND PROGRAMMING IN C	L	T	P	C
Version: 2019.1	Date of Approval: May 21, 2019	2	1	0	3
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

The objective of this course module is to acquaint the students with the basics of computers system, its components, data representation inside computer and to get them familiar with various important features of procedure-oriented programming language i.e. C.

Course Objectives

The objective of this course is to

- Equip the students with concepts of Programming through C Language
- Provide an overview of advanced programming concepts like Structure, Union and File Handling

Course Outcomes

On completion of this course, the students will be able to

After the completion of course, the students will be able to,

- CO 1: Define the purpose and structure of C Program for programming; identify and distinguish various data types and operators; conditional and control statement; Apply if-else, Switch and loops to rewrite basic C program for problem solving.
- CO 2: Compare and contrast various Array types, its declaration and implementation; differentiate between Call by Value and Reference if Functions; apply the concepts to rewrite C Programs
- CO 3: Differentiate between various String Handling Functions; describe the concept of Pointers in C Language
- CO 4: Explain the concept of Structure and Union; apply the concept of File Handling to provide data storage support to the programs.
- CO 5: Apply the concept of Computer Graphics using C programming concepts for implementing line drawing, circle drawing algorithms.

Modules	Blooms level*	Number of hours
Module I: Introduction Introduction to computer, history, von-Neumann architecture, memory system (hierarchy, characteristics and types), H/W concepts (I/O Devices), S/W concepts (System S/W & Application S/W, utilities). Data Representation: Number systems, character representation codes, Binary, octal, hexadecimal and their interconversions. Binary arithmetic, floating point arithmetic, signed and unsigned numbers, Memory storage unit.	L1, L2 and L3	7
Module II: Programming in C History of C, Introduction of C, Basic structure of C program, Concept of variables, constants and data types in C, Operators and expressions: Introduction, arithmetic, relational, Logical, Assignment, Increment and decrement operator, Conditional, bitwise operators, Expressions, Operator precedence and associativity. Managing Input and output Operation, formatting I/O.	L2, L3 and L4	7
Module III: Fundamental Features in C	L2, L3	7

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C Statements, conditional executing using if, else, nesting of if, switch and break Concepts of loops, example of loops in C using for, while and do-while, continue and break. Storage types (automatic, register etc.), predefined processor, Command Line Argument.	and L4	
Module IV: Arrays and Functions One dimensional arrays and example of iterative programs using arrays, 2-D arrays Use in matrix computations. Concept of Sub-programming, functions Example of user defined functions. Function prototype, Return values and their types, calling function, function argument, function with variable number of argument, recursion.	L2 and L3	7
Module V: Advanced features in C Pointers, relationship between arrays and pointers Argument passing using pointers, Array of pointers. Passing arrays as arguments. Strings and C string library. Structure and Union. Defining C structures, Giving values to members, Array of structure, Nested structure, passing strings as arguments. File Handling.	L2, L3 and L4	8

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6:Evaluation

Text Books

1. E Balagurusamy, "Programming in ANSI C", Seventh Edition, Tata McGraw Hill Education private limited, July 2017.
2. Yashwant Kanetkar, "Let Us C", 16th Edition, BPB Publication, June 2017.

Reference Books

1. Brain W Kernighan and Dennis M Ritchie, "The C Programming Language", 2nd Edition, Pearson Publication, Jan 2015.
2. Byron Gottfried, "Programming with C", Third Edition, Tata McGraw Hill Education private limited, July 2017.
3. E Balagurusamy, "Computer Concepts & Programming in C", Seventh Edition, Tata McGraw Hill Education private limited, July 2011.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:


Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	2	--	2	--	--	--	--	--	--	--	--	1	--	1	--
CO2	1	1	2	2	--	--	--	--	--	--	--	--	1	--	1	--
CO3	1	1	2	3	--	--	--	--	--	--	--	--	1	--	1	--
CO4	1	1	2	2	3	--	--	--	--	--	--	--	1	--	1	--
CO5	1	1	2	2	3	--	--	--	--	--	--	--	1	--	1	--

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BME2109	PROGRAMMING IN C LAB	L	T	P	C
Version 2019.1	Date of Approval: May 21, 2019	0	0	2	1
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

The primary objective of this course is to understand all the components of C, including the C language, the C Preprocessor, and the C Standard Library. An understanding of some advanced practical issues, including memory management, testing and debugging, complex declarations and expression evaluation, building and using libraries, and evaluating tradeoffs, such as size vs. speed and speed vs. complexity. The ability to write C code and create and manipulate logical programs.

Course Objectives

The objective of this course is to

- Equip the students with concepts of Programming through C Language
- Provide an overview of advanced programming concepts like Structure, Union and File Handling.

Course Outcomes

After the completion of course, the students will be able to,

CO 1: Demonstrate the use of various data types and operators in C programs; Solve various problems using conditional control statements (if-else, Switch case).

CO 2: Construct C programs related to problems involving the usage of loops, arrays and functions.

CO 3: Apply the concept of Pointers for efficient memory management and construct C programs using string handling functions.

CO 4: Demonstrate the use of Structure, Union and concept of File Handling to provide data storage support to the programs.

Modules	Blooms level*	Number of hours
LABORATORY SESSSION 1 OPERATORS, EXPRESSIONS and DECISION MAKING <ol style="list-style-type: none"> 1. Write a program to calculate simple interest and amount. 2. Write a program to swap two numbers using third variable. 3. Write a program to demonstrate Greatest of 3 nos and to print the given no in ascending order. 4. Write a program to check if the number is even or odd. 5. Write a program to perform arithmetic operations using Switch Case statement. 6. Write a program to calculate area of circle, rectangle, square and triangle using Switch Case statement. 	L3	5
LABORATORY SESSSION 2 LOOPING <ol style="list-style-type: none"> 1. Write a program to find factorial of given no using do while statement. 2. Write a program to print prime numbers up to 'n'. 3. Write a program to sum of n natural no. 4. Write a program to print Fibonacci series. 5. Write a program to reverse a number. 	L3	6

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6. Write a program to print the following pattern using for loop 1 2 2 3 3 3 4 4 4 4 7. Write a program to print the following pattern using for loop A A B A B C A B C D		
LABORATORY SESSSION 3 ARRAYS and FUNCTIONS 1. Write a program to read n num of students and 5 subjects marks. 2. Write a program to swap two numbers using call by value. 3. Write a program to convert all lower case to uppercase characters 4. Write a program to find the factorial of a number using recursion. 5. Write a program to print the add/product of two matrices of any order.	L3	5
LABORATORY SESSSION 4 POINTERS AND STRING 1. Write a program to perform operations on strings using string handling in-built functions (concatenation, reversal, copy etc.) 2. Write a program to swap two numbers using call by reference. 3. Write a program to perform dynamic memory allocation and de-allocation. 4. Write a program to print elements of array using pointers.	L3	4
LABORATORY SESSSION 5 STRUCTURE, UNION & FILE HANDLING 1. WAP program to display student information by initializing structures. 2. WAP program to find the total salary of employee and employee details using structure. 3. Write a program to store and display information using Union. 4. Program to write data into file and read data from file.	L3	4

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

- E Balagurusamy, "Programming in ANSI C", Seventh Edition, Tata McGraw Hill Education private limited, July 2017.
- Yashwant Kanetkar, "Let Us C", 16th Edition, BPB Publication, June 2017.

Reference Books

1. Brain W Kernighan and Dennis M Ricchie, "The C Programming Language", 2nd Edition, Pearson Publication, Jan 2015.
2. Byron Gottfried, "Programming with C", Third Edition, Tata McGraw Hill Education private limited, July 2017.
3. E Balagurusamy, "Computer Concepts & Programming in C", Seventh Edition, Tata McGraw Hill Education private limited, July 2011.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

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Examination Scheme:

IA				EE
A	PR	LR	V	70
5	10	10	5	

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO 1	1	2	--	2	--	--	--	--	--	--	--	--	1	--	2	--
CO 2	1	1	2	2	--	--	--	--	--	--	--	--	1	--	2	--
CO 3	1	1	2	3	--	--	--	--	--	--	--	--	1	--	2	--
CO 4	1	1	2	2	3	--	--	--	--	--	--	--	1	--	2	--

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BME2111	ELEMENTS OF MECHANICAL ENGINEERING LAB	L	T	P	C
Version 2019.1	Date of Approval: May 16, 2019	0	0	2	1
Pre-requisites/Exposure					
Co-requisites					

Pre –Requisite: Elements of Mechanical Engineering

Catalog Description

In this course the concepts of various prime movers like I C Engine, Gas Turbine, Steam Turbine, and Hydraulic Turbine are discussed in detail. Concept of power absorbing devices and power transmission devices are discussed in detail. Elementary concept of mechanics of material and machine tool also discussed in detail. The aim of this course is to make the students familiar with the basic mechanical engineering.

Course Objectives:

The objective of this course is to

1. Equip the students with practical concepts of Boiler, Turbine, IC Engine and Machine tools.
2. Understand the elements of mechanical engineering by working models and experiments.

Course Outcomes (COs): After studying this course the students will be able to:

CO 1- Define the basics of working of boilers, Steam turbines.

CO 2- Explain the principle and working of two strokes and four strokes internal combustion engines.

CO 3- Explain the working of Pelton wheel Turbine, Francis Turbine and Kaplan Turbine.

CO 4 - Describe the tensile test and power transmission drives.

CO 5- Identify and demonstrate the machine tools and lathe operation.

List of Experiments	Blooms level*	Number of hours
• To Study the Cochran and Babcock & Wilcox boilers.	L1, L2 and L3	2
• To study the working of impulse and reaction steam turbines	L1, L2 and L3	2
• To study Two-Stroke & Four-Stroke Diesel Engines.	L1, L2 and L3	2
• To Study Two-Stroke & Four-Stroke Petrol Engines.	L1, L2 and L3	2
• To study the constructional features and working of Pelton wheel Turbine, Francis Turbine and Kaplan Turbine.	L1, L2 and L3	2
• To perform tensile test, plot the stress-strain diagram and evaluate the tensile properties of a given metallic specimen.	L1, L2 and L3	2
• To Study the different power transmission drives.	L1, L2 and L3	2
• To Study different types of machine tools (lathe, milling, drilling & shaper).	L1, L2 and L3	2
• To perform the metal cutting operation on Lathe machine.	L1, L2 and L3	2

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**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

- Rajput, R.K. Elements of Mechanical Engineering, Lakmi Publication, Delhi, 2013. .
- Jain, V. Basics of Mechanical Engineering, Dhanpat Rai Publication, Delhi, 2011.
- Kumar, D.S. Elements of Mechanical Engineering, S.K. Kataria and Sons Publications, Delhi 2013.

Reference Books

- Ganesan, V. Internal Combustion Engine, New-Delhi : Tata McGraw Hill, New delhi, 2017.
- Heine, R.W. Loper and P.C. Rosenthal, Principles of metal casting, McGraw Hill, New-Delhi, 2001
- Nag, P.K. Engineering thermodynamics, : Tata McGraw Hill, New-Delhi, 2013.
- Kumar, D.S. Thermal Engineering, S.K. Kataria and Sons Publications, New-Delhi, 2013.
- Hazra, S.K. and Chaudhary, A.K. Workshop Technology Vol. II . Asian Book Comp, New-Delhi, 2012



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BME2205	OBJECT ORIENTED PROGRAMMING USING C++	L	T	P	C
Version 2019.1	Date of Approval: May 16, 2019	2	1	0	3
Pre-requisites/Exposure	Hands on knowledge of C Programming				
Co-requisites	Basic concepts of C Programming				

Catalog Description

The objective of this course is to introduce object-oriented programming. To explore and implement the various features of OOP such as inheritance, polymorphism, Exceptional handling using programming language C++. After completing this course student can easily identify the basic difference between the programming approaches like procedural and object oriented.

Course Objectives

The objective of this course is

1. Equip the students with the basic features of C++ supporting object-oriented programming. Perform object oriented programming to develop solutions to problems demonstrating usage of control structures, modularity, I/O. and other standard language constructs.
2. Provide the overview of major object-oriented concepts to implement object oriented programs in C++ like encapsulation, inheritance and polymorphism, stream I/O, templates and operator overloading

Course Outcomes

On completion of this course, the students will be able to

- CO 1: Explain the basic principles of object-oriented programming approach; Differentiate it with procedural programming approach and also discuss difference between C and C++.
- CO 2: Illustrate the different ways to define a member function inline and explain how the private members of a class can be accessed. Explain how the objects can be instantiated and destroyed with static data member?
- CO 3: Explain the concept of inheritance, types and implementation with suitable examples; find out ambiguity problem in inheritance; use the concept of overriding and constructors in inheritance.
- CO 4: Explain polymorphism in detail and implement the concept of overloading in functions as well as in operators. Write the programs for virtual function and pointer with objects.
- CO 5: Explain the exception handling mechanism. Design the programs for class and function Template. Compare and contrast various formatted and unformatted i/o function in file handling.

Modules	Blooms level*	Number of hours
MODULE 1: INTRODUCTION Review of C, Difference between C and C++, Procedure Oriented and Object Oriented Approach. Basic Concepts: Objects, classes, Principals like Abstraction, Encapsulation, Inheritance and Polymorphism. Dynamic Binding, Message Passing. Characteristics of Object-Oriented Languages. Introduction to Object-Oriented Modeling techniques (Object, Functional and Dynamic Modeling).	L1 and L2	5
MODULE 2: CLASSES AND OBJECTS Abstract data types, Object & classes, attributes, methods, C++ class declaration, Local Class and Global Class, State identity and behaviour of an object, Local Object and Global Object, Scope resolution operator, Friend Functions, Inline functions, Constructors and destructors, instantiation of objects, Types of Constructors, Static Class Data, Array of Objects, Constant member functions and Objects, Memory management Operators.	L1, L2 and L3	7

MODULE 3: INHERITANCE Inheritance, Types of Inheritance, access modes – public, private & protected, Abstract Classes, Ambiguity resolution using scope resolution operator and Virtual base class, Aggregation, composition vs classification hierarchies, Overriding inheritance methods, Constructors in derived classes, Nesting of Classes	L2, L3 and L4	8
MODULE 4: POLYMORPHISM Polymorphism, Type of Polymorphism – Compile time and runtime, Function Overloading, Operator Overloading (Unary and Binary) Polymorphism by parameter, Pointer to objects, this pointer, Virtual Functions, pure virtual functions.	L2, L3 and L4	8
MODULE 5: STRINGS, FILES AND EXCEPTION HANDLING Manipulating strings, Streams and files handling, formatted and Unformatted Input output. Exception handling, Generic Programming – function template, class Template Standard Template Library: Standard Template Library, Overview of Standard Template Library, Containers, Algorithms, Iterators, Other STL Elements, The Container Classes, General Theory of Operation, Vectors.	L2, L3 and L4	8

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Text Books

1. A.R. Venugopal, Rajkumar, T. Ravishanker “Mastering C++”, TMH, 1997
2. R. Lafore, “Object Oriented Programming using C++”, BPB Publications, 2004.
3. E. Balagurusamy, “Object Oriented Programming with C++”, Mc Graw Hill, 6th Edition, 2013.
4. Schildt Herbert, “C++: The Complete Reference”, Wiley DreamTech, 2005.

Reference Book

1. Parsons, “Object Oriented Programming with C++”, BPB Publication, 1999.
2. Steven C. Lawlor, “The Art of Programming Computer Science with C++”, Vikas Publication, 2002.
3. Yashwant Kanethkar, “Object Oriented Programming using C++”, BPB, 2004

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/ Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	2	--	--	--	--	--	--	--	--	--	--	1	--	2	--
CO2	1	1	2	3	--	--	--	--	--	--	--	--	1	--	1	2
CO3	1	1	2	--	--	--	--	--	--	--	--	--	1	--	2	2
CO4	1	1	2	3	--	--	--	--	--	--	--	--	1	1	--	2
CO5	1	1	2	--	--	--	--	--	--	--	--	--	1	1	--	1

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Course Code: BME2208	ENGINEERING GRAPHICS LAB	L	T	P	C
Version 2019.1	Date of Approval: May 16, 2019	0	0	4	2
Pre-requisites/Exposure	Concepts Mathematics (especially Trigonometry and Geometry)				
Co-requisites	Machine Drawing & CAD				

Catalog Description:

A freshman level course which provides the undergraduate engineering students with a background in descriptive geometry, orthographic projection, engineering drawing standards and annotation, computer-aided engineering graphics. The concepts of point, line and plane relationships in projection, multi-view engineering drawings, auxiliary and section views, basic dimensioning and annotation, engineering applications of drawings are also discussed.

Course Objective:

The objective of this course is to

- Equip the students with the in-depth knowledge of drawings of points, straight line, planes, cylinders, prisms, pyramids, parabola, ellipse etc.
- Draw different figures manually and will be capable of using various instruments involved in drawings.

Course Outcomes (COs):

At the end of the course, the student shall be able to:

CO 1 - Define and explain basic principles of projections of points and lines.

CO 2 - Define, describe and construct the different orientations and projections of planes.

CO 3 - Explain and construct the projections of solids and sectioning of solids in different orientations.

CO 4 - State and draw the concepts of development of surfaces and introduction to auto CAD.

CO 5 - Define and construct orthographic and isometric view of an object.

Modules	Blooms level*	Number of hours
Module I: Introduction Importance, significance and scope of engineering drawing, drawing instruments and their use, lettering, dimensioning, scales, sense of proportioning, different types of projections, B.I.S. Specifications.	L1 and L2	8



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Module II: Projection of points, lines and plane surface Principal planes, principles of orthographic projections, Projection of points in all quadrants, Projection methods - First angle & third angle projection, Projections of straight lines (first angle projection) inclined to both the planes, true lengths and traces, projection of planes, projection of planes in simple position and inclined to both the principal planes, auxiliary planes and views	L1, L2 and L3	12
Module III: Projection of solids & section of solids Projection of simple solids like prisms, pyramids, cylinder, cone and truncated solids when the axis is inclined to both of the principal planes, Sectioning of above solids in simple vertical position when the cutting plane is inclined to the one of the principal planes and perpendicular to the other, obtaining true shape of section	L1, L2 and L3	12
Module IV: Development of surfaces & Isometric projections Development of surfaces of simple and sectioned solids – Prisms, pyramids cylinders and cones, Principles of isometric projection, isometric scale, Isometric projections of simple solids and truncated solids, Prisms, pyramids, cylinders, cones, Conversion of Orthographic Views to Isometric Views and Vice-versa.	L1, L2 and L3	8
Module V: Introduction to CAD Introduction to CAD and use of its commands, practice of some 2D figures using CAD.	L1, L2 and L3	8

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	50	20

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

Text Books:

- PS Gill, 2013, Engineering Drawing, Kataria Publication.
- ND Bhatt, 2014, Engineering Drawing, Charotar publications.

References Books:

- N Sidheshwar, 2014 Machine Drawing Drawing, Tata McGraw Hill
- M.B. Shah & B.C. Rana, 2007, Engineering Drawing, Pearson Education.
- CADFolks, AutoCAD 2018 For Beginners, CreateSpace Independent Publishing Platform; 6 edition.

CO, PO and PSO mapping:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	2	--	--	--	--	--	--	--	--	--	--	1	--	--	--
CO2	1	2	--	--	--	--	--	--	--	--	--	--	1	--	--	--
CO3	1	2	--	--	--	--	--	--	--	--	--	--	1	--	--	--
CO4	1	2	--	--	--	--	--	--	--	--	--	--	1	--	--	--
CO5	1	2	--	--	--	--	--	--	--	--	--	--	1	--	--	--

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BME2209	OBJECT ORIENTED PROGRAMMING USING C++ LAB	L	T	P	C
Version 2019.1	Date of Approval: May 21, 2019	0	0	2	1
Pre-requisites/Exposure	Turbo C++				
Co-requisites	NIL				

Catalog Description

The objective of this course is to introduce object-oriented programming. To explore and implement the various features of OOP such as inheritance, polymorphism, Exceptional handling using programming language C++. After completing this course student can easily identify the basic difference between the programming approaches like procedural and object oriented.

Course Objectives

The objective of this course is

1. Perform object-oriented programming to develop solutions to problems demonstrating usage of control structures, modularity, I/O. and other standard language constructs.
2. Demonstrate adeptness of object-oriented programming in developing solutions to problems demonstrating usage of data abstraction, encapsulation, and inheritance.
3. Demonstrate ability to implement one or more patterns involving realization of an abstract interface and utilization of polymorphism in the solution of problems which can take advantage of dynamic dispatching, syntax, features of, and how to utilize the Standard Template Library.

Course Outcomes

On completion of this course, the students will be able to

- CO 1: Define and identify the basic principles of object-oriented programming approach; Differentiate it with procedural programming approach.
- CO 2: Determine the different ways to define a member function inline and explain how the private members of a class can be accessed. Solve how the objects can be instantiated and destroyed with static data member?
- CO 3: Apply the concept of inheritance, types and implementation with suitable examples; find out ambiguity problem in inheritance; use the concept of overriding and constructors in inheritance.
- CO 4: Relate the concept polymorphism with overloading in detail and implement the concept of overloading in functions as well as in operators. Write the programs for virtual function and pointer with objects.
- CO 5: Determine the exception handling mechanism. Design the programs for class and function Template. Compare and contrast various formatted and unformatted i/o function in filehandling.

Modules/Topics Covered**	Blooms level*	Number of hours
1. Sample Programs using objects and classes (a) Write a program to illustrate the concept of one class with two objects by taking student data. (b) Write a program to show the relationship of class and object to display roll no., grade and fee paid by student.	L1, L3, L5	4
2. Sample Programs for different use of private, public member variables and functions and friend functions (a) Write a program to define the member function outside and inside the class. (b) Write a program to read and display the information of N persons to illustrate the concept of array of objects. (c) Write a program to add two numbers to illustrate the use of friend function.	L1, L3, L5	4
3. Sample Programs using constructors and destructors	L1, L3,	4

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(a) Write a program to assign and copy values to illustrate the concept of parametrized and copy constructor.	L5	
(b) Write a program to show the order of constructor and destructor.		
4. Sample Programs using operator overloading (a) Write a program to add two numbers using binary operator overloading. (b) Write a program to illustrate the assignment operator overloading.	L1, L3, L5	4
5. Sample Programs using inheritance in and accessing objects of different derived classes (a) Write a program to compute the marks explaining the concept of multiple inheritance. (b) Write a program to find the factorial of a number using inheritance.	L1, L3, L5	4
6. Sample Programs using polymorphism and virtual functions (using pointers) and File Handling (a) Write a program to find the volume of cylinder and cuboid using function overloading. (b) Write a program to reverse a string using pointers. (c) Write a program to explain the relationship of inheritance and virtual function. (d) Write a program to read the student name and fee paid using read() function from the file.	L1, L3, L4, L5	4

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

*** Sample Programs provided are not limited to these only, can include others as desired.*

Text Books

1. A.R. Venugopal, Rajkumar, T. Ravishanker "Mastering C++", TMH, 1997
2. R. Lafore, "Object Oriented Programming using C++", BPB Publications, 2004.
3. "Object Oriented Programming with C++" By E. Balagurusamy.
4. Schildt Herbert, "C++: The Complete Reference", Wiley DreamTech, 2005.

Reference Book

1. Parsons, "Object Oriented Programming with C++", BPB Publication, 1999.
2. Steven C. Lawlor, "The Art of Programming Computer Science with C++", Vikas Publication, 2002.
3. Yashwant Kanethkar, "Object Oriented Programming using C++", BPB, 2004

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:


IA					EE
Components	A	PR	LR	V	70
Weightage (%)	5	10	10	5	

Note: IA –Internal Assessment, A – Attendance, PR – Performance, LR – Lab Record, V – Viva, EE- External Exam

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	3	1	2	--	--	--	--	--	--	--	--	--	2	--	--	--
CO2	3	1	2	--	--	--	--	--	--	--	--	--	1	2	--	--
CO3	2	1	2	--	--	--	--	--	--	--	--	--	1	2	--	--
CO4	2	1	2	--	--	--	--	--	--	--	--	--	1	2	--	--
CO5	2	1	2	--	--	--	--	--	--	--	--	--	1	2	--	--

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BME2302	ANALOG ELECTRONICS I	L	T	P	C
Version: 2019.1	Date of Approval: May 21, 2019	3	0	0	3
Pre-requisites/Exposure	Elementary Resistive Circuit, Theorems and Analysis Techniques: KCL, KVL, Nodal & Mesh Analysis, Thevenin & Norton Equivalents, Maximum Power Transfer.				
Co-requisites	Semiconductor Physics				

Catalog Description

This is the first course in Electronics and Communication Engineering, to educate and explain the methods used for biasing circuits in a graphical analysis of non linear electronic circuits and also includes small signal transistor models, parameters and their frequency responses. Following this, analyzing different types of feedback amplifiers, and power amplifiers using transistor and designing of different electronic circuits are included in the course. This course also considers the mathematical modelling of active solid state devices their analysis and design of single state circuits. Topics covered include the study of device characteristics and applications of p-n-junction diodes, bipolar junction transistors, and field effect transistors.

Course Objectives

The objective of this course is to

1. build from basic knowledge of Semiconductor Physics to an understanding of basic devices and their models
2. familiarize the student with the analysis and design of basic transistor amplifier circuits, feedback amplifiers and wave shaping circuits
3. build a foundation for Analog Electronics-II, Digital Circuits and Systems I & II, VLSI de-sign and analog CMOS IC Design

Course Outcomes

On completion of this course, the students will be able to

- CO1. explain different types of diodes and demonstrate wave shaping circuits
- CO2. explain operating principal of Bipolar Junction Transistor, its properties, biasing techniques and stability
- CO3. describe low and high frequency transistor amplifiers along with single and multi-stage amplifier
- CO4. explain operating principal of JFET, MOSFET, its properties, and biasing techniques
- CO5. solve and analyse different negative feedback amplifiers configurations
- CO6. describe and outline power amplifiers and their application.


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Modules	Blooms level*	Number of hours
Module I: Semiconductor Diode and Diode Circuits Different types of diodes: Zener, Schottky, LED. Zener as voltage regulator, Diffusion capacitance, Drift capacitance, the load line concept, half wave, full wave rectifiers, clipping and clamping circuits.	L1 L2 & L3	6
Module II: Bipolar Junction Transistor Bipolar junction transistor: Introduction, Transistor, construction, transistor operations, BJT characteristics, load line, operating point, leakage currents, saturation and cut off mode of operations. Bias stabilization: Need for stabilization, fixed Bias, emitter bias, self bias, bias stability with respect to variations in I_{CO} , V_{BE} & β , Stabilization factors, thermal stability.	L1 L2 & L3	9
Module III: Small signal Analysis of transistor and Multistage Amplifier Hybrid model for transistors at low frequencies, Analysis of transistor amplifier using h parameters, emitter follower, Miller's theorem, THE CE amplifier with an emitter resistance, Hybrid π model, Hybrid π Conductances and Capacitances, CE short circuit current gain, CE short circuit current gain with R_L Multistage amplifier: Cascading of Amplifiers, Coupling schemes(RC coupling and Transformer coupling)	L2 & L3	6
Module IV: Field Effect Transistors Field effect transistor (JFET, MOSFET): volt-ampere characteristics, small signal model –common drain, common source, common gate, operating point, MOSFET, enhancement and -depletion mode, Common source amplifier, Source follower	L1, L2 & L3	5
Module V: Feedback Amplifiers Feedback concept, Classification of Feedback amplifiers, Properties of negative Feedback amplifiers, Impedance considerations in different Configurations, Examples of analysis of feedback Amplifiers.	L1, L2, L3 & L4	6
Module VI: Power amplifiers Power dissipation in transistors, difference with voltage amplifiers, Amplifier classification (Class A, Class B, Class C, Class AB) class AB push pull amplifier, collector efficiency of each, cross over distortion.	L1 & L2	4

*Bloom's Level:

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5:Synthesis, L6:Evaluation

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Text Books

1. Jacob Millman, Christos Halkias, Chetan Parikh, Millman's Integrated Electronics, McGraw Hill Education, 2nd Edition, New Delhi
2. Sanjeev Gupta, Electronic Devices and Circuits, Dhanpat Rai Publications, 2010
3. Theraja B.L., Sedha R.S, Principles of Electronic Devices and Circuits, S Chand & Compa-ny, First Edition, New Delhi, 2002

Reference Books

1. Robert L. Boylestad: Electronic Devices and Circuits, Pearson Education, 11th Edition, 2013
2. Robert F. Pierret, Semiconductor Device Fundamentals, Pearson Education, 1st Edition, 2006
3. Nagrath I.J, Electronics: Analog and Digital, Prentice Hall India Learning Private Limited, Second Edition, 2013

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:


Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	2	3	--	--	--	--	--	--	--	--	3	1	--	--	3
CO2	1	2	--	--	--	--	--	--	--	--	--	3	1	3	--	3
CO3	1	2	3	--	--	--	--	--	--	--	--	--	1	-	--	--
CO4	1	2	--	--	--	--	--	--	--	--	--	3	1	3	--	3
CO5	1	2	3	--	--	--	--	--	--	--	--	3	1	--	--	3
CO6	1	3	--	--	--	--	--	--	--	--	--	3	1	--	--	3

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BME2303	CIRCUITS AND SYSTEMS	L	T	P	C
Version 2019.1	Date of Approval: May 16, 2019	2	1	0	3
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

In this course the concepts of circuits analysis based on Resistance, Inductance and Capacitance are discussed in detail. voltage- current relationship of basic circuit elements – resistors, inductors, capacitors, dependent and independent voltage and current sources; apply Kirchhoff's current and voltage laws to circuits in order to determine voltage, current and power in branches of any circuits excited by DC voltages and current sources will be discussed. Concept learnt in the studies will be applied to solve DC circuit problems using basic circuit theorems and structured methods like node voltage and mesh current analysis.

Course Objectives

The objective of this course is to

1. Equip the students with concepts basic network analysis of electrical circuits using KVL and KCL.
2. Provide an overview of one port and two port network analysis in time and frequency domain.

Course Outcomes

On completion of this course, the students will be able to

CO1: Expiation of graph theory for solving complex electrical circuits.

CO2: Analysis of RL, RC and RLC circuits using time domain approach.


CO3: Apply Laplace transform to solve RL, RC and RLC circuits in frequency domain.

CO4: Explanation and application of various network theorems to solve the given circuit.

CO5: Synthesis of RL, RC and RLC electrical circuits and explanation of two port network parameters.



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Modules	Blooms level*	Number of hours
Module 1: Graph Theory and Network equations Graph of a network, Trees, Co-trees and loops, cut set matrix, Tie set matrix, number of possible trees of a graph, duality, Loop Analysis and Node Analysis.	L1 and L2	8
Module 2: Analysis of circuits using classical Method Time and Frequency domain analysis of RL, RC and RLC circuits, Linear constant coefficient differential equation.	L2 and L3	10
Module 3: Signals and Laplace Transforms Unit step signal, Ramp signal, impulse signal, Laplace transformations and its properties, Gate function, Inverse Laplace transformations, Application of Laplace Transforms in circuit analysis.	L3 and L4	10
Module 4: Network Theorems Reciprocity theorem, Superposition theorem, Thevenin's and Norton's theorems, Millman's theorem, Maximum power transfer theorem, Compensation theorem, Tellegan's theorem.	L2 and L3	10
Module 5: Two port Network & Network Functions Introduction, two port z-, y-, T-, h-parameters, Inter-relations among parameters, Condition for reciprocity and symmetry, Interconnections of two port networks, Driving point and transfer functions, Poles, Zeros and necessary condition for driving point and transfer function.	L1, L3	10
Module 6: Network Synthesis Hurwitz polynomial, Positive real functions, synthesis of LC, RC, RL immittance functions.	L1 and L5	

*Bloom's Level:

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. M.E. Valkenburg, "Network analysis", 3 ed, Pearson Education, 2015.

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2. D. R. Choudhary, "Networks and Systems", 2 ed, New Age International, 2013.
3. K.M. Soni, "Circuits and Systems", S.K. Kataria & Sons Delhi, 2013.

Reference Books

4. Bhise, Chadda, Kulshreshtha, "Engineering network analysis and filter design", Umesh Publication, 2012.
5. F.F. Kuo, "Network Analysis and Synthesis", 2 ed, Wiley India Pvt. Ltd, 2006.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Component s	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att:
Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	3	--	--	--	2	--	--	--	--	--	--	--	--	2	--	--
CO2	1	--	3	--	--	--	--	--	--	--	--	--	2	1	3	3
CO3	1	--	3	--	1	--	--	--	--	--	--	--	--	1	--	--
CO4	2	3	--	--	--	--	--	--	--	--	--	--	3	1	3	3
CO5	2	3	2	--	--	--	--	--	--	--	--	--	--	1	--	--

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BME2314	MEDICAL IMAGING TECHNIQUES-I	L	T	P	C
Version 1.1	Date of Approval: May 16, 2019	3	0	0	3
Pre-requisites/Exposure	Basic Electronic, Biology for Engineers, Physics				
Co-requisites	General Science				

Catalog Description

This course helps the students to understand various diagnostic imaging modalities used in medical profession e.g. X-Rays, CT scan, MRI, Ultrasound, and PET, Optical imaging, Near-Infra-red Imaging etc. etc. The content of the course will also speak about the artefacts and other problems related to the machines. The course also stresses the importance of radiation safety, ethics and legal considerations as well as professionalism.

Course Objectives

The objective of this course is to

The objective of this course is to

1. To provide an overview of medical imaging principles and machine.
2. To serve as a foundation for clinical significance of medical images.

Course Outcomes

On completion of this course, the students develop capabilities of:

- CO1. *Identify* various component of Ultrasound and Doppler machine and *explain* the working principle of ultrasound and its different operating modes.
- CO2. *Describe* the principle of production of X-Rays and *identify* function of various component of X-Ray machine.
- CO3. *List* various component of CT-Scan, *explain* principle of CT-Scan imaging.
- CO4. *List* the MRI hardware components, *explain* principles of MRI imaging, and *determine* the cause of artefact by observing the MRI images.
- CO5. *Explain* the principles of PET, Optical imaging and Infrared Imaging and *determine* application of each for various pathological situation.

Course Content

Modules	Blooms level*	Number of hours
MODULE I: Ultrasonic and Doppler Imaging Basic of Imaging techniques and Clinical Application Introduction to Ultrasonic and Doppler Medical imaging modalities, Physics of ultrasound, Principles of image formation, Capture and display, Principles of A-Mode, B-Mode, M-Mode, Scan converters Frame grabbers, Single line and multi-line monitoring of ultrasound displays. Various Application of Ultrasound and Doppler imaging.	L1 and L2	8
MODULE II: X-Ray and Angiography Imaging Principles and production of soft and hard X- rays, Photon Interaction and K-shell, Details of radiographic and fluoroscopic images in X-Ray systems. Screen-film and image intensifier systems, Different generation of x-rays, X-Ray machine, Clinical significance of X-ray images, Digital Subtraction Angiography and its application.	L1 and L2	7

MODULE III: CT-Scanner Principle of CT-Scan, Evolution of CT Machines, CT image formation, Conversion of X-Ray data into scan image, Mathematical details of various algorithms, Spiral CT, Transverse Tomography, CT Angiography.	L1 and L2	5
MODULE IV: Magnetic Resonance Imaging MRI Hardware, Principle of MRI, Larmor Frequency, Mathematical Equation Governing MRI, Bloch equation, Time of Echo (TE) and Repetition Time (TR) and its significance, Image acquisition in magnetic resonance imaging, T1, T2, proton density weighted images, , Artifacts in imaging, Various Application of T1, T2 and PD weighted images, NMR spectroscopy	L2 and L3	10
MODULE V: Other Advance Imaging techniques Principles and Application of PET, Infrared Imaging, Optical Imaging.	L1 L2 and L3	6

*Bloom's Level:

L1: Knowledge; L2: Comprehension; L3: Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

- Khandpur R.S, Handbook of Biomedical Instrumentation, Tata McGraw-Hill, 2008
- Webb, S., The Physics of Medical Imaging, Adern Hilger, Bristol & Philadelphia. 2013
- Hay.B.A. Edtd., Medical Images, Formation, Perception and Measurement, John Wiley, 2008

Reference Books

1. Rabiner and Gold, *Digital Signal Processing*,
2. A.C. KAK, Principles of Computed Tomography, IEEE Press, New York

Other readings:

- <http://www.learningradiology.com/itunesfeed.htm>

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:


Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

CO-PO-PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO 1	1	2											1	2		
CO 2	1	2											1	2		
CO 3	1	2										3	1	2		
CO 4	1	2										3	1	2		
CO 5	1	2										3	1	2		

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BME2351	HUMAN ANATOMY AND PHYSIOLOGY	L	T	P	C
Version 1.1	Date of Approval: 16,MAY,2019	3	0	0	3
Pre-requisites/Exposure	Biology for Engineers				
Co-requisites	General Science				

Catalog Description

This course provides students a basic understanding of the human body structure and functioning. Students will be able to relate basic human body systems and life processes, name the major body systems and their functions, understand the anatomy of various body systems, including musculo-skeletal System, nervous system, cardiovascular system, Renal system, etc.. This course covers the basic anatomy and physiology topics for better understanding of the human body. This is the first part of this course which is continued in the next semester.

Course Objectives

The objective of this course is to

1. To provide the student with an in-depth study of anatomy and physiology (structure and function) of the human body.
2. To explain and identify biological levels of organization: i.e. cells to tissues, tissues to organs.
3. To identify and develop understanding of major organ systems, list the organs found in each, and their primary functions.
4. To identify the basic structural and functional principles of human organ systems including repair systems.

Course Outcomes

On completion of this course, the students develop capabilities of:

- CO6. *Outline* cell organization and *describe* the physiology of various cell functioning.
- CO7. *List* various muscles, bone and joint and *distinguish* between joint functioning & Structure.
- CO8. *List and Describe* various structure and functioning of blood component and functioning of heart. *Apply* Einthoven's triangle to heart functioning to obtain ECG.
- CO9. *Explain* the physiology of respiratory and digestive system and *determine* respiratory clinical parameters.
- CO10. *Outline and describe* anatomy and physiology of nervous and renal system in interaction with endocrine gland.

Course Content

Modules	Blooms level*	Number of hours
MODULE I: Basic Cell Structure and physiology Basic cell structure, various cell organelles and their functions, Cell, cell membrane, polarization and repolarisation, resting membrane potential, Nernst equation, Donnan's equilibrium, Goldman equation, action potential and its propagation, synaptic transmission. Tissues- their types, structure and function, structure and function of skin.	L1 and L2	6
MODULE II: Musculo-Skeletal System and Its Physiology Different types of muscles and their function, General description of bones, their structure and function, types of joints and their structure and function. 1. Functional aspect of bones and joints 2. Shoulder joint, Elbow joint 3.	L1 and L2	7

Radioulnar and wrist joint 4. Joints of hand 5. Hip joint 6. Knee joint 7. Ankle and foot		
MODULE III: Cardiovascular System and its Physiology Blood, Lymph and circulation: blood composition, properties and function. Structure and functions of RBCs, WBCs and platelets, Blood types, Homeostasis, Immune mechanisms, Lymph, Heart position, structure and functions, Heartbeat, electrical excitation, Einthoven's triangle, Cardiac and peripheral regulation, blood pressure and its regulation, blood flow and its regulation	L1, L2 and L3	7
MODULE IV: Respiratory System and Digestive System Respiratory System: position and functions. Mechanics of respiration, Lung volumes and capacities, Gas exchange between lungs and tissues, regulation of respiration. Digestive system: Different parts of digestive system, functions of each organ, digestion of proteins, carbohydrates, fats, vitamins and minerals.	L2 and L3	8
MODULE V: Nervous System, Renal System and endocrine system Nervous system: Basic functions and structure of CNS, ventricles, and CSF, ANS. Organs of vision, hearing, taste, and smell. Mechanism of sight, colored vision, hearing, reflex action and reflex arc. Renal system: parts of the renal system, its structure and function, formation and composition of urine. Endocrine System and Reproductive system: basic knowledge of endocrine glands, functions of male and female reproductive parts and contraception.	L1 and L2	8

*Bloom's Level:

L1: Knowledge; L2: Comprehension; L3: Application; L4: Analysis; L5: Synthesis; L6: Evaluation

Text Books

1. Guyton A.C and J.E. Hall, "Text book of Medical Physiology" Harcourt India Pvt. Ltd.
2. Principles of Human Anatomy and Physiology, Tortora, Wiley
3. Ross and Wilson, "Anatomy and Physiology in Health and Illness" by Anne Waugh and Allison Grant.

Reference Books

1. Ganong W.F. "Review of Medical Physiology", Prentice Hall
2. Gray's Anatomy for Students - Gray's Anatomy by A. Wayne Vogl, Richard Drake, Adam W. M. Mitchell

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
 Att: Attendance

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CO-PO-PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO 3	PSO 4
CO 1	1												1	3		
CO 2	1	3											1	3		
CO 3	1												1	3		
CO 4	1	3											1	3		
CO 5	1												1	3		

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BME2306	ANALOG ELECTRONICS - I LAB	L	T	P	C
Version 2019.1	Date of Approval: May 21, 2019	0	0	2	1
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

This course provides the practical implementation and verification of the theoretical facts studied in theory course. It includes studying the characteristics of diodes, rectifiers, transistors and amplifiers.

Course Objectives

The objective of this course is to

1. Provide a demonstration of various analog components like diodes, rectifiers etc.
2. Equip with understanding of different circuits like BJT, JFET, MOSFET and amplifiers.

Course Outcomes

On completion of this course, the students will be able to

CO 1: Demonstrate the characteristics of pn junction and zener diode.

CO 2: Obtain and analyze the output of clipper-clamper circuit and rectifiers with various filters.

CO 3: Plot the characteristics of BJT, JFET and MOSFET.

CO 4: Obtain the gain and demonstrate the frequency response of single stage and double stage amplifiers.

Modules/Topics Covered**	Blooms level*	Number of hours
Lab Session-I 1. To study and plot the characteristics of a junction diode. 2. To study Zener diode I-V characteristics.	L3, L5	2
Lab Session-II 3. To study diode based clipping and clamping circuits. 4. To study half wave, full wave and bridge rectifier with filters.	L3, L5	2
Lab Session-III 5. To study the input and output characteristics of a transistor in its various configurations (CE and CB). 6. To study various types of Bias Stabilization for a transistor. 7. To study and plot the characteristics of a MOSFET in its various configurations. 8. To study and plot the characteristics of a JFET in its various configurations	L3, L5	6
Lab Session-IV 9. To study the gain and plot the frequency response of a single stage transistor amplifier. 10. To measure gain and plot the frequency response of double stage RC	L3, L5	2

coupled amplifier.		
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**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

- Anand Kumar, "Fundamentals of Digital Circuits", 2nd Edition, Prentice-Hall, 2004
- Moris Mano, "Digital Design", 2nd Edition, Pearson Education, 2007.
- R.P. Jain, "Modern Digital Electronics", 2nd Edition, Tata Mcgraw Hill, 2003

Reference Books

1. Thomas L. Floyd, "Digital Fundamentals", 11th Edition, Pearson Education, 2015
2. Malvino and Leech, "Digital Principles & Applications", 1st Edition, Tata McGraw Hill, 1993

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

IA					EE
Components	A	PR	LR	V	70
Weightage (%)	5	10	10	5	

Note: IA –Internal Assessment, A – Attendance, PR – Performance, LR – Lab Record, V – Viva, EE- External Exam

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	3	1	--	--	--	--	--	--	3	--	--	2	--	1	--	3
CO2	3	1	--	--	--	--	--	--	3	--	--	2	--	1	--	3
CO3	3	1	--	--	--	--	--	--	3	--	--	2	--	1	--	3
CO4	3	1	--	--	--	--	--	--	3	--	--	2	--	1	--	3

1: strongly related, 2: moderately related and 3: weakly related



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COMPUTER AIDED GRAPHIC DESIGN LAB

Course Code: BME2315

Credit Units : 01

Course Contents:

1. To study and introduction to 3-D CAD Software to develop 3-D CAD model of Rectangular beam
2. To develop a 3-D CAD model of Hollow shaft.
3. To develop a 3-D CAD model of Nut & Bolt.
4. To develop a 3-D CAD model of Blood Vessels.
5. To develop a 3-D CAD model of Ball & Socket Joint.
6. To develop a 3-D CAD model of Knuckle Joint.
7. To develop a 3-D CAD model of Cotter Joint.
8. To study 3D rendering and develop 3D model from 2D stack of DICOM images.
9. Introduction to finishing tools for medical 3D rendered model.
10. To analyse wall-thickness, curvature analysis and part comparison.

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.



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BME2316	MEASUREMENT AND MEASURING INSTRUMENTS	L	T	P	C
Version 2017.1	Date of Approval: 16 May ,2019	3	0	0	3
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

This course provides a brief knowledge of measurements and measuring instruments related to engineering. It introduces measuring elements of instruments, characteristics of measuring instruments, error analysis, transducers and its classification, measurement of resistance, capacitance and inductance, principles of analog and digital meters and different display techniques.

Course Objectives

The objective of this course is to

- Equip the students with concepts of measurement, measuring elements and challenges in measurement.
- Provide in depth knowledge of each element of measurement system.

Course Outcomes

On completion of this course, the students will be able to

CO1. Explain measuring elements and characteristics of measurement system and solve problems related with measurement errors.

CO2. Classify different types of transducers and solve problems related with transducers.

CO3. Solve problems of resistance, capacitance and inductance measurement.

CO4: Explain and solve problems on different types of analog and digital meters suitable for voltage and current measurement.

CO5: Explain display devices used in measurement system and analyze the signals on CRO.

Course Content

Modules	Blooms level*	Number of hours
Module 1: BasicsofMeasurementSystems Elements of Generalized Measurement System; Static & Dynamic Characteristics of Instruments; Errorsin Measurements–Sources and Types of Errors; Statistical Treatment of Data–Mean, Measures of Dispersion, Rejection of database don confidence interval	L1, L2 and L3	5
Module 2: Transducers Classification; Selection of Transducers; Resistive Transducers – Potentiometer, Strain gauge, Rosettes, Thermistors and RTD; Capacitive Transducers– Measurementof Liquid level by change invariation of dielectric constant; Variable Inductance Transducers–self-generating type and passive type; Piezoelectric Transducers; Photoelectric Transducers; Digital Transducer	L1, L2, L3 and L4	9
Module 3: Measurement of Resistance, Inductance and Capacitance	L1, L2, and L3	8

D.C.Bridges: Wheatstone's bridge, Sensitivity & Limitations; Carey Foster Bridge; Kelvin double bridge; Megaohm bridge. A.C.Bridges: Maxwell's Inductance Capacitance Bridge; Anderson's Bridge; DeSauty's Bridge; Schering Bridge.		
Module 4: Analog and Digital Meters Analog meters: PMMC meters-construction, torque equation, ammeters shunts, multi-range ammeter, voltmeter multiplier, sensitivity, ohmmeters, multimeters; Construction & general equation of moving iron, electro dynamometer, hot wire instruments. Digital meters: Digital voltmeter-ramp type, integrating type, potentiometer type, Applications	L1, L2, and L3	8
Module 5: Display Devices and Recorders LED, LCD, Cold Cathode displays, Incandescent Displays, Fluorescent Displays, LVD, VDU Cathode Ray Oscilloscope: Basic functioning, Measurement of Voltage, Current, Phase and Frequency.	L1, L2, L3	6

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Text Books

- Electronic Instrumentation Technology by MMS Anand, PHI Pvt. Ltd., New Delhi Ed. 2005.
- Electronics Instrumentation by H.S. Kalsi TMH Ed. 2004.

Reference Books

- Electronics Instrumentation & Measurement Techniques by W.D. Cooper & A.D. Helfrick, PHI 3rd Ed.
- Electronics Measurement & Instrumentation by Oliver & Gage Mc-Graw Hill.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	2	--	2	-	--	--	--	--	--	--	3	2	--	1	--
CO2	1	1	--	2	--	--	--	--	--	--	--	2	2	--	1	--
CO3	1	2	--	--	--	--	--	--	--	--	--	2	2	--	1	--
CO4	1	2	--	2	--	--	--	--	--	--	--	2	1	--	2	--
CO5	1	2	--	2	--	--	--	--	--	--	--	2	1	--	2	--

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BME2317	MEASUREMENT AND MEASURING INSTRUMENTS LAB	L	T	P	C
Version 2019.1	Date of Approval: May 16, 2019	0	0	2	1
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Course Contents:

1. To Study various Temperature Measuring Instruments and to Estimate their Response times.
2. To study the working of Bourdon Pressure Gauge and to check the calibration of the gauge in a dead-weight pressure gauge calibration set up
3. To study a Linear Variable Differential Transformer (LVDT) and use it in a simple Experimental set up to measure a small displacement.
4. To measure load (tensile/compressive) using load cell on a tutor.
5. To measure torque of a rotating shaft using torsion meter/strain gauge torque transducer.
6. To measure the speed of a motor shaft with the help of non-contact type pickups (magnetic or photoelectric).
7. Measurement of distance using capacitive pick up
8. Measurement of temperature using RTD.
9. Measurement of pressure using piezoelectric pick up.

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.


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BME2318	VIRTUAL INSTRUMENTATION	L	T	P	C
Version 2019.1	Date of Approval: May 16, 2019	2	0	0	2
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

This Course introduces virtual instrumentation and its comparison over conventional instrumentation. In this course, LabVIEW has been adopted as the platform of virtual instrumentation programming. System hardware and its interfacing techniques are introduced. Applications of virtual instrumentation are explained in various field e.g. Aviation, Automotive Defence, Medical etc.

Course Objectives

The objective of this course is to

1. To provide the core knowledge of Virtual Instruments used in research and industry.
2. To provide a LabVIEW platform on which low cost virtual instruments can be designed in very short time.

Course Outcomes

On completion of this course, the students will be able to

CO1. Explain virtual instrumentation and compare it with tradition instruments.

CO2. Explain components of LabVIEW, apply programming concept and design basic virtual instruments using LabVIEW software.

CO3. Explain the concepts of LabVIEW system hardware including input, output and interfacing devices.

CO4: Explain applications of virtual instrumentation in industries.

Course Content

Modules	Blooms level*	Number of hours
Module 1: Introduction to Virtual Instrumentation Introduction, Historical perspective, advantages, block diagram and architecture of a virtual instrument, conventional vs. virtual instrumentation.	L1, L2 and L4	4
Module 2: Introduction to Software Introduction to Lab VIEW, Front panel, back panel representations, Block diagram, Menus, Palettes, VI and Sub VI, Editing and Debugging VI, Structures, Arrays, Clusters, Charts and Graphs, Data acquisition, Instrument Control, Signal Generation and Signal Processing Examples	L1, L2, L3, L4 and L5	9
Module 3: Introduction to systems hardware ADC, DAC, D/O, counters and timer, PC hardware structure, timing, interrupts, DMA, software and hardware installation, Configuring data acquisition hardware using the drives in application software, use of DAQ library functions for different analog and digital input/output operations. Input/output devices & functions like data gloves, joysticks, CRT etc.	L1 and L2	6

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Module 4: Application of Virtual Instrumentation in various fields Aviation, Automotive, High Voltage, Defense, Chemical, Industrial, Marine, Medical, Mining, Nuclear Energy, Virtual landscapes.	L1 and L2	5
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**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. Learning with LabVIEW 7 Express – R.H. Bishop, Pearson Education, Delhi.
2. Virtual Instrumentation Using LabVIEW- Sanjay Gupta & Joseph John, TMG; 2005.

Reference Book

1. LabVIEW Basic 1 Course Manual, National Instruments
2. LabVIEW for everyone -Wells Lisa K and Travis Jeffrey, Prentice Hall.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	2	--	-	-	--	--	--	--	--	--	3	--	--	1	2
CO2	1	1	2	2	--	--	--	--	--	--	--	2	--	--	1	2
CO3	1	2	--	--	--	--	--	--	--	--	--	2	--	--	1	2
CO4	1	2	--	-	--	--	--	--	--	--	--	2	--	--	1	2

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BME2319	VIRTUAL INSTRUMENTATION LAB	L	T	P	C
Version 2019.1	Date of Approval: 16 May 2019	0	0	2	1
Pre-requisites/Exposure	Signal and System				
Co-requisites					


List of Experiments:

1. To open, and explore the components of LabView.
2. To build a simple VI that converts a Celsius temperature reading to Fahrenheit.
3. (a) To create an icon and a connector pane so you can use a VI as a subVI.
(b) To build a VI and create its icon and connector pane so you can use it as a subVI.
4. To build a VI to generate 4*5 two dimensional array of random numbers (between 1 to2).
5. To Build a VI that generate Fibonacci series starting from '0'.
6. To build a VI which finds roots of quadratic equation using formula node.
7. To build a VI that reverses the contents of an array.
8. To build a VI that can be used for sorting of numeric array i.e. in ascending or descending order.
9. To build a VI for 4*1 multiplexer operation.
10. To build a VI for 3*8 Decoder operation.

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.


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BME2408	DIGITAL ELECTRONICS	L	T	P	C
Version 2019.1	Date of Approval: May 16, 2019	2	1	0	3
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

This course explores the theory and operation of the basic building blocks of digital electronics which includes combinational and sequential circuits. This course also explains the logic families and data convertors. The concepts learnt in the studies of sequential circuits will be applied in the design and analysis of Melay and Moore machines.

Course Objectives

The objective of this course is to

1. Provide the basic knowledge of digital logic levels and application of combinational and sequential circuits.
2. Equip with the understanding of logic family and data convertors.

Course Outcomes


On completion of this course, the students will be able to

CO1: Explain the various logic gates, Boolean algebra and solve the k-map & tabulation method to simplify the logical function.

CO2: Explain the adder & subtractor; Apply and analyze multiplexer, decoder & encoder to design Boolean function.

CO3: Describe flip flops, shift registers & Design counters and synchronous sequential circuits.

CO4: Explain & compare different logic families and explain data convertors.


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Modules	Blooms level*	Number of hours
MODULE 1: BOOLEAN FUNCTIONS Analog & digital signals, AND, OR, NOT, NAND, NOR , XOR & XNOR gates, Boolean algebra, DeMorgan's theorems, Implementation of logical function using only NAND/NOR gates, 1's complement and 2's complement, BCD to Gray and Gray to BCD code conversion, Standard representation of logical functions (SOP and POS forms), K-map representation and simplification of logical function up to five variables, don't care conditions, XOR & XNOR simplifications of K-maps, Tabulation method	L1,L2 and L3	6

MODULE 2: COMBINATIONAL CIRCUITS Adders, Subtractors, Implementation of full adder using half adder, full subtractor using half subtractor, Multiplexer, de-multiplexer, decoder & encoder, code converters, 1 & 2 bit comparators, BCD to seven segment decoder/encoder, Implementation of logic functions using multiplexer/de-multiplexer and decoder, Implementation of 16×1 MUX using 4×1 MUX, 4×16 decoder using 3×8 decoder etc., logic implementations using PROM, PLA & PAL.	L1, L2,L3 and L4	6
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MODULE 3: SEQUENTIAL CIRCUITS Difference between combinational and sequential circuits, Latch, Flip-flops: SR, JK, D & T flip flops – Truth table, Excitation table, Conversion of flip-flops, set up and hold time, race around condition, Master Slave flip flop, Shift registers: SIPO, PISO, PIPO, SIPO, Bi-directional, 4-bit universal shift register; Counters: Asynchronous/ripple & synchronous counters – up/down, Ring counter, sequence detector.	L2,L3, L4 and L5	7
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MODULE 4: LOGIC FAMILIES & DATA CONVERTERS Logic families: Special characteristics (Fan out, Power dissipation, propagation delay, noise margin), working of RTL, DTL, TTL, ECL and CMOS families; Data converters: Special characteristics, ADC – successive approximation, linear ramp, dual slope; DAC – Binary Weighted, R-2R ladder	L1, L2,L3 and L4	5
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der type.		
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**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. Anand Kumar, "Fundamentals of Digital Circuits", 2nd Edition, Prentice-Hall, 2004
2. Moris Mano, "Digital Design", 2nd Edition, Pearson Education, 2007.
3. R.P. Jain, "Modern Digital Electronics", 2nd Edition, Tata McGraw Hill, 2003

Reference Books

1. Thomas L. Floyd, "Digital Fundamentals", 11th Edition, Pearson Education, 2015
2. Malvino and Leech, "Digital Principles & Applications", 1st Edition, Tata McGraw Hill, 1993

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3	PSO4
CO1	1	2	3	--	--	--	--	--	--	--	--	--	1	--	--	--
CO2	1	2	3	--	--	--	--	--	--	--	--	2	1	--	--	3
CO3	1	2	1	--	--	--	--	--	--	--	--	2	1	--	--	3
CO4	2	3	3	--	--	--	--	--	--	--	--	--	1	--	--	3

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BME2412	BIOMATERIALS	L	T	P	C
Version 1.1	Date of Approval: MAY 16,2019	3	0	0	0
Pre-requisites/Exposure	Anatomy & physiology, Engineering Physics, Element of Mechanical Engineering, Engineering Mechanics				
Co-requisites	General Science				

Catalog Description

The course is about the biomaterials used in biomedical implants. It includes the concept of biocompatibility and toxicity test. Various biomaterial used in specific applications are content of course. It consist of metallic, polymer, ceramics and biological tissues. Course also provide understanding with material testing and sterilisation techniques.

Course Objectives

After successfully completing this course, students will be able to:

1. Understand the fundamental principals in biomedical engineering, material science and chemistry, and how they contribute to biomaterial development and performance.
2. Apply the math, science, and engineering knowledge gained in the course to biomaterial selection and design.
3. Critically review papers from the scientific literature and identify areas of research opportunities

Course Outcomes

On completion of this course, the students develop capabilities of:

- CO11. *Define* the biomaterials and its requirements. *Explain* the metallic implant properties. .
- CO12. *Define* the polymer and ceramic biomaterial and *describe* their application in various implants.
- CO13. *Describe* methodology to enhance biomaterial properties for better compatibility with biological tissues. *Setup* test for Biocompatibility and toxicological aspect of material.
- CO14. *Explain*sterilization techniques and *determine* mechanical testing setup for biomaterials for various application.

Course Content

Modules	Blooms level*	Number of hours
MODULE I: Introduction Definition of biomaterials, requirements of biomaterials, classification of biomaterials, Comparison of properties of some common biomaterials. Effects of physiological fluid on the properties of biomaterials, Surface properties, physical properties and mechanical properties of materials. Host tissue reactions to biomaterials Metallic implant materials: Stainless steel, Co-based alloys, Ti and Ti-based alloys. Importance of stress-corrosion cracking, corrosion behavior and the importance of passive films for tissue adhesion. Hard tissue replacement implant: Orthopedic implants and Dental implants. Soft tissue replacement implants: Percutaneous, skin implants and vascular implants,	L1 and L2	9
MODULE II: Polymeric implant materials Classification of polymers according to thermosets, thermoplastics and elastomers : Polyolefins, polyamides, acrylic polymers, fluorocarbon polymers, silicon rubbers, acetals. Physiochemical characteristics of biopolymers. Biodegradable polymers for medical purposes, Biopolymers in controlled release	L1 and L2	9

systems, Synthetic polymeric membranes and their biological applications. Ceramic implant materials: Definition of bioceramics. Common types of bioceramics: Aluminium oxides, Glass ceramics, Carbons. Bioresorbable and bioactive ceramics		
MODULE III: Composite implant materials: Mechanics of improvement of properties by incorporating different elements. Composite theory of fiber reinforcement (short and long fibers, fibers pull out). Polymers filled with osteogenic fillers (e.g. hydroxyapatite). Host tissue reactions to composite materials.. Biocompatibility & toxicological screening of biomaterials: Definition of biocompatibility, blood compatibility and tissue compatibility. Toxicity tests: acute and chronic toxicity studies (in situ implantation, tissue culture, haemolysis, thrombogenic potential tests, systemic toxicity, intracutaneous irritation test), sensitization, carcinogenicity, mutagenicity and special tests.	L1, L2 and L3	9
MODULE IV: Sterilisation Techniques: Definition of sterilization, Types of sterilization: autoclaving, ETO and gamma radiation. Effects of sterilization on the properties of materials. Testing of biomaterials/Implants: In vitro testing (Mechanical testing): tensile, compression, wears, fatigue, corrosion studies and fracture toughness. In-vivo testing (animals studies): biological performance of implants. Ex-vivo testing: in vitro testing simulating the in vivo conditions. Standards of implant materials.	L2 and L3	9

*Bloom's Level:

L1: Knowledge; L2: Comprehension; L3: Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

1. Biomaterials Science: An Introduction to Materials in Medicine, by Buddy D. Ratner, et. al. (Academic Press, San Diego, 1996)
2. Biomaterials - Science and Engineering by J B Park, (Plenum Press, 1984)
3. Biomaterials, An interfacial Approach: Hench L.L. Ethridge E.C
4. Encyclopedia of Medical Devices and Instruments. I-IV: John G. Webster, Bols
5. Vol.I Biocompatibility of Clinical implants materials: David F. Williams
6. A text book of Biomedical Engineering: Kennedy R.M.

Reference Books

1. Text book of Polymer Sciences: Fred W. Billmeyer Jr.
2. The Biomedical Engineering Hand book, CRC Press 1995: Bronzins J.D.
3. Biomaterials by Lawrence Stark & Gyan Agarwal 2. Biomaterials - An Interfacial approach by L. Hench & E. C. Ethridge
4. Biomedical Engineering Fundamentals by Joseph D. Bronzino (Publisher CRC)

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO-PO-PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1	2										3			1	3
CO2	1	2										3			1	3
CO3	1	2										3		2	1	3
CO4	1	2										3		2	1	3

1: strongly related, 2: moderately related and 3: weakly related

BME2413	SIGNALS AND SYSTEMS	L	T	P	C
Version 2019.1	Date of Approval: May 16, 2019	2	1	0	3
Pre-requisites/Exposure	Differentiation & Integration concepts				
Co-requisites					

Catalog Description

This course deals in Digital signal processing with significant skills in advance methods for modification, analysis, classification & sampling of signals. It provides the broad knowledge of design, and realization of digital signal processing systems. The problems based on transformation of domains and filter design will be focused on.

Course Objectives

The objective of this course is to

1. Equip the students with concepts of signals and systems.
2. Provide in-depth knowledge of representation of signals in frequency & z-domain.

Course Outcomes


On completion of this course, the students will be able to

CO1: Represent, analyze & categorize discrete-time signals and systems in time domain with an emphasis on linear time invariant systems.

CO2: Apply the fourier series expansion to signals and obtain its constituent frequencies.

CO3: Convert the signals from time domain to frequency domain using fourier transform.

CO4: Apply the z- transform on discrete signals to solve the problems related to computational complexity.


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Modules	Blooms level*	Number of hours
Module 1: Signals And Systems Introduction of signals and systems; classification of signal, continuous time and discrete time signals, operations performed on them, even and odd signals, periodic and non periodic signals, deterministic and random signals, energy signals, power signals, elementary signals: impulse, step, ramp and exponentials, classification of systems.	L1,L2 and L4	8
Module 2: LTI System Response of LTI system for continuous and discrete time systems, Impulse response, Step response, properties of continuous LTI and discrete LTI systems, LTI systems described by differential and difference equation, analysis of LTI Systems, interconnection of systems.	L1,L2 and L4	6
Module 3: Fourier Series Representation of continuous time periodic signal, properties of continuous time Fourier series, representation of discrete time periodic signals, convergence of the Fourier series, properties of discrete time Fourier series, Fourier series and LTI systems.	L2,L3	7
Module 4: Fourier Transform Continuous time Fourier transform, properties of continuous time Fourier transform, discrete time Fourier transform, properties of discrete time Fourier transform; applications; Bandwidth determination of signals and systems.	L2,L3	7
Module 4: z-Transform Definition of z-transform, region of convergence, properties of z-transform, first order system, second order system, inverse z-transform, analysis of LTI system using z-transform.	L2,L3	8

*Bloom's Level:

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. **Proakis, Manolakis**, Digital Signal processing, 4thedition, Pearson, 2007.
2. **Oppenheim & Schaffer**, Digital Signal Processing, 1stedition, Pearson, 1975.

Reference Books

1. **Simon Haykin**, Signals and Systems, 2ndEdition, Willy Publications.
2. **B.P.Lathi**, Linear Systems & Signals, 2ndEdition, Oxford Publication.
3. **Roberts**, Fundamentals of Signals and Systems, Tata Mcgraw Hills Publication.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	--	--	--	--	--	--	--	--	--	--	--	1	--	--	--
CO2	2	1	--	--	2	--	--	--	--	--	--	--	2	1	--	--
CO3	2	1	--	--	2	--	--	--	--	--	--	--	2	1	--	--
CO4	2	1	--	--	2	--	--	--	--	--	--	--	2	1	--	--

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BME2451	BIO-INSTRUMENTATION	L	T	P	C
Version 1.1	Date of Approval: 16, May 2017	3	0	0	3
Pre-requisites/Exposure	Anatomy & Physiology and Electronic Circuit				
Co-requisites	General Science				

Catalog Description

Bio-instruments comprise of all equipment use in healthcare system for diagnosis and therapy. This course is consist of diagnosis equipment using various physiological parameters. Course inculcate an understanding of the measurement principles of medical instrumentation, including biochemical sensors, bio-potential amplifiers, bioelectrical signals (ECG, EEG), measurement of respiratory function, cardiac variables, blood pressure, blood flow as well as medical devices.

Course Objectives

The objective of this course is to

- To provide an overview of bio-instrumentation principles and constraint.
- To serve as a foundation for design and use of medical instruments.

Course Outcomes

On completion of this course, the students develop capabilities of:

- CO15. *Identify* appropriate transducer and electrode to *estimate* specific physiological parameter.
- CO16. *List* electro-physiological signal (ECG, EEG, EMG) specification and *construct* device to analysis signal characteristics.
- CO17. *List* various respiratory parameter and *demonstrate* the use of electrical impedance tomography for plethysmography.
- CO18. *Explain* the principle of oximetry and *construct* oximeter device.
- CO19. *Explain and demonstrate* the principle of non-invasive blood pressure measurement.

Course Content

Modules	Blooms level*	Number of hours
MODULE I: Introduction to Bio-Instrumentation Transducers and Reference electrodes: classification of transducers, temperature transducers, displacement transducer, pressure transducer. Magnetic induction transducer, photoelectric transducer, piezoelectric transducer, magnetic induction. Electrode theory, biopotential electrodes, microelectrodes, skin surface electrodes, needle electrodes.	L1 and L2	10
MODULE II: Electrophysiological Signals and Measurement Devices ECG: electrodes and conversion of ionic potentials to electric potential, ECG instrumentation amplifiers, driven right leg circuitry. Introduction and characteristics of bio signals (EEG, ECG, EMG), removal of artifacts, event detection and correlation analysis of ECG signals.	L1, L2 and L3	8
MODULE III: Respiratory System and Measurement Devices Respiratory System: position and functions. Methods to measure residual volumes, Introduction to respiration measurement using electrical impedance plethysmography, Electrical impedance changes during breathing, 2 and 4 electrode measurement, 4 electrode technique.	L1, L2 and L3	6
MODULE IV: Oximetry and Measurement devices	L2 and L3	6

Introduction to Oxygen saturation using pulse oximetry, optical characteristics of oxygenated and deoxygenated blood, amplifiers. Principles of pulse oximetry, circuits of pulse oximetry, constant current source, current – voltage converter		
MODULE V: Blood Pressure measurement techniques Theories of Non-invasive blood pressure measurement, Korotkoff sounds and circuitry for method based on oscillometry. Finot-sphygmomanometer principles and limitation.	L2 and L3	6

*Bloom's Level:

L1: Knowledge; L2: Comprehension; L3: Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

- Khandpur R.S, Handbook of Biomedical Instrumentation, Tata McGraw-Hill, 2008
- Leslie Cromwell, Fred J. Weibell, Erich A Pfeiffer, Biomedical Instrumentation and Measurements , PHI , 2nd Edition , 2004.

Reference Books

3. John G. Webster, Medical Instrumentation : Application and Design, 3rd Edition , John Wiley & Sons , New York , 1998 .

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance


CO-PO-PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1	1												1		
CO2		1		2										1		
CO3	1		2											1		
CO4		1	2											1		
CO5		1	2											1		

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BME2403	BIO-INSTRUMENTATION LAB	L	T	P	C
Version 2019.1	Date of Approval: 16, May 2019	0	0	2	1
Pre-requisites/Exposure	Anatomy & Physiology and Electronic Circuit				
Co-requisites	General Science				

Course Objectives

The objective of this course is to

- To provide hands-on practice with medical signal analysis.
- To serve as a foundation for design of medical device.

Course Outcomes

On completion of this course, the students will be able to

CO20. Designing of medical device component as amplifier, sensors, power supplies, filters etc.

CO21. Design and measure the physiological signal in real time.

Catalog Description

This course helps the students to do hands-on practice with various medical equipment as pulse oximeter, ECG, EMG etc. Course also help student to build capacity to design components for medical devices as, electronic filter, power supplies, amplifiers, etc. with desire output. Course included the basic demonstration of transducer and sensors use for measurement. It consists of signal analysis and visual presentation of analyzed result.

Course Content

Laboratory Session 1: 2 hours

1. Study of pulmonary function analyzer using spirogram.

Laboratory Session 2: 2 hours

2. To study finger-tip oximeter.

Laboratory Session 3: 2 hours

3. Designing of instrumentation amplifier.

Laboratory Session 4: 2 hours

4. Designing of notch filter.

Laboratory Session 5: 2 hours

5. To study voltage regulator IC 7805, 7809, 7812 series.

Laboratory Session 6: 2 hours

6. To determine Bradycardia and Tachycardia using ECG Training Kit.

Laboratory Session 7: 2 hours

7. To determine heart rate using ECG simulator Kit.

Laboratory Session 8: 2 hours

8. Circuitry explanation for patient leakage current.

Laboratory Session 9: 2 hours

9. To determine balancing condition for thermistor using wheat stone bridge.

Laboratory Session 10: 2 hours

10. Study of pressure changes using strain gauge.

Text Books

- Khandpur R.S, Handbook of Biomedical Instrumentation, Tata McGraw-Hill, 2008
- Webb, S., The Physics of Medical Imaging, Adern Hilger, Bristol & Philadelphia. 2013
- Hay.B.A. Edtd., Medical Images, Formation, Perception and Measurement, John Wiley, 2008

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- Lab Practical Manual

Reference Books

- Rabiner and Gold, *Digital Signal Processing*,
- A.C. KAK, Principles of Computed Tomography, IEEE Press, New York

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	IA				EE	
	A	PR	LR	V	PR	V
Weightage (%)	5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

CO-PO-PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1	1												1		
CO2		1		2										1		


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BME2409	DIGITAL ELECTRONICS LAB	L	T	P	C
Version 2019.1	Date of Approval: 16, May 2019	0	0	2	1
Pre-requisites/Exposure	Signal and System				
Co-requisites	Nil				


List of Experiments:

1. To verify the truth tables of NOT, OR, AND, NOR, NAND, XOR, XNOR gates.
2. To obtain half adder, full adder using gates and verify their truth tables.
3. To obtain half subtractor, full subtractor using gates and verify their truth tables.
4. To implement control circuit using multiplexer.
5. To convert BCD code into excess 3 code and verify the truth table.
6. To verify the truth tables of RS, D, JK and T flip- flops.
7. To implement and verify 3-bit bi-directional shift register.
8. To design and study asynchronous/ripple counter.
9. To design and study synchronous counter.
10. To design and study a sequence detector.

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.


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BME2414	SIGNALS & SYSTEMS LAB	L	T	P	C
Version 1.1	Date of Approval: 16, May 2019	0	0	2	1
Pre-requisites/Exposure	Basic knowledge of Matlab				
Co-requisites					

Course Objectives

The objective of this course is to

1. To equip the students with the signal processing tool of Matlab through practical exposure.
2. To provide sound foundation of the basic signal generation and its various operations in Matlab.

Course Outcomes

On completion of this course, the students will be able to

CO1. Understand the concepts of basic signals and write matlab code to generate them.

CO2. Write programs related to various operations performed between two signals like correlation & convolution.

CO3. Write programs for transforming the signal from time domain to frequency domain & z-domain.

CO4. Use Matlab as a computation and visualization tool in the study of signals and systems.

Catalog Description

This lab exercises provide opportunities for applying & implementing basic signal and system concepts. Topics include signal generation, convolution, correlation, discrete Fourier Transforms and z transforms with an emphasis on using computer software (Matlab) for analysis and simulation.

Course Content

Laboratory Session 1: 4 hours

1. To Study auto correlation of two signals.
2. To study cross correlation of two sequences.

Laboratory Session2: 2 hours

3. To study convolution of two sequences.
4. To study impulse response.

Laboratory Session 3: 4 hours

5. To study z transform of a) sinusoidal signal, b) step function.
6. To compare fourier and z transform of a signal.

Laboratory Session 4: 2 hours

7. To study convolution theorem in time and frequency domain

.Text Books

1. Alan.V Oppenheim, Signals and Systems, 4th Edition 2007, Pearson Prentice Hall Publication.
2. K.M. Soni, Signals and Systems; 3rd Edition, S.K. Kataria & Sons Publication.
3. P.Ramesh Babu, Signal and Systems, 3rd Edition, Scitech Publications (INDIA) Pvt. Ltd.


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Reference Books

1. Simon Haykin, Signals and Systems, 2nd Edition, Willy Publications.
2. B.P.Lathi, Linear Systems & Signals, 2nd Edition, Oxford Publication.
3. Roberts, Fundamentals of Signals and Systems, TMH Publication.

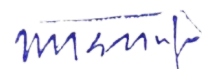
Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination**Examination Scheme:**

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.



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BME2407	ANALOG ELECTRONICS- II	L	T	P	C
Version 2019.1	Date of Approval: May 21, 2019	3	0	0	3
Pre-requisites/Exposure	Basic Electronics and Circuitual Analysis				
Co-requisites	Nil				

Catalog Description

This course introduces the application of semiconductor devices in linear analog circuits. The course stresses on circuit designs using the operational amplifier, active filters and oscillators. The course also provides the overview on the

Course Objectives

The objective of this course is to

1. Provide the fundamental knowledge of linear analog circuits.
2. Provide the knowledge about practical circuit designs using OP Amp.

Course Outcomes

On completion of this course, the students will be able to

CO1. Describe the circuits having BJT and Operational Amplifiers.


CO2. Solve the Linear and Non-linear circuits and analyze them in terms of their parameters and applications.

CO3. Categorize the waveform generation circuits and apply them in laboratory projects.

CO4. Analyze the circuitual knowledge to Linear ICs and filters and apply them for industry problem.

Course Content

Modules	Blooms level*	Number of hours
MODULE I: Building Blocks of Analog ICs 6 lecture hours Differential amplifier, Op-amp Model, op-amp DC & AC parameters, virtual ground, Current mirrors, Active loads, Level shifters and output stages.	L1 and L2	6
MODULE II: Operational amplifiers Introduction, open loop and closed loop configuration, op-amp parameters (input offset current, output offset current, i/p bias current, CMRR, PSRR, null adjustment range, etc,)	L1 and L2	5


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Inverting and non-inverting configuration, voltage gain of inverting and non inverting configurations.		
MODULE III: Linear & Non Linear Wave shaping Adders, Voltage to current, current to voltage Converter, Integrators, Differentiators, Voltage follower (voltage buffer), summer, subtractor, Comparators, log/antilog circuits using Op-amps, precision rectifiers.	L2, L3 and L4	6
MODULE IV: Waveform Generations Damped and undamped oscillations, Barkhausen criterion for sustained oscillation. Tank circuit generator Astable multi Vibrators, OTA-C Oscillators, Crystal oscillator. Types of oscillators: LC-Hartley and Colpitts, RC-RC phase shift and Wien bridge oscillator, Basics of tuned Amplifiers, Voltage Controlled Oscillator.	L2 L3 and L4	7
MODULE V: Active RC Filters & Applications of Linear Circuits Idealistic & Realistic response of filters (LP, BP, and HP), Butter worth & Chebyshev approximation filter functions, LP,BP,HP and All pass, Notch Filter, Operational transconductance amplifier (OTA)-C filters.	L2, L3 and L4	6
MODULE VI: Applications of IC Analog Multiplier & Timer IC phase locked loops, 555 Timer, IC voltage regulators-(fixed, variable) 78xx, 79xx series and adjustable.	L3 and L4	6

*Bloom's Level:


L1: Knowledge; L2: Comprehension; L3: Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

1. **Ramakant Gaekwad**, Op-Amps and Linear Integrated Circuits, 4th Edition PHI, 2001.
2. **D. Roy Choudhury and Shail B. Jain**, Linear Integrated Circuits, 2nd Edition, New age International, 2006.

Reference Books

1. **Adel S. Sedra and K. C. Smith** Microelectronic Circuits, Sixth Edition, Oxford University Press, 2013.
2. **George Clayton and Steve Winder**, Operational Amplifiers, 5th Edition, Elsevier, 2008.


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Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination**Examination Scheme:**

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-
CO2	1	1	-	-	-	3	-	-	-	-	-	-	1	-	-	-
CO3	1	2	3	-	-	3	-	-	-	-	--	-	1	1	-	-
CO4	1	1	-	-	-	2	-	-	-	-	-	-	1	1	-	-

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BME2417	ANALOG ELECTRONICS-II LAB	L	T	P	C
Version 2019.1	Date of Approval: May 21, 2019	0	0	2	1
Pre-requisites/Exposure	Circuit Theory				
Co-requisites	Nil				

Catalog Description

In this course the concepts of Analog Electronics are discussed. Design and analysis of efficient circuits using op-amp like adder, subtractor, filters and oscillators.

Course Objectives

The objective of this course is to

1. To provide the basic skills required to understand, develop, and design of various engineering applications involving Analog Electronic & Circuits.
2. To provide basic laboratory exposures for Analog Circuits and applications.

Course Outcomes

On completion of this course, the students will be able to

CO1: Construct adder, subtractor, an inverting and non-inverting amplifier.

CO2: Design transistor-based RC oscillator (Wien bridge and RC phase shift oscillator) circuit.

CO3: Construct astable and mono-stable mode timer circuit using IC 555.

CO4: Design of Integrator, differentiator and low pass & high pass active filter circuit using Op-Amp (I.C-741)

List of Experiments:

Modules	Blooms level*	Number of hours
1. To study the op amp as an inverting and non inverting amplifier. 2. To use the op amp as an adder, subtractor, integrator and differentiator. 3. To design a ramp and a square wave generator. 4. To study the IC-555 timer as stable and bistable multivibrator.	L1, L2	8
5. To design low pass, high pass and band pass filters using op- amp. and plot their frequency response. 6. To design and study class A power amplifier. 7. To design and study a class B push pull amplifier.	L3 and L4	10
8. To study various feedbacks such as voltage series feedback.	L2, L4	10

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9. To design RC phase shift and Wein bridge oscillators using op amplifier.		
10. To design and study Colpitt and Hartley oscillators.		

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	2		3										1			
CO2		2	3										3			
CO3	3												2			
CO4	3	2	2								2		1			

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BME2416	MEDICAL IMAGING TECHNIQUES-II	L	T	P	C
Version 1.1	Date of Approval: 16 May, 2019	3	1	0	3
Pre-requisites/Exposure	Basic Electronic, Biology for Engineers, Physics				
Co-requisites	General Science				

Catalog Description

This course helps the students to understand various advance techniques imaging modalities used in medical profession e.g. MRI, MRI Pulse Sequences, Diffusion, Perfusion, Contrast imaging, etc. The content of the course will also speak about the artefacts and other problems related to the machines. The course also stresses the importance of radiation safety, ethics and legal considerations as well as professionalism.

Course Objectives

The objective of this course is to

1. To provide an overview of advance medical imaging principles and machine.
2. To serve as a foundation for research in field of medical imaging.

Course Outcomes

On completion of this course, the students develop capabilities of:

- CO22. *Explain* basic component of Pulse sequence and *design* and *stimulate* Echoes.
CO23. *Describe* advance techniques of pulse sequences, and able to *differentiate* between them
CO24. *Describe* various contrast imaging principles and *analyses* clinical parameters.
CO25. *Illustrate* MRS and MRE and *compile* processed data.
CO26. *Describe* application of MRI in field of clinical research and diagnosis.

Course Content

Modules	Blooms level*	Number of hours
MODULE I: Basic of Magnetic Resonance Pulse Sequences Basic Classification, Response to a single RF Pulse: Saturation and inverse recovery, Spin Echo, Spin-echo equation, General Response of two or more RF pulses: Stimulated Echoes.	L2, L3, and L4	8
MODULE II: Advance Techniques of Pulse Sequences Review of the main classes of imaging pulse sequence, Gradient Echo-Pulse sequence(GRE), Rapid-GRE, Echo-planar and spiral imaging, Interleaved and hybrid sequence, Multislice vs 'True-3D' sequence for volume imaging, Acquisition Strategies in k-space, Gating, Parallel imaging. Other imaging Methods with Historical Interest: Points Methods and Line Scanning Methods	L2 and L3	10
MODULE III: Image contrast Mechanism and Quantitative Imaging General Principles of Quantitative Imaging(QI), Relaxation Times and Dynamic contrast enhance MRI, Flow, Diffusion and Perfusion, Susceptibility and functional MRI, Ultra-Short TE imaging, Magnetic transfer and polarisation Transfer, Chemical shift Imaging, Current-Density Imaging,	L2, L3 and L4	15

Imaging of nuclei other than Hydrogen		
MODULE IV: MR Spectroscopy and MR elastography Introduction to MRS, Chemical –Shifted Spectroscopy, 1D Spectroscopy data processing, Introduction to MRE and its typical application.	L2 and L3	8
MODULE V: Application of MR in Medicine Cancer, Neurology, Cardiology, Interventional Procedures and Monitoring of Therapy, Other Medical Applications, Molecular and Cellular Imaging, Genetic Phenotyping for Pre-Clinical Imaging	L1 and L2	7

*Bloom's Level:

L1: Knowledge; L2: Comprehension; L3: Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

- Khandpur R.S, Handbook of Biomedical Instrumentation, Tata McGraw-Hill, 2008
- Webb, S., The Physics of Medical Imaging, Adern Hilger, Bristol & Philadelphia. 2013
- Hay.B.A. Edtd., Medical Images, Formation, Perception and Measurement, John Wiley, 2008

Reference Books

- Rabiner and Gold, *Digital Signal Processing*,
- A.C. KAK, Principles of Computed Tomography, IEEE Press, New York

Other readings:

- <http://www.learningradiology.com/itunesfeed.htm>

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

CO-PO-PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO 3	PSO 4
CO 1		1	2									3		1	2	3
CO 2		2	1									3		1	2	3
CO 3		2	1									3		1	2	3
CO 4		2	1									3		1	2	3
CO 5		2	2	1								3		1	2	3

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BME2418	ARTIFICIAL NEURAL NETWORK	L	T	P	C
Version 2019.1	Date of Approval: May 21, 2019	2	0	0	2
Pre-requisites/Exposure	Basic Knowledge of Brain functioning				
Co-requisites	Nil				

Catalog Description

The course provides introduction to neural network and a deep insight into the basics of brain & its functioning basics of various neural models & neural schema used for learning. With this course students would be able to know the basics of each introductory feature of human brain and its features which would prove to be very helpful throughout their degree and would prove helpful in understanding other related subjects also.

Course Objectives

The objective of this course is to

1. Equip the students with concepts of learning of brain problem solving techniques and develop proficiency in creating neural structures using the MATLAB.
2. Provide an overview of various control statements, data structures, packages related to image addition, graphics, different types of neural models.

Course Outcome

On completion of this course, the students will be able to

CO 1: Define Artificial Neural Network & its similarity to biological neural network and explain its application in our day to day life.

CO 2: Analyze ANN learning, Error correction learning, Hebbian learning, Competitive learning and Boltzman Learning.

CO 3: Implement simple perceptron, Perceptron Learning rule, modified perceptron learning rule, feed forward neural network & feedback Neural Network.

CO 4: Explain self-organizing Map, Hopfield network, Adaptive resonance theory and its various learning rules.

CO 5: Analyze memory-based learning, Associative learning, Bi-directional learning and Auto associative learning.

Modules	Blooms level*	Number of hours
Module-I Artificial Neural Networks (ANN) and biological neural networks, supervised and unsupervised learning rules, neural network applications	L1, L2 and L3	6
Module-II Unsupervised learning:- Hebbian learning and competitive learning. Supervised learning:- Back propagation algorithms, Learning rule:- Delta learning rule, Widrow-Hoff learning rule, Winner-Take-All learning rule	L1, L2 and L3	6
Module-III Feed forward neural network, feed backward neural network, Perceptron and its learning law, single-layer perceptron, multi-layer perceptron.	L2, L3 and L4	6
Module-IV Self organizing networks: Kohonen algorithm, Hopfield Networks: Hopfield	L2, L3 and L4	6

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network algorithm, Adaptive resonance theory: Network and learning rules.		
Module V Associative memory, auto-associative memory, bi-directional associative memory.	L2, L3 and L4	6

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

TextBook:

1. Kenji Suzuki (ed.) - InTech , 2013
2. Todd Troyer - University of Texas at San Antonio, 2005.

Reference Book:

1. MATLAB 2017 Book released by MATWORS

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1												1			
CO2	1												1		1	
CO3		1	2										1			
CO4		1	2	1									1		1	
CO5			2										1			

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BME2419	ARTIFICIAL NEURAL NETWORK LAB	L	T	P	C
Version 2019.1	Date of Approval: May 21, 2019	0	0	2	1
Pre-requisites/Exposure	Basics of MATLAB				
Co-requisites	NIL				

Catalog Description

In this Lab course first student should learn about advanced level of software used for easy calculation and toolbox used for software like MATLAB.

Course Objectives

The objective of this course is to

- Make the students apply knowledge of various neural models required for solving complex problems.
- Provide a demonstration of different types of image processing techniques through MATAB toolbox.

Course Outcomes

On completion of this course, the students will be able to

CO1: Acquiring knowledge of Basics of High-end calculation software and need in Computer Science & engineering

CO2: Demonstrate the All preliminary functions in MATLAB

CO3: Apply the knowledge of all the basics function and toolbox knowledge of MATLAB

CO4: Demonstrate the Neural Network model in MATLAB

CO5: Demonstrate usage of applications involving with Image processing & Its Toolbox used by MATLAB

Modules/Topics Covered**	Blooms level*	Number of hours
7. Introduction of MATLAB (a) Basic Variable deceleration & its operation (b) Function use & its application	L3, L5	4
8. Sample Programs in MATLAB (a) Basic use of Matrix and Graph Plotting (b) Different type of graph plotting with use of different -2 type of data	L3, L5	6
9. Sample Programs using MATLAB functions (a) Create a basic program MATLAB using functions (b) Use of basic function Image processing (c) Practice on Basic function of Image processing tool box.	L3, L5	6
10. Sample programs of ANN functions (a) Practice on ANN toolbox function in MATLAB (b) Write a program for training a small network in MATLAB	L3, L5	6
11. Sample Programs using ANN tool box & Image processing toolboix (a) Demonstrate the use of ANN tool box & Image processing toolbox and write a program after combining it.	L3, L5	2

*Bloom's Level:

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

** Sample Programs provided are not limited to these only, can include others as desired.

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Text Books

- Kenji Suzuki (ed.) - InTech , 2013
- Todd Troyer - University of Texas at San Antonio , 2005

Reference Books

1. MATLAB 2017 Book released by MATWORS.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination
Examination Scheme:

IA					EE
Components	A	PR	LR	V	70
Weightage (%)	5	10	10	5	

Note: IA –Internal Assessment, A – Attendance, PR – Performance, LR – Lab Record, V – Viva, EE- External Exam

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	2	1	--	--	--	--	--	--	--	--	--	--	2	--	--	--
CO2	3	1	--	--	--	--	--	--	--	--	--	--	1	2	--	--
CO3	2	1	2	--	--	--	--	--	--	--	--	--	1	2	--	--
CO4	1	3	2	--	--	--	--	--	--	--	--	--	2	--	2	--
CO5	1	3	--	--	--	--	--	--	--	--	--	--	1	--	--	--

1: strongly related, 2: moderately related and 3: weakly related



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BME2501	MICROPROCESSOR SYSTEMS	L	T	P	C
Version: 2019.1	Date of Approval: May 21, 2019	3	0	0	3
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

This course deals with the systematic study of the Architecture and programming issues of microprocessor family and its applications. The aim of this course is

1. To introduce students with the architecture and operation of typical microprocessors.
2. To familiarize the students with the programming and interfacing of microprocessors
3. To provide the basic knowledge of the microprocessor needed to develop the embedded system based products as a solution to real time problems.

Course Outcomes

On completion of this course, the students will be able to

CO1. Explain the architecture, pin configuration, addressing modes, control words, timing diagram, instruction set of 8085 microprocessors and Interfacing ICs

CO2. Explain the architecture, pin configuration, addressing modes, control words of 8086, 8087 and other 16 bit microprocessors and Interfacing ICs

CO3. Develop the assembly language program using 8085 using stacks & subroutines.

CO4. Design circuitry to the Microprocessor I/O ports in order to interface the processor to external devices so as to provide solutions real-world control problems

Modules	Blooms level*	Number of hours
Module I: Introduction to Microcomputer Systems Introduction to Microprocessors and microcomputers, Study of 8 bit Microprocessor, 8085 pin configuration, Internal Architecture and operations, interrupts, Stacks and subroutines, various data transfer schemes.	L1, L2, L3, L4	6
Module II: ALP and timing diagrams Introduction to 8085 instruction set, advance 8085 programming, Addressing modes, Counters and time Delays, Instruction cycle, machine cycle, T-states, timing diagram for 8085 instruction.	L4, L5, L6	8
Module III: Memory System Design & I/O Interfacing Memory interfacing with 8085. Interfacing with input/output devices (memory mapped, peripheral I/O), Cache memory system. Study of following peripheral devices 8255, 8253, 8257, 8259, 8251.	L3, L4, L5, L6	9
Module IV: Architecture of 16-Bit Microprocessor Difference between 8085 and 8086, Block diagram and architecture of 8086 family, pin configuration of 8086, minimum mode & maximum mode Operation, Bus Interface Unit, Register Organization, Instruction Pointer, Stack & Stack pointer, merits of memory segmentation, Execution Unit, Register Organization.	L2, L3, L4	7
Module V: Pentium Processors	L1, L2	6

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Internal architecture of 8087, Operational overview of 8087, Introduction to 80186, 80286, 80386 & 80486 processors, Pentium processor (P-II, P-III, P-IV).		
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**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. Douglas Hall, Microprocessor and Interfacing:, Tata McGraw Hill, 2017
2. Gaonkar R. S , Microprocessor Architecture, Programming and Applications, Wiley

Reference Books

- Yu Cheng Liu & Glen A. Gibson, Microcomputer Systems: 8086/8088 family Architecture, Programming and Design, PHI Publication, 2016.
- Ram B., Fundamentals of Microprocessors and Microcomputers, Dhanpat Rai & Sons, 2017

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70


CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	2	--	--	--	--	--	--	--	--	--	--	3	2	1	
CO2	1	1	2	3	--	--	--	--	--	--	--	--	3	3	2	
CO3	-	-	-	1	2	3	--	--	--	--	--	--		2	2	1
CO4	-	-	-	1	--	2	--	--	2	3	3	--		2	2	1

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BME2513	MEDICAL IMAGE PROCESSING	L	T	P	C
Version 1.1	Date of Approval: 21 May, 2019	3	0	0	3
Pre-requisites/Exposure	Engineering Mathematics				
Co-requisites	General Science				

Catalog Description

Course give introduction to digital image processing and its application with clinical image. Course consists of image enhancement, denoise, filtering in spatial and frequency domain etc. techniques. Its include image segmentation and feature extraction methods. Besides, course gives the insight in the process of registration and its application. Course provide the foundation for medical image constriction, to develop complex algorithm and application of machine learning. Furthermore, course develop a life long learning capabilities in the students.

Course Objectives

The objective of this course is to

- To provide an overview of medical image processing and its constraint.
- To serve as a foundation for design and develop complex medical image processing algorithms.

Course Outcomes

On completion of this course, the students develop capabilities of:

- CO27. *Identify* the relation between pixels in an image, and coccots of quantization, resolution inn images.
- CO28. *Apply* intensity transformation and spatial filter for various application of Image Processing.
- CO29. *Develop and Apply* various frequency domain operation on an image for filtering, and analyzing.
- CO30. *Deploy* the programming skill of segmentation of RoI using various algorithm.
- CO31. *Deploy* the programming skill of Registration of images using various algorithm

Course Content

Modules	Blooms level*	Number of hours
MODULE I: Introduction to Medical Imaging Digital image processing, fundamental steps in digital image processing, Component of Image processing. Simple Image Formation Model, Image Sampling and Quantization, Representing Digital Images, Spatial and Intensity Resolution, Image Interpolation, Some Basic Relationships between Pixels, An Introduction to the Mathematical Tools Used in Digital Image Processing, Medical Imaging History, Various Projection or View of Medical Imaging, Fundamental Principles of Medical imaging, DICOM images format.	L1 and L2	10
MODULE II: Intensity Transformations and Spatial Filtering The Basics of Intensity Transformations and Spatial Filtering, Some Basic Intensity Transformation Functions, Histogram Processing, Fundamentals of Spatial Filtering, Smoothing Spatial Filters, Sharpening Spatial Filters, Noise model and noise filtering, Application	L1, L2 and L3	8
MODULE III: Filtering in the Frequency Domain Filtering in the Frequency Domain	L1, L2 and L3	6

The brief Introduction to Fourier Series and Transform, The Basics of Filtering in the Frequency Domain Image Smoothing Using Frequency Domain Filters , Image Sharpening Using Frequency Domain Filters, Noise filtering in frequency domain, Application.		
MODULE IV: Segmentation Morphological Image Processing: Erosion and Dilation, Opening and Closing and its segmentation application. Point, Line, and Edge Detection, Thresholding Region-Based Segmentation; Region Growing, Hough Transformation.	L2 and L3	6
MODULE V: Registration Geometric Transformation, Intensity interpolation, Similarity measure, Sum of Square difference, Correlation coefficient, Mutual Information, Structural Similarity Index, Feature based registration, Least Square Fit.	L2 and L3	6

*Bloom's Level:

L1: Knowledge; L2: Comprehension; L3: Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

- Rafael C., Gonzalez and Richard E. Woods, *Digital Image Processing*, Pearson Education Asia, 2001

Reference Books

- Anil K. Jain, *Fundamentals of Digital Image Processing*, Prentice Hall of India, 1997
- William K. Pratt, *Digital Image Processing*, John Wiley, NJ, 1987.
- Albert Macovski, *Medical Imaging systems*, Prentice Hall, New Jersey.1983.
- Sid Ahmed M.A., *Image Processing Theory, Algorithm and Architectures*, McGraw Hill, 1995.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

CO-PO-PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO 3	PSO 4
CO 1			2		1										1	
CO 2				2	1										1	
CO 3			2		1										1	
CO 4			2		1										1	
CO 5			2		1										1	

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BME2514	MACHINE LEARNING	L	T	P	C
Version 1.1	Date of Approval: 16, May 2020	3	0	0	3
Pre-requisites/Exposure	Engineering Mathematics				
Co-requisites	General Science				

Catalog Description

Machine learning is the science of getting computers to act without being explicitly programmed. In the past decade, machine learning has given us self-driving cars, practical speech recognition, effective web search, and a vastly improved understanding of the human genome. Machine learning is so pervasive today that you probably use it dozens of times a day without knowing it. Many researchers also think it is the best way to make progress towards human-level AI. In this class, you will learn about the most effective machine learning techniques, and gain practice implementing them and getting them to work for yourself. More importantly, student will learn about not only the theoretical underpinnings of learning, but also gain the practical know-how needed to quickly and powerfully apply these techniques to new problems. Finally, student will learn about some of Silicon Valley's best practices in innovation as it pertains to machine learning and AI.

This course provides a broad introduction to machine learning, datamining, and statistical pattern recognition. Topics include: (i) Supervised learning (parametric/non-parametric algorithms, support vector machines, kernels, neural networks). (ii) Unsupervised learning (clustering, dimensionality reduction, recommender systems, deep learning). (iii) Best practices in machine learning (bias/variance theory; innovation process in machine learning and AI). The course will also draw from numerous case studies and applications, so that you'll also learn how to apply learning algorithms to building smart robots (perception, control), text understanding (web search, anti-spam), computer vision, medical informatics, audio, database mining, and other areas.

Course Objectives

The objective of this course is to

- To provide an overview of Machine Learning and its constraint.
- To serve as a foundation for design and develop complex ML algorithms.

Course Outcomes

On completion of this course, the students develop capabilities of:

- CO32. *Identify* the constrain of ML, *differentiate* between supervised and unsupervised learning; *develop* function for regression and cost function.
- CO33. *Apply* the concept of ML and *deploy* gradient descent algorithm for logistic regression.
- CO34. *Apply* the regularization parameters to optimize the ML algorithm.
- CO35. *Develop* the Algorithm using Neural network principle.
- CO36. *Deploy* the principle of ML for Optimization and rectification of output error.

Course Content

Modules	Blooms level*	Number of hours
MODULE I: Introduction to Machine Learning What is Machine Learning? Supervised Learning, Unsupervised Learning; Linear	L1 and L3	10

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Regression with One Variable: Model Representation, Cost Function, Cost Function - Intuition I, Cost Function - Intuition II, Gradient Descent, Gradient Descent Intuition, Gradient Descent For Linear Regression; Linear Algebra Review: Matrices and Vectors, Addition and Scalar Multiplication, Matrix Vector Multiplication, Matrix Multiplication, Matrix Multiplication Properties, Inverse and Transpose		
MODULE II: Linear Regression with Multiple Variables Multiple Features: Gradient Descent for Multiple Variables, Gradient Descent in Practice I - Feature Scaling, Gradient Descent in Practice II - Learning Rate, Features and Polynomial Regression, Normal Equation, Normal Equation Noninvertibility; Logistic Regression: Classification, Hypothesis Representation, Decision Boundary, Cost Function, Simplified Cost Function and Gradient Descent, Advanced Optimization, Multiclass Classification: One-vs-all	L1, L2 and L3	8
MODULE III: Regularization The Problem of Overfitting, Cost Function, Regularized Linear Regression, Regularized Logistic Regression	L1, L2 and L3	6
MODULE IV: Neural Networks: Representation Non-linear Hypotheses, Neurons and the Brain, Model Representation I, Model Representation II, Examples and Intuitions I, Examples and Intuitions II, Multiclass Classification Neural Networks: Learning Cost Function, Backpropagation Algorithm, Backpropagation Intuition, Implementation Note: Unrolling Parameters, Gradient Checking, Random Initialization, Putting It Together	L2 and L3	6
MODULE V: Practical Aspects for Applying Machine Learning Deciding What to Try Next, Evaluating a Hypothesis, Model Selection and Train/Validation/Test Sets, Diagnosing Bias vs. Variance, Regularization and Bias/Variance, Learning Curves, Deciding What to Do Next Revisited Machine Learning System Design Prioritizing What to Work On, Error Analysis, Error Metrics for Skewed Classes, Trading Off Precision and Recall, Data For Machine Learning	L2 and L3	6

*Bloom's Level:

L1: Knowledge; L2: Comprehension; L3: Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

- Ethem Alpaydin, Introduction to Machine Learning, Second Edition , <http://mitpress.mit.edu/catalog/item/default.asp?ttype=2&tid=12012>. This book will cover all the material in the course.
- <https://www.coursera.org/learn/machine-learning#enroll> (One of the online platform, where students could get every for learning. Mentioned course is design and delivered by Andrew Ng(Stanford University))

Reference Books

- Stephen Marsland, Machine Learning: An Algorithmic Perspective. <http://www.amazon.com/Machine-Learning-Algorithmic-PerspectiveRecognition/dp/1420067184>

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- Christopher M. Bishop, Pattern Recognition and Machine Learning. <http://research.microsoft.com/en-us/um/people/cmbishop/prml/>.
- Tom Mitchell, Machine Learning, <http://www.cs.cmu.edu/~tom/mlbook.html>.

**Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination
Examination Scheme:**

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

Course CO-PO-PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO 3	PSO 4
CO 1			2		1										1	2
CO 2			2		1										1	2
CO 3			2		1										1	2
CO 4			2		1										1	2
CO 5			2		1										1	2

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BME2504	MICROPROCESSOR SYSTEMS LAB	L	T	P	C
Version: 2019.1	Date of Approval: May 21, 2019	0	0	2	1
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

This course focuses on the systematic study of the Architecture and programming of microprocessor family and its applications. The objectives of this course are:

1. To introduce students with the architecture operation and instruction set of 8085 and 8086 microprocessors.
2. To familiarize the students with the programming and interfacing of 8085 and 8086 microprocessors.
3. To provide the basic knowledge of the microprocessor needed to develop the embedded system based products as a solution to real time problems.

Course Outcomes

On completion of this course, the students will be able to

CO1. Set up programming strategies and select proper mnemonics and run their program on the training boards

CO2. Develop assembly language programs for various problems keeping in mind technical issues and evaluate possible causes of discrepancy in practical experimental observations in comparison.

CO3. Understand the concepts related to I/O and memory interfacing and design interfacing circuits with 8085 by making use of different peripheral devices.

Modules	Blooms level*	Number of hours
Lab Session 1: ALP using 8085: <ol style="list-style-type: none"> 1. Write at least three different programs for addition of two 8 bit numbers assuming carry may or may not be generated. 2. Write at least three different programs for subtraction of two 8 bit numbers assuming borrow may or may not be generated. 3. Write two different programs for 16 bit addition, one using instruction DAD and another without using instruction DAD. 4. Write assembly language program for 8 bit multiplication and division. 	L2, L3,L4	4
Lab Session II: To study, understand, interface and two peripheral devices with 8085.	L4,L5,L6	2
Lab session III: Any three programs using 8085 based on block of data.	L4	1
Lab session IV: ALP using 8086: <ol style="list-style-type: none"> 1. Write an ALP to add list of 10 given numbers. 2. Write an ALP to sum the numbers from 1-100. 3. Write an ALP to count negative numbers from a given list of 10 numbers. 4. Write an ALP to check number of vowels in a given string. 	L2, L3, L4	5

*Bloom's Level:

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

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3. Douglas Hall, Microprocessor and Interfacing:, Tata McGraw Hill, 2017
4. Gaonkar R. S , Microprocessor Architecture, Programming and Applications, Wiley

Reference Books

- Yu Cheng Liu & Glen A. Gibson, Microcomputer Systems: 8086/8088 family Architecture, Programming and Design, PHI Publication, 2016.
- Ram B., Fundamentals of Microprocessors and Microcomputers, Dhanpat Rai & Sons, 2017

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO4
CO1	1	2	--	--	--	--	--	--	--	--	--	--	3	2	1	
CO2	1	1	2	3	--	--	--	--	--	--	--	--	3	2	1	1
CO3	-	-	-	1	2	3	--	--	--	--	--	--		2	2	1

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BME2515	MACHINE LEARNING LAB	L	T	P	C
Version 1.1	Date of Approval: 21 May 2019	0	0	2	1
Pre-requisites/Exposure	Matlab, Engineering Mathematics				
Co-requisites					

Pre –Requisite: Matlab Programming

Catalog Description

This course helps the students to do hands-on practice with various machine learning techniques. Machine Learning is known to be future electricity and a key need in medical data processing. Course built the foundation for develop software program for medical data processing. It also lay down the foundation for deep Learning and Artificial intelligence for life-long learning.

The objective of this course is to

- To provide hands-on practice with machine learning.
- To serve as a foundation for develop critical thinking for developing software program for medical data processing.

Course Outcomes

On completion of this course, the students will be able to

- CO1. *Develop* machine learning programming program for data classification, using linear regression and logistic regression.
- CO2. *Optimization* of machine learning program using regularization techniques.
- CO3. *Develop* Neural Network program for identification and multi level classification.
- CO4. *Analysis* of error and rectify algorithm for accurate classification using machine learning concept.

List of Experiments	Blooms level*	Number of hours
<ul style="list-style-type: none"> • Write program of basic matrix operation in using MATLAB. 	L1, L2 and L3	2
<ul style="list-style-type: none"> • Write a program to learning programming using loops and decision structure in MATLAB 	L1, L2 and L3	2
<ul style="list-style-type: none"> • To write Function to compute the cost of linear regression. • To write Function to run gradient descent. • To write function to normalize features. • To writes function to compute normal equation. 	L1, L2 and L3	2
<ul style="list-style-type: none"> • To write and execute program Function to plot 2D classification data • To write and execute program Sigmoid Function • To write and execute program Logistic Regression Cost Function • To write and execute program Logistic Regression Prediction Function • To write and execute program Regularized Logistic Regression Cost for geometric transformation of image 	L1, L2 and L3	2
<ul style="list-style-type: none"> • To write and execute program Logistic regression cost function • To write and execute program Train a one-vs-all multi-class classifier • To write and execute program Predict using a one-vs-all multi-class classifier 	L1, L2 and L3	2

<ul style="list-style-type: none"> Write and execute programs Neural network prediction function 	L1, L2 and L3	2
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Text Books

- Rafael C., Gonzalez and Richard E. Woods, *Digital Image Processing Using MATLAB*, Pearson Education Asia, 2001
- Lab Practical Manual

Reference Books

- William K. Pratt, *Digital Image Processing*, John Wiley, NJ, 1987.
- Albert Macovski, *Medical Imaging systems*, Prentice Hall, New Jersey.1983.
- Sid Ahmed M.A., *Image Processing Theory, Algorithm and Architectures*, McGraw Hill, 1995.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO4
CO1	--	--	2	--	1	--	--	--	--	--	--	--	--	--	1	2
CO2	--	--	2	--	1	--	--	--	--	--	--	--	--	--	1	2
CO3	--	--	2	--	1	--	--	--	--	--	--	--	--	--	1	2
CO4	--	--	2	--	1	--	--	--	--	--	--	--	--	--	1	2
CO5	--	--	2	--	1	--	--	--	--	--	--	--	--	--	1	2

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BME2516	MEDICAL IMAGE PROCESSING LAB	L	T	P	C
Version 1.1	Date of Approval: 21 May 2019	0	0	2	1
Pre-requisites/Exposure					
Co-requisites					

Pre –Requisite: Matlab Programming

Catalog Description

This course helps the students to do hands-on practice with various medical image processing techniques. Medical imaging and post processing is a key need for diagnostic techniques. Course built the foundation for develop software program for medical image enhancement, denoising, segmentation and registration. It also includes the use of MatLab image processing toolbox use for medical images post processing.

The objective of this course is to

- To provide hands-on practice with medical images.
- To serve as a foundation for develop critical thinking for developing software program for medical imaging.

Course Outcomes

On completion of this course, the students will be able to

- CO5. Develop program to enhance, denoise and better visualization in medical image (Region of Interest) ROI.
- CO6. Develop program for image segmentation and registration for selection of ROI and using MatLab Image Processing Toolbox.

List of Experiments	Blooms level*	Number of hours
• Write program to read and display digital image using MATLAB.	L1, L2 and L3	2
• Write a program to perform convolution operation for 1D and 2D data in MATLAB	L1, L2 and L3	2
• To write and execute programs for image arithmetic operations • To write and execute programs for image logical operations	L1, L2 and L3	2
• To write and execute program for geometric transformation of image	L1, L2 and L3	2
• To understand various image noise models and to write programs for image restoration	L1, L2 and L3	2
• Write and execute programs to remove noise using spatial filters	L1, L2 and L3	2
• Write and execute programs for image frequency domain filtering	L1, L2 and L3	2
• Write a program in MATLAB for edge detection using quick mask	L1, L2 and L3	2
• Write a program in MATLAB for histogram calculation and equalization. • Write and execute programs of image manipulation Zoom and Shrink	L1, L2 and L3	2
• To process image using image processing toolbox	L1, L2 and L3	2

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Text Books

- Rafael C., Gonzalez and Richard E. Woods, *Digital Image Processing Using MATLAB*, Pearson Education Asia, 2001
- Lab Practical Manual

Reference Books

- William K. Pratt, *Digital Image Processing*, John Wiley, NJ, 1987.
- Albert Macovski, *Medical Imaging systems*, Prentice Hall, New Jersey.1983.
- Sid Ahmed M.A., *Image Processing Theory, Algorithm and Architectures*, McGraw Hill, 1995.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination**Examination Scheme:**

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO4
CO1	--	--	2	--	1	--	--	--	--	--	--	--	1	--	3	--
CO2	--	--	2	--	1	--	--	--	--	--	--	--	1	--	3	--
CO3	--	--	2	--	1	--	--	--	--	--	--	--	1	--	3	--
CO4	--	--	2	--	1	--	--	--	--	--	--	--	1	--	3	--
CO5	--	--	2	--	1	--	--	--	--	--	--	--	1	--	3	--

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BME2535	SUMMER INTERNSHIP EVALUATION I	L	T	P	C
Version 2019.1	Date of Approval: May 21, 2019	0	0	0	3
Pre-requisites/Exposure	Basic Concepts of Programming Language and Electronics				
Co-requisites	Nil				

Catalog Description

There are certain phases of every Intern's professional development that cannot be effectively taught in the academic environment. These facets can only be learned through direct, on-the-job experience working with successful professionals and experts in the field. The internship program can best be described as an attempt to institutionalize efforts to bridge the gap between the professional world and the academic institutions. Entire effort in internship is in terms of extending the program of education and evaluation beyond the classroom of a university or institution. The educational process in the internship course seeks out and focuses attention on many latent attributes, which do not surface in the normal classroom situations. These attributes are intellectual ability, professional judgment and decision-making ability, inter-disciplinary approach, skills for data handling, ability in written and oral presentation, sense of responsibility etc. In order to achieve these objectives, each student will maintain a file (**Internship File**). The Internship File aims to encourage students to keep a personal record of their learning and achievement throughout the Programme. It can be used as the basis for lifelong learning and for job applications. Items can be drawn from activities completed in the course modules and from the workplace to demonstrate learning and personal development. The report will assess the student's analytical skills and ability to present supportive evidence, whilst demonstrating understanding of their organization, its needs and their own personal contribution to the organization.

Course Objectives

The objective of this course is to

1. Equip the students with concepts of new technologies and practical exposure
2. Provide an overview of presentation and preparation of report.

Course Outcomes

On completion of this course, the students will be able to

CO1: Study the literature and *identify* the problem statement

CO2: Work on a real world problem and *solve* it using latest technology

CO3: *Prepare* a detailed report of the project

CO4: *Prepare* a brief presentation of their project

CO5: Present and *explain* the project for evaluation

Text Books

As per topic of summer internship project is chosen and discussion with guide.

Reference Books

As per topic of summer internship project is chosen and discussion with guide.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	V	PPT	R	IM	EM
Weightage (%)	10	10	10	30	70

V – Viva, PPT-Power Point Presentation, R – Report, IP-Internal Marks, EM-External Marks


CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	--	--	--	--	1	--	--	--	--	--	--	--	-		2	1
CO2	--	--	--	-	1	--	--	--	--	--	--	--	-	-	2	1
CO3	--	--	--	--	1	--	--	--	--	--	--	--	-	-	2	1
CO4	--	--	--	--	1	--	--	--	--	--	--	--	-	-	2	1

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BME2503	CONTROL SYSTEMS	L	T	P	C
Version 2019.1	Date of Approval: May 21, 2019	2	1	0	3
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

This course provides the students the core knowledge of control systems. This introduces the methods of mathematical modeling of control systems with time & frequency domain analysis along with concepts of stability.

Course Objectives

The objective of this course is to

- Equip the students with concepts of Control System.
- Provide the students in depth knowledge of time domain, frequency domain and concepts of stability.

Course Outcomes

On completion of this course, the students will be able to

CO1. Understand and compare between types of control system and find mathematical model of control system.

CO2. Understand, explain and solve problems on time domain analysis.

CO3. Understand, explain and solve problems on frequency domain analysis.

CO4: Analysis of control system stability

Modules	Blooms level*	Number of hours
Module 1: Input / Output Relationship Introduction of open loop and closed loop control systems, mathematical modeling and representation of physical systems (Electrical Mechanical and Thermal), derivation of transfer function for different types of systems, block diagram & signal flow graph, Reduction Technique, Mason's Gain Formula.	L1, L2, L3 and L4	9
Module 2: Time – Domain Analysis Time domain performance criteria, transient response of first, second & higher order systems, steady state errors and static error constants in unity feedback control systems, error criteria, generalized error constants, performance indices, response with P, PI and PID Controllers.	L1, L2 and L3	9
Module 3: Frequency Domain Analysis Polar and inverse polar plots, frequency domain specifications, Logarithmic plots (Bode Plots), gain and phase margins, relative stability, Correlation with time domain, constant close loop frequency responses, from open loop response, Nyquist Plot.	L1, L2 and L3	9
Module 4: Concept of Stability	L1, L2, L3 and	9

Asymptotic stability and conditional stability, Routh – Hurwitz criterion, Root Locus plots and their applications. Compensation Techniques: Concept of compensation, Lag, Lead and Lag-Lead networks, design of closed loop systems using compensation techniques. P, PI, PID controllers.	L4	
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**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. Dr. N.K Jain, 2005, "Automatic Control System Engineering", Dhanpat Rai Publication.
2. J. Nagrath & M. Gopal, 2000, "Control System Engineering", New Age International.

References Books:

1. B. C. Kuo, 2001, "Automatic Control system, Prentice Hall of India.
2. M, K. Ogata, 2002, "Modern Control Engineering, PHI.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance


CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	1	-	2	3	-	-	-	-	-	-	3	-	1	-	2
CO2	1	1	-	3	3	-	-	-	-	-	-	3	-	1	-	3
CO3	1	1	-	3	3	-	-	-	-	-	-	3	-	1	-	3
CO4	1	1	-	2	3	-	-	-	-	-	-	3	-	1	-	2

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BME2512	CONTROL SYSTEM LAB	L	T	P	C
Version 2019.1	Date of Approval: May 21, 2019	0	0	2	1
Pre-requisites/Exposure	MATLAB Basics				
Co-requisites	Nil				

Catalog Description

Control System has become an important field for research and development in science and engineering. This course provides the students the core knowledge of control systems. This course introduces the Practical of control system with time & frequency domain analysis along with stability of control systems on kits and MATLAB.

Course Objectives

The objective of this course is to

Perform experiments of control system.

Time & frequency domain analysis along with stability of control systems on kits and MATLAB

Course Outcomes

On completion of this course, the students will be able to

CO1. Perform and analyse experiments on time domain of control system.

CO2. Perform and analyse experiments on frequency domain of control system.

CO3. Perform and analyse experiments for stability of control system.

Modules	Blooms level*	Number of hours
Lab Session 1 1. Study and draw a) Step response of open Loop system (linear 1 st order, 2 nd order) b) Step response of closed loop systems (1 st order) 2. Study and draw temperature control system the open loop response and closed loop response with different values of gains	L2, L3 and L5	3
Lab Session 2 1. Study of operations and characteristics of a stepper motor 2. To Study a D.C. motor speed control system.	L2, L3 and L5	3
Lab Session 3 1. Performance evaluation and design of PID controller. 2. To design a suitable cascade compensator for the given system and verify the resulting improvement.	L2, L3 and L5	3
Lab Session 4 1. Note: three experiments in MATLAB have to be performed in the slot of MATLAB.	L2, L3 and L5	3

Using MATLAB obtain the unit-step response and unit impulse response of the following system: $\frac{C(s)}{R(s)} = \frac{16}{s^2 + 1.6s + 16}$ 2. For a 2 nd order transfer function using MATLAB a) Bode Plot b) Root locus plot c) Nyquist plot.		
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**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Text Books

- Dr. N.K Jain, 2005, "Automatic Control System Engineering", Dhanpat Rai Publication.
- J. Nagrath & M. Gopal, 2000, "Control System Engineering", New Age International.
- Rudra Pratap, "Getting started with MATLAB", Oxford University Press.

References Books:

- B. C. Kuo, 2001, "Automatic Control system, Prentice Hall of India.
- M, K. Ogata, 2002, "Modern Control Engineering, PHI.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	2	-	3	2	--	--	--	--	--	--	2	-	1	-	3
CO2	1	2	-	3	2	--	--	--	--	--	--	2	-	1	-	3
CO3	1	2	-	3	2	--	--	--	--	--	--	2	-	1	-	3

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BME2507	DIGITAL CIRCUITS & SYSTEMS	L	T	P	C
Version 2019.1	Date of Approval: May 21, 2019	3	0	0	3
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

This course explores the theory and operation of the basic building blocks of digital electronics which includes combinational and sequential circuits. This course also explains the logic families and data convertors. The concepts learnt in the studies of sequential circuits will be applied in the design and analysis of Melay and Moore machines.

Course Objectives

The objective of this course is to

1. Provide the basic knowledge of digital logic levels and application of combinational and sequential circuits.
2. Equip with the understanding of logic family and data convertors.

Course Outcomes

On completion of this course, the students will be able to

CO1: Explain the various logic gates, Boolean algebra and solve the k-map & tabulation method to simplify the logical function.

CO2: Explain the adder & subtractor; Apply and analyze multiplexer, decoder & encoder to design Boolean function.

CO3: Describe flip flops, shift registers & Design counters and synchronous sequential circuits.

CO4: Explain & compare different logic families and explain data convertors.

Modules	Blooms level*	Number of hours
MODULE 1: BOOLEAN FUNCTIONS Analog & digital signals, AND, OR, NOT, NAND, NOR , XOR & XNOR gates, Boolean algebra, DeMorgan's theorems, Implementation of logical function using only NAND/NOR gates, 1's complement and 2's complement, BCD to Gray and Gray to BCD code conversion, Standard representation of logical functions (SOP and POS forms), K-map representation and simplification of logical function up to five variables, don't care conditions, XOR & XNOR simplifications of K-maps, Tabulation method.	L1,L2 and L3	6
MODULE 2: COMBINATIONAL CIRCUITS Adders, Subtractors, Implementation of full adder using half adder, full subtractor using half subtractor, Multiplexer, de-multiplexer, decoder & encoder, code converters, 1 & 2 bit comparators, BCD to seven segment decoder/encoder, Implementation of logic functions using multiplexer/de-multiplexer and decoder, Implementation of 16×1 MUX using 4×1 MUX, 4×16 decoder using 3×8 decoder etc., logic implementations using PROM, PLA & PAL.	L1, L2,L3 and L4	6
MODULE 3: SEQUENTIAL CIRCUITS	L2,L3, L4 and L5	7

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Difference between combinational and sequential circuits, Latch, Flip-flops: SR, JK, D & T flip flops – Truth table, Excitation table, Conversion of flip-flops, set up and hold time, race around condition, Master Slave flip flop, Shift registers: SIPO, PISO, PIPO, SIPO, Bi-directional, 4-bit universal shift register; Counters: Asynchronous/ripple & synchronous counters – up/down, Ring counter, sequence detector.		
MODULE 4: LOGIC FAMILIES&DATA CONVERTERS Logic families: Special characteristics (Fan out, Power dissipation, propagation delay, noise margin), working of RTL, DTL, TTL, ECL and CMOS families; Data converters: Special characteristics, ADC – successive approximation, linear ramp, dual slope; DAC – Binary Weighted, R-2R ladder type.	L1, L2,L3 and L4	5

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

- Anand Kumar, “Fundamentals of Digital Circuits”, 2nd Edition, Prentice-Hall, 2004
- o Moris Mano, “Digital Design”, 2nd Edition, Pearson Education,2007.
- o R.P. Jain, “Modern Digital Electronics”, 2nd Edition, Tata Mcgraw Hill, 2003

Reference Books

1. Thomas L. Floyd, “Digital Fundamentals”, 11th Edition, Pearson Education, 2015
2. Malvino and Leech, “Digital Principles & Applications”, 1st Edition, Tata McGraw Hill, 1993

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS O 1	PS O 2	PS O 3	PSO 4
CO 1	1	2	3	--	--	--	--	--	--	--	--	--	1	--	--	--
CO 2	1	2	3	--	--	--	--	--	--	--	--	2	1	--	--	3
CO 3	1	2	1	--	--	--	--	--	--	--	--	2	1	--	--	3
CO 4	2	3	3	--	--	--	--	--	--	--	--	--	1	--	--	3

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BME2509	DIGITAL CIRCUITS AND SYSTEMS LAB	L	T	P	C
Version 2019.1	Date of Approval: May 21, 2019	0	0	2	1
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

In this Lab course the combination and sequential circuits are designed and their functionality is verified using truth table. Concepts covered would enable them to create complex circuits related to digital design. The objective of this course is to explore and implement the various features of digital logic using basic logic gates.

Course Objectives

The objective of this course is to

1. Provide a basic knowledge of digital logic levels and application of knowledge to understand digital electronics circuits.
2. Equip with understanding of different combinational and sequential circuits.

Course Outcomes

On completion of this course, the students will be able to

CO 1: Demonstrate the basic concept of logic gates;

CO 2: Illustrate the adder and subtractors.

CO 3: Demonstrate the code convertors.

CO 4: Demonstrate the combinational and sequential circuits.

Modules/Topics Covered**	Blooms level*	Number of hours
1. To verify the truth tables of NOT, OR, AND, NOR, NAND, XOR, XNOR gates.	L3, L5	2
2. To obtain half adder, full adder using gates and verify their truth tables.	L3, L5	2
3. To obtain half subtractor, full subtractor using gates and verify their truth tables.	L3, L5	2
4. To implement control circuit using multiplexer.	L3, L5	2
5. To convert BCD code into excess 3 code and verify the truth table.	L3, L5	2
6. To verify the truth tables of RS, D, JK and T flip- flops.	L3, L5	2
7. To implement and verify 3-bit bi-directional shift register.	L3, L5	2
8. To design and study asynchronous/ripple counter.	L3, L5	2
9. To design and study synchronous counter.	L3, L5	2
10. To design and study a sequence detector.	L3, L5	2

*Bloom's Level:

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

- Anand Kumar, "Fundamentals of Digital Circuits", 2nd Edition, Prentice-Hall, 2004
- Moris Mano, "Digital Design", 2nd Edition, Pearson Education, 2007.
- R.P. Jain, "Modern Digital Electronics", 2nd Edition, Tata Mcgraw Hill, 2003

Reference Books

- Thomas L. Floyd, "Digital Fundamentals", 11th Edition, Pearson Education, 2015
- Malvino and Leech, "Digital Principles & Applications", 1st Edition, Tata McGraw Hill, 1993

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Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

IA					EE
Components	A	PR	LR	V	70
Weightage (%)	5	10	10	5	

Note: IA –Internal Assessment, A – Attendance, PR – Performance, LR – Lab Record, V – Viva, EE- External Exam

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	3	1	--	--	--	--	--	--	--	--	--	--	1	--	--	3
CO2	3	1	--	--	--	--	--	--	--	--	--	--	1	--	--	3
CO3	3	1	--	--	--	--	--	--	--	--	--	--	1	--	--	3
CO4	2	1	--	--	--	--	--	--	--	--	--	--	1	--	--	3

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BME2517	DATA STRUCTURES WITH C ++	L	T	P	C
Version:2017.1	Date of Approval: 2020	3	1	2	5
Pre-requisites/Exposure	Basic Knowledge of C++ Programming				
Co-requisites	Nil				

Catalog Description

This course covers the design, analysis, and implementation of data structures and algorithms to solve engineering problems using C++ programming language. Topics include elementary data structures, (including arrays, stacks, queues, and lists), advanced data structures (including trees and graphs), the algorithms used to manipulate these structures, and their application to solving practical engineering problems. At the end of this course student will gain knowledge about different kinds of file structures and their related operations.

Course Objectives

The objective of this course is to

1. Equip the students with knowledge of algorithms, different types of data structures and analysis of space and time complexity.
2. Provide an overview of various algorithms of data structures like stack and queues and related operations and implementation.
3. Provide an overview of dynamic Data Structure like linked list and its related operations, algorithms and programs. Demonstrate practical use of dynamic data structure to solve engineering problems.
4. Equip the students with knowledge of algorithms and operations related to tree and graph data structures and their practical applications.
5. Provide an overview of Sorting, Searching and file structures and its related algorithms and techniques.

Course Outcomes

On completion of this course, the students will be able to

- CO 1: Identify operations on array, multidimensional, string and their implementation and analyze space and time complexity of algorithms.
- CO 2: Explain various algorithms and operations of data structures like stack and queues and analyze complexity of each operation.
- CO 3: Explain dynamic data structures and various algorithms and operations of data structures like linked list and their applications in computer science.
- CO 4: Illustrate the algorithms and operations related to tree and graph data structures, their practical applications and analyze complexity of algorithm associated with each operations.
- CO5: Explain Sorting, Searching and file organization and its related techniques.

Modules	Blooms level*	Number of hours
Module I: Introduction to Data structures Data structures: Definition, Types. Algorithm design, Complexity, Time-Space Tradeoffs. Use of pointers in data structures. Array Definition and Analysis, Representation of Linear Arrays in Memory, Traversing of Linear Arrays, Insertion and Deletion, Single Dimensional Arrays, Two Dimensional Arrays, Multidimensional Arrays, Function Associated with Arrays, Character String in C++, Character String Operations, Arrays as parameters, Implementing One Dimensional Array, Sparse matrix.	L1, L2	7
Module II: Introduction to Stacks and queue Stack: Definition, Array representation of stacks, Operations Associated with	L1, L2, L3, L4	8

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Stacks- Push & Pop, Polish expressions, Conversion of infix to postfix, infix to prefix (and vice versa), Application of stacks recursion, polish expression and their compilation, conversion of infix expression to prefix and postfix expression, Tower of Hanoi problem. Queue: Definition, Representation of Queues, Operations of queues- QInsert, QDelete, Priority Queues, Circular Queue, Deque.		
Module III: Dynamic Data Structure Linked list: Introduction to Singly linked lists: Representation of linked lists in memory, Traversing, Searching, Insertion into, Deletion from linked list, doubly linked list, circular linked list, generalized list. Applications of Linked List-Polynomial representation using linked list and basic operation. Stack and queue implementation using linked list.	L1, L3 and L4	7
Module IV: Trees and Graphs Trees: Basic Terminology, Binary Trees and their representation, expression evaluation, Complete Binary trees, extended binary trees, Traversing binary trees, Searching, Insertion and Deletion in binary search trees, General trees, AVL trees, Threaded trees, B trees. Graphs: Terminology and Representations, Graphs & Multigraphs, Directed Graphs, Sequential representation of graphs, Adjacency matrices, Transversal Connected Component and Spanning trees.	L1, L3 and L5	7
Module V: Sorting and Searching and file structures Sorting: Insertion Sort, Bubble sort, Selection sort, Quick sort, two-way Merge sort, Heap sort, Partition exchange sort, Shell sort, Sorting on different keys, External sorting. Searching: Linear search, Binary search File structures: Physical storage media, File Organization, Linked organization of file, Inverted file, Organization records into blocks, Sequential blocks, Hash function, Indexing & Hashing, Multilevel indexing, Tree Index, Random file, Primary Indices, Secondary Indices, B tree index files.	L1, L4, L5	7

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

1. D. S. Malik, Data Structure Using C++, 2nd Edition, Course Technology, Cengage Learning, Boston, 2004
2. Data structures and algorithms – Schaum Series.
3. File Structures An object-Oriented Approach with C++ by Michael J. Folk, Bill Zoellick, Breg Riccardi, Published by Addison Wesley (1st ISE Reprint, 1999).

Reference Books

1. J. P. Tremblay and P. G. Sorenson, Introduction to Data Structures with Applications, McGraw – Hill
2. Algorithms by Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Published by Prentice-Hall
3. India (1999).
4. Data Structures Using C and C++ second edition by Yeddiyah Langsam, Moshe J. Augenstein, Aaron M. Tenenbaum, Published by Prentice-Hall India
5. Data Structures and Algorithm analysis in C++ by Mark Allen Weiss, Published by Addison Wesley (3rd Indian Reprint 2000).
6. Data Structures – R. S. Salaria

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

CO, PO and PSO mapping

1: strongly related, 2: moderately related and 3: weakly related

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	2	1	--	--	--	--	--	--	--	--	--	2	--	--	-
CO2	1	2	2	--	--	--	--	--	--	--	--	--	2	2	1	-
CO3	1	2	2	1	--	--	--	--	--	--	--	--	2	2	1	-
CO4	1	2	2	1	--	--	--	--	--	--	--	--	2	2	1	
CO5	1	2	2	1	--	--	--	--	--	--	--	--	2	2	2	



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BME2518	DATA STRUCTURES WITH C++ LAB	L	T	P	C
2017.1	Date of Approval: 2020	0	0	2	1
Pre-requisites/Exposure	Basic Knowledge of C++ Programming				
Co-requisites	Nil				

Catalog Description

This course covers the design, analysis, and implementation of data structures and algorithms to solve engineering problems using C++ programming language. Topics include elementary data structures, (including arrays, stacks, queues, and lists), advanced data structures (including trees and graphs), the algorithms used to manipulate these structures, and their application to solving practical engineering problems. At the end of this course student will gain knowledge about different kinds of file structures and their related operations.

Course Objectives

The objective of this course is to

1. Equip the students with knowledge of algorithms, different types of data structures and analysis of space and time complexity.
2. Provide an overview of various algorithms of data structures like stack and queues and related operations and implementation.
3. Provide an overview of dynamic Data Structure like linked list and its related operations, algorithms and programs. Demonstrate practical use of dynamic data structure to solve engineering problems.
4. Equip the students with knowledge of algorithms and operations related to tree and graph data structures and their practical applications.
5. Provide an overview of Sorting, Searching and file structures and its related algorithms and techniques.

Course Outcomes

On completion of this course, the students will be able to

CO 1: Identify operations and their implementation on array and multidimensional, string and estimation space and time complexity.

CO 2: Explain various algorithm and operations of data structures like stack and queues and analyze complexity of each operation.

CO 3: Explain dynamic data structures and various algorithms and operations of data structures like linked list and their applications in computer science.

CO 4: Illustrate the algorithms and operations related to tree and graph data structures, their practical applications and analyze complexity of algorithm associated with each operations.

CO5: Explain Sorting, Searching and file organization and its related techniques.

Modules	Blooms level*	Number of hours
Module I: Introduction to Data structures <ol style="list-style-type: none"> 1. Write a program to copy one string into another without using library functions. 2. Write a program to demonstrate array and linked list implementation of sparse matrix. 3. Write a program to multiply two 2D matrix. 	L3,L5	2
Module II: Introduction to Stacks and queue <ol style="list-style-type: none"> 1. Write a program to implement push and pop operations on the stack. 	L3,L5	4

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<ol style="list-style-type: none"> Write a program to demonstrate conversion of infix to postfix. Write a program to implement simple queue and perform insertion and deletion operation on it. Write a program to implement circular queue and perform insertion and deletion operation on it. Write a program to implement dqueue and perform insertion and deletion operations on it. Write a program to implement priority queue and perform insertion and deletion operation on it. 		
Module III: Dynamic Data Structure <ol style="list-style-type: none"> Write a program to implement singly linked list and perform following operations on it. <ul style="list-style-type: none"> Insertion at end Insertion at last Insertion at desired place. Write a program to implement singly linked list and perform following operations on it. <ul style="list-style-type: none"> Deletion at end Deletion at last Deletion at desired place. Write a program to implement doubly linked list and perform following operations on it. <ul style="list-style-type: none"> Insertion at end Insertion at last Insertion at desired place. Write a program to implement singly linked list and perform addition of two polynomials. 	L3,L5	4
Module IV: Trees and Graphs <ol style="list-style-type: none"> Write a program to calculate in order, preorder and post order traversal on binary tree. Write a program to construct binary search tree and perform following operations on it. <ul style="list-style-type: none"> Deletion of element Insertion of elements. Write a program to construct binary search tree and search an element in it. Write a program to implement kruskal's algorithm to find out minimum spanning tree. 	L3,L5	6
Module V: Sorting and Searching and file structures <ol style="list-style-type: none"> Write program to implement insertion sort. Write a program to search an element in array using binary search. Write a program to implement merge sort. Write a program to implement quick sort. Write a program to implement heap sort. 	L3,L5	8

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

- D. S. Malik, Data Structure Using C++, 2nd Edition, Course Technology, Cengage Learning, Boston, 2004
- Data structures and algorithms – Schaum Series.

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- File Structures An object-Oriented Approach with C++ by Michael J. Folk, Bill Zoellick, Breg Riccardi, Published by Addison Wesley (1st ISE Reprint,1999).

Reference Books

- J. P. Tremblay and P. G. Sorenson, Introduction to Data Structures with Applications, McGraw – Hill.
- Algorithms by Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Published by Prentice-Hall India(1999).
- Data Structures Using C and C++ second edition by Yeddidiyah Langsam, Moshe J. Augenstein, Aaron M. Tenenbaum, Published by Prentice-Hall India
- Data Structures and Algorithm analysis in C++ by Mark Allen Weiss, Published by Addison Wesley (3rd Indian Reprint 2000).
- Data Structures – R. S. Salaria

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

CO, PO and PSO mapping

1: strongly related, 2: moderately related and 3: weakly related

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	2	1	--	--	--	--	--	--	--	--	--	2	--	--	-
CO2	1	2	2	--	--	--	--	--	--	--	--	--	2	2	1	-
CO3	1	2	2	1	--	--	--	--	--	--	--	--	2	2	1	-
CO4	1	2	2	1	--	--	--	--	--	--	--	--	2	2	1	-
CO5	1	2	2	1	--	--	--	--	--	--	--	--	2	2	2	-

BME2519	FUZZY LOGIC & GENETIC ALGORITHM	L	T	P	C
Version 2019.1	Date of Approval: May 21, 2019	3	0	0	3
Pre-requisites/Exposure	Basic Computer Concepts				
Co-requisites	Nil				

Catalog Description

In this course the concepts of fuzzy logic and genetic algorithm are discussed in detail. This course will provide an understanding of fuzzy logic and genetic algorithm and an outlook on the applications of these techniques to solve real world problems. It also provides an understanding of fuzzy-genetic based machine learning.

Course Objectives

The objective of this course is to

1. Provide the student with the basic understanding of genetic algorithm and fuzzy logic fundamentals, program and design the related systems.
2. Equip the students with concepts of fuzzy logic based solutions.
3. Provide an overview of performance of genetic algorithm, simulated annealing and tabu search.

Course Outcomes

On completion of this course, the students will be able to

CO1: Develop the skills to gain a basic understanding of genetic algorithm and fuzzy logic theory.

CO2: Appreciate the learning and adaptation capability of neural and fuzzy systems.

CO3: Apply various operators to optimize. Perform mathematical calculation of the GA

CO4: Able to identify the present application areas of fuzzy logic and GA

CO5: Explain the working principle and compare the performance with other methods –Simulated annealing and Tabu search.

Modules	Blooms level*	Number of hours
MODULE 1: Crisp sets: Overview, Fuzzy sets : Basic types and concepts, Characteristics and significance of paradigm shift, Fuzzy sets vs Crisp sets, Representation of fuzzy sets	L1, L2 and L3	8
MODULE 2: Types of operations, Fuzzy complements, Fuzzy intersection: t-norms, Fuzzy union: t-conorms, Combination of operations, Aggregation operation, Fuzzy numbers , Linguistic variables, Arithmetic operations on intervals, Arithmetic operations on Fuzzy numbers, Lattice of Fuzzy numbers, Fuzzy equation.	L2, L3 and L6	10
MODULE 3: General discussion, Fuzzy controller: Overview and example, Fuzzy systems and neural networks, Fuzzy neural network, Fuzzy automata. Pattern recognition in fuzzy logic, Database and information retrieval in fuzzy logic, decision making in fuzzy logic, engineering applications and fuzzy logic, Fuzzy logic in Medicine and Economics	L1, L3 and L4	10
MODULE 4: Fundamentals of genetic algorithm: A brief history of evolutionary computation, biological terminology, search space encoding, reproduction elements of genetic algorithm genetic modelling, comparison of GA and	L1, L3 and L4	10

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traditional search methods. The Fundamental Theorem, Schema Processing at work, Two-armed and k-armed Bandit problem, The Building block hypothesis.		
MODULE 5: Genetic technology:- steady state algorithm, fitness scaling, inversion. Genetic programming:- Genetic Algorithm in problem solving, Implementing a Genetic Algorithm:- computer implementation, operator (reproduction, crossover and Mutation, Fitness Scaling, Coding, Discretization). Knowledge based techniques in Genetic Algorithm. Advanced operators and techniques in genetic search:-Dominance, Diploidy and Abeyance. Inversion and other reordering operators, Niche and speciation.	L3, L4 and L6	10
MODULE 5: Genetic Algorithm in engineering and optimization-natural evolution – Simulated annealing and Tabu search -Genetic Algorithm in scientific models and theoretical foundations. Applications of Genetic based machine learning- Genetic Algorithm and parallel processors- composite laminates- constraint optimization- multilevel optimization- real life problem.	L3,L4,L6	05

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. Fuzzy Logic with Engineering Applications, 3rd Ed., T. J. Ross, Wiley India Pvt. Ltd., India, 2011.
2. Fuzzy Logic Intelligence Control & Information, John Yen and Reza Langari, Pearson Education Limited, India, 2007.
3. David E.Goldberg, "Genetic Algorithms in search , Optimization & Machine Learning"
4. Melanie Mitchell- 'An introduction to Genetic Algorithm' - Prentice-Hall of India

Reference Books

1. Understanding Neural Networks and Fuzzy Logic, S. V. Kartalopoulos, IEEE Press and Prentice Hall India, India, 2000.
2. Neuro-Fuzzy and Soft Computing – A Computational Approach to Learning and Machine Intelligence, Prentice Hall India, India, 2009.
3. William B. Langdon, Riccardo Poli, "Foundations of Genetic Programming"
4. P. J. Fleming, A. M. S. Zalzal "Genetic Algorithms in Engineering Systems "
5. David A. Coley, "An Introduction to Genetic Algorithms for Scientists and Engineers "

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	2	--	--	--	--	--	--	--	--	--	1	3	--	-
CO2	1	--	2	3	--	--	--	--	--	--	--	1	2	--	-
CO3	1	2	3	3	3	--	--	--	--	--	--	--	1	2	-
CO4	1	1	2	--	--	--2	--	--	--	--	--	--	1	1	2
CO5	1	1	2	--	-2-	--	--	--	--	--	--	--	-	2	1

1: strongly related, 2: moderately related and 3: weakly related

BME2601	MICROCONTROLLER AND ITS BIOMEDICAL APPLICATIONS	L	T	P	C
Version 2017.1	Date of Approval: July 2017	3	1	0	4
Pre-requisites/Exposure	Digital Electronics, Microprocessor				
Co-requisites	Nil				

Catalog Description

In this course the 8051 microcontroller is discussed in detail. Assembly language programming concepts are introduced to program 8051 as a timer and to provide serial communication. Further, the use of microcontroller in biomedical engineering has been described. The concepts learnt in the assembly language programming has been applied in the studies and interfacing of ADC, DAC and 8255. The overall educational objective is to provide hands-on experiences of how an embedded system could be used to solve biomedical application based problems.

Course Objectives

The objective of this course is to

- Provide the knowledge of 8051 microcontroller and with a basic understanding of instruction sets & assembly language programming.
- Inculcate a working knowledge of the necessary steps and methods used to interface a microcontroller system to devices such as DAC, sensors, ADC etc.
- Provide the general knowledge of the microcontroller architecture in biomedical applications.

Course Outcomes

On completion of this course, the students will be able to

- CO1: List the main features of 8051 microcontroller; Distinguish between microprocessor and microcontroller; Describe the block and pin diagram of 8051.
- CO2: Explain the various addressing modes of 8051; Describe the instruction set; Apply the branching instruction to generate delay.
- CO3: Describe the timer modes; Apply timers to generate square wave; Calculation of delay; Explain the concept of interrupt and apply concept of interrupt in serial interface.
- CO4: Explain the memory interfacing; Demonstrate a working knowledge of the necessary steps and methods used to interface a microcontroller system to devices such as DAC, LCD, ADC and 8255.
- CO5: List the use of microcontroller in biomedical application; Explain the use of computer in biomedical engineering; apply the general knowledge of microcontroller in biomedical applications

Modules	Blooms level*	Number of hours
MODULE 1: INTRODUCTION 8051, Comparison with microprocessor, pin diagram explanation, internal diagram 8051.	L1 and L2	10
MODULE 2: INSTRUCTION SET Addressing mode, data transfer instruction, logical, arithmetic instruction, bit instruction, branching instruction.	L1, L2 and L3	10

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MODULE 3: TIMERS AND INTERRUPTS Mode of timers, simple programming, generation of square wave. 8051 connection to RS 232, Interrupt priority in 8051, generation of waveforms using interrupt, serial interface using interrupt	L1, L2, L3 and L4	10
MODULE 4: INTERFACING Interfacing of memory, intelligent LCD, 8255, ADC, DAC, LED display.	L2 and L3	10
MODULE 5: APPLICATIONS Introduction to DSP processor, Applications of microcontrollers and computers in biomedical engineering, microcontrollers in embedded biomedical applications.	L1, L2 and L3	8

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Text Books

- M.A. Mazidi and J. G. Mazidi, "The 8051 Microcontroller and Embedded Systems", 2nd Edition, Prentice-Hall, 2004
- Raj Kamal, "Embedded Systems", 1st Edition, Tata McGraw-Hill, 2004
- Peter Atkins James W. Stewart and Kai X. Miao, "The 8051 microcontroller", 2nd Edition, Pearson Education, 2008

Reference Books

- David E. Simon, "An Embedded Software Primer", 1st Edition, Pearson Education, 1999
- K.J. Ayala, "The 8051 Microcontroller", 2nd Edition, Penram International, 1999
- Rajiv Kapadia, "8051 Microcontroller & Embedded Systems", 1st Edition, Jaico Press, 2004

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS O 1	PS O 2	PS O 3	PS O 4
CO 1	1	3	--	--	--	--	--	--	--	--	--	--	--	--	1	--
CO 2	1	2	1	--	--	--	--	--	--	--	--	--	--	--	1	--
CO 3	1	2	1	3	--	--	--	--	--	--	--	--	--	--	1	3
CO 4	2	2	1	2	--	--	--	--	--	--	--	--	--	--	1	3
CO 5	--	2	1	2	--	--	--	--	--	--	--	--	--	--	1	--

1: strongly related, 2: moderately related and 3: weakly related

BME2651	BIOMECHANICS	L	T	P	C
Version 1.1	Date of Approval: 16, May 2019	3	0	0	3
Pre-requisites/Exposure	Medical Imaging Techniques, Medical Image Processing				
Co-requisites	Engineering Mathematics, General Science				

Catalogue Description

This course is intended for engineering students to make them understand the various components of biomechanics which deals with the application of mechanics to biology. Mechanics is a branch of applied mathematics that deals with movement and tendency to movement.. it entails the study of the action of external and internal forces on the living body, especially on the skeletal system. A biomechanist is often interested in the physiology underlying movement (muscle physiology, nervous control, for example) and also the biological role of the movement) and ergonomics that is the analysis of a human performing for a given task and the design of appropriate tools. One part of this analysis is to understand the mechanics of the person and any interactions with surroundings.

Course Objectives

The objective of this course is to

1. Equip the students with concepts of the basics of bone movement , gait analysis and mechanics of bone and muscles
2. To provide the overview of Structure and composition of bone , microstructure of bone, muscle. Joint motions and various forces implied, basic mechanical models , injuries and factors affecting biomechanical properties of human body

Course Outcomes

On completion of this course, the students will be able to

CO1: Explain the human body joints, axes of planes and motions, degree of freedom and related matrix calculations.

CO2: Derive equations and solve problems related to Inverse Dynamics to calculate resultant force and momentum

CO3: Analyze gait cycle, angular kinematics of hip, knee and ankle

CO4: Describe microstructure of bone, skeletal muscle, mechanism of muscle, viscoelasticity and other related issues

Modules	Blooms level*	Number of hours
Module I: Joint motion: relative position of two bones meeting at a joint , description of a rigid body , degrees of freedom , euler angles , rotation matrices, rotation angle anatomical directions , anatomical planes ,	L-1, L-2, L-3	12
Module II : Inverse Dynamics to calculate resultant force and momentum within the body link segment models , intersegmental force and moment ,	L-1, L-2, L-3	12
Module III : Human Gait analysis , gait cycle , angular kinematics of hip , knee and ankle , force plates and ground reaction force , gait abnormalities .	L-1, L-2, L-3	12

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Module IV : Structure and composition of bone , microstructure of bone , skeletal muscle , mechanism of muscle contraction , force length and force velocity relationships , basic muscle models , tendons and ligaments , their basic mechanical models , injuries and factors affecting biomechanical properties , Cartilage , viscoelasticity and viscoelastic models .	L-1, L-2, L-3	12
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**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

Text Books

- M Nordin and VH Frankel; Lea& Febiger, Basic biomechanics of the musculoskeletal system, London 1989)
- BM Nigg, W Herzog, Biomechanics of the musculo-skeletal system, John Wiley & Sons, Chichester 1994)
- DA Winter; Biomechanics and motor control of human movement John Wiley & Sons, Chichester, 1990

References Books

- Christine Gunn, Bones and Joints: A Guide for Students.. Churchill Livingstone, Edinburgh 1996
- G.J. Tortora, Principles of Human Anatomy. Harper & Row, New York, 1983
- R.S. Snell. Clinical Anatomy for Medical Students., Little, Brown, and Company, Boston 1995.
- J.D. Currey, Bones: Structure and Mechanics. Princeton University Press, 2002.
- RS Snell. Little, Brown and Co., Clinical Anatomy for Medical Students. Boston 1995
- TA McMahon, Muscles, Reflexes, and Locomotion.. Princeton University Press, 1984
- Hazelman, B., Riley, G. and Speed, C. (eds.) Soft tissue rheumatology. Oxford University Press, 2004
- Margareta Nordin, Victor Hirsch, Basic biomechanics of the musculoskeletal system, Lippincott Williams & Wilkins, 2001

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PS 4
CO1	1	1	--	--	3	-3-	--	--	--	3	--	--		3	1	
CO2	1	1	2	3	--	-3	--	--	--	--	--	--		3	1	
CO3	1	2	3	3	3	--	--	--	--	--	--	--		3	1	
CO4	1	1	2	--	--	--	--	--	--	--	--	--		3	1	

1: strongly related, 2: moderately related and 3: weakly related

BME2609	CLINICAL NEED ASSESSMENT AND MINI PROJECT	L	T	P	C
Version 1.1	Date of Approval:2020	2	0	0	2
Pre-requisites/Exposure	Anatomy & Physiology, Biomedical Instrumentation				
Co-requisites	General Science				

Catalog Description

This course helps the students to understand various requirements of hospital and healthcare systems including all stakeholders of hospital system. Various department of hospital get exposed by student to understand needs and its drive students to find solutions for them. The content of the course will also give opportunities to interact with end user of medical equipment to find out their concern and what difficulties they face. The course also familiar students with working culture of hospital including safety standards, ethical and legal considerations as well as professionalism.

Students will learn techniques for improving the flexibility and originality of their thinking and will explore approaches used by managers and organizations to create and sustain high levels of innovation. Topics include: personal thinking preferences, everyday creativity and eliminating mental blocks, creative thinking techniques, idea selection approaches, teaming techniques for creativity, conditions that promote creativity, design for interaction, disruptive technologies, and intellectual property. The course uses fun and hands-on activities to stimulate innovation.

Course Objectives

The objective of this course is to

- To provide an overview of hospital equipment and requirements.
- To serve as a foundation for innovation in healthcare by understanding the difficulties of hospital system.

Course Outcomes

On completion of this course, the students will be able to

CO37. Identify and explain the requirements and difficulties of hospital system.

CO38. Provide the innovative solution for healthcare system with understanding of present need.

CO39. Demonstrate the capability of critical thinking, brainstorming, presentation and team building process.

Course Content

Modules	Blooms level*	Number of hours
MODULE I: Introduction to Innovation Introduction Making a case for creativity, Creative thinking as a skill, Valuing diversity in thinking, Thinking preferences, Creativity styles, Recognizing and avoiding mental blocks, Avoiding mindsets, Risk taking, Paradigm shift and paradigm paralysis, Individual and teamwork	L2, L3 and L4	4
MODULE II: Creativity and Problem Solving Creativity in problem solving, Problem Definition, Understanding, Representing, Pattern Breaking, Thinking differently, Changing your point of view, Watching for paradigm shift, Challenging conventional wisdom, Lateral thinking, provocation (escape, random word), Mind stimulation: games, brain-twisters and puzzles	L2, L3 and L4	4
MODULE III: Ideation and Solution Decision and Evaluation, Focused thinking framework, Six thinking hats,	L2, L3 and L4	4

PMI, Ethical considerations, Design for Interaction, Introduction to design for interaction,		
MODULE III: Project and Peer Review Each student must spend 3 hours per week or 6 hours every two weeks observing and shadowing a doctor in a hospital environment. The visits will be organized by ASET. Students will be exposed to practical implementation of biomedical engineering. Students will be required to identify some key clinical needs in the hospitals and come up with a biomedical engineering solution for the same. Students will have to present their findings and solutions in the form of a presentation at the end of the term	L2, L3 and L4	12

Reference Books

- Khandpur R.S, Handbook of Biomedical Instrumentation, Tata McGraw-Hill, 2008
- Webb, S., The Physics of Medical Imaging, Adern Hilger, Bristol & Philadelphia. 2013
- Hay.B.A. Edtd., Medical Images, Formation, Perception and Measurement, John Wiley, 2008
- Rabiner and Gold, Digital Signal Processing,
- A.C. KAK, Principles of Computed Tomography, IEEE Press, New York
- H. S. Fogler and S.E. LeBlanc, *Strategies for Creative Problem Solving*, Prentice Hall, 1995.
- E. Sickafus, Unified Structured Inventive Thinking, Ntelleck, 1997.
- E. Lumsdaine and M. Lumsdaine, Creative Problem Solving, McGraw Hill, 1995.
- Kaplan, Introduction to TRIZ, Ideation International, Inc., 1995.
- G. Altschuller, Creativity as an Exact Science, 1983.
- The Art of Inventing (And Suddenly The Inventor Appeared).
- 40 Principles, Keys to Technical Innovation, Technical Innovation Center, 1997.
- E. de Bono, The Use of Lateral Thinking, Penguin Books, 1990.
- De Bono's Thinking Course, Facts on File, 1981.
- Serious Creativity, Harper Collins, 1992.
- Six Thinking Hats, Little, Brown & Co., 1985.
- CoRT Thinking, Advanced Practical Thinking Training, Inc., 1995.
- Tony Buzon, Use Both Sides of Your Brain, Dutton, 1983.
- Scott G. Isaksen, Brian Dorval, and Donald Treffinger, Creative Approaches to Problem Solving, Kendall Hunt, 1994.
- F. Osborn, Applied Imagination: Principles and Procedures of Creative Problem Solving, Charles Scribner's Sons, 1979.
- D. Tanner, Total Creativity in Business and Industry, Advanced Practical ♦ Thinking Training, 1997.
- D. Pressman, Patent It Yourself, NOLO Press, 2006.
- T. Kelley. The Art of Innovation. Doubleday, 2001.
- T. Kelley. The Ten Faces of Innovation. Doubleday, 2005.
- J. Goldenberg and D. Mazursky, Creativity in product innovation. Cambridge University Press, 2002.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	F	R	P
Weightage (%)	20	40	40

F: Feedback from hospital, R: Report, P: Presentation

CO-PO-PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO 3	PSO 4
CO 1					3						2	1		2	2	1
CO 2					3						2	1		2	2	1
CO 3					3						2	1		2	2	1

1: strongly related, 2: moderately related and 3: weakly related



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BME2610	MEDICAL IMAGING AND RECONSTRUCTION ALGORITHM LAB	L	T	P	C
Version 1.1	Date of Approval: 16 May 2019	0	0	2	1
Pre-requisites/Exposure	Matlab, Engineering Mathematics, Medical Image Processing				
Co-requisites					

Pre –Requisite: MatLab Programming

Catalog Description

Fundamentals and applications of medical image reconstruction and processing. Reconstruction from non-uniformly sampled data, projection data, regularly/randomly undersampled data. Parallel imaging and compressed sensing for medical imaging. Improving image quality, denoising, deconvolution, off-resonance correction. Post-processing of images, image registration, image segmentation. Examples from magnetic resonance imaging (MRI), X-ray computed tomography (CT), and magnetic particle imaging (MPI)..

The objective of this course is to

- To provide hands-on practice with Image Reconstruction Algorithm specific with Ct and MRI.
- To serve as a foundation for to develop an advanced medical image reconstruction or processing technique.

Course Outcomes

On completion of this course, the students will be able to

CO7. Develop various reconstruction algorithm for CT-Scan raw images.

CO8. Develop various restructuring algorithm for quantitative data extraction from MRI images.

CO9. Develop Neural Network program for reconstruction of images.

CO10. Develop 3D rendering algorithm for medical image stack.

List of Experiments	Blooms level*	Number of hours
• Write program of basic Fourier transformation.	L1, L2 and L3	2
• Write a program for Radon Transformation to reconstruct images.	L1, L2 and L3	2
• To write Function for 3D rendering of stack of imaging • To writes function to compute T2 Mapping.	L1, L2 and L3	2
1. To writes function to compute T1 Mapping.	L1, L2 and L3	2
2. To writes function to compute T1-Values.	L1, L2 and L3	2
3. To writes function to compute T2-Values.	L1, L2 and L3	2
4. To writes function to compute PD weighted-Values.	L1, L2 and L3	2
5. To write and execute program for Neural style Learning (Using Deep Learning Concept)	L1, L2 and L3	2
6. Advance Deep Learning Programming for reconstruct T1 weighted Images from PD-Weighted	L1, L2 and L3	2

Text Books

- John L Semmlow, Biosignal and Biomedical Image Processing: MATLAB based Application, 3rd Edition, 2004, Marcel Dekker, Inc.
- Gengsheng Lawrence Zeng, Medical Image reconstruction, Springer 2009

Reference Books

1. <https://humanhealth.iaea.org/HHW/MedicalPhysics/NuclearMedicine/ImageAnalysis/3Dimagereconstruction/index.html>
2. Zhang, H.M. and Dong, B., 2020. A review on deep learning in medical image reconstruction. Journal of the Operations Research Society of China, pp.1-30
3. William K. Pratt, Digital Image Processing, John Wiley, NJ, 1987.
4. Albert Macovski, *Medical Imaging systems*, Prentice Hall, New Jersey.1983.
5. Sid Ahmed M.A., *Image Processing Theory, Algorithm and Architectures*, McGraw Hill, 1995.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO4
CO1		2	--	--	1	--	--	--	--	--	--	--		2	1	--
CO2		2	--	--	1	--	--	--	--	--	--	--		2	1	--
CO3		2	--	--	1	--	--	--	--	--	--	--		2	1	--
CO4		2	--	--	1	--	--	--	--	--	--	--		2	1	--
CO5		2	--	--	1	--	--	--	--	--	--	--		2	1	--

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BME2607	HOSPITAL MANAGEMENT SYSTEM	L	T	P	C
Version 1.1	Date of Approval: 16 May, 2019	3	0	0	3
Pre-requisites/Exposure	NIL				
Co-requisites					

Catalog Description

This course provides students a basic understanding of the working, regulations and management of a hospital environment.

Course Objectives

The objective of this course is

- To develop the basic awareness of management functions and various dimensions of organizational life.
- To make the students aware of the various functional aspects of management.
- To develop the understanding of the functioning and management of the hospital in general and also aware about the critical issues related to managing a hospital.
- To make the student understand the health environment in India and also the regulatory mechanisms involved in promoting the health programs.

Course Outcomes

On completion of this course, the students will be able to

CO1. Identify the working and management of a hospital environment.

CO2. Identify the role of the manager in healthcare and how organizations and people work within the healthcare system.

CO3. Evaluate and use measurement tools for quality and safety.

CO4. List the various departments in hospital.

Course Content

Modules	Blooms level*	Number of hours
MODULE I: Introduction to Hospital Architecture Classification of hospital & architecture: General hospital, specialized hospital, primary health care –their role and functions. Aspects of hospital services: inpatient, outpatient and emergency, location and environment of hospital, hierarchy of medical and paramedical staff & their functions and responsibilities. Modern Hospital Architecture- space in a hospital building, design of ward, intensive care units, air conditioning, plumbing & sanitation, gas supply, waste disposal, cleaning, dietary, sterilizing, laundry, storage and operation theatre systems, Radiology, Central labs, Blood banks, OPD, Casualty, etc	L1 and L2	14
MODULE II: Hospital Air and Gas Supply Air conditioning & gas supply systems: Air conditioning and refrigeration systems for small and large areas, Air changes, filtering, and sterility, Deodorization, disinfection, dehumidification, cryogenic systems, Centralized supply of air, oxygen, nitrous oxide & vacuum, Principle of production of liquid oxygen. Management lifts fire fighting equipments	L1 and L2	8
MODULE III: Hospital engineering & Management: Definition of biomedical Engineering, clinical engineering & hospital	L1 and L2	7

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engineering. Importance of BME department – servicing and maintenance, testing, acceptance & maintenance protocols, computerized preventive maintenance planning, MROs, Training of men for medical equipments preventive and periodical maintenance procedures. Preparation of estimates, specifications, tender details etc. Importance of ISO 9000 Certificates: Obtaining ISO certificates in hospitals, proposed protocols. Necessity for standardization, FDA, AERB, Joint Commission on Accreditation of hospitals, ICRP and other standard organization, methods to monitor the standards.		
MODULE IV: Hospital Information system: Role of database in HIS, Need of networking in HIS, overview of Networking, topologies and its configuration, structuring medical records to carry out functions like admissions, discharges, treatment history etc. , Computerization in pharmacy & billing, automated clinical laboratory systems & radiology information system. Need for evolving health policy, health organization in state, health financing system, health education, health insurance, health legislation.	L1 and L2	7

*Bloom's Level:

L1: Knowledge; L2: Comprehension; L3: Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

1. P.E. Stanley, Handbook of hospital safety, CRC Press (UNIT II)
2. Arun Kumar, Hospital Management, Anmol Publications Pvt. Ltd., Jan 2000 , 1st.ed (UNITS IV & V)
3. Harold E. Smalley, "Hospital Management Engineering – A guide to the improvement of hospital management system", PHI
4. Sharma, Essentials for Hospital Support Services and Physical Infrastructure, 1/e, Jaypee Medical Publishers 2003
5. Hospital Engineering And Facilities Management 2007 - Report, Fifth official report of the International Federation of Hospital Engineering (IFHE), January 2007

Reference Books

1. Gupta, Kant, Chandrashekhar, Satpathy, Modern Trends in Planning and Designing of Hospitals Principles and Practice with CD-ROM, Jaypee Medical publishers, 1/e, 2007
2. Sakharkar, Principles of Hospital Administration and Planning, Jaypee Medical publishers 1/e, Reprint 2004.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written

Examination Examination Scheme:

Components	A	CT	S/V/ Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance



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CO-PO-PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO 3	PSO 4
CO 1									1	1				2		1
CO 2				2						1				2		1
CO 3			2						1					2		1
CO 4			2							1				2		1
CO 5			2							1				2		1

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BME2611	THREPUETIC AND SURGICAL EQUIPMENT	L	T	P	C
Version 1.1	Date of Approval: 16 May 2019	3	0	0	3
Pre-requisites/Exposure	Bio-instrumentation				
Co-requisites	Engineering Mathematics, General Science				

Catalog Description

Therapeutic medical instruments are widely used in the field of biomedical engineering. The students studying the subject are supposed to learn the therapy for any disease after diagnosing it. The course in addition, will provide knowledge of principle and constructional features of various therapeutic medical equipments. The course will also deal with different advance Therapeutic Technology..

Course Objectives

The objective of this course is to

- To provide an overview of Threpuetic and Surgical Equipments.
- To serve as a foundation for design and develop a new insight in Medical Equipment use in Surgrey.

Course Outcomes

On completion of this course, the students develop capabilities of:

- CO40. *Identify* appropriate design aspects of defibrillator and Pacemaker.
- CO41. *Identify* various electro-Surgical equipment and its application.
- CO42. *Identify* various monitor and control parameters of ventilator and *design* aspects custom built ventilator.
- CO43. *Explain* the principle of Hemodialysis machine and its component.
- CO44. *Explain* and *demonstrate* the principle of physiotherapy machine.

Course Content

Modules	Blooms level*	Number of hours
MODULE I: Pacemaker and Defibrillator Need of Pacemaker, External and Implantable Pacemaker, Various type of pacemaker as per clinical need, Recent Advancement in Pacemaker; Need of Defibrillator, Type as of Defibrillator, Mono-phasic and Bi-Phasic Defibrillator, Physiological mechanism of therapy	L1 and L2	10
MODULE II: Surgical Equipment Principle of Surgical Diathermy, Surgical Diathermy Machine, Safety aspects in Electro-Surgical Units	L1 and L2	7
MODULE III: Ventilator Introduction to Ventilator, Basic therapeutic mechanism of ventilators; Types of Ventilators, Ventilator monitoring and Control Parameters, Ventilator design and machine,	L1, L2 and L3	7
MODULE IV: Hemodialysis Machine Functioning of Kidney, Artificial Kidney, Dialyzers, Membrane of Hemodialysis, dialysis machine	L1 and L2	5
MODULE IV: Physiotherapy and Electrotherapy Equipment High Frequency Heat Therapy, Short-wave Diathermy, Microwave	L1 and L2	7

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Diathermy, Ultrasonic Therapy Unit, Electrodiagnostic/Therapeutic Apparatus, Pain Relief Through Electrical Stimulation		
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*Bloom's Level:

L1: Knowledge; L2: Comprehension; L3: Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

- R. S. Khandpur, Biomedical Instrumentation: technology and Application, 2nd Edition, 2003, Tata McGraw-Hill.

Reference Books

- Leslie Cromwell, Fred J. Weibell, Erich A Pfeiffer, Biomedical Instrumentation and Measurements , PHI , 2nd Edition , 2004.
- John G. Webster, Medical Instrumentation : Application and Design, 3rd Edition , John Wiley & Sons , New York , 1998 .

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

CO-PO-PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO 3	PSO 4
CO 1	1	1												1		
CO 2		1		2										1		
CO 3	1		2											1		
CO 4		1	2											1		
CO 5		1	2											1		

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BME2612	DATA MINING	L	T	P	C
Version 2019.1	Date of Approval: 15 May 2019	3	0	0	3
Pre-requisites/Exposure	Concept of Database and Data Mining				
Co-requisites	Nil				

Catalog Description

Data Mining serve as one of the most important courses for postgraduate students, since it builds computational abilities, inferential thinking, and practical skills for tackling core data scientific challenges. The students will get a comprehensive understanding of different data mining techniques that can be used for prediction and for discovering patterns, be prepared to select the right technique for a given data problem and will be able to create a general-purpose analytic process.

Course Objectives

The objective of this course is to

- Provide students with an in-depth knowledge of data mining. To introduce students to basic applications, concepts, and techniques of data mining.
- Develop skills for using recent data mining software to solve practical problems and prediction in a variety of disciplines and
- Gain experience doing independent study and research.

Course Outcomes

On completion of this course, the students will be able to

CO 1: Explain concepts of Data mining, predictive analytics and analyses architecture of data mining. Differentiate between supervised and unsupervised methods

CO 2: Apply classification techniques on different data sets and solve cost –benefit analysis numerical. Analyze decision tree methods.

CO 3: Implement various clustering algorithm on different data sets and describe these algorithms.

CO 4: Prepare data representation for market basket analysis and determine the usefulness of association rules. Interpret supervised and unsupervised learning methods.

CO 5: Predict market trends and outline different factors associated mail marketing.

Course Content

Modules	Bloom's level	Number of Hours
Module I Data Preparation An introduction to data mining and predictive analytics, Data Pre-processing Exploratory Data Analysis, Dimension- Reduction Methods.	L1, L2	8
Module II Classification k- Nearest Neighbour Algorithm, Decision Trees, Model Evaluation Technique, Cost –Benefit Analysis Using Data Driven Cost.	L1, L2, L3	7
Module III Clustering Hierarchical and k- Means Clustering, Kohonen Networks, Birch Clustering, Measuring Cluster Goodness.	L1, L2, L3, L4	8
Module IV Association Rules Affinity Analysis and Market Basket Analysis, Data Representation for Market	L1, L2, L3, L6	9

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Basket Analysis, Support, Confidence, Frequent Item sets, and the a Priori Property, How Does a Priori Algorithm Work? Generating Frequent Item sets, Generating Association Rules, Extension from Flag Data to General Categorical Data, Information-Theoretic Approach: Generalized Rule Induction Method, J-Measure, Association Rules are Easy to do Badly, how can we Measure the Usefulness of Association Rules? Do Association Rules Represent Supervised or Unsupervised Learning?		
Module IV Case Study: Predicting Response to Direct Mail Marketing Business Understanding, Data Preparation, and Eda, Clustering and Principal Components Analysis, Modelling and Evaluation for Performance and Interpretability, Modelling and Evaluation for High Performance.	L2, L3, L4, L5	8

***Bloom's Level:**

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

1. Daniel T. Larose, Chantal D. Larose, "Data Mining and Predictive Analytics", John Wiley & Sons, Inc., Hoboken, New Jersey, 2015.
2. Jiawei Han and Micheline Kamber, "Data mining: concepts and techniques", Morgan Kaufmann, Second Edition, 2006.

Reference Books

1. Alex Berson, Data Warehousing, Data Mining, and Olap, Tata McGraw Hill, 2014.
2. Markus Hofmann, Ralf Klinkenberg, "Rapid-Miner: Data Mining Use Cases and Business Analytics Applications", Chapman and Hall/CRC, 2016.
3. George M Marakas, Modern Data Warehousing, Mining & Visualization Core Concepts, Pearson Education.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	2	--	--	--	--	--	--	--	--	--	--		2	1	3
CO2	1	1	2		--	--	--	--	--	--	--	--		2	1	3
CO3	1	2	3	3	3	--	--	--	--	--	--	--		2	1	2
CO4	1	1	2	--	--	3	--	--	--	--	--	3		1	1	3
CO5	1	1	2	--	--	2	--	--	--	--	--	3		3	1	1

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BME2710	EMBEDDED SYSTEM WITH RECENT TECHNOLOGY	L	T	P	C
Version: 2019.1	Date of Approval: May 16, 2019	2	0	0	2
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

This practical course is designed to quickly take students from beginner to basic functional knowledge of the Arduino microcontroller in three weekend 5-hour sessions. You can expect to learn a) how to write and upload simple code for the Arduino to perform basic logic functions like reading a switch to change a motors direction, b) how to integrate a variety of physical inputs including knobs, distance sensors, and light sensors, c) how to integrate a variety of physical outputs such as motors, lights, and speakers, and d) how to put all of these together to build simple self-contained low-cost low-power systems.

Course Objectives

The objective of this course is to

- Provide an overview of embedded system and real time operating system.
- Equip the students with concepts of Arduino microcontroller and its interfacing with external devices.

Course Outcomes

On completion of this course, the students will be able to

CO1: Explain and analyse the architecture of Arduino microcontroller, Debugging and programming techniques.

CO2: Explain and classify embedded systems and its applications.

CO3: Explain hardware and software design concepts of embedded system.

CO4: Explain real time operating system for embedded system.

Modules	Blooms level*	Number of hours
Module 1 Introduction to Arduino The Arduino Platform, Block diagram, Architecture, Pin functions, overview of main features such as I/O Ports, Timers, interrupts serial port, PWM, ADC, etc. Introduction to Arduino IDE, writing, saving, compiling and uploading sketches.	L1, L2, L3 and L4	8
Module2 Introduction to Arduino IDE Introduction to Arduino IDE, writing, saving, compiling and uploading sketches.		8
Module3 Arduino and Interfaces Interfacing discrete LEDs, Binary counter, Seven Segment LEDs. Interfacing LCD, switch Interface. Interfacing with different type of sensors and communication modules	L1, L2 and L4	8

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books:

1. Jeremy Blum, "Exploring Arduino: Tools and Techniques for Engineering Wizardry", 2nd Edition, Wiley, 2010.
2. John Nassey, "Arduino for Dummies" 3rd Edition, Wiley, 2009.

Reference:

1. <https://www.coursera.org/learn/arduino-platform>

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	3	-	2	2	--	--	--	--	--	--	2	-	-	1	3
CO2	1	2	-	2	2	--	--	--	--	--	--	2	-	-	1	3
CO3	1	2	-	2	2	--	--	--	--	--	--	2	-	-	1	3
CO4	1	2	-	2	2							2			1	3

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BME2711	ARTIFICIAL ORGANS AND REHABILITATION ENGINEERING	L	T	P	C
Version	Date of Approval: 16 May 2019	3	0	-	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

This course is intended for Biomedical engineering students to make them understand the various techniques developed to restore the functionalities of malfunctioning organs/organ system. It entails information of different health parameters by restoring the biochemical/ biophysical and physiological processing which might have undergone deterioration due to some disease or accidental injuries. The subject is designed to introduce the initial level of details about various artificial engineering instruments or devices which are used to maintain vital functions such as blood circulation, renal activities, breathing supporting measure, & Wheeled and seated mobility devices.

Course Objectives

The objective of this course is to

1. Equip the students with concepts of Artificial organs, prosthetics and engineering solution for various impairments
2. Provide an over view of Artificial Heart, artificial kidney, Artificial heart lung machine, Wheeled and seated mobility devices (WSMDs), Audimetric devices & associated assisting devices

Course Outcomes

On completion of this course, the students will be able to

- CO1: Explain concepts of modern artificial organs, Biomaterials, Rheological properties of blood
CO2: Explain functioning and design of Artificial heart lung machine, artificial artificial heart lung devices, Oxygenators, artificial pancreas, blood and skin.
CO3: Describe Audiometry :Wheeled and seated mobility devices (WSMDs) & ergonomics of wheelchair propulsion, power wheelchair electrical systems.
CO4: Explain the concepts of Impairments, disabilities and handicaps, engineering concepts in sensory and motor rehabilitation

Modules	Blooms level*	Number of hours
Module I: Introduction to artificial organs, biomaterials, inflammation, rejection, correction. Rheological properties of blood, blood viscosity, effect of shear rate, haematocrit, temperature and protein contents. Casson equation, flow of blood through blood vessels, problems of extracorporeal blood flow.	L-1, L-2, L-3	8
Module II: Artificial heart lung machine: brief explanation of gas exchange, artificial heart lung devices, Oxygenators: bubble, film oxygenators and membrane oxygenator. Liver	L-1, L-2, L-3	10

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support system , artificial pancreas , blood and skin .		
Module III: Audiometry : air conduction , bone conduction , masking , functional diagram of audiometer . Wheeled mobility : categories of wheelchairs , wheelchair structure and component design , ergonomics of wheelchair propulsion , power wheelchair electrical systems .	L-1, L-2, L-3	8
Module IV Rehabilitation Engineering : Impairments , disabilities and handicaps , engineering concepts in sensory and motor rehabilitation . Rehab for locomotion , vision , speech and hearing . Artificial limbs , prosthetic heart valves . Externally powered and controlled prosthetics . Spinal rehabilitation and Marcus study .	L-1, L-2, L-3	10

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. Robinson C.J., Rehabilitation engineering . CRC press 1995
2. Gerald E.Miller , Artificial Organs , Morgan & Claypool Publishers ,2006.
3. Bronzino Joseph , Handbook of biomedical engineering . CRC 2nd edition ,1999
4. R.S. Khandpur , Handbook of biomedical instrumentation . Tata McGraw Hill Publishers
5. Ballabio E.et.al , Rehabilitation engineering . IOS press 1993

References Books

1. Donald A. Neumann, **Kinesiology of the Musculoskeletal System - E-Book: Foundations for Rehabilitation** 2nd Edition **Publisher:** Mosby; 2 edition, 2013
2. **Michael Lysaght, Thomas J. Webster**, Biomaterials for Artificial Organs-A volume in Woodhead Publishing Series in Biomaterials **2011**
3. Saverio Affatato, Wear of Orthopaedic Implants and Artificial Joints A volume in Woodhead Publishing Series in Biomaterials, 2012

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:


Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	1	--	--	3	-3-	--	--	--	3	--	--	2	--	1	--
CO2	1	1	2	3	--	-3	--	--	--	--	--	--	2	--	1	--
CO3	1	2	3	3	3	--	--	--	--	--	--	--	2	--	1	--
CO4	1	1	2	--	--	--	--	--	--	--	--	--	2	--	1	--
CO5	1	1	2	--	--	3	--	--	--	2	--	3	2	--	1	3

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BME2712	CLINICAL ELECTRICAL SAFETY HAZARDS	L	T	P	C
Version 1.1	Date of Approval: 16, May 2020	2	0	0	2
Pre-requisites/Exposure	Anatomy & Physiology				
Co-requisites	Electronic Circuit				

Catalog Description

The objective of the course is to provide a brief knowledge of Clinical Electrical Hazards, safety standards and Safety procedures. Curriculum introduce students with safety testing method and equipment.

Course Objectives

The objective of this course is to

- To provide an overview of clinical electrical hazards and safety.
- To introduces and overview of various safety standard and organization

Course Outcomes

On completion of this course, the students develop capabilities of:

On completion of this course, the students will be able to

CO45. Differentiate various electrical hazards with effect of level of currents.

CO46. Deploy various safety techniques with knowledge of various medical standard, in designing of medical equipment.

CO47. Conduct various test to confirm safety standards for medical device and clinical setup.

Course Content

Modules	Blooms level*	Number of hours
MODULE I: Clinical Electrical Hazard Introduction to electrical safety; Various effect of current flowing from one contact point to another: Sensitivity Limits, Let-go current, Muscles Contraction, Suffocation, Cardiac fibrillation, Burn; Difference between Macro-shocks and Micro-shocks	L1 and L2	4
MODULE II: Electrical Safety Physical Test, electrical Safety Analyzer Setup, Ground Wire Resistance, Insulation Test, Equipment Leakage Current (Direct, Differential, Alternative), Patient Applied part leakage current, Leads Isolation Test/Mains applied part Leakage.	L1, L2 and L3	4
MODULE III: Type of Test Physical Test, electrical Safety Analyzer Setup, Ground Wire Resistance, Insulation Test, Equipment Leakage Current (Direct, Differential, Alternative), Patient Applied part leakage current, Leads Isolation Test/Mains applied part Leakage.	L1, L2 and L3	4

*Bloom's Level:

L1: Knowledge; L2: Comprehension; L3: Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

- Electrical Safety Practice and Standards: CRC Press Publication

Reference Books

- Electrical Safety Handbook by John Cadick, P.E., Mary Capelli-Schellpfeffer, M.D., M.P.A., Dennis K. Neitzel, C.P.E., Al Winfield, Publisher: McGraw-Hill

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination**Examination Scheme:**

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;

Att: Attendance

CO-PO-PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO 3	PSO 4
CO 1		3	1										3	1		
CO 2		3	1										3	1		
CO 3		2	1										3	1		

1: strongly related, 2: moderately related and 3: weakly related



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BME2713	BIOMECHANICS SIMULATION LAB	L	T	P	C
Version 1.1	Date of Approval: 16 May, 2019	0	0	2	1
Pre-requisites/Exposure	Engineering Mathematics, Medical Image Processing,				
Co-requisites					

Pre –Requisite: Matlab Programming

Catalog Description

This course helps the students to do hands-on practice with various simulation techniques use for Biomechanics. Biomechanics simulations study are known to be one of efficient techniques for various application of healthcare. Course built the foundation for develop software program for medical data processing.

The objective of this course is to

- To provide hands-on practice with 3D Modelling Tools.
- To provide hands-on practice with FEA Modelling.

Course Outcomes

On completion of this course, the students will be able to

CO11. Develop an efficient 3D model of human body part from 3D stacks of images.

CO12. Develop a FEA Model for solve an approximate solution on Medical Data.

List of Experiments	Blooms level*	Number of hours
• To Develop a Bone3D modeling using 3D rendering Software.	L1, L2 and L3	2
• To operate smoothening function on 3D model using 3D rendering Software.	L1, L2 and L3	2
• To operate wrapping function on 3D model using 3D rendering Software.	L1, L2 and L3	2
7. To operate error analysis and rectification on 3D model using 3D rendering Software.	L1, L2 and L3	2
8. To operate 3D analysis Tool on 3D model using 3D rendering Software.	L1, L2 and L3	2
9. To develop assembly of 3D bone.	L1, L2 and L3	2
10. To Assign material properties to each component of 3D model.	L1, L2 and L3	2
11. To develop meshed 3D model.	L1, L2 and L3	2
12. To apply boundary condition and force component on 3D surfaces.	L1, L2 and L3	2
13. To simulate for FEA modelling.	L1, L2 and L3	2

Text Books

- By Christopher C. Pollitt, The Illustrated Horse's Foot - E-Book: A comprehensive guide, Elsevier Health Sciences, 16-Nov-2015 - [Medical](#) - 272 pages

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- Moaveni Saeed Finite Element Analysis : theory and Application with Ansys, 3rd Edition, Pearson Education, 2010
- Lab Practical Manual

Reference Books

- <https://www.materialise.com/en/medical/mimics-innovation-suite/mimics>
- <https://www.ansys.com/solutions/solutions-by-industry/healthcare>

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO4
CO1		2	--	--	1	--	--	--	--	--	--	--		-3	1	--
CO2		2	--	--	1	--	--	--	--	--	--	--		3	1	--
CO3		2	--	--	1	--	--	--	--	--	--	--		3	1	--
CO4		2	--	--	1	--	--	--	--	--	--	--		3	1	--
CO5		2	--	--	1	--	--	--	--	--	--	--		3	1	--

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BME2714	EMBEDDED SYSTEM WITH RECENT TECHNOLOGY LAB	L	T	P	C
Version 1.1	Date of Approval: 16, May 2019	0	0	2	1
Pre-requisites/Exposure	Engineering Mathematics, Medical Image Processing,				
Co-requisites					

Catalog Description

This practical course is designed to quickly take students from beginner to basic functional knowledge of the Arduino microcontroller in three weekend 5-hour sessions. You can expect to learn a) how to write and upload simple code for the Arduino to perform basic logic functions like reading a switch to change a motors direction, b) how to integrate a variety of physical inputs including knobs, distance sensors, and light sensors, c) how to integrate a variety of physical outputs such as motors, lights, and speakers, and d) how to put all of these together to build simple self-contained low-cost low-power systems.

Course Objectives

The objective of this course is to

- Provide an overview of embedded system and real time operating system.
- Equip the students with concepts of Arduino microcontroller and its interfacing with external devices.

Course Outcomes

On completion of this course, the students will be able to

CO1: Explain and analyse the architecture of Arduino microcontroller, Debugging and programming techniques.

CO2: Explain and classify embedded systems and its applications.

CO3: Explain hardware and software design concepts of embedded system.

CO4: Explain real time operating system for embedded system.

List of Experiments	Blooms level*	Number of hours
14. Designing a push button to turn ON and OFF a LED.	L1, L2 and L3	2
15. Designing a potentiometer to change the resistance values of an LED.	L1, L2 and L3	2
16. using the PWM pins on Arduino to increase or decrease the intensity of the LED.	L1, L2 and L3	2
17. Design a scrolling LED loop where 6 LEDs blink, one at a time, back and forth.	L1, L2 and L3	2
18. Designing a Bar graph by using Potentiometer and LEDs	L1, L2 and L3	2
19. Arduino-based data acquisition into Excel, LabVIEW, and MATLAB	L1, L2 and L3	2
20. Arduino Interface with GSM kit	L1, L2 and L3	2
21. Arduino interface with electronic Motor	L1, L2 and L3	2
22. Arduino interfaces with Sensor	L1, L2 and L3	2

23. A low Budget Arduino Project	L1, L2 and L3	2
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Text Books:

- Jeremy Blum, “Exploring Arduino: Tools and Techniques for Engineering Wizardry”, 2nd Edition, Wiley, 2010.
- John Nassey, “Arduino for Dummies” 3rd Edition, Wiley, 2009.

Reference:

1. <https://www.coursera.org/learn/arduino-platform>

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO4
CO1	1	2	--	--	--	--	--	--	--	--	--	--	--	--	1	--
CO2	1	2	--	--	--	--	--	--	--	--	--	--	--	--	1	--
CO3	1	2	--	--	--	--	--	--	--	--	--	--	--	--	1	--
CO4	1	2	--	--	--	--	--	--	--	--	--	--	--	--	1	--
CO5	1	2	--	--	--	--	--	--	--	--	--	--	--	--	1	--

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BME2735	SUMMER INTERNSHIP EVALUATION-II	L	T	P	C
Version 2019.1	Date of Approval: May 21, 2019	0	0	0	3
Pre-requisites/Exposure	NA				
Co-requisites	Nil				

Catalog Description

There are certain phases of every Intern's professional development that cannot be effectively taught in the academic environment. These facets can only be learned through direct, on-the-job experience working with successful professionals and experts in the field. The internship program can best be described as an attempt to institutionalize efforts to bridge the gap between the professional world and the academic institutions. Entire effort in internship is in terms of extending the program of education and evaluation beyond the classroom of a university or institution. The educational process in the internship course seeks out and focuses attention on many latent attributes, which do not surface in the normal classroom situations. These attributes are intellectual ability, professional judgment and decision-making ability, inter-disciplinary approach, skills for data handling, ability in written and oral presentation, sense of responsibility etc. In order to achieve these objectives, each student will maintain a file (**Internship File**). The Internship File aims to encourage students to keep a personal record of their learning and achievement throughout the Programme. It can be used as the basis for lifelong learning and for job applications. Items can be drawn from activities completed in the course modules and from the workplace to demonstrate learning and personal development. The report will assess the student's analytical skills and ability to present supportive evidence, whilst demonstrating understanding of their organization, its needs and their own personal contribution to the organization.

Course Objectives

The objective of this course is to

1. Equip the students with concepts of new technologies and practical exposure
2. Provide an overview of presentation and preparation of report.

Course Outcomes

On completion of this course, the students will be able to

CO1: Study the literature and identify the problem statement

CO2: Work on a real world problem and solve it using latest technology

CO3: Prepare a detailed report of the project

CO4: Prepare a brief presentation of their project

CO5: Present and explain the project for evaluation

Text Books

As per topic of summer internship project is chosen and discussion with guide.

Reference Books


As per topic of summer internship project is chosen and discussion with guide.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	V	PPT	R	IM	EM
Weightage (%)	10	10	10	30	70

V – Viva, PPT-Power Point Presentation, R – Report, IP-Internal Marks, EM-External Marks


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CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1				--	--	--	--	--	1	2	2	--	-	2	2	1
CO2				-	--	--	--	--	1	2	2	--	-	2	2	1
CO3				--	--	--	--	--	1	2	-	--	-	2	2	1
CO4				--	--	--	--	--	1	2	3	--	-	2	2	1

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BME2737	PROJECT- DISSERTATION-I	L	T	P	C
Version 2019.1	Date of Approval: May 21, 2019	0	0	0	8
Pre-requisites/Exposure	Whole Curriculum				
Co-requisites	Nil				

Catalog Description

Major Project/Research experience is as close to a professional problem-solving activity as anything in the curriculum. It provides exposure to research methodology, practical skill enhancement and an opportunity to work closely with a industry external guide. It usually requires the use of advanced concepts, a variety of experimental techniques, and state-of-the-art instrumentation. Students require professional development that cannot be effectively taught in the academic environment. These facets can only be learned through direct, on-the-job experience working with successful professionals and experts in the field. The internship program can best be described as an attempt to institutionalize efforts to bridge the gap between the professional world and the academic institutions. Entire effort in internship is in terms of extending the program of education and evaluation beyond the classroom of a university or institution. The educational process in the internship course seeks out and focuses attention on many latent attributes, which do not surface in the normal classroom situations. These attributes are intellectual ability, professional judgment and decision-making ability, inter-disciplinary approach, skills for data handling, ability in written and oral presentation, sense of responsibility

Course Objectives

The objective of this course is to

1. Equip the students with concepts of new technologies and practical exposure
2. Provide an overview of presentation and preparation of report

Course Outcomes

On completion of this course, the students will be able to

CO1: Study the literature and identify the problem statement

CO2: Work on a real world problem and solve it using latest technology

CO3: Prepare a detailed report of the project

CO4: Prepare a brief presentation of their project

CO5: Present and explain the project for evaluation

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	V	PPT	R	IM	EM
Weightage (%)	10	10	10	30	70

V – Viva, PPT-Power Point Presentation, R – Report, IP-Internal Marks, EM-External Marks

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	2	2	--	--	--	--	--	--	--	--	--	-	-	-	1
CO2	1	2	2	-	--	--	--	--	--	--	--	--	-	-	-	1
CO3	1	2	-	--	--	--	--	--	--	--	--	--	-	-	-	1
CO4	1	2	3	--	--	--	--	--	--	--	--	--	-	-	-	1

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BME2715	CLINICAL SCIENCES	L	T	P	C
Version 1.1	Date of Approval:16, May, 2019	3	0	0	3
Pre-requisites/Exposure	Anatomy & Physiology				
Co-requisites					

Catalog Description

The objective of the course is to provide a brief knowledge of Clinical Science. It is to provide the students of biomedical, a clinical aspects of Nephrology, General Surgery and Gastroenterology and cardiology. Engineering student able to understand clinical related issue and develop foundation to built futuristic solution for them.

Course Objectives

The objective of this course is to

- To provide an overview of clinical science.
- To develop the foundation to provide solution with understanding of clinical aspects of problems.

Course Outcomes

On completion of this course, the students develop capabilities of:

On completion of this course, the students will be able to

CO48. Identify various clinical aspects and issue related to Nephrology.

CO49. Identify various clinical aspects and issue related to general surgery.

CO50. Identify various clinical aspects and issue related to Cardiology.

Course Content

Modules	Blooms level*	Number of hours
MODULE I: Nephrology-I Diseases in Nephrology, Principles of dialysis, Haemodialysis, Acetate dialysis, Bicarbonate dialysis. Peritoneal dialysis, Chronic ambulatory peritonealdialysis, Haemoperfusion, Sequential ultra-filtration. Haemofiltration, Adequacy of dialysis, Clearance, dialysance, Components of dialysing system, Dialysate, composition of dialysate, Types of dialysers, controls and monitoring devices for dialysers. Clinical significance. Renal transplantation: Basic principles.	L1 and L2	9
MODULE II: Nephrology-II Diseases of nervous system, Electroencephalography, Pneumoencephalography, neuromuscular stimulation, Electromyography, Clinical applications. Motor neuron disorders, the electrical study of reflexes, the silent period. The F response, The H reflex, the axon reflexes, Disorders of neuromuscular transmission	L1 and L2	9
MODULE III: General Surgery and Gastroenterology Pre-operative preparation for surgical patient, Study and operation of surgical equipment, safety aspects in electro-surgical units, Anatomy and physiology of G.I.T. Nutritional support and parenteral therapy, Height and weight	L1 and L2	9

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estimations according to age. Intravenous cannulae, stomach wash tubes, Introduction to Hypertension and Diabetes..		
MODULE IV: Cardiology: Cardio vascular measurements, Normal and abnormal ECG, interpretation of ECG, Prosthetic devices, Monitors, Heart lung machine applications and Clinical significance, CVP and SWAN catheters. Diagnostic applications, Cardiac pacing. Diagnostic indications. Criteria for selection. Therapeutic indications.	L1 and L2	9

*Bloom's Level:

L1: Knowledge; L2: Comprehension; L3: Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

- Strauss, Maurice B. & Louis G. Welt. Disease of Kidney, Vol 1 & 2 Little Brown. 1997
- James G. Mcleopd, Physiological Approach to Clinical Neurology, Butterworth Heinemann Lt., 3rd edition, 1981

Reference Books

- Robert F Rushmer, Cardio vascular Dynamics. WB Saunders, 1976.
- T.L Dent. W.E. Stodel, J. G. Turcotte, Surgical Endoscopy, year book Medical pub, 1985.
- Jones DB, Wu JS, Soper NJ, Laproscopic surgery: Principles and Procedures, 2nd Ed, Marcel Dekker, 2004

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

Course CO-PO-PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO 3	PSO 4
CO 1		3	1										3	1		
CO 2		3	1										3	1		
CO 3		2	1										3	1		

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BME2716	NEURAL NETWORK AND FUZZY LOGIC	L	T	P	C
Version 1.1	Date of Approval:16, May, 2019	3	0	0	3
Pre-requisites/Exposure	Machine Learning				
Co-requisites					

Catalog Description

Course has been divided in to two parts: Neural Networks and Fuzzy Logic. Neural networks part aims at introducing the fundamental theory and concepts of biological and artificial neural network and their applications in the area of machine intelligence. This part also offers knowledge of learning rules and architecture of various neural nets. The second part covers fuzzy logic: Fuzzy logic is a tool that can be applied to ambiguous problems, which cannot easily solved by classical techniques. Course discusses the fundamental of fuzzy set theory and fuzzy logic. In addition, this course also introduces applications of fuzzy logic in several areas such as fuzzy control and fuzzy decision making.

Course Objectives

The objective of this course is to

1. To cater the knowledge of Neural Networks and Fuzzy Logic Control and use these for controlling real time systems.

Course Outcomes

On completion of this course, the students will be able to

- CO51. Demonstrate the concepts of feed forward neural networks
- CO52. Demonstrate adequate knowledge about feedback networks.
- CO53. Apply the concept of fuzziness involved in various systems.
- CO54. Demonstrate adequate knowledge about fuzzy set theory
- CO55. Apply fuzzy logic control to real time systems.

Course Content

Modules	Blooms level*	Number of hours
MODULE I: Architecture Introduction –Biological neuron-Artificial neuron-Neuron modeling Learning rules-Single layer-Multi layer feed forward network-Back propagation-Learning factors.	L1 and L2	7
MODULE II: Neural Network for Control Feedback networks-Discrete time hop field networks-Schemes of neuro – control, identification and control of dynamical systems-case studies (Inverted Pendulum, Articulation Control).	L1 and L2	7
MODULE III: Fuzzy System Classical sets-Fuzzy sets-Fuzzy relations-Fuzzification – Defuzzification-Fuzzy rules.	L1 and L2	7
MODULE IV: Fuzzy Logic Control Membership function – Knowledge base-Decision –making logic – Optimizations of membership function using neural networks-Adaptive fuzzy	L1 and L2	8

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systems-Introduction to generate to genetic algorithm.		
MODULE IV: Application of FLC Fuzzy logic control-Inverted pendulum-Image processing-Home Heating system-Blood pressure during anesthesia-Introduction to neuro fuzzy controller	L1 and L2	7

*Bloom's Level:

L1: Knowledge; L2: Comprehension; L3: Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

1. Kosko, B, "Neural Networks and Fuzzy Systems: A Dynamical Approach to Machine Intelligence", PrenticeHall, NewDelhi, 2004.
2. Timothy J Ross, "Fuzzy Logic with Engineering Applications", John Willey and Sons, West Sussex, England, 2005.

Reference Books

1. Jack M. Zurada, "Introduction to Artificial Neural Systems", PWS Publishing Co., Boston, 2002
2. Klir G.J. & Folger T.A., "Fuzzy sets, Uncertainty and Information", Prentice –Hall of India Pvt. Ltd., New Delhi, 2008.
3. Zimmerman H.J., "Fuzzy set theory and its Applications", Kluwer Academic Publishers Dordrecht, 2001.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

CO-PO-PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO 3	PSO 4
CO1		3			1										1	3
CO2		3			1										1	3
CO3		2			1										1	3
CO4		2			1										1	3
CO5		2			1										1	3

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BME2717	VIRTUAL REALITY	L	T	P	C
Version: 2019.1	Date of Approval: 16 May 2019	3	-	-	3
Pre-requisites/Exposure	Basic Knowledge of C++ Programming				
Co-requisites	Nil				

Catalog Description

This course covers understanding of software and hardware related to computer graphics systems. Topics include an introduction to the basic concepts, 2-D and 3-D modeling and transformations, viewing transformations, clipping, color filling, projections, rendering techniques, visible surface detection and elimination algorithms, graphical software packages and graphics systems. Students will use a standard computer graphics API to reinforce concepts and study fundamental computer graphics algorithms. Last module covers elementary image processing techniques and various library function in C to build animations.

Course Objectives

The objective of this course is to

1. Equip the students with fundamental concepts of graphics system and standards.
2. Equip the students with mathematical concepts of graphics algorithms to draw objects using C language.
3. Provide an overview of various 2D & 3D transformation, clipping operations, algorithms related to hidden surface detection and elimination and their implementation.
4. Provide an overview of various elementary image processing techniques and basic library function in C to create animation sequence.

Course Outcomes

On completion of this course, the students will be able to

CO 1: Explain applications of computer graphics and define various standards and components in development of computer graphics.

CO 2: Explain generation of graphics primitives and analyze their problems and solutions. Demonstrate solid filling algorithms. Demonstrate polygon clipping and line clipping algorithm and analyze their problems and solutions.

CO 3: Apply 2D geometric transformations on 2D graphics objects with their practical implementation. Illustrate use of window to viewport transformation in computer graphics.

CO4: Apply 3D geometric transformations on 3D objects with their practical implementation.

CO 5: Illustrate the use of 3D object modeling, Visible Surface detection and elimination algorithm and analyze their problems and solutions.

Modules	Blooms level*	Number of hours
Module I: Introduction to Graphics and Graphics Hardware System Application of computer graphics, Video Display Devices, Raster Scan Display, Random Scan Display, Input Devices, Graphic Software and graphics standards, Numerical based on Raster and Random scan display, Frame buffer, Display processor.	L1, L2	5
Module II: Output Primitives and Clipping operations Algorithms for drawing 2D Primitives lines (DDA and Bresenham's line	L2, L3, L4	6

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algorithm), circles (Bresenham's and midpoint circle algorithm), ellipses (midpoint ellipse algorithm), Antialiasing and filtering techniques. Line clipping (cohen-sutherland algorithm), Curve clipping algorithm, and polygon clipping with Sutherland Hodgeman algorithm, Area fill algorithms for various graphics primitives: Scanline fill algorithm, boundary fill algorithm, flood fill algorithm, Polygon representation, various method of Polygon Inside test: Even-Odd method, winding number method, Character generation techniques.		
Module III: 2D Geometric transformation 2D Transformation: Basic transformation, Translation, Rotation, Rotation relative to an arbitrary point, scaling, Matrix Representations and Homogeneous coordinates, window to viewport transformation.	L3 and L4	6
Module IV: 3D Geometric transformation 3D Concepts: Parallel projection and Perspective projection, 3D Transformations, composite 3D transformation, co-ordinate transformation, Inverse transformation	L3 and L5	7
Module V: object modelling and Visible Surface detection fractal geometry methods, fractal dimensions, Geometric construction of deterministic self-similar fractals, Iterated function system to generate fractals. Bezier curves and Bezier surfaces, Bspline curves and surfaces, Visible surface detection method: Basic illumination, diffuse reflection, specular reflection, shadows. Ray tracing method, Depth-buffer method, A-buffer method, Depth-sorting method (painter's algorithm), Binary search partition method, Scan line method,	L4, L5	7
Module VI: Introduction to multimedia Design of animation sequences, Computer Animation languages, Elementary filtering techniques and elementary Image Processing techniques, graphics library functions used in animation design	L2, L3, L5	5

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

1. Udit Agrawal, "Principles of Computer Graphics", 2nd Edition, Dhanpat Rai Publications, New Delhi, 2017.
2. Hughes, Van Dam, et al. "Computer Graphics Principles and Practice", 3rd Edition, Pearson, 2014.
3. Hearn and Baker, "Computer Graphics with OpenGL", 3rd Edition, Prentice Hall, 2004.
4. Donald Hearn & M. Pauline Baker, "Computer Graphics C Version", Pearson Education, New Delhi, 2004.

Reference Books

1. James D. Foley, Andries van Dam, Steven K. Feiner, John Hughes, "Computer Graphics: Principles and Practice", 2nd Edition, Pearson Education, 2007.
2. F.S. Hill, "Computer Graphics using OPENGL", 2nd edition, Pearson Education, 2003.
3. David F. Rogers; "Procedural Elements for Computer Graphics" TMH. Publications.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	—	-	--	--	--	--	--	--	--	--	--		--	1	2
CO2	1	1	1	--	--	--	--	--	--	--	--	--		--	1	2
CO3	1	1	1	3	--	--	--	--	--	--	--	--		3	1	1
CO4	1	1	2	2	--	1	--	--	--	--	--	--		--	1	2
CO5	1	3	2	1	1	2	--	--	--	--	--	--		3	1	2
CO6	1	2	3	--	1	2	--	--	--	--	--	--	2	3	2	

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BME2718	ROBOTIC PROCESS AUTOMATION DESIGN & DEVELOPMENT	L	T	P	C
Version 2019.1	Date of Approval: 16May, 2019	3	0	0	3
Pre-requisites/Exposure	Basic Networking Concepts				
Co-requisites	Nil				

Catalog Description

This course aims at providing knowledge of basic concepts of Robotic Process Automation to University students. It further builds on these concepts and introduces key RPA Design and Development strategies and methodologies specifically in context of UiPath products. The student undergoing the course shall develop the competence to design and develop a robot for a defined process.

Course Objectives

The objective of this course is to

1. Equip the students with concepts of robotic process automation
2. Provide an overview of designing with uipath software.

Course Outcomes

On completion of this course, the students will be able to

CO1: Explain key terms and trends around the robotic process automation along with its physical and logical design

CO2: Understand the potential and value of the robotic process automation .

CO3: Describe the technologies used for the robotic process automation and mobile devices, including (passive and active) sensors, the physical communications layer, communications protocols, programming frameworks,.

CO4: Design programs and have hands on experience on uipath software

CO5: Develop RPA programs of moderate complexity for a well-used robotic automation process using uipath.

Modules	Bloom s level*	Numbe r of hours
Module 1: Programming Basic and Recap Programming Concepts Basics I - Understanding the application, Basic Web Concepts, Protocols, Email Clients, Data Structures, Data Tables, Algorithms, Software Processes, Software Design, SDLC. Programming Concepts Basics 2- Scripting, Net Framework, Net Fundamentals, XML, Control structures and functions, XML, HTML, CSS, Variables & Arguments.	L1, L2	8
Module II: RPA Concepts RPA Basics - History of Automation, what is RPA, RPA vs Automation, Processes & Flowcharts, Programming Constructs in RPA, What Processes can be Automated, Types of Bots, Workloads which can be automated. RPA Advanced Concepts - Standardization of processes, RPA Development methodologies, Difference from SDLC, Robotic control flow architecture, RPA business case, RPA Team, Process Design Document/Solution Design Document, Industries best suited for RPA, Risks & Challenges with RPA, RPA and emerging ecosystem	L2, L3 and L4	8

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Module III: UiPath Introduction & Basics Introduction to UiPath- Installing UiPath Studio community edition, The User Interface, KeyboardShortcuts,AboutUpdating,AboutAutomationProjects,IntroductiontoAutomation Debugging, Managing Activation Packages, Reusing Automations Library, Installing the Chrome Extension, Installing the Firefox Extension, Connecting your project to a source control system, Activities Guide. Variables, Control Flow DataManipulation- DataManipulationIntroduction,Scalarvariables,collectionsandTables, Text Manipulation, Data Manipulation, Gathering and AssemblingData. Recording and Advanced UI Interaction - Recording Introduction, Basic and Desktop Recording, Web Recording, Input/Output Methods, Screen Scraping, Data Scraping,Scraping advanced techniques.Selectors.	L2, L3 and L4	8
Module IV: UiPath Advanced Automation concepts and techniques Image, Text & Advanced Citrix Automation- Introduction to Image & Text Automation, Image based automation, Keyboard based automation, Information Retrieval, Advanced Citrix Automation challenges, Best Practices, using tab for Images, Starting Apps. Excel Data Tables & PDF - Data Tables in RPA, Excel and Data Table basics, Data Manipulation in excel, Extracting Data from PDF, extracting a single piece of data, Anchors, Using anchors in PDF. Email Automation- Email Automation, Incoming Email automation, Sending Email automation	L2, L3 and L4	12

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

- "Learning Robotic Process Automation" By Alok Mani Tripathi, Packt Publications, 1st Edition, 2018

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	--	--	3	--	--	--	--	--	--	2	--	1	1	-	-
CO2	1	--	1	2	--	--	--	--	--	--	--	--	-	1	-	-
CO3	1	--	1	2	--	--	--	--	--	--	--	--	-	1	-	2
CO4	1	--	--	2	--	--	--	--	--	--	--	--	1	1	-	2

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Anil

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BME2837	PROJECT- DISSERTATION-II	L	T	P	C
Version 2019.1	Date of Approval: May 21, 2019	0	0	0	8
Pre-requisites/Exposure	Whole Curriculum				
Co-requisites	Nil				

Catalog Description

Major Project/Research experience is as close to a professional problem-solving activity as anything in the curriculum. It provides exposure to research methodology, practical skill enhancement and an opportunity to work closely with a industry external guide. It usually requires the use of advanced concepts, a variety of experimental techniques, and state-of-the-art instrumentation. Students require professional development that cannot be effectively taught in the academic environment. These facets can only be learned through direct, on-the-job experience working with successful professionals and experts in the field. The internship program can best be described as an attempt to institutionalize efforts to bridge the gap between the professional world and the academic institutions. Entire effort in internship is in terms of extending the program of education and evaluation beyond the classroom of a university or institution. The educational process in the internship course seeks out and focuses attention on many latent attributes, which do not surface in the normal classroom situations. These attributes are intellectual ability, professional judgment and decision-making ability, inter-disciplinary approach, skills for data handling, ability in written and oral presentation, sense of responsibility

Course Objectives

The objective of this course is to

- Equip the students with concepts of new technologies and practical exposure
- Provide an overview of presentation and preparation of report

Course Outcomes

On completion of this course, the students will be able to

CO1: Study the literature and identify the problem statement

CO2: Work on a real world problem and solve it using latest technology

CO3: Prepare a detailed report of the project

CO4: Prepare a brief presentation of their project

CO5: Present and explain the project for evaluation

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	V	PPT	R	IM	EM
Weightage (%)	10	10	10	30	70

V – Viva, PPT-Power Point Presentation, R – Report, IP-Internal Marks, EM-External Marks

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	2	2	--	--	--	--	--	--	--	--	--	-	-	-	1
CO2	1	2	2	-	--	--	--	--	--	--	--	--	-	-	-	1
CO3	1	2	-	--	--	--	--	--	--	--	--	--	-	-	-	1
CO4	1	2	3	--	--	--	--	--	--	--	--	--	-	-	-	1

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BME2803	MEDICAL INFORMATICS	L	T	P	C
Version 1.1	Date of Approval: 16, May 2019	3	0	0	3
Pre-requisites/Exposure	Engineering Physics, Biomedical Instrumentation				
Co-requisites	Anatomy and Physiology				

Catalog Description

Collecting, storing and using information has always been an integral part of the practice of medicine. It has, however, become more complex and technology-based thereby creating an increasing need for biomedical graduates to be competent in information handling skills ranging from simple record-keeping to accessing and using computer-based data. As well as having the technical skills to undertake such tasks it is important that graduates appreciate the role of informatics in the day-to-day care of medical equipment and the advancement of medical science in general.

Course Objectives

The objective of course is to

- To provide an overview of computers and multimedia applications in medical field to develop educational / training packages.
- To serve as a foundation for the study of components of virtual reality and virtual reality applications in medicine.

Course Outcomes

On completion of this course, the students will be able to

- CO1. Identify and Explain requirements of the implementation of medical database.
- CO2. Outline and explain the visual basic tools for medical information system.
- CO3. Identify and explain various requirement of Computer, multimedia systems and its algorithm for Medical informatics.
- CO4. Explain the role of Computer in Medical research.

Course Content

Modules	Blooms level*	Number of hours
MODULE I: Medical Database Implementation Medical data acquisition and database systems: PC based multichannel data acquisition system; storage, analysis and retrieval techniques	L1 and L2	6
MODULE II: Visual Basic Visual programming concepts; visual Basic environment, tools and controls; Dynamic data exchange; VB based Medical Information System	L1 and L2	6
MODULE III: Computers in system design Hospital Information System its design and functional characteristics; Principles and application of Artificial Intelligence, Pattern Recognition, Neural Network and Fuzzy Logic in Medicine	L1 and L2	6
MODULE IV: Multimedia and virtual reality applied to medicine Basic concepts of Multimedia; Design of Multimedia information systems; Components of virtual reality; Virtual reality applications in medicine	L1 and L2	8

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MODULE V: Computers in medical research Medical Informatics and its levels; Design and development of educational packages on medical sciences; Integrated design concepts; Interactive multimedia, Virtual and digital libraries, Internet and its applications.	L1 and L2	10
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*Bloom's Level:

L1: Knowledge; L2: Comprehension; L3: Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

- R.D.Lele, Computer in Medicine , Tata McGraw-Hill, New Delhi, 1997
- Tay Vaughan, Multimedia making it work, Tata McGraw-Hill, New Delhi, 1997.
- Davis Chapman, Teach Yourself Visual Basic 6 in 21 days, New Delhi, 1997.

Reference Books

1. Harold Sackman, Biomedical Information Technology, Academic Press, New York, 1997.
2. Mary Brth Fecko, Electronics Resources: Access and Issues, Bowker and Saur, London, 1997

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance


CO-PO-PSO mapping:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO 3	PSO 4
CO 1	2	1													1	2
CO 2	2	1													1	2
CO 3	2	1													1	2
CO 4	2	1													1	2
CO 5	2	1													1	2

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BME2804	RECENT ADVANCEMENT IN BIOMEDICAL MODALITIES	L	T	P	C
Version 1.1	Date of Approval: May 16, 2019	3	0	0	3
Pre-requisites/Exposure	Engineering Physics, Biomedical Instrumentation				
Co-requisites	Anatomy and Physiology				

Catalog Description

This course provide insight in the recent development in the field of Biomedical Equipment. It is a open ended course for final semester students where recent on going research and newly adapt technologies in market would be discuss. Course largely help student to develop carrier path and a lifelong learning opportunities.

Course Objectives

The objective of course is to

- To provide an insight in recent development in field of Biomedical.
- To serve as a foundation for life-long learning in field of biomedical.

Course Outcomes

On completion of this course, the students will be able to

- CO5. Identify the new development in field of MRI.
- CO6. Identify the new development in field of CT-Scan.
- CO7. Identify the new development in field of Artificial Intelligence in Medicine.
- CO8. Identify the new development in field of robotic surgery.

Course Content

Modules	Blooms level*	Number of hours
MODULE I: Recent Advancements in Field of MRI Medical data acquisition and database systems: PC based multichannel data acquisition system; storage, analysis and retrieval techniques	L1 and L2	9
MODULE II: Recent Advancement in Field of CT-Scan Visual programming concepts; visual Basic environment, tools and controls; Dynamic data exchange; VB based Medical Information System	L1 and L2	9
MODULE III: Recent Advancement in aspect of Artificial Intelligence in Medical Equipments Hospital Information System its design and functional characteristics; Principles and application of Artificial Intelligence, Pattern Recognition, Neural Network and Fuzzy Logic in Medicine	L1 and L2	9
MODULE IV: Robotic Surgery and its technolgy Basic concepts of Multimedia; Design of Multimedia information systems; Components of virtual reality; Virtual reality applications in medicine	L1 and L2	9

*Bloom's Level:

L1: Knowledge; L2: Comprehension; L3: Application; L4: Analysis; L5: Synthesis, L6: Evaluation


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Text Books

- R.D.Lele, Computer in Medicine , Tata McGraw-Hill, New Delhi, 1997
- Tay Vaughan, Multimedia making it work, Tata McGraw-Hill, New Delhi, 1997.
- PubMed

Reference Books

- Harold Sackman, Biomedical Information Technology, Academic Press, New York, 1997.
- Mary Brth Fecko, Electronics Resources: Access and Issues, Bowker and Saur, London, 1997

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination**Examination Scheme:**

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

CO-PO-PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO 3	PSO 4
CO 1	2	1												1		2
CO 2	2	1												1		2
CO 3	2	1													1	2
CO 4	2	1												1		2

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BME2805	ADVANCED ROBOTIC PROCESS AUTOMATION DESIGN & DEVELOPMENT	L	T	P	C
Version 2019.1	Date of Approval: 16May 2019	3	0	0	3
Pre-requisites/Exposure	Basic Networking Concepts				
Co-requisites	Nil				

Catalog Description

This course aims at providing knowledge of basic concepts of Robotic Process Automation to University students. It further builds on these concepts and introduces key RPA Design and Development strategies and methodologies specifically in context of UiPath products. The student undergoing the course shall develop the competence to design and develop a robot for a defined process.

Course Objectives

The objective of this course is to

1. Equip the students with concepts of robotic process automation
2. Provide an overview of designing with uipath software.

Course Outcomes

On completion of this course, the students will be able to

CO1: Explain key terms and trends around the robotic process automation along with its physical and logical design

CO2: Understand the potential and value of the robotic process automation .

CO3: Describe the technologies used for the robotic process automation and mobile devices, including (passive and active) sensors, the physical communications layer, communications protocols, programming frameworks,.

CO4: Design programs and have hands on experience on uipath software

CO5: Develop RPA programs of moderate complexity for a well-used robotic automation process using uipath.

Modules	Blooms level*	Number of hours
Module 1: Exception handling and Best Practices Debugging and Exception Handling- Debugging Tools, Strategies for solving issues, Catching errors. Project Organization- Concept of project organization, Best practices, Avoiding pitfalls, Invoke Activity.	L1, L2	8
Module II: Introduction to Orchestrator Orchestrator, Tenants, Authentication, Users, Roles, Robots, Environments, Queues & Transactions, Schedules.	L2, L3 and L4	8
Module III: merging and Future Trends in IT Artificial Intelligence, Machine Learning, Agent awareness, Natural Language Processing Computer Vision	L2, L3 and L4	8
Module IV: Capstone Project Real life case studies which can be used to apply the concepts learnt during the course. The projects shall test student's skills right from process transformation and documentation to the design and development of the actual robot	L2, L3 and L4	12

*Bloom's Level:

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

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Text Books

"Learning Robotic Process Automation" By Alok Mani Tripathi, Packt Publications, 1st Edition, 2018

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;

Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	--	--	3	--	--	--	--	--	--	2	--	1		1	-
CO2	1	--	1	2	--	--	--	--	--	--	--	--	-		1	-
CO3	1	--	1	2	--	--	--	--	--	--	--	--	-		1	2
CO4	1	--	--	2	--	--	--	--	--	--	--	--	1		1	2

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ECE2105	INTRODUCTION TO COMPUTERS AND PROGRAMMING IN C	L	T	P	C
Version: 2019.1	Date of Approval: May 21, 2019	2	1	0	3
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

The objective of this course module is to acquaint the students with the basics of computers system, its components, data representation inside computer and to get them familiar with various important features of procedure-oriented programming language i.e. C.

Course Objectives

The objective of this course is to

1. Equip the students with concepts of Programming through C Language
2. Provide an overview of advanced programming concepts like Structure, Union and File Handling

Course Outcomes

On completion of this course, the students will be able to

After the completion of course, the students will be able to,

- CO 1: Define the purpose and structure of C Program for programming; identify and distinguish various data types and operators; conditional and control statement; Apply if-else, Switch and loops to rewrite basic C program for problem solving.
- CO 2: Compare and contrast various Array types, its declaration and implementation; differentiate between Call by Value and Reference if Functions; apply the concepts to rewrite C Programs
- CO 3: Differentiate between various String Handling Functions; describe the concept of Pointers in C Language
- CO 4: Explain the concept of Structure and Union; apply the concept of File Handling to provide data storage support to the programs.
- CO 5: Apply the concept of Computer Graphics using C programming concepts for implementing line drawing, circle drawing algorithms.

Modules	Blooms level*	Number of hours
Module I: Introduction Introduction to computer, history, von-Neumann architecture, memory system (hierarchy, characteristics and types), H/W concepts (I/O Devices), S/W concepts (System S/W & Application S/W, utilities). Data Representation: Number systems, character representation codes, Binary, octal, hexadecimal and their interconversions. Binary arithmetic, floating point arithmetic, signed and unsigned numbers, Memory storage unit.	L1, L2 and L3	7
Module II: Programming in C History of C, Introduction of C, Basic structure of C program, Concept of variables, constants and data types in C, Operators and expressions: Introduction, arithmetic, relational, Logical, Assignment, Increment and decrement operator, Conditional, bitwise operators, Expressions, Operator precedence and associativity. Managing Input and output Operation, formatting I/O.	L2, L3 and L4	7

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Module III: Fundamental Features in C C Statements, conditional executing using if, else, nesting of if, switch and break Concepts of loops, example of loops in C using for, while and do-while, continue and break. Storage types (automatic, register etc.), predefined processor, Command Line Argument.	L2, L3 and L4	7
Module IV: Arrays and Functions One dimensional arrays and example of iterative programs using arrays, 2-D arrays Use in matrix computations. Concept of Sub-programming, functions Example of user defined functions. Function prototype, Return values and their types, calling function, function argument, function with variable number of argument, recursion.	L2 and L3	7
Module V: Advanced features in C Pointers, relationship between arrays and pointers Argument passing using pointers, Array of pointers. Passing arrays as arguments. Strings and C string library. Structure and Union. Defining C structures, Giving values to members, Array of structure, Nested structure, passing strings as arguments. File Handling.	L2, L3 and L4	8

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6:Evaluation

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

Text Books

- E Balagurusamy, "Programming in ANSI C", Seventh Edition, Tata McGraw Hill Education private limited, July 2017.
- Yashwant Kanetkar, "Let Us C", 16th Edition, BPB Publication, June 2017.

Reference Books

- Brain W Kernighan and Dennis M Ritchie, "The C Programming Language", 2nd Edition, Pearson Publication, Jan 2015.
- Byron Gottfried, "Programming with C", Third Edition, Tata McGraw Hill Education private limited, July 2017.
- E Balagurusamy, "Computer Concepts & Programming in C", Seventh Edition, Tata McGraw Hill Education private limited, July 2011.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	2	--	2	--	--	--	--	--	--	--	--	1	--	1	--
CO2	1	1	2	2	--	--	--	--	--	--	--	--	1	--	1	--
CO3	1	1	2	3	--	--	--	--	--	--	--	--	1	--	1	--
CO4	1	1	2	2	3	--	--	--	--	--	--	--	1	--	1	--
CO5	1	1	2	2	3	--	--	--	--	--	--	--	1	--	1	--

1: strongly related, 2: moderately related and 3: weakly related

ECE2110	PROGRAMMING IN C LAB	L	T	P	C
Version 2019.1	Date of Approval: May 21, 2019	0	0	2	1
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

The primary objective of this course is to understand all the components of C, including the C language, the C Preprocessor, and the C Standard Library. An understanding of some advanced practical issues, including memory management, testing and debugging, complex declarations and expression evaluation, building and using libraries, and evaluating tradeoffs, such as size vs. speed and speed vs. complexity. The ability to write C code and create and manipulate logical programs.

Course Objectives

The objective of this course is to

- Equip the students with concepts of Programming through C Language
- Provide an overview of advanced programming concepts like Structure, Union and File Handling.

Course Outcomes

After the completion of course, the students will be able to,

CO 1: Demonstrate the use of various data types and operators in C programs; Solve various problems using conditional control statements (if-else, Switch case).

CO 2: Construct C programs related to problems involving the usage of loops, arrays and functions.

CO 3: Apply the concept of Pointers for efficient memory management and construct C programs using string handling functions.

CO 4: Demonstrate the use of Structure, Union and concept of File Handling to provide data storage support to the programs.

Modules	Blooms level*	Number of hours
LABORATORY SESSSION 1 OPERATORS, EXPRESSIONS and DECISION MAKING <ol style="list-style-type: none"> 1. Write a program to calculate simple interest and amount. 2. Write a program to swap two numbers using third variable. 3. Write a program to demonstrate Greatest of 3 nos and to print the given no in ascending order. 4. Write a program to check if the number is even or odd. 5. Write a program to perform arithmetic operations using Switch Case statement. 6. Write a program to calculate area of circle, rectangle, square and triangle using Switch Case statement. 	L3	5
LABORATORY SESSSION 2 LOOPING <ol style="list-style-type: none"> 1. Write a program to find factorial of given no using do while statement. 2. Write a program to print prime numbers up to 'n'. 3. Write a program to sum of n natural no. 	L3	6

4. Write a program to print Fibonacci series. 5. Write a program to reverse a number. 6. Write a program to print the following pattern using for loop 1 2 2 3 3 3 4 4 4 4 7. Write a program to print the following pattern using for loop A A B A B C A B C D		
LABORATORY SESSSION 3 ARRAYS and FUNCTIONS 1. Write a program to read n num of students and 5 subjects marks. 2. Write a program to swap two numbers using call by value. 3. Write a program to convert all lower case to uppercase characters 4. Write a program to find the factorial of a number using recursion. 5. Write a program to print the add/product of two matrices of any order.	L3	5
LABORATORY SESSSION 4 POINTERS AND STRING 1. Write a program to perform operations on strings using string handling in-built functions (concatenation, reversal, copy etc.) 2. Write a program to swap two numbers using call by reference. 3. Write a program to perform dynamic memory allocation and de-allocation. 4. Write a program to print elements of array using pointers.	L3	4
LABORATORY SESSSION 5 STRUCTURE, UNION & FILE HANDLING 1. WAP program to display student information by initializing structures. 2. WAP program to find the total salary of employee and employee details using structure. 3. Write a program to store and display information using Union. 4. Program to write data into file and read data from file.	L3	4

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

IA				EE
A	PR	LR	V	70
5	10	10	5	

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

Text Books

- E Balagurusamy, "Programming in ANSI C", Seventh Edition, Tata McGraw Hill Education private limited, July 2017.
- Yashwant Kanetkar, "Let Us C", 16th Edition, BPB Publication, June 2017.

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Reference Books

- Brain W Kernighan and Dennis M Ritchie, “The C Programming Language”, 2nd Edition, Pearson Publication, Jan 2015.
- Byron Gottfried, “Programming with C”, Third Edition, Tata McGraw Hill Education private limited, July 2017.
- E Balagurusamy, “Computer Concepts & Programming in C”, Seventh Edition, Tata McGraw Hill Education private limited, July 2011.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS O 1	PS O 2	PS O 3	PS O 4
CO 1	1	2	--	2	--	--	--	--	--	--	--	--	1	--	2	--
CO 2	1	1	2	2	--	--	--	--	--	--	--	--	1	--	2	--
CO 3	1	1	2	3	--	--	--	--	--	--	--	--	1	--	2	--
CO 4	1	1	2	2	3	--	--	--	--	--	--	--	1	--	2	--

1: strongly related, 2: moderately related and 3: weakly related



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ECE2109	ELEMENTS OF MECHANICAL ENGINEERING LAB	L	T	P	C
Version 2019.1	Date of Approval: July 14, 2019	0	0	2	1
Pre-requisites/Exposure					
Co-requisites					

Pre –Requisite: Elements of Mechanical Engineering

Catalog Description

In this course the concepts of various prime movers like I C Engine, Gas Turbine, Steam Turbine, and Hydraulic Turbine are discussed in detail. Concept of power absorbing devices and power transmission devices are discussed in detail. Elementary concept of mechanics of material and machine tool also discussed in detail. The aim of this course is to make the students familiar with the basic mechanical engineering.

Course Objectives:

The objective of this course is to

- Equip the students with practical concepts of Boiler, Turbine, IC Engine and Machine tools.
- Understand the elements of mechanical engineering by working models and experiments.

Course Outcomes (COs): After studying this course the students will be able to:

CO 1- Define the basics of working of boilers, Steam turbines.

CO 2- Explain the principle and working of two strokes and four strokes internal combustion engines.

CO 3- Explain the working of Pelton wheel Turbine, Francis Turbine and Kaplan Turbine.

CO 4 - Describe the tensile test and power transmission derives.

CO 5- Identify and demonstrate the machine tools and lathe operation.

List of Experiments	Blooms level*	Number of hours
1. To Study the Cochran and Babcock & Wilcox boilers.	L1, L2 and L3	2
2. To study the working of impulse and reaction steam turbines	L1, L2 and L3	2
3. To study Two-Stroke & Four-Stroke Diesel Engines.	L1, L2 and L3	2
4. To Study Two-Stroke & Four-Stroke Petrol Engines.	L1, L2 and L3	2
5. To study the constructional features and working of Pelton wheel Turbine, Francis Turbine and Kaplan Turbine.	L1, L2 and L3	2
6. To perform tensile test, plot the stress-strain diagram and evaluate the tensile properties of a given metallic specimen.	L1, L2 and L3	2
7. To Study the different power transmission drives.	L1, L2 and L3	2
8. To Study different types of machine tools (lathe, milling, drilling & shaper).	L1, L2 and L3	2
9. To perform the metal cutting operation on Lathe machine.	L1, L2 and L3	2

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**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

IA				EE
A	PR	LR	V	70
5	10	10	5	

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

Text Books

- Rajput, R.K. Elements of Mechanical Engineering, Lakmi Publication, Delhi, 2013. .
- Jain, V. Basics of Mechanical Engineering, Dhanpat Rai Publication, Delhi , 2011.
- Kumar, D.S. Elements of Mechanical Engineering, S.K. Kataria and Sons Publications, Delhi 2013.

Reference Books

- Ganesan, V. Internal Combustion Engine , New-Delhi : Tata McGraw Hill, New delhi, 2017.
- Heine, R.W. Loper and P.C. Rosenthal, Principles of metal casting, McGraw Hill, New-Delhi, 2001
- Nag, P.K. Engineering thermodynamics,: Tata McGraw Hill, New-Delhi, 2013.
- Kumar, D.S. Thermal Engineering, S.K. Kataria and Sons Publications, New-Delhi, 2013.
- Hazra, S.K. and Chaudhary, A.K. Workshop Technology Vol. II . Asian Book Comp, New-Delhi, 2012.



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ECE2118	BASIC ELECTRICAL AND ELECTRONICS ENGINEERING LAB	L	T	P	C
Version 2019.1	Date of Approval: May 21, 2019	0	0	2	1
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

In this course, students will become familiar with basic electrical circuits. The students will learn practical aspects and implementation of theorems related to electrical circuits, law's related to flow of current, voltages, transformer and transistors.

Course Objectives

The objective of this course is to:

- Provide the overview of concept of flow of current/voltage of electrical circuits.
- Provide the basic knowledge about the concepts of electrical circuits and BJTs.

Course Outcomes

On completion of this course, the students will be able to:

- CO1. Explain the fundamental theorems and laws related to the electrical circuits and experimentally verify the basic circuit theorems
- CO2. Explain the working principle and estimate the performance of single phase transformers.
- CO3. Understand 3 phase balanced and unbalanced, star and delta connected supply and load and to measure power in 3 phase circuits
- CO4. Able to design circuit with Bipolar Junction Transistor in CB, CE & CC configurations

Modules	Blooms level*	Number of hours
Lab Session 1: Network Analysis Techniques & Theorems <ol style="list-style-type: none"> 1. To verify KVL & KCL in the given network. 2. To verify Superposition Theorem. 3. To verify Maximum Power Transfer Theorem. 4. To verify Reciprocity Theorem. 5. To determine and verify R_{Th}, V_{Th}, R_N, I_N in a given network. 	L1, L2 and L3	6
Lab session II: Transformers and transistors <ol style="list-style-type: none"> 1. To perform open circuit & short circuit test on a single-phase transformer. 2. To perform regulation, ratio & polarity test on a single-phase transformer. 3. To obtain the characteristics of a transistor under common base (CB) and common emitter (CE) configuration. 	L1, L2 and L3	3
Lab session III: Alternating Current Circuits <ol style="list-style-type: none"> 1. To study transient response of a given RLC Circuit. 2. To measure power & power factor in a three phase circuit by two wattmeter method. 3. To measure power & power factor in a three phase load using three ammeter & three voltmeter method. 	L1, L2 and L3	3

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

Text Books

- V K Mehta and Rohit Mehta, Principles of Electrical Engineering and Electronics, 3rd edition, S. Chand Publications, 2014, New Delhi
- D. P. Kothari and I. J. Nagrath, Theory and Problem of Basic Electrical Engineering, PHI Learning Pvt. Ltd., 2015, New Delhi.
- J B Gupta, Electrical Science, S K Kataria and Sons, 2015, New Delhi.

Reference Books

- R J Smith and R C Dorf, Circuits Devices and Systems, 5th Edition, John Wiley
- B.L. Thareja, Basic Electronics, 5th edition, S. Chand Publishing, 2011, New Delhi
- V. Del Toro, Electrical Engineering fundamentals, PHI, 2016
- Mahmood Nahvi, Joseph Edminister, Electric Circuits, 7th edition, McGraw-Hill Education, 2017

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	1	2	--	--	--	--	--	--	--	--	--	--	1	-	-
CO2	1	1	2	3	--	--	--	--	--	--	--	--	1	-	-
CO3	1	1	3	3	-	--	--	--	--	--	--	--	1	-	-
CO4	1	1	2	--	--	--	--	--	--	--	--	--	1	-	-

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ECE2203	OBJECT ORIENTED PROGRAMMING USING C++	L	T	P	C
Version 2019.1	Date of Approval: May 21, 2019	2	1	0	3
Pre-requisites/Exposure	Hands on knowledge of C Programming				
Co-requisites	Basic concepts of C Programming				

Catalog Description

The objective of this course is to introduce object-oriented programming. To explore and implement the various features of OOP such as inheritance, polymorphism, Exceptional handling using programming language C++. After completing this course student can easily identify the basic difference between the programming approaches like procedural and object oriented.

Course Objectives

The objective of this course is

- Equip the students with the basic features of C++ supporting object-oriented programming. Perform object oriented programming to develop solutions to problems demonstrating usage of control structures, modularity, I/O. and other standard language constructs.
- Provide the overview of major object-oriented concepts to implement object oriented programs in C++ like encapsulation, inheritance and polymorphism, stream I/O, templates and operator overloading

Course Outcomes

On completion of this course, the students will be able to

- CO 1: Explain the basic principles of object-oriented programming approach; Differentiate it with procedural programming approach and also discuss difference between C and C++.
- CO 2: Illustrate the different ways to define a member function inline and explain how the private members of a class can be accessed. Explain how the objects can be instantiated and destroyed with static data member?
- CO 3: Explain the concept of inheritance, types and implementation with suitable examples; find out ambiguity problem in inheritance; use the concept of overriding and constructors in inheritance.
- CO 4: Explain polymorphism in detail and implement the concept of overloading in functions as well as in operators. Write the programs for virtual function and pointer with objects.
- CO 5: Explain the exception handling mechanism. Design the programs for class and function Template. Compare and contrast various formatted and unformatted i/o function in file handling.

Modules	Blooms level*	Number of hours
MODULE 1: INTRODUCTION Review of C, Difference between C and C++, Procedure Oriented and Object Oriented Approach. Basic Concepts: Objects, classes, Principals like Abstraction, Encapsulation, Inheritance and Polymorphism. Dynamic Binding, Message Passing. Characteristics of Object-Oriented Languages. Introduction to Object-Oriented Modeling techniques (Object, Functional and Dynamic Modeling).	L1 and L2	5
MODULE 2: CLASSES AND OBJECTS Abstract data types, Object & classes, attributes, methods, C++ class declaration, Local Class and Global Class, State identity and behaviour of an object, Local Object and Global Object, Scope resolution operator, Friend Functions, Inline functions, Constructors and destructors, instantiation of objects, Types of Constructors, Static Class Data, Array of Objects, Constant	L1, L2 and L3	7

member functions and Objects, Memory management Operators.		
MODULE 3: INHERITANCE Inheritance, Types of Inheritance, access modes – public, private & protected, Abstract Classes, Ambiguity resolution using scope resolution operator and Virtual base class, Aggregation, composition vs classification hierarchies, Overriding inheritance methods, Constructors in derived classes, Nesting of Classes	L2, L3 and L4	8
MODULE 4: POLYMORPHISM Polymorphism, Type of Polymorphism – Compile time and runtime, Function Overloading, Operator Overloading (Unary and Binary) Polymorphism by parameter, Pointer to objects, this pointer, Virtual Functions, pure virtual functions.	L2, L3 and L4	8
MODULE 5: STRINGS, FILES AND EXCEPTION HANDLING Manipulating strings, Streams and files handling, formatted and Unformatted Input output. Exception handling, Generic Programming – function template, class Template Standard Template Library: Standard Template Library, Overview of Standard Template Library, Containers, Algorithms, Iterators, Other STL Elements, The Container Classes, General Theory of Operation, Vectors.	L2, L3 and L4	8

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

Text Books

- A.R. Venugopal, Rajkumar, T. Ravishanker “Mastering C++”, TMH, 1997
- R. Lafore, “Object Oriented Programming using C++”, BPB Publications, 2004.
- E. Balagurusamy, “Object Oriented Programming with C++”, Mc Graw Hill, 6th Edition, 2013.
- Schildt Herbert, “C++: The Complete Reference”, Wiley DreamTech, 2005.

Reference Book

- Parsons, “Object Oriented Programming with C++”, BPB Publication, 1999.
- Steven C. Lawlor, “The Art of Programming Computer Science with C++”, Vikas Publication, 2002.
- Yashwant Kanethkar, “Object Oriented Programming using C++”, BPB, 2004

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	2	--	--	--	--	--	--	--	--	--	--	1	--	2	--
CO2	1	1	2	3	--	--	--	--	--	--	--	--	1	--	1	2
CO3	1	1	2	--	--	--	--	--	--	--	--	--	1	--	2	2
CO4	1	1	2	3	--	--	--	--	--	--	--	--	1	1	--	2
CO5	1	1	2	--	--	--	--	--	--	--	--	--	1	1	--	1

1: strongly related, 2: moderately related and 3: weakly related

ECE2206	OBJECT ORIENTED PROGRAMMING USING C++ LAB	L	T	P	C
Version 2019.1	Date of Approval: May 21, 2019	0	0	2	1
Pre-requisites/Exposure	Turbo C++				
Co-requisites	NIL				

Catalog Description

The objective of this course is to introduce object-oriented programming. To explore and implement the various features of OOP such as inheritance, polymorphism, Exceptional handling using programming language C++. After completing this course student can easily identify the basic difference between the programming approaches like procedural and object oriented.

Course Objectives

The objective of this course is

- Perform object-oriented programming to develop solutions to problems demonstrating usage of control structures, modularity, I/O. and other standard language constructs.
- Demonstrate adeptness of object-oriented programming in developing solutions to problems demonstrating usage of data abstraction, encapsulation, and inheritance.
- Demonstrate ability to implement one or more patterns involving realization of an abstract interface and utilization of polymorphism in the solution of problems which can take advantage of dynamic dispatching, syntax, features of, and how to utilize the Standard Template Library.

Course Outcomes

On completion of this course, the students will be able to

- CO 1: Define and identify the basic principles of object-oriented programming approach; Differentiate it with procedural programming approach.
- CO 2: Determine the different ways to define a member function inline and explain how the private members of a class can be accessed. Solve how the objects can be instantiated and destroyed with static data member?
- CO 3: Apply the concept of inheritance, types and implementation with suitable examples; find out ambiguity problem in inheritance; use the concept of overriding and constructors in inheritance.
- CO 4: Relate the concept polymorphism with overloading in detail and implement the concept of overloading in functions as well as in operators. Write the programs for virtual function and pointer with objects.
- CO 5: Determine the exception handling mechanism. Design the programs for class and function Template. Compare and contrast various formatted and unformatted i/o function in filehandling.

Modules/Topics Covered**	Blooms level*	Number of hours
1. Sample Programs using objects and classes (a) Write a program to illustrate the concept of one class with two objects by taking student data. (b) Write a program to show the relationship of class and object to display roll no., grade and fee paid by student.	L1, L3, L5	4
2. Sample Programs for different use of private, public member variables and functions and friend functions (a) Write a program to define the member function outside and inside the class. (b) Write a program to read and display the information of N persons to illustrate the concept of array of objects. (c) Write a program to add two numbers to illustrate the use of friend	L1, L3, L5	4

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function.		
3. Sample Programs using constructors and destructors (a) Write a program to assign and copy values to illustrate the concept of parametrized and copy constructor. (b) Write a program to show the order of constructor and destructor.	L1, L3, L5	4
4. Sample Programs using operator overloading (a) Write a program to add two numbers using binary operator overloading. (b) Write a program to illustrate the assignment operator overloading.	L1, L3, L5	4
5. Sample Programs using inheritance in and accessing objects of different derived classes (a) Write a program to compute the marks explaining the concept of multiple inheritance. (b) Write a program to find the factorial of a number using inheritance.	L1, L3, L5	4
6. Sample Programs using polymorphism and virtual functions (using pointers) and File Handling (a) Write a program to find the volume of cylinder and cuboid using function overloading. (b) Write a program to reverse a string using pointers. (c) Write a program to explain the relationship of inheritance and virtual function. (d) Write a program to read the student name and fee paid using read() function from the file.	L1, L3, L4, L5	4

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

*** Sample Programs provided are not limited to these only, can include others as desired.*

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

IA					EE
Components	A	PR	LR	V	70
Weightage (%)	5	10	10	5	

Note: IA –Internal Assessment, A – Attendance, PR – Performance, LR – Lab Record, V – Viva, EE- External Exam

Text Books

- A.R. Venugopal, Rajkumar, T. Ravishanker “Mastering C++”, TMH, 1997
- R. Lafore, “Object Oriented Programming using C++”, BPB Publications, 2004.
- “Object Oriented Programming with C++” By E. Balagurusamy.
- Schildt Herbert, “C++: The Complete Reference”, Wiley DreamTech, 2005.

Reference Book

- Parsons, “Object Oriented Programming with C++”, BPB Publication, 1999.
- Steven C. Lawlor, “The Art of Programming Computer Science with C++”, Vikas Publication, 2002.
- Yashwant Kanethkar, “Object Oriented Programming using C++”, BPB, 2004

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	3	1	2	--	--	--	--	--	--	--	--	--	2	--	--	--
CO2	3	1	2	--	--	--	--	--	--	--	--	--	1	2	--	--
CO3	2	1	2	--	--	--	--	--	--	--	--	--	1	2	--	--
CO4	2	1	2	--	--	--	--	--	--	--	--	--	1	2	--	--
CO5	2	1	2	--	--	--	--	--	--	--	--	--	1	2	--	--

1: strongly related, 2: moderately related and 3: weakly related

Course Code: ECE2208	ENGINEERING GRAPHICS LAB	L	T	P	C
Version 2019.1	Date of Approval: July 14, 2019	0	0	4	2
Pre-requisites/Exposure	Concepts Mathematics (especially Trigonometry and Geometry)				
Co-requisites	Machine Drawing & CAD				

Catalog Description:

A freshman level course which provides the undergraduate engineering students with a background in descriptive geometry, orthographic projection, engineering drawing standards and annotation, computer-aided engineering graphics. The concepts of point, line and plane relationships in projection, multi-view engineering drawings, auxiliary and section views, basic dimensioning and annotation, engineering applications of drawings are also discussed.

Course Objective:

The objective of this course is to

- Equip the students with the in-depth knowledge of drawings of points, straight line, planes, cylinders, prisms, pyramids, parabola, ellipse etc.
- Draw different figures manually and will be capable of using various instruments involved in drawings.

Course Outcomes (COs):

At the end of the course, the student shall be able to:

CO 1 - Define and explain basic principles of projections of points and lines.

CO 2 - Define, describe and construct the different orientations and projections of planes.

CO 3 – Explain and construct the projections of solids and sectioning of solids in different orientations.

CO 4 - State and draw the concepts of development of surfaces and introduction to auto CAD.

CO 5 – Define and construct orthographic and isometric view of an object.

Modules	Blooms level*	Number of hours
Module I: Introduction Importance, significance and scope of engineering drawing, drawing instruments and their use, lettering, dimensioning, scales, sense of proportioning, different types of projections, B.I.S. Specifications.	L1 and L2	8


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Module II: Projection of points, lines and plane surface Principal planes, principles of orthographic projections, Projection of points in all quadrants, Projection methods - First angle & third angle projection, Projections of straight lines (first angle projection) inclined to both the planes, true lengths and traces, projection of planes, projection of planes in simple position and inclined to both the principal planes, auxiliary planes and views	L1, L2 and L3	12
Module III: Projection of solids & section of solids Projection of simple solids like prisms, pyramids, cylinder, cone and truncated solids when the axis is inclined to both of the principal planes, Sectioning of above solids in simple vertical position when the cutting plane is inclined to the one of the principal planes and perpendicular to the other, obtaining true shape of section	L1, L2 and L3	12
Module IV: Development of surfaces & Isometric projections Development of surfaces of simple and sectioned solids – Prisms, pyramids cylinders and cones, Principles of isometric projection, isometric scale, Isometric projections of simple solids and truncated solids, Prisms, pyramids, cylinders, cones, Conversion of Orthographic Views to Isometric Views and Vice-versa.	L1, L2 and L3	8
Module V: Introduction to CAD Introduction to CAD and use of its commands, practice of some 2D figures using CAD.	L1, L2 and L3	8

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	50	20

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

Text Books:

- PS Gill, 2013, Engineering Drawing, Kataria Publication.
- ND Bhatt, 2014, Engineering Drawing, Charotar publications.

References Books:

- N Sidheshwar, 2014 Machine Drawing Drawing, Tata McGraw Hill
- M.B. Shah & B.C. Rana, 2007, Engineering Drawing, Pearson Education.
- CADFolks, AutoCAD 2018 For Beginners, CreateSpace Independent Publishing Platform; 6 edition.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	2	--	--	--	--	--	--	--	--	--	--	1	--	--	--
CO2	1	2	--	--	--	--	--	--	--	--	--	--	1	--	--	--
CO3	1	2	--	--	--	--	--	--	--	--	--	--	1	--	--	--
CO4	1	2	--	--	--	--	--	--	--	--	--	--	1	--	--	--
CO5	1	2	--	--	--	--	--	--	--	--	--	--	1	--	--	--

1: strongly related, 2: moderately related and 3: weakly related

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ECE2302	ANALOG ELECTRONICS-I	L	T	P	C
Version: 2019.1	Date of Approval: May 21, 2019	3	0	0	3
Pre-requisites/Exposure	Elementary Resistive Circuit, Theorems and Analysis Techniques: KCL, KVL, Nodal & Mesh Analysis, Thevenin & Norton Equivalents, Maximum Power Transfer.				
Co-requisites	Semiconductor Physics				

Catalog Description

This is the first course in Electronics and Communication Engineering, to educate and explain the methods used for biasing circuits in a graphical analysis of non linear electronic circuits and also includes small signal transistor models, parameters and their frequency responses. Following this, analyzing different types of feedback amplifiers, and power amplifiers using transistor and designing of different electronic circuits are included in the course. This course also considers the mathematical modelling of active solid state devices their analysis and design of single state circuits. Topics covered include the study of device characteristics and applications of p-n-junction diodes, bipolar junction transistors, and field effect transistors.

Course Objectives

The objective of this course is to

- build from basic knowledge of Semiconductor Physics to an understanding of basic devices and their models
- familiarize the student with the analysis and design of basic transistor amplifier circuits, feedback amplifiers and wave shaping circuits
- build a foundation for Analog Electronics-II, Digital Circuits and Systems I & II, VLSI de-sign and analog CMOS IC Design

Course Outcomes

On completion of this course, the students will be able to

CO1. explain different types of diodes and demonstrate wave shaping circuits


CO2. explain operating principal of Bipolar Junction Transistor, its properties, biasing techniques and stability

CO3. describe low and high frequency transistor amplifiers along with single and multi-stage am-plifier

CO4. explain operating principal of JFET, MOSFET, its properties, and biasing techniques

CO5. solve and analyse different negative feedback amplifiers configurations

CO6. describe and outline power amplifiers and their application.


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Modules	Blooms level*	Number of hours
Module I: Semiconductor Diode and Diode Circuits Different types of diodes: Zener, Schottky, LED. Zener as voltage regulator, Diffusion capacitance, Drift capacitance, the load line concept, half wave, full wave rectifiers, clipping and clamping circuits.	L1 L2 & L3	6
Module II: Bipolar Junction Transistor Bipolar junction transistor: Introduction, Transistor, construction, transistor operations, BJT characteristics, load line, operating point, leakage currents, saturation and cut off mode of operations. Bias stabilization: Need for stabilization, fixed Bias, emitter bias, self bias, bias stability with respect to variations in I_{CO} , V_{BE} & β , Stabilization factors, thermal stability.	L1 L2 & L3	9
Module III: Small signal Analysis of transistor and Multistage Amplifier Hybrid model for transistors at low frequencies, Analysis of transistor amplifier using h parameters, emitter follower, Miller's theorem, THE CE amplifier with an emitter resistance, Hybrid π model, Hybrid π Conductances and Capacitances, CE short circuit current gain, CE short circuit current gain with R_L Multistage amplifier: Cascading of Amplifiers, Coupling schemes(RC coupling and Transformer coupling)	L2 & L3	6
Module IV: Field Effect Transistors Field effect transistor (JFET, MOSFET): volt-ampere characteristics, small signal model –common drain, common source, common gate, operating point, MOSFET, enhancement and -depletion mode, Common source amplifier, Source follower	L1, L2 & L3	5
Module V: Feedback Amplifiers Feedback concept, Classification of Feedback amplifiers, Properties of negative Feedback amplifiers, Impedance considerations in different Configurations, Examples of analysis of feedback Amplifiers.	L1, L2, L3 & L4	6
Module VI: Power amplifiers Power dissipation in transistors, difference with voltage amplifiers, Amplifier classification (Class A, Class B, Class C, Class AB) class AB push pull amplifier, collector efficiency of each, cross over distortion.	L1 & L2	4

*Bloom's Level:



L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5:Synthesis, L6:Evaluation

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Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination**Examination Scheme:**

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text Books

1. Jacob Millman, Christos Halkias, Chetan Parikh, Millman's Integrated Electronics, McGraw Hill Education, 2nd Edition, New Delhi
2. Sanjeev Gupta, Electronic Devices and Circuits, Dhanpat Rai Publications, 2010
3. Theraja B.L., Sedha R.S, Principles of Electronic Devices and Circuits, S Chand & Compa-ny, First Edition, New Delhi, 2002

Reference Books

1. Robert L. Boylestad: Electronic Devices and Circuits, Pearson Education, 11th Edition, 2013
2. Robert F. Pierret, Semiconductor Device Fundamentals, Pearson Education, 1st Edition, 2006
3. Nagrath I.J, Electronics: Analog and Digital, Prentice Hall India Learning Private Limited, Second Edition, 2013

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	2	3	--	--	--	--	--	--	--	--	3	1	--	--	3
CO2	1	2	--	--	--	--	--	--	--	--	--	3	1	3	--	3
CO3	1	2	3	--	--	--	--	--	--	--	--	--	1	-	--	--
CO4	1	2	--	--	--	--	--	--	--	--	--	3	1	3	--	3
CO5	1	2	3	--	--	--	--	--	--	--	--	3	1	--	--	3
CO6	1	3	--	--	--	--	--	--	--	--	--	3	1	--	--	3

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ECE2303	CIRCUITS AND SYSTEMS	L	T	P	C
Version 2019.1	Date of Approval: May 21, 2019	2	1	0	3
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

In this course the concepts of circuits analysis based on Resistance, Inductance and Capacitance are discussed in detail. voltage- current relationship of basic circuit elements – resistors, inductors, capacitors, dependent and independent voltage and current sources; apply Kirchhoff's current and voltage laws to circuits in order to determine voltage, current and power in branches of any circuits excited by DC voltages and current sources will be discussed. Concept learnt in the studies will be applied to solve DC circuit problems using basic circuit theorems and structured methods like node voltage and mesh current analysis.

Course Objectives

The objective of this course is to

- Equip the students with concepts basic network analysis of electrical circuits using KVL and KCL.
- Provide an overview of one port and two port network analysis in time and frequency domain.

Course Outcomes

On completion of this course, the students will be able to

CO1: Expiation of graph theory for solving complex electrical circuits.

CO2: Analysis of RL, RC and RLC circuits using time domain approach.

CO3: Apply Laplace transform to solve RL, RC and RLC circuits in frequency domain.

CO4: Explanation and application of various network theorems to solve the given circuit.

CO5: Synthesis of RL, RC and RLC electrical circuits and explanation of two port network parameters.



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Modules	Blooms level*	Number of hours
Module 1: Graph Theory and Network equations Graph of a network, Trees, Co-trees and loops, cut set matrix, Tie set matrix, number of possible trees of a graph, duality, Loop Analysis and Node Analysis.	L1 and L2	8
Module 2: Analysis of circuits using classical Method Time and Frequency domain analysis of RL, RC and RLC circuits, Linear constant coefficient differential equation.	L2 and L3	10
Module 3: Signals and Laplace Transforms Unit step signal, Ramp signal, impulse signal, Laplace transformations and its properties, Gate function, Inverse Laplace transformations, Application of Laplace Transforms in circuit analysis.	L3 and L4	10
Module 4: Network Theorems Reciprocity theorem, Superposition theorem, Thevenin's and Norton's theorems, Millman's theorem, Maximum power transfer theorem, Compensation theorem, Tellegan's theorem.	L2 and L3	10
Module 5: Two port Network & Network Functions Introduction, two port z-, y-, T-, h-parameters, Inter-relations among parameters, Condition for reciprocity and symmetry, Interconnections of two port networks, Driving point and transfer functions, Poles, Zeros and necessary condition for driving point and transfer function.	L1, L3	10
Module 6: Network Synthesis Hurwitz polynomial, Positive real functions, synthesis of LC, RC, RL immittance functions.	L1 and L5	

*Bloom's Level:

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation



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Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination**Examination Scheme:**

Component s	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;

Att:

Attendance

Text Books

- M.E. Valkenburg, “Network analysis”, 3 ed, Pearson Education, 2015.
- D. R. Choudhary, “Networks and Systems”, 2 ed, New Age International, 2013.
- K.M. Soni, “Circuits and Systems”, S.K. Kataria & Sons Delhi, 2013.

Reference Books

- Bhise, Chadda, Kulshreshtha, “Engineering network analysis and filter design”, Umesh Publication, 2012.
- F.F. Kuo, “Network Analysis and Synthesis”, 2 ed, Wiley India Pvt. Ltd, 2006.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PS O 3	PSO 4
CO1	3	--	--	--	2	--	--	--	--	--	--	--	--	2	--	--
CO2	1	--	3	--	--	--	--	--	--	--	--	--	2	1	3	3
CO3	1	--	3	--	1	--	--	--	--	--	--	--	--	1	--	--
CO4	2	3	--	--	--	--	--	--	--	--	--	--	3	1	3	3

CO5	2	3	2	--	--	--	--	--	--	--	--	--	--	1	--	--
-----	---	---	---	----	----	----	----	----	----	----	----	----	----	---	----	----

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ECE2311	DATA STRUCTURES USING C	L	T	P	C
Version: 2019.1	Date of Approval: May 21, 2019	3	0	0	3
Pre-requisites/Exposure	Basic Knowledge of C++ Programming				
Co-requisites	Nil				

Catalog Description

This course covers the design, analysis, and implementation of data structures and algorithms to solve engineering problems using C programming language. Topics include elementary data structures, (including arrays, stacks, queues, and lists), advanced data structures (including trees and graphs), the algorithms used to manipulate these structures, and their application to solving practical engineering problems. At the end of this course student will gain knowledge about different kinds of file structures and their related operations.

Course Objectives

The objective of this course is to

1. Equip the students with knowledge of algorithms, different types of data structures and analysis of space and time complexity.
2. Provide an overview of various algorithms of data structures like stack and queues and related operations and implementation.
3. Provide an overview of dynamic Data Structure like linked list and its related operations, algorithms and programs. Demonstrate practical use of dynamic data structure to solve engineering problems.
4. Equip the students with knowledge of algorithms and operations related to tree and graph data structures and their practical applications.
5. Provide an overview of Sorting, Searching and file structures and its related algorithms and techniques.

Course Outcomes

On completion of this course, the students will be able to

- CO 1: Identify operations on array, multidimensional, string and their implementation and analyze space and time complexity of algorithms.
- CO 2: Explain various algorithms and operations of data structures like stack and queues and analyze complexity of each operation.
- CO 3: Explain dynamic data structures and various algorithms and operations of data structures like linked list and their applications in computer science.
- CO 4: Illustrate the algorithms and operations related to tree and graph data structures, their practical applications and analyze complexity of algorithm associated with each operations.
- CO5: Explain Sorting, Searching and file organization and its related techniques.



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Modules	Blooms level*	Number of hours
Module I: Introduction to Data structures Data structures: Definition, Types. Algorithm design, Complexity, Time-Space Tradeoffs. Use of pointers in data structures. Array Definition and Analysis, Representation of Linear Arrays in Memory, Traversing of Linear Arrays, Insertion and Deletion, Single Dimensional Arrays, Two Dimensional Arrays, Multidimensional Arrays, Function Associated with Arrays, Character String in C, Character String Operations, Arrays as parameters, Implementing One Dimensional Array, Sparse matrix.	L1, L2	7
Module II: Introduction to Stacks and queue Stack: Definition, Array representation of stacks, Operations Associated with Stacks- Push & Pop, Polish expressions, Conversion of infix to postfix, infix to prefix (and vice versa), Application of stacks recursion, polish expression and their compilation, conversion of infix expression to prefix and postfix expression, Tower of Hanoi problem. Queue: Definition, Representation of Queues, Operations of queues- QInsert, QDelete, Priority Queues, Circular Queue, Deque.	L1, L2, L3, L4	8
Module III: Dynamic Data Structure Linked list: Introduction to Singly linked lists: Representation of linked lists in memory, Traversing, Searching, Insertion into, Deletion from linked list, doubly linked list, circular linked list, generalized list. Applications of Linked List-Polynomial representation using linked list and basic operation. Stack and queue implementation using linked list.	L1, L3 and L4	7
Module IV: Trees and Graphs Trees: Basic Terminology, Binary Trees and their representation, expression evaluation, Complete Binary trees, extended binary trees, Traversing binary trees, Searching, Insertion and Deletion in binary search trees, General trees, AVL trees, Threaded trees, B trees. Graphs: Terminology and Representations, Graphs & Multigraphs, Directed Graphs, Sequential representation of graphs, Adjacency matrices, Transversal Connected Component and Spanning trees.	L1, L3 and L5	7
Module V: Sorting and Searching and file structures Sorting: Insertion Sort, Bubble sort, Selection sort, Quick sort, two-way Merge sort, Heap sort, Partition exchange sort, Shell sort, Sorting on different keys, External sorting. Searching: Linear search, Binary search File structures: Physical storage media, File Organization, Linked organization of file, Inverted file, Organization records into blocks, Sequential blocks, Hash function, Indexing & Hashing, Multilevel indexing, Tree Index, Random file, Primary Indices, Secondary Indices, B tree index files.	L1, L4, L5	7

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

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CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

Text Books

- Horowitz and Sahani, — Fundamentals of Data structures, Galgotia Publications.
- R.L. Kruse, B.P. Leary, C.L. Tondo, —Data structure and program design in C, PHI
- Data structures and algorithms – Schaum Series.
- File Structures An object-Oriented Approach with C++ by Michael J. Folk, Bill Zoellick, Breg Riccardi, Published by Addison Wesley (1st ISE Reprint, 1999).

Reference Books

- J. P. Tremblay and P. G. Sorenson, Introduction to Data Structures with Applications, McGraw – Hill
- Algorithms by Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Published by Prentice-Hall India (1999).
- Data Structures Using C and C++ second edition by Yeddyiah Langsam, Moshe J. Augenstein, Aaron M. Tenenbaum, Published by Prentice-Hall India
- Data Structures and Algorithm analysis in C++ by Mark Allen Weiss, Published by Addison Wesley (3rd Indian Reprint 2000).
- Data Structures – R. S. Salaria

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	1	2	1	--	--	--	--	--	--	--	--	--	2	--	--
CO2	1	2	2	--	--	--	--	--	--	--	--	--	2	2	1
CO3	1	2	2	1	--	--	--	--	--	--	--	--	2	2	1
CO4	1	2	2	1	--	--	--	--	--	--	--	--	2	2	1
CO5	1	2	2	1	--	--	--	--	--	--	--	--	2	2	2

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ECE2305	ANALOG ELECTRONICS - I LAB	L	T	P	C
Version 2019.1	Date of Approval: May 21, 2019	0	0	2	1
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

This course provides the practical implementation and verification of the theoretical facts studied in theory course. It includes studying the characteristics of diodes, rectifiers, transistors and amplifiers.

Course Objectives

The objective of this course is to

1. Provide a demonstration of various analog components like diodes, rectifiers etc.
2. Equip with understanding of different circuits like BJT, JFET, MOSFET and amplifiers.

Course Outcomes

On completion of this course, the students will be able to

CO 1: Demonstrate the characteristics of pn junction and zener diode.

CO 2: Obtain and analyze the output of clipper-clamper circuit and rectifiers with various filters.

CO 3: Plot the characteristics of BJT, JFET and MOSFET.

CO 4: Obtain the gain and demonstrate the frequency response of single stage and double stage amplifiers.

Modules/Topics Covered**	Blooms level*	Number of hours
Lab Session-I 1. To study and plot the characteristics of a junction diode. 2. To study Zener diode I-V characteristics.	L3, L5	2
Lab Session-II 3. To study diode based clipping and clamping circuits. 4. To study half wave, full wave and bridge rectifier with filters.	L3, L5	2
Lab Session-III 5. To study the input and output characteristics of a transistor in its various configurations (CE and CB). 6. To study various types of Bias Stabilization for a transistor. 7. To study and plot the characteristics of a MOSFET in its various configurations. 8. To study and plot the characteristics of a JFET in its various configurations	L3, L5	6
Lab Session-IV 9. To study the gain and plot the frequency response of a single stage transistor amplifier.	L3, L5	2

10. To measure gain and plot the frequency response of double stage RC coupled amplifier.		
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**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

IA					EE
Components	A	PR	LR	V	70
Weightage (%)	5	10	10	5	

Note: IA –Internal Assessment, A – Attendance, PR – Performance, LR – Lab Record, V – Viva, EE- External Exam

Text Books

- Anand Kumar, “Fundamentals of Digital Circuits”, 2nd Edition, Prentice-Hall, 2004
- Moris Mano, “Digital Design”, 2nd Edition, Pearson Education, 2007.
- R.P. Jain, “Modern Digital Electronics”, 2nd Edition, Tata McGraw Hill, 2003

Reference Books

- Thomas L. Floyd, “Digital Fundamentals”, 11th Edition, Pearson Education, 2015
- Malvino and Leech, “Digital Principles & Applications”, 1st Edition, Tata McGraw Hill, 1993

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	3	1	--	--	--	--	--	--	3	--	--	2	--	1	--	3
CO2	3	1	--	--	--	--	--	--	3	--	--	2	--	1	--	3
CO3	3	1	--	--	--	--	--	--	3	--	--	2	--	1	--	3
CO4	3	1	--	--	--	--	--	--	3	--	--	2	--	1	--	3

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ECE2306	CIRCUITS AND SYSTEMS LAB	L	T	P	C
Version 2019.1	Date of Approval: May 21, 2019	0	0	2	1
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

This course is intended for solving and synthesis of electrical circuits. A knowledge of grade school mathematics and physics is necessary. This course will give you a better understanding on how to solve various circuits using graph theory, nodal and mesh analysis and theorems in both time and Laplace domain.

Course Objectives

The objective of this course is to

- Provide the capability to analyze the circuits.
- Synthesize the circuits with given transfer function.

Course Outcomes

On completion of this course, the students will be able to

CO1. Analyze the circuits by various methods like graph, theorems.

CO2. Understand the various parameters to design electrical circuits.

CO3. Understand the realizability of the circuits by driving point and transfer function.

Course Content

Modules	Blooms level*	Number of hours
LABORATORY SESSSION 1 1. To verify Thevenin's theorem in a given network. 2. To verify reciprocity theorem in each network.	L1 L2 and L3	2
LABORATORY SESSSION 2 3. To verify maximum power transfer theorem in a given network. 4. To verify Tellegen's theorem in a given network.	L1 and L3	2
LABORATORY SESSSION 3 5. To determine the Z- and Y- parameters of a resistive two-port network. 6. To determine the T- (ABCD) parameters of a resistive two-port network. 7. To determine the h- parameters of a resistive two-port network.	L1 and L3	4
LABORATORY SESSSION 4 8. To design series-series connection of 2 two-port networks and determine its Z- parameters. 9. To design parallel-parallel connection of 2 two-port networks and	L2 and L3	4

determine its Y- parameters.		
10. To design a cascade connection of 2 two-port networks and determine its T- (ABCD) parameters.		

*Bloom's Level: L1: Knowledge; L2: Comprehension; L3: Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Examination Scheme:

IA				EE
A	PR	LR	V	70
5	10	10	5	

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

Text & References:

Textbooks

- M E Valkenburg, “Network Analysis”, PHI.
- D. R. Choudhary, “Network and Systems”, New Age International, Second Edition, 2005.

Reference Books

1. K. M. Soni, “Circuit and Systems”, VIII Edition, S.K. Kataria and sons, Delhi, 2009.
2. F.F. Kuo, “Network Analysis and Synthesis”, Wiley India Pvt Ltd., Second Edition, 2011.
3. Bhise, Chaddha, Kulshrestha, “Engineering analysis and Filter Design”, Umesh Publication, 2002.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO 3	PSO 4
CO 1	1		2		-	2	-	1	2	2	-	2	1	-		-
CO 2	2	1	1	2	-	-	-	-	2	-	-	2	1	-		-
CO 3		2	1	3	-	-	-	-	2	-	--	2	1	-		-

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ECE2312	DATA STRUCTURES USING C LAB	L	T	P	C
Version: 2019.1	Date of Approval: May 21, 2019	0	0	2	1
Pre-requisites/Exposure	Basic Knowledge of C Programming				
Co-requisites	Nil				

Catalog Description

This course covers the design, analysis, and implementation of data structures and algorithms to solve engineering problems using C programming language. Topics include elementary data structures, (including arrays, stacks, queues, and lists), advanced data structures (including trees and graphs), the algorithms used to manipulate these structures, and their application to solving practical engineering problems. At the end of this course student will gain knowledge about different kinds of file structures and their related operations.

Course Objectives

The objective of this course is to

- Equip the students with knowledge of algorithms, different types of data structures and analysis of space and time complexity.
- Provide an overview of various algorithms of data structures like stack and queues and related operations and implementation.
- Provide an overview of dynamic Data Structure like linked list and its related operations, algorithms and programs. Demonstrate practical use of dynamic data structure to solve engineering problems.
- Equip the students with knowledge of algorithms and operations related to tree and graph data structures and their practical applications.
- Provide an overview of Sorting, Searching and file structures and its related algorithms and techniques.

Course Outcomes

On completion of this course, the students will be able to


CO 1: Identify operations and their implementation on array and multidimensional, string and estimation space and time complexity.

CO 2: Explain various algorithm and operations of data structures like stack and queues and analyze complexity of each operation.

CO 3: Explain dynamic data structures and various algorithms and operations of data structures likelinked list and their applications in computer science.

CO 4: Illustrate the algorithms and operations related to tree and graph data structures, their practical applications and analyze complexity of algorithm associated with each operations.

CO5: Explain Sorting, Searching and file organization and its related techniques.


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Modules	Blooms level*	Number of hours
Module I: Introduction to Data structures <ol style="list-style-type: none"> 1. Write a program to copy one string into another without using library functions. 2. Write a program to demonstrate array and linked list implementation of sparse matrix. 3. Write a program to multiply two 2D matrix. 	L3,L5	2
Module II: Introduction to Stacks and queue <ol style="list-style-type: none"> 1. Write a program to implement push and pop operations on the stack. 2. Write a program to demonstrate conversion of infix to postfix. 3. Write a program to implement simple queue and perform insertion and deletion operation on it. 4. Write a program to implement circular queue and perform insertion and deletion operation on it. 5. Write a program to implement dqueue and perform insertion and deletion operations on it. 6. Write a program to implement priority queue and perform insertion and deletion operation on it. 	L3,L5	4
Module III: Dynamic Data Structure <ol style="list-style-type: none"> 1. Write a program to implement singly linked list and perform following operations on it. <ul style="list-style-type: none"> • Insertion at end • Insertion at last • Insertion at desired place. 2. Write a program to implement singly linked list and perform following operations on it. <ul style="list-style-type: none"> • Deletion at end • Deletion at last • Deletion at desired place. 3. Write a program to implement doubly linked list and perform following operations on it. <ul style="list-style-type: none"> • Insertion at end • Insertion at last • Insertion at desired place. 4. Write a program to implement singly linked list and perform addition of two polynomials. 	L3,L5	4
Module IV: Trees and Graphs <ol style="list-style-type: none"> 1. Write a program to calculate in order, preorder and post order traversal on binary tree. 2. Write a program to construct binary search tree and perform following operations on it. <ul style="list-style-type: none"> • Deletion of element • Insertion of elements. 3. Write a program to construct binary search tree and search an element in it. 4. Write a program to implement kruskal's algorithm to find out minimum spanning tree. 	L3,L5	6
Module V: Sorting and Searching and file structures	L3,L5	8

1. Write program to implement insertion sort.		
2. Write a program to search an element in array using binary search.		
3. Write a program to implement merge sort.		
4. Write a program to implement quick sort.		
5. Write a program to implement heap sort.		

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

Text Books

- Horowitz and Sahani, — Fundamentals of Data structures, Galgotia publications.
- R.L. Kruse, B.P. Leary, C.L. Tondo, —Data structure and program design in C, PHI
- Data structures and algorithms – Schaum Series.
- File Structures an Object-Oriented Approach with C++ by Michael J. Folk, Bill Zoellick, Breg Riccardi, Published by Addison Wesley (1st ISE Reprint,1999).

Reference Books

- J. P. Tremblay and P. G. Sorenson, Introduction to Data Structures with Applications, McGraw – Hill.
- Algorithms by Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Published by Prentice-Hall India(1999).
- Data Structures Using C and C++ second edition by Yeddidyah Langsam, Moshe J. Augenstein, Aaron M. Tenenbaum, Published by Prentice-Hall India
- Data Structures and Algorithm analysis in C++ by Mark Allen Weiss, Published by Addison Wesley (3rd Indian Reprint 2000).
- Data Structures – R. S. Salaria

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	1	2	1	--	--	--	--	--	--	--	--	--	2	--	--
CO2	1	2	2	--	--	--	--	--	--	--	--	--	2	2	1
CO3	1	2	2	1	--	--	--	--	--	--	--	--	2	2	1
CO4	1	2	2	1	--	--	--	--	--	--	--	--	2	2	1
CO5	1	2	2	1	--	--	--	--	--	--	--	--	2	2	2

1: strongly related, 2: moderately related and 3: weakly related

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ECE2315	MEASUREMENT AND MEASURING INSTRUMENTS	L	T	P	C
Version 2019.1	Date of Approval: May 21, 2019	2	0	0	2
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

This course provides a brief knowledge of measurements and measuring instruments related to engineering. It introduces measuring elements of instruments, characteristics of measuring instruments, error analysis, transducers and its classification, measurement of resistance, capacitance and inductance, principles of analog and digital meters and different display techniques.

Course Objectives

The objective of this course is to

- Equip the students with concepts of measurement, measuring elements and challenges in measurement.
- Provide in depth knowledge of each element of measurement system.

Course Outcomes

On completion of this course, the students will be able to

CO1. Explain measuring elements and characteristics of measurement system and solve problems related with measurement errors.

CO2. Classify different types of transducers and solve problems related with transducers.

CO3. Solve problems of resistance, capacitance and inductance measurement.

CO4: Explain and solve problems on different types of analog and digital meters suitable for voltage and current measurement.

CO5: Explain display devices used in measurement system and analyze the signals on CRO.



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Modules	Blooms level*	Number of hours
Module 1: Basics of Measurement Systems Elements of Generalized Measurement System; Static & Dynamic Characteristics of Instruments; Errors in Measurements – Sources and Types of Errors; Statistical Treatment of Data – Mean, Measures of Dispersion, Rejection of data based on confidence interval	L1, L2 and L3	5
Module 2: Transducers Classification; Selection of Transducers; Resistive Transducers – Potentiometer, Strain gauge, Rosettes, Thermistors and RTD; Capacitive Transducers – Measurement of Liquid level by change in variation of dielectric constant; Variable Inductance Transducers – self-generating type and passive type; Piezoelectric Transducers; Photoelectric Transducers; Digital Transducer	L1, L2, L3 and L4	9
Module 3: Measurement of Resistance, Inductance and Capacitance D.C. Bridges: Wheatstone's bridge, Sensitivity & Limitations; Carey Foster Bridge; Kelvin double bridge; Megaohm bridge. A.C. Bridges: Maxwell's Inductance Capacitance Bridge; Andersons Bridge; De Sauty's Bridge; Schering Bridge.	L1, L2, and L3	8
Module 4: Analog and Digital Meters Analog meters : PMMC meters- construction, torque equation, ammeter shunts, multirange ammeter, voltmeter multiplier, sensitivity, ohmmeters, multimeters; Construction & general moving iron, electro-dynamometer, hot wire equation of g instruments. Digital meters: Digital voltmeter – ramp type, integrating type, potentiometer type, Applications	L1, L2, and L3	8
Module 5: Display Devices and Recorders		

LED, LCD, Cold Cathode displays, Incandescent Displays, Fluorescent Displays, LVD, VDU Cathode Ray Oscilloscope : Basic functioning, Measurement of Voltage, Current, Phase and Frequency.	L1, L2, L3	6
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**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Component s	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text Books

- Electronic Instrumentation Technology by MMS Anand, PHI Pvt. Ltd., New Delhi Ed. 2005.
- Electronics Instrumentation by H.S. Kalsi TMH Ed. 2004.

Reference Books

- Electronics Instrumentation & Measurement Techniques by W.D. Cooper & A.D. Helfrick, PHI 3rd Ed.
- Electronics Measurement & Instrumentation by Oliver & Cage Mc-Graw Hill.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	2	--	2	-	--	--	--	--	--	--	3	--	3	--	3
CO2	1	1	--	2	--	--	--	--	--	--	--	2	--	2	--	2
CO3	1	2	--	--	--	--	--	--	--	--	--	2	--	2	--	3
CO4	1	2	--	2	--	--	--	--	--	--	--	2	--	2	--	3
CO5	1	2	--	2	--	--	--	--	--	--	--	2	--	2	--	3

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ECE2316	MEASUREMENT AND MEASURING INSTRUMENTS LAB	L	T	P	C
Version 2019.1	Date of Approval: May 21, 2019	0	0	2	1
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

Measurement System has become an important field for research and development in science and engineering. This course provides the students the core knowledge of measurement systems. This course introduces the experiments of measurement of various non electrical parameters.

Course Objectives

The objective of this course is to

- Perform experiments of measurement system.
- Analyze characteristics of measurement system.

Course Outcomes

On completion of this course, the students will be able to

CO1. To study working principles of various transducers utilized in measurement system.

CO2. Perform and analyze experiments on measurement system.

CO3. Draw and analyze characteristics system.

Modules	Blooms level*	Number of hours
Lab Session 1 <ol style="list-style-type: none"> 1 To Study various Temperature Measuring Instruments and to Estimate their Response times. 2. To study the working of Bourdon Pressure Gauge and to check the calibration of the gauge in a dead-weight pressure gauge calibration set up 	L2, L3,L4 and L5	3
Lab Session 2 <ol style="list-style-type: none"> 1. To study a Linear Variable Differential Transformer (LVDT) and use it in a simple Experimental set up to measure a small displacement. 2. To measure load (tensile/compressive) using load cell on a tutor. 	L2, L3,L4 and L5	3
Lab Session 3 <ul style="list-style-type: none"> • To measure torque of a rotating shaft using torsion meter/strain gauge torque transducer. • To measure the speed of a motor shaft with the help of non-contact type pickups (magnetic or photoelectric). 	L2, L3,L4 and L5	3

Lab Session 4 <ul style="list-style-type: none"> • Measurement of distance using capacitive pick up • Measurement of temperature using RTD. • Measurement of pressure using piezoelectric pick up 	L2, L3,L4 and L5	3
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**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

Text Books

- Electronic Instrumentation Technology by MMS Anand, PHI Pvt. Ltd., New Delhi Ed. 2005.
- Electronics Instrumentation by H.S. Kalsi TMH Ed. 2004.

Reference Books

- Electronics Instrumentation & Measurement Techniques by W.D. Cooper & A.D. Helfrick, PHI 3rd Ed.
- Electronics Measurement & Instrumentation by Oliver & Cage Mc-Graw Hill.


CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	3	-	3	3	--	--	--	--	--	--	2	-	-	1	3
CO2	1	2	-	2	2	--	--	--	--	--	--	2	-	-	1	3
CO3	1	2	-	2	2	--	--	--	--	--	--	2	-	-	1	3

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ECE2313	VIRTUAL INSTRUMENTATION	L	T	P	C
Version 2019.1	Date of Approval: May 21, 2019	2	0	0	2
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

This Course introduces virtual instrumentation and its comparison over conventional instrumentation. In this course, LabVIEW has been adopted as the platform of virtual instrumentation programming. System hardware and its interfacing techniques are introduced. Applications of virtual instrumentation are explained in various field e.g. Aviation, Automotive Defence, Medical etc.

Course Objectives

The objective of this course is to

1. To provide the core knowledge of Virtual Instruments used in research and industry.
2. To provide a LabVIEW platform on which low cost virtual instruments can be designed in very short time.

Course Outcomes

On completion of this course, the students will be able to

CO1. Explain virtual instrumentation and compare it with tradition instruments.


CO2. Explain components of LabVIEW, apply programming concept and design basic virtual instruments using LabVIEW software.

CO3. Explain the concepts of LabVIEW system hardware including input, output and interfacing devices.

CO4: Explain applications of virtual instrumentation in industries.



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Modules	Blooms level*	Number of hours
Module 1: Introduction to Virtual Instrumentation Introduction, Historical perspective, advantages, block diagram and architecture of a virtual instrument, conventional vs. virtual instrumentation.	L1, L2 and L4	4
Module 2: Introduction to Software Introduction to Lab VIEW, Front panel, back panel representations, Block diagram, Menus, Palettes, VI and Sub VI, Editing and Debugging VI, Structures, Arrays, Clusters, Charts and Graphs, Data acquisition, Instrument Control, Signal Generation and Signal Processing Examples	L1, L2, L3, L4 and L5	9
Module 3: Introduction to systems hardware ADC, DAC, D/O, counters and timer, PC hardware structure, timing, interrupts, DMA, software and hardware installation, Configuring data acquisition hardware using the drives in application software, use of DAQ library functions for different analog and digital input/output operations. Input/output devices & functions like data gloves, joysticks, CRT etc.	L1 and L2	6
Module 4: Application of Virtual Instrumentation in various fields Aviation, Automotive, High Voltage, Defense, Chemical, Industrial, Marine, Medical, Mining, Nuclear Energy, Virtual landscapes.	L1 and L2	5

*Bloom's Level:

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation


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Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination
Examination Scheme:

Component s	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text Books

1. Learning with LabVIEW 7 Express – R.H. Bishop, Pearson Education, Delhi.
2. Virtual Instrumentation Using LabVIEW- Sanjay Gupta & Joseph John, TMG; 2005.

Reference Book

1. LabVIEW Basic 1 Course Manual, National Instruments
2. LabVIEW for everyone - Wells Lisa K and Travis Jeffrey, Prentice Hall.


CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	2	--	-	-	--	--	--	--	--	--	3	--	-	3	3
CO2	1	1	2	2	--	--	--	--	--	--	--	2	--	-	2	2
CO3	1	2	--	--	--	--	--	--	--	--	--	2	--	-	2	3
CO4	1	2	--	-	--	--	--	--	--	--	--	2	--	-	2	3

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ECE2314	VIRTUAL INSTRUMENTATION LAB	L	T	P	C
Version 2019.1	Date of Approval: 14 July 2019	0	0	2	1
Pre-requisites/Exposure	Signal and System				
Co-requisites					

Catalog Description

This Course introduces virtual instrumentation. In this course, LabVIEW has been adopted as the platform of virtual instrumentation programming. Experiments are introduced to create virtual instrument based on various logics. Experiments are based on graphical programming.

Course Objectives

The objective of this course is to

Introduce LabVIEW software to design virtual instrument.

Design various logic in form virtual instrument using graphical programming.

Course Outcomes

On completion of this course, the students will be able to

CO1. Explain and use various functions available in LabVIEW.

CO2. Explain and create sub VIs which can be used as functions in complex VIs.

CO3. Analyse and create virtual instrument using graphical programming of various logics.

Modules	Blooms level*	Number of hours
Lab Session 1 1. To open, and explore the components of LabView. 2. To build a simple VI that converts a Celsius temperature reading to Fahrenheit.	L2, L3, L4 and L5	3
Lab Session 2 1. (a) To create an icon and a connector pane so you can use a VI as a subVI. (b) To build a VI and create its icon and connector pane so you can use it as a subVI. 2. To build a VI to generate 4*5 two dimensional array of random numbers (between 1 to 2).	L2, L3, L4 and L5	3
Lab Session 3 1. To Build a VI that generate Fibonacci series starting from '0'. 2. To build a VI which finds roots of quadratic equation using formula node. 3. To build a VI that reverses the contents of an array.	L2, L3, L4 and L5	3
Lab Session 4 1. To build a VI that can be used for sorting of numeric array i.e. in ascending or descending order.	L2, L3, L4 and L5	3

2. To build a VI for 4*1 multiplexer operation.		
3. To build a VI for 3*8 Decoder operation.		

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

Text Books

- Learning with LabVIEW 7 Express – R.H. Bishop, Pearson Education, Delhi.
- Virtual Instrumentation Using LabVIEW- Sanjay Gupta & Joseph John, TMG; 2005.

Reference Book

- LabVIEW Basic 1 Course Manual, National Instruments
- LabVIEW for everyone - Wells Lisa K and Travis Jeffrey, Prentice Hall.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	2	-	3	2	--	--	--	--	--	--	2	-	-	1	3
CO2	1	2	-	3	2	--	--	--	--	--	--	2	-	-	1	3
CO3	1	2	-	3	2	--	--	--	--	--	--	2	-	-	1	3

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ECE2402	COMMUNICATION SYSTEM	L	T	P	C
Version 2019.1	Date of Approval: May 21, 2019	3	0	0	3
Pre-requisites/Exposure	Signal and System				
Co-requisites					

Catalog Description

The purpose of this course is to introduce students to the basic principles of the design and analysis of modern communication systems. It will provide a thorough study of both analog and digital modulation and demodulation schemes. The performance analysis of various techniques based on requirements of noise and bandwidth will also be explained. It also introduces the students to the information theory and coding for basic understanding of mobile communication system.

Course Objectives

The objective of this course is to

- Provide a thorough introduction to analog and digital communications
- Provide in depth study of various modulation and demodulation techniques.
- Introduce students to basics of information theory and coding for applications in mobile communication.

Course Outcomes

On completion of this course, the students will be able to

CO1. Define and distinguish analog and digital communication systems.

CO2. Differentiate modulation and demodulation techniques of AM and FM systems and compare them in terms of Bandwidth and noise.

CO3. Distinguish and categorize various digital modulation techniques.

CO4. Describe Information theory and coding for applications in mobile communication system by solving different encoding problems.



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Modules	Blooms level*	Number of hours
<p>MODULE I:</p> <p>INTRODUCTION</p> <p>Communication Process, Source of Information, base-band and pass-band signals, Review of Fourier transforms, Random variables, different types of PDF, need of modulation process, analog versus digital communications</p>	L1 and L2	4
<p>MODULE II:</p> <p>AMPLITUDE MODULATION</p> <p>Amplitude modulation with full carrier, suppressed carrier systems, single side band transmission, switching modulators, synchronous detection, envelope detection, effect of frequency and phase errors in synchronous detection, comparison of various AM systems, vestigial side band transmission.</p>	L1, L2, L3 and L4	8
<p>MODULE III:</p> <p>ANGLE MODULATION</p> <p>Narrow and wide band FM, BW calculations using Carson rule, Direct & Indirect FM generations, phase modulation, Demodulation of FM signals, noise reduction using pre & de-emphasis.</p>	L1, L2, L3 and L4	9
<p>MODULE IV:</p> <p>PULSE MODULATION</p> <p>Pulse amplitude, width & position modulation, generation & detection of PAM, PWM & PPM, Comparison of frequency division and time division multiplexed systems.</p> <p>Basics of Digital Communications: ASK, PSK, FSK, QPSK basics & waveform with brief mathematical introduction</p>	L1, L2, L3 and L4	6
<p>MODULE V:</p> <p>NOISE</p> <p>Different types of noise, noise calculations, equivalent noise band width, noise figures, effective noise temperature, noise figure.</p>	L1 and L2	4

MODULE VI:	L1,L2	5
INTRODUCTION TO INFORMATION THEORY	and L3	

Measurement of Information, mutual, Shannon's theorem, Source coding, channel coding and channel capacity theorem, Huffman code

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5:Synthesis, L6:Evaluation

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text Books

- B. P. Lathi and Zhi Ding ,“Modern Digital and Analog Coimunication Systems”, Fourth Edition, Oxford University Press, 2009
- Wayne Tomasi, “Electronic Communication systems”, 5th edition, Pearson Education,2008

Reference Books

- Simon Haykin, “Communication Systems”, Third Edition, John Wiley & Sons,2007
- Taub and schilling, “Principles of Communication Systems”, Third Edition, TMH,2008

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	--	--	--	--	2	--	--	--	--	--	--	1	--	1	--
CO2	1	3	2	--	--	2	--	--	--	--	--	--	1	--	1	--
CO3	1	3	2	--	--	2	--	--	--	--	--	--	1	--	1	--
CO4	1	2	2	--	--	3	--	--	--	--	--	--	1	--	1	--

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ECE2403	ANALOG ELECTRONICS- II	L	T	P	C
Version 2019.1	Date of Approval: May 21, 2019	3	0	0	3
Pre-requisites/Exposure	Basic Electronics and Circuitual Analysis				
Co-requisites	Nil				

Catalog Description

This course introduces the application of semiconductor devices in linear analog circuits. The course stresses on circuit designs using the operational amplifier, active filters and oscillators. The course also provides the overview on the

Course Objectives

The objective of this course is to

- Provide the fundamental knowledge of linear analog circuits.
- Provide the knowledge about practical circuit designs using OP Amp.

Course Outcomes

On completion of this course, the students will be able to

CO1. Describe the circuits having BJT and Operational Amplifiers.


CO2. Solve the Linear and Non-linear circuits and analyze them in terms of their parameters and applications.

CO3. Categorize the waveform generation circuits and apply them in laboratory projects.

CO4. Analyze the circuitual knowledge to Linear ICs and filters and apply them for industry problem.

Course Content

Modules	Blooms level*	Number of hours
MODULE I: Building Blocks of Analog ICs 6 lecture hours Differential amplifier, Op-amp Model, op-amp DC & AC parameters, virtual ground, Current mirrors, Active loads, Level shifters and output stages.	L1 and L2	6
MODULE II: Operational amplifiers Introduction, open loop and closed loop configuration, op-amp parameters (input offset current, output offset current, i/p bias current, CMRR, PSRR, null adjustment range, etc.)	L1 and L2	5


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Inverting and non-inverting configuration, voltage gain of inverting and non inverting configurations.		
MODULE III: Linear & Non Linear Wave shaping Adders, Voltage to current, current to voltage Converter, Integrators, Differentiators, Voltage follower (voltage buffer), summer, subtractor, Comparators, log/antilog circuits using Op-amps, precision rectifiers.	L2, L3 and L4	6
MODULE IV: Waveform Generations Damped and undamped oscillations, Barkhausen criterion for sustained oscillation. Tank circuit generator Astable multi Vibrators, OTA-C Oscillators, Crystal oscillator. Types of oscillators: LC-Hartley and Colpitts, RC-RC phase shift and Wien bridge oscillator, Basics of tuned Amplifiers, Voltage Controlled Oscillator.	L2 L3 and L4	7
MODULE V: Active RC Filters & Applications of Linear Circuits Idealistic & Realistic response of filters (LP, BP, and HP), Butter worth & Chebyshev approximation filter functions, LP,BP,HP and All pass, Notch Filter, Operational transconductance amplifier (OTA)-C filters.	L2, L3 and L4	6
MODULE VI: Applications of IC Analog Multiplier & Timer IC phase locked loops, 555 Timer, IC voltage regulators-(fixed, variable) 78xx, 79xx series and adjustable.	L3 and L4	6

*Bloom's Level:

L1: Knowledge; L2: Comprehension; L3: Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text Books

- **Ramakant Gaekwad**, Op-Amps and Linear Integrated Circuits, 4th Edition PHI, 2001.
- **D. Roy Choudhury and Shail B. Jain**, Linear Integrated Circuits, 2nd Edition, New age International, 2006.

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Reference Books

1. **Adel S. Sedra and K. C. Smith** Microelectronic Circuits, Sixth Edition, Oxford University Press, 2013.
2. **George Clayton and Steve Winder**, Operational Amplifiers, 5th Edition, Elsevier, 2008.

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-
CO2	1	1	-	-	-	3	-	-	-	-	-	-	1	-	-	-
CO3	1	2	3	-	-	3	-	-	-	-	--	-	1	1	-	-
CO4	1	1	-	-	-	2	-	-	-	-	-	-	1	1	-	-

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ECE2404	ELECTROMAGNETIC FIELD THEORY	L	T	P	C
Version 2019.1	Date of Approval: May 21, 2019	3	0	0	0
Pre-requisites/Exposure	Mathematical Basics				
Co-requisites	Wave phenomena				

Catalog Description

Electromagnetic field theory is the most fundamental subject in the curriculum of electronics and electrical engineering education. Electromagnetics explains universal concepts in three-dimension real world, i.e., electro-magnetic wave propagation in free-space. This course provides a general introduction to the important physical concepts and mathematical methods used in treating all types of wave phenomena and electromagnetic signal propagation. This course provides essential back-ground and basic preparation for more advanced work in device physics, microwave and ultra-fast circuitry, transmission lines, electro dynamic wave propagation. Antenna design, and optoelectronics.

Course Objectives

The objective of this course is to

- Equip the students with the fundamental understanding of electro-magnetic wave system.
- To lay the foundations of mathematical Maxwell equations, electrodynamic wave propagation and transmission lines.

Course Outcomes

On completion of this course, the students will be able to


CO1: Explain and apply vector calculus to static and time varying electric-magnetic fields in different engineering situations.

CO2: Explain and able to solve Electromagnetic Relation using Maxwell Formulae

CO3: Examine the phenomena of electrodynamic wave propagation in unbounded media and its interfaces.

CO4: Analyze and generalized the concepts of guided structures like transmission lines and their characteristics.

Modules	Blooms level*	Number of hours
MODULE 1: Mathematical Basics and Electrostatics Coordinate Systems: Spherical and Cylindrical coordinates, Dirac delta function, Coulomb's law, Gauss's law, Poisson's Equation, Laplace's Equation, Electrostatic Boundary conditions, Work and Energy in Electro-	L1, L2 and L3	8


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statics, Conductors, Surface charge and force on conductors.		
MODULE 2: Magnetostatics and Magnetic Fields in matter Magnetic induction and Faraday's law, Magnetic Flux density, Magnetic Field Intensity, Biot Savart Law, steady currents, Ampere's law, Magneto-static Boundary conditions, magnetic field inside matter, magnetic susceptibility and permeability, ferromagnetism, energy stored in a Magnetic field, Magnetic Vector Potential	L2, L3 and L4	8
MODULE 3: Electrodynamics Faraday's laws, Maxwell's equations, Maxwell's modification of Ampere's law, continuity equation and Poynting theorem	L2, L3 and L4	6
MODULE 4: Electrodynamics Waves Wave propagation in unbounded media, Boundary conditions, reflection and transmission, polarization, E.M. waves in vacuum, E. M. waves in matter: reflection and transmission of plane waves.	L1, L2 and L3	8
MODULE 4: Introduction to Transmission Lines Transmission Line, Line Parameters, Characteristic Impedance, Image Impedance, HVDC and HVAC Common faults in transmission lines. Skin Effect, Ferranti Effect and Corona.	L1, L2 and L3	6

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination
Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text Books

- ☐ David J. Griffiths "Introduction to Electrodynamics" Pearson Education India Learning Private Limited; 4 edition (2015)
- ☐ Fawwaz T. Ulaby "Fundamentals of Applied Electromagnetics" Pearson; 7 edition (October 11, 2014)



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CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PS O 2	PSO 3
CO1	1	2	1	--	--	--	--	--	--	--	--	--	1	-	-
CO2	1	2	1	--	--	--	--	--	--	--	--	--	1	-	-
CO3	1	1	3	--	--	2	1	--	--	--	--	--	1	-	-
CO4	1	1	1	--	--	3	1	--	--	--	--	--	1	-	-

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ECE2411	DIGITAL ELECTRONICS	L	T	P	C
Version 2019.1	Date of Approval: May 21, 2019	2	1	0	3
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

This course explores the theory and operation of the basic building blocks of digital electronics which includes combinational and sequential circuits. This course also explains the logic families and data convertors. The concepts learnt in the studies of sequential circuits will be applied in the design and analysis of Melay and Moore machines.

Course Objectives

The objective of this course is to

1. Provide the basic knowledge of digital logic levels and application of combinational and se-quential circuits.
2. Equip with the understanding of logic family and data convertors.

Course Outcomes

On completion of this course, the students will be able to

CO1: Explain the various logic gates, Boolean algebra and solve the k-map & tabulation method to simplify the logical function.

CO2: Explain the adder & subtractor; Apply and analyze multiplexer, decoder & encoder to design Boolean function.

CO3: Describe flip flops, shift registers & Design counters and synchronous sequential circuits.

CO4: Explain & compare different logic families and explain data convertors.

Modules	Blooms level*	Number of hours
MODULE 1: BOOLEAN FUNCTIONS Analog & digital signals, AND, OR, NOT, NAND, NOR , XOR & XNOR gates, Boolean algebra, DeMorgan's theorems, Implementation of logical function using only NAND/NOR gates, 1's complement and 2's complement, BCD to Gray and Gray to BCD code conversion, Standard representation of logical functions (SOP and POS forms), K-map representation and simplification of logical function up to five variables, don't care conditions, XOR & XNOR simplifications of K-maps, Tabulation method	L1,L2 and L3	6

MODULE 2:

COMBINATIONAL CIRCUITS

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Adders, Subtractors, Implementation of full adder using half adder, full subtractor using half subtractor, Multiplexer, de-multiplexer, decoder & encoder, code converters, 1 & 2 bit comparators, BCD to seven segment decoder/encoder, Implementation of logic functions using multiplexer/de-multiplexer and decoder, Implementation of 16×1 MUX using 4×1 MUX, 4×16 decoder using 3×8 decoder etc., logic implementations using PROM, PLA & PAL.	L1, L2,L3 and L4	6
MODULE 3: SEQUENTIAL CIRCUITS Difference between combinational and sequential circuits, Latch, Flip-flops: SR, JK, D & T flip flops – Truth table, Excitation table, Conversion of flip-flops, set up and hold time, race around condition, Master Slave flip flop, Shift registers: SIPO, PISO, PIPO, SIPO, Bi-directional, 4-bit universal shift register; Counters: Asynchronous/ripple & synchronous counters – up/down, Ring counter, sequence detector.	L2,L3, L4 and L5	7
MODULE 4: LOGIC FAMILIES & DATA CONVERTERS Logic families: Special characteristics (Fan out, Power dissipation, propagation delay, noise margin), working of RTL, DTL, TTL, ECL and CMOS families; Data converters: Special characteristics, ADC – successive approximation, linear ramp, dual slope; DAC – Binary Weighted, R-2R ladder type.	L1, L2,L3 and L4	5

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

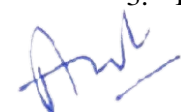
Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text Books

1. Anand Kumar, "Fundamentals of Digital Circuits", 2nd Edition, Prentice-Hall, 2004
2. Moris Mano, "Digital Design", 2nd Edition, Pearson Education, 2007.
3. R.P. Jain, "Modern Digital Electronics", 2nd Edition, Tata Mcgraw Hill, 2003



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Reference Books

- Thomas L. Floyd, "Digital Fundamentals", 11th Edition, Pearson Education, 2015
- Malvino and Leech, "Digital Principles & Applications", 1st Edition, Tata McGraw Hill, 1993

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3	PSO4
CO1	1	2	3	--	--	--	--	--	--	--	--	--	1	--	--	--
CO2	1	2	3	--	--	--	--	--	--	--	--	2	1	--	--	3
CO3	1	2	1	--	--	--	--	--	--	--	--	2	1	--	--	3
CO4	2	3	3	--	--	--	--	--	--	--	--	--	1	--	--	3

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ECE2417	SIGNALS AND SYSTEMS	L	T	P	C
Version 2019.1	Date of Approval: May 21, 2019	2	1	0	3
Pre-requisites/Exposure	Differentiation & Integration concepts				
Co-requisites					

Catalog Description

This course deals in Digital signal processing with significant skills in advance methods for modification, analysis, classification & sampling of signals. It provides the broad knowledge of design, and realization of digital signal processing systems. The problems based on transformation of do-mains and filter design will be focused on.

Course Objectives

The objective of this course is to

1. Equip the students with concepts of signals and systems.
2. Provide in-depth knowledge of representation of signals in frequency & z-domain.

Course Outcomes

On completion of this course, the students will be able to

- CO1: Represent, analyze & categorize discrete-time signals and systems in time domain with an emphasis on linear time invariant systems.
- CO2: Apply the fourier series expansion to signals and obtain its constituent frequencies.
- CO3: Convert the signals from time domain to frequency domain using fourier transform.
- CO4: Apply the z- transform on discrete signals to solve the problems related to computational complexity.



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Modules	Blooms level*	Number of hours
Module 1: Signals And Systems Introduction of signals and systems; classification of signal, continuous time and discrete time signals, operations performed on them, even and odd signals, periodic and non periodic signals, deterministic and random signals, energy signals, power signals, elementary signals: impulse, step, ramp and exponentials, classification of systems.	L1,L2 and L4	8
Module 2: LTI System Response of LTI system for continuous and discrete time systems, Impulse response, Step response, properties of continuous LTI and discrete LTI systems, LTI systems described by differential and difference equation, analysis of LTI Systems, interconnection of systems.	L1,L2 and L4	6
Module 3: Fourier Series Representation of continuous time periodic signal, properties of continuous time Fourier series, representation of discrete time periodic signals, convergence of the Fourier series, properties of discrete time Fourier series, Fourier series and LTI systems.	L2,L3	7
Module 4: Fourier Transform Continuous time Fourier transform, properties of continuous time Fourier transform, discrete time Fourier transform, properties of discrete time Fourier transform; applications; Bandwidth determination of signals and systems.	L2,L3	7
Module 4: z-Transform Definition of z-transform, region of convergence, properties of z-transform, first order system, second order system, inverse z-transform, analysis of LTI system using z-transform.	L2,L3	8

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text Books

- **Proakis, Manolakis**, Digital Signal processing, 4th edition, Pearson, 2007.
- **Oppenheim & Schaffer**, Digital Signal Processing, 1st edition, Pearson, 1975.

Reference Books

- **Simon Haykin**, Signals and Systems, 2nd Edition, Wiley Publications.
- **B.P.Lathi**, Linear Systems & Signals, 2nd Edition, Oxford Publication.
- **Roberts**, Fundamentals of Signals and Systems, Tata Mcgraw Hills Publication.

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	--	--	--	--	--	--	--	--	--	--	--	1	--	--	--
CO2	2	1	--	--	2	--	--	--	--	--	--	--	2	1	--	--
CO3	2	1	--	--	2	--	--	--	--	--	--	--	2	1	--	--
CO4	2	1	--	--	2	--	--	--	--	--	--	--	2	1	--	--

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ECE2406	COMMUNICATION SYSTEMS LAB	L	T	P	C
Version 2019.1	Date of Approval: May 21, 2019	0	0	2	1
Pre-requisites/Exposure	Signal and System				
Co-requisites	Nil				

Catalog Description

To impart knowledge on Amplitude Modulation and Angle modulation principles, generation, and its types. Also, to understand the basic concepts of pulse modulation techniques like PCM and PSK.

Course Objectives

The objective of this course is to

- To provide the basic skills required to understand, develop, and design of various engineering applications involving analog communication theory. To provide basic laboratory exposures for communication principles and applications.

Course Outcomes

On completion of this course, the students will be able to

CO1: Study the carrier modulation techniques like AM and FM modulation.

CO2: Study digital carrier modulation techniques using amplitude shift keying and Frequency shift keying.

CO3: Demonstrate various pulse modulation techniques (PCM), DM, ASK, DPSK and QPSK.

List of Experiments:

Modules	Blooms level*	Number of hours
1. To study the sampling and reconstruction of a given signal. 2. To study amplitude modulation and demodulation. 3. To study frequency modulation and demodulation. 4. To study time division multiplexing.	L1, L2	8
5. To study pulse amplitude modulation. 6. To study delta and adaptive delta modulation and demodulation. 7. To study carrier modulation techniques using amplitude shift keying and Frequency shift keying.	L3 and L4	10
8. To study carrier modulation techniques using binary phase shift keying and differential shift keying.	L2, L4	10

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9. To study pulse code modulation & differential pulse code modulation as well as relevant demodulations.		
10. To study quadrature phase shift keying & quadrature amplitude modulation.		

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	2													2	
CO2	2	2			2										2	
CO3	2										2				2	

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ECE2407	ANALOG ELECTRONICS – II LAB	L	T	P	C
Version 2019.1	Date of Approval: May 21, 2019	0	0	2	1
Pre-requisites/Exposure	Circuit Theory				
Co-requisites	Nil				

Catalog Description

In this course the concepts of Analog Electronics are discussed. Design and analysis of efficient circuits using op-amp like adder, subtractor, filters and oscillators.

Course Objectives

The objective of this course is to

- To provide the basic skills required to understand, develop, and design of various engineering applications involving Analog Electronic & Circuits.
- To provide basic laboratory exposures for Analog Circuits and applications.

Course Outcomes

On completion of this course, the students will be able to

CO1: Construct adder, subtractor, an inverting and non-inverting amplifier.

CO2: Design transistor-based RC oscillator (Wien bridge and RC phase shift oscillator) circuit.

CO3: Construct astable and mono-stable mode timer circuit using IC 555.

CO4: Design of Integrator, differentiator and low pass & high pass active filter circuit using Op-Amp (I.C-741)

List of Experiments:

Modules	Blooms level*	Number of hours
1. To study the op amp as an inverting and non inverting amplifier. 2. To use the op amp as an adder, subtractor, integrator and differentiator. 3. To design a ramp and a square wave generator. 4. To study the IC-555 timer as stable and bistable multivibrator.	L1, L2	8
5. To design low pass, high pass and band pass filters using op- amp. and plot their frequency response. 6. To design and study class A power amplifier. 7. To design and study a class B push pull amplifier.	L3 and L4	10
8. To study various feedbacks such as voltage series feedback. 9. To design RC phase shift and Wein bridge oscillators using op amplifier. 10. To design and study Colpitt and Hartley oscillators.	L2, L4	10

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

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Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	2		3										1			
CO2		2	3										3			
CO3	3												2			
CO4	3	2	2								2		1			

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ECE2412	DIGITAL ELECTRONICS LAB	L	T	P	C
Version 2019.1	Date of Approval: 14 July, 2019	0	0	2	1
Pre-requisites/Exposure	Signal and System				
Co-requisites					

Catalog Description

In this Lab course the combination and sequential circuits are designed and their functionality is verified using truth table. Concepts covered would enable them to create complex circuits related to digital design. The objective of this course is to explore and implement the various features of digital logic using basic logic gates.

Course Objectives

The objective of this course is to

- Provide a basic knowledge of digital logic levels and application of knowledge to understand digital electronics circuits.
- Equip with understanding of different combinational and sequential circuits.

Course Outcomes

On completion of this course, the students will be able to

CO 1: Demonstrate the basic concept of logic gates;

CO 2: Illustrate the adder and subtractors.

CO 3: Demonstrate the code convertors.

CO 4: Demonstrate the combinational and sequential circuits.

Modules/Topics Covered**	Blooms level*	Number of hours
1. To verify the truth tables of NOT, OR, AND, NOR, NAND, XOR, XNOR gates.	L3, L5	2
2. To obtain half adder, full adder using gates and verify their truth tables.	L3, L5	2
3. To obtain half subtractor, full subtractor using gates and verify their truth tables.	L3, L5	2
4. To implement control circuit using multiplexer.	L3, L5	2
5. To convert BCD code into excess 3 code and verify the truth table.	L3, L5	2
6. To verify the truth tables of RS, D, JK and T flip- flops.	L3, L5	2
7. To implement and verify 3-bit bi-directional shift register.	L3, L5	2
8. To design and study asynchronous/ripple counter.	L3, L5	2
9. To design and study synchronous counter.	L3, L5	2
10. To design and study a sequence detector.	L3, L5	2

*Bloom's Level:

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

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Examination Scheme:

IA					EE
Components	A	PR	LR	V	70
Weightage (%)	5	10	10	5	

Note: IA –Internal Assessment, A – Attendance, PR – Performance, LR – Lab Record, V – Viva, EE- External Exam

Text Books

- Anand Kumar, “Fundamentals of Digital Circuits”, 2nd Edition, Prentice-Hall, 2004
- Moris Mano, “Digital Design”, 2nd Edition, Pearson Education, 2007.
- R.P. Jain, “Modern Digital Electronics”, 2nd Edition, Tata Mcgraw Hill, 2003

Reference Books

- Thomas L. Floyd, “Digital Fundamentals”, 11th Edition, Pearson Education, 2015
- Malvino and Leech, “Digital Principles & Applications”, 1st Edition, Tata McGraw Hill, 1993

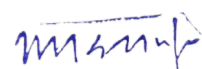
CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	3	1	--	--	--	--	--	--	--	--	--	--	1	--	--	3
CO2	3	1	--	--	--	--	--	--	--	--	--	--	1	--	--	3
CO3	3	1	--	--	--	--	--	--	--	--	--	--	1	--	--	3
CO4	2	1	--	--	--	--	--	--	--	--	--	--	1	--	--	3

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ECE2418	ELECTRONIC WORKSHOP & PCB LAB	L	T	P	C
Version 2019.1	Date of Approval: May 21, 2019	0	0	2	1
Pre-requisites/Exposure	NIL				
Co-requisites					

Catalog Description

The students will be able to understand the contribution of electronics to some extent. PCB's have definitely contributed in a significant manner as a means of interconnection of various electronic components. The field of PCB designing is a mutual contribution of wide range of various other fields.

Course Objectives

The objective of this course is to

1. To identify basic electronic components and understand operation of electrical devices.
2. To implement mini projects based on concept of electronics circuit concepts.

Course Outcomes

On completion of this course, the students will be able to

CO1. Measure voltage, frequency and phase of any waveform using CRO. Generate sine, square and triangular waveforms with required frequency and amplitude using function generator.

CO2. Analyse the characteristics of different electronic devices such as diodes, transistors etc., and simple circuits like rectifiers, amplifiers etc.

CO3. Obtain the PCB for a simple circuit.

Course Content

Experiments	Blooms level*	Number of hours
1. Study of CRO, DMM & Function Generator 2. Identification of Active & Passive Components	L1 and L2	2
1. Winding shop: Step down transformer winding of less than 5VA. 2. Soldering shop: Fabrication of DC regulated power supply	L1 and L2	2
1. PCB Lab: (a) Artwork & printing of a simple PCB. (b) Etching & drilling of PCB.	L1 and L2	3
1. Wiring & fitting shop: Fitting of power supply along with a meter in cabinet. 2. Testing of regulated power supply fabricated.	L1 and L2	2

*Bloom's Level:

L1: Knowledge; L2: Comprehension; L3: Application; L4: Analysis; L5: Synthesis, L6: Evaluation


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Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination
Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA – Internal Assessment, EE - External Exam, PR - Performance, LR – Lab Record, V – Viva.

Text Books

- **John Keown**, OrCAD PSpice and circuit simulation, 4th Edition Pearson, 2001.

Reference Books

- **Muhammad H. Rasid**, Introduction to PSpice Using OrCAD for circuit and electronics, Prentice Hall of India Pvt. Ltd, 1988.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO 3	PSO 4
CO 1	1	-	-	-	-	-	-	-	-	-	-	-	2	-	1	1
CO 2	1	2	-	-	-	3	-	-	-	-	-	-	2	-	1	1
CO 3	1	2	3	-	-	3	-	-	-	-	-	-	2	-	1	1

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ECE2414	PCB FABRICATIONS	L	T	P	C
Version 2019.1	Date of Approval: May 21, 2019	2	0	0	2
Pre-requisites/Exposure	Basic Electronics				
Co-requisites					

Catalog Description

This course will introduce students to the process of fabrication of PCB and various design and analysis concepts for the techniques used. The role of environment will also be discussed. The assembly of components on PCB and testing for quality assurance will also be discussed.

Course Objectives

The objective of this concentration elective is


- To allow students to have insight knowledge of PCB Fabrication.
- To enhance their knowledge domain beyond main subjects for application in working on various projects.

Course Outcomes

On completion of this course, the students will be able to

- CO1. Explain the design flow of PCB Fabrication.
CO2. Distinguish and Explain the techniques used and design considerations.
CO3. Apply the knowledge of computer for automation in PCB fabrication.
CO4. Prepare PCB for simple circuits in lab for projects.

Modules	Blooms level*	Number of hours
MODULE I: INTRODUCTION TO THE PCB Definition and Evolution of the Printed Circuit Board (PCB), Purposes of a PCB, Applications, Market Drivers, Typical Development Flow for a PCB, Printed Circuit Technology, Basic Electronic Components, Resistors, Capacitors, Inductors, Diodes, Transistors, Relays, Connectors, Integrated Circuits: How a silicon wafer becomes an IC, Printed Circuit Board Characteristics, PCB Materials, Fillers, resins, laminates, base material characteristics, Dielectric, conductors, Engineering References	L1 and L2	5


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<p>MODULE II:</p> <p>DESIGN AND ANALYSES</p> <p>Design and Environmental Requirements: Functional, Thermal, Vibration, Shock, EMI/EMC; Electrical Engineering: Analog and digital signals, Signal integrity, Grounding concepts, Current carrying capacity, CAD, Schematics, Layout rules of thumb; Mechanical Engineering: Panels, Standard board sizes, Packaging, Thermal Design, Heat transfer basics, Convection, Conduction, PCB Thermal Design Features, Thermal modeling, Cycling and fatigue, Component Vibration Fatigue, Vibration Models and Terminology, Combined Thermal and Structural Fatigue</p>	L1, L2 and L3	5
<p>MODULE III:</p> <p>CONTAMINATION CONTROL/ENVIRONMENTAL CONTROL</p> <p>Contamination Control, Conformal Coatings, Polluting Agents, Safety Controls, Pollution Controls, Recycling, Standards; Manufacturing: PCB Manufacturing Information, PCB Layout and Artwork; Fabrication: Machining Operations, Blanking, Cutting, Punching, Drilling, Laminating Techniques, Plating, Etching, Surface Finishing, Conformal Coatings, Inspection and Checkout, Specifications and Standards.</p>	L1 and L2	5
<p>MODULE IV:</p> <p>ASSEMBLY</p> <p>PCB Assembly Drawing Examples, Component Considerations, Component mounting and support, Mechanical Devices, Soldering Technology, Non solder Connections, Cleaning, Parts Staking, Conformal Coating Removal, Repair and Rework, Safety Considerations, ESD protection, Specifications and Standards.</p>	L1 and L2	5
<p>MODULE V:</p> <p>TESTING & QUALITY ASSURANCE</p> <p>Common PCB Production Faults, Bare Board Testing, Electrical Performance Testing, Assembled PCB Testing, Quality Assurance in Design, FMEA – Failure Mode and Effects Analysis, Software Tools,</p>	L1 and L2	4


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Quality Assurance in Manufacturing and in Assembly, Specifications and Standards.		
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*Bloom's Level:

L1: Knowledge; L2: Comprehension; L3: Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination
Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text Books

- RS Khandpur, "Printed Circuit Boards", Third Edition, Tata McGraw-Hill Education, 2008

Reference Books

- Christopher T Robertson, "Printed Circuit Board Designer's Reference: Basics", Second Edition, Prentice Hall Professional, 2004
- Charles Harper, "High Performance Printed Circuit Boards", First Edition, McGraw-Hill Education, 2000

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	2	-	3	-	-	3	3	-	-	-	-	1	2	1	-	2
CO2	2	-	3	-	-	2	2	-	-	-	-	1	2	1	-	2
CO3	2	-	3	-	1	3	-	-	-	-	-	1	2	1	-	1
CO4	2	-	-	-	1	-	-	-	-	-	-	-	2	1	-	1

1: strongly related, 2: moderately related and 3: weakly related



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ECE2421	ARTIFICIAL NEURAL NETWORK	L	T	P	C
Version 2019.1	Date of Approval: May 21, 2019	2	0	0	2
Pre-requisites/Exposure	Basic Knowledge of Brain functioning				
Co-requisites	Nil				

Catalog Description

The course provides introduction to neural network and a deep insight into the basics of brain & its functioning basics of various neural models & neural schema used for learning. With this course students would be able to know the basics of each introductory feature of human brain and its features which would prove to be very helpful throughout their degree and would prove helpful in understanding other related subjects also.

Course Objectives

The objective of this course is to

1. Equip the students with concepts of learning of brain problem solving techniques and develop proficiency in creating neural structures using the MATLAB.
2. Provide an overview of various control statements, data structures, packages related to image addition, graphics, different types of neural models.

Course Outcome

On completion of this course, the students will be able to

CO 1: Define Artificial Neural Network & its similarity to biological neural network and explain its application in our day to day life.

CO 2: Analyze ANN learning, Error correction learning, Hebbian learning, Competitive learning and Boltzman Learning.

CO 3: Implement simple perceptron, Perceptron Learning rule, modified perceptron learning rule, feed forward neural network & feedback Neural Network.

CO 4: Explain self-organizing Map, Hopfield network, Adaptive resonance theory and its various learning rules.

CO 5: Analyze memory-based learning, Associative learning, Bi-directional learning and Auto associative learning.

Modules	Blooms level*	Number of hours
Module-I Artificial Neural Networks (ANN) and biological neural networks, supervised and unsupervised learning rules, neural network applications	L1, L2 and L3	6
Module-II Unsupervised learning:- Hebbian learning and competitive learning. Supervised learning:- Back propagation algorithms, Learning rule:- Delta learning rule, Widrow-Hoff learning rule, Winner-Take-All learning rule	L1, L2 and L3	6
Module-III Feed forward neural network, feed backward neural network, Perceptron and its learning law, single-layer perceptron, multi-layer perceptron.	L2, L3 and L4	6
Module-IV Self organizing networks: Kohonen algorithm, Hopfield Networks: Hopfield	L2, L3 and L4	6

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network algorithm, Adaptive resonance theory: Network and learning rules.		
Module V Associative memory, auto-associative memory, bi-directional associative memory.	L2, L3 and L4	6

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

TextBook:

- Kenji Suzuki (ed.) - InTech , 2013
- Todd Troyer - University of Texas at San Antonio, 2005.

Reference Book:

- MATLAB 2017 Book released by MATWORS

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1												1			
CO2	1												1		1	
CO3		1	2										1			
CO4		1	2	1									1		1	
CO5			2										1			

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ECE2422	ARTIFICIAL NEURAL NETWORK LAB	L	T	P	C
Version 2019.1	Date of Approval: May 21, 2019	0	0	2	1
Pre-requisites/Exposure	Basics of MATLAB				
Co-requisites	NIL				

Catalog Description

In this Lab course first student should learn about advanced level of software used for easy calculation and toolbox used for software like MATLAB.

Course Objectives

The objective of this course is to

- Make the students apply knowledge of various neural models required for solving complex problems.
- Provide a demonstration of different types of image processing techniques through MATLAB toolbox.

Course Outcomes

On completion of this course, the students will be able to

CO1: Acquiring knowledge of Basics of High-end calculation software and need in Computer Science & engineering

CO2: Demonstrate the All preliminary functions in MATLAB

CO3: Apply the knowledge of all the basics function and toolbox knowledge of MATLAB

CO4: Demonstrate the Neural Network model in MATLAB

CO5: Demonstrate usage of applications involving with Image processing & Its Toolbox used by MATLAB

Modules/Topics Covered**	Blooms level*	Number of hours
Introduction of MATLAB (a) Basic Variable declaration & its operation (b) Function use & its application	L3, L5	4
Sample Programs in MATLAB (a) Basic use of Matrix and Graph Plotting (b) Different type of graph plotting with use of different -2 type of data	L3, L5	6
Sample Programs using MATLAB functions (a) Create a basic program MATLAB using functions (b) Use of basic function Image processing (c) Practice on Basic function of Image processing tool box.	L3, L5	6
Sample programs of ANN functions (a) Practice on ANN toolbox function in MATLAB	L3, L5	6

(b) Write a program for training a small network in MATLAB		
Sample Programs using ANN tool box & Image processing toolbox (a) Demonstrate the use of ANN tool box & Image processing toolbox and write a program after combining it.	L3, L5	2

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

*** Sample Programs provided are not limited to these only, can include others as desired.*

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

IA					EE
Components	A	PR	LR	V	70
Weightage (%)	5	10	10	5	

Note: IA –Internal Assessment, A – Attendance, PR – Performance, LR – Lab Record, V – Viva, EE- External Exam

Text Books

- Kenji Suzuki (ed.) - InTech , 2013
- Todd Troyer - University of Texas at San Antonio , 2005

Reference Books

- MATLAB 2017 Book released by MATWORS.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	2	1	--	--	--	--	--	--	--	--	--	--	2	--	--	--
CO2	3	1	--	--	--	--	--	--	--	--	--	--	1	2	--	--
CO3	2	1	2	--	--	--	--	--	--	--	--	--	1	2	--	--
CO4	1	3	2	--	--	--	--	--	--	--	--	--	2	--	2	--
CO5	1	3	--	--	--	--	--	--	--	--	--	--	1	--	--	--

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ECE2419	JAVA PROGRAMMING	L	T	P	C
Version 2019.1	Date of Approval: May 21, 2019	2	0	0	2
Pre-requisites/Exposure	Basics of Programming				
Co-requisites	NIL				

Catalog Description

The objective is to impart programming skills used in this object-oriented language java. The course explores all the basic concepts of core java programming like object, classes, data types, features, operators, control structures, interfaces, packages, applets, awt, swings and socket programming. The students are expected to learn it enough so that they can develop the basic applications as well as web solutions like creating applets etc.

Course Objectives

The objective of this course is to

- Equip the students with the basic feature of contemporary java required in solving complex problems.
- Provide a practical knowhow and implementation of java programming concepts like classes, objects, packages, swings, socket programming.

Course Outcomes

On completion of this course, the students will be able to

- CO1: Define and explain concept of byte code and platform independence, demonstrate basic java-based application development using operators, if-else, loops and arrays.
- CO2: Distinguish between various types of inheritances, polymorphisms and other concepts and able to solve complex programming problems involving class objects, inheritances, and packages.
- CO3: Describe hierarchy of exception classes and thread life cycle along with demonstrate and design solutions for some simple and complex applications using exception and multithreading concepts.
- CO4: Explain event delegation model and describe AWT class hierarchy; Apply knowledge of event handling and AWT controls create some new dynamic graphical applications.
- CO5: Explain the architecture of applet and concept of swing package. Demonstrate applications based on java applets and swings.

Modules	Blooms level*	Number of hours
Module I: Java Basics Concepts of OOP, Features of Java, How Java is different from C++, Environmental setup, Basic syntax, Objects and classes, Basic Data Types, Variable Types, Modifier Types, Basic operators, Loop Control, Decision Making, Strings and Arrays, Methods, I/O.	L1, L2 and L3	6
Module II: Java Object Oriented Inheritance, Overriding, Polymorphism, Abstraction, Encapsulation, Interfaces, Packages, Exploring java.util package.	L2 and L3	7
Module III: Exception Handling and Threading Exception Hierarchy, Exception Methods, Catching Exceptions, Multiple catch Clauses, Uncaught Exceptions Java's Built-in Exception. Creating, Implementing and Extending thread, thread priorities,	L2, L3 and L5	8

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synchronization suspending, resuming and stopping Threads, Multi-threading.		
Module IV: Event Handling And AWT Event handling Mechanism, Event Model, Event Classes, Sources of Events, Event Listener Interfaces, AWT: Working with Windows, AWT Controls, Layout Managers	L2, L3, L4 and L5	8
Module V: Java Advanced AppletClass, Architecture, Skeleton, Display Methods.Swings: Japplet, Icons, labels, Text Fields, Buttons, Combo Boxes.Socket Programming: Socket methods, Server Socket methods, Socket Client and Socket Server examples.	L2 and L3	7

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

Text:

- "JAVA The Complete Reference" by Patrick Naughton & Herbert Schild, 10th Edition, TMH
- "Introduction to JAVA Programming a primer", E.Balaguruswamy, 4th Edition, TMH

References:

- "Introduction to JAVA Programming" By Daniel/Young PHI
- "Java Script", By Jeff Frentzen and Sobotka, Tata McGraw Hill, 1999

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	2	1	--	--	--	--	--	--	--	--	--	--	2	--	--	--
CO2	3	1	--	--	--	--	--	--	--	--	--	--	1	2	--	--
CO3	2	1	2	--	--	--	--	--	--	--	--	--	1	2	--	--
CO4	1	3	2	--	--	--	--	--	--	--	--	--	2	--	2	--
CO5	1	3	--	--	--	--	--	--	--	--	--	--	1	--	--	--

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ECE2420	JAVA PROGRAMMING LAB	L	T	P	C
Version 2019.1	Date of Approval: May 21, 2019	0	0	2	1
Pre-requisites/Exposure	Basics of Programming				
Co-requisites	NIL				

Catalog Description

In this Lab course the basic features of contemporary java are implemented and demonstrated. Problems or programs will be related to concepts of classes, objects, threads, packages, exception handling, applets, AWT control, swings and socket programming. Concepts covered would enable them to create basic and complex console and graphical based applications for desktop and Internet

Course Objectives

The objective of this course is to

- Equip the students to apply knowledge of various basic java features required in solving basic and complex problems.
- Provide a demonstration of basic java programming concepts like classes, objects, threads, packages, exception handling, applets, AWT control, swings and socket programming

Course Outcomes

On completion of this course, the students will be able to

CO1: Apply the concepts learned of operators, if-else, loops and arrays to javabased application development.

CO2: Demonstrate the use of various types of inheritances, polymorphisms, class objects, inheritances, packages and other concepts to basic and complex java programming problems.

CO3: Apply the knowledge of exception handling and multithreading concepts for some simple and complex applications.

CO4: Apply knowledge of event handling and AWT controls to create some new dynamic graphical applications.

CO5: Demonstrate graphical applications based on java applets, swings and event handling.

Modules/Topics Covered**	Blooms level*	Number of hours
1. Sample Programs using Objects and classes, Variable Types, Modifier Types, operators, Loops Decision Making, Strings and Arrays, (a) WAP to display "Hello, it's a first program in java". (b) WAP to find sum of two integers taken as input from user at runtime. (c) WAP to find sum of two float numbers taken as command line arguments (d) WAP to find changed case of entered character. (e) WAP to find maximum of 3 integer numbers taken as input from user at runtime. (f) WAP in java to find out the greatest out of ten numbers stored using arrays. (g) WAP to create class with "name" as String and "age" as integer data members. The class should have two methods to take input from user and display the data.	L3, L5	6

(h) WAP to find factorial of a number using class and object.		
<p>2. Sample Programs using Inheritance, Overriding, Polymorphism, Interfaces, Packages</p> <p>a. WAP in java to illustrate the concept of interfaces.</p> <p>b. WAP to create a package as MyPack having a class with three methods: max, fact and show. Use it in other folder with setting classpath and without setting class path.</p> <p>c. Write a program in java to showcase uses of super keyword</p>	L3, L5	4
<p>1. Sample Programs using exception handling and threads</p> <p>a) Write a program to demonstrate the use of nesting of try-catch block</p> <p>b) WAP in java to illustrate the concept of using multiple catch clauses to handle different types of exceptions.</p> <p>c) WAP in java to create a user defined Exception and throw it explicitly.</p> <p>d) Demonstrate thread using Thread class and Runnable interface</p> <p>e) Demonstrate various thread methods using a program</p>	L3, L5	6
<p>(a) Sample Programs using event handling and AWT controls</p> <p>(b) Write a program to display “hello” in different color where user clicks left mouse button and “world” where right mouse button is clicked. Use black background.</p> <p>(c) WAP in java to create a Frame and handle window-closing event implementing the WindowListener interface.</p> <p>(d) WAP to create an Applet having various different buttons, recognizing them using action command string method and handling click event generated by them.</p> <p>(e) WAP to create a frame and illustrate the concept of using an adapter class in place of interfaces for handling various mouse events generated over frame window.</p> <p>(f) WAP in java to create a frame with AWT controls (like label, push buttons, Checkbox, Checkbox Group) and handle various events generated by them.</p> <p>(g) WAP in java to create a frame with various AWT controls (like choice, list, TextField and Buttons) and handle the events thrown by them.</p>	L3, L5	6
<p>5. Sample Programs using applets, swings and stream socket</p> <p>a) . Write an applet which will display “HAPPY” and “DEEPAVALI” as: The word “HAPPY” will roll from top to bottom and “DEEPAVLI” from bottom to “top” . Both will run at the same speed and stop simultaneously at the center of the applet.</p> <p>b) Write an applet to display last 32 shades of red, green and blue in equal sized square grid accompanied by appropriate labels like” Last 32 shades of Red/Green/Blue color”. Make use of BorderFactory to apply border for each individual shade.</p> <p>c) Create an applet with one single button with caption “Click”. On clicking the button will open a new Frame with title “Factorial”. The frame will have two three controls :TextField, Label and button. On clicking button calculate the factorial entered in TextField control.</p> <p>d) Create Java programs to demonstrate day time client and server</p> <p>e) Create java programs to create echo client and server</p>	L3, L5	2

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

** Sample Programs provided are not limited to these only, can include others as desired.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

IA					EE
Components	A	PR	LR	V	35
Weightage (%)	5	10	10	5	

Note: IA –Internal Assessment, A – Attendance, PR – Performance, LR – Lab Record, V – Viva, EE- External Exam

Text:

- “JAVA The Complete Reference” by Patrick Naughton & Herbert Schild, 10th Edition, TMH
- “Introduction to JAVA Programming a primer”, E. Balaguruswamy, 4th Edition, TMH

References:

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- “Java Script”, By Jeff Frentzen and Sobotka, Tata McGraw Hill, 1999

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	2	1	--	--	--	--	--	--	--	--	--	--	2	--	--	--
CO2	3	1	--	--	--	--	--	--	--	--	--	--	1	2	--	--
CO3	2	1	2	--	--	--	--	--	--	--	--	--	1	2	--	--
CO4	1	3	2	--	--	--	--	--	--	--	--	--	2	--	2	--
CO5	1	3	--	--	--	--	--	--	--	--	--	--	1	--	--	--

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ECE2415	DATABASE MANAGEMENT SYSTEMS	L	T	P	C
Version 2019.1	Date of Approval: May 21, 2019	2	0	0	2
Pre-requisites/Exposure	Computer Fundamentals and Mathematics Set Theory				
Co-requisites	Nil				

Catalog Description

This course is design to get students familiar with the fundamentals & basic concepts in Data Base Management Systems and their use. This course discusses architecture of Database Systems with concept of different types of available database model, concurrency techniques and new applications of the DBMS. The techniques for database design, normalization, database recovery and protection will enable students to work easily and efficiently on real databases.

Course Objectives

The objective of this course is

- To make students familiar with the fundamental and necessary concepts of DBMS.
- Provide an overview of normalization, concurrency techniques and database recovery with examples.

Course Outcomes

On completion of this course, the students will be able to

CO1. Differentiate between traditional data processing system and database management system and understand characteristics and applications of DBMS in real world.

CO2. Explain and use different data models such as Entity Relationship Model, Network, and Relational Model etc.

CO3. Solve queries using relational algebra, relational calculus and SQL.

CO4. Illustrate normalization concepts and apply them in real database applications.

CO5. Explain database concurrency techniques and recovery mechanisms.

Modules	Blooms level*	Number of hours
Module I: Introduction Concept and goals of DBMS, Database Languages, Database Users, Database Abstraction. Basic Concepts of ER Model, Relationship sets, Keys, Mapping, Design of ER Model.	L1, L2 and L6	9
Module II: Hierarchical model & Network Model Concepts, Data definition, Data manipulation and implementation. Network Data Model, DBTG Set Constructs, and Implementation	L1 and L2	9
Module III: Relational Model Relational database, Relational Algebra, Relational & Tuple Calculus.	L1 and L3	10
Module IV: Relational Database Design and Query Language SQL, QUEL, QBE, Normalization using Functional Dependency, Multivalued dependency and Join dependency.	L2, L3 and L4	10

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Module V: Concurrency Control and New Applications Transaction basics: ACID property, Lifecycle of Transaction, Why Concurrency Control, Schedule, Serializability, Lock Based Protocols, Time Stamped Based Protocols, Deadlock Handling, Crash Recovery. Distributed Database, Objective Oriented Database, Multimedia Database, Data Mining, Digital Libraries.	L2, L3 and L4	10
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**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

Text Books

- Korth, Silberschatz, "Database System Concepts", TMH, 4th Ed., 2000.
- Elmsari and Navathe, "Fundamentals of Database Systems", A. Wesley, 6th Ed., 2004

Reference Books

- Date C. J., "An Introduction to Database Systems", Narosa Publishing, 7th Ed., 2004

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	2	--	--	--	--	--	--	--	--	--	--	1	--	-	-
CO2	1	1	2	3	--	--	--	--	--	--	--	--	1	--	--	--
CO3	1	2	2	3	--	--	--	--	--	--	--	--	1	2	--	--
CO4	--	1	2	--	--	2	--	3	--	--	--	--	1	1	-	-
CO5	1	1	3	--	--	--	--	--	2	--	--	--	1	--	-	3

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ECE2416	DATABASE MANAGEMENT SYSTEMS LAB	L	T	P	C
Version 2019.1	Date of Approval: May 21, 2019	0	0	2	1
Pre-requisites/Exposure	Basic Concepts of DBMS				
Co-requisites	Relational Algebra and Relational Calculus				

Catalog Description

This course is designed to get students familiar with the basic concepts of SQL including DDL, DML and DCL statements. The course also explains the basic concepts of PL/SQL. Students will learn practical on Oracle software and hence can work on any RDBMS software in future.

Course Objectives

The objective of this course is

- To make students familiar with the concepts and working of SQL.
- Provide an overview of PL/SQL.

Course Outcomes

On completion of this course, the students will be able to

CO1. Illustrate SQL basic concepts like languages DDL, DML etc., data types and working.

CO2. Explain concepts of database creation, manipulation of data and data retrieval and apply them in real database applications.

CO3. Design and implement various data constraints on a database for a given problem.

CO4. Solve queries using concepts like joins, subqueries, aggregate functions, triggers etc.

CO5. Prepare PL/SQL blocks.

Modules	Blooms level*	Number of hours
Lab Session 1 Introduction of RDBMS, Oracle, SQL and data types.	L1 and L2	2
Lab Session 2 Basic concept of database creation and manipulation of data.	L1 and L3	2
Lab Session 3 Working with SELECT query.	L1 and L3	2
Lab Session 4 To apply data constraints on a table-Primary Key, Not Null, Unique.	L1 and L3	2
Lab Session 5 Working with Foreign Key and Check Constraint.	L1 and L3	2
Lab Session 6 To implement the basic concept of Aggregate and Grouping Functions.	L1 and L3	2
Lab Session 7 To apply various set operators on data.	L1 and L3	2
Lab Session 8 Concept of Nested queries in database and its application in database.	L1 and L3	2
Lab Session 9	L1 and	2

Implementation different types of JOINS in database.	L3	
Lab Session 10 Basic concepts of Triggers and Procedures and related queries.	L1 and L3	2
Lab Session 11 Introduction to PL/SQL and basic syntax.	L1 and L3	2
Lab Session 12 Write programs in PL/SQL Using Control Structures.	L3	2

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

Text Books

- Ivan Bayross , “SQL, PL/SQL the Programming Language of Oracle”, 4th Ed., BPB Publications,2009.
- Lynn Beighley, “Head First SQL”, 1st Ed., O'Reilly, 2007.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	2	--	--	--	--	--	--	--	--	--	--	1	--	-	-
CO2	1	-	2	--	--	3	--	--	--	--	--	2	1	--	1	-
CO3	1	-	1	--	--	3	--	--	--	--	--	2	1	1	2	-
CO4	1	-	2	--	--	--	--	--	--	--	--	--	1	1	--	--
CO5	1	-	2	--	--	--	--	--	2	--	--	--	1	1	--	-

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ECE2501	DIGITAL CIRCUITS & SYSTEMS	L	T	P	C
Version 2019.1	Date of Approval: May 21, 2019	3	0	0	3
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

This course explores the theory and operation of the basic building blocks of digital electronics which includes combinational and sequential circuits. This course also explains the logic families and data convertors. The concepts learnt in the studies of sequential circuits will be applied in the design and analysis of Melay and Moore machines.

Course Objectives

The objective of this course is to

- Provide the basic knowledge of digital logic levels and application of combinational and sequential circuits.
- Equip with the understanding of logic family and data convertors.

Course Outcomes

On completion of this course, the students will be able to

CO1: Explain the various logic gates, Boolean algebra and solve the k-map & tabulation method to simplify the logical function.

CO2: Explain the adder & subtractor; Apply and analyze multiplexer, decoder & encoder to design Boolean function.

CO3: Describe flip flops, shift registers & Design counters and synchronous sequential circuits.

CO4: Explain & compare different logic families and explain data convertors.

Modules	Blooms level*	Number of hours
MODULE 1: BOOLEAN FUNCTIONS Analog & digital signals, AND, OR, NOT, NAND, NOR , XOR & XNOR gates, Boolean algebra, DeMorgan's theorems, Implementation of logical function using only NAND/NOR gates, 1's complement and 2's complement, BCD to Gray and Gray to BCD code conversion, Standard representation of logical functions (SOP and POS forms), K-map representation and simplification of logical function up to five variables, don't care conditions, XOR & XNOR simplifications of K-maps, Tabulation method.	L1,L2 and L3	6
MODULE 2: COMBINATIONAL CIRCUITS Adders, Subtractors, Implementation of full adder using half adder, full subtractor using half subtractor, Multiplexer, de-multiplexer, decoder & encoder, code converters, 1 & 2 bit comparators, BCD to seven segment decoder/encoder, Implementation of logic functions using multiplexer/de-multiplexer and decoder, Implementation of 16×1 MUX using 4×1 MUX, 4×16 decoder using 3×8 decoder etc., logic implementations using PROM, PLA & PAL.	L1, L2,L3 and L4	6
MODULE 3:	L2,L3, L4	7

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SEQUENTIAL CIRCUITS Difference between combinational and sequential circuits, Latch, Flip-flops: SR, JK, D & T flip flops – Truth table, Excitation table, Conversion of flip-flops, set up and hold time, race around condition, Master Slave flip flop, Shift registers: SIPO, PISO, PIPO, SIPO, Bi-directional, 4-bit universal shift register; Counters: Asynchronous/ripple & synchronous counters – up/down, Ring counter, sequence detector.	and L5	
MODULE 4: LOGIC FAMILIES&DATA CONVERTERS Logic families: Special characteristics (Fan out, Power dissipation, propagation delay, noise margin), working of RTL, DTL, TTL, ECL and CMOS families; Data converters: Special characteristics, ADC – successive approximation, linear ramp, dual slope; DAC – Binary Weighted, R-2R ladder type.	L1, L2,L3 and L4	5

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

Text Books

- Anand Kumar, “Fundamentals of Digital Circuits”, 2nd Edition, Prentice-Hall, 2004
- Moris Mano, “Digital Design”, 2nd Edition, Pearson Education,2007.
- R.P. Jain, “Modern Digital Electronics”, 2nd Edition, Tata Mcgraw Hill, 2003

Reference Books

- Thomas L. Floyd, “Digital Fundamentals”, 11th Edition, Pearson Education, 2015
- Malvino and Leech, “Digital Principles & Applications”, 1st Edition, Tata McGraw Hill, 1993

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS O 1	PS O 2	PS O 3	PSO 4
CO 1	1	2	3	--	--	--	--	--	--	--	--	--	1	--	--	--
CO 2	1	2	3	--	--	--	--	--	--	--	--	2	1	--	--	3
CO 3	1	2	1	--	--	--	--	--	--	--	--	2	1	--	--	3
CO 4	2	3	3	--	--	--	--	--	--	--	--	--	1	--	--	3

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ECE2502	DIGITAL COMMUNICATION	L	T	P	C
Version 2019.1	Date of Approval: May 21, 2019	2	0	0	2
Pre-requisites/Exposure	Signal and System				
Co-requisites					

Catalog Description

The purpose of this course is to introduce students to the basic principles of the design and analysis of digital communication systems. It will provide a thorough study of digital modulation techniques and receiver design.

Course Objectives

The objective of this course is to

- Provide a thorough introduction to digital communications
- Provide in depth study of various analog and digital modulation techniques.
- Introduce students to basics of multiplexing in digital signals.

Course Outcomes

On completion of this course, the students will be able to

CO1. Define and distinguish analog and digital communication systems.

CO2. Compare different analog and digital modulation techniques and their receiver design.

CO3. Explain the concepts of digital multiplexing.

Modules	Blooms level*	Number of hours
MODULE I: DIGITAL COMMUNICATION SYSTEM BASICS Basic building blocks of Digital communications, analog versus digital communication, Advantages disadvantages of digital communications.	L1 and L2	4
MODULE II: DIGITAL BASEBAND TRANSMISSION Pulse code modulation, Signal to quantization ratio, non-uniform quantization companding, BW calculations.	L1, L2, and L4	8
MODULE III: TRANSMISSION OF ANALOG SAMPLES Delta Modulation, Adaptive delta-modulation, DPCM, ADCM, ADPCM, Matched Filter Receiver, Derivation of Its Impulse Response and Peak Pulse Signal to Noise Ratio. Correlator receiver, Decision Threshold and Error Probability For, Unipolar (ON-OFF) Signaling, ISI, Nyquist Criterion For Zero ISI & Raised Cosine Spectrum	L1, L2 and L4	9
MODULE IV: DIGITAL MODULATION TECHNIQUES Gram-Schmidt Orthogonalization Procedure, Types of Digital Modulation, Wave forms for Amplitude, Frequency and Phase Shift Keying, Method of Generation and Detection of Coherent & Non-Coherent Binary ASK, FSK & PSK Differential Phase Shift Keying, Quadrature Modulation Techniques QPSK, Probability of Error and Comparison of Various Digital Modulation Techniques.	L1, L2 and L4	6

MODULE V: DIGITAL MULTIPLEXING Fundamentals of Time Division Multiplexing, Electronic Commutator, Bit, Byte Interleaving T1 Carrier System, Synchronization and Signaling of T1, TDM, PCM Hierarchy, T1 to T4 PCM TDM System (DS1 to DS4 Signals)	L1 and L2	4
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**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5:Synthesis, L6:Evaluation

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

Text Books

- B. P. Lathi and Zhi Ding ,“Modern Digital and Analog Communication Systems”, Fourth Edition, Oxford University Press, 2009
- Wayne Tomasi, “Electronic Communication systems”, 5th edition, Pearson Education,2008

Reference Books

- Simon Haykin, “Communication Systems”, Third Edition, John Wiley & Sons,2007
- Taub and schilling, “Principles of Communication Systems”, Third Edition, TMH,2008


CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS O 1	PS O 2	PS O 3	PS O 4
CO 1	1	--	--	--	--	2	--	--	--	--	--	--	1	--	2	--
CO 2	1	3	2	--	--	2	--	--	--	--	--	--	1	--	2	--
CO 3	1	3	2	--	--	2	--	--	--	--	--	--	1	--	2	--

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ECE2503	CONTROL SYSTEM	L	T	P	C
Version 2019.1	Date of Approval: May 21, 2019	2	1	0	3
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

This course provides the students the core knowledge of control systems. This introduces the methods of mathematical modeling of control systems with time & frequency domain analysis along with concepts of stability.

Course Objectives

The objective of this course is to

- Equip the students with concepts of Control System.
- Provide the students in depth knowledge of time domain, frequency domain and concepts of stability.

Course Outcomes

On completion of this course, the students will be able to

CO1. Understand and compare between types of control system and find mathematical model of control system.

CO2. Understand, explain and solve problems on time domain analysis.

CO3. Understand, explain and solve problems on frequency domain analysis.

CO4: Analysis of control system stability

Modules	Blooms level*	Number of hours
Module 1: Input / Output Relationship Introduction of open loop and closed loop control systems, mathematical modeling and representation of physical systems (Electrical Mechanical and Thermal), derivation of transfer function for different types of systems, block diagram & signal flow graph, Reduction Technique, Mason's Gain Formula.	L1, L2, L3 and L4	12
Module 2: Time – Domain Analysis Time domain performance criteria, transient response of first, second & higher order systems, steady state errors and static error constants in unity feedback control systems, error criteria, generalized error constants, performance indices, response with P, PI and PID Controllers.	L1, L2 and L3	12
Module 3: Frequency Domain Analysis Polar and inverse polar plots, frequency domain specifications, Logarithmic plots (Bode Plots), gain and phase margins, relative stability, Correlation with time domain, constant close loop frequency responses, from open loop response, Nyquist Plot.	L1, L2 and L3	12
Module 4: Concept of Stability Asymptotic stability and conditional stability, Routh – Hurwitz criterion, Root	L1, L2, L3 and L4	12

Locus plots and their applications. Compensation Techniques: Concept of compensation, Lag, Lead and Lag-Lead networks, design of closed loop systems using compensation techniques. P, PI, PID controllers.		
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**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;

Att: Attendance

Text Books

- Dr. N.K Jain, 2005, "Automatic Control System Engineering", Dhanpat Rai Publication.
- J. Nagrath & M. Gopal, 2000, "Control System Engineering", New Age International.

References Books:

- B. C. Kuo, 2001, "Automatic Control system, Prentice Hall of India.
- M, K. Ogata, 2002, "Modern Control Engineering, PHI.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	1	-	2	3	-	-	-	-	-	-	3	-	1	-	2
CO2	1	1	-	3	3	-	-	-	-	-	-	3	-	1	-	3
CO3	1	1	-	3	3	-	-	-	-	-	-	3	-	1	-	3
CO4	1	1	-	2	3	-	-	-	-	-	-	3	-	1	-	2

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ECE2509	MICROPROCESSOR SYSTEMS	L	T	P	C
Version: 2019.1	Date of Approval: May 21, 2019	3	0	0	3
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

This course deals with the systematic study of the Architecture and programming issues of microprocessor family and its applications. The aim of this course is

- To introduce students with the architecture and operation of typical microprocessors.
- To familiarize the students with the programming and interfacing of microprocessors
- To provide the basic knowledge of the microprocessor needed to develop the embedded system based products as a solution to real time problems.

Course Outcomes

On completion of this course, the students will be able to

CO1. Explain the architecture, pin configuration, addressing modes, control words, timing diagram, instruction set of 8085 microprocessors and Interfacing ICs

CO2. Explain the architecture, pin configuration, addressing modes, control words of 8086, 8087 and other 16 bit microprocessors and Interfacing ICs

CO3. Develop the assembly language program using 8085 using stacks & subroutines.

CO4. Design circuitry to the Microprocessor I/O ports in order to interface the processor to external devices so as to provide solutions real-world control problems

Modules	Blooms level*	Number of hours
Module I: Introduction to Microcomputer Systems Introduction to Microprocessors and microcomputers, Study of 8 bit Microprocessor, 8085 pin configuration, Internal Architecture and operations, interrupts, Stacks and subroutines, various data transfer schemes.	L1, L2, L3, L4	6
Module II: ALP and timing diagrams Introduction to 8085 instruction set, advance 8085 programming, Addressing modes, Counters and time Delays, Instruction cycle, machine cycle, T-states, timing diagram for 8085 instruction.	L4, L5, L6	8
Module III: Memory System Design & I/O Interfacing Memory interfacing with 8085. Interfacing with input/output devices (memory mapped, peripheral I/O), Cache memory system. Study of following peripheral devices 8255, 8253, 8257, 8259, 8251.	L3, L4, L5, L6	9
Module IV: Architecture of 16-Bit Microprocessor Difference between 8085 and 8086, Block diagram and architecture of 8086 family, pin configuration of 8086, minimum mode & maximum mode Operation, Bus Interface Unit, Register Organization, Instruction Pointer, Stack & Stack pointer, merits of memory segmentation, Execution Unit, Register Organization.	L2, L3, L4	7
Module V: Pentium Processors	L1, L2	6

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Internal architecture of 8087, Operational overview of 8087, Introduction to 80186, 80286, 80386 & 80486 processors, Pentium processor (P-II, P-III, P-IV).

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

Text Books

- Douglas Hall, Microprocessor and Interfacing:, Tata McGraw Hill, 2017
- Gaonkar R. S , Microprocessor Architecture, Programming and Applications, Wiley

Reference Books

- Yu Cheng Liu & Glen A. Gibson, Microcomputer Systems: 8086/8088 family Architecture, Programming and Design, PHI Publication, 2016.
- Ram B., Fundamentals of Microprocessors and Microcomputers, DhanpatRai& Sons, 2017

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO4
CO1	1	2	--	--	--	--	--	--	--	--	--	--	3	2	1	
CO2	1	1	2	3	--	--	--	--	--	--	--	--	3	3	2	
CO3	-	-	-	1	2	3	--	--	--	--	--	--		2	2	1
CO4	-	-	-	1	--	2	--	--	2	3	3	--		2	2	1

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ECE2504	DIGITAL CIRCUITS AND SYSTEMS LAB	L	T	P	C
Version 2019.1	Date of Approval: May 21, 2019	0	0	2	1
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

In this Lab course the combination and sequential circuits are designed and their functionality is verified using truth table. Concepts covered would enable them to create complex circuits related to digital design. The objective of this course is to explore and implement the various features of digital logic using basic logic gates.

Course Objectives

The objective of this course is to

- Provide a basic knowledge of digital logic levels and application of knowledge to understand digital electronics circuits.
- Equip with understanding of different combinational and sequential circuits.

Course Outcomes

On completion of this course, the students will be able to

CO 1: Demonstrate the basic concept of logic gates;

CO 2: Illustrate the adder and subtractors.

CO 3: Demonstrate the code convertors.

CO 4: Demonstrate the combinational and sequential circuits.

Modules/Topics Covered**	Blooms level*	Number of hours
1. To verify the truth tables of NOT, OR, AND, NOR, NAND, XOR, XNOR gates.	L3, L5	2
2. To obtain half adder, full adder using gates and verify their truth tables.	L3, L5	2
3. To obtain half subtractor, full subtractor using gates and verify their truth tables.	L3, L5	2
4. To implement control circuit using multiplexer.	L3, L5	2
5. To convert BCD code into excess 3 code and verify the truth table.	L3, L5	2
6. To verify the truth tables of RS, D, JK and T flip- flops.	L3, L5	2
7. To implement and verify 3-bit bi-directional shift register.	L3, L5	2
8. To design and study asynchronous/ripple counter.	L3, L5	2
9. To design and study synchronous counter.	L3, L5	2
10. To design and study a sequence detector.	L3, L5	2

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

IA					EE
Components	A	PR	LR	V	70
Weightage (%)	5	10	10	5	

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Note: IA –Internal Assessment, A – Attendance, PR – Performance, LR – Lab Record, V – Viva, EE- External Exam

Text Books

- Anand Kumar, “Fundamentals of Digital Circuits”, 2nd Edition, Prentice-Hall, 2004
- Moris Mano, “Digital Design”, 2nd Edition, Pearson Education, 2007.
- R.P. Jain, “Modern Digital Electronics”, 2nd Edition, Tata Mcgraw Hill, 2003

Reference Books

- Thomas L. Floyd, “Digital Fundamentals”, 11th Edition, Pearson Education, 2015
- Malvino and Leech, “Digital Principles & Applications”, 1st Edition, Tata McGraw Hill, 1993

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	3	1	--	--	--	--	--	--	--	--	--	--	1	--	--	3
CO2	3	1	--	--	--	--	--	--	--	--	--	--	1	--	--	3
CO3	3	1	--	--	--	--	--	--	--	--	--	--	1	--	--	3
CO4	2	1	--	--	--	--	--	--	--	--	--	--	1	--	--	3

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ECE2505	MICROPROCESSOR SYSTEMS LAB	L	T	P	C
Version: 2019.1	Date of Approval: May 21, 2019	0	0	2	1
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

This course focuses on the systematic study of the Architecture and programming of microprocessor family and its applications. The objectives of this course are:

- To introduce students with the architecture operation and instruction set of 8085 and 8086 microprocessors.
- To familiarize the students with the programming and interfacing of 8085 and 8086 microprocessors.
- To provide the basic knowledge of the microprocessor needed to develop the embedded system based products as a solution to real time problems.

Course Outcomes

On completion of this course, the students will be able to

CO1. Set up programming strategies and select proper mnemonics and run their program on the training boards

CO2. Develop assembly language programs for various problems keeping in mind technical issues and evaluate possible causes of discrepancy in practical experimental observations in comparison.

CO3. Understand the concepts related to I/O and memory interfacing and design interfacing circuits with 8085 by making use of different peripheral devices.

Modules	Blooms level*	Number of hours
Lab Session 1: ALP using 8085: <ol style="list-style-type: none"> 1. Write at least three different programs for addition of two 8 bit numbers assuming carry may or may not be generated. 2. Write at least three different programs for subtraction of two 8 bit numbers assuming borrow may or may not be generated. 3. Write two different programs for 16 bit addition, one using instruction DAD and another without using instruction DAD. 4. Write assembly language program for 8 bit multiplication and division. 	L2, L3, L4	4
Lab Session II: To study, understand, interface and two peripheral devices with 8085.	L4, L5, L6	2
Lab session III: Any three programs using 8085 based on block of data.	L4	1
Lab session IV: ALP using 8086: <ol style="list-style-type: none"> 1. Write an ALP to add list of 10 given numbers. 2. Write an ALP to sum the numbers from 1-100. 3. Write an ALP to count negative numbers from a given list of 10 numbers. 4. Write an ALP to check number of vowels in a given string. 	L2, L3, L4	5

*Bloom's Level:

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

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Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva

Text Books

- Douglas Hall, Microprocessor and Interfacing:, Tata McGraw Hill, 2017
- Gaonkar R. S , Microprocessor Architecture, Programming and Applications, Wiley

Reference Books

- Yu Cheng Liu & Glen A. Gibson, Microcomputer Systems: 8086/8088 family Architecture, Programming and Design, PHI Publication, 2016.
- Ram B., Fundamentals of Microprocessors and Microcomputers, DhanpatRai& Sons, 2017

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO4
CO1	1	2	--	--	--	--	--	--	--	--	--	--	3	2	1	
CO2	1	1	2	3	--	--	--	--	--	--	--	--	3	2	1	1
CO3	-	-	-	1	2	3	--	--	--	--	--	--		2	2	1

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ECE2506	CONTROL SYSTEM LAB	L	T	P	C
Version 2019.1	Date of Approval: May 21, 2019	0	0	2	1
Pre-requisites/Exposure	MATLAB Basics				
Co-requisites	Nil				

Catalog Description

Control System has become an important field for research and development in science and engineering. This course provides the students the core knowledge of control systems. This course introduces the Practical of control system with time & frequency domain analysis along with stability of control systems on kits and MATLAB.

Course Objectives

The objective of this course is to

Perform experiments of control system.

Time & frequency domain analysis along with stability of control systems on kits and MATLAB

Course Outcomes

On completion of this course, the students will be able to

CO1. Perform and analyse experiments on time domain of control system.

CO2. Perform and analyse experiments on frequency domain of control system.

CO3. Perform and analyse experiments for stability of control system.

Modules	Blooms level*	Number of hours
Lab Session 1 1. Study and draw a) Step response of open Loop system (linear 1 st order, 2 nd order) b) Step response of closed loop systems (1 st order) 2. Study and draw temperature control system the open loop response and closed loop response with different values of gains	L2, L3 and L5	3
Lab Session 2 1. Study of operations and characteristics of a stepper motor 2. To Study a D.C. motor speed control system.	L2, L3 and L5	3
Lab Session 3 1. Performance evaluation and design of PID controller. 2. To design a suitable cascade compensator for the given system and verify the resulting improvement.	L2, L3 and L5	3
Lab Session 4 1. Note: three experiments in MATLAB have to be performed in the slot of	L2, L3 and L5	3

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<p>MATLAB.</p> <p>Using MATLAB obtain the unit-step response and unit impulse response of the following system:</p> $\frac{C(s)}{R(s)} = \frac{16}{s^2 + 1.6s + 16}$ <p>2. For a 2nd order transfer function using MATLAB</p> <p>a) Bode Plot</p> <p>b) Root locus plot</p> <p>c) Nyquist plot.</p>		
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**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

Text Books

- Dr. N.K Jain, 2005, “Automatic Control System Engineering”, Dhanpat Rai Publication.
- J. Nagrath & M. Gopal, 2000, “Control System Engineering”, New Age International.
- Rudra Pratap, “Getting started with MATLAB”, Oxford University Press.

References Books:

- B. C. Kuo, 2001, “Automatic Control system, Prentice Hall of India.
- M, K. Ogata, 2002, “Modern Control Engineering, PHI.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	2	-	3	2	--	--	--	--	--	--	2	-	1	-	3
CO2	1	2	-	3	2	--	--	--	--	--	--	2	-	1	-	3
CO3	1	2	-	3	2	--	--	--	--	--	--	2	-	1	-	3

1: strongly related, 2: moderately related and 3: weakly related

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ECE2535	SUMMER INTERNSHIP EVALUATION I	L	T	P	C
Version 2019.1	Date of Approval: May 21, 2019	0	0	0	3
Pre-requisites/Exposure	Basic Concepts of Programming Language and Electronics				
Co-requisites	Nil				

Catalog Description

There are certain phases of every Intern's professional development that cannot be effectively taught in the academic environment. These facets can only be learned through direct, on-the-job experience working with successful professionals and experts in the field. The internship program can best be described as an attempt to institutionalize efforts to bridge the gap between the professional world and the academic institutions. Entire effort in internship is in terms of extending the program of education and evaluation beyond the classroom of a university or institution. The educational process in the internship course seeks out and focuses attention on many latent attributes, which do not surface in the normal classroom situations. These attributes are intellectual ability, professional judgment and decision-making ability, inter-disciplinary approach, skills for data handling, ability in written and oral presentation, sense of responsibility etc. In order to achieve these objectives, each student will maintain a file (**Internship File**). The Internship File aims to encourage students to keep a personal record of their learning and achievement throughout the Programme. It can be used as the basis for lifelong learning and for job applications. Items can be drawn from activities completed in the course modules and from the workplace to demonstrate learning and personal development. The report will assess the student's analytical skills and ability to present supportive evidence, whilst demonstrating understanding of their organization, its needs and their own personal contribution to the organization.

Course Objectives

The objective of this course is to

- Equip the students with concepts of new technologies and practical exposure
- Provide an overview of presentation and preparation of report.

Course Outcomes

On completion of this course, the students will be able to

CO1: Study the literature and identify the problem statement

CO2: Work on a real world problem and solve it using latest technology

CO3: Prepare a detailed report of the project

CO4: Prepare a brief presentation of their project

CO5: Present and explain the project for evaluation

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	V	PPT	R	IM	EM
Weightage (%)	10	10	10	30	70

V – Viva, PPT-Power Point Presentation, R – Report, IP-Internal Marks, EM-External Marks

Text Books

- As per topic of summer internship project is chosen and discussion with guide.

Reference Books

- As per topic of summer internship project is chosen and discussion with guide.

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CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	2	2	--	--	--	--	--	--	--	--	--	-		1	2
CO2	1	2	2	-	--	--	--	--	--	--	--	--	-	-	1	1
CO3	1	2	-	--	--	--	--	--	--	--	--	--	-	-	1	1
CO4	1	2	3	--	--	--	--	--	--	--	--	--	-	-	1	1

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ECE2507	OPERATING SYSTEMS	L	T	P	C
Version: 2019.1	Date of Approval: May 21, 2019	3	0	0	3
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

In this course Operating System, its generic types, characteristics and functions are discussed in detail. Concepts covered would enable students to identify various categories of operating systems, with details about concepts of process management and scheduling. Contents will be helpful in identifying deadlocks in the system and designated approaches used to prevent, handle or recover from them. Further it covers the concepts of managing memory, devices and mechanisms for providing security to system and files using operating system.

Course Objectives

The objective of this course is to

- Equip the students with the knowledge about categories of operating systems and their functions.
- Provide detailed knowhow about functions of operating system like process, memory and device management along with file system security and protection.

Course Outcomes

On completion of this course, the students will be able to

- CO1: Define and explain operating systems and their evolution, also differentiate among its various types.
- CO2: Explain concepts of process and inter-process communication and synchronization. Identify solutions to detect, prevent and handle deadlocks occurring in the operating systems. Solve synchronization and CPU scheduling problems related to processes.
- CO3: Define and explain concepts of memory management like fragmentation, paging and segmentation. Solve problems related to memory management using page replacement algorithms.
- CO4: Describe the concepts of device management and list various disk allocation methods. Determine solutions for disk scheduling problems using available disk scheduling algorithms.
- CO5: State the concept of file and file system security, also distinguish among various file allocation methods.

Modules	Blooms level*	Number of hours
MODULE 1: INTRODUCTION TO OPERATING SYSTEM Operating system and function, Evolution of operating system, Batch, Interactive, multiprogramming, Time Sharing and Real Time System, multiprocessor system, Distributed system, System protection. Operating System structure, Operating System Services, System Program and calls	L1, L2 and L4	6
MODULE 2: PROCESS MANAGEMENT Process concept, State model, process scheduling, job and process synchronization, structure of process management, Threads Interprocess Communication and Synchronization: Principle of Concurrency,	L1, L2 and L3	12

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<p>Producer Consumer Problem, Critical Section problem, Semaphores, Hardware Synchronization, Critical Regions, Conditional critical region, Monitor, Inter Process Communication.</p> <p>CPU Scheduling: Job scheduling functions, Process scheduling, Scheduling Algorithms, Non-Preemptive and preemptive Strategies, Algorithm Evaluation, Multiprocessor Scheduling.</p> <p>Deadlock: System Deadlock Model, Deadlock Characterization, Methods for handling deadlock, Prevention strategies, Avoidance and Detection, Recovery from deadlock combined approach</p>		
<p>MODULE 3: MEMORY MANAGEMENT</p> <p>Single Contiguous Allocation: H/W support, S/W support, Advantages and disadvantages, Fragmentation, Paging, Segmentation, Virtual memory concept, Demand paging, Performance, Paged replaced algorithm, Allocation of frames, Thrashing, Cache memory, Swapping, Overlays</p>	L1, L2 and L3	7
<p>MODULE 4: DEVICE MANAGEMENT</p> <p>Principles of I/O hardware, Device controller, Device Drivers, Memory mapped I/O, Direct Access Memory, Interrupts, Interrupt Handlers, Application I/O interface, I/O Scheduling, Buffering, Caching, Spooling, Disk organization, Disk space management, Disk allocation Method, Disk Scheduling, Disk storage</p>	L1, L2 and L3	7
<p>MODULE 5: FILE SYSTEM AND PROTECTION AND SECURITY</p> <p>File Concept, File Organization and Access Mechanism, File Directories, Basic file system, File Sharing, Allocation method, Free space management. Policy Mechanism, Authentication, Internal excess Authorization</p>	L1 and L2	4

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5:Synthesis, L6:Evaluation

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

Text Books

- Milenekovic, "Operating System Concepts", McGraw Hill
- Silberschatz, P.B. Galvin "Operating System Concepts", John Willey & son

Reference Books

- Dietel, "An introduction to operating system", Addison Wesley
- Tannenbaum, "Operating system design and implementation", PHI
- Operating System, A Modern Perspection, Gary Nutt, Pearson Edu. 2000
- A. S Tanenbaum, Modern Operating System, 2nd Edition, PHI
- Willam Stalling "Operating system" Pearson Education

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CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	2	--	--	--	--	--	--	--	--	--	--	1	2	--	--
CO2	1	2	3	--	--	--	--	--	--	--	--	--	1	2	--	--
CO3	1	2	3	--	--	--	--	--	--	--	--	--	1	2	--	--
CO4	1	2	3	--	--	--	--	--	--	--	--	--	1	2	--	--
CO5	1	--	2	--	--	--	--	--	--	--	--	--	1	--	--	--

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ECE2513	COMPUTER NETWORKS	L	T	P	C
Version 2019.1	Date of Approval: May 21, 2019	3	0	0	3
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

The course provides a unified and fundamental view of the broad field of computer networks. The objective is to acquaint the students with the basics of networking. The world of computer networking is introduced in a top down Approach. A structured approach to explain how networks work from the inside out is being covered. In-depth application coverage includes email, the domain name system; the World Wide Web (both client- and server-side); and multimedia (including voice over IP).

Course Objectives

The objective of this course is to

- To provide an overview of data transmission and computer networks.
- To familiarize with the basic taxonomy and terminology of computer networking area.
- To equip with the knowledge of different protocols and different layers of computer networks.

Course Outcomes

On completion of this course, the students will be able to

- CO1. Explain different concepts of data transmission and apply the knowledge of encoding techniques.
- CO2. Illustrate the concepts and applications of different data communication methods.
- CO3. Explain different concepts of computer networks and its layers.
- CO4: Compare and contrast different layers and protocols used at different layers.

Modules	Blooms level*	Number of hours
Module 1: Data Transmission Analog and Digital transmission, transmission media, line configuration, data communications codes, error detection and correlation methods. Data encoding methods: analog to digital, digital to analog etc.	L1,L2 and L3	6
Module 2: Data Communication Methods Data communication interface, line control unit, UART, USRT, Serial interface, terminal types. SDLC, HDLC, Addressing Switched networks, circuit switching, packet switching, broadcast networks. IEEE 802 LAN Standards, framing, error control, flow control.	L1, L2, L3	7
Module 3: Introduction to Computer Networking Internet, Circuit switching vs Packet switching, Network Access and Physical Media, ISPs, Delay and Loss in Packet Switched Networks, Five Layer concept and their PDUs	L1, L2, L3	5
Module 4:	L2, L3	7

Application layer and Transport layer Application Layer Protocols: Web and HTTP, FTP, SMTP, DNS, brief overview of socket Programming with TCP and UDP Multiplexing and Demultiplexing, UDP, Reliable Data Transfer, UDP segment structure, Reliable Data Transfer, TCP, TCP segment Structure, Basics of Congestion Control	and L4	
Module 5: Network Layer Datagram and virtual circuit, link state routing, distance vector routing, Hierarchical Routing, IP, IPv4 Addressing, IPv6	L2, L3 and L4	4
Module VI: Link Layer and Physical Layer Services Provided, Error Detection and Correction, Multiple Access Protocols, TDM, FDM and CDMA, ALOHA, CSMA, LANs, Ethernet, Hubs, Bridges and Switches, Introduction to PPP The physical layer: Theoretical basis for data communication, transmission media, wireless transmission, telecom infrastructure, PSTN, communication satellites, mobile telephone system	L2, L3 and L4	7

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

Text Books

- James F. Kurose, "Computer Networking: A Top-Down Approach Featuring the Internet", Pearson Education India
- Forouzan, B. A., "Data Communication & networking", McGraw Hill Education.

Reference Books

- Tanenbaum, "Computer Networks" Prentice Hall.
- W. Tomasi, "Advanced Electronic Communication Systems", Pearson Education India.
- James Martin, "Telecommunications & the Computer", 3rd Edition, PHI. 2001
- P. C. Gupta, "Data Communications, PHI, 2001.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	2	--	--	--	--	--	--	--	--	--	--	--	--	1	--
CO2	1	2	3	--	--	--	--	--	--	--	--	--	--	--	1	--
CO3	1	2	2	3	3	--	--	--	--	--	--	--	--	--	1	--
CO4	1	1	2	3	--	--	--	--	--	--	--	--	--	--	1	--

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ECE2508	COMPUTER ARCHITECTURE	L	T	P	C
Version: 2019.1	Date of Approval: May 21, 2019	3	0	0	3
Pre-requisites/Exposure	Logic Gates				
Co-requisites	nil				

Catalog Description

Computer architecture is concerned with the structure and behavior of the various functional modules of the computer and how they interact to provide the processing needs of the user. It includes basic register transfer language and computer organization and design. Complete insight on the working of CPU, Memory and I/O communication will be provided. Pipelining and related topics will also be discussed.

Course Objectives

The objective of this course is to

1. Equip the students with concepts of computer architectures and their modules.
2. Provide an overview of various algorithms used and hardware implementation computer.

Course Outcomes

On completion of this course, the students will be able to

- CO1. Explain about Register transfer language and various micro operations of arithmetic logic unit.
CO2. Explain about the organization of computer modules and their details.
CO3. Explain in details of central processing unit like general purpose register, accumulator etc. and computer arithmetic.
CO4. Explain memory organization of computer and their interconnections. Details of direct memory access.
CO5. Explain parallel processing and pipeline techniques.

Modules	Blooms level*	Number of hours
Module I: Register Transfer Language Register Transfer, Bus and Memory Transfers, Arithmetic Micro-operations, Logic Micro-operations, Shift Micro-operations, Arithmetic Logic shift Unit.	L1, L2 and L3	10
Module II: Basic Computer Organizations and Design Instruction Codes, Computer Registers, Computer Instructions, Timing and Control, Instruction Cycle, Memory-Reference Instructions, Input-Output and Interrupt, Design of Accumulator Logic. Hardwired and Microprogrammed control: Control Memory, Address Sequencing, Design of Control Unit	L1,L2	9
Module III: Central Processing Unit Introduction, General Register Organization, Stack Organization, Instruction representation, Instruction Formats, Instruction type, Addressing Modes, Data Transfer and Manipulation, Program Control, Reduced Instruction Set Computer RISC and CISC Computer Arithmetic: Introduction, Addition and Subtraction Algorithm, Multiplication Algorithms, Booth Multiplication, Division Algorithms, Floating-Point Arithmetic Operations	L1,L2, L3	10

Module IV: Memory and Intersystem Communication and Input output organisation Memory: Memory types and organization Memory Hierarchy, Main Memory, Auxiliary Memory, Associative Memory, Cache Memory with mapping techniques, Virtual Memory, Memory Management Hardware Intrasystem communication and I/O: Peripheral Devices, Input-Output Controller and I/O driver, IDE for hard disk, I/O port and Bus concept, Bus cycle, Synchronous and asynchronous transfer, Modes of Transfer, DMA, DMA Transfer, DMA Controller, I/O Processor, CPU-IOP Communication	L1, L2, L3.	10
Module V: Pipelining, Vector Processing and Multiprocessors Parallel Processing, Pipelining, Arithmetic Pipeline, Instruction Pipeline, RISC Pipeline Multiprocessors: Characteristics of Multiprocessors	L1 and L2	9

*Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	ATT	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

ATT: Attendance, CT: Class Test, S/V/Q: Seminar/Viva/Quiz, HA: Home Assignment, EE: End Semester Examination.

Text Book:

- Morris Mano, Computer System Architecture, 3rd Edition – 1999, Prentice-Hall of India Private Limited.
- Harry & Jordan, Computer Systems Design & Architecture, Edition 2000, Addison Wesley, Delhi.

References Books:

- William Stallings, Computer Organization and Architecture, 4th Edition-2000, Prentice-Hall of India Private Limited.
- Kai Hwang-McGraw-Hill, Advanced Computer Architecture.
- John D. Carpinelli, Computer system Organization & Architecture, Edition 2001, Addison Wesley, Delhi
- M. Morris Mano and Charles, Logic and Computer Design Fundamentals, 2nd Edition Updated, Pearson Education, ASIA.

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO1	1	2	3	3	--	--	--	--	--	--	--	--	2	1	--
CO2	1	--	--	--	--	--	--	--	--	--	--	--	--	2	--
CO3	1	2	3	3	--	--	--	--	--	--	--	--	2	1	--
CO4	1	2	3	3	--	--	--	--	--	--	--	--	2	1	--
CO5	1	--	--	--	--	--	--	--	--	--	--	--	--	1	--

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ECE2601	VLSI DESIGN	L	T	P	C
Version 2019.1	Date of Approval: May 21, 2019	3	0	0	0
Pre-requisites/Exposure	Basics of semiconductor and analog electronics				
Co-requisites	Nil				

Catalog Description

This course deals with basic theories and techniques of digital VLSI design in CMOS technology. It covers the fundamental concepts and structures of designing digital VLSI systems which include CMOS devices and circuits, standard CMOS fabrication processes, CMOS design rules, static and dynamic logic structures, CMOS chip layout, simulation and testing, low power techniques, design tools and methodologies and Stick Diagrams.

Course Objectives

The objective of this course is to

- Provide a deep understanding of the concepts, techniques and design of complex digital VLSI circuits.
- Apply mathematical methods and circuit analysis models to analyse CMOS digital circuits, and their logic components.

Course Outcomes

On completion of this course, the students will be able to

CO1.Explain the characteristics of Basic VLSI components.

CO2. Apply the knowledge of various CMOS inverters to compare their performance.

CO3. To design and realize basic combinational and sequential functions using CMOS logic.

CO4. Design circuit Layout and Stick diagrams of CMOS logics.

Modules	Blooms level*	Number of hours
Module I: Devices and the wire Dynamic and transient behavior of Diode, Diffusion capacitance, SPICE Diode model, MOSFET basic, depletion and enhancement device. MOSFET static behavior, Threshold voltage and its dependence on V_{SB} MOSFET Operation in resistive and saturation region, channel length modulation, Velocity saturation and its impact on sub micron devices, sub threshold conduction, Model for manual analysis, Equivalent resistance for MOSFET in (velocity) saturated region, comparison of equations for PMOS and NMOS. Dynamic behavior, Channel capacitance in different regions of operation, junction capacitance, Level 1 SPICE models for MOS transistors. The Wire, Interconnect parameters: resistance, capacitance and Inductance, Lumped RC model, Elmore Delay.	L1, L2	8
Module II: CMOS Inverter VTC of an ideal inverter, Switching Model of the CMOS inverter: NMOS /PMOS discharge and charge, VTC of CMOS inverter : PMOS and NMOS operation in various regions including velocity saturation, Switching threshold, $(W/L)_p/(W/L)_n$ ratio for setting desired V_M with and without velocity saturation, Noise Margins, buffer.	L3, L4	8

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<p>Ratioed logic: Pseudo NMOS inverter and PMOS to NMOS ratio for performance, tri-state inverter, Resistive load inverter.</p> <p>Load Capacitance calculations: fan out capacitance, self capacitance calculations: Miller effect, wire capacitance; Improving delay calculation with input slope, Propagation delay: first order analysis, analysis from a design perspective, sizing a chain of inverters for minimum delay, choosing optimum number of stages, Power, Energy and Energy Delay: Dynamic power consumption, Static power, Glitches and power dissipation due to direct path currents, power and delay trade off, Transistor sizing for energy minimization.</p>		
<p>Module III: Combinational circuits</p> <p>CMOS LOGIC: Good 0 and Poor 0, series and parallel N and P switches, Two and Higher input NAND and NOR gates, Functions of the type $(AB+C(D+E))$ and their complements, XOR and XNOR gates, 2 input Multiplexer, Full Adder; Transistor sizing in CMOS logic for optimal delay, Pseudo NMOS NAND NOR and other gates and the transistor sizing, Introduction to DSVCL logic, CPL AND/NAND, OR/NOR, XOR/XNOR gates, Logical effort, Electrical Effort, Branching effort, Examples of sizing Combinational logic chains for minimum delay, Pass-transistor logic, pass gate configurations for NMOS and PMOS, 2 input and 4 input MUX, XOR, XNOR and implementation of general functions like $AB+AB*C+A*C*$, Robust and Efficient PTL Design, Delay of Transmission Gate chain.</p> <p>Dynamic CMOS design: Pre-charge and Evaluation, charge leakage, bootstrapping, charge sharing, Cascading Dynamic Gates, DOMINO Logic, Optimization of Domino Logic Gates, simple example circuit implementations of DOMINO logic.</p>	L2,L3,L4	10
<p>Module IV: Sequential Logic circuits</p> <p>Principle of bistability, NAND and NOR based SR latch, and clocked SR Latch, JK latch, example of master slave flip flop, CMOS D latch, , MUX based Latches, master slave edge triggered register, Static Timing Analysis – setup, hold time, clock skew, clock period, non ideal clocks, clock overlap, C2MOS register, TSPCR Register, Schmitt Trigger, Pipelining and NORA CMOS</p>	L2,L3,L4	5
<p>Module V: Layout Design Rules</p> <p>Introduction to CMOS Process technology, Latch up and its prevention Layout of CMOS inverter, CMOS NAND and NOR gates, Concept of Euler path, and stick diagrams for functions like $(AB+E+CD)*$.</p>	L2,L3,L4	5

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

Text Books

- Jan M Rabaey, Digital Integrated Circuits, Second Edition, Pearson.
- David Hodges, Analysis and Design of Digital ICs, McGraw Hill
- Sung-Mo Kang, CMOS Digital ICs, third edition, 2008

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Reference Books

- **Weste Niel and Harris**, CMOS VLSI design. A Circuits And Systems Perspective, 3/E, Pearson
- **Weste and Eshragian**, Principles of CMOS VLSI Design: a systems perspective, Addison-Wesley Publishing Company, 01-Jan-1993

CO, PO and PSO mapping

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CO1	1	3	--	--	--	--	--	--	--	--	--	--	2	1	-	-
CO2	3	1	3	--	1	--	--	--	--	--	--	2	2	1	-	2
CO3	3	2	1	2	--	--	--	--	--	--	--	2	2	1	-	2
CO4	2	2	1	-	--	--	--	--	--	--	--	--	2	1	-	-

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ECE2602	DIGITAL SIGNAL PROCESSING	L	T	P	C
Version 2019.1	Date of Approval: May 21, 2019	2	1	0	3
Pre-requisites/Exposure	Hands on knowledge of MATLAB Programming				
Co-requisites	Basic signals & Systems				

Catalog Description

This course deals in Digital signal processing with significant skills in advance methods for modification, analysis, classification & sampling of signals. It provides the broad knowledge of design, and realization of digital signal processing systems. The problems based on transformation of domains and filter design will be focused on.

Course Objectives

The objective of this course is to

- Equip the students with concepts of signals and systems.
- Provide in-depth knowledge of various transformations and filtering concepts.

Course Outcomes

On completion of this course, the students will be able to

CO1: Represent, analyze & categorize discrete-time signals and systems in time domain.

CO2: Apply the transformations to solve the problems related to computational complexity.

CO3: Explain the technique for conversion of real life signals to processing ready signals.

CO4: Design a digital filter with desired response and specifications.

Modules	Blooms level*	Number of hours
Module 1: Discrete Time Signals And Systems In Time Domain Classification of signal, signal processing operations, classification of systems, discrete time systems, examples of types of signal, sampling process, time domain characterization of LTI discrete- time systems, state space representation of LTI discrete time systems.	L1,L2 and L4	10
Module 2: Discrete Time Signals In Transform Domain DTFT, properties, applications, inverse DTFT, DFT, properties, applications, inverse DFT, Z-transform, properties, applications, inverse Z-transform, frequency response, transfer function, Fast Fourier transform algorithms: DIT algorithm, DIF algorithm.	L2,L3	16
Module 3: Discrete Time Processing Of Continuous Time Signals Discrete time processing of continuous time signal sampling, analog filter design, anti-aliasing filter design	L2,L4 and L5	10
Module 4: Discrete Time Processing Of Discrete- Time Signals Digital filters: Digital filter structure: FIR filter structure, IIR filter structure Digital filter design: Impulse invariance method, bilinear transform method of IIR filter design, FIR filter design.	L2,L3 and L5	12

*Bloom's Level:

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L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

Text Books

- **Proakis, Manolakis**, Digital Signal processing, 4th edition, Pearson, 2007.
- **Oppenheim & Schaffer**, Digital Signal Processing, 1st edition, Pearson, 1975.

Reference Books

- **Fafael C. Gonzalez, Richard E. Woods**, Digital Image Processing, Pearson, 2009.
- **Anil Kumar Jain**, Fundamentals of Digital Image Processing, 1st edition, Prentice Hall Information and System Sciences Series.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS O 1	PS O 2	PS O 3	PS O 4
CO 1	1	--	--	--	--	--	--	--	--	--	--	--	1	--	--	--
CO 2	2	1	--	--	2	--	--	--	--	--	--	--	2	1	--	--
CO 3	1	2	2	--	2	--	--	--	--	--	--	3	2	1	--	3
CO 4	--	2	1	--	2	--	--	--	--	--	--	3	2	1	--	3

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ECE2615	ANTENNA AND MICROWAVE ENGINEERING	L	T	P	C
Version 2022.1	Date of Approval: May 20, 2022	3	0	0	3
Pre-requisites/Exposure	Basic Electronics and Electromagnetic Theory				
Co-requisites	Nil				

Catalog Description

The basic objective of this course is to provide the core knowledge of antenna and wave propagation. The course also focuses on measurements of the antenna parameters. Microwaves are important when we are going to the high frequency regime. By studying this course students will be able to know about the microwave components and devices, microwave generators and their characteristics, microwave applications and measurement. Also, they will be familiar about the rectangular and circular waveguides, their equations and the modes existing in these waveguides.

Course Objectives

The objective of this course is to

1. Provide the basic knowledge of antenna fundamentals and Equip with the understanding various antenna types and measurements of antenna parameters .
2. Provide the fundamental knowledge of microwave frequencies, behavior of circuits at high frequencies and waveguides.
3. Provide the knowledge about microwave components and tubes.

Course Outcomes

On completion of this course, the students will be able to

CO1: Explain the antenna working principle, its parameters and use of arrays for improving them.

CO2: Describe the design equations of the practical antennas and their applications and Explain measurement methods of the antenna parameters.

CO3: Describe the microwave frequencies and behavior of circuits at high frequencies and waveguides.

CO4: Describe and analysis of rectangular and circular waveguides and Categorize various microwave components and describe them on basis of their parameters.

Modules	Blooms level*	Number of hours
MODULE I: ANTENNA Antenna Principles: Radiation from Monopole & Half Wave Dipole, power radiated by current element, radiation resistance. Directional Properties of Dipole Antenna. Antenna parameters: Radiation intensity, Radiation pattern, beam area, beam efficiency Antenna Gain, Directivity, Effective Area, Antenna Efficiency, Antenna Terminal Impedance, Antenna Temperature and Signal to Noise Ratio.	L1 and L2	9
MODULE II: PRACTICAL ANTENNAS & MEASUREMENTS Antennas Arrays: Two Element Array, Radiation Patterns in Broadside Arrays & Linear Arrays, Multiplication of patterns, Practical Antenna, their principle, geometrical equations, parameters & applications : Loop Antennas, Yagi-Uda array: Parabolic Reflectors, Horn	L1,L2 and L3	10

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Antenna, Log periodic antenna, spiral antenna, Microstrip antennas. Measurements: Radiation Pattern measurement, Gain Measurement: Comparison method, Near field method, Polarization measurement.		
MODULE III: WAVE PROPAGATION Modes of Propagation, Plane Earth Reflection, Space wave and Surface Wave, Reflection and refraction waves by the Ionosphere Tropospheric Wave. Ionosphere Wave Propagation in the Ionosphere, Virtual Height, MUF Critical frequency, Skip Distance, Duct Propagation, Space wave	L1, L2 and L3	10
MODULE IV: MICROWAVE & WAVEGUIDES Microwave frequencies, standard frequency bands, behaviour of circuits at conventional and microwave frequencies, microwave application. Overview of guided waves, TE, TM and TEM modes in rectangular	L1, L2 and L3	9
MODULE V: MICROWAVE COMPONENTS AND DEVICES Scattering matrix and its properties, Microwave bench & its components E-plane Tee, H-plane Tee, Magic Tee, Phase-Shifter, Directional Coupler, Resonator and circulators, Microwave tubes: Gunn effect & Gunn diode, Two-cavity Klystrons, Reflex Klystron, TWT and Magnetrons.	L1, L2 and L3, L4	10

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

Text Books

- S. Y. Liao, Microwave Devices and Circuits, 4th Edition PHI, 2001.
- Antennas: For All Applications by Kraus, John D. & Mashefka, Ronald J., Tata McGraw Hill, 3rd Ed.
- Antennas and Wave Propagation by Prasad, K.D. Khanna Publications.
- O.P. Gandhi, Microwave Engineering and Application, New York, Maxwell Macmillan Pub, 1981.

Reference Books

- E. S. Yang, Microelectronic Devices, Ma Graw Hill -Education, 1988.
- A. G. Milness, Semiconductor Devices and Integrated Electronics, Springer, 2012.
- K. C. Gupta, Microwave Engineering, John Wiley & Sons, 1980.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	--	--	--	--	2	--	--	--	--	--	--	1	--	1	--
CO2	1	3	2	--	--	2	--	--	--	--	--	--	1	--	1	--
CO3	1	3	2	--	--	2	--	--	--	--	--	--	1	--	1	--
CO4	1	2	2	--	--	3	--	--	--	--	--	--	1	--	1	--

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ECE2616	ANTENNA AND MICROWAVE ENGINEERING LAB	L	T	P	C
Version 2019.1	Date of Approval: May 21, 2019	0	0	2	1
Pre-requisites/Exposure	Basic Electronics and Electromagnetic Theory.				
Co-requisites	Nil				

Catalog Description

Antennas are used to transmit electromagnetic energy and Microwaves are important when we are going to the high frequency regime. By studying this course students will be able to understand antenna design parameters and know about the microwave components and devices, microwave generators and their characteristics, microwave applications and measurement.

Course Objectives

The objective of this course is to

- Provide knowledge about Radiation phenomena and pattern and characteristics of different types of antennas.
- Provide the fundamental knowledge of microwave frequencies and components of microwave bench.
- Provide the knowledge about microwave components, tunes and oscillators.

Course Outcomes

On completion of this course, the students will be able to

CO1: Analyze the radiation mechanisms of antennas and Demonstrate knowledge of antennas in communication systems.

CO2: Describe the characteristics of microwave oscillators and Explain and study the working of the various microwave tees.

CO3: Analyse microwave frequency signal and Categorize various microwave components and study their operations.

Course Content

Experiments	Blooms level*	Number of hours
1. To study and design dipole antenna, horn antenna and yadi uda antenna in Simulation software like ANSYS HFSS. 2. To design a rectangular microstrip patch antenna in Simulation software and draw its hardware on LPKF Protomat PCB machine.	L1 L2 and L3	4
1. To measure frequency and guided wavelength of a microwave signal. 2. To measure the impedance of a given load. 3. To measure various parameters of a directional coupler.	L1 L2 and L3	3
1. To study the characteristic and functions of an isolator. 2. To study and simulate the characteristic and functions of a circulator. 3. To study and simulate the characteristic and functions of various tees.	L1 L2 and L3	3

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1. To study the characteristics of reflex klystron. 2. To study the characteristic of Gunn diode.	L1 L2 and L3	2
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*Bloom's Level: L1: Knowledge; L2: Comprehension; L3: Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA – Internal Assessment, EE - External Exam, PR - Performance, LR – Lab Record, V – Viva.

Text Books

- S. Y. Liao, Microwave Devices and Circuits, 4th Edition PHI, 2001.
- O.P. Gandhi, Microwave Engineering and Application, New York, Maxwell Macmillan Pub, 1981.

Reference Books

- E. S. Yang, Microelectronic Devices, Ma Graw Hill -Education, 1988.
- A. G. Milness, Semiconductor Devices and Integrated Electronics, Springer, 2012.
- K. C. Gupta, Microwave Engineering, John Wiley & Sons, 1980.


CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1	-	-	-	-	-	-	-	-	-	-	-	2	-	1	1
CO2	1	2	-	-	-	3	-	-	-	-	-	-	2	-	1	1
CO3	1	2	3	-	-	3	-	-	-	-	--	-	2	-	1	1

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ECE2605	VLSI DESIGN LAB	L	T	P	C
Version 2019.1	Date of Approval: May 21, 2019	0	0	2	1
Pre-requisites/Exposure	Hands on knowledge of analog electronics				
Co-requisites	Basic concepts of Digital electronics				

Catalog Description

In this Lab course the designing of VLSI circuits using Mentor Graphics software are implemented and demonstrated. Concepts covered would enable them to create complex applications related to VLSI design. The objective of this course is to explore and implement the various features of VLSI design and analyze the dc and transient analysis.

Course Objectives

The objective of this course is to

Provide a deep understanding of CMOS logic using Mentor Graphics tool.

Analyze, design concepts of different combinational and sequential circuits and their simulation.

Course Outcomes

On completion of this course, the students will be able to

CO 1: Demonstrate the basic concept of MOSFET;

CO 2: Illustrate the static and switching characteristics of inverters using CMOS with varying capacitance, width and channel Length of CMOS using Mentor Graphics tool.

CO 3: Demonstrate and create models of moderately sized CMOS circuits that realize specified digital functions using Mentor graphics Tool.

CO 4: Demonstrate the layout and stick diagrams using Mentor graphics Tool.

CO 5: Demonstrate the power consumption during transient analysis.

Modules/Topics Covered**	Blooms level*	Number of hours
1. MOSFET characteristics with varying VGS for both pmos and nmos.	L3, L5	2
2. Effect on VTC of CMOS inverter with variation of W and L.	L3, L5	2
3. Transient analysis of CMOS inverter with varying capacitive load, W and L. Rise time, fall time power dissipation, propagation delay calculation of CMOS inverter with the variation of capacitive load, W and L.	L3, L5	4
4. NOR and NAND gate - Transient analysis	L3, L5	2
5. XOR/XNOR gate - Transient analysis	L3, L5	2
6. 2:1 MUX and XOR gate with P.T.L.- Transient analysis	L3, L5	2
7. D type latch and flip flop - Transient analysis	L3, L5	2
8. 3 input NAND gate implementation with DOMINO (precharge and evaluation).	L3, L5	2
9. 4 inverter chain to derive capacitive load.	L3, L5	2

*Bloom's Level:

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination


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Examination Scheme:

IA					EE
Components	A	PR	LR	V	70
Weightage (%)	5	10	10	5	

Note: IA –Internal Assessment, A – Attendance, PR – Performance, LR – Lab Record, V – Viva, EE- External Exam

Text

- Neil Weste and K. Eshragian, “Principles of CMOS VLSI Design: A System Perspective,” 2nd edition, Pearson Education (Asia) Pvt. Ltd., 2000.
- D.A Pucknell and Eshraghain, “ Basic VLSI Design”, PHI, India, 1995.

References:

- Mentor Graphics user Manual

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	3	1	--	--	--	--	--	--	--	--	--	--	2	1	--	--
CO2	3	1	--	--	--	--	--	--	--	--	--	--	1	1	--	--
CO3	3	1	--	--	--	--	--	--	--	--	--	--	1	1	--	--
CO4	3	1	--	--	--	--	--	--	--	--	--	--	2	1	--	--
CO5	3	1	--	--	--	--	--	--	--	--	--	--	1	1	--	--

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ECE2609	DIGITAL SIGNAL PROCESSING LAB	L	T	P	C
Version 2019.1	Date of Approval: May 21, 2019	0	0	2	1
Pre-requisites/Exposure	Basics of MATLAB				
Co-requisites					

Catalog Description

Signal processing has become an important tool for research and investigation in many areas of science and engineering. This course is designed to provide the students an understanding of the basic concepts of digital signal processing and various techniques used in it. Students will perform practical on MATLAB to demonstrate the theoretical concepts of the subject.

Course Objectives

The objective of this course is to

- Make students demonstrate the basic concepts of digital signal processing.
- Design filters and determine its coefficients.

Course Outcomes

On completion of this course, the students will be able to

CO1. Practically apply the theoretical concepts of digital signal processing.

CO2. Design analog and digital filters using different techniques.

CO3. Verify FFT algorithm in decimation in time and decimation in frequency domain.

Modules	Blooms level*	Number of hours
Lab Session 1 1. To generate unit step sequence, exponential sequence and sinusoidal sequence. 2. To determine convolution of two given sequences. 3. To compute DFT and IDFT of a given sequence. 4. To determine the circular convolution of two given sequences. 5. To determine z and inverse z transform of a given sequence	L3	4
Lab Session 2 6. To design various analog filters. 7. To design FIR filter using Hamming window. 8. To convert Analog filter into Digital Filter using bilinear transformation. 9. To plot the frequency response of an FIR system	L3 and L4	4
Lab Session 3 10. To verify 8 points FFT algorithm in decimation in time (DIT) & decimation in frequency (DIF). 11. To determine the filter coefficient using Ramez exchange algorithm. 12. To design an IIR digital filter and its parallel realization.	L3 and L4	4

*Bloom's Level:

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

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Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

Text Books

- Proakis, Manolakis, Digital Signal processing, 4th edition, Pearson, 2007.
- Oppenheim & Schaffer, Digital Signal Processing, 1st edition, Pearson, 1975.

References:

- Fafael C. Gonzalez, Richard E. Woods, Digital Image Processing, Pearson, 2009.
- Anil Kumar Jain, Fundamentals of Digital Image Processing, 1st edition, Prentice Hall Information and System Sciences Series.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	--	--	--	2	--	--	--	--	--	--	2	1	--	-	-
CO2	1	-	3	--	2	--	--	--	--	--	--	2	1	3	--	-
CO3	1	-	3	--	2	--	--	--	--	--	--	2	1	3	--	3

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ECE2637	MINOR PROJECT	L	T	P	C
Version : 2019.1	Date of Approval: May 21, 2019	0	0	4	2
Pre-requisites/Exposure	Basics of Electronics and Communication				
Co-requisites	Nil				

Catalog Description

Minor Project is a professional problem-solving activity included in the curriculum. It provides exposure to research methodology, practical skill enhancement and an opportunity to work closely with latest technology for development of solution of real-world problems. It usually requires the use of advanced concepts, a variety of experimental techniques, and state-of-the-art instrumentation. This course develops attributes like intellectual ability, professional judgment and decision-making ability, inter-disciplinary approach, skills for data handling, ability in written and oral presentation, sense of responsibility.

Course Objectives

The objective of this course is to

- Equip the students with concepts of new technologies and practical exposure
- Provide an overview of presentation and preparation of report

Course Outcomes

On completion of this course, the students will be able to

CO1: Study the literature and identify the problem statement

CO2: Work on a real world problem and solve it using latest technology

CO3: Prepare a brief report of the project

CO4: Present and explain the project for evaluation

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	V	PPT	R	IM	EM
Weightage (%)	10	10	10	30	70

V – Viva, PPT-Power Point Presentation, R – Report, IP-Internal Marks, EM-External Marks

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	1	2	1	2	2	2	2	2	3	3	2	1	1	1	2
CO2	1	2	1	1	1	2	2	2	2	3	3	2	1	1	1	1
CO3	1	2	3	3	2	3	3	2	2	2	3	2	1	1	1	1
CO4	1	2	3	3	2	3	3	2	2	1	3	2	1	1	1	1

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ECE2607	ADVANCED JAVA PROGRAMMING	L	T	P	C
Version 2019.1	Date of Approval: May 21, 2019	2	0	0	2
Pre-requisites/Exposure	Basics of Java Programming				
Co-requisites	NIL				

Catalog Description

In this course the advanced features of contemporary java are discussed in detail. Concepts covered would enable them to handle complex programs relating to managing data and processes over the network. Discussion will be on relating to concepts of remote method invocation to working with swings architecture. Further practical implementation of database connectivity and using them in servlet and jsp based applications will be made.

Course Objectives

The objective of this course is to

- Equip the students with the advanced feature of contemporary java required in solving complex problems.
- Provide a practical knowhow and implementation of advanced java programming concepts like database programming with servlets and jsp.

Course Outcomes

On completion of this course, the students will be able to

- CO1: Define and explain concept of an Remote method invocation application, demonstrate swing based application developed using concepts of remote method invocation
- CO2: Distinguish between various java and open database connectivity drivers and able to solve complex programming problems involving database interaction.
- CO3: Describe servlet and its lifecycle, along with demonstrate and design solutions for some complex dynamic web applications using servlets.
- CO4: Explain jsp scripting and Differentiate between processing of servlets and jsp scripting pages. Apply knowledge of servlets and jsp scripting to create some new dynamic web applications.
- CO5: Explain the architecture of Model View Controller and struts. Demonstrate applications based on java beans and struts.

Modules	Blooms level*	Number of hours
MODULE 1: DISTRIBUTED COMPUTING Introduction to Java RMI, RMI services, RMI client, Running client and server, Introduction of Swing, Swing Components, Look and Feel for Swing Components, Introduction to Multimedia Programming.	L1, L2 and L3	6
MODULE 2: DATABASE CONNECTIVITY ODBC and JDBC Drivers, Connecting to Database with the java.sql Package, Using JDBC Terminology, JDBC with mysql, postgresql.	L2 and L3	7
MODULE 3: SERVLET PROGRAMMING Introduction to Servlets, Servlet Life Cycle, Servlet based Applications, Servlet and HTML.Filters, jdbc with servelets, session Management techniques in detail.	L2, L3 and L5	8

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MODULE 4: JSP PROGRAMMING JSP: Introduction to JSP, JSP implicit objects, JSP based Applications, Java. Net. Login & Logout Example, jdbc with jsp.	L2, L3, L4 and L5	8
MODULE 5: J2EE WEB APPLICATION The Model-View-Controller Architecture What is Struts, Struts Tags, Creating Beans, Other Bean Tags, Bean Output, Creating HTML Forms, The Action Form class The Action class, Simple Struts: a simple Struts application; Introduction to EJB.	L2 and L3	7

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation*

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text Books

- J. Jaworski, Java 1.2 Unleashed, Techmedia – SAMS, 1998, United States
- S. Allamaraju, Professional Java Server Programming, Wrox Press Limited, 2001, United States.
- J. Goodwill and B. Morgan, Developing Java Servlets, Techmedia – SAMS, 2017, United States

Reference Books

- D. Flanagan, J. Parley, W. Crawford and K. Magnusson, Java Enterprise in a nutshell - A desktop Quick reference, O'REILLY, 2003, USA.
- S. Ausbury and S. R. Weiner, Developing Java Enterprise Applications, John Wiley and Sons, 2001, USA.
- J. Hunder and W. Crawford, Java Servlet Programming, O'REILLY, 2002, USA

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	2	1	--	--	--	--	--	--	--	--	--	--	2	--	--	--
CO2	3	1	--	--	--	--	--	--	--	--	--	--	1	2	--	--
CO3	2	1	2	--	--	--	--	--	--	--	--	--	1	2	--	--
CO4	1	3	2	--	--	--	--	--	--	--	--	--	2	--	2	--
CO5	1	3	--	--	--	--	--	--	--	--	--	--	1	--	--	--

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ECE2610	ADVANCED JAVA PROGRAMMING LAB	L	T	P	C
Version 2019.1	Date of Approval: May 21, 2019	0	0	2	1
Pre-requisites/Exposure	Basics of Java and Advanced Java Programming				
Co-requisites	NIL				

Catalog Description

In this Lab course the advanced features of contemporary java are implemented and demonstrated. Concepts covered would enable them to create complex applications related to data management. Problems or programs will be related to concepts of remote method invocation, swings, servlets, jsp and java beans.

Course Objectives

The objective of this course is to

- Make the students apply knowledge of various advanced java features required in solving complex problems.
- Provide a demonstration of advanced java programming concepts like database programming with servlets, jsp and creating java beans.

Course Outcomes

On completion of this course, the students will be able to

- CO1: Apply the knowledge of swings architecture and remote method invocation used to provide solution to distributed computing problems
- CO2: Demonstrate the use of JDBC connectivity along with swings based architecture, thereby handling data management.
- CO3: Apply the knowledge of servlets and server programming to construct dynamic web applications using web servers.
- CO4: Demonstrate the differences between creating and deploying dynamic web applications using jsp concepts and servlets.
- CO5: Demonstrate usage of applications involving java beans and jdbc programming to handle data management.

Modules/Topics Covered**	Blooms level*	Number of hours
1. Sample Programs using swings architecture and remote method invocation (a) Write a program using swings creating tabbed panes and menu over a frame and handle their associated events (b) Write a program using swings List control containing list of cities, allowing the user to choose any one of them and display using event handing. (c) Demonstrate an application showcasing the use of remote method invocation(RMI) for designing a distributed application. (d) Create an application using concepts of RMI to depict a client server based interaction.	L3, L5	6
2. Sample Programs using JDBC and swings (a) Create an application demonstrating the use of swings, having a menu over a frame and jdbc programming to perform insert and select operations by handling menu related events. (b) Create an application using swings, having a design providing features	L3, L5	4

for iterating over a dataset performing operations like forward, backward, start and end with help of jdbc programming.		
(c) Sample Programs using servlets with jdbc, html and swings 1. Create an application using servlets to perform redirection based on validating user data entered through a web form. 2. Design an application to fetch data from database using servlets and display it using its post method. 3. Demonstrate the process of writing cookies using a servlet and display a message after writing. 4. Write a program to create a session object for the username fetched from user using a servlet, further access that session value on another servlet invoked by redirection.	L3, L5	6
5. Sample Programs using JSP with jdbc, html and swings (a) Write a program using jsp to demonstrate the features of jsp elements used to declare, define and display sum of two integers. (b) Create an application using jsp to calculate and display the greatest out of two integers using if else statements. Integer numbers should be entered using a web form. (c) Demonstrate with a jsp program mechanism to retrieve checkbox data accessed using multiple value parameters fetching approach. (d) Write a program to demonstrate the use of jsp forward action tag used with parameters and processed using another jsp page.	L3, L5	6
6. Sample Programs using jsp, java beans and swings (a) Demonstrate the use of jsp include action tag for including an html and another jsp page in initial jsp resource. (b) Write a program creating Java bean class and setting its properties using required jsp action tags. Output should also display the retrieved property values.	L3, L5	2

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

*** Sample Programs provided are not limited to these only, can include others as desired.*

Modes of Evaluation: Lab Record /Viva- Via /Performance/Written Examination

Examination Scheme:

IA					EE
Components	A	PR	LR	V	70
Weightage (%)	5	10	10	5	

Note: IA –Internal Assessment, A – Attendance, PR – Performance, LR – Lab Record, V – Viva, EE- External Exam

Text Books

- J. Jaworski, Java 1.2 Unleashed, Techmedia – SAMS, 1998, United States
- S. Allamaraju, Professional Java Server Programming, Wrox Press Limited, 2001, United States
- J. Goodwill and B. Morgan, Developing Java Servlets, Techmedia – SAMS, 2017, United States

Reference Books

- D. Flanagan, J. Parley, W. Crawford and K. Magnusson, Java Enterprise in a nutshell - A desktop Quick reference, O'REILLY, 2003, USA
- S. Ausbury and S. R. Weiner, Developing Java Enterprise Applications, John Wiley and Sons, 2001, USA
- J. Hunder and W. Crawford, Java Servlet Programming, O'REILLY, 2002, USA

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CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	2	1	--	--	--	--	--	--	--	--	--	--	2	--	--	--
CO2	3	1	--	--	--	--	--	--	--	--	--	--	1	2	--	--
CO3	2	1	2	--	--	--	--	--	--	--	--	--	1	2	--	--
CO4	1	3	2	--	--	--	--	--	--	--	--	--	2	--	2	--
CO5	1	3	--	--	--	--	--	--	--	--	--	--	1	--	--	--

1: strongly related, 2: moderately related and 3: weakly related



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ECE2617	IOT & WIRELESS SENSOR NETWORKS	L	T	P	C
Version 2019.1	Date of Approval: May 21, 2019	3	0	0	3
Pre-requisites/Exposure	Circuit Theory				
Co-requisites	Nil				

Catalog Description

This course covers the fundamentals of IoT systems with emphasis on translating theoretical bases into practical network design and technologies. It covers the bigger picture of IoT systems with a focus on wireless IoT technologies, network design, system architecture, Overview of Wireless Sensor Networks and Communication Protocols.

Course Objective:

The objective of this course is to

Introduction and description of core concepts of IoT, role and scope of smart sensors for insuring convergence of Technologies and multidisciplinary engineering practices, Machine Intelligence Quotient.

Course Outcomes

On completion of this course, the students will be able to

CO1: Introduction and description of core concepts of IoT, role and scope.

CO2: Architecture and Design Principles of internet network for IoT based system applications.

CO3: Introduction to physical devices used in IoT based systems.

CO4: Recognize upcoming challenges in Sensor Networks.

CO5: To identify communication protocols employed in WSNs.

Course Contents:

Modules	Blooms level*	Number of hours
Module 1 Overview of Internet of Things IoT Conceptual Framework, IoT Architectural View, Technology Behind IoT, Sources of IoT, M2M communication, Examples of IoT. Modified OSI Model for the IoT/M2M Systems, data enrichment, data consolidation and device management at IoT/M2M Gateway, web communication protocols used by connected IoT/M2M devices, Message communication protocols (CoAP-SMS, CoAP-MQ, MQTT, XMPP) for IoT/M2M devices.	L1 and L2	8
Module-2 Architecture and Design Principles for IoT Internet connectivity, Internet-based communication, IPv4, IPv6, 6LoWPAN protocol, IP Addressing in the IoT, Application layer protocols: HTTP, HTTPS, FTP, TELNET and ports Data Collection, Storage and Computing using a Cloud Platform: Introduction, Cloud computing paradigm for data collection, storage and computing, Cloud service models, IoT Cloud- based data collection, storage and computing services using Nimbits.	L2 and L3	10
Module-3: IoT Physical Devices and Endpoints Arduino UNO: Introduction to Arduino, Arduino UNO, Installing the Software, Fundamentals of Arduino Programming. IoT Physical Devices and Endpoints RaspberryPi: Introduction to RaspberryPi, About the RaspberryPi Board:	L2 and L4	10

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Hardware Layout, Operating Systems on RaspberryPi, Configuring RaspberryPi, Programming RaspberryPi with Python, Wireless Temperature Monitoring System Using Pi, DS18B20 Temperature Sensor, Connecting Raspberry Pi via SSH, Accessing Temperature from DS18B20 sensors, Remote access to RaspberryPi, Smart and Connected Cities, An IoT Strategy for Smarter Cities, Smart City IoT Architecture, Smart City Security Architecture, Smart City Use-Case Examples.		
Module-4 Overview of Wireless Sensor Networks Challenges for Wireless Sensor Networks, Enabling Technologies for Wireless Sensor Networks. Architectures: Single-Node Architecture - Hardware Components, Energy Consumption of Sensor Nodes, Operating Systems and Execution Environments, Network Architecture-Sensor Network Scenarios, Optimization Goals and Figures of Merit, Design principles for WSNs, Service interfaces of WSNs Gateway Concepts.	L3 and L4	10
Module-5 Communication Protocols: Physical Layer and Transceiver Design Considerations, MAC Protocols for Wireless Sensor Networks, Low Duty Cycle Protocols And Wakeup Concepts - S-MAC , The Mediation Device Protocol, Wakeup Radio Concepts, Contention based protocols(CSMA,PAMAS), Schedule based protocols (LEACH, SMACS, TRAMA) Address and Name Management in WSNs, Assignment of MAC Addresses, Routing Protocols- Energy-Efficient Routing, Geographic Routing, Hierarchical networks by clustering.	L1 and L2	10

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

Text Books:

- Raj Kamal, "Internet of Things-Architecture and design principles", McGraw Hill Education, 2017.
- Holger Karl & Andreas Willig, "Protocols And Architectures for Wireless Sensor Networks", John Wiley, 2005.
- Feng Zhao & Leonidas J. Guibas, "Wireless Sensor Networks- An Information Processing Approach", Elsevier, 2007.
- David Hanes, Gonzalo Salgueiro, Patrick Grossetete, Robert Barton, Jerome Henry, "IoT Fundamentals: Networking Technologies, Protocols, and Use Cases for the Internet of Things", 1 st Edition, Pearson Education.

Reference Books:

- Vijay Madisetti and ArshdeepBahga, "Internet of Things (A Hands-on-Approach)", 1 stEdition, VPT, 2014.
- Kazem Sohraby, Daniel Minoli, & Taieb Znati, "Wireless Sensor Networks Technology, Protocols, And Applications", John Wiley, 2007.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	3													2	
CO2		2													3	
CO3	2	1			2						3				2	2
CO4		2			1						3				1	2
CO5	1											3			2	

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ECE2618	DATA MINING	L	T	P	C
Version 2019.1	Date of Approval: 14 July 2019	3	0	0	3
Pre-requisites/Exposure	Concept of Database and Data Mining				
Co-requisites	Nil				

Catalog Description

Data Mining serve as one of the most important courses for postgraduate students, since it builds computational abilities, inferential thinking, and practical skills for tackling core data scientific challenges. The students will get a comprehensive understanding of different data mining techniques that can be used for prediction and for discovering patterns, be prepared to select the right technique for a given data problem and will be able to create a general-purpose analytic process.

Course Objectives

The objective of this course is to

- Provide students with an in-depth knowledge of data mining. To introduce students to basic applications, concepts, and techniques of data mining.
- Develop skills for using recent data mining software to solve practical problems and prediction in a variety of disciplines and
- Gain experience doing independent study and research.

Course Outcomes

On completion of this course, the students will be able to

CO 1: Explain concepts of Data mining, predictive analytics and analyses architecture of data mining. Differentiate between supervised and unsupervised methods

CO 2: Apply classification techniques on different data sets and solve cost –benefit analysis numerical. Analyze decision tree methods.

CO 3: Implement various clustering algorithm on different data sets and describe these algorithms.

CO 4: Prepare data representation for market basket analysis and determine the usefulness of association rules. Interpret supervised and unsupervised learning methods.

CO 5: Predict market trends and outline different factors associated mail marketing.

Course Content

Modules	Bloom's level	Number of Hours
Module I Data Preparation An introduction to data mining and predictive analytics, Data Pre-processing Exploratory Data Analysis, Dimension- Reduction Methods.	L1, L2	8
Module II Classification k- Nearest Neighbour Algorithm, Decision Trees, Model Evaluation Technique, Cost –Benefit Analysis Using Data Driven Cost.	L1, L2, L3	7
Module III Clustering Hierarchical and k- Means Clustering, Kohonen Networks, Birch Clustering, Measuring Cluster Goodness.	L1, L2, L3, L4	8
Module IV Association Rules Affinity Analysis and Market Basket Analysis, Data Representation for Market Basket Analysis, Support, Confidence, Frequent Item sets, and the a Priori Property,	L1, L2, L3, L6	9

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How Does a Priori Algorithm Work? Generating Frequent Item sets, Generating Association Rules, Extension from Flag Data to General Categorical Data, Information-Theoretic Approach: Generalized Rule Induction Method, J-Measure, Association Rules are Easy to do Badly, how can we Measure the Usefulness of Association Rules? Do Association Rules Represent Supervised or Unsupervised Learning?		
Module IV Case Study: Predicting Response to Direct Mail Marketing Business Understanding, Data Preparation, and Eda, Clustering and Principal Components Analysis, Modelling and Evaluation for Performance and Interpretability, Modelling and Evaluation for High Performance.	L2, L3, L4, L5	8

***Bloom's Level:**

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

Text Books

- Daniel T. Larose, Chantal D. Larose, "Data Mining and Predictive Analytics", John Wiley & Sons, Inc., Hoboken, New Jersey, 2015.
- Jiawei Han and Micheline Kamber, "Data mining: concepts and techniques", Morgan Kaufmann, Second Edition, 2006.

Reference Books

- Alex Berson, Data Warehousing, Data Mining, and Olap, Tata McGraw Hill, 2014.
- Markus Hofmann, Ralf Klinkenberg, "Rapid-Miner: Data Mining Use Cases and Business Analytics Applications", Chapman and Hall/CRC, 2016.
- George M Marakas, Modern Data Warehousing, Mining & Visualization Core Concepts, Pearson Education.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	2	--	--	--	--	--	--	--	--	--	--	1	2	2	3
CO2	1	1	2	--	--	--	--	--	--	--	--	--	1	2	3	3
CO3	1	2	3	3	3	--	--	--	--	--	--	--	1	2	2	2
CO4	1	1	2	--	--	3	--	--	--	--	--	3	1	1	2	3
CO5	1	1	2	--	--	2	--	--	--	--	--	3	1	3	2	1

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ECE2613	EMBEDDED SYSTEM	L	T	P	C
Version 2019.1	Date of Approval: May 21, 2019	2	0	0	2
Pre-requisites/Exposure	Hands on knowledge of Microcontrollers, their interfacing, and programing, and Embedded Systems				
Co-requisites					

Course Description:

The syllabus is divided into two parts, the first one deals with 8051 architecture and its interfacing with other devices. Second part of the syllabus deals with the basic embedded system and it's design. This course will provide an introduction of the basic concepts of embedded systems design, RTOSs, various types of microcontrollers, communication with 8051 microcontroller, RS 232, analog-digital interface, and A/D and D/A conversions. This course also provides the knowledge of C-language programing for microcontrollers. The syllabus makes student perfect in assembly language programming, addressing modes etc. apart from it input-output programming is discussed in detail. In the second part Embedded systems and it's application is discussed. Real Time Operating System is also explained at length. 8051 C programming is also incorporated in the syllabus.

Course Objectives:

The objective of this course is to;

- Provide the basic knowledge of introduction to an embedded systems design and RTOS, OS Services, I/O Subsystems, Interrupt Routines in RTOS Environment, RTOS Task Scheduling model.
- Equip with the understanding of various types of microcontrollers, arithmetic instructions and programs, and several application based programing.
- Equip with the understanding of basics of communication, overview of RS-232, I2C Bus, UART, USB, IEEE 488 (GPIB), and analog-digital interfacing.
- Provide the basic knowledge of 8051 C, 8051 memory constitution, Data interface, and A/D and D/A conversions.
- Provide the knowledge of advance microcontrollers, PIC microcontrollers, AVR microcontrollers, and ARM microcontrollers.

Course Outcomes:

On completion of this course, the students will be able to:

CO1: Explain the design of embedded systems and RTOS, and RTOS Task Scheduling model.

CO2: Describe the fundamentals of various types of microcontrollers, and their several applications based programing.

CO3: Describe fundamentals of communication of 8051 microcontroller, RS-232, I2C Bus, 8051 C, 8051, analog-digital interfacing, and A/D and D/A conversions.

CO4: Explain the fundamentals of advance microcontrollers, PIC microcontrollers, AVR microcontrollers, and ARM microcontrollers.



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Modules	Blooms level*	Number of hours
Module1: Introduction to an embedded systems design & RTOS Introduction to Embedded system, Processor in the System, Microcontroller, Memory Devices, Embedded System Project Management, ESD and Co-design issues in System development Process, Design cycle in the development phase for an embedded system, Use of target system or its emulator and In-circuit emulator, Use of software tools for development of an ES. Inter-process Communication and Synchronization of Processes, Tasks and Threads, Problem of Sharing Data by Multiple Tasks, Real Time Operating Systems: OS Services, I/O Subsystems, Interrupt Routines in RTOS Environment, RTOS Task Scheduling model, Interrupt Latency and Response times of the tasks.	L1, L2, L3, and L4	8
Module 2: Overview of Microcontroller Microcontroller and Embedded Processors, Overview of 8051 Microcontroller family: Architecture, basic assembly language programming concepts, The program Counter and ROM Spaces in the 8051, Data types, 8051 Flag Bits and PSW Register, 8051 Register Banks and Stack Instruction set, Loop and Jump Instructions, Call Instructions, Time delay generations and calculations, I/O port programming Addressing Modes, accessing memory using various addressing modes, Arithmetic instructions and programs, Logical instructions, BCD and ASCII application programs, Single-bit instruction programming, Reading input pins vs. port Latch, Programming of 8051 Timers, Counter Programming.	L1, L2, L3, and L4	8
Module 3: Communication with 8051 Basics of Communication, Overview of RS-232, I2C Bus, UART, USB, IEEE 488 (GPIB). Parallel input output applications. (Stepper motor Sequencer program, Strobed input/output). Interrupt driven applications (real time clock, serial input/output with interrupt). Analog-digital interfacing (Pulse width modulator, 8-bit ADC).	L1, L2, L3, and L5	7
Module 4: 8051 C Programming Introduction to 8051 C, 8051 memory constitution, Constants, variables and data types. Arrays structures and unions, pointers, Loops and decisions, Functions, Modules and programs, Data interface, Timer control, Interrupt operations, Digital operations, A/D and D/A conversions.	L1, L2 L3, and L5	7
Module 5: Introduction to Advance Microcontrollers Introduction to PIC microcontrollers, Introduction to AVR Microcontrollers, Introduction to ARM microcontrollers.	L1, L2 L3, and L4	6

*Bloom's Level:

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Evaluation

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination



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Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text Books:

- Raj Kamal, 2004, "Embedded Systems", TMH.
- James W. Stewart and Kai X. Miao, 2nd Edition. "The 8051 microcontroller" Pearson Edu. Prentice Hall.
- M.A. Mazidi and J. G. Mazidi, 2004 "The 8051 Microcontroller and Embedded Systems", PHI.

References Books:

- David E. Simon, 1999, "An Embedded Software Primer", Pearson Education
- K.J. Ayala, 1991, "The 8051 Microcontroller", Penram International.
- Dr. Rajiv Kapadia, "8051 Microcontroller & Embedded Systems", Jaico Press
- Dr. Prasad, 2004, "Embedded Real Time System", Wiley Dreamtech.

CO, PO and PSO Mapping:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS O 1	PS O 2	PS O 3	PS O 4
CO 1	1	3	2	--	--	--	--	--	--	--	--	--	--	1	--	--
CO 2	1	3	2	--	2	--	--	--	--	--	--	--	--	1	--	--
CO 3	1	3	2	--	2	--	--	--	--	--	--	--	--	1	--	--
CO 4	1	3	2	--	2	--	--	--	--	--	--	--	--	1	--	--

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ECE2614	EMBEDDED SYSTEM LAB	L	T	P	C
Version 2019.1	Date of Approval: May 21, 2019	0	0	2	1
Pre-requisites/Exposure	Basics of Microcontroller (8051), its programing and interfacing				
Co-requisites					

Course Description:

This course will provide the practical introduction of microcontroller 8051, its interfacing and programming for various applications, and also designing of microcontrollers.

Course Objectives:

The objective of this course is to;

- Provide the practical knowledge of microcontrollers (specially 8051), and its interfacing and programming.
- Equip with the understanding of designing of a model of microcontroller.
- Equip with understanding of parallel data communication, interfacing microcontroller with a LCD.

Course Outcomes:

On completion of this laboratory course work, the students will be able to:

CO1: Explain the interfacing of microcontroller 8051, and its programming for several applications.

CO2: Describe the fundamentals of design of microcontroller model, and their several applications based programing.

CO3: Describe fundamentals of parallel data communication by interfacing microcontroller (8051) with a LCD.

Modules	Blooms level*	Number of hours
Lab Session 1 13. Write a program to add two 8-bit numbers using microcontroller 8051. 14. Write a program to multiply two 8-bit numbers using microcontroller 8051.	L1 and L3	2
Lab Session 2 15. Write a program to divide two 8-bit numbers using microcontroller 8051. 16. Write a program to subtract two 8-bit numbers using microcontroller 8051.	L1, L3, and L4	2

Lab Session 3 17. Write a program to generate a geometric progression using microcontroller 8051. 18. Write a program to generate a square wave using microcontroller 8051.	L1, L3, and L4	4
Lab Session 4 19. Write a program to generate a delay of 5 ms using microcontroller 8051. 20. Study and implement serial communication by interfacing microcontroller with a computer.	L1, L3, and L4	2
Lab Session 5 9. Study and implement parallel data communication by interfacing microcontroller with a LCD. 10. Study of temperature measurement.	L1, L3, and L4	2
Lab Session 5 *Student has to submit working model based on 8051 and its interfaces.	L1, L3, and L4	2

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

Text Books:

- Raj Kamal, 2004, “Embedded Systems”, TMH.
- James W. Stewart and Kai X. Miao, 2en Edition. “The 8051 microcontroller” Pearson Edu. Prentice Hall.
- M.A. Mazidi and J. G. Mazidi, 2004 “The 8051 Microcontroller and Embedded Systems”, PHI.



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CO, PO and PSO Mapping:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	P O 10	P O 11	P O 12	PSO 1	PSO 2	PSO 3	PSO 4
CO 1	2	--	1	--	2	--	--	--	2	--	--	--	--	1	--	3
CO 2	2	--	1	--	2	--	--	--	2	--	--	--	--	1	--	3
CO 3	2	--	1	--	2	--	--	--	2	--	--	--	--	1	--	3

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ECE2719	RADAR AND SATELLITE COMMUNICATION	L	T	P	C
Version 2019.1	Date of Approval: May 21, 2019	3	0	0	3
Pre-requisites/Exposure	Basic Electronics and Communication systems				
Co-requisites	Nil				

Catalog Description

This course builds basic knowledge of different types of Radar systems and satellite communication along with link designing & application. It also covers different modulation schemes & channels used.

Course Objectives

The objective of this course is to

- Provide the fundamental knowledge of Radar and its types.
- Provide the knowledge about satellite communication and its components.

Course Outcomes

On completion of this course, the students will be able to

CO1. Describe the working of Radar and its equation.

CO2. Describe the various types of radars and their applications.

CO3. Explain the satellite communications and the components used in this communication.

CO4. Explain the various access techniques used in communication and the satellite link budget.

Course Content

Modules	Blooms level*	Number of hours
MODULE I: Introduction to Radar Principle of detection and ranging, Radar frequencies and bands. Applications, Radar block diagram and operation. Radar Range Equation: Range prediction, Minimum detectable signal, Receiver noise SNR, Integration of radar pulses, Radar cross section of targets, Transmitter Power, PRF and system losses & Propagation effects.	L1 and L2	6
MODULE II: CW FM Radar Doppler effect, CW Radar, Frequency-modulated CW Radar, Multiple-frequency CW Radar. MTI and Pulse Doppler Radar: MTI delay lines, Delay line Cancellers, Coherent and Non-Coherent MTI, Pulse Doppler Radar.	L1 and L2	7
MODULE III: Introduction to Satellite Communication satellites, Orbiting satellites, Frequencies and bands, Satellite multiple access formats. Satellite Channel: Power flow, Polarization, Atmospheric losses, Receiver noise, CNR, Satellite link analysis for uplinks and downlinks. Overview of Coaxial cable system and optical Network (SONET); Overview of WLL (Wireless loop)	L1 and L2	8
MODULE IV: Satellite Transponder Transponder model, Satellite signal processing RF-RF translation, IF demodulation.	L2 L3 and L4	7
Module V: Multiple-Access FDMA; amplification with multiple FDMA carriers, AM/FM Conversion with FDMA, Switched FDMA, Synchronization, SS-TDMA; CDMA; DS CDMA, Frequency-hopped, CDMA. Carrier recovery & bit timing. Satellite link	L2 L3 and L4	8

budget analysis		
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*Bloom's Level: L1: Knowledge; L2: Comprehension; L3: Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text Books

- M.I. Skolnik. Introduction to Radar Systems, 2nd Edition Tata Mc Graw-Hill.
- T. Pratt & C.W. Boston, Satellite Communications, New York, John Wiley & Sons, 1986.

Reference Books

- Tri Ha, Digital Satellite Communication, Tata Mc Graw-Hill , 1990-03
- Harry and Vam Trees, Satellite Communication, IEEE Proceeding, 1979.

CO, PO and PSO Mapping:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO 3	PSO 4
CO 1	1	-	-	-	-	-	-	-	-	-	-	-	2	-	1	-
CO 2	1	2	-	-	-	3	-	-	-	-	-	-	2	-	1	-
CO 3	1	2	3	-	-	3	-	-	-	-	--	-	2	-	1	-
CO 4	1	2	-	-	-	2	-	-	-	-	-	-	2	-	1	-

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ECE2720	ADVANCED MOBILE COMMUNICATION	L	T	P	C
Version: 2019.1	Date of Approval: May 21, 2019	2	0	0	2
Pre-requisites/Exposure	Communication systems, Digital Communication				
Co-requisites	NIL				

Catalog Description

This course introduces fundamental concepts of mobile communications and global system for mobile. This course enables the student to understand the technical functionality of a mobile network. This course also gives mathematical formulations to calculate losses using different propagation models.

Course Objectives

The objective of this course is to

- Make students familiar with fundamentals of mobile communication systems
- Understand different multiple access systems like TDMA, FDMA, CDMA with respect to complexity, installation cost, speed of transmission, channel properties etc.

Course Outcomes

On completion of this course, the students will be able to

CO1: Define and explain the concepts of mobile communications.

CO2: Explain and compare different multiple access techniques

CO3: Obtain propagation losses for a given transmission system.

CO4: Explain fundamentals of GSM system.

Modules	Blooms level*	Number of hours
MODULE 1: Introduction to Wireless Communication System Evolution of mobile radio communication, Mobile radiotelephony in U.S., Mobile radio system around the world, second generation (2G) cellular network, evolution to 2.5G wireless network, evolution for 2.5G TDMA standards, third generation (3G) and forth generation wireless networks.	L1 and L2	4
MODULE 2: The Cellular Concept System design fundamentals, frequency reuse channel assignment strategies, Hand off strategies, Interference and system capacity, improving coverage and capacity in cellular system.	L2 and L3	10
MODULE 3: Propagation Model and Spread Spectrum Modulation Techniques Longley rice model, okumara model, hata model, pcs extension to hata model, wolfish and bertoni model, Pseudo Noise (PN) sequence, Direct sequence spread spectrum (DSSS), frequency hopped spread spectrum (FHSS).	L2 and L4	12


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MODULE 4: Multiple Access Techniques for Wireless Communication Introduction to multiple access, Frequency division multiple access (FDMA), Time division Multiple access (TDMA), Spread spectrum multiple access, Packet Radio.	L2 and L3	6
MODULE 5: Global System for Mobile Global system for mobile (GSM), GSM system architecture, GSM radio subsystem, GSM channel types, Example of a GSM cell, Frame structure of GSM.	L2	4

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

A: Attendance, CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination

Textbooks

Text:

- Theodore S. Rappaport, "Wireless Communication", 2nd edition, Pearson Education, 2009.

References:

- William Stallings, "Wireless Communications & Networks", 2nd edition, Pearson Education, 2009.
- Gerry Christensen, Robert Duncan, Paul G. Florack, "Wireless Intelligent Networking", 2nd edition, Artec House Publication 2011.


CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO 3	PSO 4
CO 1	1	2	--	--	--	--	--	--	3	--	--	--	3	--	1	--
CO 2	1	2	--	--	--	--	--	--	--	--	--	--	2		1	--
CO 3	1	2	--	--	--	--	--	--	3	--	--	--	--	--	1	--
CO 4	1	2	--	--	--	--	--	--	3	--	--	--	--	--	1	--

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ECE2721	EMBEDDED SYSTEM WITH ARM PROCESSORS	L	T	P	C
Version: 2019.1	Date of Approval: May 21, 2019	2	0	0	2
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

This course introduces the concept of architecture and programming of advanced embedded microcontrollers i.e, ARM family of microcontrollers that are widely used in design of real time sophisticated embedded systems like tablets, hand held devices, automation and industrial control systems.

Course Objectives

The objective of this course is to

- Provide an overview of embedded system and real time operating system.
- Equip the students with concepts of ARM microcontroller and its interfacing with external devices.

Course Outcomes

On completion of this course, the students will be able to

CO1: Explain and analyse the architecture of ARM microcontroller, Debugging and programming techniques.

CO2: Explain and classify embedded systems and its applications.

CO3: Explain hardware and software design concepts of embedded system.

CO4: Explain real time operating system for embedded system.

Modules	Blooms level*	Number of hours
Module 1 ARM Microcontroller A brief history of ARM evolution, ARM-32 bit Microcontroller: Thumb-2 technology and applications of ARM, Architecture of ARM Cortex M3, Various Units in the architecture, Debugging support, General Purpose Registers, Special Registers, exceptions, interrupts, stack operation, reset sequence ARM Cortex M3 Instruction Sets and Programming: Assembly basics, Instruction list and description, Useful instructions, Memory mapping, Bit-band operations and CMSIS, Assembly and C language Programming	L1, L2, L3 and L4	9
Module2 Embedded System Components Embedded Vs General computing system, Classification of Embedded systems, Major applications and purpose of ES. Core of an Embedded System including all types of processor/controller, Memory, Sensors, Actuators, LED, 7 segment LED display, Optocoupler, Relay, Piezo buzzer, Push button switch, Communication Interface (onboard and external types), Embedded firmware, Other system components.	L1, L2 and L4	9
Module 3	L1 and	9

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Embedded System Design Concepts Characteristics and Quality Attributes of Embedded Systems, Operational and non-operational quality attributes, Embedded 86 Systems-Application and Domain specific, Hardware Software Co-Design and Program Modelling (excluding UML), Embedded firmware design and development (excluding C language).	L2	
Module 4 RTOS and IDE for Embedded System Design Operating System basics, Types of operating systems, Task, process and threads (Only POSIX Threads with an example program), Thread preemption, Preemptive Task scheduling techniques, Task Communication, Task synchronization issues – Racing and Deadlock, Concept of Binary and counting semaphores (Mutex example without any program), How to choose an RTOS, Integration and testing of Embedded hardware and firmware, Embedded system Development Environment – Block diagram (excluding Keil), Disassembler/decompiler, simulator, emulator and debugging techniques.	L1 and L2	9

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

Text Books:

- Joseph Yiu, “The Definitive Guide to the ARM Cortex-M3”, 2nd Edition, Newnes, (Elsevier), 2010.
- Shibu K V, “Introduction to Embedded Systems”, Tata McGraw Hill Education Private Limited, 2nd Edition, 2009.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	3	-	2	2	--	--	--	--	--	--	2	-	-	1	3
CO2	1	2	-	2	2	--	--	--	--	--	--	2	-	-	1	3
CO3	1	2	-	2	2	--	--	--	--	--	--	2	-	-	1	3
CO4	1	2	-	2	2							2				

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ECE2722	RADAR AND SATELLITE COMMUNICATIONS LAB	L	T	P	C
Version 2019.1	Date of Approval: May 21, 2019	0	0	2	1
Pre-requisites/Exposure	Basic Electronics and Communication systems				
Co-requisites	Nil				

Catalog Description

This course builds basic knowledge and practical skills for different types of Radar systems and satellite communication along with link designing & application. It also covers different modulation schemes & channels used.

Course Objectives

The objective of this course is to

1. Provide the fundamental knowledge of Radar and its types.
2. Provide the knowledge about modulation techniques.

Course Outcomes

On completion of this course, the students will be able to

CO1. Describe the working of AM transmitter and receiver.

CO2. Describe the working of FM transmitter and receiver.

CO3. Explain the satellite communications and the components used in this communication.

CO4. Explain the various access techniques used in communication.

Course Content

Modules	Blooms level*	Number of hours
1. To study AM transmitter and receiver.	L1 and L2	1
2. To study FM transmitter and receiver.	L1 and L2	1
3. To implement the following circuits. <ul style="list-style-type: none"> - AM Transmitter - FM Transmitter - AM Receiver - FM Receiver - Remote Control - Wireless Mic System 	L1 and L2	3
4. To study RF portion of satellite receiver. <ul style="list-style-type: none"> - Study of dish antenna and section N.B section - Study of tuner - Study of R.F modulator section 	L2 L3 and L4	3
5. To study the base-band portion of satellite receiver <ul style="list-style-type: none"> - study of video section - study of sound section - study of signal indicator - study of power supply section 	L2 L3 and L4	4

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*Bloom's Level: L1: Knowledge; L2: Comprehension; L3: Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text Books

- 1. M.I. Skolnik. Introduction to Radar Systems, 2nd Edition Tata Mc Graw-Hill.
- 2. T. Pratt & C.W. Boston, Satellite Communications, New York, John Wiley & Sons, 1986.

Reference Books

- Tri Ha, Digital Satellite Communication, Tata Mc Graw-Hill, 1990-03
- Harry and Vam Trees, Satellite Communication, IEEE Proceeding, 1979.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO 1	1	-	-	-	-	-	-	-	-	-	-	-	2	-	1	-
CO 2	1	2	-	-	-	3	-	-	-	-	-	-	2	-	1	-
CO 3	1	2	3	-	-	3	-	-	-	-	--	-	2	-	1	-
CO 4	1	2	-	-	-	2	-	-	-	-	-	-	2	-	1	-

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ECE2723	PYTHON LAB	L	T	P	C
Version : 2019.1	Date of Approval: May 21, 2019	0	0	2	1
Pre-requisites/Exposure	Python programming platform basics				
Co-requisites	Nil				

Catalog Description

Python has become an important programming tool for research and development in science and engineering. It can be used for programming very easily using various already available packages. This course provides the students the knowledge of python programming. This course introduces the experiments related to logic design using python.

Course Objectives

The objective of this course is

- Demonstration of python tool for programming.
- Practice of logic development using python.

Course Outcomes

On completion of this course, the students will be able to

CO1. Use python platform for programming purpose.

CO2. Perform experiments and analyze output for various logics.

CO3. Simulate and analyze real problems using python.

Modules	Blooms level*	Number of hours
Lab Session 1 <ul style="list-style-type: none"> • Compute the GCD of two numbers. • Find the square root of a number (Newton's method) • Exponentiation (power of a number) 	L2, L3,L4 and L5	3
Lab Session 2 <ul style="list-style-type: none"> • Find the maximum of a list of numbers • Linear search and Binary search • Selection sort, Insertion sort 	L2, L3,L4 and L5	3
Lab Session 3 <ul style="list-style-type: none"> • Merge sort • First n prime numbers • Multiply matrices • Programs that take command line arguments (word count) 	L2, L3,L4 and L5	3
Lab Session 4 <ul style="list-style-type: none"> • Find the most frequent words in a text read from a file • Simulate elliptical orbits in Pygame • Simulate bouncing ball using Pygame 	L2, L3,L4 and L5	3

*Bloom's Level:

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L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

Text Books

- Chun, J Wesley, Core Python Programming, Second Edition, Pearson, 2007 Reprint 2010
- Barry, Paul, Head First Python, 2nd Edition, O Rielly, 2010

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	2	3	-	3	3	--	--	--	--	--	--	2	-	1	-	3
CO2	1	2	-	2	2	--	--	--	--	--	--	2	-	1	-	3
CO3	1	2	-	2	2	--	--	--	--	--	--	2	-	1	-	3

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ECE2735	SUMMER INTERNSHIP EVALUATION-II	L	T	P	C
Version 2019.1	Date of Approval: May 21, 2019	0	0	0	3
Pre-requisites/Exposure	NA				
Co-requisites	Nil				

Catalog Description

There are certain phases of every Intern's professional development that cannot be effectively taught in the academic environment. These facets can only be learned through direct, on-the-job experience working with successful professionals and experts in the field. The internship program can best be described as an attempt to institutionalize efforts to bridge the gap between the professional world and the academic institutions. Entire effort in internship is in terms of extending the program of education and evaluation beyond the classroom of a university or institution. The educational process in the internship course seeks out and focuses attention on many latent attributes, which do not surface in the normal classroom situations. These attributes are intellectual ability, professional judgment and decision-making ability, inter-disciplinary approach, skills for data handling, ability in written and oral presentation, sense of responsibility etc. In order to achieve these objectives, each student will maintain a file (**Internship File**). The Internship File aims to encourage students to keep a personal record of their learning and achievement throughout the Programme. It can be used as the basis for lifelong learning and for job applications. Items can be drawn from activities completed in the course modules and from the workplace to demonstrate learning and personal development. The report will assess the student's analytical skills and ability to present supportive evidence, whilst demonstrating understanding of their organization, its needs and their own personal contribution to the organization.

Course Objectives

The objective of this course is to

- Equip the students with concepts of new technologies and practical exposure
- Provide an overview of presentation and preparation of report.

Course Outcomes

On completion of this course, the students will be able to

CO1: Study the literature and identify the problem statement

CO2: Work on a real world problem and solve it using latest technology

CO3: Prepare a detailed report of the project

CO4: Prepare a brief presentation of their project

CO5: Present and explain the project for evaluation

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	V	PPT	R	IM	EM
Weightage (%)	10	10	10	30	70

V – Viva, PPT-Power Point Presentation, R – Report, IP-Internal Marks, EM-External Marks

Text Books

As per topic of summer internship project is chosen and discussion with guide.

Reference Books

As per topic of summer internship project is chosen and discussion with guide.

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CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	2	2	--	--	--	--	--	--	--	--	--	-		1	2
CO2	1	2	2	-	--	--	--	--	--	--	--	--	-	-	1	1
CO3	1	2	-	--	--	--	--	--	--	--	--	--	-	-	1	1
CO4	1	2	3	--	--	--	--	--	--	--	--	--	-	-	1	1

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ECE2706	OPTICAL COMMUNICATION	L	T	P	C
Version 2019.1	Date of Approval: May 21, 2019	2	0	0	2
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

This course deals with the study of fundamentals of optical communication. This includes the properties of optical fibers and how they are used to establish optical links for communication systems. The aim of this course is

- To introduce students with the basics of optical communication system through the wave propagation principles in optical fiber, different sources and detectors used for formation of optical links.
- To familiarize the students with the different degradation factors for quality of transmission.
- To give exposure of advanced Communication use in present optical communication networks through advanced multiplexing technologies, networking and system set up.

Course Outcomes

On completion of this course, the students will be able to

CO1: Demonstrate basics of optical fiber communication link, structure, propagation and transmission properties of an optical fiber.

CO2: Describe the principles of optical sources and detectors and power launching-coupling methods.

CO3: Estimate the losses and analyze the propagation characteristics of an optical signal in different types of fibers

CO4: Identify the applications of optical fiber communication links in various fields.

Modules	Blooms level*	Number of hours
Module I: Fundamentals of Fiber Optics Different generations of optical fiber communication systems, Optical fiber structure, light propagation- total internal reflection, acceptance angle and numerical aperture, signal attenuation and dispersion. Modes in an optical fiber, Optical fibers: step-index, Graded-index, Single and Multimode, other types of fibers.	L1, L2, L3, L4	5
Module II: Optical Sources LED-spontaneous emission- material used in LED, LED efficiency, surface emitting LED, edge emitters, stimulated emission, spontaneous emission, Structure of various LED's, LASER: stimulated emission, double heterostructure LASER, LASER tuning and degradation, driver for LED and LASER.	L2, L3	4
Module III: Photo Detectors Characteristics of photo detector, direct and indirect band gap semiconductors, homo junction and hetero junction photodiodes, p-i-n photodiode, avalanche photodiode, phototransistor, optocouplers	L2, L3	4
Module IV: Fiber Properties Fiber end preparation, fiber splicing, fiber connectors, connection losses, fiber couplers, fiber materials, fiber fabrication, mechanical properties of fibers, different fiber cables.	L2	3
Module V: Fiber Optic Communication System Basic communication components, coupling to and from the fiber, multiplexing and coding, repeaters, bandwidth and rise time budgets,	L3, L4, L5	5

noise, bit error rate and eye pattern.		
Module VI: Application of Fiber Optics Long haul communication, LAN, medical application, undersea communication, military application, coherent optical communication, Fiber optic sensors- Intensity modulated sensor, Phase sensor, Diffraction Grating sensors.	L3, L4	3

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

Text Books

- G. Keiser, Optical fiber Communication. Mc. Graw Hill, 2017.

Reference Books

- J. Senior, Optical Fiber Communications- principles & practice., PHI, 2010.
- G.P. Agrawal, Fiber-Optic Communication Systems., Wiley, 2007.

CO, PO and PSO mapping

	P O 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1		2			2		1					3		1	
CO2	2	3	3										3		1	
CO3	2	1		1		2	3							3	1	2
CO4		3			2	2	2		3		2				1	2

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ECE2716	OPTICAL COMMUNICATIONS LAB	L	T	P	C
Version 2019.1	Date of Approval: May 21, 2019	0	0	2	1
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

This course deals with the practical aspects of fundamentals of optical communication. This includes the properties of optical fibers and how they are used to establish optical links for communication systems. The aim of this course is

- To introduce students with the basics of optical communication system through the basics of optical waveguides, their parameters and link set up using different type of fibers.
- To familiarize the students with the different degradation factors for quality of transmission.
- To give exposure of multiplexing techniques, coding, coupling techniques used in present optical communication networks

Course Outcomes

On completion of this course, the students will be able to

CO1: Analyze different types of optical waveguides for their properties like Numerical Aperture, basic properties, coupling and transmission characteristic of optical fibres.

CO2: Identify and estimate the losses in optical fiber that affect the performance of transmission systems.

CO3: Design the basic optical links through digital and analog links, different modulation and coding techniques.

Modules	Blooms level*	Number of hours
Lab Session 1: To measure the Numerical Aperture of a multimode fiber	L1,L2	1
Lab Session II: To measure attenuation by cut Back technique.	L4	1
Lab session III: To study the model properties of a multimode fiber.	L1,L2	1
Lab session IV: To couple the light into a single mode fiber & measure the far-field power distribution	L2, L3, L4	1
Lab session V: To measure various fiber alignment losses.	L3,L4	1
Lab session VI: To estimate the power budget for a fiber optic system.	L3,L4	1
Lab session VII: To set up a fiber optic analog link.	L3	1
Lab session VIII: To set up a fiber optic digital link.	L3	1
Lab session IX: To study Time Division Multiplexing of signals.	L3	1
Lab session X: To study Manchester Coding.	L3	1
Lab session XI: To study voice digitization	L3	1
Lab session XII: To simulate optical fiber wave guide.	L4, L5	1

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**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva

Text Books

- G. Keiser, Optical fiber Communication. Mc. Graw Hill, 2017.

Reference Books

- J. Senior, Optical Fiber Communications- principles & practice., PHI, 2010.
- G.P. Agrawal, Fiber-Optic Communication Systems., Wiley, 2007.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1		2			2		1					3		1	
CO2	2	3	3										3		1	
CO3	2	1		1		2	3							3	1	2
CO4		3			2	2	2		3		2				1	2

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ECE2712	DIGITAL IMAGE PROCESSING	L	T	P	C
Version: 2019.1	Date of Approval: May 21, 2019	2	0	0	2
Pre-requisites/Exposure	Basics of Signal Processing				
Co-requisites	NIL				

Catalog Description

Image processing has become an important tool for research and investigation in many areas of science and engineering. It takes full advantage of the computational technology of Mathematics and utilization of various tools. This course gives a detailed insight of Image Processing with different techniques used for different purposes.

Course Objectives

The objective of this course is to

- Equip the students with concepts of digital image processing.
- Provide in-depth knowledge of various techniques used at different steps of image processing.

Course Outcomes

On completion of this course, the students will be able to

CO1: Define and explain the fundamentals of image and its histogram.

CO2: Explain different techniques of image restoration and enhancement.

CO3: Apply coding techniques to remove different types of redundancies in image.

CO4: Represent and recognize the image.

Modules	Blooms level*	Number of hours
MODULE 1: Introduction to Digital Image Fundamentals The origins of Digital Image Processing, Examples of Fields that Use Digital Image Processing, Fundamentals Steps in Image Processing, Elements of Digital Image Processing Systems, Image Sampling and Quantization, Some basic relationships like Neighbors, Connectivity, Distance Measures between pixels, Linear and Non Linear Operations. Image Enhancement in the Spatial Domain: Some basic Gray Level Transformations, Histogram Processing, Enhancement Using Arithmetic and Logic operations, Basics of Spatial Filters, Smoothing and Sharpening Spatial Filters, Combining Spatial Enhancement Methods.	L1 and L2	7
MODULE 2: Image Enhancement in Frequency Domain Introduction to Fourier Transform and the frequency Domain, Smoothing and Sharpening Frequency Domain Filters, Homomorphic Filtering. Image Restoration: A model of The Image Degradation / Restoration Process, Noise Models, Restoration in the presence of Noise Only Spatial Filtering, Periodic Noise Reduction by Frequency Domain Filtering, Linear Position-Invariant Degradations, Estimation of Degradation Function, Inverse filtering, Wiener filtering, Constrained Least Square Filtering, Geometric Mean Filter, Geometric Transformations.	L2 and L3	13
MODULE 3:	L1 and	12

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Image Compression Coding, Interpixel and Psychovisual Redundancy, Image Compression models, Elements of Information Theory, Error free comparison, Lossy compression, Image compression standards. <i>Image Segmentation:</i> Detection of Discontinuities, Edge linking and boundary detection, Thresholding, Region Oriented Segmentation, Motion based segmentation	L2	
MODULE 4: Representation and Description Representation, Boundary Descriptors, Regional Descriptors, Use of Principal Components for Description, Introduction to Morphology, Some basic Morphological Algorithms. Object Recognition: Patterns and Pattern Classes, Decision-Theoretic Methods, Structural Methods.	L2 and L3	6

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

A: Attendance, CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination

Text Books

Text:

- Rafael C. Gonzalez & Richard E. Woods, "Digital Image Processing", 2nd edition, Pearson Education.
- A. K. Jain, "Fundamental of Digital Image Processing", PHI.

References:

- Maher A. Sid-Ahmed, "Image Processing Theory, Algorithms and Architectures", McGraw-Hill, 1995.
- William K. Pratt, "Digital Image Processing", Wiley-Interscience publication, Second Edition, 1991.
- R. Arthyr, "Fundamentals of Electronic Image Processing", PHI.
- Image processing, Analysis, and Machine vision by Milan Sonka vaclan Halavac Roger Boyle, Vikas Publishing House

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO 3	PSO 4
CO 1	1	2	--	--	3	--	--	--	--	--	--	--	1	--	--	--
CO 2	1	2	--	--	3	--	--	--	--	--	--	--	1	2	--	--
CO 3	1	2	--	--	3	--	--	--	3	--	--	--	1	3	2	--
CO 4	1	2	--	--	--	--	--	--	--	--	--	--	1	--	2	--

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Anil

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ECE2713	DIGITAL IMAGE PROCESSING LAB	L	T	P	C
Version 2019.1	Date of Approval: May 21, 2019	0	0	2	1
Pre-requisites/Exposure	Basics of MATLAB				
Co-requisites					

Catalog Description

Image processing has become an important tool for research and investigation in many areas of science and engineering. This course is designed to provide the students an understanding of the basic concepts of digital image processing and various techniques used in it. Students will perform practical on hardware kit as well as on software.

Course Objectives

The objective of this course is to

1. Make students demonstrate the concepts of image processing.
2. Apply the different techniques to process image.

Course Outcomes

On completion of this course, the students will be able to

CO1. Explain the basic image processing tools and commands.

CO2. Apply the filters to remove noise in spatial & frequency domain.

CO3. Apply image processing techniques for compression, segmentation and restoration.

Modules	Blooms level*	Number of hours
Lab Session 1 1. To study about the basic image processing tools. 2. Write program for histogram processing.	L3	3
Lab Session 2 3. Write program for filtering in frequency domain. 4. Write program for filtering in spatial domain.	L3 and L4	3
Lab Session 3 5. Write programs for different compression schemes. 6. Write program image restoration.	L3 and L4	3
Lab Session 4 7. Write program for performing different morphological operations. 8. Write program for image segmentation.	L3 and L4	3

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

IA	EE
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A	PR	LR	V	PR	V
5	10	10	5	35	35

IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

Text Books

- Rafael C. Gonzalez & Richard E. Woods, “Digital Image Processing”, 2nd edition, Pearson Education.
- A. K. Jain, “Fundamental of Digital Image Processing”, PHI.

References:

- Maher A. Sid-Ahmed, “Image Processing Theory, Algorithms and Architectures”, McGraw-Hill, 1995.
- William K. Pratt, “Digital Image Processing”, Wiley-Interscience publication, Second Edition, 1991.
- R. Arthyr, “Fundamentals of Electronic Image Processing”, PHI.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	--	--	--	2	--	--	--	--	--	--	2	1	--	-	-
CO2	1	-	3	--	2	--	--	--	--	--	--	2	1	3	--	-
CO3	1	-	3	--	2	--	--	--	--	--	--	2	1	3	--	3

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ECE2724	ROBOTIC PROCESS AUTOMATION DESIGN & DEVELOPMENT	L	T	P	C
Version 2019.1	Date of Approval: 14 July 2019	3	0	0	3
Pre-requisites/Exposure	Basic Networking Concepts				
Co-requisites	Nil				

Catalog Description

This course aims at providing knowledge of basic concepts of Robotic Process Automation to University students. It further builds on these concepts and introduces key RPA Design and Development strategies and methodologies specifically in context of UiPath products. The student undergoing the course shall develop the competence to design and develop a robot for a defined process.

Course Objectives

The objective of this course is to

- Equip the students with concepts of robotic process automation
- Provide an overview of designing with uipath software.

Course Outcomes

On completion of this course, the students will be able to

CO1: Explain key terms and trends around the robotic process automation along with its physical and logical design

CO2: Understand the potential and value of the robotic process automation .

CO3: Describe the technologies used for the robotic process automation and mobile devices, including (passive and active) sensors, the physical communications layer, communications protocols, programming frameworks,.

CO4: Design programs and have hands on experience on uipath software

CO5: Develop RPA programs of moderate complexity for a well-used robotic automation process using uipath.

Modules	Blooms level*	Number of hours
Module I: Programming Basic and Recap Programming Concepts Basics I - Understanding the application, Basic Web Concepts, Protocols, Email Clients, Data Structures, Data Tables, Algorithms, Software Processes, Software Design, SDLC. Programming Concepts Basics 2- Scripting, Net Framework, Net Fundamentals, XML, Control structures and functions, XML, HTML, CSS, Variables & Arguments.	L1, L2	8
Module II: RPA Concepts RPA Basics - History of Automation, what is RPA, RPA vs Automation, Processes & Flowcharts, Programming Constructs in RPA, What Processes can be Automated, Types of Bots, Workloads which can be automated. RPA Advanced Concepts - Standardization of processes, RPA Development methodologies, Difference from SDLC, Robotic control flow architecture, RPA business case, RPA Team, Process Design Document/Solution Design	L2, L3 and L4	8

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Document, Industries best suited for RPA, Risks & Challenges with RPA, RPA and emerging ecosystem		
Module III: UiPath Introduction & Basics Introduction to UiPath- Installing UiPath Studio community edition, The User Interface, Keyboard Shortcuts, About Updating, About Automation Projects, Introduction to Automation Debugging, Managing Activation Packages, Reusing Automations Library, Installing the Chrome Extension, Installing the Firefox Extension, Connecting your project to a source control system, Activities Guide. Variables, Control Flow Data Manipulation- Data Manipulation Introduction, Scalar variables, collections and Tables, Text Manipulation, Data Manipulation, Gathering and Assembling Data. Recording and Advanced UI Interaction - Recording Introduction, Basic and Desktop Recording, Web Recording, Input/Output Methods, Screen Scraping, Data Scraping, Scraping advanced techniques. Selectors.	L2, L3 and L4	8
Module IV: UiPath Advanced Automation concepts and techniques Image, Text & Advanced Citrix Automation- Introduction to Image & Text Automation, Image based automation, Keyboard based automation, Information Retrieval, Advanced Citrix Automation challenges, Best Practices, using tab for Images, Starting Apps. Excel Data Tables & PDF - Data Tables in RPA, Excel and Data Table basics, Data Manipulation in excel, Extracting Data from PDF, extracting a single piece of data, Anchors, Using anchors in PDF. Email Automation- Email Automation, Incoming Email automation, Sending Email automation	L2, L3 and L4	12

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

Text Books

- "Learning Robotic Process Automation" By Alok Mani Tripathi, Packt Publications, 1st Edition, 2018

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	--	--	3	--	--	--	--	--	--	2	--	1	1	-	-
CO2	1	--	1	2	--	--	--	--	--	--	--	--	-	1	-	-
CO3	1	--	1	2	--	--	--	--	--	--	--	--	-	1	-	2
CO4	1	--	--	2	--	--	--	--	--	--	--	--	1	1	-	2

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ECE2731	TERM PAPER	L	T	P	C
Version 2019.1	Date of Approval: May 21, 2019	0	0	0	2
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

Term paper evaluation course requires the students to study about the current technology topic in detail. The students have to read research papers, books and other study sources and finalize the topics for their presentation. Then the student has to prepare it in detail and write a detailed research paper mentioning all the content related to the topic. The evaluation is later done and a presentation is also to be prepared.

Course Objectives

The objective of this course is to

- To increase the knowledge and the understanding of a particular topic.
- To introduce the students about how to write technical papers/research papers.

It trains the students to make use of research tools and material available both in print and digital formats.

Course Outcomes

On completion of this course, the students will be able to

CO1: Study the literature and identify the current technical topic

CO2: Study the identified topic in detail

CO3: Prepare a detailed report including the introduction, architecture, advantages, disadvantages etc

CO4: Prepare a brief presentation of the concerned topic

CO5: Present and explain the topic for evaluation

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	V	PPT	R	IM	EM
Weightage (%)	10	10	10	30	70

V – Viva, PPT-Power Point Presentation, R – Report, IP-Internal Marks, EM-External Marks

Text Books

As per topic of term paper and discussion with guide.

Reference Books

As per topic of term paper and discussion with guide.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	2	1	--	--	--	--	--	--	--	--	--	--	2	-	-	1
CO2	2	1	--	--	--	--	--	--	--	--	--	--	2	-	-	1
CO3	2	2	-	--	--	--	--	--	--	--	--	1	2	-	-	1
CO4	2	2	--	--	--	--	--	--	--	--	1	1	2	-	-	1
CO5	2	2	--	--	--	--	--	--	--	--	1	1	2	-	-	1

1: strongly related, 2: moderately related and 3: weakly related

ECE2732	PROJECT (WITH PRESENTATION & EVALUATION)	L	T	P	C
Version 2019.1	Date of Approval: May 21, 2019	0	0	0	2
Pre-requisites/Exposure	Basics of Electrical & Electronics				
Co-requisites	Nil				

Catalog Description

Project/Research experience is as close to a professional problem-solving activity as anything in the curriculum. It provides exposure to research methodology, practical skill enhancement and an opportunity to work closely with a industry external guide. It usually requires the use of advanced concepts, a variety of experimental techniques, and state-of-the-art instrumentation. Students require professional development that cannot be effectively taught in the academic environment. These facets can only be learned through direct, on-the-job experience working with successful professionals and experts in the field. The internship program can best be described as an attempt to institutionalize efforts to bridge the gap between the professional world and the academic institutions. Entire effort in internship is in terms of extending the program of education and evaluation beyond the classroom of a university or institution. The educational process in the internship course seeks out and focuses attention on many latent attributes, which do not surface in the normal classroom situations. These attributes are intellectual ability, professional judgment and decision-making ability, inter-disciplinary approach, skills for data handling, ability in written and oral presentation, sense of responsibility

Course Objectives

The objective of this course is to

- Equip the students with concepts of new technologies and practical exposure
- Provide an overview of presentation and preparation of report

Course Outcomes

On completion of this course, the students will be able to

- CO1: Study the literature and identify the problem statement
CO2: Work on a real world problem and solve it using latest technology
CO3: Prepare a detailed report of the project
CO4: Prepare a brief presentation of their project
CO5: Present and explain the project for evaluation

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	V	PPT	R	IM	EM
Weightage (%)	10	10	10	30	70

V – Viva, PPT-Power Point Presentation, R – Report, IP-Internal Marks, EM-External Marks

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	2	2	2	--	--	--	--	--	--	--	--	1	2	-	-	1
CO2	2	2	2	-	1	--	--	--	--	3	--	1	2	-	-	1
CO3	2	2	-	--	--	--	--	--	--	3	--	1	2	-	-	1
CO4	2	2	3	--	--	--	--	--	--	--	1	1	2	-	-	1

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ECE2837	PROJECT (DISSERTATION)	L	T	P	C
Version 2019.1	Date of Approval: May 21, 2019	0	0	0	8
Pre-requisites/Exposure	Basics of Electronics and Communication				
Co-requisites	Nil				

Catalog Description

Major Project/Research experience is as close to a professional problem-solving activity as anything in the curriculum. It provides exposure to research methodology, practical skill enhancement and an opportunity to work closely with a industry external guide. It usually requires the use of advanced concepts, a variety of experimental techniques, and state-of-the-art instrumentation. Students require professional development that cannot be effectively taught in the academic environment. These facets can only be learned through direct, on-the-job experience working with successful professionals and experts in the field. The internship program can best be described as an attempt to institutionalize efforts to bridge the gap between the professional world and the academic institutions. Entire effort in internship is in terms of extending the program of education and evaluation beyond the classroom of a university or institution. The educational process in the internship course seeks out and focuses attention on many latent attributes, which do not surface in the normal classroom situations. These attributes are intellectual ability, professional judgment and decision-making ability, inter-disciplinary approach, skills for data handling, ability in written and oral presentation, sense of responsibility

Course Objectives

The objective of this course is to

1. Equip the students with concepts of new technologies and practical exposure
2. Provide an overview of presentation and preparation of report

Course Outcomes

On completion of this course, the students will be able to

CO1: Study the literature and identify the problem statement

CO2: Work on a real world problem and solve it using latest technology

CO3: Prepare a detailed report of the project

CO4: Prepare a brief presentation of their project

CO5: Present and explain the project for evaluation

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	V	PPT	R	IM	EM
Weightage (%)	10	10	10	30	70

V – Viva, PPT-Power Point Presentation, R – Report, IP-Internal Marks, EM-External Marks

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	2	2	--	--	--	--	--	--	--	--	--	-	-	1	2
CO2	1	2	2	-	--	--	--	--	--	--	--	--	-	-	1	1
CO3	1	2	-	--	--	--	--	--	--	--	--	--	-	-	1	1
CO4	1	2	3	--	--	--	--	--	--	--	--	--	-	-	1	1

1: strongly related, 2: moderately related and 3: weakly related

ECE2815	INFORMATION THEORY AND CODING	L	T	P	C
Version 2019.1	Date of Approval: 14 July 2019	3	0	0	3
Pre-requisites/Exposure	Communication System				
Co-requisites					

Catalog Description

The purpose of this course is to introduce students to the basics of coding used in communication system. The course aims to discuss the different entropies, channel capacity and purpose of encoding

Course Objectives

The objective of this course is to

- Provide a thorough introduction to coding used in communication system.
- Provide in depth study of entropies, channel capacity and purpose of encoding.

Course Outcomes

On completion of this course, the students will be able to

CO1. Measure entropy in terms of probability and mutual information.

CO2 Explain shannon fano and Huffman coding.

CO3. Prepare linear and cyclic codes for communication system.

CO4 Synthesize different BCH and convolutional codes for information source.

Modules	Blooms level*	Number of hours
MODULE I: Basic Concepts of Information Theory A measure of Uncertainty, Binary Sources, Measure of Information for two – dimensional discrete finite probability Scheme, Noise characteristics of channel, Basic relationship among different entropies, Measure of mutual information channel capacity, Capacity of channel with symmetric noise structure BSC and BEC.	L1 and L2	7
MODULE II: Element of Encoding Propose of encoding separable binary codes, Shannon Fano encoding , Noiseless coding Theorem of decidability, Mc Millen's Theorem, Average length of encoding message, Shannon's Binary encoding, Fundamental Theorem of discrete Noiseless coding, Huffman's Minimum Redundancy codes. Coding for Reliable Digital Transmission & Storage Introduction, types of codes, Modulation and Demodulation, Maximum likelihood decoding, types of error, error control strategies.	L1 and L2	9
MODULE III: Introduction to Algebra Groups, Fields Binary field Arithmetic, Construction of Galois field GF (2m), Basic Properties of Galois Field GF (2m), Vector Space, Matrices. Linear Block Codes: Introduction to Linear Block codes, Syndrome and Error detection, Minimum distance of block code, error detecting and Error correcting capability a block code Hamming Code. Cyclic Codes: Description of Cyclic codes, Generator and parity check	L1, L2, L3 and L4	10

matrices of cyclic codes, encoding of cyclic codes syndrome computation & error detection decoding of cyclic codes, Error trapping decoding of cyclic codes, Goley Codes.		
MODULE IV: BCH Codes Description of codes, Decoding of BCH codes, Implementation of Galoes Field Arithmetic, Implementation of error connection, Convolution Codes: Encoding of convolution codes, structural properties of Convolution codes, distance properties of Convolution codes, Distance Properties of convolution codes, Maximum likelihood decoding of convolution codes. Automatic Repeat Request Strategies Stop and wait, Go back and selective repeat ARQ strategies, Hybrid ARQ Schemes.	L1, L2, L3 and L4	10

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5:Synthesis, L6:Evaluation

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text Books

- F.M. Reza, "An introduction to Information Theory", McGraw Hill, 2000.
- Viterbi A and Omura J K, "Principles of Digital Communication and Coding", McGraw Hill, 1979

Reference Books

- Cover T M and Thomas J A, "Elements of Information theory", 2nd edition, John Wiley & Sons, 2006
- Roth R, "Introduction to Coding theory", Cambridge University Press, 2006.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	2	2	1	--	2	--	--	--	--	--	--	3	--	--	--
CO2	2	3	1	--	2	--	--	--	--	--	--	2	--	--	--
CO3	2	3	1	--	2	--	--	--	--	--	--	3	--	--	--
CO4	2	3	2	--	2	--	--	--	--	--	--	3	--	--	--

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ECE2805	RTOS PROGRAMMING	L	T	P	C
Version 2019.1	Date of Approval: 14, July 2019	3	0	0	3
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

The syllabus introduces real time operating systems and resource analysis. It introduces the concepts of Processing, I/O Resources, Memory, Multi-resource, Soft Real-Time Services, Embedded System components, Debugging Components, Performance Tuning, High availability and Reliability Design.

Course Objectives

The objective of this course is to

- Provide an overview of real time operating system.
- Equip the students with concepts of Resources ,debugging techniques, performance tuning and reliability analysis.

Course Outcomes

On completion of this course, the students will be able to

CO1: Explain history of real time operating system and the concepts of resource analysis.

CO2: Explain the concepts of processing and I/O resources.

CO3: Explain the concept of memory, multi-resource and soft real-time services.

CO4: Explain embedded system components and apply debugging techniques.

CO5: Explain performance tuning, high availability and the concepts of reliability design.

Modules	Blooms level*	Number of hours
Module-1 Introduction to Real-Time Embedded Systems: Brief history of Real Time Systems, A brief history of Embedded Systems, System Resources: Resource Analysis, Real-Time Service Utility, Scheduling Classes, The Cyclic Executive, Scheduler Concepts, Preemptive Fixed Priority Scheduling Policies, Real-Time OS, Thread Safe Reentrant Functions.	L1 and L2	7
Module-2 Processing and I/O Resources: Preemptive Fixed-Priority Policy, Feasibility, Rate Monotonic least upper bound, Necessary and Sufficient feasibility, Deadline – Monotonic Policy, Dynamic priority policies, I/O Resources: Worst-case Execution time, Intermediate I/O, Execution efficiency, I/O Architecture.	L1 and L2	8
Module-3 Memory, Multi-resource and Soft Real-Time Services: Physical hierarchy, Capacity and allocation, Shared Memory, ECC Memory, Flash file systems, Multi-resource Services: Blocking, Deadlock and livelock, Critical sections to protect shared resources, priority inversion, Soft Real-Time Services: Missed Deadlines, QoS, Alternatives to rate monotonic policy, Mixed hard and soft real-time services.	L1 and L2	8
Module-4	L1, L2	7

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Embedded System and Debugging Components: Firmware components, RTOS system software mechanisms, Software application components, Debugging Components: Exceptions assert, Checking return codes, Single-step debugging, kernel scheduler traces, Test access ports, Trace ports, Power-On self test and diagnostics, External test equipment, Application-level debugging.	and L3	
Module-5 Performance Tuning, High availability and Reliability Design: Basic concepts of drill-down tuning, hardware – supported profiling and tracing, Building performance monitoring into software, Path length, Efficiency, and Call frequency, Fundamental optimizations. High availability and Reliability Design: Reliability and Availability, Similarities and differences, Reliability, Reliable software, Available software, Design tradeoffs, Hierarchical applications for Fail-safe design.	L1, L2, L3 and L4	6

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

Text Books:

- “Real-Time Embedded Systems and Components”, Sam Siewert, Cengage Learning India Edition, 2007.
- “Programming and Customizing the PIC microcontroller”, Myke Predko, 3rd Ed, TMH, 2008.

Reference Books:

- “Programming for Embedded Systems”, Dreamtech Software Team, Jhon Wiley, India Pvt. Ltd., 2008.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	2	2	-	-	3	--	--	--	--	--	--	3			
CO2	1	2	-	-	2	--	--	--	-	--	--	2			
CO3	1	2	-	-	2	--	--	--	--	--	-	2			
CO4	1	2	-	-	2	-	--	--	-	--	-	2			
CO5	1	2	-	-	1	-	--	--	-	--	-	2			

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ECE2806	VERILOG PROGRAMMING	L	T	P	C
Version 2019.1	Date of Approval: May 21, 2019	2	0	0	2
Pre-requisites/Exposure	Basic Digital Electronics				
Co-requisites	Nil				

Catalog Description

This course discusses fundamental Verilog concepts of today's most advanced digital design techniques. It offers broad coverage of Verilog HDL from a practical design perspective. Introduces students to gate, dataflow (RTL), behavioural, and switch level modeling, describes leading logic synthesis methodologies; explains timing and delay simulation; and introduces many other essential techniques for creating tomorrow's complex digital designs.

Course Objectives

The objective of this course is to

- Provide the fundamental knowledge of Verilog HDL for practical designs.
- Introduces the knowledge logic synthesis and design methodologies.

Course Outcomes

On completion of this course, the students will be able to

- CO1. Describe the basic concepts of Verilog HDL.
CO2. Design and solve the Gate level and dataflow modeling of various circuits.
CO3. Solve the circuits using Behavioural modeling.
CO4. Utilize the circuit knowledge on advanced Verilog topics.

Course Content

Modules	Blooms level*	Number of hours
MODULE I : Introduction to Verilog HDL and Basic Concepts Emergence of HDL, typical design flow, trends in HDL, Modeling concept Design methodologies, modules, instances, simulation, design block and stimulus block Lexical conventions, Data Types. System Tasks and Compiler Directives, Modules and Ports	L1 and L2	6
MODULE II: Gate-Level Modeling and Dataflow Modeling Gate Types. Gate Delays, Continuous Assignments. Delays. Expressions, Operators, and Operands. Operator Types. Examples for combinational and sequential circuit using Gate level and Data-flow modeling.	L1 and L2	5
MODULE III: Behavioural Modeling Structured Procedures. Procedural Assignments. Timing Controls. Conditional Statements. Multiway Branching. Loops. Sequential and Parallel Blocks. Generate Blocks. Examples	L1 and L2	6
MODULE IV: Tasks and Functions and Useful Modeling Techniques Difference between Tasks and Functions. Tasks. Functions. Procedural Continuous Assignments. Overriding Parameters. Conditional Compilation and Execution. Time Scales. Useful System Tasks	L1 and L2	7
MODULE V: Advanced Verilog Topics Timing and Delays. Switch Level Modeling, User-Defined Primitives, Logic Synthesis with Verilog HDL, Advanced Verification Techniques.	L2, L3 and L5	6

*Bloom's Level: L1: Knowledge; L2: Comprehension; L3: Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text Books

- Samir Palnitkar, Verilog HDL, 2nd Edition Pearson Education, 1996.
- Donald Thomas, Philip moorby, The Verilog hardware Description language, 5th Edition, Kluwer Academic publishers, 2002.

Reference Books

- J. Bhasker, Verilog HDL Synthesis: A Practical Primer, Star Galaxy publications, 1998.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO 3	PSO 4
CO 1	1	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-
CO 2	1	1	-	-	-	3	-	-	-	-	-	-	1	-	-	-
CO 3	1	2	3	-	-	3	-	-	-	-	--	-	1	1	-	-
CO 4	1	1	-	-	-	2	-	-	-	-	-	-	1	1	-	-

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ECE2813	VERILOG PROGRAMMING LAB	L	T	P	C
Version 2019.1	Date of Approval: May 21, 2019	0	0	2	1
Pre-requisites/Exposure	Basic digital electronics				
Co-requisites	Nil				

Catalog Description

This course discusses fundamental Verilog concepts of today's most advanced digital design techniques. It offers broad coverage of Verilog HDL from a practical design perspective. Introduces students to gate, dataflow (RTL), behavioral, and switch level modeling, describes leading logic synthesis methodologies; explains timing and delay simulation; and introduces many other essential techniques for creating tomorrow's complex digital designs.

Course Objectives

The objective of this course is to

- Provide the fundamental knowledge of designing digital circuits in Verilog HDL.
- Provide the knowledge of logic synthesis methodologies of digital circuits.

Course Outcomes

On completion of this course, the students will be able to

- CO1. Describe the codes for various combinational circuits.
CO2. Write the codes for various sequential circuits.
CO3. Model circuits using behavioral and dataflow methods.
CO4. Synthesize the circuits using various methodologies.

Course Content

Experiments	Blooms level*	Number of hours
1. Write a Verilog code to realize all the logic gates. 2. Write a Verilog code to implement Half Adders, Full adders and Subtractors using Gates.	L1 and L2	2
3. Write a Verilog code to describe the function of Multiplexer and Demultiplexer using different modelling styles. 4. Write a Verilog code to realize D Flip-Flop and D Latch.	L1 and L2	2
5. Write a Verilog code to implement 2:1 Mux and D Latch using Switches. 6. Write a Verilog code to implement Encoders and Decoders Using if-else Statement and case Statement.	L1 and L2	2
7. Write a Verilog code to implement SR Flip Flop using UDP (User Defined Program). 8. Write the Verilog code for a JK Flip-flop, and its test bench. Use all possible combinations of inputs to test its working.	L1 and L2	3
9. Write the hardware description of a 8-bit register with parallel load, shift left and shift right modes of operation and test its operation. 10. Write a Verilog code to realize Up/Down Counter and Divide by 4.5 Counter. Write a Verilog code to describe the function of Synchronous FIFO. 11. Write a Verilog code using FSM to realize a sequence detector (101101).	L1 and L2	3

*Bloom's Level: L1: Knowledge; L2: Comprehension; L3: Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA – Internal Assessment, EE - External Exam, PR - Performance, LR – Lab Record, V – Viva.

Text Books

- Samir Palnitkar, Verilog HDL, 2nd Edition Pearson Education, 1996.
- Donald Thomas, Philip moorby, The Verilog hardware Description language, 5th Edition, Kluwer Academic publishers, 2002.

Reference Books

- J. Bhasker, Verilog HDL Synthesis: A Practical Primer, Star Galaxy publications, 1998.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO 3	PSO 4
CO 1	1	-	-	-	-	-	-	-	-	-	-	-	2	-	1	1
CO 2	1	2	-	-	-	3	-	-	-	-	-	-	2	-	1	1
CO 3	1	2	3	-	-	3	-	-	-	-	--	-	2	-	1	1
CO 4	1	2	-	-	-	2	-	-	-	-	-	-	2	-	1	1

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ECE2818	WIRELESS COMMUNICATION	L	T	P	C
Version : 2019.1	Date of Approval: May 21, 2019	3	0	0	3
Pre-requisites/Exposure	Communication System				
Co-requisites	Nil				

Course Objective:

The objective of the course is to provide an overview of Wireless Communication networks area and its applications in communication engineering. The contribution of Wireless Communication networks to overall technological growth and the various terminology, principles, devices, schemes, concepts, algorithms and different methodologies used in Wireless Communication Networks are described.

Course Objectives

The objective of this course is to

- To introduce advanced wireless communication systems.
- To learn the wireless channel characteristics and models.

Course Outcomes

On completion of this course, the students will be able to

CO1: Evolution of mobile radio communications and comparative study of 2G, 3G.

CO2: Explain cellular concepts, fading, wireless networks and Wireless standards.

CO3: Apply the TDMA, FDMA and CDMA techniques for a given network application.

CO4: Comparison based on various parameters of wireless, telephone and ISDN networks.

CO5: Study the advanced concepts of Intelligent cell concept and application.

Course Contents:

Modules	Blooms level*	Number of hours
Module 1 Introduction to Wireless Communication Systems Evolution of mobile radio communications, examples of wireless comm. systems, paging systems, Cordless telephone systems, comparison of various wireless systems. Modern Wireless Communication Systems: Second generation cellular networks, third generation wireless networks, wireless in local loop, wireless local area networks, Blue tooth and Personal Area networks.	L1 and L2	8
Module 2 Introduction to Cellular Mobile Systems Spectrum Allocation, basic Cellular Systems, performance Criteria, Operation of cellular systems, analog cellular systems, digital Cellular Systems. Ellular System Design Fundamentals: Frequency Reuse, channel assignment strategies, handoff Strategies, Interference and system capacity, tracking and grade off service, improving coverage and capacity.	L2 and L3	10
Module 3 Multiple Access Techniques For Wireless Communication Introduction to Multiple Access, FDMA, TDMA, Spread Spectrum multiple Access, space division multiple access, packet ratio, capacity of a cellular systems.	L2 and L4	10
Module 4 Wireless Networking Difference between wireless and fixed telephone networks, development of	L3 and L4	10

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wireless networks, fixed network transmission hierarchy, traffic routing in wireless networks, wireless data services, common channel signaling, ISDN (Integrated Services digital Networks), advanced intelligent networks.		
Module 5 Intelligent cell concept and application Intelligent cell concept, applications of intelligent micro-cell Systems, in-Building Communication, CDMA cellular Radio Networks.	L1 and L2	10

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text Books:

1. Theodore S. Rappaport, Wireless Communications, Pearson, 2010.
2. W.C.Y.Lee, Mobile Cellular Telecommunication, Tata McGraw Hill, 2010.

Reference Book:

1. Jochen Schiller, Mobile Communications, Pearson, 2011.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	2													2	
CO2		3									2				1	3
CO3	2				3						2				2	3
CO4		3													3	
CO5	2		3												1	

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ECE2816	ADVANCED ROBOTIC PROCESS AUTOMATION DESIGN & DEVELOPMENT	L	T	P	C
Version 2019.1	Date of Approval: 14 July 2019	3	0	0	3
Pre-requisites/Exposure	Basic Networking Concepts				
Co-requisites	Nil				

Catalog Description

This course aims at providing knowledge of basic concepts of Robotic Process Automation to University students. It further builds on these concepts and introduces key RPA Design and Development strategies and methodologies specifically in context of UiPath products. The student undergoing the course shall develop the competence to design and develop a robot for a defined process.

Course Objectives

The objective of this course is to

- Equip the students with concepts of robotic process automation
- Provide an overview of designing with uipath software.

Course Outcomes

On completion of this course, the students will be able to

CO1: Explain key terms and trends around the robotic process automation along with its physical and logical design

CO2: Understand the potential and value of the robotic process automation .

CO3: Describe the technologies used for the robotic process automation and mobile devices, including (passive and active) sensors, the physical communications layer, communications protocols, programming frameworks,.

CO4: Design programs and have hands on experience on uipath software

CO5: Develop RPA programs of moderate complexity for a well-used robotic automation process using uipath.

Modules	Blooms level*	Number of hours
Module 1: Exception handling and Best Practices Debugging and Exception Handling- Debugging Tools, Strategies for solving issues, Catching errors. Project Organization- Concept of project organization, Best practices, Avoiding pitfalls, Invoke Activity.	L1, L2	8
Module II: Introduction to Orchestrator Orchestrator, Tenants, Authentication, Users, Roles, Robots, Environments, Queues & Transactions, Schedules.	L2, L3 and L4	8
Module III: merging and Future Trends in IT Artificial Intelligence, Machine Learning, Agent awareness, Natural Language Processing Computer Vision	L2, L3 and L4	8
Module IV: Capstone Project Real life case studies which can be used to apply the concepts learnt during the course. The projects shall test student's skills right from process transformation and documentation to the design and development of the actual robot	L2, L3 and L4	12

*Bloom's Level:

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

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Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination
Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

Text Books

- "Learning Robotic Process Automation" By Alok Mani Tripathi, Packt Publications, 1st Edition, 2018

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	--	--	3	--	--	--	--	--	--	2	--	1	1	-	-
CO2	1	--	1	2	--	--	--	--	--	--	--	--	-	1	-	-
CO3	1	--	1	2	--	--	--	--	--	--	--	--	-	1	-	2
CO4	1	--	--	2	--	--	--	--	--	--	--	--	1	1	-	2

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ECE2812	ADVANCED VLSI DESIGN	L	T	P	C
Version 2019.1	Date of Approval: May 21, 2019	3	0	0	3
Pre-requisites/Exposure	VLSI Design				
Co-requisites	Nil				

Catalog Description

This course explores the theory and operation of the basic building blocks of VLSI design which includes current mirror and Op-amp. This course also explains the designing of OTA and their types. The concepts learnt in the studies of OTA will be applied in the design and analysis of filters and oscillators.

Course Objectives

The objective of this course is to

- Provide the advanced knowledge of VLSI design with building blocks and designing of OTA.
- Equip with the understanding various types of OTA with their noise analysis.

Course Outcomes

On completion of this course, the students will be able to

CO1: Explain the basic operation of MOS transistor, cascade transistors and noise performances.

CO2: Explain the CMOS inverter with DC characteristics, active load and current mirrors.

CO3: Describe gain margin and phase margin; Design and analysis of OTA and explanation on CMRR, offset and PSRR.

CO4: Explain & design cascade and folded OTA.

Modules	Blooms level*	Number of hours
MODULE 1: Review of Elementary Transistor Stages MOST single transistor amplifying phase, BJT single transistor, Source and emitter follower and their noise performance, Cascade transistors and noise performance.	L1 and L2	8
MODULE 2: Inverter stage and Building Blocks CMOS inverter, DC analysis, low frequency gain, bandwidth, current capacity, slew rate, amplifying phase, BJT inverter stage and Noise performance, Cascade and its Bandwidth, active load, differential stages, current mirrors and their noise output.	L1, L2 and L3	10
MODULE 3: Op amp Design: Introduction Design of single transistor OTA: GBW and phase margin, Miller CMOS OTA: GBW and phase margin, Full Dc analysis: Common mode input voltage range versus current supply, output range versus supply voltage, maximum output current, source and sink, Noise analysis of OTAs.	L2, L3, L4 and L5	10
MODULE 4: Op amp Design: Matching specifications Transistor mismatch, Offset voltage definition, Mismatch definition, differential stage with active load, Offset drift, CMRR, Offset and CMRR of	L1, L2, L3 and L4	10

Miller OTA, Offset in BJT and JFET, Power Supply rejection ratio of simple and Miller OTA.		
MODULE 5: Design of OTAs and design Options Symmetrical, Cascade OTA, Folded Cascade OTA, Operational Current Amplifier, design for optimum GBW and SR, CMOS Configurations, Bipolar op amp configurations.	L1, L2,L3 and L4	10

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

Text Books

- Behzad Razavi, "Design of Analog CMOS Integrated Circuits", 2nd Edition, Tata Mcgraw Hill, 2017
- Gray, Hurst, Lewis and Meyer, "Analysis and design of Analog ICs", 5th Edition, Wiley publication, 2008

Reference Books

- Meyer Gray, Hurst, Lewis, "Analysis and Design of Analog Integrated Circuits", 5th Edition, Wiley publication, 2009
- Allen, "CMOS Analog Circuit Design", 3rd Edition, Oxford University Press, 2013.


CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS O 1	PS O 2	PS O 3	PSO 4
CO 1	3	2	3	--	--	--	--	--	--	--	--	--	--	1	--	--
CO 2	3	2	3	--	--	--	--	--	--	--	--	2	--	1	--	3
CO 3	3	2	1	--	1	--	--	--	--	--	--	2	--	1	--	3
CO 4	2	3	3	--	1	--	--	--	--	--	--	--	--	1	--	3

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ECE2814	POWER ELECTRONICS	L	T	P	C
Version 2019.1	Date of Approval: May 21, 2019	3	0	0	3
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

This course introduces students to the theory of Power Electronics. It includes basics of Thyristor family devices with its firing circuits. It includes the design concepts of Converter, Inverter, Chopper, AC voltage controller, cycloconverter along with some basic application based on power electronics.

Course Objectives

The objective of this course is to

- Equip the students with concepts of Power Electronics Devices.
- Provide in depth knowledge so that they can design applications based on Power Electronic concepts.

Course Outcomes

On completion of this course, the students will be able to

CO1. Explain concept of various triggering elements.

CO2. Explain and solve problems on thyristor, its rating, protection and firing circuits as well as compare and design firing circuits of thyristor.

CO3. Analyze and solve the problems of Converter, Inverter, Chopper, AC voltage controller and Cycloconverter for different types of load.

CO4: Explain design concept of power electronic applications.

Modules	Blooms level*	Number of hours
Module 1: Triggering Devices Triggering devices, Unijunction Transistor, Characteristics and applications of UJT, Programmable Unijunction Transistor, DIAC, Silicon Controlled Switch, Silicon Unilateral Switch, silicon Silicon bilateral Switch, Shockley diode.	L1 and L2	6
Module 2: Thyristor Firing Circuits, Turn on systems Two transistor model of Thyristor, Method of Triggering a thyristor, Thyristor Types, Requirement for triggering circuits, Thyristor Firing Circuits, Fullwave control of Ac with one thyristor, Light activated SCRs (LASCR), Control Circuit, dv/dt and di/dt protection of Thyristor, Pulse Transformer triggering, Firing SCR by UJT, TRIAC firing circuit, Phase control of SCR by pedestal and Ramp.	L1, L2, L3, L4 and L5	9
Module 3: Controlled Rectifiers Types of Converters, effect of inductive load, Commutating diode or free wheeling diode, controlled rectifiers, Bi phase half wave, single phase full wave phase controlled converter using bridge principle, harmonics.	L1, L2, L3 and L4	8

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Module 4: Inverters Types of Inverters, Bridge Inverters, Voltage Source Inverters, Pulse Width Modulation Inverters, Current source Inverters.	L1, L2, L3 and L4	6
Module 5: AC Voltage Controllers Types of AC voltage Controllers, AC Phase Voltage controllers, single Phase Voltage Controller with RL load, harmonic analysis of single phase full wave controller with RL load.	L1, L2, L3 and L4	5
Module VI: DC to DC Converters DC choppers, Chopper classification, two quadrant chopper, Four quadrant chopper.	L1, L2, L3 and L4	5
Module VII: Cyclo Converter Single phase and three phase cycloconverters.	L1, L2, L3 and L4	4
Module VIII: Industrial Applications One shot Thyristor trigger Circuit, over voltage protection, simple battery charger, battery charging regulator, AC static switches, DC static switch	L1 and L2	5

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

Text Books

- Michael Jacob "Power Electronics: Principles and Applications", Thomson Press (India) Ltd
- P. S. Bimbhara, "Power Electronics" Khanna Publications

Reference Books

- H. C. Rai, "Power Electronics Devices, Circuits, Systems and Application", Galgotia, 3rd Ed.
- M. H. Rashid, "Power Electronics Devices, Circuits and Applications", Pearson Education India

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	2	--	--	--	--	--	--	--	--	--	--	--	3	--	3
CO2	1	1	2	--	--	--	--	--	--	--	--	3	--	2	--	2
CO3	1	1	--	--	--	--	--	--	--	--	--	3	--	2	--	2
CO4	1	1	3	--	--	--	--	--	--	--	--	3	--	2	--	2

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Curriculum & Scheme of Examination

2022

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COMPUTER FUNDAMENTALS

Course Code: IFT2111

Credit Units: 03

Course Objective:

This course is aimed to provide a fundamental understanding of computer science for the students in their early stages of academic career. Various computer nomenclatures regarding to hardware and software will be introduced for students to develop an in-depth realization of several subjects and their significant roles in the field. After this course, you will be able to understand fundamental concepts of computer.

Course Contents:

Module I Computer and its characteristics, application of computers, digital and analog computer, Generation of computers, Storage devices: primary storage devices (RAM,ROM,PROM,EPROM,EEPROM) , secondary storage devices(Floppy disk, Hard disk, optical disk, magnetic tapes), Input and output devices (keyboard, mouse, light pen, joystick, scanner, monitor, printers etc.)

Module II Software and its types (System Software, Application Software, Firmware Softwares) Computer Languages and its types (Machine Language, Assembly Language, High Level Language: advantages and disadvantages of computer languages),Translators :Compiler, Linker, Interpreter . Number system and its types, conversion from one base to another and vice versa.

Module III Word Processor and its features, Editing of Text, Find and Replace, Bullets and Numbering, Spell Checker, Grammar Checker, Auto Correct, Auto Complete, Auto Text, Header and footer, tables, mail merge, border and shading, page setup, printing.

Module IV Spread sheet and its features, Entering Information in Worksheet, Editing Cell Entry, Moving and Copying Data, deleting or Inserting Cells, Rows and Columns, Custom Numeric Formats, Using Formulas and functions, Creating charts.

Module V Presentation Software and its uses, steps for creating PowerPoint Presentation, PowerPoint Views, Assigning Slide Transitions, Using Preset Animations, Hiding Slides, Slide Show, Controlling the Slide Show with a Keyboard, Setting Slide Show Timings.

Examination Scheme:

Components	CT1	A/C/Q	Attd	EE
Weightage (%)	15	10	5	70

Test & References

Text:

- P.K Sinha & Priti Sinha, Computer Fundamentals, BPB Publications.
- Peter Norton, Introduction to Computers, Tata Mcgraw Hill.

References:

- Suresh K. Basandra, Computer Systems Today, Galgotia Publications.
- Joyce Coax , Joan Preppernau,,Steve Lambert and Curtis Frye,2007 Microsoft Office System step by step, Microsoft Press
- R.K. Taxali, PC Software for Windows, Tata Mcgraw Hill.


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DIGITAL ELECTRONICS

Course Code: IFT2112

Credit Units: 03

Course Objective:

An entry level course in digital electronics covering number systems, binary mathematics, digital codes, logic gates, Boolean algebra, Karnaugh maps, and combinational logic. Emphasis will be on circuit logic analysis and design of digital circuits. The student will explain the operation of digital logic gates and use Boolean algebra and Karnaugh mapping to express logic operations and minimize logic circuits in design. The student will construct, analyze combinational logic circuits & sequential circuits; create a truth table for standard digital logic gates; and add, subtract, multiply and divide using the binary numbering system. Student will also be able to understand about digital to analog conversion and vice versa.

Course Contents:

Module I: Number System

Decimal, Binary, Octal, Hexadecimal Number Systems and Conversion of the bases, Complements: r's complement, (r-1)'s complement, Binary codes: Grey code, BCD Code, Excess-3 code

Introduction to logic systems

Positive and negative logic, Logic functions - NOT, AND, OR, NOR, EX-OR, EX NOR

Truth tables Boolean algebra, De Morgan's theorems Standard forms for Logical Expressions - Sum of Products, Product of Sums Specification of Logical functions in terms of Minterms and Maxterms, Karnaugh Maps, Simplification of Logical functions, Introduction of "don't care" states.

Module II: Combinational Building Blocks

Multiplexers, De-multiplexers, Decoders, Encoders

Arithmetic circuits

Half Adders and Full Adders, Half Subtractor and Full Subtractor

Module III: Flip-flops

The RS latch, the clocked RS flip-flop, JK Flip Flop, the Master-Slave JK flip-flop, Delay and Toggle flip-flops

Flip-flops in counter circuits

Asynchronous (ripple) Counters (UP/DOWN), Synchronous Counter design (UP/DOWN), Non Sequential Counting

Module IV: Shift Registers

Shift registers in general, Ring Counters, Johnson Counter

Introduction to Memory

Primary: RAM, Static RAM, Dynamic RAM, ROM, PROM, EAPROM, Secondary: Floppy Disk, Hard Disk, CDROM

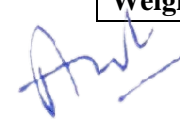
Module V: Introduction to Logic Families, DACs and ADCs

Introduction to logic families-TTL, RTL,ECL,CMOS,DTL,IIL

Binary weighted resistor DAC, Resolution, linearity and settling time of DACs, Successive approximation ADC

Examination Scheme:

Components	CT1	A/C/Q	Attd	EE
Weightage (%)	15	10	5	70


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Text & References:**Text:**

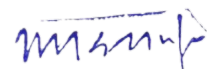
- R.P Jain, Mordern Digital Electronics, Tata Mcgraw Hill.

References:

- Malvino & Leach, Digital Electronics, Tata Mcgraw Hill,2006,Edition 6.
- Floyd, Digital Fundamentals,Pearson,2015.
- M.M Mano, Digital Logic and Computer Design,Pearson.



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COMPUTER PROGRAMMING WITH C LANGUAGE

Course Code: IFT2116

Credit Units: 03

Course Objective:

The primary objective of this course is to understand all the components of C, including the C language, the C Preprocessor, and the C Standard Library. An understanding of some advanced practical issues, including memory management, testing and debugging, complex declarations and expression evaluation, building and using libraries, and evaluating tradeoffs, such as size vs. speed and speed vs. complexity. The ability to write C code and create and manipulate linked lists.

Course Contents:

Module I: Introduction to 'C' Language

History of C, Introduction of C, Basic structure of C program, Concept of variables, constants and data types in C, Operators and expressions: Introduction, arithmetic, relational, Logical, Assignment, Increment and decrement operator, Conditional, bitwise operators, Expressions, Operator precedence and associativity. Managing Input and output Operation, formatting I/O.

Module II: Decision making and looping

Decision making in program, Relational Logical operators example, if statements, if -else, nested if-else statements, Switch, case loop, Do-While, While, for loop and nesting of loop, continue and break , Storage types , predefined processor.

Module III: Arrays and Functions

One Dimensional Arrays, Arrays Manipulation, Sorting, Searching, Function declaration, example & calling a function. Passing Arguments, call by value and call by references, Recursive function, .Recursion.

Module IV: Pointers and String

Pointers: Declaration, Pointer assignments, initialization, Pointers and Dynamic Memory Allocation, Array of Pointers, strings, string handler functions.

Module V: Structure Union & file handling

Structure definition, Declaration, structure Assignments, Arrays in structure, Structure Arrays, Pointer Structure, Nested Structure, Arrays of Structure, Union declaration, assignments & example programs, Difference between structure & union, file handling and the related functions.

Examination Scheme:

Components	CT1	A/C/Q	Attd	EE
Weightage (%)	15	10	5	70

Text & References:

Text:

- Problem Solving through C language, E. Balagurusamy, TMH publication.
- Peter Nortons, "Introduction to Computers", TMH publication.

References:

- Peter Nortons, "DOS Guide", Prentice Hall
- Gottfried, "Programming in C", Schaum, Tata McGraw Hill
- Y. Kanetkar, "Let us C", BPB Publications
- Y. Kanetkar, "Understanding Pointers", BPB Publications
- Schmidt, "The Complete Reference of C", Tata McGraw Hill

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COMPUTER FUNDAMENTALS LAB


Course Code: IFT2117

Credit Units: 01

1. Create a new folder and do the following:
 1. Make a word document in it.
 2. Make an Excel document in it.
 3. Make a new folder in it
 4. Rename the initial folder
 5. Move the initial folder
 6. Copy the initial folder.
 7. Delete the initial folder
2. Implement the various well known features of Windows operating system such as Notepad, WordPad, Paint, System tools, Entertainment etc. enclosed in Start→Programs→Accessories.
3. Implement various display properties by right clicking on the Windows Desktop.
4. Explore the taskbar of Windows.
5. Set the wall paper and screen saver.
6. Set the date/time.

MS-Word

1. Create a document and
 - a. Put Bullets and Numbers
 - b. Apply various Font parameters.
 - c. Apply Left, Right, and Centre alignments.
 - d. Apply hyperlinks
 - e. Insert pictures
 - f. Insert ClipArt
 - g. Show the use of WordArt
 - h. Add Borders and Shading
 - i. Show the use of Find and Replace.
 - j. Apply header/footers
2. Create any document and show the use of File→versions.
3. Create any document and show the difference between paste and paste special.
4. Create a document to show the use of Washout/Watermark.
5. Implement the concept of mail merge.
6. Implement the concept of macros.
7. Implement the concept of importing a file/document.
8. Implement the concept of merging the documents.
9. Create a student table and do the following:
 - a. Insert new row and fill data
 - b. Delete any existing row
 - c. Resize rows and columns
 - d. Apply border and shading
 - e. Apply merging/splitting of cells
 - f. Apply sort
 - g. Apply various arithmetic and logical formulas.
10. Create your resume using General Templates.


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COMPUTER PROGRAMMING WITH C LANGUAGE Lab

Course Code: IFT2118

Credit Units: 01

1. Write a program to swap 2 no
2. Write a program to demonstrate Greatest of 3 nos and to print the given no in ascending order.
3. Write a program to perform the arithmetic expression using switch statement.
4. Write a program to find factorial of given no using do while statement.
5. Write a program to print prime up to n no.
6. Write a program to sum of n natural no.
7. Write a program to print the product of two matrices of any order.
8. Write a program to print Fibonacci series.
9. Write a program to print the following pattern using for loop
1
2 2
3 3 3
4 4 4 4
10. Write a program to read n num of students and 5 subjects marks.
11. Write a program to find factorial of a num using 3 types of functions.
12. Write a program to convert all lower case to uppercase characters
13. Write a program to find the factorial of a number using recursion
14. WAP program to print the element of array using pointers.
15. WAP program to implement call by reference.
16. WAP program to find greatest of 'n' num using function.
17. WAP to Create , initialize and access the elements of a structure.
18. WAP program to print the elements of a structure using pointers
19. WAP program to display student information by initializing structures
20. WAP program to find total number of marks.
21. WAP program to find the total salary of employee and employee details using structure.
22. Program to write data into file and read data from file.

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.



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WEB TECHNOLOGIES

Course Code: IFT2217

Credit Units: 03

Course Objective:

This course is aimed to provide a fundamental understanding of web site creation. HTML is the language used for designing most basic web pages. Syllabus includes basic and advanced features of HTML. It also give an overview of XML and CSS.

Course Contents:

Module I: Introduction to HTML

History of HTML, Structure of HTML, HTML Basic: Elements, Tags and Attributes. Adding Comments, Adding Title, HTML Background: using plain color, using image, Formatting Text : Paragraph, inserting line break, Heading Style, Bold text, Italicized text, Underlined text, Teletype text, Strikeout, Superscript, Subscript, Important text, Emphasized text, Inserted text, Deleted text, Larger text, Smaller text. Working with Text: Changing font Sizes and Colors.

Creating List: Ordered List, Unordered List, Definition List, Nested List. Inserting image, Creating Hyper Text Links, Creating Image Links, Horizontal Rules, Marquee Tag. Address Tag.

Module II: Table & Frames

Tables: Creating Tables, Table Element, Adding Border, Adding Column Headings, Cellspacing and Cellpadding, Adding a Caption, Setting the table Width and Height, Add Row Headings, Aligning Cell contents, Setting Column Width, Centering a Table, Inserting Image, Rowspan, Colspan, Assigning Background Colors.

Frames: Frameset Element, Frame Element, Noframes Element, Specifying Target, Inline Frames.

Module III: Forms and validation

Forms: Introduction to Forms, Form Elements, Text Field, Password Field, Label, Check Box, Radio Button, Selection List, Text Area, Button.

Front level validations using JavaScript: Checking a Non-empty Text/Password Field, Restricting Length of Text/Password Field.

Module IV: Cascading Style Sheets

Overview of style sheets, Advantages, Different ways to use style sheet: External style sheet, Internal style sheet, Inline style sheet.

Selectors: Element selector, Id selector, Class selector, Grouping selector. Adding style to a Document, Adding Comments in CSS.

Module V: XML

Introduction to XML, XML Basics, XML Structure, XML Tags, XML Elements, XML Attributes, Adding Comments, XML Document Type Declaration: Internal DTD and External DTD. Well formed XML Documents and Valid XML Documents.

Examination Scheme:

Components	CT	A/C/Q	ATTD.	EE
Weightage	15	10	5	70

Text & References:

Text:

- HTML, DHTML, JavaScript, Perl, CGI, Ivan Bayross, BPB Publication.
- Web Technologies, Uttam.K.Roy, Oxford University Press.

References:

- HTML Complete Reference, BPB Publication.

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DATA & FILE STRUCTURES USING 'C' LANGUAGE

Course Code: IFT2211

Credit Units: 03

Course Objective:

This course is an introduction to the use, design, and analysis of data structures in computer programs. The very commonly used data structures like arrays, stacks, queues, lists, trees, and graphs will be discussed in detail. Sorting and hashing are important topics in the study of algorithms. They are also closely related to the design of data structures. Several algorithms to implement these techniques are included in the syllabus.

Course Contents:

Module I: Basic concepts and Array

Definition Accessing the address of a variable, Declaring and initializing pointers. Accessing a variable through its pointer. Meaning of static and dynamic memory allocation. Memory allocation functions : malloc, calloc, free and realloc.

Representation of arrays single and multi dimensional arrays. Address calculation using column and rows major ordering. Various operations on arrays, Application of arrays: matrix multi multiplication.

Module II: Stacks and Queues

Definition, Array representation of stack. Operations on stack: Infix, prefix and postfix notations. Conversion of an arithmetic expression from Infix to postfix. Evaluation of postfix expression using stacks.

Definition, Array representation of Queue. Types of queue: Simple queue, circular queue, double ended queue (deque), priority queue, operations on all types of Queues.

Module III: Linked List

Definition, Components of linked list, Representation of linked list, Advantages and Disadvantages of linked list. Types of linked list : Singly linked list, Doubly linked list, Circular linked list and circular doubly linked list. Operations on singly linked list : creation, insertion, deletion, search and display (based on the different position as specified by the user). Linked representation of Stacks & Queues.

Module IV: Trees

Definition : Tree, Binary tree, Complete binary tree, Binary search tree, Heap Tree terminology : Root, Node, Degree of a node and tree, Terminal nodes, Non terminal nodes, Siblings, Level, Edge, Path, depth, Parent node, ancestors of a node. Binary tree : Array representation of tree, Creation of binary tree. Traversal of Binary Tree: Preorder, Inorder and post order. Representation of trees and its application, Binary search tree: Insertion & deletion in BST. Height balanced (AVL) tree

Module V: Searching, sorting and complexity

Searching: Sequential and binary search, Comparison between linear and binary search. Sorting: insertion, selection, bubble, quick, merge, heap sort.

Module VI: Graphs

Graph representation: adjacency list, adjacency matrix. Types of Graphs: Directed & Undirected Graph. Traversal scheme: Depth first search, Breadth first search. Spanning tree: definition, minimal spanning tree algorithms.

Examination Scheme:

Components	CT1	A/C/Q	ATTD.	EE
Weightage (%)	15	10	5	70

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Text & References:

Text:

- Brian W. Kernighan, Dennis M. Ritchie “The C Programming Language”, Prentice Hall.
- T. Langsam, M.J Augenstein and A.M. Tanenbaum, “Data structure using C and C++ Second edition, 2000, Prentice hall of India.
- R. Kruse, G.L. Tonodo and B. Leung,” Data structures and program design in C”, Second Edition, 1997, Pearson education.
- S. Chottopadhyay, D. Ghoshdastidar & M. Chottopadhyay. Data structures through language”, First edition, 2001, BPB Publication.

References:

- G.L. Heileman, Data structures, Algorithms and object oriented programming,” First Edition 2002, Tata McGraw Hill.
- E. Horowitz, Sahni and D. Mehta,” Fundamentals of data structures in C++,” 2000 Galgotia Publication



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DATABASE MANAGEMENT SYSTEMS

Course Code: IFT2218

Credit Units: 03

Course Objective:

The objective of this course is to expose the students to the fundamentals & basic concepts in Data Base Management Systems. This course discusses architecture of Database Systems with concept of relational model & ER model. This course explains techniques for database design, Normalization and database recovery and protection.

Course Contents:

Module I: Introduction to DBMS

Definition of DBMS, Characteristics and Application of Database, Data Independence, DBMS Architecture, Levels, Database Administrator, File System Approach Vs DBMS Approach, Advantages of Using a DBMS, Data Models, Schemas, and Instances, Classification of DBMS.

Module II: Relational Database & ER Model

Relational System, Codd's Rule, Relational Model, Optimization, Tables and Views, Entity, Types of Entity, Weak Entity Attributes, Entity sets, Entity – Relationship Diagrams, Overview of Enhanced-Entity Relationship (EER) Model.

Module III: Relational Model Objects

Domains and Relations, Relations and predicates, Relational Data Integrity; Primary Key, Candidate Key, Foreign Key and their rules; Relational operators, Relational Algebra, Relational Calculus, SQL Language: Schema Definition, Constraints, Queries and Views.

Module IV: Database Design

Definition of Functional Dependencies, Process Of Normalization, First Normal Form, Second Normal Form, Third Normal Form, Boyce Codd Normal Form, Fourth Normal Form, Fifth Normal Form, Database design and implementation process.

Module V: Data Recovery & Protection

Introduction to Transaction Processing, Types of Failure, Database Recovery techniques: Based on Deferred Update, based on Immediate Update, Shadow Paging. Concurrency Control Techniques: Two-Phase Locking technique, Timestamp Ordering, Multiversion Technique.

Introduction to Database Security, Data Security Requirements, Protecting data within database.

Examination Scheme:

Components	CT1	A/C/Q	Attd	EE
Weightage (%)	15	10	5	70

Text & References:

Text:

- Fundamental of Database Systems, Elmasri & Navathe, Pearson Education, Asia
- Database System Concepts, Korth & Sudarshan, TMH

References:

- Raghurama Krishnan: Data base Management Systems, Johannes Gehrke, Tata McGrawHill Latest Edition.
- C.J.Date: Introduction to Database Systems, Pearson Education.
- Data Base Management System, Leon & Leon, Vikas Publications
- Introduction to Database Systems, Bipin C Desai, Galgotia
- Oracle 9i The Complete Reference, Oracle Press

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COMPUTER ORGANISATION AND ARCHITECTURE

Course Code: IFT2219

Credit Units: 03

Course Objective:

The student will develop an understanding of the underlying operation of a modern digital computer, identify and understand the various "building blocks" from which a modern computer is constructed. The student will learn to develop simple assembly language programs and understand the underlying operations of more complex programs using Intel's 8085 Microprocessor.

Course Contents:

Module I: General Computer Architecture

Block Diagram of typical Computer, Memory Section, Input/Output Section, CPU, Registers, Arithmetic Unit, Instruction handling Areas, Stacks

Register Transfer Language and Micro operations: Register Transfer, Bus and Memory Transfer, Arithmetic Micro operations(Binary Adder, Binary Adder-subtractor, Binary incrementer, Arithmetic Circuit), Logic Micro operations, Shift Micro operations, Arithmetic Logic Shift Unit

Module II: Basic Computer Organization and Design

Instruction Codes, stored program organization computer registers, common bus system, Timing and Control, Instruction Cycle, Memory Reference Instructions, Input Output Instructions and Interrupts

Module III: Central Processing Unit

General Register Organization, Stack Organization, Instruction Formats, Addressing Modes, RISC, CISC
Pipelining and Vector Processing: Parallel Processing, Pipelining(General considerations), Arithmetic Pipeline, Instruction Pipeline, Vector Processing, Array Processors

Module IV: Input Output Organization

I/O Interface, Asynchronous Data Transfer, Modes of Transfer, Priority Interrupt, DMA, IOP, Serial Communication

Memory Organization: Associative Memory(Hardware organization, Match logic), Cache Memory(associative mapping, Direct Mapping, Set Associative Mapping), Virtual Memory

Module V: Introduction to Microprocessor

Machine Language, Assembly Language, Assembler, High Level Language, Compiler, Interpreter, Internal Architecture 8085.

Examination Scheme:

Components	CT1	A/C/Q	Attd	EE
Weightage (%)	15	10	5	70

Text & References:

Text:

- Computer System Architecture, M.M. Mano, Pearson Education.

References:

- Computer Architecture and Organization, J.P Hayes, TMH.
- Hayes Computer Architecture and Organization, TMH Publisher.


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DATA & FILE STRUCTURES USING 'C' LANGUAGE LAB

Course Code: IFT2216

Credit Units: 01

Course Contents:

1. Write a program to perform the following operations on two given matrices: Addition and Multiplication
2. Write a program to insert & delete an element from the k^{th} element of an array
3. Write a program to search an element in a given array using linear search.
4. Write a program to search an element in a given array using binary search.
5. Write a program to sort the elements of an array using Bubble Sort.
6. Write a program to sort the elements of an array using Selection Sort.
7. Write a program to sort the elements of an array using Insertion Sort.
8. Write a program using the concept of iteration and recursion to sort the elements of an array using Quick Sort.
9. Write a program to implement a Stack, show overflow and underflow while performing push and pop operations respectively.
10. Write a program to implement a queue and show the following: insertion and deletion
11. Write a program to implement Linear Linked List and show the following operations: creation, display, insertion, deletion and searching.
12. Write a program to implement Doubly Linked List and show the following operations: creation, display, insertion, deletion and searching.
13. Write a program to construct a Binary Search tree and perform the following operations: Insertion and Deletion of a node.
14. Write a program to implement Depth First Search using linked representation of graph.
15. Write a program to implement Breadth First Search using linked representation of graph.

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.



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WEB TECHNOLOGIES LAB

Course Code: IFT2220

Credit Units: 01

Course Contents:

Design a webpage to show a basic structure of html document using tags like head, title and body.
Design a webpage to show various tags used for formatting text.
Design a webpage to show usage of various heading tags, font tag and background color.
Design a webpage to insert image in the background.
Design a webpage to insert image with alignment.
Design a webpage to show the use of link(Text & Image).
Design a webpage to show scrolling text and scrolling image using marquee tag.
Design a webpage to show usage of ordered list.
Design a webpage to show usage of unordered list.
Design a webpage to show usage of definition list.
Design a webpage to show usage of nested list.
Design a table with 5 rows and 5 columns.
Design a table using rowspan, colspan, cell padding and cell spacing.
Divide a webpage into 3 blocks using frame tag(row wise) .
Divide a webpage into 3 blocks using frame tag(column wise) .
Design a log-in form to show various elements of form.

Examination Scheme:

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.



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DATABASE MANAGEMENT SYSTEM LAB

Course Code: IFT2221

Credit Units: 01

1. Given the table STUDENT:

Student No.	Class	Name	GAME	Grade1	SUPW	Grade2
10	7	Sameer	Cricket	B	Photography	A
11	8	Sujit	Tennis	A	Gardening	C
12	7	Kamal	Swimming	B	Photography	B
13	7	Veena	Tennis	C	Cooking	A
14	9	Archana	Basket Ball	A	Literature	A
15	10	Arpit	Cricket	A	Gardening	C

- (i) Display the names of the students who are getting a grade C in either GAME or SUPW.
- (ii) Display the number of students getting grade A in cricket.
- (iii) Display the different games offered in the school.
- (iv) Display the SUPW taken by the students, whose name starts with 'A'.
- (v) Add a new column named 'Marks'.
- (vi) Assign a value 200 for Marks for all those who are getting grade B or above in GAME.
- (vii) Arrange the whole table in the alphabetical order to SUPW.

2. Given the table SPORTS:

Student No.	Class	Name	GAME1	Grade1	GAME2	Grade2
10	7	Sameer	Cricket	B	Swimming	A
11	8	Sujit	Tennis	A	Skating	C
12	7	Kamal	Swimming	B	Football	B
13	7	Veena	Tennis	C	Tennis	A
14	9	Archana	Basket Ball	A	Cricket	A
15	10	Arpit	Cricket	A	Athletics	C

- (i) Display the names of the students who are getting a grade C in either GAME1 or GAME2.
- (ii) Display the number of students getting grade A in cricket.
- (iii) Display the names of the students who have same game for both GAME1 and GAME2.
- (iv) Display the games taken by the students, whose name starts with 'A'.
- (v) Add a new column named 'Marks'.
- (vi) Assign a value 200 for Marks for all those who are getting grade B or above in GAME.
- (vii) Arrange the whole table in the alphabetical order of Name.

3. Given the table STUDENT:

Student No.	Name	Stipend	Stream	AvgMarks	Grade	Class
1	Karan	400.00	Medical	78.5	B	12B
2	Divakar	450.00	Commerce	89.2	A	11C
3	Divya	300.00	Commerce	68.6	C	12C
4	Arun	350.00	Humanities	73.1	B	12C
5	Sabina	500.00	Nonmedical	90.6	A	11A
6	John	400.00	Medical	75.4	B	12B
7	Robert	250.00	Humaities	64.4	C	11A
8	Rubina	450.00	Nonmedical	88.5	A	12A
9	Vikas	500.00	Nonmedical	92.0	A	12A
10	Mohan	300.00	Commerce	67.5	C	12C

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- (i) Select all the Nonmedical stream students from STUDENT.
- (ii) List the names of those students who are in class 12 sorted by Stipend.
- (iii) List all students sorted by AvgMarks in descending order.
- (iv) Display a report listing Name, Stipend, Stream, and amount of Stipend received in a year assuming that the stipend is paid every month.
- (v) Count the number of students with Grade 'A'.
- (vi) Insert a new student in the STUDENT table and fill all the columns with some values.
- (vii) Give the output of the following SQL statements:
 - (a) Select MIN(AvgMarks) from STUDENT where AvgMarks > 75;
 - (b) Select SUM(Stipend) from STUDENT where Grade = 'B';
 - (c) Select AVG(Stipend) from STUDENT where Class = '12A';
 - (d) Select COUNT(DISTINCT);

4. Write SQL statement to create EMPLOYEE relation which contain EmpNo, Name, Skill, PayRate.

5. Create a table with the under-mentioned structure (Table name is Emp)

EmpNo	NUMBER(4)
DeptNo	NUMBER(2)
EmpName	CHAR(10)
Job	CHAR(10)
Manager	NUMBER(4)
HireDate	DATE
Salary	NUMBER(7, 2)
Commission	NUMBER (7, 2)

6. Find out the number of employees having manager as job.

7. Display only the jobs with maximum salary greater than or equal to 3000.

8. Find all those employees whose job does not start with 'M'.

9. List the minimum and maximum salary of each job type.

10. Find all the employees who have no manager.

11. Create a table with the under-mentioned structure (Table name is Dept)

DeptNo	NUMBER(2)
DeptName	CHAR(12)
Location	CHAR(12)

12. Create a table with the under-mentioned structure (Table name is PROJECT)

ProjId	NUMBER(4)
ProjDesig	CHAR(20)
ProjStartDT	DATE
ProjEndDT	DATE
BudgetAmount	NUMBER(7)
MaxNoStaff	NUMBER(2)

13. Create a table with the under-mentioned structure (Table name is SalGrade)

LowSal	NUMBER(7, 2)
HighSal	NUMBER(7, 2)
Grade	NUMBER(2)

Where LowSal is the lowest salary limit in the grade and HighSal is the highest salary limit in the grade

14. Write SQL statements to list all employees in the following format:

```
EMPLOYEE WORKS IN DEPARTMENT Dept. No
SMITH WORKS IN DEPARTMENT          20
SUDHIR WORKS IN DEPARTMENT          20
RAJWORKS IN DEPARTMENT              10
SMITHS WORKS IN DEPARTMENT          30
SANTOSH WORKS IN DEPARTMENT         30
```

15. Given the table MOV:

No.	Title	Type	Rating	Stars	Qty	Price
1	Gone with the Wind	Drama	G	Gable	4	39.95
2	Friday the 13 th	Horror	R	Jason	2	69.95
3	Top Gun	Drama	PG	Cruise	7	49.95
4	Splash	Comedy	PG13	Hanks	3	29.95
5	Independence Day	Drama	R	Turner	3	19.95
6	Risky Business	Comedy	R	Cruise	2	44.95
7	Cocoon	Scifi	PG	Ameche	2	31.95
8	Crocodile Dundee	Comedy	PG13	Harris	2	69.95
9	101 Dalmations	Comedy	G		3	59.95
10	Tootsie	Comedy	PG	Hoffman	1	29.95

Find the total value of the movie cassettes available in the library.

Display a list of all movies with Price over 20 and sorted by Price.

Display all the movies sorted by Qty in descending order.

Display a report listing a movie number, current value and replacement value for each movie in the above table. Calculate the replacement value for all movies as Qty * Price * 1.15.

Count the number of movies where rating is not 'G'.

Insert a new movie in the MOV table. Fill all the columns with some values.

Give the output of the following SQL statements:

Select AVG (Price) from MOV where Price < 30;

Select MAX (Price) from MOV where Price > 30;

Select SUM (Price * Qty) from MOV where Qty < 4;

Select COUNT (DISTINCT);

16. Write a PL/SQL program for:

- Printing the Fibonacci series from 1 to 50.
- Printing the smallest number among any three numbers.
- Printing the table of any specific number entered.

17. Create a trigger named "Client_Master" which keeps track of records deleted or updated when such operations are carried out. Records in this table are inserted into table "Audit" when database trigger fires due to an update or delete statement fired on this table "Client".

Table: Client

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Column name	Data type	Size
Client_no	Varchar2	6
Name	Varchar2	20
Address	Varchar2	30
Balance_Due	Number	10,2

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.



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DISCRETE MATHEMATICAL STRUCTURES WITH APPLICATIONS TO CS

Course Code: IFT2317

Credit Units: 03

Course Objective:

The Objective of this course is to provide the fundamentals and the concepts of Discrete Mathematical Structures with Applications to Computer Sciences including Mathematical Logic, Boolean Algebra and its Applications, Switching circuit & Logic Gates, Graphs and Trees. Important theorems with constructive proofs, real life problems & graph theoretic algorithms to be covered with an aim of helping the students to understand the computational and algorithmic aspects of Mathematical Logic, Boolean Algebra, Graphs and Trees in the field of Computer sciences and its applications.

Course Contents:

Module I: Introduction

Permutation and Combination : Counting Techniques.

Relation: Type and compositions of relations, Pictorial representation of relations, closures of relations, Composite Relations, Equivalence relations.

Function: Types, Composition of function, Mathematical Induction, Discrete Numeric Function and Generating Functions

Module II: Mathematical Logic

Proposition, Propositional Calculus- Propositional Variables and Compound Propositions, Basic Logical Operations: -Conjunction, Disjunction, Negation, Conditional, Bi conditional. Compound Statements, Equivalence, Duality, Algebra of Statements, Valid and Invalid, Arguments, Tautologies, Contradiction, Contingency , Boolean Functions – Disjunctive Normal Form, Conjunctive Normal Form.

Duality Principle.

Module III: Graphs

Basic Terminology of Graphs , Handshaking Lemma , Sub graphs, and Union of Graphs , Connected graph, Disconnected graph, Null graph, Incidence matrix, Adjacency matrix, Degree of a graph, Directed Graph, Walk, Path, Circuit, Wheel, Eulerian graph, Hamiltonian graph, Planar graph , Kuratowski's graphs-I and II , Coloring , Bipartite Graph , Cyclic Graph.

Module IV: Trees

Tree, Properties of Tree, Spanning Tree, Fundamental Circuit, Cut-Set, Cut-Vertices. Binary Tree , Rooted Trees, Path length, Minimum Spanning Trees, Huffman Encoding.

Examination Scheme:

Components	CT1	A/C/Q	Attd	EE
Weightage (%)	15	10	5	70

Text & References:

Text:

- Kenneth H. Rosen, "Discrete Mathematics and its applications", TMH
- Elements of Discrete Mathematics: C.L. Liu, TMH, Edition 4.
- Graph Theory with Applications to Engineering and Computer Science: N. Deo

References:

- Discrete Mathematics: Harikishan & Shivraj Pundir, Pragati's Prakashans.


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MANAGEMENT INFORMATION SYSTEM

Course Code: IFT2318

Credit Units: 03

Course Objective:

This course will provide the students with an understanding of the principles of information systems technology and its impact on the strategic goals and direction of the organization. They will learn how MIS concepts are applied in business and how information systems can provide solutions to the entire organization.

Course Contents:

Module I: Introduction to MIS and Fundamentals of Information

Background, meaning, nature, characteristics, myths, requirements, problems and solutions, benefits, limitations, significance and role of management information system, Concept of information, characteristics of information, value of information, source of information, type of information, process of management.

Module II: Conceptual Framework of Information System

Concept of system, definition of system, characteristics of system, system stake holder, types of system, evolution of information system, approaches to management information system, A framework for MIS architecture, components of MIS, classification of information system.

Module III: Concept of Decision Making and MIS

Introduction, Decision Making and managers, Classification of managerial decision, Model for decision making process, MIS and Decision Making, Concept of balance, efficiency and effectiveness.

Module IV: Development, Implementation, Evaluation and Maintenance of MIS

Principles for information system development, MIS development process, methods of implementing of MIS, evaluation of MIS, structure for evaluation of MIS, maintenance, problems related to maintenance and measure to overcome these problems.

Module V: Control and Security Issues in MIS

Meaning of control, need of control, types of control, security hazards, goal of security control against hazards, security techniques.

Examination Scheme:

Components	CT1	A/C/Q	Attd	EE
Weightage (%)	15	10	5	70

Text & References:

Text:

- Management Information System, Dharmender kumar and Sangeeta gupta, Excel books, Ist edition.

References:

- Management Information System: managing the digital firm, Laudon & Laudon, 14th edition. (E-book is also available free)
- Simplified approach to management information system, Ravi kumar, ranjeev k chopra, Katson books, Ist edition.

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OBJECT ORIENTED PROGRAMMING WITH C++

Course Code: IFT2312

Credit Units: 03

Course Objective:

C++ is one of the most widely used programming languages for solving problems. The objective of this course is to provide object oriented programming fundamentals using C++. Topics to be covered include fundamentals of syntax & semantics of C++, loops & decisions, functions, classes and structures and features of classes such as overloading and inheritance, files, streams, pointers etc.

Course Contents:

Module I: Overview of C++

What is Object Oriented Programming, Characteristics of OOP, Difference between C and C++. Basics:- Input/Output in C++ using cin/cout, Preprocessor Directives, Data Types-Integer, Float, character, Enumerations, library functions, comments, storage classes, manipulators, operators in C++, scope resolution operator, memory management operator. arrays and strings.

Module II: Classes and objects

Functions: Simple functions, passing arguments to functions, returning values from functions, reference arguments, returning by reference, Overloaded functions, Inline functions, friend function, Structures and class.

Classes and objects: A simple class, C++ objects as physical objects, objects as function arguments, returning objects from functions, static class data, array as class data member, array of objects.

Module III: Inheritance

Inheritance, Types of Inheritance, access modes – public, private & protected, Abstract Classes, Ambiguity resolution using scope resolution operator and Virtual base class, Constructors, Types of constructors, Destructors.

Module IV: Polymorphism

Polymorphism, Type of Polymorphism – Compile time and runtime, Function Overloading, Operator Overloading (Unary and Binary) Polymorphism by parameter, Pointer to objects, this pointer, Virtual Functions, pure virtual functions.

Module V: Files and Exception Handling and I/O

Files and Streams: streams, string I/O, character I/O, file pointer, error handling, command line arguments.

formatted and Unformatted Input output, Introduction of Exception handling, Try Catch block, Rethrowing an Exception.

Examination Scheme:

Components	CT1	A/C/Q	Attd	EE
Weightage (%)	15	10	5	70

Text & References:

Text

- Programming with C++, Ravi Chandran, TMH Publisher.
- Object Oriented Programming with C++, E Balagurusamy, Tata Mc Graw Hill
- Programming in C++, John R Hubbard, SCHAUUM's series.

References:

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The complete reference C++, Herbert Schildt, TMH Publisher.
Turbo C++, Robert Lafore, Galgotia Publications.

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OPERATING SYSTEMS

Course Code: IFT2314

Credit Units: 03

Course Objective:

To study and apply concepts relating to operating systems, such as concurrency and control of asynchronous processes, deadlocks, memory management, processor and disk scheduling, parallel processing, and file system organization and Demonstrate an understanding of the differences between processes and threads, the different process or thread synchronization methods and the, the different memory management techniques used in Operating Systems, the different I/O management techniques used in Operating Systems, the tradeoffs in design and implementation concepts used in the development of Operating Systems.

Course Contents:

Module I :Introduction and System Structure

What is an operating system, History of OS, OS concepts, Types of OS, OS Structure, OS Operations. System calls, Types of System Calls, System Programs, OS Structure, Virtual Machines, System Boot

Module II:Process Management

Process Concept, Process Scheduling, Scheduling Criteria, Scheduling Algorithms, Overview of Thread Scheduling and Multiprocessor scheduling, Operations on Processes, Interprocess communication with example. Client-server Communication, Overview of Multithreaded programming models

Module III:Process Coordination

Overview of Process Synchronization, Critical Section Problem, Semaphores, Classic problems. Deadlock- Prevention, Avoidance, Detection, Recovery, Algorithms

Module IV:Memory Management

Memory Management Strategies-Introduction, Swapping, Contiguous Memory Allocation, Paging, Segmentation, Virtual Memory Management- Demand Paging, Thrashing, Page Replacement

Module V :Storage Management

Overview of File System, Access Methods, Directory and Disk Structures, File Sharing, Protection, Disk Scheduling, Disk Management, I/O hardware

Module VI:Protection and Security

Goals and Principles of Protection, Access Matrix, Security Problem, Program Threats, System and Network Threats, Overview of Cryptography, Overview of User Authentication and Security Defense.

Examination Scheme:

Components	CT1	A/C/Q	Attd	EE
Weightage (%)	15	10	5	70

Text & References:

Text :

- Operating System Principles , Arbraham Silberschatz & Peter Baer Galvin by Wiley Student Publication
- Tannenbaum A.S., Modern Operating System,Pearson Publisher, 2015.

References:

- Crowly Charrles, Operating System- A design Approach,Addison Publisher.
- Dietel H.M., Operating Systems, TMH Publisher.

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FUNDAMENTALS OF SOFTWARE ENGINEERING

Course Code: IFT2319

Credit Units : 03

Course Objective:

The purpose of this course is to acquaint students with the concepts and methods available for software development in industrial environments. Students will be exposed to a variety of topics such as design notations, costing techniques, and testing methods, as well as to the tools which are available to support software specification, design, testing, and maintenance.

Course Contents:

Module I: Software Development Life Cycle

Evolution of Software Engineering, Software Problems, Issues Involved in Software Engineering, Fundamental Qualities of a Software Product, Approaches to Software Engineering, Planning the development Process, Development/Product Life-Cycle Model, Kinds of Software Life-Cycle Model.

Module II: Project Management

Project Management Concepts, Project Management Activities, Size Metrics. Software Requirement analysis and Specification, Cost Models.

Module III: System Design

Design Objectives, Design Principles, Effective Modular Design (Functional Independence, Coupling, and Cohesion), Design Tools and Techniques, Prototyping, Structured Programming.

Module IV: Coding

Programming Practices, Verification, Monitoring and Control.

Module V: Software Testing

Testing Fundamentals, Test case design, Functional Testing, Structural Testing, Test Plan, Activities during testing, Unit System, Integration Testing, Software Maintenance.

Module VI: Software Reliability

Concept of Software Reliability, Software Repair and Availability, Software Errors, Failure and Faults.

Examination Scheme:

Components	CT1	A/C/Q	Attd	EE
Weightage (%)	15	10	5	70

Text & References:

Text:

- Software Engineering, A Practitioner's Approach – Roger S. Pressman., Tata Mc Graw Hill

References:

- An Integrated Approach to Software Engineering, Pankaj Jalote., Narosa Publishing House
- Software Engineering Concepts, Richard Fairley., Tata Mc Graw Hill



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OBJECT ORIENTED PROGRAMMING WITH C++ LAB

Course Code: IFT2315

Credit Units: 01

Course Contents:

1. WAP to calculate factorial of a given number n.
2. WAP to do the following:
 - a. Generate the following menu:
 1. Add two numbers.
 2. Subtract two numbers.
 3. Multiply two numbers.
 4. Divide two numbers.
 5. Exit.
 - b. Ask the user to input two integers and then input a choice from the menu. Perform all the arithmetic operations which have been offered by the menu. Checks for errors caused due to inappropriate entry by user and output a statement accordingly.
3. WAP to read a set of numbers in an array & to find the largest of them.
4. WAP to exchange contents of two variables using call by value.
5. WAP to exchange contents of two variables using call by reference.
6. Calculate area of different geometrical figures (circle, rectangle, square, triangle) using function overloading.
7. WAP to add two complex numbers using friend function.
8. WAP to maintain the student record which contains Roll number, Name, Marks1, Marks2, Marks3 as data member and getdata(), display() and setdata() as member functions.
9. WAP to increment the employee salaries on the basis of there designation (Manager-5000, General Manager-10000, CEO-20000, worker-2000). Use employee name, id, designation and salary as data member and inc_sal as member function (Use array of object).
10. Write a class bank, containing data member: Name of Depositor, A/c type, Type of A/c, Balance amount. Member function: To assign initial value, To deposit an amount, to withdraw an amount after checking the balance (which should be greater than Rs. 500) , To display name & balance.
11. WAP to define nested class 'student_info' which contains data members such as name, roll number and sex and also consists of one more class 'date' ,whose data members are day, month and year. The data is to be read from the keyboard & displayed on the screen.
12. WAP to generate a series of Fibonacci numbers using copy constructor, where it is defined outside the class using scope resolution operator.
13. Write a class string to compare two strings, overload (==) operator.
14. Write a class to concatenate two strings, overload (+) operator.
15. Create a class item, having two data members x & y, overload '-' (unary operator) to change the sign of x and y.
16. Create a class Employee. Derive 3 classes from this class namely, Programmer, Analyst & Project Leader. Take attributes and operations on your own. WAP to implement this with array of pointers.
17. Create two classes namely Employee and Qualification. Using multiple inheritance derive two classes Scientist and Manager. Take suitable attributes & operations. WAP to implement this class hierarchy.
18. WAP to read data from keyboard & write it to the file. After writing is completed, the file is closed. The program again opens the same file and reads it.
19. WAP to creat a class student containing Name & class as parameters, create another class marks which inherit student class taking own data members as mark1 & mark2 & show result.

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

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Note: IA- Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

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OPERATING SYSTEM LAB

Course Code: IFT2320

Credit Units: 01

Unix Programmes

1. Write a Shell Script that takes a search string and filename from the terminal & displays the results.
2. Write a Shell Script that takes pattern and filename as command line arguments and displays the results appropriately i.e. pattern found/pattern not found.
3. Write a Shell Script that accepts only three arguments from the command line. The first argument is the pattern string, the second argument is the filename in which the pattern is to be searched and the third argument is the filename in which the result is to be stored.
4. Write a Shell Script which creates the following menu and prompts for choice from user and runs the chosen command.

Today's date
Process of user
List of files
Quit to UNIX

5. Write a Shell Script that computes the factorial of a given number
6. Write a Shell Script that changes the extension of a group of files from txt to doc
7. Write a Shell Script that accepts both filename and a set of patterns as positional parameters to a script.
8. Write a Shell Script which will redirect the output of the date command without the time into a file.
9. Write a Shell Script (using while loop) to execute endlessly (until terminated by user) a loop which displays contents of current directory, disk space status, sleep for 30 seconds and display the users currently logged in on the screen.
10. Write a Shell Script that receives two filenames as arguments. It should check whether content of the two files is same or not. If they are same, second file should be deleted.
11. If a number is input through the keyboard, WASS to calculate sum of its digits.
12. Write a Shell Script which takes a command line argument of Kms and by default converts that number into meters. Also provide options to convert km to dm and km to cm.
13. Write a Shell Script using for loop, which displays the message "Welcome to the UNIX System"
14. Write a Shell Script to change the filename of all files in a directory from lower-case to upper-case.
15. Write a Shell Script that examines each file in the current directory. Files whose names end in **old** are moved to a directory named **old files** and files whose names end in **.c** are moved to directory named **cprograms**.
16. Write a Shell Script which searches all files in the given directory (to be taken as command line argument) for the file having the title (to be taken as command line argument), as the first line in the file.
 - a) Display the contents of the searched file.
 - b) In the end, print the file is ###, where
is small-sized if total no. of lines is <50
is medium-sized if total no. of lines between 50&100
is large-sized.
17. Write a shell script which reports names and sizes of all files in a directory (directory would be supplied as an argument to the shell script) whose size is exceeding 1000 bytes. The filenames should be printed in descending order of their sizes. The total number of such files should also be reported.
18. Write a shell script to calculate and print the first **m** Fibonacci numbers.
19. Write a shell script to compute the **GCD** and **LCM** of two numbers.
20. Write a shell script to generate all combinations of 1, 2 and 3 using **for loop**.

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA- Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

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SUMMER INTERNSHIP EVALUATION-I

Course Code: IFT2335

Credit Units: 03

Objective:

There are certain phases of every Intern's professional development that cannot be effectively taught in the academic environment. These facets can only be learned through direct, on-the-job experience working with successful professionals and experts in the field. The internship program can best be described as an attempt to institutionalize efforts to bridge the gap between the professional world and the academic institutions. Entire effort in internship is in terms of extending the program of education and evaluation beyond the classroom of a university or institution. The educational process in the internship course seeks out and focuses attention on many latent attributes, which do not surface in the normal classroom situations. These attributes are intellectual ability, professional judgment and decision-making ability, inter-disciplinary approach, skills for data handling, ability in written and oral presentation, sense of responsibility etc.

Guidelines

In order to achieve these objectives:

- **Each student will be allotted a supervisor** for proper guidance.
- **Student will first submit details of company, external guide, project title to coordinator/supervisor as per given schedule.**
- For internal assessment purpose, students will submit an industry feedback and a progress report.
- Student will maintain a file (**Internship File/Project Report**) which he/she will submit after completion of internship. **Further, coordinator will provide NTCC project guidelines and sample to help in preparation of file.** The Internship File aims to encourage students to keep a personal record of their learning and achievement throughout the Programme. It can be used as the basis for lifelong learning and for job applications. Items can be drawn from activities completed in the course modules and from the workplace to demonstrate learning and personal development. The File will assess the student's analytical skills and ability to present supportive evidence, whilst demonstrating understanding of their organization, its needs and their own personal contribution to the organization.

The **layout guidelines** for the Project Report

1. File should be in the following specification

- A4 size paper
- Spiral Binding
- **Font**

For normal text Font Type and Size must be- Times New Roman, 12 pt. The minimum font size of materials within a table or a figure can be 10 point.

- **Margins**

A margin of 3.75 cm (1½ inch) is to be given on the binding edge while on the other sides it is to be 2.5 cm (1 inch). The text of the report, including headings, figures, tables, and notes, but excluding page numbers, must be accommodated within the page area.

- **Line Spacing**

The line spacing in the main text must be between one-and-a-half (1.5). Single line spacing should be given for figure captions, table titles, figure legends, and footnotes. Equations, tables, figures, and quotations should be set off from the main text with adequate space (not less than the normal line spacing adopted for the main text). Two consecutive paragraphs should be separated by a spacing which must be larger than the line spacing adopted for the text.

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Each sketch, drawing, graph and photograph should have a figure number and title below the figure etc. Numbering should be sequential, chapter wise. For instance, if there are 24 figures chapter 3 spread over all of its sections the figure numbers run from Figure 3.1 through Figure 3.24. In figures experimental data should typically be represented by centered symbols, and theoretical data by continuous curves.

Each table should have a table number and caption above the table. Numbering should be sequential, chapter wise, as in the case of Figure numbers. For instance, if there are 18 tables in chapter 3 the table numbers run from Figure 3.1 through Figure 3.18.

Make sure that figures and tables are complete in other respects such as legends, references (if any) and coordinate labels with units. Each figure and table must be explicitly referred to in the text and located where its first reference occurs, preferably after the reference.

- **Drawings**

All engineering drawings must conform to relevant Standards and should include a title block. If drawings are large they should be included at the back of the report in a separate pocket. In case drawings are made using CAD packages, a CD ROM should be included which contains all the files and details of the packages used.

- **Equations**

The numbering of equations should be sequential, chapter wise. Numbered equations must be explicitly referred to in the text.

2. Report Size: The maximum number of pages of the Report should be preferably between 50-80 pages.

3. Report Layout: The report should contain the following components

Front Page
Declaration
Student Certificate (University)
Certificate (Company)
Acknowledgement
Abstract
Contents
List of Figures
List of Tables
Company Profile (optional)
Chapters
Appendices(optional)
References / Bibliography

The above components are described below:

1. **The Title Page**-- Format will be given by coordinator/supervisor.

2. **Declaration by the Students**--This is page number (i), the beginning of the small case Roman numeral page numbers. The student has to give a declaration to the effect that the data used for the work, the work depicted in the report, and the written material contained in the report are not copied from others and that due permission has been taken from, and due credit has been given to, the sources whenever they are used.

3. **Certificate**--This is page number (ii). It is given by the Institute. The certificate will be signed by the Faculty Supervisor(s) before the viva-voce after verifying the format and by the Head of the Department after review with the Supervisor(s).

4. **Company Certificate**: This is a certificate, which the company gives to the students.

5. **Contents**--This is page number (iii). The table of Contents should be titled just Contents (not Table of Contents). Try to fit it into one or two pages.

6. **Acknowledgement**--This is page number (iv). Keep this brief and avoid using informal language. This page must be signed by the candidate.

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7. Abstract and Keywords-This is page number (v). The abstract (preferably one page) should contain the context/relevance of the problem at hand, a description of what was done and a gist of the significant observations/results.

The keywords (maximum 6) are a hint that what is contained in the report.

8. Company Profile: A Company Profile corresponds to a file with company-specific data. Company data can be stored there and included in a booking when needed.

9. Chapters—Introduction, Literature Review/Background Study etc. as given by coordinator/supervisor.

10. References / Bibliography --This should include papers and books referred to in the body of the report. These should be ordered alphabetically on the author's surname. The titles of journals preferably should not be abbreviated; if they are, abbreviations must comply with an internationally recognised system.

ASSESSMENT OF THE INTERNSHIP FILE

Continuous Internal Assessment consists of topic relevance, progress report and industry feedback on company letterhead. Final Assessment includes viva, presentation, execution and report marks.

Examination Scheme:

Components	IF	PR	R	E	V	FP
Weightage (%)	20	20	15	15	15	15

V – Viva, IF – Industry Feedback, FP – Final Presentation, R – Report, PR-Progress Report, E-Execution



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MULTIMEDIA AND ITS APPLICATIONS

Course Code: IFT2424

Credit Units: 04

Course Objective:

The objective of the course is to give an overview of different multimedia technologies like audio and video including multimedia devices. The course also includes some practical sessions on these technologies.

Course Contents:

Module I: Introduction

Introduction: Objectives – History of Multimedia – Its market – Content copyright – Resources for multimedia developers – Types of produces – Evaluation – Hardware Architecture – OS and Software – Multimedia Architecture – Software library – Drivers.

Module II: Digital Audio Representation and Processing

Uses of audio in computer applications, digital representation of sound, transmission of digital sound, digital audio signal processing, digital audio and the computer.

Module III: Video Technology

Raster scanning principles, sensors for T.V. cameras, color fundamentals, color video, video equipment, worldwide television standards.

Module IV: Digital Video and Image Compression

Evaluating a compression system, redundancy and visibility, video compression techniques, the JPEG image compression standards, the MPEG motion video compression standard, DVI technologies, Time Based Media Representation and Delivery.

Module V: Multimedia Devices, Presentation Services and the User Interface

Introduction .Multimedia services and Window systems, client control of continuous media, device control, temporal co ordination and composition, hyper application.

Module VI: Application of Multimedia

Intelligent multimedia system, desktop virtual reality, multimedia conferencing.

Examination Scheme:

Components	CT1	PR.	ATTD.	EE
Weightage (%)	10	15	5	70

Text & References:

- Multimedia systems John F. Koegal Buford Addison- Wesley



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COMPUTER NETWORKS

Course Code: IFT2418

Credit Units: 03

Course Objective:

The objective of the course is to provide introductory concepts in Data Communications such as Signaling, Encoding, Modulation, Error Detection & Correction. The course is also aimed at providing basic understanding of Computer networks starting with OSI Reference Model, Protocols at different layers with special emphasis on IP, TCP & UDP and Routing algorithms.

Course Contents:

Module I

Introduction to Data Communication, Networks-protocols, advantages, disadvantages & applications, Line Configuration, topology, Transmission mode, Classification of networks. OSI Model, functionality of layers in OSI model, Protocols at each layer, encapsulation, peer-to-peer communication.

Module II:

Parallel & Serial Transmissions, Analog & Digital Signals, Periodic & Aperiodic Signals, Data encoding techniques-Digital data-digital signals, Digital data-Analog signals, Analog data- Digital signals, Analog data- Analog signals, Multiplexing.

Module III

Transmission Media-Twisted Pair Cable, Coaxial Cable, Fiber-Optics Cable, Radio frequency Allocation, Terrestrial Microwave, Infrared rays, Satellite Communication, Cellular Telephony. Introduction to ISDN.

Module IV

Framing, Switching, Types of Errors, Error Detection & Correction (VRC, LRC, CRC, Checksum, Hamming Code), Flow Control (Stop-and-wait & Sliding Window), Error Control (Stop & Wait ARQ, Sliding Window ARQ using Go-back n method and Selective-Reject), IEEE Standards-802.3, Token Bus (802.4), Token Ring (802.5), FDDI.

Module IV

Routing process, Routing Algorithms-Shortest Path Routing, Flooding, Distance Vector Routing, Link State Routing, Addressing-IPv4, IPv6, Internetworking, Connection-oriented Vs Connectionless protocols- TCP,UDP.

Examination Scheme:

Components	CT1	A/C/Q	Attd	EE
Weightage (%)	15	10	5	70

Text & References:

Text:

- Data Communication and Networking by Behrouz Forouzan, Fourth Edition, TMH.
- Computer Networks by A.S. Tanenbaum, Fifth Edition, Prentice Hall.

References:

- Data and Computer Communications by W. Stallings, Prentice Hall.

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PRINCIPLES OF MANAGEMENT

Course Code: IFT2419

Credit Units : 03

Course Objective:

- To provide a basis of understanding to the students with reference to working of Business Organizations through the process of Management.
- To inculcate the managerial skills of planning, organizing, and controlling and to teach how it can be executed in a variety of circumstances and apply concepts of strategic and tactical organizational planning.
- On completion of the syllabi the student will understand the basic principles of management - will acquaint himself with management process, functions and principles. Student will also get the idea about new developments in management.

Course Contents:

Module I: NATURE OF MANAGEMENT

Meaning, Definition, its nature purpose, importance & Functions, Management as Art, Science & Profession- Management as social System Concepts of management-Administration-Organization, Levels of Management - Concept, Significance, Role & Skills, Concepts of PODSCORB, Managerial Grid.

Evolution of Management thoughts : Contribution of F.W Taylor, Henry Fayol and Contingency Approach.

Module II: PLANNING AND DECISION MAKING

Planning : Meaning, Importance, Elements, Process, Types and levels, Limitations

Decision Making: Meaning, Importance, Process, Techniques of Decision Making

Module III: ORGANISING

Organizing: Concepts, Structure (Formal & Informal, Line & Staff and Matrix), Meaning, Advantages and Limitations. Departmentation: Meaning, Basis and Significance, Span of Control: Meaning, Graicunas Theory, Factors affecting span of Control, Centralization vs Decentralization, Delegation: Authority & Responsibility relationship

Module IV: DIRECTING , LEADERSHIP, CO-ORDINATION AND CONTROLLING

Directing: Meaning and Process,

Leadership: Meaning, Styles and Qualities of Good Leader, Co-Ordination as an Essence of Management,

Controlling: Meaning, Process and Techniques


Module V: Recent Trends

Challenges in recent Trends : Green Management, CSR, Increasing Concern for the Environment, Greater Personalization and Customization, Faster Pace of Innovation, Increasing Complexity, Increasing Competition for Talent

Solution Trends : Becoming More Connected, Becoming More Global, Becoming More Mobile Rise of the Creative Class, Increasing Collaboration

Examination Scheme:

Components	CT1	A/C/Q	Attd	EE
Weightage (%)	15	10	5	70

Prof. (Dr.)  Text Books : Essential of Business Administration - K.Aswathapa Himalaya Publishing House
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Books Recommended:-

- Essential of Management - Horold Koontz and Itainz Weibrich - McGrawhills International
- Management Theory & Practice - J.N.Chandan
- Principles & practice of management - Dr. L.M.Parasad, Sultan Chand & Sons - New Delhi
- Business Organization & Management - Dr. Y.K. Bhushan
- Management: Concept and Strategies By J. S. Chandan, Vikas Publishing
- Principles of Management, By Tripathi, Reddy Tata McGraw Hill
- Business organization and Management by Talloo by Tata McGraw Hill
- Business Environment and Policy – A book on Strategic Management/Corporate Planning By Francis Cherunilam Himalaya Publishing House 2001 Edition



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COMPUTER NETWORKS LAB

Course Code: IFT2420

Credit Units: 01

Course Objective:

The course familiarizes with the equipment applications and protocols installed in enterprise networks, with a focus on switched networks, IP Telephony requirements, and security. It also introduces advanced routing protocols such as Enhanced Interior Gateway Routing Protocol (EIGRP) and Open Shortest Path First (OSPF) Protocol. Hands-on exercises include configuration, installation, and troubleshooting.

Course Contents:

1. Drawing an Enterprise Network for Amity University showing its different campuses across the country.
2. Configuring all the devices (PCs, Servers, Switches) to create a LAN within campuses of the Enterprise Network.
3. Configuring Virtual LANs (VLANs) in an Enterprise Network.
4. Configuring Trunking and Inter-VLAN Routing in an Enterprise Network.
5. Implementing RIP (Routing Information Protocol) to enable communication between different LANs.
6. Implementing OSPF (Open Shortest Path First) to enable communication between different LANs.
7. Implement EIGRP (Interior Routing Protocol) to establish connectivity within domestic campuses of the Enterprise Network.
8. Implement BGP (Border Gateway Protocol) and Redistribution to establish connectivity between different campuses of the Enterprise Network.
9. Configuring WAN connectivity using protocols-HDLC and PPP.
10. Implementing Frame-Relay to configure WAN service provider cloud.
11. Configuring Standard and Extended ACLs on a Router.
12. Troubleshooting Switching, Routing and ACL issues.

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.
Software : Packet tracer.



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ACCOUNTING AND FINANCIAL MANAGEMENT

Course Code: IFT2518

Credit Units : 03

Course Objective:

The objective of this course is to provide to students of IFT and IMCA with an introduction to fundamentals, concepts and principles / practices of Accounting and Financial Management. The topics covered including basic accounting, preparation of Trial Balance, Profit and Loss Account and Balance Sheet Account as applied to Banking including Bank Reconciliation Statement, Definition and Principles of Working Capital Management, Capital Budgeting and Analysis of Financial Statements.

Course Contents:

Module I: Accounting

Definition of Accounting, Its Objectives, Advantages and Limitation. Principles, Concepts and Conventions of Accounting, Double entry system, Recording of Transactions in subsidiary Books – Journal, Cash Book, sales Book, Purchase Book and Return Book. Posting into Ledger accounts.

Module II: Final Accounts

Preparation of Trial balance, Final Accounts including adjustments Trading account, Profit and Loss account, Balance Sheet.

Module III: Banking

Opening of different types of Banks Accounts, Cheque Book, Pass Book, Deposit slips, Bank Reconciliation Statements.

Module IV: Working Capital Management

Definition of working Capital, Types of Working Capital, Determinants of working Capital, Cash Management and Receivables Management.

Capital Budgeting: Principles and Techniques.

Module V: Analysis of Financial statements

Ratio Analysis: Meaning, Advantages, limitations, types of ratios and their usefulness Statements of charges in the Financial Position on Cash basis.

Examination Scheme:

Components	CT1	A/C/Q	Attd	EE
Weightage (%)	15	10	5	70

Text & References:

- T.S Grewal, Book keeping,, S Chand Publishing
- Prasanna Chandra, Financial Management., Tata Mc Graw Hill
- IM Pandey, Financial Management., Vikas Publishing



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CORE JAVA PROGRAMMING

Course Code: IFT2510

Credit Units: 03

Course Objective:

The objective of this course is to give proficiency in developing applications and applets in Java, in-depth knowledge of object oriented concepts, developing GUI applications in Java, creation of packages, Event Handling, Layout Manager, SWING and String handling in Java

Course Contents:

Module I: Introduction to Java Programming

Concepts of OOP, Features of Java, How Java is different from C++, Data types, Control Statements, identifiers, arrays, operators. Variables, Applications and Applets, Classes and methods, Constructor, method overloading, Inheritance: method overriding, Abstract classes, Final classes, String classess

Module II: Java Packages and interfaces

Package creation, Packages deployment, using packages, Interfaces, Exception Handling and Multithreading

Module III: AWT and Event Handling

Introduction to AWT, Layout Manager, Event handling Mechanism, Event Model, Event Classes, Sources of Events, Event Listener Interfaces, AWT: Working with Windows, AWT Controls, Html basic tags, Applet Classes,

Module IV: Java Swings

Swing classes & controls. Advantages of Swing over AWT, event handling

Examination Scheme:

Components	CT1	PR.	ATTD.	EE
Weightage (%)	15	10	5	70


Text & References:

Text:

- Naughton, Schidt “The Complete Reference JAVA 2 “ TMH

References:

- Balaguruswamy “Programming in JAVA”, Tata Mc Graw Hill
- Deitel & Deitel “Java™ How to Program, 6/E”, Prentice Hall


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BASICS OF COMPUTER GRAPHICS

Course Code: IFT2519

Credit Units: 03

Course Objective:

The objective of this course is to present the basic principles for the design, use and understanding of computer graphics systems. Both hardware and software components of graphics systems are discussed here. This course also teaches the students about different algorithms for creating and manipulating graphics displays. Varieties of mathematical methods are used in various computer graphics algorithm.

Course Contents:

Module I: Introduction of Graphics

Development of Computer Graphics, Basic Graphics System and Standards.

Graphics Devices:

Raster and Random Scan Devices, Continual Refresh and Storage Displays, Display Processor, Color Display Techniques, Frame Buffer, Concepts in Raster Graphics and color generation.

Module II: Graphics Primitives

Points, Pixels, Scan Conversion, Line Drawing Algorithms, Circle Drawing Algorithms, Anti-aliasing Technique, Methods of Character generator.

Polygon

Polygon representation, Polygon Filling algorithm, Inside/Outside Testing

Module III: Transformation

Scaling, Translation, Rotation, Composite Transformation, Fix point scaling, Rotation about arbitrary point, Reflection, Shears, Composite Transformation, Modeling and Coordinate Transformation

Viewing: Interactive Picture Construction Techniques, Interactive Input/Output Devices,

Module IV: Segment

Segment Table, Creating Deleting and Renaming a Segment, Visibility and Image Transformation

Windowing and Clipping: Window, View-port, Line clipping, polygon clipping, Window to viewport transformation, polygon clipping using Sutherland Hodgman Algorithm.

Module V: 3-D Transformation and Visible surface detection

3-D Transformation : shearing, scaling, translation, rotation, Homogeneous coordinates.

Visible surface detection: Z - buffer algorithm, Scanline Visible surface detection algorithm, painter's algorithm, fractal and its properties, Basic Illumination, diffuse reflection, specular reflection.

Examination Scheme:

Components	CT1	A/C/Q	Attd	EE
Weightage (%)	15	10	5	70

Text & References:


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Text:

- Computer Graphics By Donald Hearn And Pauline Baker, Pearson Education
- Harrington's "Computer Graphics " A Programming Approach, Tata Mc Gra Hill

References:

- Principle of Interactive Computer Graphics By New, W. M. And Spraul, Tata Mc Gra Hill
- Foley "Computer Graphics" Addison Wesley
- Rogers' "Procedural Elements Of Computer Graphics " Mc-Grawhill



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CORE JAVA PROGRAMMING LAB

Course Code: IFT2511

Credit Units: 01

Course Contents:

1. Create a "Hello, World" program that simply prints out that statement.
2. Write a program that prints three arguments taken from the command line.
3. Write a program that prints values from 1 to 100.
4. Create a class with a default constructor (one that takes no arguments) that prints a message. Create an object of this class.
5. Write Java assignment statements to evaluate the following equations:
 - (i) $\text{Energy} = \text{mass}(\text{acceleration} * \text{height} + (\text{velocity})^2 / 2)$
 - (ii) $\text{Torque} = 2m_1m_2 / m_1 + m_2 * g$
6. Design and write a Java program to define a class called Rectangle that contains members for representing its length and breadth. Provide members to get and set these attributes.
7. Design a class to represent a bank account. Include the following members:

Data members:
Name of the depositor
Account number
Type of account
Balance amount in the account

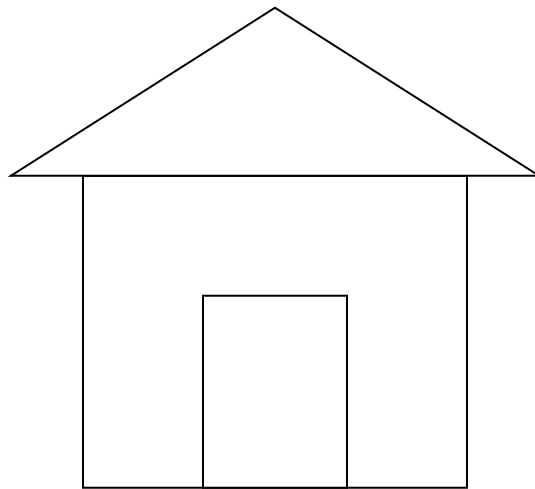
Methods:
To assign initial values
To deposit an amount
To withdraw an amount after checking balance
To display the name and balance
8. Write simple program to calculate the sum of digits of any number.
9. Write a simple program to display a "*" I triangle shape.
Output will be like this

```
      *
     * * *
    * * * * *
```
10. Write a simple program to call a method called simple from a main function. The method simple should accept an integer as an argument and calculate the square of the number in the method simple.
11. Write a Java program to add two integers and two float numbers. When no arguments are supplied, give a default value to calculate the sum. Use method overloading to achieve this.
12. Write a program to perform mathematical operations. Create a class called AddSub with methods to add and subtract. Create another class called MultDiv that extends from AddSub class to use the member data of the superclass. MultDiv should have methods to multiply and divide. A main method should access the method and perform the mathematical operations.
13. Write an interface with a method called display. Implement this method in a class to display two names.
14. Write an interface that has two methods called push and pop of a stack. Write a class to implement the two methods for a fixed size stack creation.
15. Write a small program to catch Negative Array Size Exception. This exception is caused when the array is initialized to negative values.
16. Write a program to handle Null Pointer Exception and use the finally clause to display a message to the user.
17. Write a Java program that takes a string and converts it into uppercase and lowercase letters.
18. Write a Java program to find the volume of a sphere and a cone.

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19. Write a Java program to convert rupees to dollars.
20. Write a Java program to find x to the power y. Use overloading for different cases when x and y are combinations of integer and floating point numbers.
21. Create an abstract class called Figure that has an abstract method called draw (). Make the subclasses called Filled_Rectangle, Filled_Arc and override the draw method in which you would print the message regarding the current object.
22. Write a Java program that has integer variables a, b, c and result as float. Store some values in them and apply the formula $result = a/(b-c)$. Catch the probable exception.
23. Write applets to draw the following shapes:
 - (i) Cone
 - (ii) Cylinder
 - (iii) Cube
 - (iv) Square inside a circle
 - (v) Circle inside a square
24. Write an applet to display the following figure:



25. Write an swings to display five buttons and five labels.
26. Write a Java program to create 5 threads by extending Thread class.
27. Write a Java program to create 5 threads by implementing Runnable interface.

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

Anil

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BASICS OF COMPUTER GRAPHICS LAB

Course Code: IFT2520

Credit Units: 01

- 1) Write a program to change the working mode from text to graphics and plot a pixel.
- 2) Write a program to draw a line of same dimension in three different graphics mode.
- 3) Write a program to display line, rectangle, circle and polyline using graphics command.
- 4) Write a program to draw a line of slope between 0 and 1 using DDA algorithm.
- 5) Write a program to draw a line of slope between 1 and ∞ using DDA algorithm.
- 6) Write a program to draw a line of slope between 0 and 1 using midpoint algorithm.
- 7) Write a program to draw a line of slope between 1 and ∞ using midpoint algorithm.
- 8) Write a program to draw a dashed line of slope 1 using any line algorithm.
- 9) Write a program to draw a dotted line of slope 1 using DDA algorithm.
- 10) Write a program to draw a line of slope between 0 and -1 using midpoint algorithm.
- 11) Write a program to draw a line of slope between -1 and $-\infty$ using midpoint algorithm.
- 12) Write a program to draw an octant of a circle with its center at point (0,0) using midpoint circle drawing.
- 13) Write a program to draw a circle with its center at point (0, 0) and radius r using midpoint circle drawing.
- 14) Write a program to draw an octant of a circle with its center at point (a, b) and radius r using midpoint circle drawing.
- 15) Write a program to draw a circle with its center at point (a, b) and radius r using midpoint circle drawing.
- 16) Write a program to fill a polygon using flood-fill method.
- 17) Write a program to fill a polygon using boundary-fill method.
- 18) Write a program to reflect a point in X and Y-axis both.
- 19) Write a program to rotate a point (100, 50) about origin in anti-clock wise direction.
- 20) Write a program to rotate a point (100,150) about point (30, 40) in clock wise direction..

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

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SUMMER INTERNSHIP EVALUATION-II

Course Code: IFT2535

Credit Units: 06

Objective:

There are certain phases of every Intern's professional development that cannot be effectively taught in the academic environment. These facets can only be learned through direct, on-the-job experience working with successful professionals and experts in the field. The internship program can best be described as an attempt to institutionalize efforts to bridge the gap between the professional world and the academic institutions. Entire effort in internship is in terms of extending the program of education and evaluation beyond the classroom of a university or institution. The educational process in the internship course seeks out and focuses attention on many latent attributes, which do not surface in the normal classroom situations. These attributes are intellectual ability, professional judgment and decision-making ability, inter-disciplinary approach, skills for data handling, ability in written and oral presentation, sense of responsibility etc.

Guidelines

In order to achieve these objectives:

- **Each student will be allotted a supervisor** for proper guidance.
- **Student will first submit details of company, external guide, project title to coordinator/supervisor as per given schedule.**
- For internal assessment purpose, students will submit an industry feedback and a progress report.
- Student will maintain a file (**Internship File/Project Report**) which he/she will submit after completion of internship. **Further, coordinator will provide NTCC project guidelines and sample to help in preparation of file.** The Internship File aims to encourage students to keep a personal record of their learning and achievement throughout the Programme. It can be used as the basis for lifelong learning and for job applications. Items can be drawn from activities completed in the course modules and from the workplace to demonstrate learning and personal development. The File will assess the student's analytical skills and ability to present supportive evidence, whilst demonstrating understanding of their organization, its needs and their own personal contribution to the organization.

The **layout guidelines** for the Project Report

1. File should be in the following specification

- A4 size paper
- Spiral Binding
- **Font**

For normal text Font Type and Size must be- Times New Roman, 12 pt. The minimum font size of materials within a table or a figure can be 10 point.

- **Margins**

A margin of 3.75 cm (1½ inch) is to be given on the binding edge while on the other sides it is to be 2.5 cm (1 inch). The text of the report, including headings, figures, tables, and notes, but excluding page numbers, must be accommodated within the page area.

- **Line Spacing**

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The line spacing in the main text must be between one-and-a-half (1.5). Single line spacing should be given for figure captions, table titles, figure legends, and footnotes. Equations, tables, figures, and quotations should be set off from the main text with adequate space (not less than the normal line spacing adopted for the main text). Two consecutive paragraphs should be separated by a spacing which must be larger than the line spacing adopted for the text.

- **Tables and Figures**

Each sketch, drawing, graph and photograph should have a figure number and title below the figure etc. Numbering should be sequential, chapter wise. For instance, if there are 24 figures chapter 3 spread over all of its sections the figure numbers run from Figure 3.1 through Figure 3.24. In figures experimental data should typically be represented by centered symbols, and theoretical data by continuous curves.

Each table should have a table number and caption above the table. Numbering should be sequential, chapter wise, as in the case of Figure numbers. For instance, if there are 18 tables in chapter 3 the table numbers run from Figure 3.1 through Figure 3.18.

Make sure that figures and tables are complete in other respects such as legends, references (if any) and coordinate labels with units. Each figure and table must be explicitly referred to in the text and located where its first reference occurs, preferably after the reference.

- **Drawings**

All engineering drawings must conform to relevant Standards and should include a title block. If drawings are large they should be included at the back of the report in a separate pocket. In case drawings are made using CAD packages, a CD ROM should be included which contains all the files and details of the packages used.

- **Equations**

The numbering of equations should be sequential, chapter wise. Numbered equations must be explicitly referred to in the text.

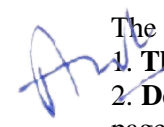
2. Report Size: The maximum number of pages of the Report should be preferably between 50-80 pages.

3. Report Layout: The report should contain the following components

Front Page
Declaration
Student Certificate (University)
Certificate (Company)
Acknowledgement
Abstract
Contents
List of Figures
List of Tables
Company Profile (optional)
Chapters
Appendices(optional)
References / Bibliography

The above components are described below:

1. **The Title Page**-- Format will be given by coordinator/supervisor.
2. **Declaration by the Students**-- This is page number (i), the beginning of the small case Roman numeral page numbers. The student has to give a declaration to the effect that the data used for the work, the work


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depicted in the report, and the written material contained in the report are not copied from others and that due permission has been taken from, and due credit has been given to, the sources whenever they are used.

3. Certificate-This is page number (ii). It is given by the Institute. The certificate will be signed by the Faculty Supervisor(s) before the viva-voce after verifying the format and by the Head of the Department after review with the Supervisor(s).

4. Company Certificate: This is a certificate, which the company gives to the students.

5. Contents-This is page number (iii). The table of Contents should be titled just Contents (not Table of Contents). Try to fit it into one or two pages.

6. Acknowledgement-This is page number (iv). Keep this brief and avoid using informal language. This page must be signed by the candidate.

7. Abstract and Keywords-This is page number (v). The abstract (preferably one page) should contain the context/relevance of the problem at hand, a description of what was done and a gist of the significant observations/results.

The keywords (maximum 6) are a hint that what is contained in the report.

8. Company Profile: A Company Profile corresponds to a file with company-specific data. Company data can be stored there and included in a booking when needed.

9. Chapters—Introduction, Literature Review/Background Study etc. as given by coordinator/supervisor.

10. References / Bibliography --This should include papers and books referred to in the body of the report. These should be ordered alphabetically on the author's surname. The titles of journals preferably should not be abbreviated; if they are, abbreviations must comply with an internationally recognised system.

ASSESSMENT OF THE INTERNSHIP FILE

Continuous Internal Assessment consists of topic relevance, progress report and industry feedback on company letterhead. Final Assessment includes viva, presentation, execution and report marks.

Examination Scheme:

Components	IF	PR	R	E	V	FP
Weightage (%)	20	20	15	15	15	15

V – Viva, IF – Industry Feedback, FP – Final Presentation, R – Report, PR-Progress Report, E-Execution



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COMPUTER ORIENTED STATISTICAL & OPTIMIZATION METHODS

Course Code: IFT2616

Credit Units : 03

Course Objective:

The objective of this course is to expose students to the fundamentals and concepts of statistical and optimization methods, in particular, with reference to frequency distribution and measures of central tendency, measures of dispersion, skewness and kurtosis, theory of probability, linear programming problems, transportation, assignment and game problems. This course is designed with an aim of helping the students to understand important theorems, different formulae and practical applications of these statistical and optimization methods in the field of Computer Sciences and Applications.

Course Contents:

Module I

Collection of Data, Sampling and Sampling Designs, Classification and Tabulation of Data, Graphical representation of Data, Measures of Central Value, Measures of Dispersion. Moments, Skewness, Kurtosis, Correlation and Regression.

Module II: Probability

Classical Definition of Probability, Algebra of Events, Probability Axioms, Conditional Probability.

Probability Distributions: Discrete and Continuous Distributions, Binomial Distribution, Poisson distribution, Normal Distribution.

Module III: Linear Programming

Mathematical Formulation of Linear Programming models and its Graphical Solutions, Simplex Method, Charne's Big M method, Two Phase Method.

Module IV: Transportation Problem

General Transportation model, Starting basic Solutions:-North west Corner Method, Least Cost Method, Vogel's Approximation Method, Test of optimality, unbalanced Problem. Assignment Problems

Module V: Game Theory

Two-Person Zero Sum Games, Maximin-Minimax Principal, Pure Strategies, Mixed Strategies, Expected Pay off, Concept of Dominance, Graphical Solution of $m \times 2$ and $2 \times n$ Games.

Examination Scheme:

Components	CT1	A/C/Q	Attd	EE
Weightage (%)	15	10	5	70

Text & References:

Text:

- P.K. Gupta & Manmohan, Linear Programming and Theory of Games, S Chand & Sons Educational Publishers
- S.C Gupta & V.K. Kapoor, Fundamentals of Mathematical Statistics, S Chand & Sons Educational Publishers

References:

- Hogg, Probability and Statistical Inference, Prentice Hall Publication
- Alexander. M. Mood, Introduction to the Theory of Statistics, Tata Mc Graw Hill

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INTERNET OF THINGS

Course Code: IFT2622

Credit Units : 04

Course Objective:

The Internet is evolving to connect people to physical things and also physical things to other physical things all in real time. It's becoming the Internet of Things (IoT). The course enables student to understand the basics of Internet of things and protocols. It introduces some of the application areas where Internet of Things can be applied. Students will learn about the working of Internet of Things.

Course Contents:

Module I: INTRODUCTION TO IOT

Introduction to IoT, its importance, Elements of an IoT ecosystem, Characteristics of IoT, Physical design of IoT: Things in IoT, Logical design of IoT- IoT functional blocks, IoT communication models, IoT communication API's

Module II: IoT ENABLING TECHNOLOGIES & IOT LEVELS

Wireless Sensor Networks, cloud computing, big data analytics, communication protocols, embedded systems, IOT components, IoT levels: Level 1, Level 2, Level 3, Level 4, Level 5 and level 6.

Module III: IOT AND M2M

Introduction to M2M, difference between IoT and M2M, Software Defined Networking(SDN) for IoT: its architecture, key elements and its layers, Network Function Virtualization(NFV) -its architecture and key elements

Module IV: IoT SYSTEM MANGEMENT:

Need for IoT system management, SNMP and its limitations, Network Operator Requirements, NETCONF(Network Configuration Protocol) :its protocol layers, YANG

Module V: IOT DESIGN METHODOLOGY & APPLICATIONS

Steps in designing IoT device, Smart Applications, Introduction to Python and Raspberry Pi

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

Text:

- Vijay Madisetti and Arshdeep Bahga, "Internet of Things (A Hands-on-Approach)", 1st Edition,
- VPT, 2014 Honbo Zhou, "The Internet of Things in the Cloud: A Middleware Perspective", CRC Press, 2012.
- Dieter Uckelmann, Mark Harrison, Michahelles, Florian (Eds), "Architecting the Internet of Things", Springer, 2011.
- David Easley and Jon Kleinberg, "Networks, Crowds, and Markets: Reasoning About a Highly Connected World", Cambridge University Press, 2010.
- Olivier Hersent, David Boswarthick, Omar Elloumi, "The Internet of Things – Key applications and Protocols", Wiley, 2012.

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References:

- Francis daCosta, “Rethinking the Internet of Things: A Scalable Approach to Connecting Everything”, 1st Edition, Apress Publications, 2013
- Cuno Pfister, Getting Started with the Internet of Things, O’Reilly Media, 2011, ISBN: 978-1-4493-9357-1



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INTRODUCTION TO OPEN SOURCE TECHNOLOGIES (PHP, MySql)

Course Code: IFT2618

Credit Units: 03

Course Objective:

This course is aimed to provide a fundamental understanding of dynamic web site creation. PHP is the language used for development of most common web sites. Syllabus includes basic and advanced features of PHP which includes detailed introduction of PHP and MYSQL, Arrays, Loops and variables etc. It also gives an overview open source framework like JOOMLA, ZEND etc...

Course Contents:

Module I: Introduction to Open Source and PHP programming

Introduction to Open Sources Technologies, Introduction to PHP, installation and configuration, Advantages and Disadvantages of PHP, Client Side Scripting, Server Side Scripting, Variables, data types, various types of function, creating your own function, Strings in PHP, String Functions.

Module II: Operator, Loops, Array, Exception and Error Handling

Operators, Conditions, Loops, Using for each, Creating and Using Arrays, Multidimensional Array, Associative array.

Error Handling in PHP, Errors and Exceptions, Exception class, try/catch block, throwing an exception, defining your own Exception subclass.

Module III: Classes, File system, Passing Information between pages

Object oriented programming with Php, Working with Datetime, code re-use, require (), include(), and the include_path; Understanding PHP file permissions, File reading and writing functions, File system functions, File uploads, Sending mail & use of email server.

HTTP, GET arguments, POST arguments, Using Session in PHP, cookies, The setcookie() function, Deleting Cookies and Reading Cookies.

Module IV: Working with database

HTML Tables and Database tables, Database manipulation(Select, Insert, Update, Delete), validating User Input using Javascript.

MYSQL, Introducing MySQL; database design concepts; the Structured Query, Language (SQL); communicating with a MySQL backend via the PHP, MySQL API Building Database Applications,

Module V: Working with Frameworks

Working with Mambo, Working with Joomla, Working with framework. Use of Joomla in rapid development of website. Developing of simple website using joomla.

Examination Scheme:

Components	CT1	PR.	ATTD.	EE
Weightage (%)	15	10	5	70

Text & References:

Text:

- Beginning PHP, Apache, MySQL Web Development, Michael K. Glass, Yann Le Scouarnec, Elizabeth Naramore, Gary Mailer, Jeremy Stolz, Jason Gerner, published by Wiley, wrox

References:

- The Complete Reference PHP, by Steven Holzner, Tata McGraw-Hill Publication
- Beginning PHP and MYSQL, by W. Jason Gilmore, Apress Publication

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INTRODUCTION TO OPEN SOURCE TECHNOLOGIES (PHP, MySql) LAB

Course Code: IFT2620

Credit Units: 01

Course Contents:

1. Write the process of installation of web server.
2. Write programs to print all details of your php server. Use phpinfo().
3. Write a program to give demo of ECHO and PRINT command.
4. Write a program to implement the string functions.
5. Write a program to print Fibonacci series upto a given number.
6. Write a menu driven program to implement a calculator which performs only addition, subtraction, multiplication and division. The operation should happen based on user choice.
7. Write a program sort ten number by using array.
8. Write a program to demonstrate the concept of associative array.
9. Write a program to demonstrate the concept of multidimensional array.
10. Write a program to demonstrate the concept of Classes & objects.
11. Create a login form with two text fields called “login” and “password”. When user enters “Amity” as a user name and “university” as a password it should be redirected to a Welcome.HTML page or to Sorry.HTML in case of wrong username/password.
12. Create a database in MySql and connect that database from PHP.
13. Write a program to Update, insert and delete the values of table in database.
14. Create a form with a text box asking to enter your favorite city with a submit button when the user enters the city and clicks the submit button another php page should be opened displaying “Welcome to the city”.
15. Write a program to design login form in which find the greatest number amongst three numbers.
16. WAP for Marksheet generation.
17. Design a webpage for entering the student details with all the validations applied on it.
18. Write a php script to print current date and time.
19. Write a php script to use include and require functions.
20. Write a php script including all the file handling functions.

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.



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MOBILE COMPUTING

Course Code: IFT2611

Credit Units: 03

Course Objective:

The course objectives are to make the student understand the concept of mobile computing paradigm, Its novel applications and limitations, to understand the typical mobile networking Infrastructure through 2G technologies (GSM, GPRS, EDGE), 3G technologies (WCDMA, UMTS, HSPA), to understand the issues and solutions of various layers of mobile networks, WLANs and Mobile IP, to understand the Global Mobile Satellite Systems, to understand the advanced techniques and current trends (4G and 5G networks)

Course Contents:

Module I: Introduction

Introduction to cellular engineering, Frequency Re-use, Channel Assignment Strategies, Fixed and Dynamic Channel Assignment Strategies, Handoff Process, Factors affecting Handoff Process, Handoff detection Strategies, Few practical cases of Handoff Scenario, Interference and System Capacity, Cell Splitting, Sectoring, History of Mobile phone generations, 1G technology

Module II: Second Generation (2G) Mobile Technologies

PCS Architecture, Mobility management in PCS, GSM, Architecture, GSM addresses and identifiers, Protocol Stack, GSM security, Mobility Management in GSM, GPRS (2.5G), GPRS Architecture, GPRS Network Nodes, Protocol Stack.

Module III: Mobile Data Communication

Bluetooth: Architecture, Network and Protocol stack.

WLANs (Wireless LANs), Modes of operation of WLANs, IEEE 802.11 standard, System Architecture, Protocol stack, Wireless Multiple Access techniques: SDMA, FDMA, TDMA, CDMA.

Mobile IP, Motivation, Problems, Data Transfer, Encapsulation and tunneling.

Wireless Application Protocol (WAP): The Mobile Internet standard, WAP Gateway and Protocols, Wireless Markup Languages (WML).

Module IV: Third Generation (3G) Mobile Technologies

Introduction to International Mobile Telecommunications 2000 (IMT 2000) vision, 3GPP, UMTS, Wideband Code Division Multiple Access (W-CDMA), CDMA 2000, HSPA, Wireless Local Loop (WLL): Introduction to WLL Architecture, wireless Local Loop Technologies.

Module V: Global Mobile Satellite Systems

Global Mobile Satellite Systems, Global History, Applications, Classical Satellite System, Terminologies, Geostationary and Geosynchronous Satellites, Types of Orbits based upon distance from Earth (LEO, MEO, GEO, HEO), Based upon Eccentricity (Circular and Elliptical), Routing, Localization and Handover in satellite systems, case studies on IRIDIUM and GLOBALSTAR LEO satellite systems.

Module VI: Fourth Generation (4G) Mobile Technologies and Current Trends

4G standard: IMT Advanced requirement, Long Term Evolution, architecture, Mobile IPV6 (MIPv6), WiMax standard IEEE 802.16, VoIP, VoLTE, Presence Aware Technology, Pervasive Networks, NFC (Near Field Communication), Overview into 5G technology, NGMNA and IoT.


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Examination Scheme:

Components	CT1	A/C/Q	Attd	EE
Weightage (%)	15	10	5	70

Text & References:**Text:**

- Jochen Schiller, "Mobile Communications", Addison-Wesley, second edition, 2004
- Stojmenovic and Cacute, "Handbook of Wireless Networks and Mobile Computing", Wiley, 2002, ISBN 0471419028

References:

- Mark Ciampa, Thomson learning, "Guide to Designing and Implementing wireless LANs", Vikas Publishing House, 2001
- Yi-Bing Lin & Imrich Chlamtac, "Wireless and Mobile Networks Architectures", John Wiley & Sons, 2001.
- Raj Pandya, "Mobile and Personal Communication systems and services", Prentice Hall of India, 2001.
- Afif Osseiran, Jose F. Monserrat, Patrick Marsch, "5G Mobile and Wireless Communications Technology", Cambridge University Press, October 2016
- Arunabha Ghosh, Jun Zhang, Jeffrey G. Andrews, Rias Muhamed, "Fundamentals of LTE", Princeton Hall, First Edition



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CRYPTOGRAPHY & NETWORK SECURITY

Course Code: IFT2621

Credit Units: 03

Course Objective:

Network Security was always important, but has gained significance with the increase of application of Internet associated e-commerce. Threat and compromise /Breach potentially increased with the introduction of the end user involvement, communication and networking. Thus the course is introduced to make the student acquainted with the concepts and practices to make the network environment secure.

Module 1:

Integer arithmetic, modular arithmetic, matrices, Linear Congruence: Definition – Basic properties of congruence, Divisibility - Greatest common divisor, equivalence classes, residue classes. Chinese remainder theorem, Euclid and Extended Euclid, modular inverse, exponentiation and logarithm. Algebraic structures: groups, fields, rings, Modulo groups - Primitive roots - Discrete logarithms.

Module 2:

Introduction to security attacks, services and mechanism, Classical encryption techniques, substitution cipher: ceaser cipher, playfair cipher, mono/polyalphabetic cipher, hill cipher, affine cipher. Transposition techniques: columnar cipher, rail fence cipher up to two round.

Module 3:

Stream and block ciphers. Modern Block Ciphers: Block ciphers principles, Shannon's theory of confusion and diffusion, feistel structure, Data encryption standard (DES), Strength of DES.

Module 4

Principals of public key crypto systems, RSA algorithm, security of RSA. Message Digest: Authentication requirements, authentication functions, hash function and SHA-1, message authentication code. Concept of Digital Signature. Diffie-Hellman Key Exchange.

Module 5:

IP Security: Architecture, Authentication header, Encapsulating security payloads, HTTPS, Viruses, Worms, Malware, Botnets, Firewall and its types.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	15	5	5	70

Text :

- “Cryptography & Network Security”, William Stallings, PHI
- “Cryptography & Network Security”, Behrouz A. Forouzan, TMH
- “Cryptography & Network Security”, Atuk Kahate,



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E-COMMERCE

Course Code: IFT2619

Credit Units : 03

Course Objective:

This course is aimed at incorporating the fundamentals of E-Commerce which involves study of Network Infrastructure, Mobile Commerce, Web Security, encryption, etc. which are essential components of Managing e-transactions making life even simpler and getting rid of various time consuming and tedious activities.

Course Contents:

Module I: Introduction

Traditional commerce – an overview, What is E-commerce?, Comparison between Traditional and Electronic commerce, Issues associated with electronic commerce. Types of E-Commerce: Inter Organizational E- commerce, Intra Organizational E-Commerce, Architectural frame work of E-Commerce, Benefits, Advantages and Disadvantages of E- Commerce.

Module II: Web Security

Firewalls, Types of Firewalls, Transaction Security, Cryptography: Secret Key Encryption, Public key Encryption, Implementation & management issues, Virtual Private Networks, Client Server Network Security.

Module III: Electronic Payment Scheme

Limitations of Traditional Payment system, Cyber Cash, First Virtual payment schemes, Online credit card system: SET, Smart card, Electronic cheques, Digital Cash, Debit card.

Module IV: Electronic Data Interchange (EDI)

Definition of EDI, EDI in action, Types of EDI, Benefits of EDI.

Module V: E-Commerce and Market

SCM, marketing issues, Advertising and online publishing, Copyright and its protection methods

Examination Scheme:

Components	CT1	A/C/Q	Attd	EE
Weightage (%)	15	10	5	70

Text & References:

Text:

- Ravi Kalakota. Andrew Whinston. “Frontiers of Electronic Commerce “. Addison Wesley

References:

- Denial Amor “The E Business revolution”, Addison Wesley
- Greenstein & Feinman, “ Electronics Commerce”, Tata McGraw Hill



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DATA WAREHOUSING AND DATA MINING

Course Code: IFT2604

Credit Units: 03

Course Objective:

This course is divided into two parts: one on Data Warehousing and one on Data Mining. Both data warehousing and data mining are advanced recent developments in database technology which aim to address the problem of extracting information from the overwhelmingly large amounts of data which modern societies are capable of amassing. Data warehousing focuses on supporting the analysis of data in a multidimensional way. Data mining focuses on inducing compressed representations of data in the form of descriptive and predictive models. Course gives an in-depth knowledge of both the concepts.

Course Contents:

Module I: Introduction to Data Warehousing

Data Warehouse definition & Characteristics, The need for data ware housing, Operational and Informational Data Stores, Difference between Data warehouse and DBMS, Benefits of Data warehousing, Data mart, Meta Data, Conceptual Modeling of Data Warehouses: star schemas, Snowflake, Fact Constellations with example each.

Module II: Data Warehousing Components & Architecture

Data Warehouse Architecture, Components of Data Warehouse Architecture, Data Warehousing Topologies, Meta Data, Components of Meta data, Mapping Meta Data. Challenges with Data Warehousing.

Module III: On Line Analytical Processing (OLAP)

Definition: OLAP, Difference between OLTP and OLAP, OLAP Server Architecture, OLAP Operations, Multi Relational & Multi Dimensional: MOLAP, ROLAP, OLAP Tools, Metadata Repository, Data Warehouse Back-End Tools and Utilities.

Module IV: Data Mining : Association Rules , Classification and Clustering

Introduction to Data Mining, Applications, Limitations, Techniques, Association Rules: Apriori Algorithm, Classification: Decision Tree
Cluster Analysis: Features, Types of Cluster Analysis Methods: Partitional, Hierarchical, Density Based, Grid based Methods, , Web Data Mining, Search Engine, Case Study, Limitations.

Examination Scheme:

Components	CT1	A/C/Q	Attd	EE
Weightage (%)	15	10	5	70

Text & References:

Text::

- Han & Kamber) Data Mining: Concepts and Techniques, Morgan Kaufmann Publishers, March 2006
- Alex Berson, Data Warehousing, Data Mining, and Olap, Tata McGraw Hill.

References:

- George M Marakas, Modern Data Warehousing, Mining & Visualization Core Concepts, Pearson Education.
- M.H. Dunham, "Data Mining: Introductory and Advanced Topics" Pearson Education.
- Jiawei Han, Micheline Kamber, "Data Mining Concepts & Techniques" Elsevier.

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MAJOR PROJECT/ DISSERTATION

Course Code: IFT2637

Credit Units: 30

Objective:

Major Project/Research experience is as close to a professional problem-solving activity as anything in the curriculum. It provides exposure to research methodology, practical skill enhancement and an opportunity to work closely with a industry external guide. It usually requires the use of advanced concepts, a variety of experimental techniques, and state-of-the-art instrumentation. Students require professional development that cannot be effectively taught in the academic environment. These facets can only be learned through direct, on-the-job experience working with successful professionals and experts in the field. The internship program can best be described as an attempt to institutionalize efforts to bridge the gap between the professional world and the academic institutions. Entire effort in internship is in terms of extending the program of education and evaluation beyond the classroom of a university or institution. The educational process in the internship course seeks out and focuses attention on many latent attributes, which do not surface in the normal classroom situations. These attributes are intellectual ability, professional judgment and decision-making ability, inter-disciplinary approach, skills for data handling, ability in written and oral presentation, sense of responsibility etc.

In order to achieve these objectives:

- **Each student will be allotted a supervisor** for proper guidance.
- **Student will first submit details of company, external guide, project title to coordinator/supervisor as per given schedule.**
- After project approval student will submit synopsis as per given guidelines.
- Student will maintain a file (**Internship File/Project Report**) which he/she will submit after completion of internship. **Further, coordinator will provide NTCC project guidelines and sample to help in preparation of file.** The Internship File aims to encourage students to keep a personal record of their learning and achievement throughout the Programme. It can be used as the basis for lifelong learning and for job applications. Items can be drawn from activities completed in the course modules and from the workplace to demonstrate learning and personal development. The File will assess the student's analytical skills and ability to present supportive evidence, whilst demonstrating understanding of their organization, its needs and their own personal contribution to the organization.

In general, the Project Report File should be comprehensive and include

- A short account of the activities that were undertaken as part of the project;
- A statement about the extent to which the project has achieved its stated goals.
- A statement about the outcomes of the evaluation and dissemination processes engaged in as part of the project;
- Any activities planned but not yet completed as part of the project, or as a future initiative directly resulting from the project;
- Any problems that have arisen that may be useful to document for future reference.

The **layout guidelines** for the Project Report

1. File should be in the following specification

- A4 size paper
- Hard Bound- Dark Green Colour


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- **Font**

For normal text Font Type and Size must be- Times New Roman, 12 pt. The minimum font size of materials within a table or a figure can be 10 point.

- **Margins**

A margin of 3.75 cm (1½ inch) is to be given on the binding edge while on the other sides it is to be 2.5 cm (1 inch). The text of the report, including headings, figures, tables, and notes, but excluding page numbers, must be accommodated within the page area.

- **Line Spacing**

The line spacing in the main text must be between one-and-a-half (1.5). Single line spacing should be given for figure captions, table titles, figure legends, and footnotes. Equations, tables, figures, and quotations should be set off from the main text with adequate space (not less than the normal line spacing adopted for the main text). Two consecutive paragraphs should be separated by a spacing which must be larger than the line spacing adopted for the text.

- **Tables and Figures**

Each sketch, drawing, graph and photograph should have a figure number and title below the figure etc. Numbering should be sequential, chapter wise. For instance, if there are 24 figures chapter 3 spread over all of its sections the figure numbers run from Figure 3.1 through Figure 3.24. In figures experimental data should typically be represented by centered symbols, and theoretical data by continuous curves.

Each table should have a table number and caption above the table. Numbering should be sequential, chapter wise, as in the case of Figure numbers. For instance, if there are 18 tables in chapter 3 the table numbers run from Figure 3.1 through Figure 3.18.

Make sure that figures and tables are complete in other respects such as legends, references (if any) and coordinate labels with units. Each figure and table must be explicitly referred to in the text and located where its first reference occurs, preferably after the reference.

- **Drawings**

All engineering drawings must conform to relevant Standards and should include a title block. If drawings are large they should be included at the back of the report in a separate pocket. In case drawings are made using CAD packages, a CD ROM should be included which contains all the files and details of the packages used.

- **Equations**

The numbering of equations should be sequential, chapter wise. Numbered equations must be explicitly referred to in the text.

2. Report Size: The maximum number of pages of the Report should be preferably between 50-80 pages.

3. Report Layout: The report should contain the following components

Front Page

Declaration

Student Certificate (University)

Certificate (Company)

Acknowledgement

Abstract


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Contents
List of Figures
List of Tables
Company Profile (optional)
Chapters
Appendices(optional)
References / Bibliography

The above given components are described below:

1. **The Title Page**-- Format will be given by coordinator/supervisor.
2. **Declaration by the Students**-This is page number (i), the beginning of the small case Roman numeral page numbers. The student has to give a declaration to the effect that the data used for the work, the work depicted in the report, and the written material contained in the report are not copied from others and that due permission has been taken from, and due credit has been given to, the sources whenever they are used.
3. **Certificate**-This is page number (ii). It is given by the Institute. The certificate will be signed by the Faculty Supervisor(s) before the viva-voce after verifying the format and by the Head of the Department after review with the Supervisor(s).
4. **Company Certificate**: This is a certificate, which the company gives to the students.
5. **Contents**-This is page number (iii). The table of Contents should be titled just Contents (not Table of Contents). Try to fit it into one or two pages.
6. **Acknowledgement**-This is page number (iv). Keep this brief and avoid using informal language. This page must be signed by the candidate.
7. **Abstract and Keywords**-This is page number (v). The abstract (preferably one page) should contain the context/relevance of the problem at hand, a description of what was done and a gist of the significant observations/results.
The keywords (maximum 6) are a hint that what is contained in the report.
8. **Company Profile**: A Company Profile corresponds to a file with company-specific data. Company data can be stored there and included in a booking when needed.
9. **Chapters**—Introduction, Literature Review/Background Study etc. as given by coordinator/supervisor.
10. **References / Bibliography** --This should include papers and books referred to in the body of the report. These should be ordered alphabetically on the author's surname. The titles of journals preferably should not be abbreviated; if they are, abbreviations must comply with an internationally recognised system.

ASSESSMENT OF THE INTERNSHIP FILE

Continuous Internal Assessment
50 Marks

Final Assessment
rks

Continuous Internal Assessment consists of topic relevance, synopsis, progress report and draft report. Final Assessment includes viva, presentation, report and execution marks.

Examination Scheme:

Components	S	PR1	PR2	PR3	V	E	R	FP
Weightage (%)	20	10	10	10	10	10	15	15

S-Synopsis, PR1-Progress Report-1, PR2- Progress Report-2, PR3- Progress Report-3, V – Viva, FP – Final Presentation, R – Report, E-Execution

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BIOMEDICAL

Programme Structure

Course Code	Course Title	Lecture (L) Hours Per Week	Tutorial (T) Hours Per Week	Practical (P) Hours Per Week	Total Credits
BME2351	Human Anatomy and Physiology-I	3	-	-	3
BME2451	Bioinstrumentation	3	-	-	3
BME2551	Tissue Engineering	3	-	-	3
BME2651	Biomechanic	3	-	-	3
BME2751	Medical Image Processing	3	-	-	3
BME2851	Seminar –Biomedical Engineering	3	-	-	3
	TOTAL				18



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BIOMEDICAL

Syllabus

HUMAN ANATOMY AND PHYSIOLOGY-I

Course Code: BME2351

Credit Units: 03

Course Objective:

To provide students a basic understanding of the human body structure and functioning. Students will be able to relate basic human body systems and life processes, name the major body systems and their functions , understand the anatomy of various body systems .

Course Contents:

Module I:

Basic cell structure , various cell organelles and their functions , Tissue- their types , structure and function , structure and function of skin , Different types of muscles and their function , General description of bones , their structure and function , types of joints and their structure and function .

Module II:

Cell , cell membrane , polarisation and repolarisation , resting membrane potential , Nernst equation , Donnan's equilibrium , Goldman equation action potential and its propagation , synaptic transmission ,

Module III

Blood , Lymph and circulation : blood composition , properties and function . Structure and functions of RBCs, WBCs and platelets , Blood types , Homeostasis , Immune mechanisms , Lymph., Heart position , structure and functions , Heartbeat , electrical excitation , Einthoven's triangle , Cardiac and peripheral regulation , blood pressure and its regulation , blood flow and its regulation.

Module IV

Respiratory System : position and functions . Mechanics of respiration , Lung volumes and capacities , Gas exchange between lungs and tissues , regulation of respiration . Digestive system : Different parts of digestive system , functions of each organ , digestion of proteins , carbohydrates , fats , vitamins and minerals.

Module V

Osteology , Bone , brief introduction to different bones in skull , vertebral column , upper extremity , hands , lower extremity , foot .

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

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Text and References

- Guyton A.C and J.E. Hall , “ Text book of Medical Physiology “ Harcourt India Pvt. Ltd.
- Principles of Human Anatomy and Physiology , Tortora , Wiley
- Ganong W.F. “ Review of Medical Physiology” , Prentice Hall
- Gray's Anatomy for Students - Gray's Anatomy by A. Wayne Vogl, Richard Drake, Adam W. M. Mitchell



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BIOINSTRUMENTATION

Course Code : BME2451

Credit Units: 03

Course Objective:

To enable the student to understand the working and construction of various equipments used in the medical field.

Course Contents:

Module I:

Transducers and Reference electrodes: classification of transducers, temperature transducers , displacement transducer , pressure transducer , catheter transducer , photoelectric transducer , piezoelectric transducer . po2 electrodes , membrane electrodes , blood gas analysis , Ion specific electrodes .

Module II :

ECG : electrodes and conversion of ionic potentials to electric potential , ECG instrumentation amplifiers, driven right leg circuitry. Introduction and characteristics of bio signals (EEG , ECG , EMG) . , removal of artefacts , event detection and correlation analysis of ECG signals .

Module III :

Respiration measurement using electrical impedance plethysmography : electrical impedance changes during breathing , 2 and 4 electrode measurement , 4 electrode technique .

Module IV :

Oxygen saturation using pulse oximetry : optical characteristics of oxygenated and deoxygenated blood , principles of pulse oximetry , circuits of pulse oximetry , constant current source , current – voltage converter , amplifiers .

Module V :

Non invasive blood pressure measurement : theory and circuitry of method using Korotkoff sounds and method based on oscillometry .

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

- Leslie Cromwell , Fred J. Weibell , Erich A Pfeiffer , Biomedical Instrumentation and Measurements , PHI , 2nd Edition , 2004.
- R.S. Khandpur , Handbook of Biomedical Instrumentation , Tata McGraw Hill 2004 .
- John G. Webster , Medical Instrumentation : Application and Design, 3rd Edition , John Wiley & Sons , New York , 1998 .



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TISSUE ENGINEERING

Course Code: BME2551

Credit Units: 03

Course Objective:

To enable students to understand the principles of tissue engineering and learn the basics of cell culture , tissue culture ,scaffolding , types of bioreactors and mass transfer reactions .

Course Contents:

Module I:

Cell culture: Different cell types, progenitor cells and cell differentiations, different kind of matrix, cell-cell interaction. Aspect of cell culture: cell expansion, cell transfer, cell storage and cell characterization, Bioreactors.

Module II :

Molecular biology aspects: Cell signaling molecules, growth factors, hormone and growth factor signaling, growth factor delivery in tissue engineering, cell attachment: differential cell adhesion, receptor-ligand binding, and Cell surface markers.

Module III :

Scaffold and transplant: Engineering biomaterials for tissue engineering, Degradable materials (collagen, silk and polylactic acid), porosity, mechanical strength, 3-D architecture and cell incorporation. Engineering tissues for replacing bone, cartilage, tendons, ligaments, skin and liver. Basic transplant immunology, stems cells: introduction, hepatopoiesis.

Module IV :

Cryopreservation of cells and tissues, Transport in biological system, Mass transport through cell membranes, Mathematical modelling of mass transfer in engineered tissues

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

- Clemens van Blitterswijk, Tissue Engineering, Academic Press, 2008
- Principles of tissue engineering, Robert. P.Lanza, Robert Langer & William L. Chick, Academic press.
- The Biomedical Engineering –Handbook, Joseph D. Bronzino, CRC press.
- Tissue Engineering, B. Palsson, J.A. Hubbell, R.Plonsey & J.D. Bronzino, CRC- Taylor & Francis



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BIOMECHANICS

Course Code: BME2651

Credit Units: 03

Course Objective:

To enable students to understand the basics of bone movement , gait analysis and mechanics of bone and muscles

Course Contents:

Module I:

Joint motion: relative position of two bones meeting at a joint , description of a rigid body , degrees of freedom , euler angles , rotation matrices, rotation angle anatomical directions , anatomical planes ,

Module II :

Inverse Dynamics to calculate resultant force and momentum within the body link segment models , intersegmental force and moment ,

Module III :

Human Gait analysis , gait cycle , angular kinematics of hip , knee and ankle , force plates and ground reaction force , gait abnormalities .

Module IV :

Structure and composition of bone , microstructure of bone , skeletal muscle , mechanism of muscle contraction , force length and force velocity relationships , basic muscle models , tendons and ligaments , their basic mechanical models , injuries and factors affecting biomechanical properties , Cartilage , viscoelasticity and viscoelastic models .

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

- Basic biomechanics of the musculoskeletal system (M Nordin and VH Frankel; Lea& Febiger, London 1989)
- Biomechanics of the musculo-skeletal system (BM Nigg, W Herzog (eds); John Wiley & Sons, Chichester 1994)
- Biomechanics and motor control of human movement (DA Winter; John Wiley & Sons, Chichester 1990)
- Bones and Joints: A Guide for Students. Christine Gunn. Churchill Livingstone, Edinburgh 1996 (3rd ed.)



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MEDICAL IMAGE PROCESSING

Course Code: BME2751

Credit Units: 03

Course Objective:

To enable students to understand techniques used in imaging in the medical profession , the artefacts and other problems experience in doing so .

Course Contents:

Module I:

Digital image fundamental :Elements of digital image processing systems, Elements of Visual perception, Image sampling and quantization,– Some Basic relationships between pixels, Matrix and Singular Value representation of discrete images

Module II :

Image transforms 1DDFT, 2D DFT, Cosine, Sine Hadamard, Haar, Slant, KL transform and their properties

Module III :

Image enhancement :Histogram – Modification and specification techniques, Enhancement by point processing Image smoothening, Image sharpening, generation of spatial masks from frequency domain specification, Homomorphic filtering, and color image processing.

Module IV :

Image segmentation : spatial feature extraction , transforms features , segmentation techniques , analysis techniques, application of matlab for digital image processing .

Module V

Run length, Huffman coding, arithmetic coding, Pixel coding, transform coding, JPEG Standard, predictive techniques, Application of image processing techniques in thermography, SPECT, PET images.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

- Rafael C., Gonzalez and Richard E. Woods, *Digital Image Processing*, Pearson Education Asia, 2001
- Anil K. Jain, *Fundamentals of Digital Image Processing*, Prentice Hall of India, 1997
- William K. Pratt, *Digital Image Processing*, John Wiley, NJ, 1987.
- Albert Macovski, *Medical Imaging systems*, Prentice Hall, New Jersey. 1983.
- Sid Ahmed M.A., *Image Processing Theory, Algorithm and Architectures*, McGraw Hill, 1995.



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CLOUD COMPUTING

Programme Structure

Course Code	Course Title	Lecture (L) Hours Per Week	Tutorial (T) Hours Per Week	Practical (P) Hours Per Week	Total Credits
CSE2353	Computer Networks	3	-	-	3
CSE2453	Distributed System	3	-	-	3
CSE2553	High Performance Computing	3	-	-	3
CSE2653	Information Storage Management	3	-	-	3
CSE2753	Interfacing with Virtualization	3	-	-	3
CSE2853	Cloud Computing Tools & Techniques	3	-	-	3
	TOTAL				18



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CLOUD COMPUTING

Syllabus

COMPUTER NETWORKS

Course Code: CSE2353

Credit Units: 03

Course Objective:

The course provides a unified and fundamental view of the broad field of computer networks. Furthermore, the easy to understand and extremely relevant world of Computer Net working is introduced in a top down Approach. Introduction to intranets and intranet servers and browsers, networks and network servers, LANs/WANs, internetworking technologies, the OSI reference model for networking protocols, CSMA/CD, TCP/IP implementation

Course Contents:

Module I: Introduction

Introduction to computer networks, evolution of computer networks and its uses, Advantages and Disadvantages of Computer Network, reference models: OSI reference Models, TCP/IP Protocol Suit Networking fundamentals: Internet, Circuit switching vs Packet switching, ISPs, Delay and Loss in Packet Switched Networks

Module II: Local Area Network

LAN Architecture, LAN topologies- Bus/ Tree LAN, Ring LAN, Star LAN, Wireless LAN, Ethernet and Fast Ethernet, Token Ring

Module III: Application layer and data link layer

Application Layer Protocols: HTTP, FTP, SMTP, DNS

Data link layer design issues, Flow Control- Stop and Wait, Error Detection, Error Control, error detection and correction, data link layer protocols, sliding window protocols, example of data link protocol- HDLC

Module IV: Medium access layer

Channel allocation problem, multiple access protocols, Introduction to ALOHA, CSMA/CD, CSMA/CA

Module V: The network layer

Introduction, Routers, Network layer concepts, shortest path routing, flooding, distance vector routing, link state routing (without algorithms), congestion control and quality of service, internetworking, IP, Ipv4 Addressing vs Ipv6

Module VI: The transport layer

The transport layer services, elements of transport protocols, TCP and UDP, Brief introduction to presentation and session layer, E-mail

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

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Att: Attendance

Text & References:

Text:

- Data Communication & networking: Forouzan, B. A.
- Data and Computer Communications, W. Stallings, Prentice Hall of India

References:

- Computer Networks: Tanenbaum, Andrew S, Prentice Hall



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DISTRIBUTED SYSTEM

Course Code: CSE2453

Credit Unit: 03

Course Objective:

It serves as one of the important courses in terms of having an understanding about the basic concepts about distributed systems, their types or categories with some concepts about basic networking and various different directions in which it is useful and applicable. The outcome of the course implicitly and explicitly affects the abilities of students to have a good understanding of the upcoming other related courses.

Course Contents:

Module 1: Introduction to Distributed System

Introduction, Goals of Distributed System Examples of distributed systems , Trends in distributed systems , Resource sharing in distributed system, Challenges faced, System Models basics, types of System Models, Physical models , Architectural models , Fundamental models.

Module 2: Networking and Internetworking

Introduction to networking, Networking issues for distributed systems, Types of network (LAN, MAN, WAN, WLAN, WMAN, WWAN, internetworks), Network principles, Internet protocols, Basics of Inter-Process communication, Multicast Communication, Network virtualization: overlay networks, Remote invocation, Remote Procedure Call, Remote method invocation.

Module 3: Operating System Support, Web Services and Security

Introduction , Operating System layer, Operating System Architecture, Virtualization at Operating System level, Introduction to web services, Service descriptions and IDL for web services, Applications of web services, Overview of Security Techniques, Cryptographic algorithms , Digital signatures, Needham–Schroeder, Kerberos techniques.

Module 4: Distributed File Systems and Distributed Transactions

Introduction (URI, URL's) , Name services and the Domain Name System(NameSpace, Name Resolution, DNS), Directory services, Transactions , Nested transactions , Locks , Optimistic concurrency control, Flat and nested distributed transactions , Atomic commit protocols , Concurrency control in distributed transactions , Distributed deadlocks.

Module 5: Distributed Multimedia System and Distributed Algorithms

Characteristics of multimedia data, Quality of service management, Resource management, Stream adaptation, Introduction to communication protocols, Balanced sliding window protocol, Routing algorithms, Destination based routing, APP problem, Deadlock free Packet switching.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

Text & References:

Text:

- Coulouris, Dollimore, Kindberg, Blair, "Distributed System: Concepts and Design", Fifth Edition, Pearson Ed.
- Singhal & Shivaratri, "Advanced Concept in Operating Systems", McGraw Hill

References:

- Andrew S. Tanenbaum, "Computer Networks", 4th ed., Prentice Hall
- Gerald Tel, "Distributed Algorithms", Cambridge University Press

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HIGH PERFORMANCE COMPUTING

Course Code: CSE2553

Credit Units: 03

Course Objective:

This course gives an insight about Cluster and Grid computing. The major objective of this course is to provide a sound foundation to the students on the concepts, percepts and practices in a field that is of immense concern to the industry and business. This would be helpful to students for understanding a subject related to but a bit higher in its hierarchy.

Course Contents:

Module 1: Parallel and Distributed Programming Models

Introduction to high performance computing, basic definitions: cluster, grid, meta-computing, middleware etc., examples of representative applications. Programming models: shared memory, message passing, peer-to-peer. Development of parallel and distributed applications, Design phases, Common parallel patterns, Performance metrics and profiling.

Module 2: Overview of Cluster Computing

The Role of Clusters, Definition and Taxonomy, Distributed Computing, Limitations, Architecture of cluster-based systems, Design Decisions, Network Hardware, Network Software, Protocols Distributed File Systems, Virtualization technologies, Issues in cluster design: performance, single-system-image, fault tolerance, manageability, programmability, load balancing, security, storage.

Module 3: Introduction of Grid Computing

Introduction, Evolution of the Grid, Definitions of Grid Computing, Infrastructure of hardware and software, Grid models, Applications, Examples of usage, Research possibilities / scope in Grid Computing, HPC and Grids, Scheduling HPC applications in Grids, Grid Monitoring Architecture (GMA) – An Overview of Grid Monitoring Systems.

Module 4: Integrating task parallelism with data parallelism

Introduction and motivation, A model for integrating task parallelism into data parallel programming platforms, Integration of the model into ARC, Design and implementation applications, performance analysis, guidelines for composing user programs, related work.

Anonymous remote computing and communication model: Introduction, Location in dependent inter task communication with DP, DP model of iterative grid computations, Design and implementation of distributed pipes.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70


Text & References:

Text:

- “Grid Computing a Research Monograph” by D. Janakiram, Tata McGraw hill publications

References:

- Joshy Joseph & Craig Fellenstein, “Grid Computing”, Pearson Education
- “Grid Computing: A Practical Guide to technology and Applications” by Ahmar Abbas, Charles River media


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INFORMATION STORAGE MANAGEMENT

Course Code: CSE2653

Credit Units: 03

Course Objective:

The course provides detailed knowledge, practical training and insight into the implementation and management of various storage technologies with a focus towards applying these technologies in an information lifecycle paradigm. This course focuses on evolution of storage and implementation models, Storage devices principles, Storage classes (SAN, NAS, CAS) and Backup, Business Continuity, and Disaster Recovery principles

Course Contents:

Module 1: Introduction to Storage Technology

Information Storage - Data, Types of Data, Information, Storage, Evolution of Storage Technology and Architecture, Data Center Infrastructure, Key Challenges in Managing Information, Information Lifecycle -Information Lifecycle Management, ILM Implementation, ILM Benefits.

Module 2: Data Protection & Intelligent Storage System

Components of a Storage System Environment, RAID -Implementation of RAID, RAID Array Components, RAID levels, RAID Impact on Disk Performance, Components of an Intelligent Storage System, Intelligent Storage Array-High-end Storage Systems, Midrange Storage System

Module 3: Storage Networking Technologies & Virtualization

Direct-Attached Storage and Introduction to SCSI- Types of DAS, DAS Benefits and Limitations, Disk Drive Interfaces, Introduction to Parallel SCSI, Storage Area Networks- Fibre Channel: Overview, SAN and its evolution, Components of SAN, Network-Attached Storage- General Purpose Servers vs. NAS Devices, Benefits of NAS, Components of NAS.

Module 4: CAS and Business Continuity

CAS: Fixed Content and Archives, Types of Archives, Features and Benefits of CAS, CAS Architecture, Object Storage and Retrieval in CAS.

Introduction to Business Continuity: Information Availability, BC Terminology, BC Planning Lifecycle, Failure Analysis.

Module 5: Backup, Recovery & Replication

Backup and Recovery : Backup Purpose, Backup Considerations, Backup Granularity, Recovery Considerations, Backup Methods, Backup Process, Backup and Restore Operations, Backup Topologies, Backup Technologies.

Replication: Local Replication- Uses of Local Replicas, Data Consistency, Local Replication Technologies, Remote Replication- Modes of Remote Replication, Remote Replication Technologies.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

Text & References:

Text:

- Information Storage and Management, Wiley Publication ISBN: 978-81-265-2147-0

References:

- Marc Farley Osborne, "Building Storage Networks", Tata McGraw Hill
- Robert Spalding, "Storage Networks: The Complete Reference", Tata McGraw Hill


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INTERFACING WITH VIRTUALIZATION

Course Code: CSE2753

Credit Units: 03

Course Objective:

This course gives students an insight into the basics of cloud computing along with virtualization, cloud computing is one of the fastest growing domain from a while now. It will provide the students basic understanding about cloud and virtualization along with it how one can migrate over it.

Course Contents:

Module-I: Introduction to Virtualization

Virtualization and cloud computing - Need of virtualization – cost, administration, fast deployment, reduce infrastructure cost – limitations

Types of hardware virtualization: Full virtualization - partial virtualization - para virtualization

Desktop virtualization: Software virtualization – Memory virtualization - Storage virtualization – Data virtualization – Network virtualization

Module-II: Hypervisors and Virtual machines

Server Virtualization: Understanding Server Virtualization, types of server virtualization, Virtual machine basics, types of virtual machines, hypervisor concepts and types

Module-III: Virtualization Solutions

Understanding Microsoft's Virtualization solutions: Microsoft's Infrastructure Optimization Model, Virtualization and the Infrastructure Optimization Model, Benefits of Virtualization, Achieving the Benefits of Datacenter Virtualization, Achieving the Benefits of Client Virtualization, Achieving the Benefits of Cloud Virtualization

Module-IV: Migrating into a Cloud

Introduction, Challenges while migrating to Cloud, Broad approaches to migrating into the cloud-why migrate -deciding on cloud migration, the Seven-step model of migration into a cloud, Migration Risks and Mitigation, Enterprise cloud computing paradigm, relevant Deployment Models for Enterprise Cloud Computing, Adoption and Consumption Strategies, issues for enterprise applications on the cloud

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

Text & References:

Text:

- David Marshall, Wade A. Reynolds, Advanced Server Virtualization: VMware and Microsoft Platform in the Virtual Data Center, Auerbach
- Cloud Computing: Web-Based Applications That Change the Way You Work and Collaborate Online - Michael Miller - Que 2008

References:

- Publications, 2006. Cloud Computing (Principles and Paradigms), Edited by Rajkumar Buyya, James Broberg, Andrzej Goscinski, John Wiley & Sons, Inc. 2011
- Cloud computing a practical approach - Anthony T.Velte , Toby J. Velte Robert Elsenpeter, TATA McGraw- Hill , New Delhi – 2010


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CLOUD COMPUTING TOOLS AND TECHNIQUES

Course Code: CSE2853

Credit Units: 03

Course Objective:

This course gives students an insight into the basics of cloud computing along with virtualization, cloud computing is one of the fastest growing domain from a while now. It will provide the students basic understanding about cloud and virtualization along with it how one can migrate over it.

Course Contents:

Module-I: Cloud Computing Overview

Origins of Cloud computing – Cloud components - Essential characteristics – On-demand self-service, Broad network access, Location independent resource pooling ,Rapid elasticity , Measured service, Comparing cloud providers with traditional IT service providers, Roots of cloud computing.

Module-II: Cloud Insights

Architectural influences – High-performance computing, Utility and Enterprise grid computing, Cloud scenarios – Benefits: scalability ,simplicity ,vendors ,security, Limitations – Sensitive information - Application development- security level of third party - security benefits, Regularity issues: Government policies.

Module-III: Cloud Architecture- Layers and Models

Layers in cloud architecture, Software as a Service (SaaS), features of SaaS and benefits, Platform as a Service (PaaS), features of PaaS and benefits, Infrastructure as a Service (IaaS), features of IaaS and benefits, Service providers, challenges and risks in cloud adoption.

Cloud deployment model: Public clouds – Private clouds – Community clouds - Hybrid clouds - Advantages of Cloud computing.

Module-IV: Cloud Simulators- CloudSim and GreenCloud

Introduction to Simulator, understanding CloudSim simulator, CloudSim Architecture(User code, CloudSim, GridSim, SimJava) Understanding Working platform for CloudSim, Introduction to GreenCloud

Module-V: Introduction to VMWare Simulator

Basics of VMWare, advantages of VMware virtualization, using VMware workstation, creating virtual machines-understanding virtual machines, create a new virtual machine on local host, cloning virtual machines, virtualize a physical machine, starting and stopping a virtual machine.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

Text & References:

Text:

- Cloud computing a practical approach - Anthony T.Velte , Toby J. Velte Robert Elsenpeter, TATA McGraw- Hill , New Delhi – 2010
- Cloud Computing: Web-Based Applications That Change the Way You Work and Collaborate Online - Michael Miller - Que 2008

References:

- Cloud computing for dummies- Judith Hurwitz , Robin Bloor , Marcia Kaufman ,Fern Halper, Wiley Publishing, Inc, 2010
- Cloud Computing (Principles and Paradigms), Edited by Rajkumar Buyya, James Broberg, Andrzej Goscinski, John Wiley & Sons, Inc. 2011


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EMBEDDED SYSTEM

Programme Structure

Course Code	Course Title	Lecture (L) Hours Per Week	Tutorial (T) Hours Per Week	Practical (P) Hours Per Week	Total Credits
ECE2352	Introduction to Microprocessor System	3	-	-	3
ECE2452	Microcontroller	3	-	-	3
ECE2552	PCB Fabrication	3	-	-	3
ECE2652	Robotics and Automation	3	-	-	3
ECE2752	Simulation and Modelling Processing	3	-	-	3
ECE2852	Project (Embedded System)	3	-	-	3
	TOTAL				18



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EMBEDDED SYSTEM

Syllabus

INTRODUCTION TO MICROPROCESSOR SYSTEMS

Course Code: ECE2352

Credit Units: 03

Course Objective:

This course deals with the systematic study of the Architecture and programming issues of 8085-microprocessor family. The aim of this course is to give the students basic knowledge of the above microprocessor needed to develop the systems using it.

Course Contents:

Module I: Introduction to Microcomputer Systems

Introduction to Microprocessors and microcomputers, Study of 8 bit Microprocessor, 8085 pin configuration, Internal Architecture and operations, interrupts, Stacks and subroutines, various data transfer schemes.

Module II: ALP and timing diagrams

Introduction to 8085 instruction set, advance 8085 programming, Addressing modes, Counters and time Delays, Instruction cycle, machine cycle, T-states, timing diagram for 8085 instruction.

Module III: Memory System Design & I/O Interfacing

Memory interfacing with 8085. Interfacing with input/output devices (memory mapped, peripheral I/O), Cache memory system. Study of following peripheral devices 8255, 8253, 8257, 8259, 8251.

Module IV: Architecture of 16-Bit Microprocessor

Difference between 8085 and 8086, Block diagram and architecture of 8086 family, pin configuration of 8086, minimum mode & maximum mode Operation, Bus Interface Unit, Register Organization, Instruction Pointer, Stack & Stack pointer, merits of memory segmentation, Execution Unit, Register Organization.

Module V: Pentium Processors

.Internal architecture of 8087, Operational overview of 8087, Introduction to 80186, 80286, 80386 & 80486 processors, Pentium processor (P-II, P-III, P-IV).

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance


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Text & References:

- Ramesh. S. Gaonkar, “Microprocessor architecture Programming and Application with 8085” Penram International Publishing, 4th Edition
- B.Ram, “Fundamentals of microprocessors and microcomputer” DhanpatRai, 5th Edition.]
- Douglas V Hall.
- M. Rafiquzzaman, “Microprocessor Theory and Application” PHI – 10th Indian Reprint.
- Naresh Grover, “Microprocessor comprehensive studies Architecture, Programming and Interfacing” DhanpatRai, 2003.
- Gosh,” 0000 to 8085” PHI.



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MICROCONTROLLER

Course Code: ECE2452

Credit Units: 03

Course Objective:

The syllabus deals with 8051 architecture and its interfacing with other devices. A microcontroller is an integrated circuit that is programmable. The syllabus makes student perfect in assembly language programming, addressing modes etc apart from it input-output programming is discussed in detail. In the second part Embedded systems and it's application is discussed. 8051 C programming is also incorporated in the syllabus.

Course Contents:

Module I: Overview of Microcontroller

Microcontroller and Embedded Processors, Overview of 8051 Microcontroller family: Architecture, basic assembly language programming concepts, The program Counter and ROM Spaces in the 8051, Data types, 8051 Flag Bits and PSW Register, 8051 Register Banks and Stack Instruction set, Loop and Jump Instructions, Call Instructions, Time delay generations and calculations, I/O port programming Addressing Modes, accessing memory using various addressing modes, Arithmetic instructions and programs, Logical instructions, BCD and ASCII application programs, Single-bit instruction programming, Reading input pins vs. port Latch, Programming of 8051 Timers, Counter Programming.

Module II: Communication with 8051

Basics of Communication, Overview of RS-232, I2C Bus, UART, USB, IEEE 488 (GPIB). Parallel input output applications. (Stepper motor Sequencer program, Strobed input/output). Interrupt driven applications (real time clock, serial input/output with interrupt). Analog-digital interfacing (Pulse width modulator, 8-bit ADC).

Module III: Basics of 8051 C Programming

Introduction to 8051 C, 8051 memory constitution, Constants, variables and data types. Arrays structures and unions, pointers, Loops and decisions, Functions, Modules and programs.

Module IV: 8051 C Programming

Data interface, Timer control, Interrupt operations, Digital operations, A/D and D/A conversions, Common control problem examples (Centronics parallel interface, Printer interface, Memory access, Key matrix scanning, Stepper motor control and digital clock.).

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance



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Text & References:

Text:

- Raj Kamal, 2004, “Embedded Systems”, TMH.
- James W. Stewart and Kai X. Miao, 2en Edition. “The 8051 microcontroller” Pearson Edu. Prentice Hall.
- M.A. Mazidi and J. G. Mazidi, 2004 “The 8051 Microcontroller and Embedded Systems”, PHI.

References:

- David E. Simon, 1999, “An Embedded Software Primer”, Pearson Education
- K.J. Ayala, 1991, “The 8051 Microcontroller”, Penram International.
- Dr. Rajiv Kapadia, “8051 Microcontroller & Embedded Systems”, Jaico Press
- Dr. Prasad, 2004, “Embedded Real Time System”, Wiley Dreamtech



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PCB FABRICATION

Course Code: ECE2552

Credit Units: 03

Aim: To equip the students with the knowledge of PCB design and fabrication processes.

Objective:

- To make familiar with PCB design and various processes involved.
- To provide in-depth core knowledge in design, performance analysis and fabrication of Printed Circuit Boards.
- To provide the knowledge in PCB fabrication process and factors affecting PCB performance.

Module I: Introduction to the PCB

Definition and Evolution of the Printed Circuit Board (PCB), Purposes of a PCB, Applications, Market Drivers, Typical Development Flow for a PCB, Printed Circuit Technology, Basic Electronic Components, Resistors, Capacitors, Inductors, Diodes, Transistors, Relays, Connectors, Integrated Circuits: How a silicon wafer becomes an IC, Printed Circuit Board Characteristics, PCB Materials, Fillers, resins, laminates, base material characteristics, Dielectric, conductors, Engineering References

Module II: Design and Analyses

Design and Environmental Requirements: Functional, Thermal, Vibration, Shock, EMI/EMC; Electrical Engineering: Analog and digital signals, Signal integrity, Grounding concepts, Current carrying capacity, CAD, Schematics, Layout rules of thumb; Mechanical Engineering: Panels, Standard board sizes, Packaging, Thermal Design, Heat transfer basics, Convection, Conduction, PCB Thermal Design Features, Thermal modeling, Cycling and fatigue, Component Vibration Fatigue, Vibration Models and Terminology, Combined Thermal and Structural Fatigue

Module III: Contamination Control/Environmental Control

Contamination Control, Conformal Coatings, Polluting Agents, Safety Controls, Pollution Controls, Recycling, Standards; Manufacturing: PCB Manufacturing Information, PCB Layout and Artwork; Fabrication: Machining Operations, Blanking, Cutting, Punching, Drilling, Laminating Techniques, Plating, Etching, Surface Finishing, Conformal Coatings, Inspection and Checkout, Specifications and Standards

Module IV: Assembly

PCB Assembly Drawing Examples, Component Considerations, Component mounting and support, Mechanical Devices, Soldering Technology, Nonsolder Connections, Cleaning, Parts Staking, Conformal Coating Removal, Repair and Rework, Safety Considerations, ESD protection, Specifications and Standards

Module V: Testing & Quality Assurance

Common PCB Production Faults, Bare Board Testing, Electrical Performance Testing, Assembled PCB Testing, Quality Assurance in Design, FMEA – Failure Mode and Effects Analysis, Software Tools, Quality Assurance in Manufacturing and in Assembly, Specifications and Standards

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

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Text & References:

Text & References:

- Jon Uarteresian, 2002, “Fabricating Printed Circuit Boards”, Newnes (Elsevier Science)
- RS Khandpur, 2008, “Printed Circuit Boards”, Tata McGraw-Hill Education
- Christopher T Robertson, 2004, “Printed Circuit Board: Designer's Reference, Basics”, Prentice Hall Professional, 2004
- Charles Harper, 2000, “High Performance Printed Circuit Boards”, McGraw-Hill Education



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ROBOTICS AND AUTOMATION

Course Code: ECE2652

Credit Units: 03

Aim: To equip the students with the knowledge of Robotics, Automation and their applications.

Objective:

- To make students familiar with the field of robotics.
- To provide in-depth core knowledge in design and performance analysis of bots.
- To provide the knowledge in sensors, actuators, motion planning and kinematics & dynamics of robots.

Module-I: Introduction to Robotics

History, Robots, Robot Usage, Robot Subsystems, Robot Classification by Application, Robot Classification by Coordinate System, Robot Classification by Actuation System, Robot Classification by Control Method, Robot Classification by Programming Method

Module-II: Actuators and Sensors

Pneumatic Actuators, Hydraulic Actuators, Electric Actuators, Selection of Motors, Sensor Classification, Internal Sensors, External Sensors, Vision System, Sensor Selection,

Module-III: Transformations and Kinematics

Robot Architecture, Pose of a Rigid Body, Coordinate Transformation, Denavit and Hartenberg (DH) Parameters,, Forward Position Analysis, Inverse Position Analysis, Velocity Analysis: The Jacobian Matrix, Link Velocities 133 , Jacobian Computation, Jacobian Using the DeNOC, Singularity, Acceleration Analysis,

Module-IV: Statics and Dynamics

Forces and Moment Balance, Recursive Calculation, Equivalent Joint Torques, Role of Jacobian in Statics, Force Ellipsoid, Inertia Properties, Euler–Lagrange Formulation, Newton—Euler Formulation, Recursive Newton–Euler Algorithm, Dynamics Algorithms

Module-V: Recursive Robot Dynamics and Control

Dynamic Modelling, Analytical Expressions, Recursive Inverse Dynamics using RIDIM, Recursive Forward Dynamics and Simulation, Control Techniques, Second-Order Linear Systems, Feedback Control, Performance of Feedback Control Systems, A Robotic Joint, Joint Controller, Non-linear Trajectory Control, State-space Representation and Control, Stability, Cartesian and Force Controls

Module-VI: Motion Planning

Joint Space Planning, Cartesian Space Planning, Position and Orientation Trajectories, Point-to-Point Planning, Continuous Path Generation

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

- John J. Craig, 2004, “Introduction to Robotics: Mechanics and Control” Prentice Hall, 3rd Edition
- S K Saha, 2008, “Introduction to Robotics”, McGraw-Hill Education (India)
- Thomas R. Kurfess, 2004, “Robotics and Automation Handbook”, CRC Press

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SIMULATION & MODELLING LAB

Course Code: ECE2752

Credit Units: 03

Course Contents:

List of Experiments:

1. Layout & Simulation of CMOS Inverter using CAD Tools.
2. Layout & Simulation of NAND & NOR Gates with Optimal Aspect Ratio.
3. Design & Simulation of SR Latch using NAND & NOR Representations.
4. Design & Simulation of JK Flip Flop using SR Latch.
5. Design & Simulation of Master Slave JK Flip Flop.
6. Design & Simulation of R2R Ladder DAC.
7. Design & Simulation of ADC using DAC.

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.



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GEOTECHNICAL ENGINEERING

Programme Structure

Course Code	Course Title	Lecture (L) Hours Per Week	Tutorial (T) Hours Per Week	Practical (P) Hours Per Week	Total Credits
CIV2351	Engineering Geology	3	-	-	3
CIV2451	Geo informatics	3	-	-	3
CIV2551	Geotechnical Engineering-I	3	-	-	3
CIV2651	Geotechnical Engineering-II	3	-	-	3
CIV2751	Project (Geotechnical Engineering)	3	-	-	3
CIV2851	Seminar (Geotechnical Engineering)	3	-	-	3
	TOTAL				18



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GEOTECHNICAL ENGINEERING

Syllabus

ENGINEERING GEOLOGY

Course Code: CIV2351

Credit Units: 03

Course Objective:

The student is given an introduction to basics of Geology genesis and characteristic of rocks: Geological structure and other effects of civil engineering structures. Geology of India is introduced.

Course Contents:

Module I: Branches and scope of geology

Physical geology

Geological agents and their action, weathering, volcanism, earthquake and plate tectonics

Module II: Elements of crystallography and mineralogy

Petrology

Types of rocks, genesis and physical and chemical characters, Building stones

Module III: Structural geology

Types of structures and classification and their effect on civil engineering projects and Geological mapping

Hydrogeology

Groundwater and occurrence, investigations, quality, artificial recharge

Module IV: Geology in Civil Engineering

Tunnels, dams, reservoirs, bridges, Runways, Roads and Buildings.

Slope failures and landslides. Investigations, Remote sensing and GIS applications

Geology of India

Types, age and occurrence of rock formations and economic importance

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

- Parbin Singh, Engineering & General Geology, S.K. Kataria & Sons, New Delhi (2008)
- Bangar, K.M., Principles of Engineering Geology, Standard Publishers Distributors, Delhi (2009)
- Billings, Marland P., Structural Geology, 3rd ed., Prentice-Hall India, New Delhi.
- Todd, D.K., Ground Water Hydrology, 2nd ed., Wiley India, New Delhi (2008)


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GEOINFORMATICS

Course Code: CIV2451

Credit Units: 03

Course Objective:

Geoinformatics is an important data system for all civil engineering activities including construction of structures, dams, water systems etc. Correct and reliable information and geographical data are a requirement today. The course thus addresses this issue.

Course Contents:

Module I

Triangulation - principle - reconnaissance - selection of site for base line - selection of stations - orders of triangulation - triangulation figures - scaffolds and signals - marking of stations - intervisibility and heights of stations - satellite stations - base line measurement - equipment and corrections - adjustment of observations.

Module II

Survey adjustments and theory of errors – introduction – laws of accidental errors – probability curve – principle of least squares – laws of weights – probable error – normal equation – most probable value – method of correlates – angle adjustment – station adjustment – figure adjustment – adjustment of triangles – adjustment of a geodetic quadrilateral.

Module III

Curves - types of curves - elements of a curve - simple curves - different methods of setting out – introduction to compound curves - reverse curves, transition curves, vertical curves - hydrographic survey - scope - shoreline survey - river survey - soundings – sounding equipment - methods - ranges - locating sounding - plotting - three point problem.

Module IV

Photogrammetry – terrestrial and aerial photogrammetry – heights and distances from Photographs – flight planning – elements of stereoscopy – photo mosaic – photo interpretation – applications of photogrammetry. GNSS – GPS – differential GPS.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Texts & References:

- S.K Duggal, Surveying Vol. I and II, 2nd ed., Tata McGraw Hill, New Delhi (2004).
- Arora K.R., Surveying Vol. I & II, Standard Book House, New Delhi (2008)
- Punmia B.C., Ashok Kr. Jain, Arun Kr. Jain, Surveying Vol. I & II, Laxmi Pub, New Delhi (2004)



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GEOTECHNICAL ENGINEERING-I

Course Code: CIV2551

Credit Units: 04

Course Objective:

Soil mechanics and related topics are important areas in Civil Engineering and the first part of Geotechnical Engineering deals with soils and their characteristics.

Course contents:

Module I: Nature of soil and functional relationships

Soil type -Concepts of single grained, honey combed and flocculent structure and their effects on the basic soil properties - 3 phase system - void ratio - specific gravity - dry density - porosity - water content - saturated unit weight - submerged unit weight - degree of saturation. Laboratory and field identification of soils: Determination of water content by oven drying -Specific gravity using pycnometer and specific gravity bottle - Grain size analysis by sieve analysis, hydrometer analysis and pipette analysis - Atterberg limits and indices – Visual identification by simple field tests - Field density by core cutter, sand replacement and wax coating methods. Classification of soils: Necessity -Principles of classification - I.S. classification – Plasticity charts - Group index.

Module II: Soil Water, Permeability and Stress Distribution

Soil water: Types - Effective stress - Total stress - Pore pressure - Pressure diagrams. Permeability: Definition - Darcy's law - Factors affecting permeability – Laboratory determination - Stratified soils: average permeability. Stress distribution: Boussinesq's equations for vertical pressure due to point loads- Assumptions and limitations - pressure bulb – Influence diagram - Vertical pressure due to uniformly distributed loads, line loads and strip loads - Newmark charts and their use - Westergaard's solution.

Module III: Consolidation and Compaction

Consolidation: Definition - Concepts of coefficient of compressibility - Coefficient of volume change and compression index - e-log p curves - Terzaghi's theory of one dimensional consolidation – Determination of coefficient of consolidation- pre-consolidation pressure difference between consolidation and compaction. Compaction: Definition and objectives of compaction - Proctor test and modified proctor test - Concept of OMC and maximum dry density - Zero air voids line -Factors influencing compaction.- Effect of compaction on soil properties - Field compaction methods - Proctor needle for field control.

Module IV: Shear Strength and Stability of Slopes

Shear Strength: Definition - Mohr's strength and stress circles - origin of planes - Mohr's envelope - Mohr-Coulomb strength theory -Direct, triaxial and UCC tests - Drainage conditions - Measurement of pore pressure - Vane shear tests -Total and effective stress -strength parameters – Stress path, Liquefaction of sand - Choice of test conditions for field problems. Stability of slopes: Slope failure, base failure and toe failure - Swedish circle method - $\phi=0$ analysis and $c=0$ analysis - Friction circle method - Taylor's stability number -Stability charts - Sliding block analysis.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

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Text & References:

- Terzaghi K. & Peck R.B., Soil Mechanics in Engineering Practice, John Wiley Sons, 1967.
- Alam Singh, Soil Engineering-Theory and Practice, Asia Pub, 1967.
- Punmia B.C., Soil Mechanics and Foundations, Saurabh, 1992.
- Murthy V.N.S., Soil Mechanics and Foundation Engineering, Dhanpat Rai, 1984
- Khan I.H., Text Book of Geotechnical Engineering, Prentice Hall of India



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GEOTECHNICAL ENGINEERING-II

Course Code: CIV2651

Credit Units: 04

Course Objective:

Advanced topics of soil mechanics and the design of foundations are covered in this course.

Course Contents:

Module I: Earth pressure

Earth pressure at rest. Active and passive earth pressure for cohesionless and cohesive soils. Coulomb's and Rankine's theories. Point of application of earth pressure for cases of with and without surcharge in cohesionless and cohesive soils. Culmann's and Rebhan's graphical construction for active earth pressure. Friction circle method for active earth pressure. Site investigation and soil exploration: Objectives. Planning. Reconnaissance. Depth of exploration. Methods of subsurface exploration. Test pits. Auger borings. Wash boring. Rotary drilling. Percussion drilling. Core drilling. Sampling. Types of soil samples. Splitspoon sampler. Thin walled sampler. Piston sampler. Denison sampler. Hand cut samples. Location of water table. S.P.T. Field vane shear test. Introduction to geophysical methods. Boring log. Soil profile.

Module II: Bearing capacity

Ultimate and allowable bearing capacity. Terzaghi's equation for bearing capacity for continuous circular and square footings. Types of shear failures. Bearing capacity factors and charts. Effect of water table on bearing capacity. Meyerhoff's bearing capacity theory. Skempton's formulae. Bearing capacity from field tests. Bearing capacity from building codes. Net bearing pressure. Methods of improvement of soil bearing capacity: vibro flotation and sand drains.

Settlement analysis: Distribution of contact pressure. Immediate and consolidation settlement. Estimation of initial and final settlement under building loads. Limitations in settlement computation. Causes of . Permissible, total and differential settlements. Cracks and effects of settlement.

Module III: Foundations

General considerations: Functions of foundations. Requisites of satisfactory foundations. Different types of foundations. Definition of shallow and deep foundation. Selection of type of foundation. Advantages and limitations of various types of foundations. Design considerations . Footings subjected to eccentric loading. Conventional procedure for proportioning footings for equal settlements.

Open excavation: Open foundation excavations with unsupported slopes. Supports for shallow and deep excavations. Stress distribution in sheeting and bracing of shallow and deep excavations. Stability of bottom of excavations. Raft foundations: Bearing capacity equations. Design considerations. Conventional design procedure for rigid mat. Uplift pressures. Methods of resisting uplift. Floating foundations.

Module IV: Pile foundations

Uses of piles. Classification of piles based on purpose and material. Determination of type and length of piles. Determination of bearing capacity of axially loaded. Single vertical pile. Static and dynamic formulae. Determination of bearing capacity by penetration tests and pile load tests (IS methods). Negative skin friction. Group action and pile spacing. Analysis of pile groups. Load distribution by Culmann's method. Caissons and piers: Open (well) caissons. Box (floating) caissons. Pneumatic caissons. Construction details and design considerations of well foundations. Drilled piers and their construction details.



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Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

- Joseph E. & Bowles, Foundation Analysis & Design, McGraw Hill
- Leonards G.A., Foundation Engineering, McGraw Hill
- Punmia B.C., Soil Mechanics & Foundations, Laxmi, 1988.
- Tomlinson M.J., Foundation Design & Construction, Pitman, 1963.
- Terzaghi & Peck, Soil Mechanics in Engineering Practice, Asia Publishing
- Arora K.R., Soil Mechanics & Foundation Engg., Standard Publications, 1987.
- Murthy V.N.S., Soil Mechanics & Foundations.



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PROJECT (Geotechnical Engineering)

Course Code: CIV2751

Credit Units: 03

Methodology

The topic for the project work can be a design/experimental/field / analytical/simulation project in any topic of Geotechnical Engineering area. The work can be done individually or by a group of students under the guidance of a faculty of the Department. On completion of the project, the students are to present a report covering various aspects learnt by them and give a presentation on same.

Examination Scheme:

Literature study/ Fabrication/ Experimentation	40
Written Report	20
Viva	15
Presentation	25
Total	100



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SEMINAR (GEOTECHNICAL ENGINEERING)

Course Code: CIV2851

Credit Units: 03

Objectives:

To enable the students to acquire knowledge for searching compilation and to
Develop skills for presentation in the form of the seminar

Contents:

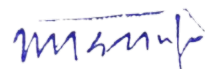
The seminar comprises the selection of an appropriate research proposal and developing research proposals. The student is required to organize and analyze the data/ information collected and write a complete document and presenting the document in the form of seminar.

Text Book:

Relevant technical/ professional material and references in Geotechnical Engineering courses and journals.



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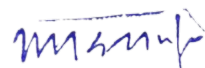
INSTRUMENTATION ENGINEERING

Programme Structure

Course Code	Course Title	Lecture (L) Hours Per Week	Tutorial (T) Hours Per Week	Practical (P) Hours Per Week	Total Credits
ECE2351	Basic Instrumentation	3	-	-	3
ECE2451	Virtual Instrumentation	3	-	-	3
ECE2551	Biomedical Instrumentation	3	-	-	3
ECE2651	Analytical Instrumentation	3	-	-	3
ECE2751	Industrial Process Control	3	-	-	3
ECE2851	Project (Instrumentation Engineering)	3	-	-	3
	TOTAL				18



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INSTRUMENTATION ENGINEERING

Syllabus

BASIC INSTRUMENTATION

Course Code: ECE2351

Credit Units: 03

Introduction

Review of measurement and measuring systems. Functional elements of a measuring system. Input-output configuration of instrumentation systems. Methods of correction for interfering and modifying inputs. Errors and uncertainty in measurements, Statistical analysis of errors. Loading effects, Generalised impedance and stiffness.

Generalized Performance Characteristics

Static and Dynamic performance characteristics, Characteristic of periodic and transient inputs and the response of measuring system to these inputs. Response of measuring system to random inputs, Frequency spectra, auto correlation, cross correlation spectral density, Experimental determination of system parameters, requirement of instrument transfer function to ensure accurate measurement.

Measurement System

Introduction, principle, design of various active and passive transducers. Introduction to semiconductor sensors and its applications, design of signal conditioning circuits for various Resistive, Capacitive and Inductive transducers and piezoelectric transducer, Analog to Digital and Digital to Analog converters, modulation – types, filters – active, passive, digital, Data transmission and telemetry-classification, Recorders – Types of recorders, XY-Plotters, Ultraviolet, magnetic and digital recording.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

LABORATORY/FIELD EXPERIENCES

1. Experimental determination of system parameters.
2. Study and verification of transducer characteristics.
3. Study of signal conditioning techniques.
4. Verification of dynamic performance characteristics of a given system.
5. Case study of a real life measuring system in an industry.
6. Various data acquisition software.

BOOKS RECOMMENDED

- Measurement System, Applications, and Design, E.O. Doebelin. McGraw-Hill International.
- Introduction to Instrumentation & Control, A.K Ghosh, Prentice Hall of India.
- Principles of Measurement and Instrumentation, Alan S Morris, Prentice Hall of India
- Transducers and Instrumentation, DVS Murthy, Prentice Hall of India
- Electrical and Electronics Measurement and instrumentation, A.K. Sawhney, Dhanpat Rai & Sons. Delhi

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VIRTUAL INSTRUMENTATION

Course Code: ECE2451

Credit Units: 03

Course Contents:

Introduction to Virtual Instrumentation: Introduction, Historical perspective, advantages, block diagram and architecture of a virtual instrument, conventional vs. virtual instrumentation.

Introduction to Software : Introduction to Lab VIEW, Front panel, back panel representations, Block diagram, Menus, Palettes, VI and Sub VI, Editing and Debugging VI, Structures, Arrays, Clusters, Charts and Graphs, Data acquisition, Instrument Control, Signal Generation and Signal Processing Examples

Introduction to systems hardware: ADC, DAC, D/O, counters and timer, PC hardware structure, timing, interrupts, DMA, software and hardware installation, Configuring data acquisition hardware using the drives in application software, use of DAQ library functions for different analog and digital input/output operations. Input/output devices & functions like data gloves, joysticks, CRT etc.

Application of Virtual Instrumentation in various fields: Aviation, Automotive, High Voltage, Defense, Chemical, Industrial, Marine, Medical, Mining, Nuclear Energy, Virtual landscapes.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

LABORATORY / FIELD EXPERIENCES

1. Geographical programming using Lab VIEW
2. Applications of Lab VIEW

BOOKS RECOMMENDED

- Learning with LabVIEW 7 Express – R.H. Bishop, Pearson Education, Delhi.
- LabVIEW Basic 1 Course Manual, National Instruments
- Virtual Instrumentation Using LabVIEW- Sanjay Gupta & Joseph John, TMG; 2005.
- LabVIEW for everyone -Wells Lisa K and Travis Jeffrey, Prentice Hall.



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BIOMEDICAL INSTRUMENTATION

Course Code: ECE2551

Credit Units: 03

Course Contents:

Sensors and Transducers for biological applications

Types, properties, characteristics and selection of transducers for biological instrumentation.

Measurement of electrical parameters

Leads and electrodes, electrocardiography, electrical activity of the heart, equivalent cardiac generator. Einthoven lead system, standardization of recording and display of ECT (Electrocardiogram), EEG (Electroencephalogram), EMG (Electromyogram), EOG (Electrooculogram), ERG (Electroretinogram), EGG (Electrogastogram).

Measurement of non-electrical parameters

Blood flow, drop recorder, electromagnetic flow meter, measurement of systolic and diastolic pressures, blood pressure instruments, intraocular pressure, lung air pressure, Audiometers. Measurement of body temperature, thermography. Cardiac tachometer, respiration rate phonocardiogram, heart sounds electrical stethoscope pulmonary function analysers. CO₂ - O₂ - Concentration in exhaled air, blood and lungs, pH value of blood, impedance plethysmography blood gas analysers, blood cell counters.

Medical Imaging Systems

Medical display systems, medical thermography X-Ray, diathermy equipment. Ultrasonics in biomedical application for diagnostic and therapeutic, CAT, MRI, Laser applications in biomedical field.

Patient safety

Electrical Safety of Medical Equipments, Shock Hazards from Electrical Equipment, Methods of Accident Prevention, Test Instruments for checking Safety parameters of biomedical equipments.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

BOOKS RECOMMENDED

- Biomedical Instrumentation and Measurements; L.C. Cronwell F.J. Weibell. E.A. Pfeiffer, PHI.
- Principles of applied instrumentation: Gaddes and Baker, John Wiley & Sons.
- Handbook of Bio-medical Instrumentation; R.S. Khandpur, McGraw Hill
- Medical Instrumentation – Application & Design, John G. Webster, Editor, John Wiley & Sons.



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ANALYTICAL INSTRUMENTATION

Course Code: ECE2651

Credit Units: 03

Course Contents:

Analytical Methods of Measurements

Physical methods of chemical analysis, special methods of analysis, basic techniques, terminologies, units, Interaction of electromagnetic radiations with matter, emission, absorption and scattering techniques. Instrumentation related to X-Ray, Ultraviolet and Infrared techniques.

Special Analysis

Various light sources, spectrometer, detectors and data processing, comparison of various spectral analytical techniques, refractometry, nuclear magnetic resonance spectrometry. Analytical techniques based on separation method: Basics of chromatography liquid, gas and HPLC Mass Spectrometry and related instrumentation.

Electrometric Methods of Analysis

Techniques and related instrumentations for pH and selective potentiometry, Voltammetry, Colometry and Conductometry, Analytical data presentation. Error analysis, Design considerations of an analytical laboratory, automated analysis, Atomic absorption, spectrometry, polarimetry, Turbidimetry, Nephelometry.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70


CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

BOOKS RECOMMENDED

- Instrumental Methods of Chemical analysis; Galen W. Ewing, McGraw-Hill, Koga Kusha Ltd.
- Instrumental Methods of Analysis: HW Willard, Lynnel Merrikt. Jr John A. Dean, F.A. Settle, Jr. Wadsworth Publishing Co. U.S.A.
- Introduction to Instrumentation Analysis: Robert D. Braun McGraw Hill Co. International Ed.
- Analytical Instrumentation HandBook: Galen W. Ewing, Marcel Decker Inc, USA.
- Instrumental Methods of Chemical Analysis: Gurdeep Chetwal, Sham Anand Himalaya Publishing House.
- Instrumental Methods of Chemical Analysis: B.K. Sharma, Goel Publishing House, Meerut.
- Instrumentation Engineers Hand Book-Process Control, BG Liptak, Butterworth Heinemann.



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INDUSTRIAL PROCESS CONTROL

Course Code: ECE2751

Credit Units: 03

Course Contents:

Process Characteristics: Process, Process variable, mathematical modeling of liquid, gas, thermal, mechanical and chemical system. Linearizing techniques, liquid level control in a tank. Dynamics of manometer, response of non-interacting and interacting first order elements in series.

Controller characteristics: Characteristics of on-off, proportional, integral, derivative modes and their combinations.

Automatic control: Single and combined modes in closed loop, static error, velocity error. Dynamic behavior of feedback control processes for different modes. IAE, ISE, IATE criteria. Tuning of controllers.

Controllers: Electronics, pneumatic, hydraulic controllers implementing. Single and composite mode of controllers. Latest trends in industrial controllers employing PLCs & other logic devices such as fuzzy logic control DCS & Computer based systems etc.

Final control elements:

Types & function of Control valves. Electrical, Pneumatic, hydraulic actuators.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Books recommended:

- Instrument Engineers' Handbook of Process Control; Bela G. Liptak; 3rd Edn. Chilton Book Company Randor Pennsylvania
- Process Control Instrumentation Technology; CD Johnson 8th Edn; PHI 2006
- Automatic Process Control; D.P.Eckman; 1992 Wiley Eastern Ltd.
- Industrial Instrumentation; D.P. Eckman; Wiley Eastern Ltd.
- Principles of Industrial Process Control; D.P.Eckman;Wiley Eastern Ltd.
- Process System analysis & control; D.R.Coughanowr; 2ndEdn; 1991;McGraw International Edn.
- Principles of Process Control; D. Patranabis; 2nd Edn.1998 TMH
- Process Control; Peter Harriot; 2000, TMH
- Chemical Process Control; G. Stephanopoulos; 2002; PHI



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LASER SYSTEM

Programme Structure

Course Code	Course Title	Lectures (L) Hours per week	Tutorial (T) Hours per week	Practical (P) Hours per week	Total Credits
LOE2351	Basics of Lasers	2	-	2	3
LOE2451	Laser Technology & Applications	3	-	-	3
LOE2551	Laser Systems & Devices	3	-	-	3
LOE2651	Lasers in Defense Applications	3	-	-	3
LOE2751	Lasers in Industrial Applications	3	-	-	3
LOE2851	Lasers in Atmospheric Studies	3	-	-	3
	TOTAL				18



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LASER SYSTEM

Syllabus

BASICS OF LASERS

Course Code: LOE2351

Credit Units: 3

Course Objective:

The basic aim of this Course is to make students (with Physics & Maths background up to 12th standard) appreciate the fundamentals of lasers and their diversified applications. The approach will stress more on the concepts & fundamentals with very simple or sometimes no mathematical equations. The outcome of this Course will make the students/trainees more excited to more about lasers and their applications in specific fields of their interest.

- **Overview of Lasers** :History, Types and Applications of Lasers
- **Nature of Light**: Corpuscular Theory, Wave Theory, Electromagnetic Spectrum, Quantum nature of light, Dual nature of nature, De Broglie's hypothesis, wavelength associated with particle, momentum of photon, Energy-mass relation, Momentum of photon. Mass of photon.
- **Matter**: Structure of Atoms & Molecules. Energy Levels, Electronic, Vibrational and Rotational Energy Levels with Examples. Two-level representation.
- **Interaction of Radiation with Matter**: Absorption, Spontaneous Emission, Stimulated Emission, Einstein's A & B Coefficients of Transitions, Maxwell Boltzmann Distribution, Planck's law of blackbody radiation.
- **Principle of Laser action**: Population inversion, metastable states, gain medium, Pumping mechanisms, feedback mechanism, threshold condition for laser beam generation.
- **Optical Resonators** :Types of Resonators, Stability Criteria, g-parameters.
- **Characteristics of Laser Beams**: Monochromaticity, Directionality, Brightness, Coherence: temporal & spatial, Focusability, Ultra-short pulse generation.
- **Types of Lasers**: Three-level and Four-level Lasers, Solid, Liquid and Gas Lasers. Brief description of Ruby, He-Ne, Nd:YAG, Carbon Dioxide Lasers, Semiconductor Lasers. X-Ray Lasers, Free-electron Lasers. Fiber Lasers.
- **Longitudinal & Transverse Modes** : Temporal modes, Spatial Modes & characteristics.
- **Application of Lasers**: General Applications of Lasers, Laser Applications in Industry, Defence, Medicine, Entertainment etc.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

Text & References:

- Laser Principles, Types & Applications: K R Nambiar, New Age International, 2004.
- Lasers: Theory and Applications : A K Ghatak and K Thyagarajan, McMillan, 2003.


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LASER TECHNOLOGY & APPLICATIONS

Course Code: LOE2451

Credit Units: 3

Course Objective: The aim of this Course is to make students/trainees understand the fundamentals of lasers, laser systems, their characteristics and diversified applications including industry, medicine & Defence. The approach will be to stress more on the fundamentals with the help of very simple mathematical equations. The outcome of this Course will prepare the students/trainees to use this knowledge for applications of lasers in specific fields of their interest.

Module I: INTERACTION OF LIGHT WITH MATTER Einstein coefficients, Relation between these coefficients, Lifetime of excited state, Line Broadening mechanisms, Population inversion, Threshold condition for Laser, Laser-Rate equations for three-level and four-level systems, Conditions for CW and pulsed laser action.

Module II: DIFFERENT POPULATION INVERSION TECHNIQUES WITH EXAMPLES

Optically pumped lasers, solid state lasers, dye lasers, electrical-discharge pumped lasers, gas lasers, chemical lasers, gas dynamic lasers, semiconductor lasers, free-electron lasers, gamma ray lasers, fiber lasers (only introductory description of these lasers).

Module III: OPTICAL RESONATORS

General considerations, Laser resonators, General conditions of stability, Plane and spherical mirror cavities, Modes and optical resonators, Gaussian beam propagation, Theory of Q-switching and experimental methods - Theory of Mode locking and experimental methods. Frequency stabilization of laser beams. Multimode oscillation.

Module-IV: CHARACTERISTICS OF LASER BEAMS AND APPLICATIONS

Monochromaticity, Spatial & temporal coherence, temporal coherence & monochromaticity relation, connection between spatial coherence and directionality, rightness, Focusability, ultra-short pulse generation. Peak Power, Average Power, Duty Cycle in Pulsed Lasers.

Module V: TYPES OF LASERS

Solid, Liquid and Gas Lasers. Brief description of Ruby, He-Ne, Nd:YAG, Nd:glass, Er:glass, Er:YAG, Carbon Dioxide Lasers, Nitrogen Lasers, Semiconductor Lasers. X-Ray Lasers, Free-electron Lasers. Fiber Lasers, Femtosecond lasers, Raman Lasers.

Module VI: APPLICATION OF LASERS

General Applications of Lasers including Industry, Defence, Medicine, Entertainment etc.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

REFERENCES:

- Laser Principles, Types & Applications: K R Nambiar, New Age International, 2004.
- Lasers: Theory and Applications : A K Ghatak and K Thyagarajan, McMillan, 2003.
- Lecture Notes on "Laser Technology & Applications" (LOE2451) by Prof. (Dr.) Jai Paul Dudeja

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LASER SYSTEMS & DEVICES

Course Code: LOE2551

Credit Units: 3

Course Objective: This course describes in details the principles, energy level diagrams, block diagrams and operation of various types of laser systems: solid, semiconductor, liquid and gas lasers. These laser systems are further classified according to the pumping schemes employed and systems output characteristics of each laser system are then explained. This course will make the students understand the actual functioning of various laser systems.

Module I: OPTICAL MATERIALS

Optical materials for IR to UV wavelengths

Module II: LASER COMPONENTS

- (a) MLD Components: metal coated, multilayer dielectric coated, AR coated, thin film polarizers, narrow-band filters.
- (b) Optical Components: Polarizers, beam splitters, beam expanders and collimators, gratings, graticules.
- (c) Arc/Flash Lamps: Electrical and spectral characteristics of arc/flash lamps, pulse forming networks for flash lamps.

Module III: LASER POWER SUPPLIES

Simple DC high-voltage power supplies, switch-mode power supply (SMPS), constant current power supply. High-voltage fast switches: spark gaps, SCR, thyatrons, krytrons, saturable magnetic core, avalanche transistors. Pulsed power supplies for lasers: Marx generators for CO₂ lasers, pulsed circuits for nitrogen, copper, excimer and semiconductor lasers,

Module IV: DESIGN OF OPTICALLY-PUMPED LASERS

- (a) Optically Pumped Lasers: Ruby, Nd:YAG, Er:glass, Dye lasers, FIR lasers, Raman shifted lasers
- (b) Electrical Discharged Lasers: He-Ne, Nitrogen, Various types of CW and Pulsed Carbodioxide lasers, argon-ion, copper and copper compound lasers, Excimer lasers.
- (c) Brief Description of Other Lasers: Chemical Lasers, Semiconductor Lasers, Free electron laser, X-ray laser, Fiber Lasers.

Module V: LASER PARAMETRS MEASUREMENTS

Types of detectors (for UV, IR and visible wavelengths) and their characteristics, Measurement laser average power, peak power, energy, wavelength, frequency, linewidth, pulse duration, pulse repetition rate, beam quality, divergence, beam diameter etc. Choppers, Monocromators, Lock-in Amplifiers, Box-car averagers, Spectroradiometers, Spectrophotometers, spectrum analyzers, wavemeters, densitometers.

Module VI: LASER HAZARDS AND SAFETY MEASURES

Types of hazards, hazards to eyes and skin, Maximum Permissible Exposure (MPE), Classification of lasers, from the point of view of hazards, safety measures, NOHD, buffer zone, laser safety measures.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

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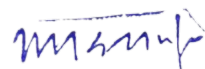
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Text & References:

- Laser Principles, Types and Applications , K R Nambiar, New Age International 2004.
- Laser Fundamentals, William T Sifvast, Cambridge University Press, 2004
- J. Verdeyen, Laser Electronics, Prentice Hall, 1995
- Solid State Laser Engineering, W. Koechner, Springer Series in Optical Sciences, Vo. 1, Springer Verlag



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LASERS IN DEFENSE APPLICATIONS

Course Code: LOE2651

Credit Units: 3

Course Objective: This course describes various applications of lasers Defence.

Module I: LASER BEAM PROPAGATION THROUGH ATMOSPHERE

Atmospheric absorption and scattering by molecules and aerosols, Atmospheric transmission, Beer's law, atmospheric windows. Absorption of laser radiation by carbon dioxide, ozone and water molecules. Scattering of laser radiation by air molecules, haze particles, fog droplets, cloud droplets and rain drops. Types of atmospheric scattering : Rayleigh, Mie scattering, diffraction theory. Atmospheric attenuation coefficient. Visibility of the atmosphere. Atmospheric turbulence and turbidity. Refractive-index structure coefficient. Nonlinear effects in the atmosphere: thermal blooming, beam bending, kinetic cooling, bleaching, self-induced transparency, Air breakdown.

Module II: LASER RANGE FINDERS

Solid-state (Nd:glass, Nd:YAG and Er:glass) laser rangefinders (LRFs), Waveguide carbondioxide LRFs, Semiconductor LRFs. Discussion in each about the laser transmitter, receiver, signal processing unit, optical arrangement. Laser range equation, maximum and minimum ranges, range accuracy, range blocking, first echo/last echo logic, field of view, boresighting. Eye safe laser rangefinders. Optoelectronic proximity fuze, Satellite to Submarine Laser Range Finders.

Module III: LASER TARGET DESIGNATORS AND LASER-GUIDED WEAPONS

Laser Guidance, Laser target designators, laser guided missiles, laser guided bomb. Laser beam riding of missiles. Laser & electro-optic surveillance systems. IR guidance.

Module IV: LASER WEAPONS : Laser blinding gun, gas dynamic laser-baser weapon, COIL-based laser weapon, HF/DF laser based weapon.

Module V: LASER GYROSCOPES & SENSORS: Laser ring gyro, optical fiber gyro, optical sensors (including fiber-optic sensors) in tanks, ships, aircraft etc.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

Text & References:

- Laser Principles, Types and Applications , K R Nambiar, New Age International 2004.
- Laser Fundamentals, William T Sifvast, Cambridge University Press, 2004
- J. Verdeyen, Laser Electronics, Prentice Hall, 1995



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LASERS IN INDUSTRIAL APPLICATIONS

Course Code: LOE2751

Credit Units: 3

Course Objective: To endow the students with knowledge about industrial laser systems and interaction of laser radiation with matter and applications of lasers in various materials processing like cutting, welding, surface treatment etc.

MODULE I INDUSTRIAL LASER SYSTEMS

High power laser systems - Focusing optics - Steering optics - Mechanisms - Overview of industrial lasers - CW & pulsed - Q-switched and Mode locked.

MODULE II THERMAL PROCESSES IN INTERACTION ZONE

Depth of penetration with respect to laser energy density - Reflectivity of Metals with respect to wavelength - Rate of heating and cooling - Maximum temperature rise and depth of hardened layer - Different gases used during laser materials processing - Operational parameters in laser materials processing - Key hole effect.

MODULE III SURFACE TREATMENT

Surface modification:- surface cladding - surface alloying - Hard facing - Shock hardening - laser parameters for surface alloying - process variables - Beam profiles - Different methods to obtain desired penetration depths - Experimental set-up.

MODULE IV LASER WELDING

Different modes of laser beam welding - Comparison between laser beam and electron beam welding - Influence of different parameters - Absorptivity - Welding speed - Focussing conditions - Advantages and limitations of laser welding - Laser welding of industrial materials - Recent developments in laser welding techniques

MODULE V LASER CUTTING AND DRILLING

Laser energy density for cutting and drilling - Melt flashing mechanism - Various assisting gases and their importance - Advantages of laser cutting - Laser instrumentation for cutting and drilling - Factors affecting cutting rates - Effect of laser pulse energy on diameter and depth of drilled hole.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

TEXTS & REFERENCES:

- Reddy J.F., 'High Power Laser Applications', Academic Press, 1977.
- Ian W. Boyd, 'Laser Processing of Thin Films and Microstructures', Springer - Verlag, 1987.
- Duley W.W., 'Laser Processing and Analysis of Materials', Plenum Press, New York, 1983.


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LASERS IN ATMOSPHERIC STUDIES

Course Code: LOE2851

Credit Units: 3

Course Objective:

This course aims to train the students on the basics of applications of lasers and various laser-based techniques to remotely detect and measure the concentration and size etc. of various constituents of the atmosphere including aerosols, pollutants and other toxic agents.

MODULE I: Introduction and Overview of Laser-Based Remote Sensing Techniques

Why Lasers for Remote Sensing of Environment. Aerosols, Pollutants, CBW Agents, Toxicity Levels, Non-Laser based Detection Techniques.

MODULE II: Lidar Techniques

Aerosol Lidar Differential Absorption Lidar (DIAL), Heterodyne Lidar, Micro-Pulse Lidar, LIF-Based Lidar, Raman Lidar, Doppler Lidar, Space Borne Lidar

MODULE III: Laser Sources for Remote Detection

Nd: YAG Laser, Carbondioxide Laser, UV Lasers, Tunable Lasers, Semiconductor Lasers

MODULE IV: Detectors and Telescopes and Data Processing:

Various Types of Detectors and their characteristics for different wavelengths and applications, Telescopes, Data acquisition and processing systems

MODULE V: Laser Based Techniques for Standoff Detection of Explosive Materials

Laser Induced Breakdown Spectroscopy (LIBS). Laser Induced Fluorescence (LIF). Raman Techniques, Hybrid (Integrated) Sensors.

Examination Scheme:

Components	A	MP	EE
Weightage (%)	5	25	70

MP: Mini Project, EE: End Semester Examination; A: Attendance

TEXTS & REFERENCES:

Laser Remote Sensing: Fundamentals and Applications. RM Measures. John Wiley



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ADVANCED DATABASE MANAGEMENT SYSTEMS

Course Code: DSE4102

Credit Units: 03

Course Objective:

The objective of this course is to expose the students to the implementation techniques of database system. This course explains techniques for query processing and optimization with transaction and concurrency control techniques

Course Contents:

Module I: Relational Databases

Integrity Constraints revisited, Extended ER diagram, Relational Algebra & Calculus, Functional, Multivalued and Join Dependency, Normal Forms, Rules about functional dependencies.

Module II: Query Processing and Optimization

Valuation of Relational Operations, Transformation of Relational Expressions, Indexing and Query Optimization, Limitations of Relational Data Model, Null Values and Partial Information.

Object Oriented and Object Relational Databases

Modeling Complex Data Semantics, Specialization, Generalization, Aggregation and Association, Objects, Object Identity, Equality and Object Reference, Architecture of Object Oriented and Object Relational Databases

Module III: Parallel and Distributed Databases

Distributed Data Storage – Fragmentation & Replication, Location and Fragment

Transparency Distributed Query Processing and Optimization, Distributed Transaction Modeling and concurrency Control, Distributed Deadlock, Commit Protocols, Design of Parallel Databases, Parallel Query Evaluation.

Advanced Transaction Processing

Nested and Multilevel Transactions, Compensating Transactions and Saga, Long Duration Transactions, Weak Levels of Consistency, Transaction Work Flows, Transaction Processing Monitors.

Module IV

Multimedia databases, Databases on the Web and Semi-Structured Data. Case Study: Oracle Xi

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

Text:

- Elmars, Navathe, Somayajulu, Gupta, "Fundamentals of Database Systems", 4th Edition, Pearson Education, 2007
- Garcia, Ullman, Widom, "Database Systems, The complete book", Pearson Education, 2007
- R. Ramakrishnan, "Database Management Systems", McGraw Hill International Editions, 1998

References:

- Date, Kannan, Swaminathan, "An Introduction to Database Systems", 8th Edition Pearson Education, 2007
- Singh S.K., "Database System Concepts, design and application", Pearson Education, 2006.
- Silberschatz, Korth, Sudarshan, "Database System Concepts", McGraw Hill, 6th Edition, 2006
- W. Kim, "Modern Database Systems", 1995, ACM Press, Addison – Wesley,
- D. Maier, "The Theory of Relational Databases", 1993, Computer Science Press, Rokville, Maryland
- Ullman, J. D., "Principals of database systems", Galgotia publications, 1999
- Oracle Xi Reference Manual
- Dietrich, and Urban, "An Advanced Course in Database Systems", Pearson, 2008.

ADVANCED COMPUTER NETWORKS

Course Code: DSE4104

Credit Units: 03

Course Objective:

The objective of the course is to provide thorough understanding & in-depth knowledge of concepts in computer networks Such as Internet protocols and routing, local area networks, wireless communications and networking, performance analysis, congestion control, TCP, network address translation, multimedia over IP, switching and routing, mobile IP, multicasting, IPv6. Peer-to-peer networking, network security, and other current research topics. A focus will be placed on wireless networking, reflecting rapid advances in this area. This course motivates the students to explore current research areas in the same field.

Course Contents:

Module I

Uses computer networks, Reference Models, TCP/IP suite of protocols, MAC protocols for high-speed LANS, MANs, and wireless LANs. (For example, FDDI, DQDB, HIPPI, Gigabit Ethernet, Wireless Ethernet, etc.)Fast access technologies. (For example, ADSL, Cable Modem, etc.)

Module II

Network Layer Design Issues, Routing Algorithms, Congestion Control Algorithms, Quality of Service, Internet Working, Network Layer in Internet.

IPv6 basic protocol, extensions and options, support for QoS, security, etc., Changes to other protocols, Application Programming Interface for IPv6.

Module III

Mobile IP, IP Multicasting. Multicast routing protocols, address assignments, session discovery, etc.

Module IV

The Transport Protocol: The Transport Service, Elements of transport protocol, a simple Transport Protocol, Internet Transport Protocols UDP, Internet Transport Protocols TCP, TCP extensions for high-speed networks, transaction-oriented applications Performance Issues.

The Application Layer: DNS-(Domain Name System), Electronic Mail, World Wide Web Multimedia.

Module V

Overview of network security, Secure-HTTP, SSL, ESP, Key distribution protocols. Digital signatures, digital certificates-mail Security, Web security, Social Issues.

Examination Scheme:

Components	A	CT	H	V/S/O	EE
Weightage (%)	5	10	7	8	70

Text & References:

Text:

- Computer Networks - Andrew S Tanenbaum, 4th Edition. Pearson Education/PHI
- Data Communications and Networking – Behrouz A. Forouzan. Third Edition TMH.

References:

- Computer Communications and Networking Technologies –Michael A.Gallo, William M .Hancock - Thomson Publication.
- W. Stallings. Cryptography and Network Security: Principles and Practice, 2nd Edition, Prentice Hall, 1998.
- W. R. Stevens. TCP/IP Illustrated, Volume 1: The protocols, Addison Wesley, 1994.
- C. E. Perkins, B. Woolf, and S. R. Alpert. Mobile IP: Design Principles and Practices, Addison Wesley, 1997.

DIGITAL COMPUTER ORGANIZATION

Course Code: DSE4103

Credit Units: 03

Course Objective:

With increase in availability of system resources, concept of parallel architecture has obtained immense popularity. This course provides a comprehensive study of scalable and parallel computer architectures for achieving a proportional increase in performance with increasing system resources. In this course we have discussed the theory, technology, architecture (hardware) and software aspects of parallel computer and Vector computers.

Course Contents:

Module I: Parallel computer models

The state of computing, Multiprocessors and multicomputers, Multivector and SIMD computers, Architectural development tracks

Program and network properties: Conditions of parallelism, Data and resource dependences, Hardware and software parallelism, Program partitioning and scheduling, Grain size and latency, Program flow mechanisms, Control flow versus data flow, Data flow architecture, Demand driven mechanisms, Comparisons of flow mechanisms

Module II: System Interconnect Architectures

Network properties and routing, Static interconnection networks, Dynamic interconnection Networks, Multiprocessor system interconnects, Hierarchical bus systems, Crossbar switch and multiport memory, Multistage and combining network.

Module III: Processors and Memory Hierarchy

Advanced processor technology, Instruction-set Architectures, CISC Scalar Processors, RISC Scalar Processors, Superscalar Processors, VLIW Architectures, Vector and Symbolic processors

Memory Technology: Hierarchical memory technology, Inclusion, Coherence and Locality, Memory capacity planning, Virtual Memory Technology

Module IV: Backplane Bus System

Backplane bus specification, Addressing and timing protocols, Arbitration transaction and interrupt, Pipelining: Linear pipeline processor, Nonlinear pipeline processor, Instruction pipeline design, Mechanisms for instruction pipelining, Dynamic instruction scheduling, Branch handling techniques, Arithmetic Pipeline Design, Computer arithmetic principles.

Module V: Vector Processing Principles

Vector instruction types, Vector-access memory schemes.

Synchronous Parallel Processing: SIMD Architecture and Programming Principles, SIMD Parallel Algorithms

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

Text & References:

Text:

- Kai Hwang, "Advanced computer architecture"; TMH, 2000.

References:

- J.P. Hayes, "computer Architecture and organization", MGH, 1998.
- M.J Flynn, "Computer Architecture, Pipelined and Parallel Processor Design", Narosa Publishing, 1998.
- D.A. Patterson, J.L. Hennessy, "Computer Architecture: A quantitative approach", Morgan Kaufmann, 2002.
- Kai Hwang and Briggs, "Computer Architecture and Parallel Processing"; MGH,

ADVANCED DATABASE MANAGEMENT SYSTEM LAB

Course Code: DSE4106

Credit Units: 01

Programs should be based on following topics:

Quick Review of Simple SQL Statements, SQL Built-in Functions, Primary Key, Foreign Key, Normalization, Joins View, Union. **Emphasis** on PL/SQL, Cursors 8. Exception handling, Procedure, Functions, Trigger, concurrency control, transaction processing. Introduction to SQLite.

Recommended Software: PostgreSQL, MySQL, Oracle.

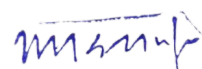
Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.



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ADVANCED COMPUTER NETWORK LAB

Course Code: DSE4107

Credit Units: 01

Course Contents:

1. Study of different types of networking cables, and implement cross and straight cable using clamping tool
2. Implementation of Stop and Wait Protocol and Sliding Window Protocol.
3. Study of Socket Programming and Client
4. Write a code simulating ARP /RARP protocols.
5. Write a code simulating PING and TRACEROUTE commands
6. Create a socket for HTTP for web page upload and download.
7. Write a program to implement RPC (Remote Procedure Call)
8. Implementation of Subnetting
9. Applications using TCP Sockets like Echo client and echo server, Chat Server, File Transfer, Applications using TCP and UDP Sockets ,DNS,SNMP
10. Study of Network simulator (NS).and Simulation of Congestion Control Algorithms using NS.
11. Perform a case study about the different routing algorithms to select the network path with its optimum and economical during data transfer Link State routing, Flooding, Distance vector.

Recommend Software:C/C++ on Linux/Unix, NS, Packet Tracer

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

MATLAB PROGRAMMING

Course Code: DSE4108

Credit Units: 02

Understanding The MATLAB Environment, Using the Help System in MATLAB, MATLAB Basics, Linear Algebra; Vectors and Matrices and various operations on them, M files; Scripts and User-defined functions, Plotting, Flow Control and Loops; For and While Loops, If and Case statements, structures, writing basic programs using the above, study of various toolboxes available in matlab and case study of any one tool box.

Recommended Software: MATLAB/Octave


Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.



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PYTHON PROGRAMMING LAB

Course Code: DSE4109

Credit Units: 01

Course Contents:

1. Setting up python on Windows/Linux/Mac
2. First program in python
3. Programs related to basic input/output.
4. Programs related to variables, strings, numbers
5. Programs related to Lists and Tuples
6. Programs related to Functions
7. Programs related to If Statements
8. Programs related to While Loops and Input
9. Programs related to Basic Terminal Apps
10. Programs related to Dictionaries
11. Programs related to Classes
12. Programs related to Exceptions
13. Programs related to GUI programming
14. Using Word, Excel, PDF files in python.
15. Web programming in python,
16. Case study of application areas of python.

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.


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DATA MINING AND PREDICTIVE ANALYTICS

Course Code: DSE4202

Credit Units: 03

Course Objective: This course introduces the topics of Data Mining, and Data Analytics by providing a basic, practical foundation that allows the students to participate in Data Analytics projects. The course incorporates an introduction to the Data Analytics lifecycle, Machine Learning (ML), Data Mining algorithms and computational paradigms that allow computers to find patterns and regularities in databases, perform prediction and forecasting, and generally improve their performance through interaction with data.

Course Contents:

Module-I: Data Preparation

An introduction to data mining and predictive analytics, Data Pre-processing Exploratory Data Analysis, Dimension- Reduction Methods.

Module-II: Classification

k- Nearest Neighbour Algorithm, Decision Trees, Model Evaluation Technique, Cost –Benefit Analysis Using Data Driven Cost.

Module-III: Clustering

Hierarchical and k- Means Clustering, Kohonen Networks, Birch Clustering, Measuring Cluster Goodness.

Module-IV: Association Rules

Affinity Analysis and Market Basket Analysis, Data Representation for Market Basket Analysis, Support, Confidence, Frequent Item sets, and the a Priori Property, How Does a Priori Algorithm Work ? Generating Frequent Item sets, Generating Association Rules, Extension from Flag Data to General Categorical Data, Information-Theoretic Approach: Generalized Rule Induction Method, J -Measure, Association Rules are Easy to do Badly, How can we Measure the Usefulness of Association Rules? Do Association Rules Represent Supervised or Unsupervised Learning?

Module-V: Case Study: Predicting Response to Direct Mail Marketing

Business Understanding, Data Preparation, and Eda, Clustering and Principal Components Analysis, Modelling and Evaluation for Performance and Interpretability, Modelling and Evaluation for High Performance.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

- Daniel T. Larose, Chantal D. Larose, “Data Mining and Predictive Analytics”, John Wiley & Sons, Inc., Hoboken, New Jersey, 2015.
- Thomas W. Miller, “Modelling Techniques in Predictive Analytics”, Pearson FT Press, 2013.
- Markus Hofmann, Ralf Klinkenberg, “Rapid-Miner: Data Mining Use Cases and Business Analytics Applications”, Chapman and Hall/CRC, 2016

DATA WAREHOUSING AND MULTIDIMENSIONS MODELLING

Course Code: DSE4203

Credit Units: 03

Course Objective: This course focuses on the fundamentals of data warehousing and multidimensional Modelling. Data warehouse development life cycle, Data warehouse analysis, CUBE, ROLL UP and STAR queries, Data Warehouse Design - Massive de-normalisation, STAR schema design, Data ware house Architecture, OLAP, ROLAP and MOLAP, concepts of Fact and dimension table are the major areas of coverage of this course. This course also deals with the issues while implementing the multidimensional models

Course Contents:

Module I Introduction

Multidimensional Data Management, Multidimensional History, Related Terminology,

Module II Fundamental Concepts

Cubes ,Dimensions, Facts, Measures, Relational Representations, Star Schemas, Snowflake Schemas, Data Warehouses And Data Marts, Multidimensional Modelling Process, Analysis And Querying ,Roll Up, Drill Down, Drill Out, Slicing And Dicing, Drill Across, Pivot Tables, Ranking, Multi-Dimensional Querying in MDX and SQL, Graphical Querying and Visualizations .

Module III Advance Concepts

Slowly Changing Dimensions, The Problem, Solutions, Other Special Kinds Of Dimensions, Mini dimensions, Outriggers, Degenerate Dimensions, Junk Dimensions, Time Dimensions, Data Quality Dimensions, Advanced Hierarchies, Parent-Child Hierarchies, Unbalanced Hierarchies, Non Covering Hierarchies , Non –Strict Hierarchies, Multiple Hierarchies And Parallel Hierarchies.

Module IV Implementation Issues

Materialized Views, Indexing, Indexing Overview, Bitmap Indices, Join Indices, Query Processing, OLAP Implementations, Extract-Transform-Load.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

Text & References:

- Christian S. Jensen, Christian Thomsen, and Professor Torben Pedersen, “Multidimensional Databases and Data Warehousing”, Morgan & Claypool Publisher, 2010.
- Ralph Kimball, Margy Ross, "The Data Warehouse Toolkit: The Definitive Guide", 3rd Edition, John Wiley & Sons, 2013.
- Len Silverston, Paul Agnew, “The Data Model Resource Book: Volume 3: Universal Patterns for Data Modeling”, John Wiley & Sons., 2009.

DATABASE AND KNOWLEDGE BASE SYSTEMS

Course Code: DSE4204

Credit Units: 03

Course Objective: This course discusses design methodology for databases to verify their structural correctness and implements databases. It also provides applications software primarily in the relational model using querying languages, primarily SQL, and other database supporting software applying the theory behind various database models and query languages implementing security and integrity policies relating to databases and preparation for data analytics working in group settings to design and implementing database projects.

Course Contents:

Module-I: Introduction

Database Languages, Object-Base Systems, Knowledge-base Systems, History and Perspective, Data Models for Database Systems: Data Models, The Entity-relationship Model, The Relational Data Model, Operations in the Relational Data Model, The Network Data Model, The Hierarchical Data Model, An Object-Oriented Model, Logic as a Data Model: The Datalog Data Model, Evaluating Non- recursive Rules, Computing the Meaning of Recursive Rules, Incremental Evaluation of Least Fixed Points, Negations in Rule Bodies, Relational Algebra and Logic, Relational Calculus, Tuple Relational Calculus.

Module-II: Relational Query and Object-Oriented Database Language

ISBL: A "Pure" Relational Algebra Language, QUEL: A Tuple Relational Calculus Language, Query-by-Example: A DRC Language, Data Definition in QBE, The Query Language SQL, Data Definition in SQL, The DBTG Data Definition language, The DBTG Query Language, The DBTG Database Modification Commands, Data Definition in IMS, A Hierarchical Data Manipulation Language, Data Definition in OPAL, Data Manipulation in OPAL

Module-III: Physical Data Organization and Design of Relational Databases

The Physical Data Model, The Heap Organization, Hashed Files, Indexed Files, B-trees, Files with a Dense Index, Secondary Indices, Data Structures in DBTG Databases, Data Structures for Hierarchies, Data Structures for Relations, A Search Tree Structure, Functional Dependencies, Lossless-Join Decomposition, Normalization, Generalized Dependencies.

Module-IV: Transaction Management

Basic Concepts, A Simple Transaction Model, The Two-phase Locking Protocol, a Model with Read and write-Locks, Lock Modes, A Read-Only, Write-Only Model, Concurrency for Hierarchically Structured Items, Handling Transaction Failures, Aggressive and Conservative Protocols, Recovery From Crashes, Timestamp-based Concurrency Control.

Module-V: Distributed Database Management

Distributed Databases, Distributed Locking, Distributed Two-phase Locking, Distributed Commitment, A Nonblocking Commit Protocol, Timestamp-based, Distributed Concurrency, Recovery of Nodes, Distributed Deadlocks.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

- Jeffrey D. Ullman "Principles of Database and Knowledge-Base Systems", Vol. 1, Computer Science Press, USA, 1988.
- AviSilberschatz, Henry F. Korth and S. Sudarshan, "Database System Concepts", Mcgraw Hill Education, 2000.

Ngoc Thanh Nguyen, Edward Szczerbicki, "Intelligent Systems for Knowledge Management", Springer-verlagGmbh, 2009.

BIG DATA TECHNOLOGIES

Course Code: DSE4205

Credit Units: 03

Course Objective:

This course brings together several key big data technologies used for storage, analysis and manipulation of data. It also introduces the students the key concepts of Hadoop framework, MapReduce, Pig, Hive, and No-SQL. Students will prepare a sample project in Hadoop.

Course Contents:

Module I: Introduction to Big Data

Big Data and its Importance – Four V's of Big Data – Drivers for Big Data – Introduction to Big Data Analytics – Big Data Analytics applications.

Module II: Big Data Technologies

Hadoop's Parallel World – Data discovery – Open source technology for Big Data Analytics – cloud and Big Data – Predictive Analytics – Mobile Business Intelligence and Big Data – Crowd Sourcing Analytics – Inter- and Trans-Firewall Analytics - Information Management.

Module III: Processing Big Data

Integrating disparate data stores - Mapping data to the programming framework - Connecting and extracting data from storage - Transforming data for processing - Subdividing data in preparation for Hadoop Map Reduce.

Module IV: Hadoop Map Reduce

Employing Hadoop Map Reduce - Creating the components of Hadoop Map Reduce jobs - Distributing data processing across server farms –Executing Hadoop Map Reduce jobs - Monitoring the progress of job flows - The Building Blocks of Hadoop Map Reduce - Distinguishing Hadoop daemons - Investigating the Hadoop Distributed File System Selecting appropriate execution modes: local, pseudo-distributed, fully distributed.

Module V: Big Data Tools and Techniques

Installing and Running Pig – Comparison with Databases – Pig Latin – User- Define Functions – Data Processing Operators – Installing and Running Hive – Hive QL – Tables – Querying Data – User-Defined Functions – Oracle Big Data.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

- Michael Minelli, Michehe Chambers, “Big Data, Big Analytics: Emerging Business Intelligence and Analytic Trends for Today's Business”, 1st Edition, AmbigaDhiraj, Wiely CIO Series, 2013.
- Tom White, “Hadoop: The Definitive Guide”, 3rd Edition, O'reilly, 2012.
- Arvind Sathi, “Big Data Analytics: Disruptive Technologies for Changing the Game”, 1st Edition, IBM Corporation, 2012.
- Bill Franks, “Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with Advanced Analytics”, 1st Edition, Wiley and SAS Business Series, 2012.

RESEARCH METHODOLOGY AND TECHNICAL REPORT WRITING

Course Code: DSE4206

Credit Units: 02

Course Objectives: The course will enhance scientific, technical and research writing skills and impart knowledge about various stages of research process, statistical analysis, statistical tests and their applications in statistical decision making.

Course Contents:

Module I: Introduction to research: Definition, motivation, need, objectives, significance and characteristics of research; types of research; steps in research process; planning a research proposal; literature review, web searching.

Module II: Population and sample, parameter and statistic, sampling and data collection, sampling design: steps, types, sample size, sampling methods, large and small samples, primary and secondary data, data processing and analysis. Sample surveys and questionnaire designing, scaling techniques.

Module III: Dependent and independent variables, univariate, bivariate and multivariate analysis, means-arithmetic, geometric and harmonic; measure of dispersion of data, standard deviation, variance, coefficient of variation and degree of freedom. Hypothesis testing: null hypothesis and alternate hypothesis, errors in hypothesis testing, significance and confidence levels, parametric tests and non-parametric tests, one-tailed and two-tailed tests, analysis of variance. Regression analysis and curve fitting, method of least-squares, explained and unexplained variations, coefficient of correlation, coefficient of determination.

Module IV: Technical/scientific/research report writing: structure and components of scientific reports, formats of dissertations, research report, report writing skills, report preparation, referencing, bibliography and footnotes. Making presentation-use of visual aids and PPTs. Publication of research papers, citations, Intellectual property rights and copy rights, plagiarism, patents and patent laws, commercialization and ethical issues.

Examination Scheme:

Attendance	Assignment/Library consultation / Thesis writing	Class test	Final Exam	Total
5	15	10	70	100

Text Books:

- Blake, G. and Bly, R.W. 1993, The Elements of Technical Writing. MacMillan, New York
- Booth, V. 1981. Writing a Scientific Paper and Speaking at Scientific Meetings. The Biochemical Society, London
- Chawla, D and Sondhi, N. 2016, Research Methodology- Concepts and Cases. Vikas Publishing House Pvt Ltd. New Delhi
- Kothari, C.R. 2008. Research Methodology- Methods and Techniques, 2nd.ed. New Age International Publishers, New Delhi.

Reference Books:

- Geode, Millian J. & Paul K. Hatl, Methods in Research, McGraw Hills, New Delhi.
- Montgomery, Douglas C. (2007), 5th Ed. Design and Analysis of Experiments, Wiley India.
- Panneerselvam, R. 2009. Research Methodology, PHI Learning Pvt. Ltd., New Delhi-110001
- Ranjit Kumar 2009. Research Methodology- A step-by-step Guide for beginners; 2nd ed. Dorling Kindersley (India) Pvt. Ltd. Patparganj, Delhi- 110092

DATA MINING AND PREDICTIVE ANALYTICS LAB

Course Code: DSE4208

Credit Units: 01

Course Objective:

- To analyse the data using statistical methods.
- To understand and demonstrate data mining using any open source data mining tool.

Recommended Software: ORANGE, Rapid Miner

List of Experiments

1. Data Analysis- Getting to know the Data (Using ORANGE, Rapid Miner)
 - Parametric - Means, T-Test, Correlation
 - Prediction for numerical outcomes - Linear regression
 - Correlation analysis
 - Preparing data for analysis
 - Pre-processing techniques
2. Data Mining (Using ORANGE, Rapid Miner or any open source data mining tool)
 - Implement clustering algorithm
 - Implement classification using
 - Decision tree
 - Back propagation
 - Visualization methods.

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.



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DATA WAREHOUSING AND MULTIDIMENSIONAL MODELLING LAB

Course Code: DSE4209

Credit Units: 01

Programs should be based on following topics:

Quick Review SQL Statements, SQL Built-in Functions, **Emphasis** on PL/SQL, Cursors 8. Exception handling, Procedure, Functions, Trigger, concurrency control, transaction processing. Introduction to ETL Tools: Talend Open Source Data Integrator, Scriptella, KETL
Pentaho Data Integrator - Kettle, JasperSoft ETL, GeoKettle, CloverETL, HPCC Systems

Recommended Software: SQL Server, ETL Tools (Open Source)

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.



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INFORMATION MANAGEMENT SYSTEM

Course Code: DSE4210

Credit Units: 03

Course Objective:

This course exposes students with the basics of managing the information and explores the various aspects of database design and modelling. It examines the basic issues in information governance and information integration and also helps to understand the information architecture

Course Contents:

Module-I: Database Modelling, Management and Development

Database design and modelling – Business Rules and Relationship; Java database Connectivity (JDBC), Database connection Manager, Stored Procedures. Trends in Big Data systems including NoSQL – Hadoop HDFS, MapReduce, Hive, and enhancements.

Module-II: Data Security and Privacy

Program Security, Malicious code and controls against threats; OS level protection; Security – Firewalls, Network Security Intrusion detection systems. Data Privacy principles. Data Privacy Laws and compliance.

Module-III: Information Governance

Master Data Management (MDM) – Overview, Need for MDM, Privacy, regulatory requirements and compliance. Data Governance – Synchronization and data quality management.

Module-IV: Information Architecture

Principles of Information architecture and framework, Organizing information, Navigation systems and Labelling systems, Conceptual design, Granularity of Content.

Module-V: Information Lifecycle Management

Data retention policies; Confidential and Sensitive data handling, lifecycle management costs. Archive data using Hadoop; Testing and delivering big data applications for performance and functionality; Challenges with data administration;

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

- Jeffrey A. Hoffer, HeikkiTopi, V Ramesh – MODERN DATABASE MANAGEMENT, 10 Edition, PEARSON, 2012.
- Alex Berson, Larry Dubov MASTER DATA MANAGEMENT AND DATA GOVERNANCE, 2/E, Tata McGraw Hill, 2011.
- Security in Computing, 4/E, Charles P. Pfleeger, Shari Lawrence Pfleeger, Prentice Hall; 2006
- Information Architecture for the World Wide Web; Peter Morville, Louis Rosenfeld ; O'Reilly Media; 1998.
- <http://ibm.com/big-data> – Four dimensions of big data and other ebooks on Big Data Analytics

INFORMATION SYSTEM SECURITY

Course Code: DSE4211

Credit Units: 03

Course Objective:

This course provides a deep and comprehensive study of the security principles and practices of information systems. Topics include basic information security concepts, common attacking techniques, common security policies, basic cryptographic tools, authentication, access control, software security, operating system security, and legal and ethical issues in information systems security

Course Contents:

Module-I: Introduction

Computer Security Concepts, Threats, Attacks, and Assets Security Functional Requirements A Security Architecture for Open Systems Computer Security Trends.

Module-II: COMPUTER SECURITY TECHNOLOGY AND PRINCIPLES

Cryptographic Tools, User Authentication, Access Control, Database Security, Malicious Software, Denial-of-Service Attacks.

Module-III: SOFTWARE SECURITY

Buffer Overflow: Stack Overflows, Defending Against Buffer Overflows, Other Forms of Overflow Attacks, Software Security: Software Security Issues, Handling Program Input, Writing Safe Program Code, Interacting with the Operating System and Other Programs, Handling Program Output

Module-IV: TRUSTED SYSTEMS SECURITY

Operating System Security: Introduction to Operating System Security, System Security Planning, Operating Systems Hardening, Application Security, Security Maintenance, Linux/Unix Security, Windows Security, Virtualization Security. Trusted Computing and Multilevel Security: Bell-LaPadula Model for Computer Security, Other Formal Models for Computer Security, Concept of Trusted Systems, Application of Multilevel Security, Trusted Computing and the Trusted Platform Module, Common Criteria for Information Technology Security Evaluation, Assurance and Evaluation

Module-V: MANAGEMENT ISSUES

IT Security Management and Risk Assessment, IT Security Controls, Plans, and Procedures, Physical and Infrastructure Security, Human Resources Security, Security Auditing, Legal and Ethical Aspects

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

- W. Stallings, "Computer Security: Principles and Practice," 2nd Edition, Prentice Hall, ISBN: 0132775069, 2011.
- M. Stamp, "Information Security: Principles and Practice," 2nd Edition, Wiley, ISBN: 0470626399, 2011.
- M. E. Whitman and H. J. Mattord, "Principles of Information Security," 4th Edition, Course Technology, ISBN: 1111138214, 2011.
- M. Bishop, "Computer Security: Art and Science," Addison Wesley, ISBN: 0-201-44099-7, 2002.
- Elmsari and Navathe, "Fundamentals of Database Systems", 4th Ed., A. Wesley, 2004
- Ullman J. D., "Principles of Database Systems", 2nd Ed., Galgotia Publications, 1999.

DESCRIPTIVE ANALYSIS

Course Code: DSE4301

Credit Units: 03

Course Objective:

This course introduces some elementary statistical methods of analysis of data and compute various measurements of central tendency, dispersion, skewness and kurtosis. Also discusses computation of the correlation coefficient from ungrouped bivariate data and interpret them and analyse data pertaining to attributes and to interpret results.

Course Contents:

Module-I: Introduction to Statistics

Definitions: Webster's and Secrist's definition of Statistics, Importance of Statistics, Scope of Statistics: In the field of Industry, Biological Sciences, Medical Sciences, Economics Sciences, Social, Sciences, Management Sciences, Agriculture, Insurance, Actuarial Science, Education and Psychology.

Module-II: Population and Sample

Types of characteristics: Attributes: Nominal scale, ordinal scale. Variables: Interval scale, ratio scale, discrete and continuous variables, Types of data: Primary data, Secondary data, Notion of a statistical population: Finite population, infinite population, homogeneous population and heterogeneous population. Notion of sample, random sample and non-random sample, Methods of sampling: Simple random sampling with and without replacement (SRSWR and SRWOR) stratified random sampling, systematic sampling, cluster sampling and two-stage sampling.

Module-III: Presentation of Data

Classification: Raw data and its classification, Discrete frequency distribution, Sturge's rule, continuous frequency distribution, inclusive and exclusive methods of classification, Open end classes, cumulative frequency distribution and relative frequency distribution, Graphical Presentation of Data: Histogram, frequency curve, frequency polygon, ogive curves, stem and leaf chart, Check sheet, Parato diagram, Examples and Problems.

Module-IV: Measures of Central Tendency

Concept of central tendency of statistical data, Arithmetic Mean (A.M.), combined mean of a number of groups, merits and demerits, Geometric Mean (G.M.), Harmonic Mean (H.M.), Weighted Mean, Weighted A.M., G.M. and H.M. , Mode, Median, Empirical relation between mean, median and mode, Order relation between arithmetic mean, geometric mean, harmonic mean.

Module-V: Measures of Dispersion

Concept of dispersion, characteristics of good measure of dispersion, Range, Mean deviation, Mean square definition, Variance and standard deviation, Combined variance, Combined standard deviation, generalization for n groups, Measures of dispersion for comparison: coefficient of range, coefficient of quartile deviation and coefficient of mean deviation, coefficient of variation.

Module-VI: Skewness and Kurtosis

Concept of skewness of frequency distribution, positive skewness, negative skewness, symmetric frequency distribution, Bowley's coefficient of skewness, interpretation using Box plot, Karl Pearson's coefficient of skewness, Measures of skewness based on moments (β_1 , γ_1), Concepts of kurtosis, leptokurtic, mesokurtic and platykurtic frequency distributions, Measures of kurtosis based on moments, (β_2 , γ_2).

Module-VII: Correlation & Regression

Bivariate data, bivariate frequency distribution, Concept of correlation between two variables, positive correlation, negative correlation, Scatter diagram, conclusion about the type of correlation from scatter diagram, Covariance between two variables, Karl Pearson's coefficient of correlation, Spearman's rank correlation coefficient, In case of ties, compute Karl Pearson's correlation coefficient between ranks. Regression: lines of regression, fitting of lines of regression by the least

squares method, interpretation of slope and intercept. 9.2 Regression coefficient (b_{yx} , b_{xy}), Effect of change of origin and scale, Angle between the two lines of regression, Mean residual sum of squares, Residual plot and its interpretation.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

Text and References :

- Goon A.M., Gupta M. K., Dasgupta B. (1998): Fundamentals of Statistics (V-1), World Press.
- Miller and Freund: Modern Elementary Statistics.
- Snedecor and Cochran: Statistical Methods, Oxford and IBH Publishers.
- Mukhopadhyay, P: Mathematical Statistics (1996), New Central Book Agency, Calcutta.
- Introduction to Mathematical Statistics, Ed. 4 (1989), MacMillan Publishing Co. New York.
- Gupta and Kapoor: Fundamentals of Mathematical Statistics, Sultan Chand and Sons, New Delhi.
- Neil Weiss: Introductory Statistics: Pearson Publishers.



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LEARNING AND REASONING WITH BAYESIAN NETWORKS

Course Code: DSE4302

Credit Units: 04

Course Objective:

This course provides an in-depth exposition of knowledge representation, reasoning, and machine learning under uncertainty using the framework of Bayesian networks. Both theoretical underpinnings and practical considerations will be covered, with a special emphasis on constructing and learning graphical models, and on various exact and approximate inference algorithms.

Course Contents:

Module-I: Introduction

Reasoning about beliefs using Logic and Probability Propositional Logic, Probability Calculus and Bayesian Reasoning, Bayesian Networks, Syntax and Semantics, Building Bayesian Networks.

Module-II: Bayesian Networks Inference

Inference by variable elimination, Inference by Factor Elimination (Jointree), Compiling Bayesian Networks, Complexity of probabilistic inference, compiling bayesian networks.

Module-III: Approximate Inference

Inference by Belief Propagation: Algorithm, Iterative belief propagation, semantics of IBP, Join graphs, edge-detection semantics, Approximate Inference by Stochastic Sampling: Simulating a Bayesian network, direct sampling, expectations, estimating a conditional probability, Markov chain simulation.

Module-IV: Learning: The Maximum Likelihood Approach

Introduction, estimating parameters from complete data, estimating parameters from incomplete data, learning network structure, searching for network structure.

Module-V: Learning: The Bayesian Approach

Introduction, Meta Networks, Learning with Discrete Parameter Sets, Learning with Continuous Parameter Sets, Learning Network Structure

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

Text & References:

- Adnan Darwiche, Modelling and Reasoning with Bayesian Networks. Cambridge University Press 2009
- Richard E. Neapolitan, "Learning Bayesian networks", Prentice Hall Series in Artificial Intelligence, 2004.
- Timo Koski, John Noble, "Bayesian Networks: An Introduction", Wiley series in Probability and Statistics, 2009.
- Finn V. Jensen and Thomas Nielsen. Bayesian Networks and Decision Graphs. Springer 2007.

SOCIAL NETWORK DATA ANALYTICS

Course Code: DSE4303

Credit Units: 03

Course Objective:

This course gives an introduction to social network analysis, with a focus on modelling. It provides an overview of research questions connected to social networks, and of descriptive measures, models, and methods of analysis that can be used to analyse empirical social network data. It helps to understand the online interactive demonstrations and hands-on analysis of real-world data sets

Course Contents:

Module-I: Introduction

Overview: Social network data-Formal methods- Paths and Connectivity-Graphs to represent social relations-Working with network data- Network Datasets-Strong and weak ties - Closure, Structural Holes, and Social Capital.

Module-II: Community Discovery in Social Networks: Applications, Methods and Engineering Trends

Introduction, Communities In Context, Core Methods, Quality Functions, The Kernighan-Lin (KL) Algorithm, Agglomerative/Divisive Algorithms, Spectral Algorithms, Multi-Level Graph Portioning, Markov Clustering. Other Approaches, Emerging Fields and Problems, Community Discovery in Dynamic Networks, Community Discovery in Heterogeneous Networks, Community Discovery in Directed Networks, Coupling Content and Relationship Information for Community Discovery,

Module-III: Information Networks and the World Wide Web

The Structure of the Web- World Wide Web- Information Networks, Hypertext, and Associative Memory- Web as a Directed Graph, Bow-Tie Structure of the Web- Link Analysis and Web Search, Searching the Web: Ranking, Link Analysis using Hubs and Authorities- Page Rank- Link Analysis in Modern Web Search, Applications, Spectral Analysis, Random Walks, and Web Search. Module IV

Module-IV: Node Classifications in Social Networks

Introduction, Problem Formulation, Representing Data As A Graph, The Node Classification Problem, Methods Using Local Classifiers, Iterative Classification Method, Random Walk Based Methods, Label Propagation, Graph Regularization, Adsorption, Applying Node Classification To Large Social Networks, Basic Approaches, Second-Order Methods, Implementation Within Map-Reduce, Inference Using Graphical Models, Metric Labelling, Spectral Partitioning, Graph Clustering, Variations on Node Classification.

Module-V: Data and Text Mining In Social Media

Data Mining In Nutshell, Social Media, Motivations For Data Mining In Social Media, Data Mining Methods For Social Media, Data Representation, Data Mining- A Process, Social Networking Sites: Illustrative Examples, Related Efforts, Ethnography And Netnography, Event Maps, Text Mining: Keyword Search, Query Semantics And Answer Ranking, Keyword Search over Xml and Relational Data, Keyword Search Over Graph Data, Classification Algorithms, Clustering Algorithms, Transfer Learning in Heterogeneous Networks.

Module-VI: Overview of Social Tagging

Introduction, Problems With Metadata Generation and Fixed Taxonomies, Tags: Why And What?, Different User Tagging Motivations, Kinds Of Tags, Linguistic Classifications Of Tags, Game-Based Tagging, Tag Generation Models, Tagging System Design, Tag Analysis, Tagging Distributions, Identifying Tag Semantics, Tags Versus Keywords, Visualization Of Tags, Tag Clouds For Browsing/Search, Tag Selection For Tag Clouds, Tag Hierarchy Generation, Tag Cloud Display Formats, Tag Evolution Visualization.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

Text & References:

- Easley and Kleinberg, “Networks, Crowds, and Markets: Reasoning about a highly connected world”, Cambridge Univ. Press, 2010.
- Charu C. Aggarwal, “Social Network Data Analytics”, Springer, 2011.
- Robert A. Hanneman and Mark Riddle, “Introduction to social network methods”, University of California, 2005.
- Jure Leskovec, AnandRajaraman, and Jeffrey D. Ullman, “Mining of Massive Datasets”, Cambridge University Press, 2 edition, 2014.
- Wasserman, S., & Faust, K, “Social Network Analysis: Methods and Applications”, Cambridge University Press; 1 edition, 1994.



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R PROGRAMMING LAB

Course Code: DSE4304

Credit Units: 01

Course Objective:

This lab will provide a basic introduction to the R programming Language and the use of R to perform basic statistics and programming tasks. The main objectives of this lab is to impart the students with the knowledge of R Programming, Machine Learning using R Mining from streaming Data, Mining from Distributed Data.

R Programming Objective

- Master the use of the R interactive environment
- Expand R by installing R packages
- Explore and understand how to use the R documentation
- Read Structured Data into R from various sources
- Understand the different data types in R
- Understand the different data structures in R
- Understand how to use dates in R
- Use R for mathematical operations
- Use of vectorised calculations
- Write user-defined R functions
- Use control statements
- Write Loop constructs in R
- Use Apply to iterate functions across data
- Reshape data to support different analyses
- Understand split-apply-combine (group-wise operations) in R
- Deal with missing data
- Manipulate strings in R
- Understand basic regular expressions in R
- Understand base R graphics
- Focus on GGplot2 graphics for R
- Be familiar with trellis (lattice) graphics
- Use R for descriptive statistics
- Use R for inferential statistics
- Write multivariate models in R
- Understand confounding and adjustment in multivariate models
- Understand interaction in multivariate models
- Predict/Score new data using models
- Understand basic non-linear functions in models
- Understand how to link data, statistical methods, and actionable questions

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

HADOOP LAB

Course Code: DSE4305

Credit Units: 02

Course Objective:

- To provide an overview of several key technologies used in manipulating, storing, and analysing big data.
- To understand the fundamentals of Hadoop.
- To apply the learning specific problems in various domains.

Recommended Tools

Big Data Tools and Technology [Learning and Demonstration of Big Data Ecosystem]

- Hadoop
- HBase
- NoSQL
- Hive
- Pig

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

SUMMER INTERNSHIP EVALUATION

Course Code: DSE4335

Credit Units: 06

Guidelines:

There are certain phases of every Intern's professional development that cannot be effectively taught in the academic environment. These facets can only be learned through direct, on-the-job experience working with successful professionals and experts in the field. The internship program can best be described as an attempt to institutionalize efforts to bridge the gap between the professional world and the academic institutions. Entire effort in internship is in terms of extending the program of education and evaluation beyond the classroom of a university or institution. The educational process in the internship course seeks out and focuses attention on many latent attributes, which do not surface in the normal classroom situations. These attributes are intellectual ability, professional judgment and decision-making ability, inter-disciplinary approach, skills for data handling, ability in written and oral presentation, sense of responsibility etc.

In order to achieve these objectives:

- **Each student will be allotted a supervisor** for proper guidance.
- **Student will first submit synopsis in the format given by coordinator/supervisor.**
- Student will maintain a file (**Internship File/Project Report**). **Further, coordinator will provide NTCC project guidelines and sample to help in preparation of file.** The Internship File aims to encourage students to keep a personal record of their learning and achievement throughout the Programme. It can be used as the basis for lifelong learning and for job applications. Items can be drawn from activities completed in the course modules and from the workplace to demonstrate learning and personal development. The File will assess the student's analytical skills and ability to present supportive evidence, whilst demonstrating understanding of their organization, its needs and their own personal contribution to the organization.

The **layout guidelines** for the Project Report

1. File should be in the following specification

- A4 size paper
- **Font**

For normal text Font Type and Size must be- Times New Roman, 12 pt. The minimum font size of materials within a table or a figure can be 10 point.

- **Margins**

A margin of 3.75 cm (1½ inch) is to be given on the binding edge while on the other sides it is to be 2.5 cm (1 inch). The text of the report, including headings, figures, tables, and notes, but excluding page numbers, must be accommodated within the page area.

- **Line Spacing**

The line spacing in the main text must be between one-and-a-half (1.5). Single line spacing should be given for figure captions, table titles, figure legends, and footnotes. Equations, tables, figures, and quotations should be set off from the main text with adequate space (not less than the normal line spacing adopted for the main text). Two consecutive paragraphs should be separated by a spacing which must be larger than the line spacing adopted for the text.

- **Tables and Figures**

Each sketch, drawing, graph and photograph should have a figure number and title below the figure etc. Numbering should be sequential, chapter wise. For instance, if there are 24 figures chapter 3 spread over all of its sections the figure numbers run from Figure 3.1 through Figure 3.24. In figures experimental data should typically be represented by centered symbols, and theoretical data by continuous curves.

Each table should have a table number and caption above the table. Numbering should be sequential, chapter wise, as in the case of Figure numbers. For instance, if there are 18 tables in chapter 3 the table numbers run from Figure 3.1 through Figure 3.18.

Make sure that figures and tables are complete in other respects such as legends, references (if any) and coordinate labels with units. Each figure and table must be explicitly referred to in the text and located where its first reference occurs, preferably after the reference.

- **Drawings**

All engineering drawings must conform to relevant Standards and should include a title block. If drawings are large they should be included at the back of the report in a separate pocket. In case drawings are made using CAD packages, a CD ROM should be included which contains all the files and details of the packages used.

- **Equations**

The numbering of equations should be sequential, chapter wise. Numbered equations must be explicitly referred to in the text.

2. Report Size: The maximum number of pages of the Report should be preferably between 50-80 pages.

3. Report Layout: The report should contain the following components

Front Page

Table of Content

Acknowledgement

Student Certificate

Company Profile (optional)

Introduction

Main Body

References / Bibliography

The File will include *five sections* in the order described below. The content and comprehensiveness of the main body and appendices of the report should include the following:

1. **The Title Page**--Title - An Internship Experience Report For (Your Name), name of internship organization, name of the Supervisor/Guide and his/her designation, date started and completed, and number of credits for which the report is submitted.

2. **Declaration by the Students**--This is page number (i), the beginning of the small case Roman numeral page numbers. The student has to give a declaration to the effect that the data used for the work, the work depicted in the report, and the written material contained in the report are not copied from others and that due permission has been taken from, and due credit has been given to, the sources whenever they are used.

3. **Certificate**--This is page number (ii). The certificate will be signed by the Faculty Supervisor(s) before the viva-voce after verifying the format and by the Head of the Department after review with the Supervisor(s).

4. **Acknowledgements**--This is page number (iii). Keep this brief and avoid using informal language. This page must be signed by the candidate.

5. **Abstract and Keywords**--This is page number (iv). The abstract (preferably one page) should contain the context/relevance of the problem at hand, a description of what was done and a gist of the significant observations/results.

The keywords (maximum 6) are a hint that what is contained in the report.

7. **Contents**--This is page number (v). The table of Contents should be titled just *Contents* (not Table of Contents). Try to fit it into one or two pages.

8. **Introduction**--short, but should include how and why you obtained the internship experience position and the relationship it has to your professional and career goals.

9. **Main Body**--should include but not be limited to daily tasks performed. Major projects contributed to, dates, hours on task, observations and feelings, meetings attended and their purposes, listing of tools and materials and their suppliers, and photographs if possible of projects, buildings and co-workers.

10. **References / Bibliography** --This should include papers and books referred to in the body of the report. These should be ordered alphabetically on the author's surname. The titles of journals preferably should not be abbreviated; if they are, abbreviations must comply with an internationally recognised system.

ASSESSMENT OF THE INTERNSHIP FILE

Continuous Internal Assessment

40 Marks

Final Assessment

60 Marks

Continuous Internal Assessment consists of topic relevance, progress report and synopsis marks. Final Assessment includes viva, presentation and report marks.


Examination Scheme:

Components	V	S	R	PR	FP
Weightage (%)	20	20	20	20	20

V – Viva, S – Synopsis, FP – Final Presentation, R – Report, PR-Progress Report



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PROJECT-DISSERTATION-I

Course Code: DSE4337

Credit Units: 05

GUIDELINES FOR DISSERTATION

Research experience is as close to a professional problem-solving activity as anything in the curriculum. It provides exposure to research methodology and an opportunity to work closely with a faculty guide. It usually requires the use of advanced concepts, a variety of experimental techniques, and state-of-the-art instrumentation.

Research is genuine exploration of the unknown that leads to new knowledge which often warrants publication. But whether or not the results of a research project are publishable, the project should be communicated in the form of a research report written by the student.

Sufficient time should be allowed for satisfactory completion of reports, taking into account that initial drafts should be critiqued by the faculty guide and corrected by the student at each stage.

The File is the principal means by which the work carried out will be assessed and therefore great care should be taken in its preparation.

In general, the File should be comprehensive and include

A short account of the activities that were undertaken as part of the project;

A statement about the extent to which the project has achieved its stated goals.

A statement about the outcomes of the evaluation and dissemination processes engaged in as part of the project;

Any activities planned but not yet completed as part of the DISSERTATION, or as a future initiative directly resulting from the project;

Any problems that have arisen that may be useful to document for future reference.

➤ Report Layout

The report should contain the following components:

➤ Title or Cover Page

The title page should contain the following information: Project Title; Student's Name; Course; Year; Supervisor's Name.

➤ Acknowledgements (optional)

Acknowledgment to any advisory or financial assistance received in the course of work may be given.

➤ Abstract

A good "Abstract" should be straight to the point; not too descriptive but fully informative. First paragraph should state what was accomplished with regard to the objectives. The abstract does not have to be an entire summary of the project, but rather a concise summary of the scope and results of the project

➤ Table of Contents

Titles and subtitles are to correspond exactly with those in the text.

➤ Introduction

Here a brief introduction to the problem that is central to the project and an outline of the structure of the rest of the report should be provided. The introduction should aim to catch the imagination of the reader, so excessive details should be avoided.

➤ Materials and Methods

This section should aim at experimental designs, materials used. Methodology should be mentioned in details including modifications if any.

➤ Results and Discussion

Present results, discuss and compare these with those from other workers, etc. In writing these section, emphasis should be given on what has been performed and achieved in the course of the work, rather than discuss in detail what is readily available in text books. Avoid abrupt changes in contents from section to section and maintain a lucid flow throughout the thesis. An opening and closing paragraph in every chapter could be included to aid in smooth flow.

Note that in writing the various sections, all figures and tables should as far as possible be next to the associated text, in the same orientation as the main text, numbered, and given appropriate titles or captions. All major equations should also be numbered and unless it is really necessary never write in “point” form.

➤ **Conclusion**

A conclusion should be the final section in which the outcome of the work is mentioned briefly.

➤ **Future prospects**

➤ **Appendices**

The Appendix contains material which is of interest to the reader but not an integral part of the thesis and any problem that have arisen that may be useful to document for future reference.

➤ **References / Bibliography**

This should include papers and books referred to in the body of the report. These should be ordered alphabetically on the author's surname. The titles of journals preferably should not be abbreviated; if they are, abbreviations must comply with an internationally recognised system.

Examples

For research article

Voravuthikunchai SP, Lortheeranuwat A, Ninrprom T, Popaya W, Pongpaichit S, Supawita T. (2002) Antibacterial activity of Thai medicinal plants against enterohaemorrhagic *Escherichia coli* O157: H7. *Clin Microbiol Infect*, **8** (suppl 1): 116–117.

For book

Kowalski, M. (1976) Transduction of effectiveness in *Rhizobium meliloti*. SYMBIOTIC NITROGEN FIXATION PLANTS (editor P.S. Nutman IBP), **7**: 63-67

ASSESSMENT OF THE DISSERTATION FILE

Essentially, marking will be based on the following criteria: the quality of the report, the technical merit of the project and the project execution.

Technical merit attempts to assess the quality and depth of the intellectual efforts put into the project.

Project execution is concerned with assessing how much work has been put in.

The File should fulfill the following *assessment objectives*:

Range of Research Methods used to obtain information

Execution of Research

Data Analysis

Analyse Quantitative/ Qualitative information

Control Quality

Draw Conclusions

Examination Scheme:

Dissertation 50

Viva Voce 50

Total 100

ata, leading to production of a structured report.

Selecting the Dissertation Topic

It is usual to give you some discretion in the choice of topic for the dissertation and the approach to be adopted. You will need to ensure that your dissertation is related to your field of specialization.

Deciding this is often the most difficult part of the dissertation process, and perhaps, you have been thinking of a topic for some time.

It is important to distinguish here between ‘dissertation topic’ and ‘dissertation title’. The topic is the specific area that you wish to investigate. The title may not be decided until the dissertation has been written so as to reflect its content properly.

Few restrictions are placed on the choice of the topic. Normally we would expect it to be:

- relevant to business, defined broadly;
- related to one or more of the subjects or areas of study within the core program and specialisation stream;
- clearly focused so as to facilitate an in-depth approach, subject to the availability of adequate sources of information and to your own knowledge;
- of value and interest to you and your personal and professional development.

Planning the Dissertation

This will entail following:

- Selecting a topic for investigation.
- Establishing the precise focus of your study by deciding on the aims and objectives of the dissertation, or formulating questions to be investigated. Consider very carefully what is worth investigating and its feasibility.
- Drawing up initial dissertation outlines considering the aims and objectives of the dissertation. Workout various stages of dissertation
- Devising a timetable to ensure that all stages of dissertation are completed in time. The timetable should include writing of the dissertation and regular meetings with your dissertation guide.

The Dissertation plan or outline

It is recommended that you should have a dissertation plan to guide you right from the outset. Essentially, the dissertation plan is an outline of what you intend to do, chapter wise and therefore should reflect the aims and objectives of your dissertation.

There are several reasons for having a dissertation plan

- It provides a focus to your thoughts.
- It provides your faculty-guide with an opportunity, at an early stage of your work, to make constructive comments and help guide the direction of your research.
- The writing of a plan is the first formal stage of the writing process, and therefore helps build up your confidence.
- In many ways, the plan encourages you to come to terms with the reading, thinking and writing in a systematic and integrated way, with plenty of time left for changes.
- Finally, the dissertation plan generally provides a revision point in the development of your dissertation report in order to allow appropriate changes in the scope and even direction of your work as it progresses.

Keeping records

This includes the following:

- Making a note of everything you read; including those discarded.
- Ensuring that when recording sources, author’s name and initials, date of publication, title, place of publication and publisher are included. (You may consider starting a card index or database from the outset). Making an accurate note of all quotations at the time you read them.
- Make clear what is a direct quotation and what is your paraphrase.

Dissertation format

All students must follow the following rules in submitting their dissertation.

- Front page should provide title, author, Name of degree/diploma and the date of submission.
- Second page should be the table of contents giving page references for each chapter and section.
- The next page should be the table of appendices, graphs and tables giving titles and page references.
- Next to follow should be a synopsis or abstract of the dissertation (approximately 500 words)
- Next is the ‘acknowledgements’.

- Chapter I should be a general introduction, giving the background to the dissertation, the objectives of the dissertation, the rationale for the dissertation, the plan, methodological issues and problems. The limitations of the dissertation should also be hinted in this chapter.
- Other chapters will constitute the body of the dissertation. The number of chapters and their sequence will usually vary depending on, among others, on a critical review of the previous relevant work relating to your major findings, a discussion of their implications, and conclusions, possibly with a suggestion of the direction of future research on the area.
- After this concluding chapter, you should give a list of all the references you have used. These should be cross - references with your text. For articles from journals, the following details are required e.g.

Draper P and Pandyal K. 1991, The Investment Trust Discount Revisited, Journal of Business Finance and Accounting, Vol18, No6, Nov, pp 791-832.

For books, the following details are required:

Levi, M. 1996, International Financial Management, Prentice Hall, New York, 3rd Ed, 1996

- Finally, you should give any appendices. These should only include relevant statistical data or material that cannot be fitted into the above categories.

The Layout Guidelines for the Dissertation

- A4 size Paper
- Font: Arial (10 points) or Times New Roman (12 points)
- Line spacing: 1.5
- Top and bottom margins: 1 inch/ 2.5 cm; left and right margins: 1.25 inches/ 3 cm

Guidelines for the assessment of the Dissertation

While evaluating the dissertation, faculty guide will consider the following aspects:

1. Has the student made a clear statement of the objective or objective(s).
2. If there is more than one objective, do these constitute parts of a whole?
3. Has the student developed an appropriate analytical framework for addressing the problem at hand.
4. Is this based on up-to-date developments in the topic area?
5. Has the student collected information / data suitable to the frameworks?
6. Are the techniques employed by the student to analyse the data / information appropriate and relevant?
7. Has the student succeeded in drawing conclusion form the analysis?
8. Do the conclusions relate well to the objectives of the project?
9. Has the student been regular in his work?
10. Layout of the written report.

Assessment Scheme:

Continuous Evaluation:

40%

(Based on Abstract, Regularity, Adherence to initial plan, Records etc.)

Final Evaluation: Based on,

60%

Contents & Layout of the Report,	20
Conceptual Framework,	05
Objectives & Methodology and	05
Implications & Conclusions	10
Viva & Presentation	20

WEB TECHNOLOGY

Course Code: DSE4306

Credit Units: 03

Course Objectives:

This course provides knowledge on Core technologies that are needed for the web like HTML and XML and facilitate how to build XML applications with DTD and style sheets that span multiple domains ranging from finance to vector graphics to genealogy for use with legacy browsers.

Course Contents:

MODULE-I: Introduction

HTML Common tags, Cascading Style sheets - Introduction to Java Scripts - Objects in Java Script - Dynamic HTML with Java Script.

MODULE-II: Vbscript Language Elements

Constants - Variables and Data Types - Mathematical Operations – Logical Operators - Looping and Decision Structures - VBScript Functions and Objects: Data Conversion Functions - Mathematical Functions - Data Formatting Functions - Text Manipulation Functions - Data and Time Functions - Built-in Objects.

MODULE-III: ASP Fundamentals

Using Server – Side Includes- Learning the SSI Directives – Creating Modular ASP Code -Using the Request Object: Using Form Information - Using QueryString Information – Using Server Variables - Using the Response Object: Create Output – Managing Output – Managing the Connection.

MODULE-IV: Using Cookies

Introduction to Cookies: Cookies and Your Browser – Creating a Cookie – Modifying and removing Cookies – Tracking Preferences with Cookies Using the Application, Session and Server Objects: The application Object – The Session Object – The Server Object – Using the global .asa file - Active Data Objects Essentials: Microsoft's Universal Data Access Strategy – The Connection Object – The Record set and Field Objects – The Command and Parameter Objects – Using the Errors Collection.

MODULE-V: Introducing XML

XML: The Life of an XML documents - Related technologies- First XML Document: Hello XML – Exploring the Simple XML Document – Assigning Meaning to XML Tags – Writing a Style Sheet for an XML Document – Attaching a Style Sheet to an XML Document – Style Languages: CSS Style Sheets, CSS Layouts, CSS Text Styles.

MODULE-VI: Attributes, Empty Tags & XSL

Attributes – Attributes versus Elements – Empty Elements and Empty Element Tags – XSL-DTDs and Validity: Document Type Definitions – Element Declarations – DTD Files – Document Type Declarations – Validating Against a DTD-Element Declaration - Entity Declarations: What Is an Entity – Internal General Entities – External General Entities – Internal Parameter Entities – External Parameter Entities – Building a Document from Places-Attribute Declaration: What is an Attribute – Declaring Attributes in DTDs – Declaring Multiple Attributes – Specifying Default Values for Attributes – Attribute Types – Predefined Attributes – A DTD for Attribute- Based Baseball Statistics.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

Text & References:

- Dave Mercer, “ASP 3.0 Beginners Guide”, Tata McGraw-Hill Edition, Sixth reprint, 2004.
- Rajkamal, “Web Technology”, 1st Edition, Tata McGraw - Hill, 2001.

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SERVICE ORIENTED ARCHITECTURE

Course Code: DSE4307

Credit Units: 03

Course Objective:

The subject gives an introduction to the fundamentals and issues relating to Service Oriented Architecture and bring out the importance of service orientation and web services. It also teaches appropriate tools as technique on how to build the Service Oriented Architecture with web services.

Course Contents:

Module I: Introduction

Basic definition - Fundamentals of SOA - Characteristics and misperceptions about SOA-Benefits and pitfalls of SOA.

Module II: Evolution of SOA

The evolution of SOA - Web service and primitive SOA - The extension of SOA - Web service extension.

Module III: Web Service and Contemporary SOA

Message Exchange Pattern- Service Activity- Coordination- Atomic Transaction- Business Activity- Orchestration – Choreography- Addressing- Reliable Messaging- Correlation and Policies- Meta data Exchange- Security- Notification and Eventing.

Module IV: Principles of Service Orientation

Principles of service orientation -Building SOA-Planning and Analysis- SOA delivery strategies - Service Oriented Analysis Introduction -Service Modelling of Service Oriented Analysis.

Module V: Service Oriented Design

Introduction to service oriented design - WSDL related XML Schema language Basics - WSDL Language Basics - SOAP Language Basics - Service interface design tools - Steps to composing SOA - Consideration for choosing service layers, positioning core SOA standards and choosing SOA extension – Service design and business process design.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

Text & References:

- Thomas Erl, “Service Oriented Architecture, Concepts, Technology and Design”, Pearson Education, 2009.
- Shankar Kambhampaty, “Service Oriented Architecture for Enterprise Architecture for Enterprise Application”, 1st Edition, Wiley Publication, 2008.

NATURAL LANGUAGE PROCESSING

Course Code: DSE4308

Credit Units: 03

Course Objective:

This course provides a general introduction including the use of state automata for language processing and syntax including a basic parse. It explains advanced feature like feature structures and realistic parsing methodologies. It also gives concepts of remotes processing and detail information about a typical natural language processing applications.

Course Contents:

Module-I: Introduction

Introduction: Knowledge in speech and language processing - Ambiguity - Models and Algorithms - Language, Thought and Understanding- Regular Expressions and automata: Regular expressions - Finite-State automata. Morphology and Finite-State Transducers: Survey of English morphology - Finite-State Morphological parsing - Combining FST lexicon and rules - Lexicon- Free FSTs: The porter stammer - Human morphological processing.

Module-II: Syntax Analysis

Word classes and part-of-speech tagging: English word classes - Tagsets for English - Part-of-speech tagging - Rule-based part-of-speech tagging - Stochastic part-of-speech tagging - Transformation-based tagging – Other issues - Context-Free Grammars for English: Constituency - Context-Free rules and trees - Sentence-level constructions - The noun phrase - Coordination - Agreement - The verb phrase and sub categorization – Auxiliaries - Spoken language syntax - Grammars equivalence and normal form - Finite- State and Context-Free grammars - Grammars and human processing. Parsing with Context-Free Grammars: Parsing as search - A Basic Top-Down parser - Problems with the basic Top-Down parser - The early algorithm - Finite-State parsing methods.

MODULE-III: Advanced Features and Syntax

Features and Unification: Feature structures - Unification of feature structures
- Features structures in the grammar - Implementing unification - Parsing with unification constraints
- Types and Inheritance. Lexicalized and Probabilistic
Parsing: Probabilistic context-free grammar - Problems with PCFGs -
Probabilistic lexicalized CFGs - Dependency Grammars - Human parsing.

MODULE-IV: Semantic

Representing Meaning: Computational desiderata for representations – Meaning structure of language
- First order predicate calculus - Some linguistically relevant concepts - Related representational approaches – Alternative approaches to meaning. Semantic Analysis: Syntax-Driven semantic analysis - Attachments for a fragment of English - Integrating semantic analysis into the early parser - Idioms and compositionality - Robust semantic analysis. Lexical semantics: relational among lexemes and their senses - WordNet: A database of lexical relations - The Internal structure of words - Creativity and the lexicon.

MODULE-V: Natural Language Generation

Introduction to language generation - Architecture for generation – Surface realization - Discourse planning - Other issues- Machine Translation: Language similarities and differences - The transfer metaphor - The interlingua idea: Using meaning - Direct translation - Using statistical techniques – Usability and system development.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;

Att: Attendance

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Text & References:

- Daniel Jurafsky & James H. Martin, "Speech and Language Processing", 2nd Edition, Pearson Education, 2009.
- James Allen, "Natural Language Understanding", 2nd Edition, Pearson Education, 2008.
- Manning, Christopher D and Hinrich Schütze, "Foundations of Statistical Natural Language Processing", Cambridge, 1st Edition, MA: MIT Press, 1999.



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AGENT BASED INTELLIGENT SYSTEMS

Course Code: DSE4309

Credit Units: 03

Course Objective:

This course provides students basic knowledge of employing intelligent agents in solving complex problems and gives the awareness of the building blocks of agents and working of different types of agents. It also analyses the reasons for uncertainty and ability to design agents to handle them.

Course Contents:

Module-I: Introduction

Definitions – History – Hybrid Intelligent Agents – Agents vs Multi Agent Systems– Structure – Environment – Basic Problem Solving Agents – Complex Problem Solving Agents – Formulating Search Strategies – Intelligent Search.

Module-II: Concepts for Building Agents

Situated Agents: Actions and Percepts - Proactive and Reactive Agents: Goals and Events- Challenging Agent Environments: Plans and Beliefs - Social Agents - Agent Execution Cycle.

Module-III: Knowledge Based Agents

Knowledge Representation – Logic – First Order Logic – Reflex Agent – Building a Knowledge Base – General Ontology – Inference – Logical Recovery.

Module-IV: Planning Agents

Situational Calculus – Representation of Planning – Partial Order Planning – Practical Planners– Conditional Planning - Preplanning Agents.

Module-V: Agents and Uncertainty

Acting under uncertainty – Probability – Baye's Rule – Belief Networks – Utility Theory - Decision Network- Value of Information – Decision Theoretic Agent Design.

Module-VI: Higher Level Agents

Learning Agents – General Model – Inductive Learning – Learning Decision Tree – Reinforcement Learning – Knowledge in Learning – Communicative Agents – Types of Communicative Agents – Future of AI.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text and References:

- Stuart Russell and Peter Norvig, "Artificial Intelligence: A Modern Approach", 3rd Edition, Prentice Hall, 2010.
- Lin Padgham, Michael Winikoff, "Developing Intelligent Agent Systems: A Practical Guide", 1st Edition, John Wiley & Sons, 2004.
- ZiliZhang, Chengqi Zhang, "Agent-Based Hybrid Intelligent Systems: An Agent- Based Framework for Complex Problem Solving", 1st Edition, Springer-Verlag New York, LLC , 2004.
- Ngooc Thanh Nguyaaen, Lakhmi C. Jain, "Intelligent Agents in the Evolution of Web and Applications", 4th Edition, Springer, 2009.

PROJECT-DISSERTATION-II

Course Code: DSE4437

Credit Units: 15

GUIDELINES FOR DISSERTATION

Research experience is as close to a professional problem-solving activity as anything in the curriculum. It provides exposure to research methodology and an opportunity to work closely with a faculty guide. It usually requires the use of advanced concepts, a variety of experimental techniques, and state-of-the-art instrumentation.

Research is genuine exploration of the unknown that leads to new knowledge which often warrants publication. But whether or not the results of a research project are publishable, the project should be communicated in the form of a research report written by the student.

Sufficient time should be allowed for satisfactory completion of reports, taking into account that initial drafts should be critiqued by the faculty guide and corrected by the student at each stage.

The File is the principal means by which the work carried out will be assessed and therefore great care should be taken in its preparation.

In general, the File should be comprehensive and include

A short account of the activities that were undertaken as part of the project;

A statement about the extent to which the project has achieved its stated goals.

A statement about the outcomes of the evaluation and dissemination processes engaged in as part of the project;

Any activities planned but not yet completed as part of the DISSERTATION, or as a future initiative directly resulting from the project;

Any problems that have arisen that may be useful to document for future reference.

➤ Report Layout

The report should contain the following components:

➤ Title or Cover Page

The title page should contain the following information: Project Title; Student's Name; Course; Year; Supervisor's Name.

➤ Acknowledgements (optional)

Acknowledgment to any advisory or financial assistance received in the course of work may be given.

➤ Abstract

A good "Abstract" should be straight to the point; not too descriptive but fully informative. First paragraph should state what was accomplished with regard to the objectives. The abstract does not have to be an entire summary of the project, but rather a concise summary of the scope and results of the project

➤ Table of Contents

Titles and subtitles are to correspond exactly with those in the text.

➤ Introduction

Here a brief introduction to the problem that is central to the project and an outline of the structure of the rest of the report should be provided. The introduction should aim to catch the imagination of the reader, so excessive details should be avoided.

➤ Materials and Methods

This section should aim at experimental designs, materials used. Methodology should be mentioned in details including modifications if any.

➤ Results and Discussion

Present results, discuss and compare these with those from other workers, etc. In writing these section, emphasis should be given on what has been performed and achieved in the course of the work, rather than discuss in detail what is readily available in text books. Avoid abrupt changes in

contents from section to section and maintain a lucid flow throughout the thesis. An opening and closing paragraph in every chapter could be included to aid in smooth flow.

Note that in writing the various sections, all figures and tables should as far as possible be next to the associated text, in the same orientation as the main text, numbered, and given appropriate titles or captions. All major equations should also be numbered and unless it is really necessary never write in “point” form.

➤ **Conclusion**

A conclusion should be the final section in which the outcome of the work is mentioned briefly.

➤ **Future prospects**

➤ **Appendices**

The Appendix contains material which is of interest to the reader but not an integral part of the thesis and any problem that have arisen that may be useful to document for future reference.

➤ **References / Bibliography**

This should include papers and books referred to in the body of the report. These should be ordered alphabetically on the author's surname. The titles of journals preferably should not be abbreviated; if they are, abbreviations must comply with an internationally recognised system.

Examples

For research article

Voravuthikunchai SP, Lortheeranuwat A, Ninrprom T, Popaya W, Pongpaichit S, Supawita T. (2002) Antibacterial activity of Thai medicinal plants against enterohaemorrhagic *Escherichia coli* O157: H7. *Clin Microbiol Infect*, **8** (suppl 1): 116–117.

For book

Kowalski, M. (1976) Transduction of effectiveness in *Rhizobium meliloti*. SYMBIOTIC NITROGEN FIXATION PLANTS (editor P.S. Nutman IBP), **7**: 63-67

ASSESSMENT OF THE DISSERTATION FILE

Essentially, marking will be based on the following criteria: the quality of the report, the technical merit of the project and the project execution.

Technical merit attempts to assess the quality and depth of the intellectual efforts put into the project.

Project execution is concerned with assessing how much work has been put in.

The File should fulfill the following **assessment objectives**:

Range of Research Methods used to obtain information

Execution of Research

Data Analysis

Analyse Quantitative/ Qualitative information

Control Quality

Draw Conclusions

Examination Scheme:

Dissertation	50
Viva Voce	50
Total	100

Selecting the Dissertation Topic

It is usual to give you some discretion in the choice of topic for the dissertation and the approach to be adopted. You will need to ensure that your dissertation is related to your field of specialization.

Deciding this is often the most difficult part of the dissertation process, and perhaps, you have been thinking of a topic for some time.

It is important to distinguish here between 'dissertation topic' and 'dissertation title'. The topic is the specific area that you wish to investigate. The title may not be decided until the dissertation has been written so as to reflect its content properly.

Few restrictions are placed on the choice of the topic. Normally we would expect it to be:

- relevant to business, defined broadly;
- related to one or more of the subjects or areas of study within the core program and specialisation stream;
- clearly focused so as to facilitate an in-depth approach, subject to the availability of adequate sources of information and to your own knowledge;
- of value and interest to you and your personal and professional development.

Planning the Dissertation

This will entail following:

- Selecting a topic for investigation.
- Establishing the precise focus of your study by deciding on the aims and objectives of the dissertation, or formulating questions to be investigated. Consider very carefully what is worth investigating and its feasibility.
- Drawing up initial dissertation outlines considering the aims and objectives of the dissertation. Workout various stages of dissertation
- Devising a timetable to ensure that all stages of dissertation are completed in time. The timetable should include writing of the dissertation and regular meetings with your dissertation guide.

The Dissertation plan or outline

It is recommended that you should have a dissertation plan to guide you right from the outset. Essentially, the dissertation plan is an outline of what you intend to do, chapter wise and therefore should reflect the aims and objectives of your dissertation.

There are several reasons for having a dissertation plan

- It provides a focus to your thoughts.
- It provides your faculty-guide with an opportunity, at an early stage of your work, to make constructive comments and help guide the direction of your research.
- The writing of a plan is the first formal stage of the writing process, and therefore helps build up your confidence.
- In many ways, the plan encourages you to come to terms with the reading, thinking and writing in a systematic and integrated way, with plenty of time left for changes.
- Finally, the dissertation plan generally provides a revision point in the development of your dissertation report in order to allow appropriate changes in the scope and even direction of your work as it progresses.

Keeping records

This includes the following:

- Making a note of everything you read; including those discarded.
- Ensuring that when recording sources, author's name and initials, date of publication, title, place of publication and publisher are included. (You may consider starting a card index or database from the outset). Making an accurate note of all quotations at the time you read them.
- Make clear what is a direct a direct quotation and what is your paraphrase.

Dissertation format

All students must follow the following rules in submitting their dissertation.

- Front page should provide title, author, Name of degree/diploma and the date of submission.
- Second page should be the table of contents giving page references for each chapter and section.
- The next page should be the table of appendices, graphs and tables giving titles and page references.
- Next to follow should be a synopsis or abstract of the dissertation (approximately 500 words)
- Next is the 'acknowledgements'.
- Chapter I should be a general introduction, giving the background to the dissertation, the objectives of the dissertation, the rationale for the dissertation, the plan, methodological issues and problems. The limitations of the dissertation should also be hinted in this chapter.
- Other chapters will constitute the body of the dissertation. The number of chapters and their sequence will usually vary depending on, among others, on a critical review of the previous relevant work relating to your major findings, a discussion of their implications, and conclusions, possibly with a suggestion of the direction of future research on the area.
- After this concluding chapter, you should give a list of all the references you have used. These should be cross - references with your text. For articles from journals, the following details are required e.g.

Draper P and Pandyal K. 1991, The Investment Trust Discount Revisited, Journal of Business Finance and Accounting, Vol18, No6, Nov, pp 791-832.

For books, the following details are required:

Levi, M. 1996, International Financial Management, Prentice Hall, New York, 3rd Ed, 1996

- Finally, you should give any appendices. These should only include relevant statistical data or material that cannot be fitted into the above categories.


The Layout Guidelines for the Dissertation

- A4 size Paper
- Font: Arial (10 points) or Times New Roman (12 points)
- Line spacing: 1.5
- Top and bottom margins: 1 inch/ 2.5 cm; left and right margins: 1.25 inches/ 3 cm

Guidelines for the assessment of the Dissertation

While evaluating the dissertation, faculty guide will consider the following aspects:

- Has the student made a clear statement of the objective or objective(s).
- If there is more than one objective, do these constitute parts of a whole?
- Has the student developed an appropriate analytical framework for addressing the problem at hand.
- Is this based on up-to-date developments in the topic area?
- Has the student collected information / data suitable to the frameworks?
- Are the techniques employed by the student to analyse the data / information appropriate and relevant?
- Has the student succeeded in drawing conclusion form the analysis?
- Do the conclusions relate well to the objectives of the project?
- Has the student been regular in his work?
- Layout of the written report.


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Assessment Scheme:

Continuous Evaluation:

(Based on Abstract, Regularity,
Adherence to initial plan, Records etc.)

40%

Final Evaluation: Based on,
Contents & Layout of the Report,
Conceptual Framework,
Objectives & Methodology and
Implications & Conclusions
Viva & Presentation

60%
20
05
05
10
20



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Master of Science - Renewable Energy

FLEXILEARN

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Programme Structure

Curriculum & Scheme of Examination

2022

**AMITY UNIVERSITY HARYANA
GURUGRAM**

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RWE4101	RENEWABLE ENERGY CONVERSION SYSTEMS	L	T	P	C
Version 1.1	Date of Approval: Date, Aug 2014	3	0	0	3
Pre-requisites/Exposure	NIL				
Co-requisites	NIL				

Course Objectives

The objective of the course is to provide introduction to different Renewable energy sources and Analyze the full coverage of Renewable energy supplies needed for modern economies. Course covers scientific aspects of power generation from Sun, wind, and biomass & ocean thermal routes.

Course Outcomes

On completion of this course, the students will be able to:

CO1: Describe the various renewable energy sources and the possible conversion paths to a useful form of energy.

CO2: Describe the aerodynamics of wind turbines and calculate their power, energy production, output and their environmental impact.

CO3: Explain how geothermal is currently used as a source of energy, its future potential both in providing energy and in producing alternative fuels.

CO4: Explain the physical principles of solar energy and photovoltaic energy conversion route.

CO5: Explain how OTEC & Nuclear energy is currently used as a source of energy, its future potential both in providing energy and in producing alternative fuels.

Catalog Description

This course aims to make the students understand the importance renewable energy conversion systems and also explains the significance of energy supply from renewables as an essential component of every nation's strategy, especially when there is responsibility for the environment and for sustainability.

Course Content

Modules	Blooms level*	Number of hours
Module I: Introduction to Renewable Energy Renewable and Non-Renewable Energy, World energy scenario; Fossil fuel resources - estimates and duration; India's energy scenario; Synergy between energy and environment, global environment issues, greenhouse gas emission, global warming, green energy solutions, technical and social implications of renewable energy	L1, L2	7
Module II: Solar Concepts Introduction, Sun as the source of radiation, Earth and Solar constant, Extra-terrestrial solar radiation, components of radiation, effects of earth's atmosphere, Introduction to solar PV, Introduction to solar Thermal.	L1, L2	8
Module III: Biofuels, Wind Energy Biofuels- Definition, generations and types; Wind-Characteristics, Sources of wind, components of wind turbines, advantages and environmental aspects of wind energy	L1, L2	7
Module IV: Hydro Energy, Tidal Energy	L1, L2	7

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Hydro- Principles, hydro-turbines, social and environmental aspects. Tidal- The nature of the resource, physics, power generation, technical factors, environmental factors, tidal energy potential, tidal barrage, tidal stream, tidal current turbines.		
Module V: Geothermal, OTEC, Nuclear Energy Geothermal- Principles, suitable sites and criteria, Advantages and disadvantages; OTEC- Principles, Open and closed systems, Nuclear fusion, fission, various types of nuclear fuels and nuclear reactors.	L1, L2	7

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

- J. W. Twidell, T Weir, Renewable energy resources, 3rd edition, Routledge, Taylor and Francis group, 2015
- G. N. Tiwari, Solar Energy: Fundamentals, design, modeling and applications, Narosa, 2002. ISBN-10: 0849324092
- V.V. N. Kishore, Renewable Energy Engineering and Technology: Principles and Practice, The Energy and Resources Institute, TERI, 2010. ISBN-10: 9788179932216.

Reference Books

- J. A. Duffie and W. A. Beckmann, Solar Engineering of Thermal Processes, 4th edition, Wiley, 2013. ISBN: 978-0-470-87366-3
- P. Gipe, Wind Energy Comes of Age, 1st edition, Wiley, 1995.
- Directory, Indian Windpower 2004, CECL, Bhopal.
- R. Murray, K. E. Holbert, Nuclear energy: An introduction to the concepts, systems and applications of nuclear processes, 7th edition, Butterworth-Heinemann, 2014

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Relationship between the Course Outcomes (COs) , Programme Outcomes (POs) and Program Specific Outcomes

	PO 1	PO 2	PO 3	PO 4	PSO 1	PSO 2	PSO3	PSO4
CO1	1	3	2	3	1	3	2	-
CO2	1	3	2	3	1	3	2	-
CO3	1	3	2	-	1	3	2	-
CO4	1	3	2	-	1	3	2	-
CO5	1	3	2	-	1	3	2	-

1: strongly related, 2: moderately related and 3: weakly related



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RWE4102	INTRODUCTION TO SOLAR PHOTOVOLTAICS	L	T	P	C
Version 1.1	Date of Approval: 25 July, 2016	3	1	0	4
Pre-requisites/Exposure					
Co-requisites					

Course Objectives

The objective of this course are as follows

1. This course covers the design and engineering of solar cells along with their different material aspects, electrical, thermal & optical characteristics for better efficiency.
2. To understand the role of solar energy in the context of regional and global energy system, its economic, social and environmental connotations, and the impact of technology on a local and global context.
3. To understand the physical principles of the photovoltaic (PV) solar cell and what are its sources of losses.
4. To understand and apply the basic concepts of solar radiation necessary for dimensioning (sizing) PV systems installation.

Course Outcomes

On completion of this course, the students will be able to

CO1. To know some practical applications that use solar photovoltaic systems and be able to do specify, analyze and design.

CO2. To know and be able to analyze the behavior of a self-consumption demand and the measurement of network management.

CO3. To carry out a basic engineering project related to energy supply using solar photovoltaic technology.

CO4. To know the main lines of research in the field of photovoltaic technology and solar energy and to bring innovative ideas in the field of solar photovoltaic energy.

Catalog Description

This course covers the concepts of basic engineering project related to energy supply using solar photovoltaic technology. Also, to make students understand the practical applications that use solar photovoltaic systems and be able to do specify, analyze and design.

Course Content

Modules	Blooms level*	Number of hours
Module I: Thin film solar cell technologies Generic advantages of thin film technologies, material in thin film technologies, thin film deposition techniques, Amorphous Si solar cell technology, CdTe solar cell technology, CIGS solar cell technology, thin film epitaxial Si solar cell technology.	L1, L2	7
Module II: Concentrating PV Cells and systems Light concentration, concentration ratio, series resistance optimization, optics for concentrator PV, tracking requirement of CPV, cooling requirements, high concentration solar cells	L1, L2	8
Module III: Emerging Solar Cells technologies and concepts Organic solar cells, Dye-sensitized solar cells, GaAs solar cells, Thermo-photovoltaic, approaches to overcome single junction efficiency limits, Solar photovoltaic modules, spectrum modification approaches, hot carrier solar cells.	L2, L3	7

Module IV: Solar PV Modules Solar PV modules from solar cells, mismatch in series connection, mismatch in parallel connections, design and structure of PV modules, PV module power output and factors affecting its performance.	L3, L4	7
Module V: Balance of Solar PV systems Battery for energy storage in solar PV system, factors affecting battery performance, DC-DC converters, charge controllers, Dc-AC converters, Maximum Power Point Tracking, stand alone SPV system, design methodology of PV systems, wire sizing , hybrid PV, grid connected PV, life cycle costing.	L5, L6	7

Bloom's Level:

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

- Solar Photovoltaics (Fundamentals, Technologies and Application) by Chetan Singh Solanki, PHI publications, 5th Edition.
- Handbook of Photovoltaic Science and Engineering by Antonio Luque & Steven Hegedus – John Wiley and Sons.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:


Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

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	PO 1	PO 2	PO 3	PO 4	PSO 1	PSO 2	PSO3	PSO4
CO1	1	3	2	3	1	3	2	-
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CO4	1	2	2	-	1	3	2	-
CO5	1	3	2	-	1	3	2	-

1: strongly related, 2: moderately related and 3: weakly related


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RWE4103	INTRODUCTION TO SOLAR THERMAL TECHNOLOGY	L	T	P	C
Version 1.1	Date of Approval: Date, Aug 2016	3	1	0	4
Pre-requisites/Exposure					
Co-requisites					

Course Objectives

The objective of this course is to introduce materials relevant to the engineering of solar thermal systems. Students will develop the skills to analysis the thermal performance of solar thermal systems. Many of these calculations will be based on solar applications in different area. Finally the concepts of engineering economics applied to solar energy will also be introduced.

Course Outcomes

On completion of this course, the students will be able to
CO1. Conduct the thermal Analysis of a solar thermal devices.
CO2. Explain working mechanism of solar thermal collectors
CO3. Design a solar thermal system based on the requirement.

Catalog Description

In this course, the various modes of heat transfer shall be discussed. The different types of errors, accuracy of the numerical methods are also discussed in detail. Students will taught to calculate the amount of incident solar flux on horizontal and tilted surfaces. Thermal analysis of flat plate collector and concentrating collectors will be taught. The energy storage systems and the different components of solar systems will be discussed. The various water heating, air heating systems and its application to space heating and cooling and other solar devices will be discussed. Solar thermal power generation will be taught in this course.

Course Content

Modules	Blooms level*	Number of hours
Module 1: Introduction Solar spectrum, Sun-Earth angles, Solar time, measurement of solar radiations (pyrheliometers, pyranometers), solar radiation on horizontal surface (estimation of average solar radiation, estimation of clear sky radiation).	L1, L2	7
Module 2: Flat plate collector Liquid flat plate collectors, Materials (glazing material, collector plates), classification (evacuated tubular collectors, Types of FPCs), Performance Analysis, efficiency of collectors and Testing of FPC, Effects of various parameters on performance, Analysis of Unconventional FPCs, air heating collectors.	L1, L2	8
Module 3: Solar Concentrator Characteristic parameters, classification of concentrators, tracking concentrator and non-tracking concentrators, cylindrical parabolic collector, compound parabolic collector, paraboloid dish collector, central receiver collector	L2, L3	7
Module 4: Solar Water Heating Introduction, Swimming pool heating, types (built-in-storage type, separate storage type), Performance predictions.	L3, L4	7

*Bloom's Level:

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

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Text Books

- J. W. Twidell, T Weir, Renewable energy resources, 3rd edition, Routledge, Taylor and Francis group, 2015
- G. N. Tiwari , Solar Energy: Fundamentals, design, modeling and applications, Narosa, 2002. ISBN-10: 0849324092
- V.V. N. Kishore, Renewable Energy Engineering and Technology: Principles and Practice, The Energy and Resources Institute, TERI, 2010. ISBN-10: 9788179932216.

Reference Books

1. J. A. Duffie and W. A. Beckmann, Solar Engineering of Thermal Processes, 4th edition, Wiley, 2013. ISBN: 978-0-470-87366-3

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination**Examination Scheme:**

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CO3	1	2	2	-	1	3	2	-
CO4	1	2	2	-	1	3	2	-
CO5	1	3	2	-	1	3	2	-

1: strongly related, 2: moderately related and 3: weakly related



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RWE4104	BIOMASS	L	T	P	C
Version 1.1	Date of Approval: 25 July, 2016	2	0	0	4
Pre-requisites/Exposure					
Co-requisites					

Course Objectives

The objective of this course are as follows:

- To understands the various renewable feedstocks, their availability and attributes for biofuel production
- To describe the biomass conversion processes and devices
- To examine different biomass energy conversion technologies in the energy Sector and develop to select appropriate methodologies from the range of different biomass energy technologies
- To understands and describe the capital costs, and cost effectiveness of Biomass energy compared with traditional sources.

Course Outcomes

On completion of this course, the students will be able to

- CO1. To know some practical applications that conceptualizes the framework necessary to understand above thermochemical energy processes (combustion, gasification, pyrolysis, reforming), mechanical and chemical processes (oil extraction and trans-esterification), finally biochemical processes (fermentation and anaerobic digestion)
- CO2. To carry out a basic engineering project related to financial evaluation of renewable energy systems.
- CO3. To understand the basic principles of the designing of a bio-energy thermo-chemical conversion process.
- CO4. This course covers the various aspects of Biofuel, biomethanation and their production technologies.

Catalog Description

At the end of the course the students should be able to understand some practical applications that conceptualizes the framework necessary to understand above thermochemical energy processes (combustion, gasification, pyrolysis, reforming), mechanical and chemical processes (oil extraction and trans-esterification), finally biochemical processes (fermentation and anaerobic digestion).

Course Content

Modules	Blooms level*	Number of hours
Module I- Bio Fuels & Bio Reactors Enzymatic conversion of biomass, Enzyme kinetics, Biochemistry and process parameters of biomethanation; Biogas digester types; Digester design and biogas utilization; Economics of biogas plant with their environmental and social impacts; Bioconversion of substrates into alcohol: Methanol & ethanol Production, organic acids, solvents, amino acids, antibiotics etc. Batch, plug low reactor (PFR), continuous stirred rank reactors (CSTR), fluidized bed reactor bubble column, fixed film reactors, air lift fermentor etc. concept of ideal and non-ideal reactor	L1, L2	10

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Module II- Design and analysis of Reactors Residence time distribution, models of non-ideal reactor-plug flow reactor for microbial processes, optimization of reactor systems. Multiphase bioreactors –packed bed with immobilized enzymes and or microbial cells. Three phase fluidized bed tricking bed reactor, Design and analysis of above reactor systems.	L2, L3	12
Module III- Bioreactors Gas liquid reactors, unconventional bioreactors like Hollow fiber reactor, membrane reactor, reactors for biofuels. Reactor stability, various biogas reactors.	L3, L4	14
Module IV- Reactor Engineering and its optimization Thermodynamic and stoichiometric aspects of microbial processes, engineering analysis of metabolic pathways, optimization of fermentation media, kinetic modeling of enzyme and microbial processes, mass transfer in bio-chemical processes, scales up concept, batch fed batch and continuous microbial reactors.	L4, L5	12
Module V- Separation technologies and process control Distillation, cryogenic, adsorption and absorption, PSA and membrane separation process, sensors for monitoring bioprocess parameters. Bioprocess control and computer coupled bioreactors. Growth and production formation by recombinant cells.	L3, L4	8

*Bloom's Level:

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

- Francisco RosilloCallé, Frank Rosillo-Calle, The Biomass Assessment Handbook: Bioenergy for a Sustainable Environment, PHI Publication, 1996.
- Ashok Pandey, Christian Larroche, Steven C. Ricke, Claude-Gilles Dussap, Edgard Gnansounou, Biofuels: Alternative Feedstocks and Conversion Processes, TMH, 2003.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Relationship between the Course Outcomes (COs) , Programme Outcomes (POs) and Program Specific Outcomes

	PO 1	PO 2	PO 3	PO 4	PSO 1	PSO 2	PSO3	PSO4
CO1	1	3	2	3	1	3	2	-
CO2	1	2	2	3	1	3	2	-
CO3	1	2	2	-	1	3	2	-
CO4	1	2	2	-	1	3	2	-
CO5	1	3	2	-	1	3	2	-

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RWE4106	FIELD WORK I/ SEMINAR I	L	T	P	C
Version 1.1	Date of Approval: 14 July 2016	0	0	0	1
Pre-requisites/ Exposure	Solar PV lab				
Co-requisites	Solar thermal lab				

Course Objectives

The objective of this course is to

- To understand the various aspects of various instruments viz. solar dryer, solar concentrator, solar water heater by carrying out the experiment on latest technological equipments in the area of interest of the students.
- To describe the basics of operation of solar radiation measurement, wind speed and solar energy absorption and collecting devices.
- To understand and describe the applications of various experimental studies in practical life to analyze the various parameters of environment.

Course Outcomes

On completion of this course, the students will be able to

- CO1. To describe the basics of operation of solar radiation measurement, wind speed and solar energy absorption and collecting devices.
- CO2. To examine different areas viz. variation of various pollutants and contaminants present in the atmosphere and the effect of solar radiations on their concentration.
- CO3. To understand the component of solar radiation responsible for the working of solar thermal technology and investigate the efficiency/performance parameters of all equipments.

Catalog Description

In today's competitive environment an understanding is required which will facilitate the implementation of basic principles, tools and techniques used in the field of solar photovoltaic engineering. This course is designed for the students who want to understand the basics of solar PV and thermal energy conversion engineering. A student is supposed to have a basic knowledge of mathematical modeling and tools. The subject will further enhance the knowledge regarding the various methods and techniques used for solving various problems related to practical designing of solar power systems.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

Relationship between the Course Outcomes (COs) , Programme Outcomes (POs) and Program Specific Outcomes

	PO 1	PO 2	PO 3	PO 4	PSO 1	PSO 2	PSO3	PSO4
CO1	1	3	2	3	1	3	2	-
CO2	1	2	2	3	1	3	2	-
CO3	1	2	2	-	1	3	2	-
CO4	1	2	2	-	1	3	2	-
CO5	1	3	2	-	1	3	2	-

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RWE4107	SOLAR RADIATION MEASUREMENT AND ANALYSIS LAB	L	T	P	C
Version 1.1	Date of Approval: 26 June,2020	0	0	4	2
Pre-requisites/ Exposure	Solar PV lab				
Co-requisites	Solar thermal lab				

Course Objectives

The objective of this course is to

- To understand the various aspects of various instruments viz. Lux meter, AC/DC clamp meter, multi-meter, Anemometer, potentiometer etc. by carrying out the experiment on latest technological equipments in the area of interest of the students.
- To describe the basics of operation of solar radiation measurement, wind speed and solar energy absorption and collecting devices.
- To understand and describe the applications of various experimental studies in practical life to analyze the various parameters in the field of solar photovoltaic energy conversion.

Course Outcomes

On completion of this course, the students will be able to

- CO1. To describe the basics of operation of solar radiation measurement, wind speed and solar energy absorption and collecting devices.
- CO2. To examine different areas viz. variation of various pollutants and contaminants present in the atmosphere and the effect of solar radiations falling on various solar photovoltaic energy conversion systems.
- CO3. To understand the component of solar radiation responsible for the working of solar PV technology and investigate the efficiency/performance parameters of all equipments.

Catalog Description

In today's competitive environment an understanding is required which will facilitate the implementation of basic principles, tools and techniques used in the field of solar photovoltaic engineering. This course is designed for the students who want to understand the basics of solar PV and thermal energy conversion engineering. A student is supposed to have a basic knowledge of mathematical modeling and tools. The subject will further enhance the knowledge regarding the various methods and techniques used for solving various problems related to practical designing of solar power systems.

Course Content

Modules	Blooms level*	Number of hours
Module 1: Solar radiation measurement 1.To measure solar radiation on horizontal surface and estimation 2.To measure solar radiation on tilted surface and estimation 3.To measure earth's albedo. 4.To investigate how different surfaces of the Earth reflect and absorb heat.	L1, L2	7
Module 2: Sun Earth Angles 5.Find the declination angle for all the days of the year. Find the variation of declination angle over the year. 6.Find solar altitude angle and zenith angle for a location at a given time. 7.Find sunset hour angle and number of daylight hours for a given location. Study the variation of length of daylight on summer and winter solstices and equinoxes for different latitudes.	L1, L2	8
Module 3: Extraterrestrial Radiation Estimation	L2, L3	7

8. Find the extraterrestrial radiation on a plane normal to the direction of radiation on nth day of the year.		
9. Find the yearly variation of extraterrestrial radiation.		

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

- J. W. Twidell, T Weir, Renewable energy resources, 3rd edition, Routledge, Taylor and Francis group, 2015
- G. N. Tiwari, Solar Energy: Fundamentals, design, modeling and applications, Narosa, 2002. ISBN-10: 0849324092
- V.V. N. Kishore, Renewable Energy Engineering and Technology: Principles and Practice, The Energy and Resources Institute, TERI, 2010. ISBN-10: 9788179932216.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

Relationship between the Course Outcomes (COs) , Programme Outcomes (POs) and Program Specific Outcomes

	PO 1	PO 2	PO 3	PO 4	PSO 1	PSO 2	PSO3	PSO4
CO1	1	3	2	3	1	3	2	-
CO2	1	2	2	3	1	3	2	-
CO3	1	2	2	-	1	3	2	-
CO4	1	2	2	-	1	3	2	-
CO5	1	3	2	-	1	3	2	-

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RWE4206	SOLAR PHOTOVOLTAIC AND THERMAL LAB	L	T	P	C
Version 1.1	Date of Approval: 26 June,2020	0	0	4	2
Pre-requisites/ Exposure	Solar PV lab				
Co-requisites	Solar thermal lab				

Course Objectives

The objective of this course is to

- To understand the various aspects of various instruments viz. Lux meter, AC/DC clamp meter, multi-meter, Anemometer, potentiometer etc. by carrying out the experiment on latest technological equipments in the area of interest of the students.
- To describe the basics of operation of solar radiation measurement, wind speed and solar energy absorption and collecting devices.
- To understand and describe the applications of various experimental studies in practical life to analyze the various parameters in the field of solar photovoltaic energy conversion.

Course Outcomes

On completion of this course, the students will be able to

- CO1. To describe the basics of operation of solar radiation measurement, wind speed and solar energy absorption and collecting devices.
- CO2. To examine different areas viz. variation of various pollutants and contaminants present in the atmosphere and the effect of solar radiations falling on various solar photovoltaic energy conversion systems.
- CO3. To understand the component of solar radiation responsible for the working of solar PV technology and investigate the efficiency/performance parameters of all equipments.

Catalog Description

In today's competitive environment an understanding is required which will facilitate the implementation of basic principles, tools and techniques used in the field of solar photovoltaic engineering. This course is designed for the students who want to understand the basics of solar PV and thermal energy conversion engineering. A student is supposed to have a basic knowledge of mathematical modeling and tools. The subject will further enhance the knowledge regarding the various methods and techniques used for solving various problems related to practical designing of solar power systems.



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Course Content

Modules	Blooms level*	Number of hours
Module 1 : Solar PV Systems 1. To demonstrate the I-V characteristics of PV module with varying radiation and temperature level. 2. To demonstration the I-V characteristics of series and parallel combination of PV module. 3. To demonstrate the effect of varying tilt angles or solar angle of incidences on solar PV module output in PVSYST software.	L1, L2	7
Module 2 : Solar Thermal Systems 1. To study the performance analysis of an Evacuated Tube Collector 2. To find the overall loss coefficient of a liquid storage tank 3. To determine the Performance (UL, FR, η) of the Parabolic Trough collector with varying Solar Radiation with water as heat removal medium (Forced mode)	L2, L3	8
Module 3: Solar thermal Systems 4. To determine the Performance (UL, FR, η) of the Parabolic Trough collector with water as heat removal medium (Forced mode) with fixed input parameters different flow rates 5. To determine the Performance (UL, FR, η) of the Parabolic Trough collector for different flow rates and Solar Radiation. 6. To determine the Performance (UL, FR, η) of the Parabolic Trough collector with different inlet water temperature (Forced mode)	L3, L4	7
7. Estimate hourly beam, diffuse and global radiation on a horizontal surface.	L1, L4, L6	1
8. Estimate solar radiation on a tilted surface	L1, L4, L6	1
9. Determine thermal efficiency, $F_R U_L$ and $F_R \tau \alpha$ for a given flat plate collector.	L1, L4, L6	2

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books


- Solar Photovoltaics (Fundamentals, Technologies and Application) by Chetan Singh Solanki;
- Handbook of Photovoltaic Science and Engineering by Antonio Luque & Steven Hegedus - Wiley; Lecture notes.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

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Relationship between the Course Outcomes (COs) , Programme Outcomes (POs) and Program Specific Outcomes

	PO 1	PO 2	PO 3	PO 4	PSO 1	PSO 2	PSO3	PSO4
CO1	1	3	2	3	1	3	2	-
CO2	1	2	2	3	1	3	2	-
CO3	1	2	2	-	1	3	2	-
CO4	1	2	2	-	1	3	2	-
CO5	1	3	2	-	1	3	2	-

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RWE4205	FINANCIAL EVALUATION OF RENEWABLE ENERGY SYSTEMS	L	T	P	C
Version 1.1	Date of Approval: 25 July, 2013	4	0	0	4
Pre-requisites/Exposure					
Co-requisites					

Course Objectives

The objectives of this course are as follows:

- The objective of this course is to provide you with the conceptual framework necessary to understand above financial issues and the techniques to manage them efficiently and effectively. Whether you choose a career in manufacturing companies, non-governmental or service sector, investment banks or management consultancy, or want to be an entrepreneur, a thorough learning of the art of corporate finance is a must. The topics covered are time value of money, capital budgeting, depreciation and cash flow formation.
- Evaluate the time value of money of a particular financial decision.
- Calculate maturity amount and present investment amount.
- Identification and application of different depreciation methods.
- Apply capital budgeting tools and techniques to evaluate a project.

Course Outcomes

On completion of this course, the students will be able to

- **CO1.** To know some practical applications that conceptualizes the framework necessary to understand above financial issues and the techniques to manage them efficiently and effectively.
- **CO2.** To carry out a basic engineering project related to financial evaluation of renewable energy systems.
- **CO3.** To understand the basic principles of the payback period, impact assessment of solar photovoltaic conversion system, solar thermal systems and other renewable energy systems .
- **CO4.** This course covers the various aspects of depreciation methods, straight line depreciation, declining balance method, sum of the year digits method of depreciation.

Catalog Description

At the end of the course the students should be able to understand the factors that influence the use of various depreciation methods, straight line depreciation, declining balance method, sum of the year digits method of depreciation. The outcome will be measured by the performance of students in various class tests/assignments in addition to the End Semester Examination (ESE) that contains significant number of questions on problems related to the financial Mathematics- cash flow diagrams, interest formula relating present & future worth of single amount, uniform series compound amount factor, uniform series sinking fund factor, uniform series present worth factor, uniform series capital recovery factor, interest formulae with continuous compounding.

Course Content

Modules	Blooms level*	Number of hours
Module I: Introduction, Economic efficiency, time value of money, interest, inflation	L1, L2	5
Module II: Basic formulae of financial Mathematics- cash flow diagrams, interest formula relating present & future worth of single amount, uniform series compound amount factor, uniform series sinking fund factor, uniform series present worth factor, uniform series capital recovery factor, interest formulae with continuous compounding. Interest formulae for uniform or arithmetic gradient of cash flows.	L1, L2	9

Module III: Indicators of Financial Performance- Simple & discounted payback periods, net present value (NPV), equivalent uniform annual worth, benefit cost ratio method, interest rate of return (IRR), computation of IRR, multiple values of IRR.	L1, L2, L3	8
Module IV: Incremental Analysis of Investment Projects- incremental analysis, incremental analysis in Net Present Value Method, incremental analysis in Equivalent Uniform Annual Worth method, incremental analysis in Benefit Cost Ratio method, incremental analysis in Internal Rate of return method	L5, L6	10
Module V: Depreciation & Depreciation Accounting- Definitions, Depreciation methods, straight line Depreciation, declining balance method, sum of the year digits method of Depreciation	L3, L4, L6	8
Module VI: Case studies of financial evaluation of renewable energy technologies- solar distillation, domestic solar water heating, solar PV lanterns	L3, L4, L6	8

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation*

Text Books

- T C Kandpal, H P Garg, Financial Evaluation of Renewable Energy Technologies, MacMillan Publishers of India 2003.
- Charles W Donovan, Renewable Energy Finance: Powering the future, Imperial College Press, London, 2015
- B Simkins, R Simkins, Energy Finance & Economics: Analysis and Valuation, Risk Management & the future of Energy. 1st Ed. John Wiley & Sons 2013.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Relationship between the Course Outcomes (COs), Programme Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO 1	PO 2	PO 3	PO 4	PSO 1	PSO 2	PSO3	PSO4
CO1	3	3	1	2	3	2	1	2
CO2	3	3	1	2	3	2	1	2
CO3	3	3	1	1	3	2	1	2
CO4	3	3	1	2	3	2	1	2

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RWE4207	ENERGY ACCESS AND PLANNING	L	T	P	C
Version 1.1	Date of Approval: 25 July, 2016	3	1	0	4
Pre-requisites/Exposure					
Co-requisites					

Course Objectives

The objective of this course are as follows

- The objective of this Course is to provide you with the conceptual framework necessary to understand above energy access issues and the techniques to manage them efficiently and effectively. Whether you choose a career in manufacturing companies, non-governmental or service sector, investment banks or management consultancy, or want to be an entrepreneur, a thorough learning of the art of corporate finance is a must. The topics covered are time value of money, capital budgeting, depreciation and cash flow formation.
- Evaluate the traditional planning for energy demands, grid and off grid energy generation issues.
- Calculate factors like high quality, wide reach and productive activities in various areas of renewable energy.
- Identification and application of different depreciation methods.
- Apply capital budgeting tools and techniques to evaluate a project.

Course Outcomes

On completion of this course, the students will be able to

- CO1. Evaluate the traditional planning for energy demands, grid and off grid energy generation issues.
- CO2. To calculate factors like high quality, wide reach and productive activities in various areas of renewable energy.
- CO3. Identification and application of different depreciation methods.
- CO4. The objective of this Course is to provide you with the conceptual framework necessary to understand above energy access issues and the techniques to manage them efficiently and effectively. Whether you choose a career in manufacturing companies, non-governmental or service sector, investment banks or management consultancy, or want to be an entrepreneur, a thorough learning of the art of corporate finance is a must.

Catalog Description

Energy access planning is aimed at developing a socially inclusive energy supply system that gives both the poor and the rich sustainable access to at least the minimum amount of energy for their basic needs. This type of planning is also done to identify environmentally sound and climate-friendly technologies and resource options for providing energy access, and the associated investment opportunities.

Course Content

Modules	Blooms level*	Number of hours
Module I: Sustainable Energy Access Planning Framework Background, Objectives of this Study, Elements of Sustainable Energy Access Planning, Key Steps in Sustainable Energy Access Planning and Linkages between Assessments	L1, L2	7
Module II: Energy Poverty Assessment	L2, L3	8

Introduction, Energy Poverty Defined, Approaches to Energy Poverty Assessment , Energy Poverty Assessment Approaches for Use in Sustainable Energy Access Planning , Data Requirements		
Module III: Demand & Resource Assessment Introduction, Approaches to Assessing Energy Demand, Demand Assessment Methodology for Sustainable Energy Access Planning, Dimensions of Resource Assessment , Approaches to Resource Assessment, Data Requirements	L3, L4	7
Module IV: Cost & Benefit Assessment Introduction, Review of Cost Assessment Models, Proposed Sustainable Energy Access Planning Methodology, Incremental Cost of Energy Access, Applications of the Incremental Energy Access Cost, with Case Studies, Potential Benefits of an Energy Access Program, Approaches to Benefit Assessment, Data Requirements	L4, L5	7
Module V: Sustainability & Affordability Assessment Introduction, Approaches to Sustainability Assessment, Methodologies for Sustainability Assessment, Different Forms of the Affordability Problem, Approaches to Affordability Assessment, Assessment of Support Programs to Make Energy Services Affordable, Data Requirements	L5, L6	7

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

- Smart Grid & Renewables- A Guide for Effective Development- IRENA
- Ram M Shrestha and Jiwan S Acharya, Asian Development Bank, Sustainable Energy Access Planning- A Framework- ISBN:978-92-9254-965-7.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:


Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Relationship between the Course Outcomes (COs) , Programme Outcomes (POs) and Program Specific Outcomes

	PO 1	PO 2	PO 3	PO 4	PSO 1	PSO 2	PSO3	PSO4
CO1	1	3	2	3	1	3	2	-
CO2	1	2	2	3	1	3	2	-
CO3	1	2	2	-	1	3	2	-
CO4	1	2	2	-	1	3	2	-
CO5	1	3	2	-	1	3	2	-

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RWE4208	WIND ENERGY	L	T	P	C
Version 1.1	Date of Approval: 25 July, 2013	4	0	0	4
Pre-requisites/Exposure	SAE 4101				
Co-requisites					

Course Objectives

The objectives of this course are as follows:

- The objective of this Course is to provide you with the conceptual framework necessary to understand above challenges in wind energy conversion systems installation and the techniques to manage them efficiently and effectively.
- describe how wind energy is harnessed to create electricity
- state the major pros and cons of using wind energy
- demonstrate how wind energy can be utilized to create work

Course Outcomes

On completion of this course, the students will be able to

- **CO1.** Understand the fundamentals of the conventional power generation, transmission and distribution systems. Understand the importance and roles of wind energy in this modern age, how to maximise the natural resources and convert them into renewable energy
- **CO2.** Understand the components of wind power generations, create understanding of the factors affecting wind energy generation
- **CO3.** Appreciation the benefits of harvesting wind energy, Understand its characteristics and operations
- **CO4.** Explore the suitability of introducing wind energy generation to for a specific site

Catalog Description

At the end of the course the students should be able to understand some practical applications that conceptualize the framework necessary to understand the insight into the context and importance of wind energy sources and their potential, present status, fundamental principles, applications and environmental aspects.

Course Content

Modules	Blooms level*	Number of hours
Module I: Wind characteristics: Sources of wind, wind classification in flat terrain, sitting in non-flat terrain, ecological indicators of site suitability, site resource assessment: anemometer, met towers, wind map, wind rose	L1, L2	5
Module II: Wind energy system: Bernoulli's equation and significance; Euler's energy equation for turbomachines, energy and power in wind, different types of rotors: horizontal and vertical; wind turbine components, electric power generation, Fixed and variable speed; and storage.	L1, L2	9
Module III: Applied aerodynamics: Airfoil structure, aerodynamics of airfoil: lift, drag and stall; lift based wind turbines, drag machines, pitch concept, yaw concept, slip coefficient, Betz law, axial momentum theory, tip speed ratio, forces and moments due to vertical wind gradient. Role of dynamics in wind power- cross wind axis machines, wind axis machines- general momentum theory- vortex strip theory, forces and moments due to vertical wind gradient, control mechanism.	L1, L2, L3	8
Module IV: Towers and systems installation:	L4, L5, L6	10

Specific types of towers, tower height, tower and system raising, wiring, lightening protection, installation, maintenance of other equipments.		
Module V: Wind energy conversion systems: Specification and characteristics of commercial water-pumping wind mills, electricity producing wind energy, conversion systems, selection of system case study, Environment aspects.	L3, L4, L6	8

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation*

Text Books

- P. Gipe, Wind Energy Comes of Age, 1st edition, John Wiley & Sons Inc.1995
- L. L. Freris, Wind Energy Conversion System, Prentice Hall, 1990

Reference Books

- Tony Burton, David Sharpe, Nick Jenkins Ervin Bossanyi, Garrad Hassan & Partners, Wind energy Hand Book, John Wiley & Sons Inc. 2001
- Directory Indian Windpower 2018, CECL, Bhopal.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:


Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Relationship between the Course Outcomes (COs), Programme Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO 1	PO 2	PO 3	PO 4	PSO 1	PSO 2	PSO3	PSO4
CO1	1	3	2		1	2	3	-
CO2	3	2	3	1	3	2	1	-
CO3	3	2	3	1	3	2	1	-
CO4	2	2	3	1	3	2	1	-

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RWE4209	RISK MANAGEMENT IN RENEWABLE ENERGY PROJECTS	L	T	P	C
Version 1.1	Date of Approval: Date, Aug 2016	3	1	0	4
Pre-requisites/Exposure					
Co-requisites					

Course Objectives

This module will help participants to understand the risks involved in the project and the loan application evaluation process to be followed.

Course Outcomes

On completion of this course, the students will be able to

CO1. Define project parameters, project scope, stakeholders, project phases, Time & Resource requirements and limitations

CO2. Identify risks associated with the project viz Social, environmental, economic, political, technological risks to name a few

CO3. Plan the strategy for risk mitigation

CO4: Measure the impact of the risks associated with the project

Catalog Description

The course is designed for the students to prepare them for the working in various renewable energy projects right from conceptualization to delivery of project. Students will discover the renewable energy project life cycle and learn how to build a successful project from pre implementation to completion. It will introduce project management topics such as resources, costs, time constraints and project scopes. The students will learn about the various risks associated with RE projects. Identify them and decide suitable measures for risk mitigation.



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Course Content

Modules	Blooms level*	Number of hours
Module 1: Conventional energy projects and related uncertainties Introduction, the study, challenges in RE projects, risk associated with conventional energy projects, risk management approach in energy policies	L1, L2	7
Module II: Uncertainties in RES projects RES project characteristics, Risk associated with specific RES technologies. Risk: Definition and types, Risk analysis, Risk Identification, Risk impact assessment, Risk prioritization, Risk tracking, Risk mitigation planning, implementation and progress monitoring, tools for risk mitigation, Case study for managing risks in industries.	L2, L3	8
Module III: Recommended Risk Management methodology Project definition & requirement, risk identification, risk evaluation, risk control, risk follow up, risk feedback, risk management implementation in RES investment lifecycle	L3, L4	7
Module IV: Support measures Measures to address political risk, Measures to address economic risks, Measures to address technical risks, Measures to address social risks, generic interventions, Conclusions & recommendation	L4, L5	7

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books


- 1.) Prasanna, C. (2008). Projects, Planning, Analysis, Selection, Financing, Implementation and Review. Tata McGraw-Hill Publishing Company Limited.
- 2.) Finnerty, J. D. (2013). Project financing: Asset-based financial engineering. John Wiley & Sons.
- 3.) Frigenti, E., & Comminos, D. (2002). The Practice of Project Management: a guide to the business focused approach. Kogan Page Publishers.
- 4.) Lewis, J. P. (2002). Fundamentals of project management: developing core competencies to help outperform the competition. AMACOM Div American Mgmt Assn.
- 5.) Scott, B. (2005). The Art of Project Management. California USA. O'Reilly Media Inc.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance


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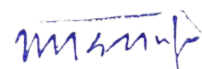
Relationship between the Course Outcomes (COs) , Programme Outcomes (POs) and Program Specific Outcomes

	PO 1	PO 2	PO 3	PO 4	PSO 1	PSO 2	PSO3	PSO4
CO1	1	3	2	3	1	3	2	-
CO2	1	2	2	3	1	3	2	-
CO3	1	2	2	-	1	3	2	-
CO4	1	2	2	-	1	3	2	-
CO5	1	3	2	-	1	3	2	-

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RWE4305	SOLAR POWER GENERATION LAB	L	T	P	C
Version 1.1	Date of Approval: 26 June,2020	0	0	4	2
Pre-requisites/ Exposure	Solar PV lab				
Co-requisites	Solar thermal lab				

Course Objectives

The objective of this course is to

- To understand the various aspects of various instruments viz. Lux meter, AC/DC clamp meter, multi-meter, Anemometer, potentiometer etc. by carrying out the experiment on latest technological equipments in the area of interest of the students.
- To describe the basics of operation of solar radiation measurement, wind speed and solar energy absorption and collecting devices.
- To understand and describe the applications of various experimental studies in practical life to analyze the various parameters in the field of solar photovoltaic energy conversion.

Course Outcomes

On completion of this course, the students will be able to

- CO1. To describe the basics of operation of solar radiation measurement, wind speed and solar energy absorption and collecting devices.
- CO2. To examine different areas viz. variation of various pollutants and contaminants present in the atmosphere and the effect of solar radiations falling on various solar photovoltaic energy conversion systems.
- CO3. To understand the component of solar radiation responsible for the working of solar PV technology and investigate the efficiency/performance parameters of all equipments.

Catalog Description

In today's competitive environment an understanding is required which will facilitate the implementation of basic principles, tools and techniques used in the field of solar photovoltaic engineering. This course is designed for the students who want to understand the basics of solar PV and thermal energy conversion engineering. A student is supposed to have a basic knowledge of mathematical modeling and tools. The subject will further enhance the knowledge regarding the various methods and techniques used for solving various problems related to practical designing of solar power system



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Course Content

Modules	Blooms level*	Number of hours
Module 1 : Maximum Power Point Tracking 1. Finding MPP by varying the resistive load across the PV panel. 2. Finding MPP by varying the duty cycle of DC-DC converter. 3. Using MPPT algorithm find the V_{max} , I_{max} and P_{max} and duty cycle at which MPP occurs. 4. Perform the experiment (3) with different values of perturbation (ΔD) Observe the response of P_{max} with the P_{max} observed in exp -3. 5. Perform the experiment no 1 to no 4, with battery in the circuit.	L1, L2	10
Module II: 6. To study performance analysis of off grid Solar PV Power Plant 7. To study performance of a solar thermal power plant	L2, L3	12
Module III 1. To demonstrate and generate the I-V and P-V Characteristics of PV Module with varying solar radiation level in MATLAB software. 2. To demonstrate and generate the I-V and P-V Characteristics of PV Module with varying temperature level in MATLAB software. 3. To demonstrate and generate the I-V and P-V Characteristics of PV Module with varying tilt angles or solar angle of incidences in PVSYS software. 4. To realize the model of a solar module in MATLAB software and generate its I-V characteristics using single diode model. 5. To realize the model of a solar module in MATLAB software and generate its P-V characteristics using single diode model.	L2, L3	5

*Bloom's Level:

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books


- Solar Photovoltaics (Fundamentals, Technologies and Application) by Chetan Singh Solanki;
- Handbook of Photovoltaic Science and Engineering by Antonio Luque & Steven Hegedus - Wiley; Lecture notes.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.


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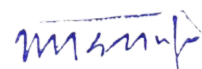
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RWE4306	Field Work II/ Seminar II	L	T	P	C
Version 1.1	Date of Approval: 14 July 2016	0	0	0	1
Pre-requisites/ Exposure	Solar PV lab				
Co-requisites	Solar thermal lab				

Course Objectives

The objective of this course is to

- To understand the various aspects of various instruments viz. solar dryer, solar concentrator, solar water heater by carrying out the experiment on latest technological equipments in the area of interest of the students.
- To describe the basics of operation of solar radiation measurement, wind speed and solar energy absorption and collecting devices.
- To understand and describe the applications of various experimental studies in practical life to analyze the various parameters of environment.

Course Outcomes

On completion of this course, the students will be able to

- CO1. To describe the basics of operation of solar radiation measurement, wind speed and solar energy absorption and collecting devices.
- CO2. To examine different areas viz. variation of various pollutants and contaminants present in the atmosphere and the effect of solar radiations on their concentration.
- CO3. To understand the component of solar radiation responsible for the working of solar thermal technology and investigate the efficiency/performance parameters of all equipments.

Catalog Description

In today's competitive environment an understanding is required which will facilitate the implementation of basic principles, tools and techniques used in the field of solar photovoltaic engineering. This course is designed for the students who want to understand the basics of solar PV and thermal energy conversion engineering. A student is supposed to have a basic knowledge of mathematical modeling and tools. The subject will further enhance the knowledge regarding the various methods and techniques used for solving various problems related to practical designing of solar power systems.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

Relationship between the Course Outcomes (COs) , Programme Outcomes (POs) and Program Specific Outcomes

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RWE4335	SUMMER INTERNSHIP EVALUATION	L	T	P	C
Version 1.1	Date of Approval: 14 July 2016	0	0	0	6
Pre-requisites/ Exposure					
Co-requisites					

Course Objectives

The objective of this course is to

- To emphasize on the importance of practical experience in life is integral part of learning of the various concepts of power generation related to renewable energy systems.
- To describe the basics of designing and innovative idea reproduction ethics.
- To examine different industrial areas viz. biomass energy conversion technologies, green building aspects in the energy sector, solar power plants and develop to select appropriate methodologies from the range of different technologies
- To understand and describe the capital costs, and cost effectiveness of renewable energy compared with traditional sources.
- To start a step stone in the direction of make students think like entrepreneurs and energy auditors/managers.

The students pursue six week training industries dealing in the area of renewable energy and present their comprehensive learning for evaluation.

Course Outcomes

On completion of this course, the students will be able to

- CO1. To examine different industrial areas viz. biomass energy conversion technologies, green building aspects in the energy sector, solar power plants and develop to select appropriate methodologies from the range of different technologies
- CO2. To emphasize on the importance of practical experience in life is integral part of learning of the various concepts of power generation related to renewable energy systems.
- CO3. To understand and describe the capital costs, and cost effectiveness of renewable energy compared with traditional sources.

Catalog Description

In today's competitive environment an understanding is required which will facilitate the implementation of basic principles, tools and techniques used in the field of solar photovoltaic engineering. This course is designed for the students who want to understand the basics of solar PV and thermal energy conversion engineering. A student is supposed to have a basic knowledge of mathematical modeling and tools. The subject will further enhance the knowledge regarding the various methods and techniques used for solving various problems related to practical designing of solar power systems.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

	REPORT	PRESENTATION	VIVA	ANALYSIS	CONTENT
	30	30	10	15	15

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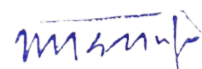
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CO4	1	2	2	-	1	3	2	-
CO5	1	3	2	-	1	3	2	-

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RWE4307	DESIGNING OF SOLAR PROJECTS	L	T	P	C
Version 1.1	Date of Approval: 25 July, 2013	3	1	0	4
Pre-requisites/Exposure					
Co-requisites					

Course Objectives

The objective of this course are as follows:

- This course covers the design and engineering of solar power system along with their different material aspects, electrical, thermal & optical characteristics for better efficiency.
- To understand the role of solar energy in the context of regional and global energy system, it's economic, social and environmental connotations, and the impact of technology on a local and global context.
- To understand the physical principles of the photovoltaic (PV) solar cell and what are its sources of losses.
- To understand and apply the basic concepts of solar radiation necessary for dimensioning (sizing) PV systems installation.

Course Outcomes

On completion of this course, the students will be able to

- CO1. To know some practical applications that use solar photovoltaic systems and be able to do specify, analyze and designing of real time systems.
- CO2. To know and be able to analyze the behavior of a self-consumption demand and the measurement of network management.
- CO3. To carry out a basic engineering project related to energy supply using solar photovoltaic technology.
- CO4. To know the main lines of research in the field of photovoltaic technology and solar energy. To bring innovative ideas in the field of solar photovoltaic energy.

Catalog Description

At the end of the course the students should be able to understand some practical applications that conceptualize the framework necessary to design and engineering of solar power system along with their different material aspects, electrical, thermal & optical characteristics for better efficiency.

Course Content

Modules	Blooms level*	Number of hours
Module I: Applications of Solar Energy Solar Photovoltaic applications -Solar home lighting systems, Solar water pumping systems, Solar power plants; Solar Thermal applications-Solar water heating systems. Factors to be considered in Solar System Design: Solar Radiation, Atmospheric effect on Solar Radiation, Daily and Seasonal Temperature Variations, Physical parameters, Availability of Land foundation needs, Orientation and Obstructions, Proximity of power Evacuation, Water availability, Any industries of pollution nearby, Power supply for construction. Typical Site Evaluation Methodology	L1, L2	10

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Module II: System Design of Solar Photovoltaic Systems Load Analysis- Accurate sizing, Peak current loads, Worst case scenarios, Plan for future, Compatibility issues, Determining design margins. Solar Array Design- Collector size, Selection of most appropriate module, Dust and Other contaminating effects, Orientation and Tilt issues, Design of Balance of Systems (BOS). Battery Design- Physical and Performance Requirement, Reserve Capacity, temperature and Ageing duration, Regulation and Charge control.	L2, L3	12
Module III: Designing Solar Home Lighting Systems (Case study) Case description, Assessment of load profile, Typical System Design, Assumptions in System Design, Battery Design, PV Array Design, Inverter Capacity, Charge Controller, Overall System Design, Request for Quotation, Evaluation of Quotations, Negotiation with the Parties, Finalization of Order, Inspection of goods Received, Parameters to be checked during Installation	L3, L4	14
Module IV: Designing Solar PV Water pumping system (Case study) System Design Methodology, Typical System Design, Case Description, Assumptions in System Design, Insolation Availability, Pumping Flow Requirement, Pumping Head Requirement (Static), Pumping Head Requirement (Dynamic), Pumping Energy Requirement, Pump Selection PV Array Design, Request for Quotation, Evaluation of Quotations, Negotiation with the Parties Finalization of Order, Inspection of goods Received, Parameters to be checked during Installation	L4, L5	12
Module V: Designing Solar Thermal Water Heating System (Case study) Case Description Typical System Design, Assumptions in System Design, Energy required for heating water, Collector Area Required, Request for Quotation, Evaluation of Quotations, Negotiation with the Parties, Finalization of Order, inspection of goods Received, Parameters to be checked during Installation.	L5, L6	12
Module VI:- Introduction To Smart Grids Concept of smart grid, smart grid control, Communications and Sensing in a Smart Grid, Hardware Architecture, Software architecture, Protocol detail, Discrete control and Analog control, application & benefits, PLCs Vs RTUs, IED's, RTU Block diagram, PMU communication interface, Future trends.	L5, L6	8
Module VI: Designing of various applications using MATLAB and PVSYST software Introduction to MATLAB, arithmetic operations on MATLAB, designing of solar photovoltaic power system on MATLAB, load estimation, Introduction to PVSYST, locational aspects of solar PV power point installation, designing of SPV power plant using PVSYST.	L3, L4	8

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

- Dr. P Jayakumar, Solar Energy Resource Assessment Handbook ,APCTT, 2008.
- Introduction to MATLAB: Katsons publications.

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Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination**Examination Scheme:**

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Relationship between the Course Outcomes (COs) , Programme Outcomes (POs) and Program Specific Outcomes

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CO4	1	2	2	-	1	3	2	-
CO5	1	3	2	-	1	3	2	-

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RWE4310	SMART GRIDS AND RENEWABLES	L	T	P	C
Version 1.1	Date of Approval: 25 July, 2016	3	1	0	4
Pre-requisites/Exposure					
Co-requisites					

Course Objectives

The objective of this course are as follows

- To discuss the current status of smart grid technology and its implementation aspects in India and World.
- To discuss the technical solutions for integrating more large capacity renewable energy in current energy generation scenario.
- To discuss role of Smart Grid in electricity grid connection..
- To identify factors affecting grid integration of renewable energy viz. net-metering, energy costing, automation of energy generation monitoring/control of energy generation by various renewable energy sources.

Course Outcomes

On completion of this course, the students will be able to

CO1. To identify factors affecting grid integration of renewable energy viz. net-metering, energy costing, automation of energy generation monitoring/control of energy generation by various renewable energy sources.

CO2. To know and be able to analyze the behavior of a self-consumption demand and the measurement of network management.

CO3. To carry out a basic engineering project related to energy supply using smart grid and SCADA technology.

CO4. To know the main lines of research in the field of photovoltaic technology and solar energy and to bring innovative ideas in the field of solar photovoltaic energy in smart grid systems.

Catalog Description

This course provides an introduction to how in developed countries, smart grid technologies can be used to upgrade, modernize or extend old grid systems, while at the same time providing opportunities for new, innovative solutions to be implemented.

Course Content

Modules	Blooms level*	Number of hours
Module I: Introduction: Smart Grids and Renewables Making the Transition to a Smarter Grid, Start with Pilot and Demonstration, Projects, Specific Technology Recommendations, Costs and Benefits: Making the Business Case for Smart Grid Technologies, Recognise and Respond to Technological conservatism, Leverage the Need for Private Sector, Investment, Recognise the Continual Nature of Technological Change, Regulation	L1, L2	10
Module II: How Smart Grids Enable Renewables Smart Grids and Variability, Smart Grids and Distributed Generation, Smart Grids and Capital Intensity, Improved Consumer Information, Control, and Choice, Improved Transmission and Distribution System Monitoring and Control, Integration of New Resources,	L2, L3	12

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Module III: Nontechnical Barriers to Smart Grids		
Data Ownership and Privacy, Grid Security, Control of Distributed Resources, The Role of New Private Sector Grid Players, The Need for Standards	L3, L4	14
Module IV: Smart Grid Technologies		
Advanced Metering Infrastructure, Advanced Electricity Pricing, Demand Response, Distribution Automation, Renewable Resource Forecasting, Smart Inverters, Distributed Storage, Microgrids and Virtual Power Plants, Bulk Power Technologies	L4, L5	12

Text Books

- Smart Grid & Renewables- A Guide for Effective Development- IRENA
- Antonio Luque & Steven Hegedus – Handbook of Photovoltaic Science and Engineering JohnWiley; Lecture notes.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

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RWE4403	GREEN BUILDINGS	L	T	P	C
Version 1.1	Date of Approval: 25 July, 2016	3	0	0	3
Pre-requisites/Exposure					
Co-requisites					

Course Objectives

The objective of this course is to

1. To make students understand about the various designing aspects of green buildings .
2. To covers the challenges, technology and application of protocols and standards of designing the green buildings using passive sources for heating and cooling.

Course Outcomes

On completion of this course, the students will be able to

- CO1. Understand the policies, protocols and rating agencies of green buildings.
CO2. Learn about certification guidelines of LEED, GRIHA, IGBC and BEE in the area of green buildings.
CO3. Various factors that affect the designing parameters, economical aspects and socio-economical constraints of design, operation and maintenance of green buildings.
CO4. To introduce the policy and protocols for certification of green buildings in real world.

Catalog Description

This course covers the challenges, technology and application of green buildings covering designing parameters, economical aspects and socio-economical constraints of design, operation and maintenance in longer term.

Course Content

Modules	Blooms level*	Number of hours
Module I: Climate Introduction, Climate & its Component, Factor Affecting Climate, Climatic Zones and their characteristics, Urban Climate, Microclimate.	L1, L2	12
Module II: Energy and Welfare Economics Evaluation of policy instruments, Energy return on investment, Concept of welf Module II: Green Building- Concepts, Design and Performance. Building, Implications of climate on building design, Green Buildings, Objective & Essential Characteristics of Green Buildings (i.e. Building Envelope, Passive Heating, Passive Cooling, Day lighting, Building Materials, Heat Transfer, Solar Radiation, Simplified Method for Performance Estimation), solar rooftop, solar water heating are economics, Energy goods and energy services, Renewable Energy in Developing Countries, World Energy Council Action Plan.	L2, L3	12
Module III: Green Building Rating System Various green building rating National and International stage, USGBC, IGBC, GRIHA, BREAM, STAR RATING.	L3, L4	12
Module IV: Policies & Examples	L4, L5	12

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Different policies (National & International), Energy Conservation Act 2005, ECBC, BEE Different example at National and International stage		
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**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

- J. W. Twidell, T Weir, Renewable energy resources, 3rd edition, Routledge, Taylor and Francis group, 2015
- G. N. Tiwari, Solar Energy: Fundamentals, design, modeling and applications, Narosa, 2002. ISBN-10: 0849324092
- V.V. N. Kishore, Renewable Energy Engineering and Technology: Principles and Practice, The Energy and Resources Institute, TERI, 2010. ISBN-10: 9788179932216.

Reference Books

- Sustainable Building Design Book edited and published by SB05 TOKYO
- Green Building – Guidebook for Sustainable Architecture Authored By Michael Bauer
- Climate Responsive Architecture: A Design Handbook for Energy Efficient Buildings Authored Arvind Krishan

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

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RWE4437	DISSERTATION /SEMINAR & PROGRESS REPORT /COMPREHENSIVE VIVA	L	T	P	C
Version 1.1	Date of Approval: 14 July 2016	0	0	0	10
Pre-requisites/ Exposure					
Co-requisites					

Course Objectives

The objective of this course is to

- To emphasize on the importance of practical experience in life is integral part of learning of the various concepts of set up of renewable energy systems.
- To describe the basics of designing and innovative idea reproduction ethics.
- To examine different industrial areas viz. biomass energy conversion technologies, green building aspects in the energy sector, solar power plants and develop to select appropriate methodologies from the range of different technologies
- To understand and describe the payback period, investment cost and cost effectiveness of renewable energy compared with traditional sources.
- To start a step stone in the direction of make students think like entrepreneurs and energy auditors/managers.
- The students pursue three months industrial training dealing in the area of renewable energy and present their comprehensive learning for evaluation.

Course Outcomes

On completion of this course, the students will be able to

- CO1. To examine different industrial areas viz. biomass energy conversion technologies, green building aspects in the energy sector, solar power plants and develop to select appropriate methodologies from the range of different technologies
- CO2. To emphasize on the importance of practical experience in life is integral part of learning of the various concepts of set up of renewable energy systems.
- CO3. The students pursue three months industrial training dealing in the area of renewable energy and present their comprehensive learning for evaluation.

Catalog Description

In today's competitive environment an understanding is required which will facilitate the implementation of basic principles, tools and techniques used in the field of solar photovoltaic engineering. This course is designed for the students who want to understand the basics of solar PV and thermal energy conversion engineering. A student is supposed to have a basic knowledge of mathematical modeling and tools. The subject will further enhance the knowledge regarding the various methods and techniques used for solving various problems related to practical designing of solar power systems.



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Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

	REPORT	PRE-SENTSA-TION	VIVA	ANALY-SIS	CONTENT
	30	30	10	15	15

Relationship between the Course Outcomes (COs) , Programme Outcomes (POs) and Program Specific Outcomes

	PO 1	PO 2	PO 3	PO 4	PSO 1	PSO 2	PSO3	PSO4
CO1	1	3	2	3	1	3	2	-
CO2	1	2	2	3	1	3	2	-
CO3	1	2	2	-	1	3	2	-
CO4	1	2	2	-	1	3	2	-
CO5	1	3	2	-	1	3	2	-

1: strongly related, 2: moderately related and 3: weakly related



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Master of Science Renewable Energy (Part-Time)

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Programme Structure

Curriculum & Scheme of Examination

2022

**AMITY UNIVERSITY HARYANA
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RWP4101	RENEWABLE ENERGY CONVERSION SYSTEMS	L	T	P	C
Version 1.1	Date of Approval: Date, Aug 2016	2	0	0	3
Pre-requisites/Exposure					
Co-requisites					

Course Objectives

The objective of the course is to provide introduction to different Renewable energy sources and Analyze the full coverage of Renewable energy supplies needed for modern economies. Course covers scientific aspects of power generation from Sun, wind, and biomass & ocean thermal routes.

Course Outcomes

On completion of this course, the students will be able to:

CO1: Describe the various renewable energy sources and the possible conversion paths to a useful form of energy.

CO2: Describe the aerodynamics of wind turbines and calculate their power, energy production, output and their environmental impact.

CO3: Explain how geothermal is currently used as a source of energy, its future potential both in providing energy and in producing alternative fuels.

CO4: Explain the physical principles of Solar energy and photovoltaic energy conversion route.

Catalog Description

This course aims to make the students understand the importance renewable energy conversion systems and also explains the significance of energy supply from renewables as an essential component of every nation's strategy, especially when there is responsibility for the environment and for sustainability.

Course Content

Modules	Blooms level*	Number of hours
Module I: Introduction to Renewable Energy Renewable and Non-Renewable Energy, World energy scenario; Fossil fuel resources - estimates and duration; India's energy scenario; Synergy between energy and environment, global environment issues, greenhouse gas emission, global warming, green energy solutions, technical and social implications of renewable energy	L1, L2	7
Module II: Solar Concepts Introduction, Sun as the source of radiation, Earth and Solar constant, Extra-terrestrial solar radiation, components of radiation, effects of earth's atmosphere, Introduction to solar PV, Introduction to solar Thermal.	L1, L2	8
Module III: Biofuels, Wind Energy Biofuels- Definition, generations and types; Wind-Characteristics, Sources of wind, components of wind turbines, advantages and environmental aspects of wind energy	L1, L2	7
Module IV: Hydro Energy, Tidal Energy Hydro- Principles, hydro-turbines, social and environmental aspects. Tidal- The nature of the resource, physics, power generation,	L1, L2	7

technical factors, environmental factors, tidal energy potential, tidal barrage, tidal stream, tidal current turbines.		
Module V: Geothermal, OTEC, Nuclear Energy Geothermal- Principles, suitable sites and criteria, Advantages and disadvantages; OTEC- Principles, Open and closed systems, Nuclear fusion, fission, various types of nuclear fuels and nuclear reactors.	L1, L2	7

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

- J. W. Twidell, T Weir, Renewable energy resources, 3rd edition, Routledge, Taylor and Francis group, 2015
- G. N. Tiwari, Solar Energy: Fundamentals, design, modeling and applications, Narosa, 2002. ISBN-10: 0849324092
- V.V. N. Kishore, Renewable Energy Engineering and Technology: Principles and Practice, The Energy and Resources Institute, TERI, 2010. ISBN-10: 9788179932216.

Reference Books

- J. A. Duffie and W. A. Beckmann, Solar Engineering of Thermal Processes, 4th edition, Wiley, 2013. ISBN: 978-0-470-87366-3
- P. Gipe, Wind Energy Comes of Age, 1st edition, Wiley, 1995.
- Directory, Indian Windpower 2004, CECL, Bhopal.
- R. Murray, K. E. Holbert, Nuclear energy: An introduction to the concepts, systems and applications of nuclear processes, 7th edition, Butterworth-Heinemann, 2014

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Relationship between the Course Outcomes (COs) , Programme Outcomes (POs) and Program Specific Outcomes

	PO 1	PO 2	PO 3	PO 4	PSO 1	PSO 2	PSO3	PSO4
CO1	1	3	2	3	1	3	2	-
CO2	1	3	2	3	1	3	2	-
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CO5	1	3	2	-	1	3	2	-

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RWP4102	INTRODUCTION TO SOLAR PHOTOVOLTAICS	L	T	P	C
Version 1.1	Date of Approval: 25 July, 2016	2	0	0	4
Pre-requisites/Exposure					
Co-requisites					

Course Objectives

The objective of this course are as follows

1. This course covers the design and engineering of solar cells along with their different material aspects, electrical, thermal & optical characteristics for better efficiency.
2. To understand the role of solar energy in the context of regional and global energy system, its economic, social and environmental connotations, and the impact of technology on a local and global context.
3. To understand the physical principles of the photovoltaic (PV) solar cell and what are its sources of losses.
4. To understand and apply the basic concepts of solar radiation necessary for dimensioning (sizing) PV systems installation.

Course Outcomes

On completion of this course, the students will be able to

CO1. To know some practical applications that use solar photovoltaic systems and be able to do specify, analyze and design.

CO2. To know and be able to analyze the behavior of a self-consumption demand and the measurement of network management.

CO3. To carry out a basic engineering project related to energy supply using solar photovoltaic technology.

CO4. To know the main lines of research in the field of photovoltaic technology and solar energy and to bring innovative ideas in the field of solar photovoltaic energy.

Catalog Description

This course covers the concepts of basic engineering project related to energy supply using solar photovoltaic technology. Also, to make students understand the practical applications that use solar photovoltaic systems and be able to do specify, analyze and design.

Course Content

Modules	Blooms level*	Number of hours
Module I: Thin film solar cell technologies Generic advantages of thin film technologies, material in thin film technologies, thin film deposition techniques, Amorphous Si solar cell technology, CdTe solar cell technology, CIGS solar cell technology, thin film epitaxial Si solar cell technology.	L1, L2	7
Module II: Concentrating PV Cells and systems Light concentration, concentration ratio, series resistance optimization, optics for concentrator PV, tracking requirement of CPV, cooling requirements, high concentration solar cells	L1, L2	8
Module III: Emerging Solar Cells technologies and concepts Organic solar cells, Dye-sensitized solar cells, GaAs solar cells, Thermo-photovoltaic, approaches to overcome single junction efficiency limits, Solar photovoltaic modules, spectrum modification approaches, hot carrier solar cells.	L2, L3	7

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Module IV: Solar PV Modules Solar PV modules from solar cells, mismatch in series connection, mismatch in parallel connections, design and structure of PV modules, PV module power output and factors affecting its performance.	L3, L4	7
Module V: Balance of Solar PV systems Battery for energy storage in solar PV system, factors affecting battery performance, DC-DC converters, charge controllers, Dc-AC converters, Maximum Power Point Tracking, stand alone SPV system, design methodology of PV systems, wire sizing , hybrid PV, grid connected PV, life cycle costing.	L5, L6	7

Bloom's Level:

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

- Solar Photovoltaics (Fundamentals, Technologies and Application) by Chetan Singh Solanki, PHI publications, 5th Edition.
- Handbook of Photovoltaic Science and Engineering by Antonio Luque & Steven Hegedus – John Wiley and Sons.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Relationship between the Course Outcomes (COs) , Programme Outcomes (POs) and Program Specific Outcomes

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CO4	1	2	2	-	1	3	2	-
CO5	1	3	2	-	1	3	2	-

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RWP4103	INTRODUCTION TO SOLAR THERMAL TECHNOLOGY	L	T	P	C
Version 1.1	Date of Approval: Date, Aug 2016	2	0	0	4
Pre-requisites/Exposure					
Co-requisites					

Course Objectives

The objective of this course is to introduce materials relevant to the engineering of solar thermal systems. Students will develop the skills to analysis the thermal performance of solar thermal systems. Many of these calculations will be based on solar applications in different area. Finally the concepts of engineering economics applied to solar energy will also be introduced.

Course Outcomes

On completion of this course, the students will be able to
CO1. Conduct the thermal Analysis of a solar thermal devices.
CO2. Explain working mechanism of solar thermal collectors
CO3. Design a solar thermal system based on the requirement.

Catalog Description

In this course, the various modes of heat transfer shall be discussed. The different types of errors, accuracy of the numerical methods are also discussed in detail. Students will taught to calculate the amount of incident solar flux on horizontal and tilted surfaces. Thermal analysis of flat plate collector and concentrating collectors will be taught. The energy storage systems and the different components of solar systems will be discussed. The various water heating, air heating systems and its application to space heating and cooling and other solar devices will be discussed. Solar thermal power generation will be taught in this course.

Course Content

Modules	Blooms level*	Number of hours
Module 1:Introduction Solar spectrum, Sun-Earth angles, Solar time, measurement of solar radiations (pyrheliometers, pyranometers), solar radiation on horizontal surface (estimation of average solar radiation, estimation of clear sky radiation).	L1, L2	7
Module 2: Flat plate collector Liquid flat plate collectors, Materials (glazing material, collector plates), classification (evacuated tubular collectors, Types of FPCs), Performance Analysis, efficiency of collectors and Testing of FPC, Effects of various parameters on performance, Analysis of Unconventional FPCs, air heating collectors.	L1, L2	8
Module 3: Solar Concentrator Characteristic parameters, classification of concentrators, tracking concentrator and non-tracking concentrators, cylindrical parabolic collector, compound parabolic collector, paraboloid dish collector, central receiver collector	L2, L3	7
Module 4: Solar Water Heating Introduction, Swimming pool heating, types (built-in-storage type, separate storage type), Performance predictions.	L3, L4	7

*Bloom's Level:

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

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Text Books

- J. W. Twidell, T Weir, Renewable energy resources, 3rd edition, Routledge, Taylor and Francis group, 2015
- G. N. Tiwari , Solar Energy: Fundamentals, design, modeling and applications, Narosa, 2002. ISBN-10: 0849324092
- V.V. N. Kishore, Renewable Energy Engineering and Technology: Principles and Practice, The Energy and Resources Institute, TERI, 2010. ISBN-10: 9788179932216.

Reference Books

1. J. A. Duffie and W. A. Beckmann, Solar Engineering of Thermal Processes, 4th edition, Wiley, 2013. ISBN: 978-0-470-87366-3

**Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination
Examination Scheme:**

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Relationship between the Course Outcomes (COs) , Programme Outcomes (POs) and Program Specific Outcomes

	PO 1	PO 2	PO 3	PO 4	PSO 1	PSO 2	PSO3	PSO4
CO1	1	3	2	3	1	3	2	-
CO2	1	2	2	3	1	3	2	-
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CO5	1	3	2	-	1	3	2	-

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RWP4105	Field Work I/ Seminar I	L	T	P	C
Version 1.1	Date of Approval: 14 July 2016	0	0	0	1
Pre-requisites/ Exposure	Solar PV lab				
Co-requisites	Solar thermal lab				

Course Objectives

The objective of this course is to

- To understand the various aspects of various instruments viz. solar dryer, solar concentrator, solar water heater by carrying out the experiment on latest technological equipments in the area of interest of the students.
- To describe the basics of operation of solar radiation measurement, wind speed and solar energy absorption and collecting devices.
- To understand and describe the applications of various experimental studies in practical life to analyze the various parameters of environment.

Course Outcomes

On completion of this course, the students will be able to

- CO1. To describe the basics of operation of solar radiation measurement, wind speed and solar energy absorption and collecting devices.
- CO2. To examine different areas viz. variation of various pollutants and contaminants present in the atmosphere and the effect of solar radiations on their concentration.
- CO3. To understand the component of solar radiation responsible for the working of solar thermal technology and investigate the efficiency/performance parameters of all equipments.

Catalog Description

In today's competitive environment an understanding is required which will facilitate the implementation of basic principles, tools and techniques used in the field of solar photovoltaic engineering. This course is designed for the students who want to understand the basics of solar PV and thermal energy conversion engineering. A student is supposed to have a basic knowledge of mathematical modeling and tools. The subject will further enhance the knowledge regarding the various methods and techniques used for solving various problems related to practical designing of solar power systems.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:


IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

Relationship between the Course Outcomes (COs) , Programme Outcomes (POs) and Program Specific Outcomes

	PO 1	PO 2	PO 3	PO 4	PSO 1	PSO 2	PSO3	PSO4
CO1	1	3	2	3	1	3	2	-
CO2	1	2	2	3	1	3	2	-
CO3	1	2	2	-	1	3	2	-
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CO5	1	3	2	-	1	3	2	-

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RWP4204	ENERGY STORAGE	L	T	P	C
Version 1.1	Date of Approval: 25 July, 2016	2	0	0	4
Pre-requisites/Exposure					
Co-requisites					

Course Objectives

The objective of this course is to

1. This course covers the various options of energy storage ranging from conventional batteries to super-capacitors. These storage systems are applicable for solar PV, Solar thermal and wind energy systems
2. To understand the role of various energy storage systems in the context of regional and global energy system, its economic, social and environmental connotations, and the impact of technology on a local and global context.
3. To understand the basic principles of the battery storage, capacitor storage and various electric and magnetic energy storage systems.
4. To understand and apply the basic concepts of application areas of solar energy storage systems along with sizing of an autonomous battery banks and super-capacitor systems.

Course Outcomes

On completion of this course, the students will be able to

- CO1. To know some practical applications that use solar photovoltaic systems and be able to do specify, analyze and design
- CO2. To carry out a basic engineering project related to energy supply using solar photovoltaic storage technology.
- CO3. To understand the basic principles of the battery storage, capacitor storage and various electric and magnetic energy storage systems.
- CO4. This course covers the various options of energy storage ranging from conventional batteries to super-capacitors. These storage systems are applicable for solar PV, Solar thermal and wind energy systems.

Catalog Description

At the end of the course the students should be able to understand the factors that influence the use of solar radiation as an energy source; know the various active and passive technologies that are available for collecting solar energy, have the ability to apply design principles to selection of an appropriate solar energy installation to meet requirements.

Course Content

Modules	Blooms level*	Number of hours
Module 1: Energy Storage Need of energy storage; Different modes of Energy Storage. Potential energy: Pumped hydro storage; KE and Compressed gas system: Flywheel storage, compressed air energy storage; Electrical and magnetic energy storage: Capacitors, electromagnets	L1, L2	7
Module 2: Electrochemical Energy Storage Systems Batteries: Primary, Secondary, Lithium, Solid-state and molten solvent batteries; Lead acid batteries; Nickel Cadmium Batteries; Advanced Batteries	L2, L3	8
Module 3: Magnetic and Electric Energy Storage Systems	L3, L4	7

Superconducting Magnet Energy Storage (SMES) systems; Capacitor and Batteries: Comparison and application; Super capacitor: Electrochemical Double Layer Capacitor (EDLC), principle of working, structure		
Module 4: Sensible Heat Storage SHS mediums; Stratified storage systems; Rock-bed storage systems; Thermal storage in buildings; Earth storage; Energy storage in aquifers.	L4, L5	7
Module 5: Hydrogen Energy storage and Fuel cells Modes of hydrogen storage, safety aspects of hydrogen energy storage, fuel cells and types of fuel cells, Basic Fuel cell design and its characterization, Nano materials engineering for electrode preparation in biobatteries	L5, L6	7

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

- J. A. Duffie and W. A. Beckmann, Solar Engineering of Thermal Processes, 4th edition, Wiley, 2013. ISBN: 978-0-470-87366-3
- S P Sukhatme and J K Nayak, Solar Energy, Principles of Thermal Collection and Storage- Tata McGraw Hill Edu.Pvt. Ltd, 2nd Edition.
- John F. Kreider and Frank Kreith, Solar Heating and Cooling, 2nded., Hemisphere Publishing Corp, 1982

Reference Books

- The Passive Solar Energy Book” by Edward Mazria, Rodale Press, 1979
- Solar Radiation Data Manual for Flat-Plate and Concentrating Collectors” National Renewable Energy Laboratory, 1994,
- Modeling Daylight Availability and Irradiance Components from Direct and Global Irradiance” by R. Perez, P. Ineichen, R. Seals, J. Michalsky and R. Stewart, Solar Energy 44 (5) pp. 271-289
- 2009 ASHRAE Handbook – Fundamentals (Inch-Pound Edition), American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc. (Stevens E-book on line)

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Relationship between the Course Outcomes (COs) , Programme Outcomes (POs) and Program Specific Outcomes

	PO 1	PO 2	PO 3	PO 4	PSO 1	PSO 2	PSO3	PSO4
CO1	1	3	2	3	1	3	2	-
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RWP4205	SOLAR PHOTOVOLTAIC AND THERMAL LAB	L	T	P	C
Version 1.1	Date of Approval: 26 June,2020	0	0	4	2
Pre-requisites/ Exposure	Solar PV lab				
Co-requisites	Solar thermal lab				

Course Objectives

The objective of this course is to

- To understand the various aspects of various instruments viz. Lux meter, AC/DC clamp meter, multi-meter, Anemometer, potentiometer etc. by carrying out the experiment on latest technological equipments in the area of interest of the students.
- To describe the basics of operation of solar radiation measurement, wind speed and solar energy absorption and collecting devices.
- To understand and describe the applications of various experimental studies in practical life to analyze the various parameters in the field of solar photovoltaic energy conversion.


Course Outcomes

On completion of this course, the students will be able to

- CO1. To describe the basics of operation of solar radiation measurement, wind speed and solar energy absorption and collecting devices.
- CO2. To examine different areas viz. variation of various pollutants and contaminants present in the atmosphere and the effect of solar radiations falling on various solar photovoltaic energy conversion systems.
- CO3. To understand the component of solar radiation responsible for the working of solar PV technology and investigate the efficiency/performance parameters of all equipments.

Catalog Description

In today's competitive environment an understanding is required which will facilitate the implementation of basic principles, tools and techniques used in the field of solar photovoltaic engineering. This course is designed for the students who want to understand the basics of solar PV and thermal energy conversion engineering. A student is supposed to have a basic knowledge of mathematical modeling and tools. The subject will further enhance the knowledge regarding the various methods and techniques used for solving various problems related to practical designing of solar power systems.


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Course Content

Modules	Blooms level*	Number of hours
Module 1 : Inverters <ul style="list-style-type: none"> Observe the output voltage waveform of inverter in auto mode. Observe the output voltage with manual control. 180 degree control 120 degree control. Observe the RMS value and waveform of output voltage with both 180 and 120 degree control. (The experiment to be carried out can be performed by taking on-line data from www.nrel.com)	L1, L2	7
Module 2 : Solar Thermal Systems <ul style="list-style-type: none"> To study the performance analysis of an Evacuated Tube Collector To find the overall loss coefficient of a liquid storage tank To determine the Performance (UL, FR, η) of the Parabolic Trough collector with varying Solar Radiation with water as heat removal medium (Forced mode) 	L2, L3	8
Module 3: Solar thermal Systems <ul style="list-style-type: none"> To determine the Performance (UL, FR, η) of the Parabolic Trough collector with water as heat removal medium (Forced mode) with fixed input parameters different flow rates To determine the Performance (UL, FR, η) of the Parabolic Trough collector for different flow rates and Solar Radiation. To determine the Performance (UL, FR, η) of the Parabolic Trough collector with different inlet water temperature (Forced mode) 	L3, L4	7

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books


- Solar Photovoltaics (Fundamentals, Technologies and Application) by Chetan Singh Solanki;
- Handbook of Photovoltaic Science and Engineering by Antonio Luque & Steven Hegedus - Wiley; Lecture notes.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.


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RWP4206	RISK MANAGEMENT IN RENEWABLE ENERGY PROJECTS	L	T	P	C
Version 1.1	Date of Approval: Date, Aug 2016	2	0	0	4
Pre-requisites/Exposure					
Co-requisites					

Course Objectives

This module will help participants to understand the risks involved in the project and the loan application evaluation process to be followed.

Course Outcomes

On completion of this course, the students will be able to

CO1. Define project parameters, project scope, stakeholders, project phases, Time & Resource requirements and limitations

CO2. Identify risks associated with the project viz Social, environmental, economic, political, technological risks to name a few

CO3. Plan the strategy for risk mitigation

CO4: Measure the impact of the risks associated with the project

Catalog Description

The course is designed for the students to prepare them for the working in various renewable energy projects right from conceptualization to delivery of project. Students will discover the renewable energy project life cycle and learn how to build a successful project from pre implementation to completion. It will introduce project management topics such as resources, costs, time constraints and project scopes. The students will learn about the various risks associated with RE projects. Identify them and decide suitable measures for risk mitigation.

Course Content

Modules	Blooms level*	Number of hours
Module 1: Conventional energy projects and related uncertainties Introduction, the study, challenges in RE projects, risk associated with conventional energy projects, risk management approach in energy policies	L1, L2	7
Module II: Uncertainties in RES projects RES project characteristics, Risk associated with specific RES technologies. Risk: Definition and types, Risk analysis, Risk Identification, Risk impact assessment, Risk prioritization, Risk tracking, Risk mitigation planning, implementation and progress monitoring, tools for risk mitigation, Case study for managing risks in industries.	L2, L3	8
Module III: Recommended Risk Management methodology Project definition & requirement, risk identification, risk evaluation, risk control, risk follow up, risk feedback, risk management implementation in RES investment lifecycle	L3, L4	7
Module IV: Support measures Measures to address political risk, Measures to address economic risks, Measures to address technical risks, Measures to address social risks, generic interventions, Conclusions & recommendation	L4, L5	7

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

- 1.) The Owner's Role in Project Risk Management. National Academic Press
- 2.) Risk Analysis in Project Management, by J. Raftery

Reference Books

- 1.) Financial risk management instruments for RE projects. UNEP Report
- 2.) Prasanna, C. (2008). Projects, Planning, Analysis, Selection, Financing, Implementation and Review. Tata McGraw-Hill Publishing Company Limited.
- 3.) Finnerty, J. D. (2013). Project financing: Asset-based financial engineering. John Wiley & Sons.
- 4.) Frigenti, E., & Comminos, D. (2002). The Practice of Project Management: a guide to the business focused approach. Kogan Page Publishers.
- 5.) Lewis, J. P. (2002). Fundamentals of project management: developing core competencies to help outperform the competition. AMACOM Div American Mgmt Assn.
- 6.) Scott, B. (2005). The Art of Project Management. California USA. O'Reilly Media Inc.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Relationship between the Course Outcomes (COs) , Programme Outcomes (POs) and Program Specific Outcomes

	PO 1	PO 2	PO 3	PO 4	PSO 1	PSO 2	PSO3	PSO4
CO1	1	3	2	3	1	3	2	-
CO2	1	2	2	3	1	3	2	-
CO3	1	2	2	-	1	3	2	-
CO4	1	2	2	-	1	3	2	-
CO5	1	3	2	-	1	3	2	-

1: strongly related, 2: moderately related and 3: weakly related



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RWP4303	BIOMASS	L	T	P	C
Version 1.1	Date of Approval: 25 July, 2016	2	0	0	4
Pre-requisites/Exposure					
Co-requisites					

Course Objectives

The objective of this course are as follows:

- To understands the various renewable feedstocks, their availability and attributes for biofuel production
- To describe the biomass conversion processes and devices
- To examine different biomass energy conversion technologies in the energy Sector and develop to select appropriate methodologies from the range of different biomass energy technologies
- To understands and describe the capital costs, and cost effectiveness of Biomass energy compared with traditional sources.

Course Outcomes

On completion of this course, the students will be able to

- CO1. To know some practical applications that conceptualizes the framework necessary to understand above thermochemical energy processes (combustion, gasification, pyrolysis, reforming), mechanical and chemical processes (oil extraction and trans-esterification), finally biochemical processes (fermentation and anaerobic digestion)
- CO2. To carry out a basic engineering project related to financial evaluation of renewable energy systems.
- CO3. To understand the basic principles of the designing of a bio-energy thermo-chemical conversion process.
- CO4. This course covers the various aspects of Biofuel, biomethanation and their production technologies.

Catalog Description

At the end of the course the students should be able to understand some practical applications that conceptualizes the framework necessary to understand above thermochemical energy processes (combustion, gasification, pyrolysis, reforming), mechanical and chemical processes (oil extraction and trans-esterification), finally biochemical processes (fermentation and anaerobic digestion).

Course Content

Modules	Blooms level*	Number of hours
Module I - : Introduction Introduction, Properties of biomass, sources of biomass, broad classification of biomass, agro and forestry residues; Techniques of biomass assessment, biomass estimation, Biodegradation and biodegradability of substrate	L1, L2	10
Module II- Biochemistry of biomass Introduction of bio-molecules: carbohydrates, proteins, Amino ac-ids, lipids and Nucleic acid. Enzymes: Definition with examples of holoenzyme, apoenzyme, coenzymes, cofactors, activators, inhib-itors, active site, units of enzyme activity,	L2, L3	12

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specific enzymes, En-zyme Kinetics, Factors affecting enzyme activity: enzyme concentration, substrate concentration, pH and temperature		
Module III- Biofuel Definition and types of Biofuels: Biogas, Biodiesel, Algal biofuel, Ethanol, Methanol etc.; Photosynthesis, fermentation, anaerobic digestion, Biodiesel production from oil seeds (edible and non-edible), waste oils and algae, Quality standards for biodiesel, En-vironmental impacts of biofuel production	L3, L4	14
Module IV- Bioreactors Introduction, Microbial growth curve, Types of bioreactors: Batch, plug flow reactor (PFR), continuous stirred tank reactors (CSTR), fluidized bed reactor bubble column, fixed film reactors, air lift fermentor, Photo bioreactor etc.	L4, L5	12
Module V: Government Policies Biofuel policy, Supporting programs and policies on biogas, bio-hydrogen, biodiesel and bioethanol, biogas purification technology and waste to energy program.	L5, L6	12

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

- Francisco RosilloCallé, Frank Rosillo-Calle, The Biomass Assessment Handbook: Bioenergy for a Sustainable Environment, PHI Publication, 1996.
- Ashok Pandey, Christian Larroche, Steven C. Ricke, Claude-Gilles Dussap, Edgard Gnansounou, Biofuels: Alternative Feedstocks and Conversion Processes, TMH, 2003.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Relationship between the Course Outcomes (COs) , Programme Outcomes (POs) and Program Specific Outcomes

	PO 1	PO 2	PO 3	PO 4	PSO 1	PSO 2	PSO3	PSO4
CO1	1	3	2	3	1	3	2	-
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CO3	1	2	2	-	1	3	2	-
CO4	1	2	2	-	1	3	2	-
CO5	1	3	2	-	1	3	2	-

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RWP4305	DESIGNING OF SOLAR PROJECTS	L	T	P	C
Version 1.1	Date of Approval: 25 July, 2016	2	0	0	4
Pre-requisites/Exposure					
Co-requisites					

Course Objectives

The objective of this course are as follows:

- This course covers the design and engineering of solar power system along with their different material aspects, electrical, thermal & optical characteristics for better efficiency.
- To understand the role of solar energy in the context of regional and global energy system, it's economic, social and environmental connotations, and the impact of technology on a local and global context.
- To understand the physical principles of the photovoltaic (PV) solar cell and what are its sources of losses.
- To understand and apply the basic concepts of solar radiation necessary for dimensioning (sizing) PV systems installation.

Course Outcomes

On completion of this course, the students will be able to

- CO1. To know some practical applications that use solar photovoltaic systems and be able to do specify, analyze and designing of real time systems.
- CO2. To know and be able to analyze the behavior of a self-consumption demand and the measurement of network management.
- CO3. To carry out a basic engineering project related to energy supply using solar photovoltaic technology.
- CO4. To know the main lines of research in the field of photovoltaic technology and solar energy. To bring innovative ideas in the field of solar photovoltaic energy.

Catalog Description

At the end of the course the students should be able to understand some practical applications that conceptualize the framework necessary to design and engineering of solar power system along with their different material aspects, electrical, thermal & optical characteristics for better efficiency.

Course Content

Modules	Blooms level*	Number of hours
Module I: Applications of Solar Energy Solar Photovoltaic applications -Solar home lighting systems, Solar water pumping systems, Solar power plants; Solar Thermal applications-Solar water heating systems. Factors to be considered in Solar System Design: Solar Radiation, Atmospheric effect on Solar Radiation, Daily and Seasonal Temperature Variations, Physical parameters, Availability of Land foundation needs, Orientation and Obstructions, Proximity of power Evacuation, Water availability, Any industries of pollution nearby, Power supply for construction. Typical Site Evaluation Methodology	L1, L2	10
Module II: System Design of Solar Photovoltaic Systems	L2, L3	12

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Load Analysis- Accurate sizing, Peak current loads, Worst case scenarios, Plan for future, Compatibility issues, Determining design margins. Solar Array Design- Collector size, Selection of most appropriate module, Dust and Other contaminating effects, Orientation and Tilt issues, Design of Balance of Systems (BOS). Battery Design- Physical and Performance Requirement, Reserve Capacity, temperature and Ageing duration, Regulation and Charge control.		
Module III: Designing Solar Home Lighting Systems (Case study) Case description, Assessment of load profile, Typical System Design, Assumptions in System Design, Battery Design, PV Array Design, Inverter Capacity, Charge Controller, Overall System Design, Request for Quotation, Evaluation of Quotations, Negotiation with the Parties, Finalization of Order, Inspection of goods Received, Parameters to be checked during Installation	L3, L4	14
Module IV: Designing Solar PV Water pumping system (Case study) System Design Methodology, Typical System Design, Case Description, Assumptions in System Design, Insolation Availability, Pumping Flow Requirement, Pumping Head Requirement (Static), Pumping Head Requirement (Dynamic), Pumping Energy Requirement, Pump Selection PV Array Design, Request for Quotation, Evaluation of Quotations, Negotiation with the Parties Finalization of Order, Inspection of goods Received, Parameters to be checked during Installation	L4, L5	12
Module V: Designing Solar Thermal Water Heating System (Case study) Case Description Typical System Design, Assumptions in System Design, Energy required for heating water, Collector Area Required, Request for Quotation, Evaluation of Quotations, Negotiation with the Parties, Finalization of Order, inspection of goods Received, Parameters to be checked during Installation.	L5, L6	12
Module VI:- Introduction To Smart Grids Concept of smart grid, smart grid control, Communications and Sensing in a Smart Grid, Hardware Architecture, Software architecture, Protocol detail, Discrete control and Analog control, application & benefits, PLCs Vs RTUs, IED's, RTU Block diagram, PMU communication interface, Future trends.	L5, L6	8
Module VI: Designing of various applications using MATLAB and PVSYST software Introduction to MATLAB, arithmetic operations on MATLAB, designing of solar photovoltaic power system on MATLAB, load estimation, Introduction to PVSYST, locational aspects of solar PV power point installation, designing of SPV power plant using PVSYST.	L3, L4	8

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

- Dr. P Jayakumar, Solar Energy Resource Assessment Handbook ,APCTT, 2008.
- Introduction to MATLAB: Katsons publications.


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Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination
Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Relationship between the Course Outcomes (COs) , Programme Outcomes (POs) and Program Specific Outcomes

	PO 1	PO 2	PO 3	PO 4	PSO 1	PSO 2	PSO3	PSO4
CO1	1	3	2	3	1	3	2	-
CO2	1	2	2	3	1	3	2	-
CO3	1	2	2	-	1	3	2	-
CO4	1	2	2	-	1	3	2	-
CO5	1	3	2	-	1	3	2	-

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RWP4306	LARGE SCALE GRID INTEGRATION OF RE-NEWABLE ENERGY SOURCES	L	T	P	C
Version 1.1	Date of Approval: 25 July, 2018	2	0	0	4
Pre-requisites/Exposure					
Co-requisites					

Course Objectives

The objective of this course is to

1. To aware students about the present situation of Grid Integration.
2. To covers the challenges, technology and application of large scale grid integration of renewable energy sources.

Course Outcomes

On completion of this course, the students will be able to

- CO1. Understand the drivers behind the grid integration.
CO2. Learn about RE generation Technology, Transmission technology.
CO3. To Future technical solutions for integrating more large-capacity RE.
CO4. To introduce Smart Grids.

Catalog Description

This course covers the challenges, technology and application of large scale grid integration of renewable energy sources. This also gives the introduction to Smart Grids

Course Content

Modules	Blooms level*	Number of hours
Module I: Introduction: Smart Grids and Renewables Making the Transition to a Smarter Grid, Start with Pilot and Demonstration, Projects, Specific Technology Recommendations, Costs and Benefits: Making the Business Case for Smart Grid Technologies, Recognise and Respond to Technological conservatism, Leverage the Need for Private Sector, Investment, Recognise the Continual Nature of Technological Change, Regulation	L1, L2	10
Module II:How Smart Grids Enable Renewables Smart Grids and Variability, Smart Grids and Distributed Generation, Smart Grids and Capital Intensity, Improved Consumer Information, Control, and Choice, Improved Transmission and Distribution System Monitoring and Control, Integration of New Resources,	L2, L3	12
Module III: Nontechnical Barriers to Smart Grids Data Ownership and Privacy, Grid Security, Control of Distributed Resources, The Role of New Private Sector Grid Players, The Need for Standards	L3, L4	14
Module IV:Smart Grid Technologies	L4, L5	12

Advanced Metering Infrastructure, Advanced Electricity Pricing, Demand Response, Distribution Automation, Renewable Resource Forecasting, Smart Inverters, Distributed Storage, Microgrids and Virtual Power Plants, Bulk Power Technologies		
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Text Books

- Smart Grid & Renewables- A Guide for Effective Development- IRENA
- Antonio Luque & Steven Hegedus – Handbook of Photovoltaic Science and Engineering JohnWiley; Lecture notes.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Relationship between the Course Outcomes (COs) , Programme Outcomes (POs) and Program Specific Outcomes

	PO 1	PO 2	PO 3	PO 4	PSO 1	PSO 2	PSO3	PSO4
CO1	1	3	2	3	1	3	2	-
CO2	1	2	2	3	1	3	2	-
CO3	1	2	2	-	1	3	2	-
CO4	1	2	2	-	1	3	2	-
CO5	1	3	2	-	1	3	2	-

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RWP4403	GREEN BUILDINGS	L	T	P	C
Version 1.1	Date of Approval: 25 July, 2016	2	0	0	4
Pre-requisites/Exposure					
Co-requisites					

Course Objectives

The objective of this course is to

- To make students understand about the various designing aspects of green buildings .
- To covers the challenges, technology and application of protocols and standards of designing the green buildings using passive sources for heating and cooling.

Course Outcomes

On completion of this course, the students will be able to

- CO1. Understand the policies, protocols and rating agencies of green buildings.
CO2. Learn about certification guidelines of LEED, GRIHA, IGBC and BEE in the area of green buildings.
CO3. Various factors that affect the designing parameters, economical aspects and socio-economical constraints of design, operation and maintenance of green buildings.
CO4. To introduce the policy and protocols for certification of green buildings in real world.

Catalog Description

This course covers the challenges, technology and application of green buildings covering designing parameters, economical aspects and socio-economical constraints of design, operation and maintenance in longer term.

Course Content

Modules	Blooms level*	Number of hours
Module I: Climate Introduction, Climate & its Component, Factor Affecting Climate, Climatic Zones and their characteristics, Urban Climate, Microclimate.	L1, L2	12
Module II: Energy and Welfare Economics Evaluation of policy instruments, Energy return on investment, Concept of welf Module II: Green Building- Concepts, Design and Performance. Building, Implications of climate on building design, Green Buildings, Objective & Essential Characteristics of Green Buildings (i.e. Building Envelope, Passive Heating, Passive Cooling, Day lighting, Building Materials, Heat Transfer, Solar Radiation, Simplified Method for Performance Estimation), solar rooftop, solar water heating are economics, Energy goods and energy services, Renewable Energy in Developing Countries, World Energy Council Action Plan.	L2, L3	12
Module III: Green Building Rating System Various green building rating National and International stage, USGBC, IGBC, GRIHA, BREAM, STAR RATING.	L3, L4	12
Module IV: Policies & Examples Different policies (National & International), Energy Conservation Act 2005, ECBC, BEE Different example at National and International stage	L4, L5	12

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**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

- J. W. Twidell, T Weir, Renewable energy resources, 3rd edition, Routledge, Taylor and Francis group, 2015
- G. N. Tiwari, Solar Energy: Fundamentals, design, modeling and applications, Narosa, 2002. ISBN-10: 0849324092
- V.V. N. Kishore, Renewable Energy Engineering and Technology: Principles and Practice, The Energy and Resources Institute, TERI, 2010. ISBN-10: 9788179932216.

Reference Books

- Sustainable Building Design Book edited and published by SB05 TOKYO
- Green Building – Guidebook for Sustainable Architecture Authored By Michael Bauer
- Climate Responsive Architecture: A Design Handbook for Energy Efficient Buildings Authored Arvind Krishan

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Relationship between the Course Outcomes (COs) , Programme Outcomes (POs) and Program Specific Outcomes

	PO 1	PO 2	PO 3	PO 4	PSO 1	PSO 2	PSO3	PSO4
CO1	1	3	2	3	1	3	2	-
CO2	1	2	2	3	1	3	2	-
CO3	1	2	2	-	1	3	2	-
CO4	1	2	2	-	1	3	2	-
CO5	1	3	2	-	1	3	2	-

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RWP4404	Field Work II/ Minor Project /Seminar II	L	T	P	C
Version 1.1	Date of Approval: 14 July 2016	0	0	0	2
Pre-requisites/ Exposure	Solar PV lab				
Co-requisites	Solar thermal lab				

Course Objectives

The objective of this course is to

- To understand the various aspects of various instruments viz. solar dryer, solar concentrator, solar water heater by carrying out the experiment on latest technological equipments in the area of interest of the students.
- To describe the basics of operation of solar radiation measurement, wind speed and solar energy absorption and collecting devices.
- To understand and describe the applications of various experimental studies in practical life to analyze the various parameters of environment.

Course Outcomes

On completion of this course, the students will be able to

- CO1. To describe the basics of operation of solar radiation measurement, wind speed and solar energy absorption and collecting devices.
- CO2. To examine different areas viz. variation of various pollutants and contaminants present in the atmosphere and the effect of solar radiations on their concentration.
- CO3. To understand the component of solar radiation responsible for the working of solar thermal technology and investigate the efficiency/performance parameters of all equipments.

Catalog Description

In today's competitive environment an understanding is required which will facilitate the implementation of basic principles, tools and techniques used in the field of solar photovoltaic engineering. This course is designed for the students who want to understand the basics of solar PV and thermal energy conversion engineering. A student is supposed to have a basic knowledge of mathematical modeling and tools. The subject will further enhance the knowledge regarding the various methods and techniques used for solving various problems related to practical designing of solar power systems.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

Relationship between the Course Outcomes (COs) , Programme Outcomes (POs) and Program Specific Outcomes

	PO 1	PO 2	PO 3	PO 4	PSO 1	PSO 2	PSO3	PSO4
CO1	1	3	2	3	1	3	2	-
CO2	1	2	2	3	1	3	2	-
CO3	1	2	2	-	1	3	2	-
CO4	1	2	2	-	1	3	2	-
CO5	1	3	2	-	1	3	2	-

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RWP4406	THERMOELECTRIC SYSTEMS AND DEVICES	L	T	P	C
Version 1.1	Date of Approval: 25 July, 2016	2	0	0	4
Pre-requisites/Exposure					
Co-requisites					

Course Objectives

The objective of this course are as follows

- To discuss the current status of usage of thermoelectric generator, cooler and a heat pump in day to day life along with their respective advantages and disadvantages.
- To understand the technical implications of thermoelectric generator, heat pump and cooler for practical applications.
- To discuss the technical solutions for integrating thermoelectric devices with other energy sources like solar PV and solar thermal.
- To discuss role of performance analysis and evaluation of thermoelectric systems.
- To identify factors affecting grid integration of renewable energy viz netmetering, energy costing, automation of energy generation monitoring/control of energy generation by various renewable energy sources.

Course Outcomes

On completion of this course, the students will be able to

- CO1. To discuss the technical solutions for integrating thermoelectric devices with other energy sources like solar PV and solar thermal.
- CO2. To understand the technical implications of thermoelectric generator, heat pump and cooler for practical applications.
- CO3. To understand the technical implications of thermoelectric generator, heat pump and cooler for practical applications.
- CO4. To discuss the current status of usage of thermoelectric generator, cooler and a heat pump in day to day life along with their respective advantages and disadvantages.

Catalog Description

This course To understand the fundamentals of thermoelectric generators , coolers and heat pump; to apply to the optimum design problems in order to experience state-of-the-art technologies in the fields.

Course Content

Module I: Introduction: Smart Grids and Renewables

Making the Transition to a Smarter Grid, Start with Pilot and Demonstration, Projects, Specific Technology Recommendations, Costs and Benefits: Making the Business Case for Smart Grid Technologies, Recognise and Respond to Technological conservatism, Leverage the Need for Private Sector, Investment, Recognise the Continual Nature of Technological Change, Regulation

Module II:How Smart Grids Enable Renewables

Smart Grids and Variability, Smart Grids and Distributed Generation, Smart Grids and Capital Intensity, Improved Consumer Information, Control, and Choice, Improved Transmission and Distribution System Monitoring and Control, Integration of New Resources,

Module III: Nontechnical Barriers to Smart Grids

Data Ownership and Privacy, Grid Security, Control of Distributed Resources, The Role of New Private Sector Grid Players, The Need for Standards

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Module IV: Smart Grid Technologies

Advanced Metering Infrastructure, Advanced Electricity Pricing, Demand Response, Distribution Automation, Renewable Resource Forecasting, Smart Inverters, Distributed Storage, Microgrids and Virtual Power Plants, Bulk Power Technologies

Text Books

- Smart Grid & Renewables- A Guide for Effective Development- IRENA
- Handbook of Photovoltaic Science and Engineering by Antonio Luque & Steven Hegedus - Wiley; Lecture notes.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Relationship between the Course Outcomes (COs) , Programme Outcomes (POs) and Program Specific Outcomes

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CO1	1	3	2	3	1	3	2	-
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CO3	1	2	2	-	1	3	2	-
CO4	1	2	2	-	1	3	2	-
CO5	1	3	2	-	1	3	2	-

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RWP4503	SOLAR POWER GENERATION LAB	L	T	P	C
Version 1.1	Date of Approval: 26 June,2020	0	0	4	2
Pre-requisites/ Exposure	Solar PV lab				
Co-requisites	Solar thermal lab				

Course Objectives

The objective of this course is to

- To understand the various aspects of various instruments viz. Lux meter, AC/DC clamp meter, multi-meter, Anemometer, potentiometer etc. by carrying out the experiment on latest technological equipments in the area of interest of the students.
- To describe the basics of operation of solar radiation measurement, wind speed and solar energy absorption and collecting devices.
- To understand and describe the applications of various experimental studies in practical life to analyze the various parameters in the field of solar photovoltaic energy conversion with the help of MATLAB and PVSYS software.

Course Outcomes

On completion of this course, the students will be able to

- CO1. To describe the basics of operation of solar radiation measurement, wind speed and solar energy absorption and collecting devices.
- CO2. To examine different areas viz. variation of various pollutants and contaminants present in the atmosphere and the effect of solar radiations falling on various solar photovoltaic energy conversion systems.
- CO3. To understand the component of solar radiation responsible for the working of solar PV technology and investigate the efficiency/performance parameters of all equipments.

Catalog Description

In today's competitive environment an understanding is required which will facilitate the implementation of basic principles, tools and techniques used in the field of solar photovoltaic engineering. This course is designed for the students who want to understand the basics of solar PV and thermal energy conversion engineering. A student is supposed to have a basic knowledge of mathematical modeling and tools. The subject will further enhance the knowledge regarding the various methods and techniques used for solving various problems related to practical designing of solar power systems.



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Course Content

Modules	Blooms level*	Number of hours
Module 1 : Maximum Power Point Tracking Finding MPP by varying the resistive load across the PV panel. Finding MPP by varying the duty cycle of DC-DC converter. Using MPPT algorithm find the V_{max} , I_{max} and P_{max} and duty cycle at which MPP occurs. Perform the experiment (3) with different values of perturbation (ΔD). Observe the response of P_{max} with the P_{max} observed in exp -3. Perform the experiment no 1 to no 4, with battery in the circuit.	L1, L2	10
Module II: <ul style="list-style-type: none"> To demonstrate and generate the I-V and P-V Characteristics of PV Module with varying solar radiation level in MATLAB software. To demonstrate and generate the I-V and P-V Characteristics of PV Module with varying temperature level in MATLAB software. To demonstrate and generate the I-V and P-V Characteristics of PV Module with varying tilt angles or solar angle of incidences in PVSYS software. To realize the model of a solar module in MATLAB software and generate its I-V characteristics using single diode model. To realize the model of a solar module in MATLAB software and generate its P-V characteristics using single diode model. To study performance analysis of off grid Solar PV Power Plant To study performance of a solar thermal power plant 	L2, L3	12

*Bloom's Level:

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

- Solar Photovoltaics (Fundamentals, Technologies and Application) by Chetan Singh Solanki;
- Handbook of Photovoltaic Science and Engineering by Antonio Luque & Steven Hegedus - Wiley; Lecture notes.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

Relationship between the Course Outcomes (COs) , Programme Outcomes (POs) and Program Specific Outcomes

	PO 1	PO 2	PO 3	PO 4	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	3	2	3	1	3	2	-
CO2	1	2	2	3	1	3	2	-
CO3	1	2	2	-	1	3	2	-
CO4	1	2	2	-	1	3	2	-
CO5	1	3	2	-	1	3	2	-

1: strongly related, 2: moderately related and 3: weakly related

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RWP4637	DISSERTATION /SEMINAR & PROGRESS REPORT /COMPREHENSIVE VIVA	L	T	P	C
Version 1.1	Date of Approval: 14 July 2016	0	0	0	10
Pre-requisites/ Exposure					
Co-requisites					

Course Objectives

The objective of this course is to

- To emphasize on the importance of practical experience in life is integral part of learning of the various concepts of set up of renewable energy systems.
- To describe the basics of designing and innovative idea reproduction ethics.
- To examine different industrial areas viz. biomass energy conversion technologies, green building aspects in the energy sector, solar power plants and develop to select appropriate methodologies from the range of different technologies
- To understands and describe the payback period, investment cost and cost effectiveness of renewable energy compared with traditional sources.
- To start a step stone in the direction of make students think like entrepreneurs and energy auditors/managers.
- The students pursue three months industrial training dealing in the area of renewable energy and present their comprehensive learning for evaluation.


Course Outcomes

On completion of this course, the students will be able to

- CO1. To examine different industrial areas viz. biomass energy conversion technologies, green building aspects in the energy sector, solar power plants and develop to select appropriate methodologies from the range of different technologies
- CO2. To emphasize on the importance of practical experience in life is integral part of learning of the various concepts of set up of renewable energy systems.
- CO3. The students pursue three months industrial training dealing in the area of renewable energy and present their comprehensive learning for evaluation.

Catalog Description

In today's competitive environment an understanding is required which will facilitate the implementation of basic principles, tools and techniques used in the field of solar photovoltaic engineering. This course is designed for the students who want to understand the basics of solar PV and thermal energy conversion engineering. A student is supposed to have a basic knowledge of mathematical modeling and tools. The subject will further enhance the knowledge regarding the various methods and techniques used for solving various problems related to practical designing of solar power systems.


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Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

	REPORT	PRE-SENTSA-TION	VIVA	ANALY-SIS	CONTENT
	30	30	10	15	15

Relationship between the Course Outcomes (COs) , Programme Outcomes (POs) and Program Specific Outcomes

	PO 1	PO 2	PO 3	PO 4	PSO 1	PSO 2	PSO3	PSO4
CO1	1	3	2	3	1	3	2	-
CO2	1	2	2	3	1	3	2	-
CO3	1	2	2	-	1	3	2	-
CO4	1	2	2	-	1	3	2	-
CO5	1	3	2	-	1	3	2	-

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Curriculum & Scheme of Examination

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Course Code: AIE4102	ADVANCED DATABASE MANAGEMENT SYSTEMS	L	T	P	C
Version 2020.1	Date of Approval: 19 July 2020	3	0	0	3
Pre-requisites/Exposure	Basic knowledge of DBMS				
Co-requisites	NIL				

Catalog Description

The objective of this course is to expose the students to the implementation techniques of database system. This course explains techniques for query processing and optimization with transaction and concurrency control techniques.

Course Objectives

The objective of this course is to

1. To understand the basic concepts and terminology related to DBMS and Relational Database Design
2. To design and understand Distributed, parallel and object oriented Databases.
3. To understand advanced DBMS techniques to handle and optimize queries in database.

Course Outcomes

On completion of this course, the students will be able to

CO1. Understand the basics of database management system and implementation of relational database.

CO2. Knowhow of the file organization, Query Optimization, Transaction management, and database administration techniques.

CO3. Understand and design Distributed, parallel and object oriented Databases models and possible methods of proving them.

Modules	Blooms level*	Number of hours
MODULE 1: Relational Database Integrity Constraints revisited, Extended ER diagram, Relational Algebra & Calculus, Functional, Multivalued and Join Dependency, Normal Forms, Rules about functional dependencies.	L1, L2 and L3	8
MODULE 2: Query Processing and Optimization Valuation of Relational Operations, Transformation of Relational Expressions, Indexing and Query Optimization, Limitations of Relational Data Model, Null Values and Partial Information. Objected Oriented and Object Relational Databases Modeling Complex Data Semantics, Specialization, Generalization, Aggregation and Association, Objects, Object Identity, Equality and Object Reference, Architecture of Object Oriented and Object Relational Databases	L1,L2,l3	9

MODULE 3: Parallel and Distributed Databases Distributed Data Storage – Fragmentation & Replication, Location and Fragment Transparency Distributed Query Processing and Optimization, Distributed Transaction Modeling and concurrency Control, Distributed Deadlock, Commit Protocols, Design of Parallel Databases, and Parallel Query Evaluation. Advanced Transaction Processing Nested and Multilevel Transactions, Compensating Transactions and Saga, Long Duration Transactions, Weak Levels of Consistency, Transaction Work Flows, Transaction Processing Monitors.	L1, L2 and L3	10
MODULE 4: Multimedia databases, Databases on the Web and Semi-Structured Data , Case Study: Oracle Xi	L1, L2	9

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. Elmars, Navathe, Somayajulu, Gupta, "Fundamentals of Database Systems", 4th Edition, Pearson Education, 2007
2. Garcia, Ullman, Widom, "Database Systems, The complete book", Pearson Education, 2007
3. R. Ramakrishnan, "Database Management Systems", McGraw Hill International Editions, 1998

Reference Books

1. Date, Kannan, Swaminathan, "An Introduction to Database Systems", 8th Edition Pearson Education, 2007
2. Singh S.K., "Database System Concepts, design and application", Pearson Education, 2006.
3. Silberschatz, Korth, Sudarshan, "Database System Concepts", Mcgraw Hill, 6th Edition, 2006
4. W. Kim, "Modern Database Systems", 1995, ACM Press, Addison – Wesley,
5. D. Maier, "The Theory of Relational Databases", 1993, Computer Science Press, Rokville, Maryland
6. Ullman, J. D., "Principals of database systems", Galgotia publications, 1999
7. Oracle Xi Reference Manual
8. Dietrich, and Urban, "An Advanced Course in Database Systems", Pearson, 2008.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS O 1	PS O 2	PS O 3	PSO 4
CO 1	2	-	3	--	--	--	--	--	--	--	--	--	2	2	-	-
CO 2	2	2	3	-	--	--	--	--	--	--	--	--	2	1	-	-
CO 3	2	-	3	-	-	--	--	--	--	--	--	--	2	1	-	-

1: strongly related, 2: moderately related and 3: weakly related

Course Code: AIE4103	DIGITAL COMPUTER ORGANIZATION	L	T	P	C
Version 2020.1	Date of Approval: 19 July 2020	3	0	0	3
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

The Objective of this course is to expose the students to the fundamentals and the concepts of Digital & Computer Organization and Representation of Information and Basic Building Blocks, Basic Organization, Memory Organization, Input-Output Organization, Processor Organization etc. This course is designed to understand the concepts of Computer Organization for Research & Development as well as for application.

Course Objectives

The objective of this course is to

An understanding of a machine's instruction set architecture (ISA) including basic instruction fetch and execute cycles, instruction formats, control flow, and operand addressing modes.

Course Outcomes

On completion of this course, the students will be able to

CO1. Understand and Interpret the functional architecture of computing systems.

CO2. Identify, compare and assess issues related to ISA, memory, control and I/O functions.

CO3. Understand the general concepts in digital logic design, including logic elements, and their use in combinational and sequential logic circuit design.

CO4. Design and analyze solutions in the area of computer architecture.

Modules	Blooms level*	Number of hours
MODULE 1: Parallel computer models The state of computing, Multiprocessors and multicomputers, Multivector and SIMD computers, Architectural development tracks Program and network properties: Conditions of parallelism, Data and resource dependences, Hardware and software parallelism, Program partitioning and scheduling, Grain size and latency, Program flow mechanisms, Control flow versus data flow, Data flow architecture, Demand driven mechanisms, Comparisons of flow mechanisms	L1, L2 and L3	7
MODULE 2: System Interconnect Architectures Network properties and routing, Static interconnection networks, Dynamic interconnection Networks, Multiprocessor system interconnects, Hierarchical bus systems, Crossbar switch and multiport memory, Multistage and combining network.	L1,L2,L3	8
MODULE 3: Processors and Memory Hierarchy Advanced processor technology, Instruction-set Architectures, CISC Scalar Processors, RISC Scalar Processors, Superscalar Processors, VLIW Architectures, Vector and Symbolic processors Memory Technology: Hierarchical memory technology, Inclusion, Coherence and Locality, Memory capacity planning, Virtual Memory	L1, L2 and L3	8

Technology		
MODULE 4: Backplane Bus System Backplane bus specification, Addressing and timing protocols, Arbitration transaction and interrupt, Cache addressing models, Direct mapping and associative caches. Pipelining: Linear pipeline processor, Nonlinear pipeline processor, Instruction pipeline design, Mechanisms for instruction pipelining, Dynamic instruction scheduling, Branch handling techniques, Arithmetic Pipeline Design, Computer arithmetic principles, Static arithmetic pipeline, Multifunctional arithmetic pipelines	L1, L2	7
MODULE 5: Vector Processing Principles Vector instruction types, Vector-access memory schemes. Synchronous Parallel Processing: SIMD Architecture and Programming Principles, SIMD Parallel Algorithms, SIMD Computers and Performance Enhancement	L2,L4	6

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. M. Moris Mano, "Computer Systems Architecture", 4th Edition, Pearson/PHI, ISBN:10:0131755633
2. Carl Hamacher, Zvonko Vranesic, Safwat Zaky, "Computer Organization", 5 th Edition, McGraw Hill

Reference Books

1. J.P. Hayes, "computer Architecture and organization", MGH, 1998.
2. M.J Flynn, "Computer Architecture, Pipelined and Parallel Processor Design", Narosa Publishing, 1998.
3. D.A. Patterson, J.L. Hennessy, "Computer Architecture: A quantitative approach", Morgan Kauffmann, 2002.
4. Hwang and Briggs, "Computer Architecture and Parallel Processing"; MGH, 2000.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS O 1	PS O 2	PS O 3	PSO 4
CO 1	2	-	3	--	--	--	--	--	--	--	--	--	2	1	-	-
CO 2	2	2	3	-	--	--	--	--	--	--	--	--	2	1	2	-
CO 3	2	-	3	-	-	--	--	--	--	--	--	--	2	1	2	-
CO 4	2	-	3	-	-	--	--	--	--	--	--	--	2	1		-

1: strongly related, 2: moderately related and 3: weakly related

Course Code: AIE4104	ADVANCED COMPUTER NETWORKS	L	T	P	C
Version 2020.1	Date of Approval: 19 July 2020	3	0	0	3
Pre-requisites/Exposure	Basics of Computer Network				
Co-requisites	Nil				

Catalog Description

Advanced Computer Networks provides the knowledge of computer networks and related current research topics. This course illustrates the OSI and TCP-IP layers, services, devices, cables, protocols, network security, network performance parameters etc. This course focuses on advanced computer network concepts in theory as well as in real life applications in networking.

Course Objectives

The objective of this course is to

- Equip the students with the advanced networking concepts.
- Explain the different techniques of error detection and correction methods used at various layers.
- Provide an overview of various algorithms involved in advanced computer networks at OSI and TCP-IP Layers.

Course Outcomes

On completion of this course, the students will be able to

CO1: Explain the concept of reference model, wireless Ethernet standards, protocols and applications of networks.

CO2: Describe network Layer design issues, routing algorithms, IP addressing.

CO3: State Multicasting issues and multicast routing protocol. Describe mobile IP and its use in Multicasting.

CO4: State transport and application layers and explain services, protocols, performance parameters in these layers. Also describe DNS, Email and www with applications of each in computer network.

CO5: State network security and describe various types of computer network security, the digital signature, security algorithms. Explain the social issues related to network security and web security.

Modules	Blooms level*	Number of hours
MODULE 1: Uses computer networks, Reference Models, TCP/IP suite of protocols, MAC protocols for high-speed LANS, MANs, and wireless LANs. (For example, FDDI, DQDB, HIPPI, Gigabit Ethernet, Wireless Ethernet, etc.)Fast access technologies. (For example, ADSL, Cable Modem, etc.)	L1, L2	6
MODULE 2: Network Layer Design Issues, Routing Algorithms, Congestion Control Algorithms, Quality of Service, Internet Working, Network Layer in Internet. IPv6 basic protocol, extensions and options, support for QoS, security, etc., Changes to other protocols, Application Programming Interface for IPv6.	L2, L3	8
MODULE 3: Mobile IP, IP Multicasting. Multicast routing protocols, address assignments, session discovery, etc.	L1, L2	8
MODULE 4: The Transport Protocol: The Transport Service, Elements of transport	L1, L2, and L3	8

protocol, a simple Transport Protocol, Internet Transport Protocols UDP, Internet Transport Protocols TCP, TCP extensions for high-speed networks, transaction-oriented applications Performance Issues. The Application Layer: DNS-(Domain Name System), Electronic Mail, World Wide Web Multimedia.		
MODULE 5: Overview of network security, Secure-HTTP, SSL, ESP, Key distribution protocols. Digital signatures, digital certificates-mail Security, Web security, Social Issues..	L1, L2	6

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

1. William Stallings, Cryptography & Network Security: Principles and Practices, Prentice Hall, 2005, (ISBN: 978-0131873162).

Reference Books

1. Behrouz A. Forouzan, Cryptography & Network Security, McGraw-Hill, 2007, USA. (ISBN: 0073327530 9780073327532).
2. Douglas R. Stinson, Chapman and Hall, Cryptography Theory & Practice, CRC Press, 2005.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	-	-	-	-	--	--	--	--	--	--	--	1	--	-	--
CO2	1	-	-	-	3	--	3	--	--	--	--	--	1	--	-	--
CO3	1	-	-	-	3	--	3	--	--	--	--	--	2	1	-	--
CO4	1	-	-	--	2	--	2	--	3	--	--	--	2	1	-	--
CO5	1	-	-	-	1	-	1	--	2	--	--	--	1	2	-	--

1: strongly related, 2: moderately related and 3: weakly related

Course Code: AIE4106	ADVANCED DATABASE MANAGEMENT SYSTEM LAB	L	T	P	C
Version 2020.1	Date of Approval: 19 July 2020	0	0	2	1
Pre-requisites/Exposure	Basic knowledge of DBMS				
Co-requisites	Nil				

Catalog Description

The objective of this course is to expose the students to the implementation techniques of database system. This course explains techniques for query processing and optimization with transaction and concurrency control techniques.

Course Objectives

The objective of this course is

1. Equip the students with the different issues involved in the design and implementation of a database system.
2. Provide a practical knowledge of implementation/demonstration of data manipulation language to query, update, and manage a database.

Course Outcomes

On completion of this course, the students will be able to

CO1. Demonstrate and analyze and apply common SQL statements including DDL, DML and DCL statements to perform different operations.

CO2. Demonstrate and Apply different types of constraints on the database.

CO3. Design different views of tables for different users and to apply embedded and nested queries.

CO4. Design and implement a database for a given problem according to well known design principles that balance data retrieval performance with data consistency.

Modules	Blooms level*	Number of hours
Module 1: 1. Introduction to SQL and understand basic commands 2. Understand various DDL and DML commands. 3. To understand joins in SQL.	L1, L2 and L3	4
Module 2: 1. To understand constraints SQL 2. Wild cards and aggregate functions in SQL 3. To understand and execute procedures and views in SQL	L2 and L3	6
Module 3: 1. To understand and execute triggers in SQL 2. To develop a database application to demonstrate the representation of multi valued attributes and use of nested tables to represent complex objects. Write suitable queries	L2, L3, L4 and L5	4
Module 4: 1. To understand and execute Indexes in SQL	L2, L3 and L4	4
Module 5:		1

1. To understand the concept of Exception handling in SQL	L2, L3 and L4	
2. Query Evaluation Plans		
3. Concurrency and Transactions		

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. Abraham Silberschatz, Henry F. Korth, S. Sudharshan, "Database System Concepts", 6th edition, Tata McGraw Hill, 2011
2. Ramez Elmasri, Shamkant B. Navathe, "Fundamentals of Database Systems", 4th Edition, Pearson/Addison Wesley, 2007

Reference Book

1. Database System Concepts by A. Silberschatz, H.F. Korth and S. Sudarshan, 3rd edition, 1997, McGrawHill, International Edition.
2. Introduction to Database Management system by Bipin Desai, 1991, Galgotia Pub.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/ Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS O 1	PS O 2	PS O 3	PS O 4
CO 1	2	1	--	--	--	--	--	--	--	--	--	--	1	2	--	--
CO 2	3	1	--	--	--	--	--	--	--	--	--	--	1	1	--	--
CO 3	1	3	2	--	--	--	--	--	--	--	--	--	1	2	3	--
CO 4	1	3	2	--	--	--	--	--	--	--	--	--	1	1	--	--
CO 5	1	3	--	--	--	--	--	--	--	--	--	--	1	2	--	1

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Course Code: AIE4107	ADVANCED COMPUTER NETWORKS LAB	L	T	P	C
Version 2020.1	Date of Approval: 19 July 2020	0	0	2	1
Pre-requisites/Exposure	Basics of Computer Networks				
Co-requisites	Nil				

Catalog Description

Advanced Computer Networks Lab provides the knowledge of various installations & connections of LAN, WAN, etc, study of Cisco Packet Tracer Tool and its implementations, simulation of flow-control protocols such as Sliding Window, Stop & Wait with help of programming languages. This course focuses on real-life applications in networking and its software implementation in the laboratory.

Course Objectives

The objective of this course is to

- Equip the students with the advanced networking concepts.
- Explain the different techniques of error detection and correction methods used at various layers.
- Provide an overview of various algorithms involved in advanced computer networks at OSI and TCP-IP Layers.

Course Outcomes

On completion of this course, the students will be able to

CO1: Understand fundamental underlying principles of computer networking

CO2: Understand details and functionality of CISCO router

CO3: Demonstrate and configure details and functionality of DHCP server

CO4: Analyze performance of various communication protocols.

CO5: Compare routing algorithms

Modules	Blooms level*	Number of hours
MODULE 1: 1. Configuration and logging to a CISCO Router and introduction to the basic user Interfaces. Introduction to the basic router configuration and basic commands. 2. Configuration of IP addressing for a given scenario for a given set of topologies.	L1, L2	2
MODULE 2: 1. Configure a DHCP Server to serve contiguous IP addresses to a pool of four IP devices with a default gateway and a default DNS address. Integrate the DHCP server with a BOOTP demon to automatically serve Windows and Linux OS Binaries based on client MAC address	L2, L3	2
MODULE 3: 1. Configure, implement and debug the following: Use open source tools for debugging and diagnostics. a. ARP/RARP protocols b. RIP routing protocols	L1, L2	3

c. BGP routing d. OSPF routing protocols e. Static routes (check using netstat)		
MODULE 4: <ol style="list-style-type: none"> 1. Configure DNS: Make a caching DNS client, and a DNS Proxy; implement reverse DNS and forward DNS, using TCP dump/Wireshark characterise traffic when the DNS server is up and when it is down. 2. Configure FTP Server on a Linux/Windows machine using a FTP client/SFTP client characterise file transfer rate for a cluster of small files 100k each and a video file of 700mb. Use a TFTP client and repeat the experiment 	L1, L2, and L3	3
MODULE 5: <ol style="list-style-type: none"> 1. Configure a mail server for IMAP/POP protocols and write a simple SMTP client in C/C++/Java client to send and receive mails. 2. Implement Open NMS+ SNMPD for checking Device status of devices in community MIB of a linux PC. Using yellow pages and NIS/NFS protocols implement Network Attached Storage Controller (NAS). Extend this to serve a windows client using SMB. Characterise the NAS traffic using wireshark. 	L1, L2	3

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

2. William Stallings, Cryptography & Network Security: Principles and Practices, Prentice Hall, 2005, (ISBN: 978-0131873162).

Reference Books

3. Behrouz A. Forouzan, Cryptography & Network Security, McGraw-Hill, 2007, USA. (ISBN: 0073327530 9780073327532).
4. Douglas R. Stinson, Chapman and Hall, Cryptography Theory & Practice, CRC Press, 2005.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	-	-	-	-	--	--	--	--	--	--	--	1	--	-	--
CO2	1	-	-	-	3	--	3	--	--	--	--	--	1	--	-	--
CO3	1	-	-	-	3	--	3	--	--	--	--	--	1	2	2	--
CO4	1	-	-	--	2	--	2	--	3	--	--	--	2	1	-	--
CO5	1	-	-	-	1	-	1	--	2	--	--	--	2	1	-	--

1: strongly related, 2: moderately related and 3: weakly related

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Course Code: AIE4108	MATLAB PROGRAMMING	L	T	P	C
Version 2020.1	Date of Approval: 19 July 2020	0	0	4	2
Pre-requisites/Exposure	C Programming				
Co-requisites	Basic knowledge of Programming				

Catalog Description

The objective of this course is to expose the students to the implementation techniques of Mat Lab Programming.

Course Objectives

The objective of this course is to

- To understand the basic concepts and terminology related to Mat Lab.
- Application of Mat Lab in field of Signal Processing and Control systems.

Course Outcomes

On completion of this course, the students will be able to

CO1. Understand the basics of Matlab programming environment.

CO2. Analysis of given LTI System and verifying its physical reliability and stability properties.

CO3. Waveform synthesis using Laplace Transforms and z-transform of a given signal and system.

Modules	Blooms level*	Number of hours
<ol style="list-style-type: none"> To write a MATLAB program to perform some basic operation on matrices such as addition, subtraction, multiplication. To write a "MATLAB" Program to generate various signals and sequences, such as unit impulse, unit step, unit ramp, sinusoidal, square, saw tooth, triangular, sinc signals. To performs operations on signals and sequences such as addition, multiplication, scaling, shifting, folding, computation of energy and average power. Write a program for finding even and odd parts of sequences Using MATLAB Software& program for finding real and imaginary parts of sequences Using MATLAB Software. 	L1, L2 and L3	8
<ol style="list-style-type: none"> Write a program to find the out put with linear convolution operation Using MATLAB Software Write a program to compute auto correlation and cross correlation between signals and Sequences. Write a program to compute linearity and time invariance properties of a given continuous /discrete System. 	L1,L2,L3	6
<ol style="list-style-type: none"> Write a program to Unit Step And Sinusoidal Response Of The Given LTI System And Verifying Its physical reliability and stability properties. Write a program to demonstrate Gibbs Phenomenon using MATLAB. Write a program to obtain Fourier Transform and Inverse Fourier Transform of a given signal / sequence and to plot its Magnitude and Phase Spectra 	L1, L2 and L3	8

11. Write a program to perform waveform synthesis using Laplace Transforms of a given signal.		
12. Write a program to locating the zeros and poles and plotting the pole zero maps in s-plane and z-plane 13. for the given transfer function. 14. Write a program to Generate Gaussian Noise and to Compute its Mean, M.S. Values, Skew, kurtosis, 15. PS and PDF 16. Write a program to demonstrate Sampling Theorem and aliasing effect using MATLAB. 17. Write a program for removal of noise by auto correlation/cross correlation.	L1, L4	12

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

Amos Gilat, "MATLAB: An Introduction with Applications", Wiley; Fourth edition (2012)4ed.

Reference Books

Bansal, Goel and Sharma, MATLAB and its Applications in Engineering" Pearson Education India; Second edition (1 March 2016).

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS O 1	PS O 2	PS O 3	PSO 4
CO 1	2	1	--	--	--	--	--	--	--	--	--	--	1	2	--	--
CO 2	3	1	--	--	--	--	--	--	--	--	--	--	1	1	--	--
CO 3	1	3	2	--	--	--	--	--	--	--	--	--	1	2	3	--

1: strongly related, 2: moderately related and 3: weakly related

Course Code: AIE4109	PYTHON PROGRAMMING LAB	L	T	P	C
Version 2020.1	Date of Approval: 19 July 2020	0	0	2	1
Pre-requisites/Exposure	Hands on knowledge of C and C++ Programming				
Co-requisites	Basic concepts of OOP Programming				

Catalog Description

The course is designed to provide an introduction to the Python programming language. The focus of the course is to provide students with an introduction to programming, I/O, and visualization using the Python programming language.

Course Objectives

The objective of this course is

- Equip the students with the basic feature of python required in solving complex problems and build GUI applications
- Provide a practical knowledge of implementation/demonstration of python programming concepts like of lists, tuples, dictionaries, Object Oriented Programming concepts in Python, Strings and Files in Python.

Course Outcomes

On completion of this course, the students will be able to

- CO 1: Demonstrate the basics of python programming using if-else, loops and List, Dictionary, tuples.
- CO 2: Demonstrate the concept of inheritances, polymorphisms and other concepts and able to solve complex programming problems involving class objects.
- CO 3: Demonstrate the ability to write database applications in Python
- CO 4: Demonstrate Files Handling in Python.
- CO 5: Demonstrate database operation and GUI applications in python.

Modules	Blooms level*	Number of hours
Write a program which will find all such numbers which are divisible by 7 but are not a multiple of 5, between 2000 and 3200 (both included). The numbers obtained should be printed in a comma-separated sequence on a single line. Create a program that asks the user to enter their name and their age. Print out a message addressed to them that tells them the year that they will turn 100 years old. Define a function max() that takes two numbers as arguments and returns the largest of them. Use the if-then-else construct available in Python. (It is true that Python has the max() function built in, but writing it yourself is nevertheless a good exercise.) Define a function max_of_three() that takes three numbers as arguments and returns the largest of them.	L1, L2 and L3	4
Define a function that computes the length of a given list or string. (It is true that Python has the len() function built in, but writing it yourself is nevertheless a good exercise.) Write a function that takes a character (i.e. a string of length 1) and returns True if it is a vowel, False otherwise. Write a function translate() that will translate a text into "rövarspråket" (Swedish for "robber's language"). That is, double	L2 and L3	6

<p>every consonant and place an occurrence of "o" in between. For example, translate("this is fun") should return the string "tothohisosisofunon".</p> <p>Define a function sum() and a function multiply() that sums and multiplies (respectively) all the numbers in a list of numbers. For example, sum([1, 2, 3, 4]) should return 10, and multiply([1, 2, 3, 4]) should return 24.</p> <p>Define a function reverse() that computes the reversal of a string. For example, reverse("I am testing") should return the string "gnitset ma I".</p>		
<p>Ask the user for a number. Depending on whether the number is even or odd, print out an appropriate message to the user</p> <p>Take a list, say for example this one:</p> <pre>a = [1, 1, 2, 3, 5, 8, 13, 21, 34, 55, 89]</pre> <p>and write a program that prints out all the elements of the list that are less than 5.</p> <p>Create a program that asks the user for a number and then prints out a list of all the divisors of that number. (If you don't know what a divisor is, it is a number that divides evenly into another number. For example, 13 is a divisor of 26 because 26 / 13 has no remainder.)</p> <p>Take two lists, say for example these two:</p> <pre>a = [1, 1, 2, 3, 5, 8, 13, 21, 34, 55, 89]</pre> <pre>b = [1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13]</pre> <p>and write a program that returns a list that contains only the elements that are common between the lists (without duplicates). Make sure your program works on two lists of different sizes.</p>	L2, L3, L4 and L5	4
<p>Ask the user for a string and print out whether this string is a palindrome or not. (A palindrome is a string that reads the same forwards and backwards.)</p> <p>Let's say I give you a list saved in a variable: a = [1, 4, 9, 16, 25, 36, 49, 64, 81, 100]. Write one line of Python that takes this list a and makes a new list that has only the even elements of this list in it.</p> <p>Make a two-player Rock-Paper-Scissors game. (Hint: Ask for player plays (using input), compare them, print out a message of congratulations to the winner, and ask if the players want to start a new game)</p> <p>Remember the rules:</p> <pre>Rock beats scissors Scissors beats paper</pre> <ul style="list-style-type: none"> Paper beats rock 	L2, L3 and L4	4
<p>Write a program that asks the user how many Fibonnaci numbers to generate and then generates them. Take this opportunity to think about how you can use functions. Make sure to ask the user to enter the number of numbers in the sequence to generate.(Hint: The Fibonnacisequence is a sequence of numbers where the next number in the sequence is the sum of the previous two numbers in the sequence. The sequence looks like this: 1, 1, 2, 3, 5, 8, 13, ...)</p> <p>Write a program (function!) that takes a list and returns a new list that contains all the elements of the first list minus all the duplicates.</p> <p>Write a function that takes an ordered list of numbers (a list where the elements are in order from smallest to largest) and another number. The function decides whether or not the given number is inside the list and returns (then prints) an appropriate boolean.</p>	L2, L3 and L4	1

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. Michael Urban and Joel Murach, Python Programming, Shroff/Murach, 2016
2. Mark Lutz, Programming Python, O'Reilly, 4th Edition, 2010
3. Patrick Naughton & Herbert Schild, "JAVA The Complete Reference", 10th Edition, TMH

Reference Book

1. Daniel/Young , Introduction to JAVA Programming” , PHI.
2. Jeff Frentzen and Sobotka, “Java Script”, Tata McGraw Hill,1999.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination**Examination Scheme:**

Components	A	CT	S/V/ Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS O 1	PS O 2	PS O 3	PS O 4
CO 1	2	1	--	--	--	--	--	--	--	--	--	--	1	2	--	--
CO 2	3	1	--	--	--	--	--	--	--	--	--	--	1	1	--	--
CO 3	1	3	2	--	--	--	--	--	--	--	--	--	1	2	3	--
CO 4	1	3	2	--	--	--	--	--	--	--	--	--	1	1	--	--
CO 5	1	3	--	--	--	--	--	--	--	--	--	--	1	2	--	1

1: strongly related, 2: moderately related and 3: weakly related

Course Code: AIE4206	RESEARCH METHODOLOGY AND TECHNICAL REPORT WRITING	L	T	P	C
Version 2019.1	Date of Approval: 19 July 2020	2	0	0	2
Pre-requisites/Exposure	NIL				
Co-requisites	NIL				

Catalogue Description

This course deals with types of research, significance and characteristics and planning a research proposal, population and sample, parameter and statistic, sampling and data collection, sampling design: steps, types, sample size, sampling methods. It deals with univariate, bivariate and multivariate analysis, measure of dispersion of data, standard deviation, variance, coefficient of variation and degree of freedom. Hypothesis testing: parametric tests and non-parametric tests, regression analysis and curve fitting, method of least-squares, explained and unexplained variations, coefficient of correlation of determination. The course also deals with technical/scientific/research report writing: referencing and bibliography and footnotes. Publication of research papers, citations, intellectual property rights and copy rights, plagiarism, patent and patent laws, commercialization and ethical issues.

Course Objectives

The objective of this course is to:

- Deals with types of research, significance and characteristics and planning a research proposal and to enhance scientific and technical writing and research skills.
- Impart knowledge about various stages of research process, statistical analysis and tools & their applications in decision making by hypothesis testing and regression analysis.
- It also deals with intellectual property rights and copy rights, plagiarism, patent and patent laws, commercialization and ethical issues.

Course Outcomes

On completion of this course, the students will be able to:

- CO1. Classify different research types, explain steps in research process and planning research proposal.
- CO2. Describe sampling methods, sampling steps and design, carry out data processing and analysis.
- CO3. Explain hypothesis testing, parametric and non-parametric tests, carry out regression analysis, curve fitting.
- CO4. Demonstrate technical and scientific report writing skills, describe plagiarism, patent laws and intellectual property rights.

Course Content

Modules	Blooms level*	Number of hours
Module I: Introduction and Research Planning		
Introduction to research: Definition, motivation, need, objectives, significance and characteristics of research; types of research; steps in research process; planning a research proposal; literature review, web searching.	L1, L2	4
Module II: Sampling Methods		
Measurement scales, population and sample, parameter and	L1, L2, L3	5

statistic, sampling and data collection, sampling design: steps, types, sample size, sampling methods, data processing and analysis. Sampling surveys and questionnaire designing, primary and secondary data.		
Module III: Hypothesis Testing and Regression Analysis Univariate, bivariate and multivariate analysis, means-arithmetic, geometric and harmonic; measure of dispersion of data, standard deviation, variance, coefficient of variation and degree of freedom. Hypothesis testing: kinds errors in hypothesis testing, significance and confidence levels, parametric tests and non-parametric tests, one-tailed and two-tailed tests, analysis of variance. Regression analysis and curve fitting, method of least-squares, explained and unexplained variations, coefficient of correlation of determination.	L1, L3, L4	10
Module IV: Technical Report Writing and Plagiarism Technical/scientific/research report writing: structure and components of scientific reports, formats of dissertations, research report, report writing skills, report preparation, referencing and bibliography and footnotes. Publication of research papers, citations, making presentation-use of visual aids and PPTs. Intellectual property rights and copy rights, plagiarism, patent and patent laws, commercialization and ethical issues.	L1, L3, L4	5

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books:

Blake, G. and Bly, R.W. The Elements of Technical Writing. MacMillan, New York, 1993.
 Chawla, D and Sondhi, N. Research Methodology- Concepts and Cases. Vikas Publishing House PVT LTD. New Delhi, 2016.

Kothari, C.R. Research Methodology- Methods and Techniques, 2nd.ed. New Age International Publishers, New Delhi. 2008.

Reference Books:

Montomery, Douglas C, Design and Analysis of Experiments, 5th Ed, Wiley India.2005.
 Panneerselvam, R.2009. Research Methodology, PHI Learning Pvt.Ltd., New Delhi, 2009
 Ranjit Kumar 2009. Research Methodology- A step –by- step Guide for beginners; 2nd ed. Dorling Kindersley (India) Pvt. Ltd, Delhi, 2009.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO3	PSO4
CO1	1	1	2	2	3	-	-	-	-	-	-	1	3	1	2	-
CO2	1	3	1	3	3	-	-	-	-	-	-	1	3	1	2	-
CO3	1	3	1	-	-	-	-	-	-	-	-	1	3	3	2	-
CO4	1	3	2	-	3	-	-	-	-	-	-	1	3	1	2	3
CO5	2	1	1	-	-	-	-	-	-	-	-	1	3	1	2	-

1: strongly related, 2: moderately related and 3: weakly related

Course Code: RBE4201	FUNDAMENTALS OF ROBOTIC SYSTEM AND ROBOT PROGRAMMING	L	T	P	C
Version 2020.1	Date of Approval: 19 July 2020	3	0	0	3
Pre-requisites/Exposure	Basic knowledge of control system and programming				
Co-requisites	Nil				

Catalog Description

Enlighten the students about the fundamentals of robotic systems make them to understand the basics of robot, robot transformations and sensors, micro/nano robotic systems and to program them for functioning.

Course Objectives

The objective of this course is to

- Equip the students with the basic knowledge and designing of robotics.
- Implement their concept in robotics and design robot for various applications of engineering.

Course Outcomes

On completion of this course, the students will be able to

CO1: Explain and Understand the design and functionality of robots

CO2: Describe the control system with the help of sensor and robot transformations.

CO3: Understand and robot cell design and implement in micro/nano robotics system

CO4: Explain and Understand the robotic programming language and use in design of robot.

Modules	Blooms level*	Number of hours
MODULE 1: INTRODUCTION Robot anatomy-Definition, law of robotics, History and Terminology of Robotics-Accuracy and repeatability of Robotics-Simple problems-Specifications of Robot-Speed of Robot-Robot joints and links-Robot classifications-Architecture of robotic systems-Robot Drive systems-Hydraulic, Pneumatic and Electric system.	L1 and L2	5
MODULE 2: END EFFECTORS AND ROBOT CONTROLS Mechanical grippers-Slider crank mechanism, Screw type, Rotary actuators, cam type-Magnetic grippers-Vacuum grippers-Air operated grippers-Gripper force analysis-Gripper design-Simple problems-Robot controls-Point to point control, Continuous path control, Intelligent robot-Control system for robot joint-Control actions-Feedback devices-Encoder, Resolver, LVDT-Motion Interpolations-Adaptive control.	L1, L2 and L3	7
MODULE 3: ROBOT TRANSFORMATIONS AND SENSORS Robot kinematics-Types- 2D, 3D Transformation-Scaling, Rotation, Translation- Homogeneous coordinates, multiple transformation-Simple problems. Sensors in robot – Touch sensors-Tactile sensor – Proximity and range sensors – Robotic vision sensor-Force sensor-Light sensors, Pressure sensors.	L1 and L2	5
MODULE 4: ROBOT CELL DESIGN AND MICRO/NANO ROBOTICS SYSTEM	L1, L2, L3, L4 and L5	8

Robot work cell design and control-Sequence control, Operator interface, Safety monitoring devices in Robot-Mobile robot working principle, actuation using MATLAB, NXT Software Introductions-Robot applications- Material handling, Machine loading and unloading, assembly, Inspection, Welding, Spray painting and undersea robot. Micro/Nanorobotics system overview-Scaling effect-Top down and bottom up approach- Actuators of Micro/Nano robotics system-Nanorobot communication techniques-Fabrication of micro/nano grippers-Wall climbing micro robot working principles-Biomimetic robot-Swarm robot-Nanorobot in targeted drug delivery system.		
MODULE 5: BASICS OF ROBOT PROGRAMMING Robot programming-Introduction-Types- Flex Pendant- Lead through programming, Coordinate systems of Robot, Robot controller- major components, functions-Wrist Mechanism-Interpolation-Interlock commands-Operating mode of robot, Jogging-Types, Robot specifications- Motion commands, end effectors and sensors commands.	L1, L2 and L3	5
MODULE 6: VAL, VAL-II, RAPID AND AML LANGUAGE Robot Languages-Classifications, Structures- VAL- language commands motion control, hand control, program control, pick and place applications, palletizing applications using VAL, Robot welding application using VAL program-WAIT, SIGNAL and DELAY command for communications using simple applications. RAPID- language basic commands- Motion Instructions-Pick and place operation using Industrial robot- manual mode, automatic mode, subroutine command based programming. Move-master command language- Introduction, syntax, simple problems. VAL-II programming-basic commands, applications- Simple problem using conditional statements-Simple pick and place applications-Production rate calculations using robot. AML Language-General description, elements and functions, Statements, constants and variables-Program control statements-Operating systems, Motion, Sensor commands-Data processing.	L1, L2 and L3	6

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

1. Craig. J. J. "Introduction to Robotics mechanics and control", Addison- Wesley, 1999.

Reference Books

1. S.R. Deb, Robotics Technology and flexible automation, Tata McGraw-Hill Education., 2009
2. Mikell P Groover & Nicholas G Odrey, Mitchel Weiss, Roger N Nagel, Ashish Dutta, Industrial Robotics, Technology programming and Applications, McGraw Hill, 2012
3. Richard D. Klafter, Thomas .A, Chri Elewski, Michael Negin, Robotics Engineering an Integrated Approach, Phi Learning.,
4. 2009.
5. Deb. S. R. "Robotics technology and flexible automation", Tata McGraw Hill publishing company limited, 1994
6. Mikell. P. Groover, "Industrial Robotics Technology", Programming and Applications, McGraw Hill Co, 1995.
7. Klafter. R.D, Chmielewski.T.A. and Noggin's., "Robot Engineering : An Integrated Approach", Prentice Hall of India Pvt. Ltd., 1994.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination
Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	2	1	2	1	3	--	--	--	--	--	--	-	1	2	-
CO2	1	1	2	1	1	--	--	--	--	--	--	--	1	--	-	3
CO3	1	2	1	1	1	3	--	--	--	--	--	--	1	2	-	-
CO4	1	2	2	2	3	3	--	--	--	--	--	--	-	--	2	3

1: strongly related, 2: moderately related and 3: weakly related

Course Code: RBE4202	ADVANCED CONTROL SYSTEMS DRIVERS FOR ROBOTS	L	T	P	C
Version 2020.1	Date of Approval: 19 July 2020	3	0	0	3
Pre-requisites/Exposure	Basic concepts of control system				
Co-requisites					

Catalog Description

This course provides comprehensive and insight knowledge of Digital control systems. Objective of the course is to provide the students the core knowledge of Stability theory of Digital systems and State Variable analysis of Digital System

Course Objectives

The objective of this course is to

- Equip the students with concepts of basic control system and its stability.
- Provide a thorough understanding of control system model by considering standard examples.
- Give an insight of state variable methods for control systems.

Course Outcomes

On completion of this course, the students will be able to

CO1: Explain the fundamentals of a digital control system.

CO2: Apply the standard methods to check the stability of a control system.

CO3: Design model for digital control system for an application with given requirements.

CO4: Analyze the analog and digital control systems using state variable method.

Modules	Blooms level*	Number of hours
Module 1: Introduction Configuration of the basic Digital Control Systems, types of sampling operations, Sample and Hold operations, Sampling theorem, Basic discrete time signals.	L1,L2,L4	12
Module 2: Stability Methods Mapping between s-plane and z-plane, stability methods: Modified Routh Criterion, Jury's method, modified Schur-Cohn criterion.	L3	6
Module 3: Models Of Digital Control Systems Digital temperature control System, Digital position control system, stepping motors and their control. Design of Digital compensator using frequency response plots.	L5	6
Module 4: Control Systems Analysis Using State Variable Methods State variable representation, conversion of state variable models to transfer function and vice-versa, Eigen values and eigen vectors, Solution of state equations, Concepts of controllability and observability.	L3	6
Module 5: State Variable Analysis Of Digital Control Systems State variable description of digital control systems, conversion of state variable models to pulse transfer function and vice versa, solution of state difference equations, controllability and observability.	L3	6

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. M. Gopal, Digital Control and State Variable Methods, 4th edition, Tata Mc-Graw-Hill.
2. K.Ogata, Discrete Time Control Systems, Pearson Education, (Singapore) (Thomson Press India).
3. B.C Kuo, Digital Control Systems, Prentice Hall.

Reference Books

1. I.J. Nagrath & M.Gopal, Control System Engg., John Wiley & sons.
2. K.K. Aggarwal, Control System Analysis and Design, Khanna Publishers.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3	PSO 4
CO 1	1	2	--	--	--	--	--	--	--	--	--	--	1	--	--	--
CO 2	1	--	--	2	--	--	--	--	--	--	--	--	1	--	--	3
CO 3	--	--	1	--	3	--	--	--	--	--	--	--	3	1	--	--
CO 4	2	1	2	--	3	--	--	--	--	--	--	--	1	--	--	--

1: strongly related, 2: moderately related and 3: weakly related

Anil

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Course Code: RBE4203	MICROPROCESSOR AND INTERFACING	L	T	P	C
Version 2020.1	Date of Approval: 19 July 2020	3	0	0	3
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

This course deals with the systematic study of the Architecture and programming issues of microprocessor family and its applications. The aim of this course is

1. To introduce students with the architecture and operation of typical microprocessors.
2. To familiarize the students with the programming and interfacing of microprocessors
3. To provide expertise in designing the embedded system based products as a solution to real time problems.

Course Outcomes

On completion of this course, the students will be able to

CO1. Explain the architecture, pin configuration, addressing modes, control words of various microprocessors and Interfacing ICs

CO2. Develop the assembly language program using 8085 and 8086 using stacks & subroutines, procedures, segments, interrupts and interfacing.

CO3. Analyze assembly language programs; select appropriate assemble into machine across assembler utility of a microprocessor and solve various automation based problems of power system.

CO4. Design circuitry to the Microprocessor I/O ports in order to interface the processor to external devices so as to provide solutions real-world control problems

Modules	Blooms level*	Number of hours
Module I: Microprocessor Intel 8085 - Introduction, register structure, memory Addressing, Addressing Modes, Instruction Set, Timing Methods, CPU Pins and Associated Signals, Instruction timing and execution. programming I/O. Interrupt System, DMA, SID & SOD lines, Instruction set, 8085 based system design.	L1, L2, L3, L4	8
Module II: Intel 8086 Introduction, Architecture, Addressing modes, instruction set, memory management, assembler dependent instructions, Input/Output, system design using 8086.	L2, L3, L4	7
Module III: Pentium Processors Internal Architecture of 8087, operational overview of 8087, Introduction to 80186, 80286, 80386 & 80486 processors and Pentium Processors.	L2, L3	6
Module IV: Peripheral Interfacing Parallel versus serial transmission, synchronous and asynchronous serial data transmission. Interfacing of hexadecimal keyboard and display unit, interfacing of cassette recorders and parallel, serial interface standards. Study of Peripheral Devices 8255, 8253, 8257, 8251, 8259	L3, L4, L5, L6	7
Module V: Microprocessor applications to Power Engineering Protective Relaying: over-current, impedance, MHO, reactance, bi-directional relays.	L4, L5, L6	8

Measurements: Frequency, power angle & power factor, Voltage and Current, KVA, KW, & KVAR, maximum demand. Resistance, Reactance, Temperature Controls.		
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**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. Douglas Hall, Microprocessor and Interfacing:, Tata McGraw Hill, 2017
2. Gaonkar R. S , Microprocessor Architecture, Programming and Applications, Wiley

Reference Books

1. Yu Cheng Liu & Glen A. Gibson, Microcomputer Systems: 8086/8088 family Architecture, Programming and Design, PHI Publication, 2016.
2. Ram B., Fundamentals of Microprocessors and Microcomputers, Dhanpat Rai & Sons, 2017

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance


CO, PO, PSO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	2	--	--	--	--	--	--	--	--	--	--	1			
CO2	1	1	2	3	--	--	--	--	--	--	--	--	1	2		
CO3	-	-	-	1	2	3	--	--	--	--	--	--		1	2	
CO4	-	-	-	1	--	2	--	--	2	3	3	--		2	1	3

1: strongly related, 2: moderately related and 3: weakly related



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Course Code: RBE4204	KINEMATICS AND DYNAMICS OF ROBOTS	L	T	P	C
Version 2020.1	Date of Approval: 19 July 2020	3	0	0	3
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

This course deals with the systematic study of the Architecture and programming issues of robotic moments and design. The aim of this course is

1. To introduce students with the architecture and operation of robots.
2. To familiarize the students with the programming and interfacing of Robots
3. To provide expertise in designing the embedded system and kinematics of a robot based on real time problems.

Course Outcomes

On completion of this course, the students will be able to

CO1. Explain the architecture, kinematic analysis for axis in Robot Design.

CO2. Understand the Workspace, Analysis And trajectory planning

CO3. Understand the Dynamic Moments and Mathematical modeling of various forces in Moments of robotic machine

CO4. Design a robot with understanding of dynamic kinematics.

Modules	Blooms level*	Number of hours
Module I: Introduction Introduction, position and orientation of objects, objects coordinate frame Rotation matrix, Euler angles Roll, pitch and yaw angles coordinate Transformations, Joint variables and position of end effectors, Dot and cross products, coordinate frames, Rotations, Homogeneous coordinates	L1, L2, L3, L4	7
Module II: Direct Kinematics Link coordinates D-H Representation, The ARM equation. Direct kinematic analysis for Four axis, SCARA Robot and three, five and six axis Articulated Robots.	L2, L3, L4	6
Module III: Inverse Kinematics The inverse kinematics problem, General properties of solutions. Tool configuration, Inverse kinematics of four axis SCARA robot and three and five axis, Articulated robot.	L2, L3	6
Module IV: Workspace Analysis And Trajectory Planning Workspace Analysis, work envelope of a Four axis SCARA robot and five axis articulated robot workspace fixtures, the pick and place operations, Joint space technique - continuous path motion, Interpolated motion, straight line motion and Cartesian space technique in trajectory planning.	L3, L4, L5, L6	8
Module V: Manipulator Dynamics Introduction, Lagrange's equation kinetic and potential energy. Link inertia Tensor, link Jacobian Manipulator inertia tensor. Gravity, Generalized forces, Lagrange-Euler Dynamic model, Dynamic model of a Two-axis planar robot, Newton Euler formulation, Lagrange - Euler formulation, problems.	L4, L5, L6	9

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**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text & References:

1. Robert J. Schilling, Fundamentals of Robotics Analysis and Control, PHI Learning., 2009.
2. Richard D. Klafter, Thomas .A, Chri Elewski, Michael Negin, Robotics Engineering an Integrated Approach, Phi Learning., 2009.
3. P.A. Janaki Raman, Robotics and Image Processing An Introduction, Tata Mc Graw Hill Publishing company Ltd., 1995.
4. Francis N-Nagy Andras Siegler, Engineering foundation of Robotics, Prentice Hall Inc., 1987.
5. Bernard Hodges, Industrial Robotics, Second Edition, Jaico Publishing house, 1993.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

CO, PO, PSO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO4
CO1	1	-	--	--	--	2	--	--	--	--	--	--	1			
CO2	1	1	-	-	2	--	--	3	--	--	--	--	1	2		
CO3	1	-	-	2	-	3	--	--	--	--	--	--		1	2	3
CO4	-	-	-	1	--	2	--	--	2	-	3	--		2	1	3

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Course Code: RBE4206	FUNDAMENTAL OF ROBOTICS SYSTEM AND ROBOT PROGRAMMING LAB	L	T	P	C
Version 2020.1	Date of Approval: 19 July 2020	0	0	2	1
Pre-requisites/Exposure					
Co-requisites	Nil				

Catalog Description

The objective of this course is to enlighten the students about the fundamentals of robotic systems. To understand the basics of robot, Robot Transformations and Sensors, Micro/Nano robotic systems and to program them for functioning.

Course Objectives

The objective of this course is to

1. Equip the students with the basic knowledge and designing of robotics.
2. Implement their concept in robotics and design robot for various applications of engineering.

Course Outcomes

On completion of this course, the students will be able to

CO1: Understand and be able to apply a variety of techniques to solve problems in areas such as robot control and navigation

CO2: program a robot to perform a specified task (e.g obstacle avoidance or wall following) in a target environment.

CO3: Understand how simulations of robots work, where they can be useful and where they can break down.

Modules	Blooms level*	Number of hours
Lab Session 1: Study of different types of robots based on configuration and application.	L1, L2 and L3	4
Lab Session 2: Study of different type of links and joints used in robots	L1, L2, L3 and L4	4
Lab Session 3: Study of components of robots with drive system and end effectors.	L1, L2, L3 and L4	4
Lab Session 4 Determination of maximum and minimum position of links.	L3 and L4	2
Lab Session 5 Verification of transformation (Position and orientation) with respect to gripper and world coordinate system	L3 and L4	4
Lab Session 6 Estimation of accuracy, repeatability and resolution.	L3 and L4	2
Lab Session 7 Robot programming exercises	L1, L2, L3 and L4	4

*Bloom's Level:

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text & References:

Text:-

1. Craig, J. J. "Introduction to Robotics mechanics and control", Addison- Wesley, 1999.

References:-

1. S.R. Deb, Robotics Technology and flexible automation, Tata McGraw-Hill Education., 2009
2. Mikell P Groover & Nicholas G Odrey, Mitchel Weiss, Roger N Nagel, Ashish Dutta, Industrial Robotics, Technology programming and Applications, McGraw Hill, 2012
3. Richard D. Klafter, Thomas .A, Chri Elewski, Michael Negin, Robotics Engineering an Integrated Approach, Phi Learning.,
4. 2009.
5. Deb. S. R. "Robotics technology and flexible automation", Tata McGraw Hill publishing company limited, 1994
6. Mikell. P. Groover, "Industrial Robotics Technology", Programming and Applications, McGraw Hill Co, 1995.
7. Klafter. R.D, Chmielewski.T.A. and Noggin's., "Robot Engineering : An Integrated Approach", Prentice Hall of India Pvt. Ltd., 1994.

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	1	--	3	--	--	--	--	--	--	--	--	1	1	--	3
CO2	2	2	--	3	1	--	--	--	--	--	--	--	1	1	--	3
CO3	2	--	--	--	--	1	3	--	--	--	--	--	2	1	--	3



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Course Code: RBE4207	ADVANCED CONTROL SYSTEMS & DRIVES FOR ROBOTS LAB	L	T	P	C
Version 2020.1	Date of Approval: 19 July 2020	0	0	2	1
Pre-requisites/Exposure	Basic Concepts of Control Systems				
Co-requisites					

Catalog Description

This course is designed to get students an understanding of the basic concepts of control systems and its major applications. The course also includes some interdisciplinary applications like digital electronics and mechanical devices. Students will perform practical on hardware kit as well as on software.

Course Objectives

The objective of this course is to

1. Make students demonstrate the concepts of control systems.
2. Apply the concepts of control systems in various applications.

Course Outcomes

On completion of this course, the students will be able to

CO1. Practically verify the theoretical concepts of control systems.

CO2. Design various digital logic gates using programmable logic controller.

CO3. Analyse and explain the response of Process Control Simulator, Magnetic amplifier, Synchros, Servomotor and compensators.

Modules	Blooms level*	Number of hours
Lab Session 1 Determination of Transfer functions of an Electrical System	L3	1
Lab Session 2 Time Response Characteristics of a Second order System (Typical RLC network).	L3 and L4	1
Lab Session 3 Characteristics of Synchros: (a) Synchro transmitter characteristics. (b) Implementation of error detector using synchro pair	L3 and L4	2
Lab Session 4 Determination of Magnetic Amplifier Characteristics with different possible connections.	L3 and L4	2
Lab Session 5 Process Control Simulator: (a) To determine the time constant and transfer function of first order process. (b) To determine the time response of closed loop second order process with Proportional Control. (c) To determine the time response of closed loop second order process with Proportional Integral Control. (d) To determine the time response of closed loop second order process with Proportional Integral-Derivative Control. (e) To determine the effect of disturbances on a process.	L3 and L4	6

Lab Session 6 To study the compensation of the second order process by using: (a) Lead Compensator. (b) Lag Compensator. (c) Lead- Lag Compensator	L3 and L4	2
Lab Session 7 Realization of AND, OR, NOT gates, other derived gates and ladder logic on Programmable Logic Controller with computer interfacing.	L3 and L5	2
Lab Session 8 To determination of AC servomotor Characteristics	L3 and L4	2
Lab Session 9 To study the position control of DC servomotor with P, PI control actions.	L3	2
Lab Session 10 Analog Computer: (a) To examine the operation of potentiometer and adder. (b) To examine the operation of integrator	L3	2
Lab Session 11 To solve a second order differential equation.	L3	2

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

- M. Gopal, Digital Control and State Variable Methods, 4th edition, Tata Mc-Graw-Hill.
- K.Ogata, Discrete Time Control Systems, Pearson Education, (Singapore) (Thomson Press India).
- B.C Kuo, Digital Control Systems, Prentice Hall.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	--	--	--	2	--	--	--	--	--	--	2	1	--	-	-
CO2	1	-	3	--	2	--	--	--	--	--	--	2	1	3	--	-
CO3	1	-	2	--	2	--	--	--	--	--	--	2	1	3	--	3

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Course Code: RBE4208	MICROPROCESSOR & INTERFACING LAB	L	T	P	C
Version 2020.1	Date of Approval: 19 July 2020	0	0	2	1
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

This course deals with the systematic study of the Architecture and programming issues of microprocessor family and its applications. The aim of this course is to give the students detailed knowledge of the above microprocessor needed to develop the systems using.

Course Objectives

The objective of this course is to

1. To expose students to the operation of typical microprocessor trainer kit.
2. Learn the design aspects of I/O and Memory Interfacing circuits.
3. To provide solid foundation on interfacing the external devices to the processor according to the user requirements to create novel products and solutions for the real time problems

Course Outcomes

On completion of this course, the students will be able to

CO1: Developing of assembly level programs and providing the basics of the processors

CO2: write programs like ASCII conversion, searching and sorting elements, reverse given string and compute nCr .

CO3: Understand the concepts related to I/O and memory interfacing

Modules	Blooms level*	Number of hours
Lab Session 1: To load the numbers 49H and 53H ion memory location 9510 & 9511.	L3 and L4	2
Lab Session 2: Respectively and add the contents of memory location 9601.	L3 and L4	2
Lab Session 3: To write the Assembly Language Programming for 8 bit addition with and without carry.	L3 and L4	2
Lab Session 4 To write the Assembly Language Programming for 8 bit subtraction with and without borrow.	L1, L2, and L3	2
Lab Session 5 To write the Assembly Language Programming for 8 bit Multiplication and Division.	L1, L2, and L3	2
Lab Session 6 To write the Assembly Language Programming for sorting an array of numbers in Ascending & Decending order.	L3 and L4	2
Lab Session 7 To write the Assembly Language Programming with Additional Instructions.	L3 and L4	2
Lab Session 8 To write and execute a program using Stacks.	L3 and L4	2

Lab Session 9 To study and program the programmable Peripheral interface (8255 board).	L1, L2 and L3	2
Lab Session 10 To study and program the programmable interval timer (8253 board).	L1, L2, L3 and L4	2
Lab Session 11 To study and program the programmable DMA Controller (8257 board).	L1, L2, L3 and L4	2
Lab Session 12 i) To study and program the programmable Interrupt Controller (8259 board). ii) To study of programmable Serial Communication interface (8251 board).	L1, L2, L3 and L4	2

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text & References:

1. Rafiquzzaman, M. Theory & Applications PHI Publications 1993.
2. Gaonkar R. S. Microprocessor Architecture, Programming and Applications John Wiley 1989.
3. Ram B. Fundamentals of Microprocessors and Microcomputers, Dhanpat Rai & Sons 1995.
4. Liu Yu Cheng and Gibson, G.A. PHI 1992.
5. Leventhal, L.A. Introduction to Microprocessors: Software, Hardware, Programming.

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	2	3	2	2	--	1	--	--	--	--	--	--	1	--	--	--
CO2	1	1	1	2	--	--	--	2	--	--	--	3	1	2	--	--
CO3	1	2	2	3	--	--	-	--	--	--	--	--	--	2	1	3

Course Code: RBE4209	FUNDAMENTALS OF ARTIFICIAL INTELLIGENCE FOR ROBOTICS	L	T	P	C
Version 2020.1	Date of Approval: 19 July 2020	3	0	0	3
Pre-requisites/Exposure	Basic knowledge of computer system				
Co-requisites	Nil				

Catalog Description

Expose the students to the fundamentals of AI and expert systems and its application in Robotics and familiarize to the students with the Fundamental concept of AI and expert system.

Course Objectives

The objective of this course is to

- Equip the students with the artificial technique concepts used in robotics.
- Provide an overview of various technique and design the expert system with the help of these technique.

Course Outcomes

On completion of this course, the students will be able to

CO1: Explain and Understand artificial intelligence techniques and their limitation.

CO2: Describe the various searching techniques to solve the problem of different field.

CO3: Implement artificial intelligence based program in various application using basic AI language.

CO4: Understand and design the expert system for inter-dispersary engineering system.

Modules	Blooms level*	Number of hours
MODULE 1: INTRODUCTION :- Introduction – History, Definition of AI, Emulation of human cognitive process, Intelligent agents – The concept of rationality, the nature of environments, the structure of agents.	L1 and L2	6
MODULE 2: SEARCH METHODS :- Problem – Solving Agents : Problem Definitions, Formulating Problems, Searching for solutions – Measuring Problem – Solving Performance with examples. Search Strategies : Uninformed search strategies – Breadth – first Search, Uniform – Cost Search, depth –first search, depth – limited search, Iterative deepening depth – first search, bidirectional search, comparing uniformed search strategies. Informed search strategies – Heuristic information, Hill climbing methods, best – first search, branch – and – bound search, optimal search and A* and Iterative deepening A*.	L1, L2 and L3	9
MODULE 3: PROGRAMMING AND LOGICS IN ARTIFICIAL INTELLIGENCE :- LISP and other programming languages – Introduction to LISP, Syntax and numerical function, LISP and PROLOG distinction, input, output and local variables, interaction and recursion, property list and arrays alternative languages, formalized symbolic logics – properties of WERS, non-deductive inference methods.	L1, L2 and L3	11
MODULE 4:	L1, L2,	10

<p>EXPERT SYSTEM :-</p> <p>Expert system – Introduction, difference between expert system and conventional programs, basic activities of expert system – Interpretation, Prediction, Diagnosis, Design, Planning, Monitoring, Debugging, Repair, Instruction, Control. Basic aspects of expert system – Acquisition module, Knowledge base – Production rules, semantic net, frames. Inference engine – Backward chaining and forward chaining. Explanatory interface.</p>	L3,L4 and L5	
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**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

1. Russell Stuart, Norvig Peter, "Artificial Intelligence Modern Approach", Pearson Education series in AI, 3rd Edition, 2010.

Reference Books

1. Dan.W.Patterson, "Introduction to Artificial Intelligence and Expert Systems", PHI Learning, 2009.
2. Donald.A.Waterman, "A guide to Expert Systems", Pearson, 2002.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	2	1	2	1	--	--	--	--	--	--	--	-	2	3	-
CO2	1	1	2	1	1	--	--	--	--	--	--	--	1	--	2	-
CO3	1	2	1	1	1	--	--	--	--	--	--	--	-	2	3	-
CO4	1	2	2	2	3	--	--	--	--	--	--	--	1	--	2	3

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Course Code: RBE4210	ROBOTICS SIMULATIONS AND SIMULTANEOUS LOCALIZATION MAPPING	L	T	P	C
Version 2020.1	Date of Approval: 19 July 2020	3	0	0	3
Pre-requisites/Exposure	Knowledge of basics of Artificial Intelligence concepts, Robotics and simulations required.				
Co-requisites	Nil				

Catalog Description

Robotics Simulations find many applications in the areas of Artificial Intelligence, pattern recognition, controls etc. Robotics Simulations offer fundamentally alternative approaches to simulation. These robotics design, architecture, mapping and localization can be applied to many complicated problems of Artificial Intelligence and other applications in Real World Computing. This course provides a comprehensive treatment of robotics, location mapping, simulation techniques, robotic motion, robotic parts etc.

Course Objectives

The objective of this course is to

- Introduces the basics of Robotics and Artificial Intelligence.
- 2. It deals with essentials of techniques of simulations for robot design and location mapping.

Course Outcomes

On completion of this course, the students will be able to

CO1: Understand the principles of robotics and robotics movements, robotics simulations and robotics design.

CO2: comparison robotic functions, robotic views and robotic parts in simulations.

CO3: Understand concept of robotic perception, robotic movements, dynamics and controls of robotic movement, with which they can be able to apply the conceptual things to the robotic software architecture and applications.

CO4: Get thorough knowledge in robotics packages and robotic linkages.

CO5: Design the required and related systems

Modules	Blooms level*	Number of hours
MODULE 1: INTRODUCTIONS Robotics systems, robot movements, quality of simulation, types of simulation, robotics applications, robotics simulation displays. Simulation notation, Auto lisp functions, Features, Command syntax, writing design functions.	L1, L2	4
MODULE 2: ROBOTIC PRINCIPLES Straight lines, Angles and optimal moves circular interpolation, Robotic functions Geometrical commands, Edit commands. Selecting robot views, standard Robot part, using the parts in a simulation.	L1, L2, L3 and L4	10
MODULE 3: LOCALIZATION AND MAPPINGS Introduction, Robotic perception – localization, mappings planning to move – configuration space, cell decomposition methods, skeletonization methods, Planning uncertain movements – Robust methods. Moring –dynamics and control, Potential Field control, reactive control, Robotics software architecture, Applications.	L1, L3, L4 and L5	5
MODULE 4: ROBOTIC SIMULATION Simulation packages, Loading the simulation, Simulation editors, delay,	L1, L2, L3, and	7

Resume commands. Slide commands, program flow control. Robot motion control, Analysis of robot elements, Robotic linkages.	L4	
MODULE 5:ROBOTIC MOTION Solids construction, Solid animation. Types of motion, velocity and acceleration, Types of simulation motion Harmonic motion, parabolic motion, and uniform motion velocity and acceleration analysis for robots.	L2, L3, L4 and L5	5
MODULE 6:ROBOT DESIGN Linkages, Types, Transmission elements Flexible connectors, pulley-and-Belt drives, variable speed transmission. Design of Robot for particular applications – A case study.	L2, L3, L4 and L5	5

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text & References:

- “Robotics Simulations “Daniel L. Ryan, CRC Press Inc., 1994.
- “Robotics Engineering an Integrated Approach”, Richard D.Klafter, Thomas A, Chri Elewski, Micheal Negin, Phi Learning 2009.
- “Fundamentals of Robotics Analysis and Control”, Robert schilling PHI Learning, 2009.
- “ Industrial Robotics, Technology programming and Applications”, Mikell P Groover & Nicholas G Odrey, Mitchel Weiss, Roger N Nagel, Ashish Dutta, McGraw Hill, 2012.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	3	--	1	--	--	--	--	--	--	--	--	1	--	2	--
CO2	1	3	--	2	--	--	--	2	--	--	--	--	1	2	--	1
CO3	1	2	2	4	--	--	--	--	--	--	--	--	1	1	--	--
CO4	1	2	2	2	--	---	--	--	--	--	--	--	1	2	--	--
CO5	1	3	2	1	--	--	--	--	--	--	--	--	1	1	--	4

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Course Code : MLE4202	DATA MINING AND PREDICTIVE ANALYTICS	L	T	P	C
Version 2020.1	Date of Approval: 19 July 2020	3	0	0	3
Pre-requisites/Exposure	Concept of Database and Data Mining				
Co-requisites					

Course Objectives

The objective of this course is to

- Provide students with an in-depth knowledge of data mining. To introduce students to basic applications, concepts, and techniques of data mining.
- Develop skills for using recent data mining software to solve practical problems and prediction in a variety of disciplines and
- Gain experience doing independent study and research.

Course Outcomes

On completion of this course, the students will be able to

CO 1: Explain concepts of Data mining, predictive analytics and analyses architecture of data mining.

Differentiate between supervised and unsupervised methods

CO 2: Apply classification techniques on different data sets and solve cost –benefit analysis numerical. Analyze decision tree methods.

CO 3: Implement various clustering algorithm on different data sets and describe these algorithms.

CO 4: Prepare data representation for market basket analysis and determine the usefulness of association rules. Interpret supervised and unsupervised learning methods.

CO 5: Predict market trends and outline different factors associated mail marketing.

Catalog Description

Data Mining and Predictive analytics serve as one of the most important courses for postgraduate students, since it builds computational abilities, inferential thinking, and practical skills for tackling core data scientific challenges. The students will get a comprehensive understanding of different data mining techniques that can be used for prediction and for discovering patterns, be prepared to select the right technique for a given data problem and will be able to create a general-purpose analytic process.

Course Content

Modules	Bloom's level	Number of Hours
Module I Data Preparation An introduction to data mining and predictive analytics, Data Pre-processing Exploratory Data Analysis, Dimension- Reduction Methods.	L1, L2	8
Module II Classification k- Nearest Neighbour Algorithm, Decision Trees, Model Evaluation Technique, Cost –Benefit Analysis Using Data Driven Cost.	L1, L2, L3	7
Module III Clustering Hierarchical and k- Means Clustering, Kohonen Networks, Birch Clustering, Measuring Cluster Goodness.	L1, L2, L3	8

Module IV Association Rules Affinity Analysis and Market Basket Analysis, Data Representation for Market Basket Analysis, Support, Confidence, Frequent Item sets, and the a Priori Property, How Does a Priori Algorithm Work? Generating Frequent Item sets, Generating Association Rules, Extension from Flag Data to General Categorical Data, Information-Theoretic Approach: Generalized Rule Induction Method, J-Measure, Association Rules are Easy to do Badly, how can we Measure the Usefulness of Association Rules? Do Association Rules Represent Supervised or Unsupervised Learning?	L1, L2, L3	9
Module IV Case Study: Predicting Response to Direct Mail Marketing Business Understanding, Data Preparation, and Eda, Clustering and Principal Components Analysis, Modelling and Evaluation for Performance and Interpretability, Modelling and Evaluation for High Performance.	L2, L3, L4, L5	8

***Bloom's Level:**

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

1. Daniel T. Larose, Chantal D. Larose, "Data Mining and Predictive Analytics", John Wiley & Sons, Inc., Hoboken, New Jersey, 2015.
2. Jiawei Han and Micheline Kamber, "Data mining: concepts and techniques", Morgan Kaufmann, Second Edition, 2006.

Reference Books

1. Alex Berson, Data Warehousing, Data Mining, and Olap, Tata McGraw Hill.
2. Markus Hofmann, Ralf Klinkenberg, "Rapid-Miner: Data Mining Use Cases and Business Analytics Applications", Chapman and Hall/CRC, 2016.
3. George M Marakas, Modern Data Warehousing, Mining & Visualization Core Concepts, Pearson Education.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	2	--	--	--	--	--	--	--	--	--	--	3	--	--	--
CO2	1	1	2	--	--	--	--	--	--	--	--	--	--	--	3	--
CO3	1	2	3	3	3	--	--	--	--	--	--	--	3	--	--	--
CO4	1	1	2	--	--	3	--	--	--	--	--	3	--	2	--	--
CO5	1	1	2	--	--	2	--	--	--	--	--	-3	1	--	--	--

1: strongly related, 2: moderately related and 3: weakly related

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Course Code: MIE4203	DATA WAREHOUSING AND MULTIDIMENSIONAL MODELING	L	T	P	C
Version 2020.1	Date of Approval: 19 July 2020	3	0	0	3
Pre-requisites/Exposure	Basic Knowledge of Database				
Co-requisites	Nil				

Catalog Description

In this course the concepts of basic concepts of Multi-dimensional database are discussed in detail. As a precursor to the study of the course it provide an in depth understanding of basic concepts of data warehouse which includes its architecture, data warehouse operations, data marts, metadata. The concept further enhances the understanding of advance concepts that cover the slowly and rapidly changing dimensions, indexes in OLAP and concept hierarchies. It also include the different application of data warehouse

Course Objectives

The objective of this course is to

- Equip the students with concepts of Multi-dimensional database, its need and various applications.
- It provides an overview of some basic concepts in data warehouse such as its architecture, OLAP applications, and metadata. It also includes some advance concepts such as OLAP hierarchies, OLAP changing dimensions.

Course Outcomes

On completion of this course, the students will be able to

CO1: Explain the concept of Multi-dimensional database and its importance.

CO2: Analyse the fundamental concept of data warehouse which include OLAP operations, architecture.

CO 3: Explain the different types of dimensions that exist in data warehouse.

CO4: Explain the advance concepts of data warehouse which include OLAP indexing.

Modules	Blooms level*	Number of hours
MODULE 1: Introduction: Multidimensional Data Management, Multidimensional History, Related Terminology	L1 and L2	8
MODULE 2: Fundamental Concepts : Cubes ,Dimensions, Facts, Measures, Relational Representations, Star Schemas, Snowflake Schemas, Data Warehouses And Data Marts, Multidimensional Modelling Process, Analysis And Querying ,Roll Up, Drill Down, Drill Out, Slicing And Dicing, Drill Across, Pivot Tables, Ranking, Multi-Dimensional Querying in MDX and SQL, Graphical Querying and Visualizations .	L1, L2 and L3	8
MODULE 3: Advance Concepts Slowly Changing Dimensions, The Problem, Solutions, Other Special Kinds Of Dimensions, Mini dimensions, Outriggers, Degenerate Dimensions, Junk Dimensions, Time Dimensions, Data Quality Dimensions, Advanced Hierarchies, Parent-Child Hierarchies, Unbalanced Hierarchies, Non Covering Hierarchies , Non –Strict Hierarchies, Multiple Hierarchies And	L2, L3 and L4	10

Parallel Hierarchies.		
MODULE 4: Module IV: Implementation Issues Materialized Views, Indexing, Indexing Overview, Bitmap Indices, Join Indices, Query Processing, OLAP Implementations, Extract-Transform-Load.	L3, L4 and L5	10

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books:

1. Jiawei Han & Micheline Kamber, "Data Mining Concepts And Techniques", 3rd Edition, Morgan Kaufmann Publication, An Imprint of Elsevier, 2015.
2. Vipin Kumar, Pang Ning "Introduction to Data Mining", 3rd Edition, Pearson Publication, Chennai, 2016.
3. Mohammed, Wagner "Data Mining and Analysis", 4th Edition, Cambridge University Press, Brazil, 2018.

Reference Books:

1. Daneil, D. Larose "Data Mining and Predictive Analytics", 2nd Edition, John Wiley and Sons, Canada, 2015.
2. Paulraj "Data Warehousing Fundamental for IT Professional", 2nd Edition, John Wiley and Sons, Canada, 2010.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS O 1	PS O 2	PS O 3	PS O 4
CO 1	1	2	3	--	--	--	-	--	--	--	--	--	-	--	-	-
CO 2	1	--	2	-	--	--	--	--	--	--	--	--	-	--	--	--
CO 3	1	2	2	--	--	--	--	--	--	--	--	--	--	--	--	--
CO 4	1	1	2	--	--	--	3	--	--	--	--	--	--	--	--	--

1: strongly related, 2: moderately related and 3: weakly related

Course Code:- MLE4204	BIG DATA TECHNOLOGIES	L	T	P	C
Version 2020.1	Date of Approval: 19 July 2020	3	0	0	3
Pre-requisites/Exposure	Basics of DBMS and SQL				
Co-requisites	Nil				

Catalog Description

This course brings together several key big data technologies used for storage, analysis and manipulation of data. It also introduces the students the key concepts of Hadoop framework, MapReduce, Pig, Hive, and No-SQL. Students will learn to work on Hadoop platform. The concepts learnt will make students capable of working on big data projects easier.

Course Objectives

The objective of this course is

1. To make students familiar with big data technologies.
2. Provide an overview of Hadoop architecture and its working with other open source technologies.

Course Outcomes

On completion of this course, the students will be able to

CO1. Explain importance and applications of Big Data Analytics.

CO2. Differentiate among analytics technologies.

CO3. Demonstrate architecture of Hadoop and Mapreduce framework.

CO4. Illustrate Hadoop installation process and commands.

CO5. Introduce concepts of Hive and Pig.

Modules	Blooms level*	Number of hours
Module I: Introduction to Big Data Big Data and its Importance – Four V's of Big Data – Drivers for Big Data – Introduction to Big Data Analytics – Big Data Analytics applications.	L1 and L2	5
Module II: Big Data Technologies Hadoop's Parallel World – Data discovery – Open source technology for Big Data Analytics – cloud and Big Data – Predictive Analytics – Mobile Business Intelligence and Big Data – Crowd Sourcing Analytics – Inter- and Trans-Firewall Analytics - Information Management.	L2 and L5	4
Module III: Processing Big Data Integrating disparate data stores - Mapping data to the programming framework - Connecting and extracting data from storage - Transforming data for processing - Subdividing data in preparation for Hadoop Map Reduce.	L1 and L3	8
Module IV: Hadoop Map Reduce Employing Hadoop Map Reduce - Creating the components of Hadoop Map Reduce jobs - Distributing data processing across server farms –Executing Hadoop Map Reduce jobs - Monitoring the progress of job flows - The Building Blocks of Hadoop Map Reduce - Distinguishing Hadoop daemons - Investigating the Hadoop Distributed File System Selecting appropriate execution modes: local, pseudo-distributed, fully distributed.	L2, L3 and L4	9
Module V Big Data Tools and Techniques	L2 and	10

Installing and Running Pig – Comparison with Databases – Pig Latin – User-Define Functions – Data Processing Operators – Installing and Running Hive – Hive QL – Tables – Querying Data – User- Defined Functions – Oracle Big Data.	L3	
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**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. Michael Minelli, Michehe Chambers, Ambiga Dhiraj, "Big Data, Big Analytics: Emerging Business Intelligence and Analytic Trends for Today's Business", 1st Edition, Wiley CIO Series, 2013.
2. Tom White, "Hadoop: The Definitive Guide", 3rd Edition, O'reilly, 2012.
3. Arvind Sathi, "Big Data Analytics: Disruptive Technologies for Changing the Game", 1st Edition, IBM Corporation, 2012.
4. Bill Franks, "Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with Advanced Analytics", 1st Edition, Wiley and SAS Business Series, 2012.

Reference Books

1. Anil Maheshwari, "Big Data", McGraw Hill
2. Mayank Bhushan, "Big Data and Hadoop- Learn by Example", BPB Publications

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	--	2	--	--	--	--	--	--	--	--	--	1	--	2	-
CO2	1	2	--	3	3	--	--	--	--	--	--	--	1	--	2	-
CO3	1	--	1	2	--	--	--	--	--	--	--	--	1	--	2	-
CO4	1	1	2	--	--	2	--	--	--	--	3	--	-	--	1	3
CO5	1	--	1	--	1	3	--	--	--	--	3	--	1	-	-	-

1: strongly related, 2: moderately related and 3: weakly related

Anil

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Registrar
Amity University Haryana
Manesar Gurgaon-122413

Course Code: MLE4206	DATA MINING AND PREDICTIVE ANALYSIS LAB	L	T	P	C
Version 2020.1	Date of Approval: 19 July, 2020	0	0	2	1
Pre-requisites/Exposure	Basic knowledge of Database				
Co-requisites	NIL				

Catalog Description

Data Mining and Predictive analytics serve as one of the most important courses for postgraduate students, since it builds computational abilities, inferential thinking, and practical skills for tackling core data scientific challenges. The students will get a comprehensive understanding of different data mining techniques that can be used for prediction and for discovering patterns, be prepared to select the right technique for a given data problem and will be able to create a general-purpose analytic process.

Course Objectives

The objective of this course is to

- Provide students with an in-depth knowledge of data mining. To introduce students to basic applications, concepts, and techniques of data mining.
- Develop skills for using recent data mining software to solve practical problems and prediction in a variety of disciplines and
- Gain experience doing independent study and research.

Course Outcomes

On completion of this course, the students will be able to

CO 1: Explain concepts of Data mining, predictive analytics and analyses architecture of data mining. Differentiate between supervised and unsupervised methods

CO 2: Apply classification techniques on different data sets and solve cost –benefit analysis numerical. Analyze decision tree methods.

CO 3: Implement various clustering algorithm on different data sets and describe these algorithms.

CO 4: Prepare data representation for market basket analysis and determine the usefulness of association rules. Interpret supervised and unsupervised learning methods.

CO 5: Predict market trends and outline different factors associated mail marketing.

Modules/Topics Covered**	Blooms level*	Number of hours
1. To understand the basic features of Data Warehousing.	L1, L2	2
2. Explore WEKA Data Mining/Machine Learning Toolkit (a) Downloading and/or installation of WEKA data mining toolkit. (b) Understand the features of WEKA tool kit such as Explorer, Knowledge flow interface, Experimenter, command-line interface. (c) Navigate the options available in the WEKA (deselect attributes panel, preprocess panel, classify panel, cluster panel, associate panel and visualize). (d) Study the ARFF file format.	L2, L3, L5	2
3. To understand the working of datasets in WEKA & to perform demonstration of preprocessing on dataset weather.arff .	L3, L4, L5	2
4. To apply Numeric Transform (data preprocessing step) on Iris Dataset.	L3, L4, L5	2

5. To understand the importance of CSV data and then load student academic record (CSV format) in Weka.	L3, L4, L5	2
6. To understand the concept of discretization and to perform discretization on the dataset airline.arff.	L3, L4, L5	2
7. To create Training, Validation and Test dataset for iris.arff.	L3, L4, L5	2
8. To perform decision tree classification using J48 algorithm on weather.arff	L3, L4, L5	2
9. To apply Apriori technique on the dataset and to generate association rules.	L3, L4, L5	2
10. (a) Demonstration of classification rule process on dataset student.arff using j48 algorithm. (b) Demonstration of classification rule process on dataset employee.arff using j48 algorithm.	L3, L4, L5	2
11. Demonstration of classification rule process on dataset employee.arff using naïve bayes algorithm	L3, L4, L5	4

***Bloom's Level:** L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation.

**** Sample Programs provided are not limited to these only, can include others as desired.**

Text Books

3. Bostjan Kaluza, "Instant Weka How-to", Packt Publishing Limited, 2013.
4. Daniel T. Larose, Chantal D. Larose, "Data Mining and Predictive Analytics", John Wiley & Sons, Inc., Hoboken, New Jersey, 2015.
5. Jiawei Han and Micheline Kamber, "Data mining: concepts and techniques", Morgan Kaufmann, Second Edition, 2006.

Reference Books

1. Yuan Mei Yu, Data Mining and Machine Learning: WEKA Applied Technology and Practice (Chinese Edition) Paperback 2014.
2. Alex Berson, Data Warehousing, Data Mining, and Olap, Tata McGraw Hill, 2014.
3. Markus Hofmann, Ralf Klinkenberg, "Rapid-Miner: Data Mining Use Cases and Business Analytics Applications", Chapman and Hall/CRC, 2016.
4. George M Marakas, Modern Data Warehousing, Mining & Visualization Core Concepts, Pearson Education.

Modes of Evaluation: Performance/Viva/ Lab Record/Written Examination

Examination Scheme:

IA					EE
Components	A	PR	LR	V	70
Weightage (%)	5	10	10	5	

Note: IA –Internal Assessment, A – Attendance, PR – Performance, LR – Lab Record, V – Viva, EE- External Exam

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	2	--	--	--	--	--	--	--	--	--	--	1	2	2	3
CO2	1	1	2	--	--	--	--	--	--	--	--	--	1	2	3	3
CO3	1	2	3	3	3	--	--	--	--	--	--	--	1	2	2	2
CO4	1	1	2	--	--	3	--	--	--	--	--	3	1	1	2	3
CO5	1	1	2	--	--	2	--	--	--	--	--	3	1	3	2	1

1: strongly related, 2: moderately related and 3: weakly related

Course Code : MLE4207	DATA WAREHOUSING AND MULTIDIMENSIONS MODELLING LAB	L	T	P	C
Version 2020.1	Date of Approval: 19 July 2020	0	0	4	2
Pre-requisites/Exposure	Basic Knowledge of Database				
Co-requisites	NIL				

Catalog Description

In this Lab course Data warehousing and Multidimensional modeling programs are implemented and demonstrated using a SQL Server and ETL Tools. The Concepts that are covered would enable them to analyze the working of ETL tools and enable them to understand the following topics namely SQL Statements, SQL Built-in Functions, PL/SQL Cursors , Exception handling, Procedure, Functions, Trigger and concurrency control. Programs will be related to concepts of understanding the working of ETL tools on multidimensional data.

Course Objectives

The objective of this course is to

- Make the students apply knowledge of Database by analyzing the different database concepts in SQL Server.
- Provide a demonstration of ETL tools to organize the data sets.

Course Outcomes

On completion of this course, the students will be able to

CO1: Apply the knowledge of transaction processing to gain analysis on different data sets through concurrency control mechanism.

CO2: Demonstrate the use of SQL Built-in Functions, PL/SQL Cursors, Exception handling and Procedures.

CO3: To implement the different warehousing concepts on the given ETL tools.

CO4: Demonstrate the working of basic SQL statements and triggers.

Modules/Topics Covered**	Blooms level*	Number of hours
1. To understand the basic of SQL statements (a) Perform the following SQL statements on the table that perform the following query on the database <ul style="list-style-type: none"> • Create, update ,alter and delete a record • Joins and constraints on the table. • Wild card operators. 	L1,L3,L4	4
2. Sample Programs to execute the concept of Procedures (a) Preliminary introduction of Procedures their Syntax and usage (b) Write a procedural program to find out minimum of two numbers. (c) Write a program to print the reverse of a number using looping construct in PL/SQL Procedures. (d) Write a procedural program to find out the factorial of number.	L3, L4,L5	4
3. Sample Programs to implement the concept of Triggers (a) Preliminary introduction of Triggers their Syntax and usage (b) Create a Trigger on Employee record that automatically updates the salary of an Employee after each financial year.	L3, L4,L5	4

(c) Create a Trigger for the following events: <ul style="list-style-type: none"> • Deletion of a record • Updating of a record • Insertion of a new record. 		
4. Sample Programs to implement the concept of Cursors and Exception Handling. (a) Write a program to demonstrate the concept of Cursors in PL/SQL (b) Write a program that handles an exception that incurred in the given program.	L3,L4, L5	6
5. To perform demonstration to understand the working of ETL tools (a) Preliminary introduction of ETL Tools their features and importance. (b) Perform validation on the data set by applying the ETL tools. (c) Perform the following operations using ETL tools <ul style="list-style-type: none"> • Source to target mapping • Data checks on source data • Packages and schema validation • Data verification in the target system • Data integrity and quality checks in the target system 	L4,L5,L6	6

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

**** Sample Programs provided are not limited to these only, can include others as desired.**

Text Books:

2. Jiawei Han & Micheline Kamber, "Data Mining Concepts And Techniques", 3rd Edition, Morgan Kaufmann Publication, An Imprint of Elsevier, 2015.
2. Vipin Kumar, Pang Ning "Introduction to Data Mining", 3rd Edition, Pearson Publication, Chennai, 2016.
3. Mohammed, Wagner "Data Mining and Analysis", 4th Edition, Cambridge University Press, Brazil, 2018.

Reference Books:

3. Daneil, D. Larose "Data Mining and Predictive Analytics", 2nd Edition, John Wiley and Sons, Canada, 2015.
4. Paulraj "Data Warehousing Fundamental for IT Professional", 2nd Edition, John Wiley and Sons, Canada, 2010.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination
Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS O 1	PS O 2	PS O 3	PS O 4
CO 1	2	1	3	--	--	--	--	--	--	--	--	--	2	1	--	--
CO 2	2	1	3	--	--	--	--	--	--	--	--	--	2	1	--	--
CO 3	1	1	2	--	1	--	--	--	--	--	--	--	2	1	--	--
CO 4	2	1	3	--	--	--	--	--	--	--	--	--	2	1	--	--

1: strongly related, 2: moderately related and 3: weakly related

MLE4208	R PROGRAMMING LAB	L	T	P	C
Version 2020.1	Date of Approval: 19 July 2020	0	0	4	2
Pre-requisites/Exposure	Knowledge of statistics				
Co-requisites	Nil				

Catalog Description

This lab will provide a basic introduction to the R programming Language and the use of R to perform basic statistics and programming tasks. The main objectives of this lab is to impart the students with the knowledge of R Programming, Machine Learning using R Mining from streaming Data, Mining from Distributed Data.

Course Objectives

The objective of this course is

- To make students familiar with R Programming Language and its concepts.
- Equip the students with knowledge of R Programming, Machine Learning using R Mining from streaming Data, Mining from Distributed Data.

Course Outcomes

On completion of this course, the students will be able to

CO1. Install and configure R Studio and R packages.

CO2. Explain concepts of Structured Data, data types, data structures and Use R for mathematical operations

CO3. Describe the use of R functions, control statements, Loop constructs and apply to iterate functions across data.

CO4. Understand basic regular expressions graphics. Use of R for descriptive statistics and inferential statistics

CO5. Predict/Score new data using models, understand basic non-linear functions in models and how to link data, statistical methods.

Modules	Blooms level*	Number of hours
Lab Session 1 <ul style="list-style-type: none"> • Installation & Configuration steps of R Studio. • use of the R interactive environment • Expand R by installing R packages • Explore and understand how to use the R documentation. 	L1 and L2	2
Lab Session 2-3 <ul style="list-style-type: none"> • Read Structured Data into R from various sources • Understand the different data types in R • Understand the different data structures in R • Understand how to use dates in R • Use R for mathematical operations 	L1 and L3	4
Lab Session 4-5 <ul style="list-style-type: none"> • Use of vectorised calculations • Write user-defined R functions 	L1 and L3	4

<ul style="list-style-type: none"> • Use control statements • Write Loop constructs in R • Use Apply to iterate functions across data 		
Lab Session 6-8 <ul style="list-style-type: none"> • Reshape data to support different analyses • Understand split-apply-combine (group-wise operations) in R • Deal with missing data • Manipulate strings in R • Understand basic regular expressions in R • Understand base R graphics 	L1 and L3	6
Lab Session 9-10 <ul style="list-style-type: none"> • Focus on GGplot2 graphics for R • Be familiar with trellis (lattice) graphics • Use R for descriptive statistics • Use R for inferential statistics • Write multivariate models in R 	L1 and L3	4
Lab Session 11-12 <ul style="list-style-type: none"> • Understand confounding and adjustment in multivariate models • Understand interaction in multivariate models • Predict/Score new data using models • Understand basic non-linear functions in models • Understand how to link data, statistical methods, and actionable questions 	L1 and L3	6

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. Jeffrey Aven, "SAMS Teach Yourself Hadoop in 24 Hours", 1st Ed., Pearson ,2017.
2. Tom White, "Hadoop: The Definitive Guide", 3rd Edition, O'reilly, 2012.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	2	--	--	3	--	--	--	--	--	--	--	--	1	1	-
CO2	1	-	--	--	2	--	--	--	--	--	--	2	--	1	1	-
CO3	1	-	1	--	--	--	--	--	--	--	--	2	--	1	1	-
CO4	1	-	2	--	--	--	--	--	--	--	--	--	---	1	1	--
CO5	1	-	2	--	--	--	--	--	--	--	--	--	--	1	--	-

1: strongly related, 2: moderately related and 3: weakly related

Course Code : MLE4209	DATABASE AND KNOWLEDGE BASE SYSTEMS	L	T	P	C
Version 2020.1	Date of Approval: 19 July 2020	3	0	0	0
Pre-requisites/Exposure	Basic Knowledge of Database AND AI				
Co-requisites	NIL				

Catalog Description

This course discusses design methodology for databases to verify their structural correctness and implements databases. It also provides applications software primarily in the relational model using querying languages, primarily SQL, and other database supporting software applying the theory behind various database models and query languages implementing security and integrity policies relating to databases and preparation for data analytics working in group settings to design and implementing database projects.

Course Objectives

The objective of this course is to

- To understand the basic concepts and terminology related to DBKBS and Relational Database Design.
- To design and implement Distributed Databases and Knowledge base.

Course Outcomes

CO1: Write complex queries including full outer joins self-join, sub queries, and set theoretic queries and do their optimization.

CO2: Know how Optimization, Transaction management, Query and database administration is done in distributed databases.

CO3: Learning various types of deadlines in real-time database.

CO4: Familiarizing with the present applications of knowledge base.

CO5: Understand the concepts of multilevel transactions in databases.

Modules	Blooms level*	Number of hours
MODULE 1: Database Languages, Object-Base Systems, Knowledge-base Systems, History and Perspective, Data Models for Database Systems: Data Models, The Entity-relationship Model, The Relational Data Model, Operations in the Relational Data Model, The Network Data Model, The Hierarchical Data Model, An Object-Oriented Model, Logic as a Data Model: The Datalog Data Model, Evaluating Non- recursive Rules, Computing the Meaning of Recursive Rules, Incremental Evaluation of Least Fixed Points, Negations in Rule Bodies, Relational Algebra and Logic, Relational Calculus, Tuple Relational Calculus.	L1, L2 and L3	8
MODULE 2: ISBL: A "Pure" Relational Algebra Language, QUEL: A Tuple Relational Calculus Language, Query-by-Example: A DRC Language, Data Definition in QBE, The Query Language SQL, Data Definition in SQL, The DBTG Data Definition language, The DBTG Query Language, The DBTG Database Modification Commands, Data Definition in IMS, A Hierarchical Data	L2, L3 and L6	10

Manipulation Language, Data Definition in OPAL, Data Manipulation in OPAL.		
MODULE 3: The Physical Data Model, The Heap Organization, Hashed Files, Indexed Files, B-trees, Files with a Dense Index, Secondary Indices, Data Structures in DBTG Databases, Data Structures for Hierarchies, Data Structures for Relations, A Search Tree Structure, Functional Dependencies, Lossless-Join Decomposition, Normalization, Generalized Dependencies.	L1, L3 and L4	10
MODULE 4: Basic Concepts, A Simple Transaction Model, The Two-phase Locking Protocol, a Model with Read and write-Locks, Lock Modes, A Read-Only, Write-Only Model, Concurrency for Hierarchically Structured Items, Handling Transaction Failures, Aggressive and Conservative Protocols, Recovery From Crashes, Timestamp-based Concurrency Control.	L1, L3 and L4	10
MODULE 5: Distributed Databases, Distributed Locking, Distributed Two-phase Locking, Distributed Commitment, A Nonblocking Commit Protocol, Timestamp-based, Distributed Concurrency, Recovery of Nodes, Distributed Deadlocks.	L3, L4 and L6	10

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. Jeffrey D. Ullman "Principles of Database and Knowledge-Base Systems", Vol. 1, Computer Science Press, USA, 1988.
2. Ngoc Thanh Nguyen, Edward Szczerbicki, "Intelligent Systems for Knowledge Management", Springer-verlagGmbh, 2009.

Reference Books

5. AviSilberschatz, Henry F. Korth and S. Sudarshan, "Database System Concepts", Mcgraw Hill Education, 2000.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	2	--	--	--	--	--	--	--	--	--	--	-	--	2	
CO2	1	--	2	3	--	--	--	--	--	--	--	--	1	--	-	
CO3	1	2	3	3	3	--	--	--	--	--	--	--	-	--	-	3
CO4	1	1	2	--	--	--2	--	--	--	--	--	--	-	2	-	3
CO5	1	1	2	--	-2-	--	--	--	--	--	--	--	1	--	-	

1: strongly related, 2: moderately related and 3: weakly related

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Course Code : MLE4210	INFORMATION MANAGEMENT SYSTEM	L	T	P	C
Version 2020.1	Date of Approval: 19 July 2020	3	0	0	3
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

Information management systems includes basics of managing the information and explores the various aspects of database design and modelling. It examines the basic issues in information governance and information integration and also helps to understand the information architecture.

Course Objectives

The objective of this course is to

1. Understand the basic principles and working of information technology.
2. Provide the role of information technology and information system in business.
3. To contrast and compare how internet and other information technologies support business systems.

Course Outcomes

On completion of this course, the students will be able to

CO1: State and explain the fundamental concepts of information management systems.

CO2: Develop the knowledge about management of information systems.

CO3: Interpret and recommend the use of information technology to solve business problems.

CO4: Apply a framework and process for aligning organizations IT objective with business strategies.

Modules	Blooms level*	Number of hours
Module I: Database Modelling, Management and Development Database design and modelling – Business Rules and Relationship; Java database Connectivity (JDBC), Database connection Manager, Stored Procedures. Trends in Big Data systems including NoSQL – Hadoop HDFS, MapReduce, Hive, and enhancements.	L1 and L2	6
MODULE II: Data Security and Privacy Program Security, Malicious code and controls against threats; OS level protection; Security – Firewalls, Network Security Intrusion detection systems. Data Privacy principles. Data Privacy Laws and compliance.	L1, L2, and L3	8
MODULE III: Information Governance Master Data Management (MDM) – Overview, Need for MDM, Privacy, regulatory requirements and compliance. Data Governance – Synchronization and data quality management.	L1, L2 and L3	7
MODULE IV: Information Architecture Principles of Information architecture and framework, Organizing information, Navigation systems and Labelling systems, Conceptual design, Granularity of Content.	L1, L2, and L3	8
Module V: Information Lifecycle Management		7

Data retention policies; Confidential and Sensitive data handling, lifecycle management costs. Archive data using Hadoop; Testing and delivering big data applications for performance and functionality; Challenges with data administration;	L1 and L2	
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**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

1. Jeffrey A. Hoffer, HeikkiTopi, V Ramesh – MODERN DATABASE MANAGEMENT, 10 Edition, PEARSON, 2012.
2. Alex Berson, Larry Dubov MASTER DATA MANAGEMENT AND DATA GOVERNANCE, 2/E, Tata McGraw Hill, 2011.

Reference Books

1. Security in Computing, 4/E, Charles P. Pfleeger, Shari Lawrence Pfleeger, Prentice Hall; 2006
2. Information Architecture for the World Wide Web; Peter Morville, Louis Rosenfeld ; O'Reilly Media; 1998.
3. <http://ibm.com/big-data> – Four dimensions of big data and other ebooks on Big Data Analytics

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	3	2	3	3	--	--	--	--	--	--	--	1	--	3	--
CO2	1	1	1	1	1	--	--	--	--	--	--	--	1	--	3	--
CO3	1	1	1	1	1	--	--	--	--	--	--	--	1	--	3	--
CO4	1	1	2	2	1	--	--	--	--	--	--	--	1	--	3	--

1: strongly related, 2: moderately related and 3: weakly related

Course Code: MLE4211	FUNDAMENTALS OF ARTIFICIAL INTELLIGENCE	L	T	P	C
Version 2020.1	Date of Approval: 19 July 2020	3	0	0	3
Pre-requisites/Exposure	Basic knowledge of computer system				
Co-requisites	Nil				

Catalog Description

Expose the students to the fundamentals of AI and expert systems and its application in Robotics and familiarize to the students with the Fundamental concept of AI and expert system.

Course Objectives

The objective of this course is to

- Equip the students with the artificial technique concepts used in robotics.
- Provide an overview of various technique and design the expert system with the help of these technique.

Course Outcomes

On completion of this course, the students will be able to

CO1: Explain and Understand artificial intelligence techniques and their limitation.

CO2: Describe the various searching techniques to solve the problem of different field.

CO3: Implement artificial intelligence based program in various application using basic AI language.

CO4: Understand and design the expert system for inter-dispersary engineering system.

Modules	Blooms level*	Number of hours
MODULE 1: INTRODUCTION :- Introduction – History, Definition of AI, Emulation of human cognitive process, Intelligent agents – The concept of rationality, the nature of environments, the structure of agents.	L1 and L2	6
MODULE 2: SEARCH METHODS :- Problem – Solving Agents : Problem Definitions, Formulating Problems, Searching for solutions – Measuring Problem – Solving Performance with examples. Search Strategies : Uninformed search strategies – Breadth – first Search, Uniform – Cost Search, depth –first search, depth – limited search, Iterative deepening depth – first search, bidirectional search, comparing uniformed search strategies. Informed search strategies – Heuristic information, Hill climbing methods, best – first search, branch – and – bound search, optimal search and A* and Iterative deepening A*.	L1, L2 and L3	9
MODULE 3: PROGRAMMING AND LOGICS IN ARTIFICIAL INTELLIGENCE :- LISP and other programming languages – Introduction to LISP, Syntax and numerical function, LISP and PROLOG distinction, input, output and local variables, interaction and recursion, property list and arrays alternative languages, formalized symbolic logics – properties of WERS, non-deductive inference methods.	L1, L2 and L3	11

MODULE 4: EXPERT SYSTEM :- Expert system – Introduction, difference between expert system and conventional programs, basic activities of expert system – Interpretation, Prediction, Diagnosis, Design, Planning, Monitoring, Debugging, Repair, Instruction, Control. Basic aspects of expert system – Acquisition module, Knowledge base – Production rules, semantic net, frames. Inference engine – Backward chaining and forward chaining. Explanatory interface.	L1, L2, L3,L4 and L5	10
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**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

- Russell Stuart, Norvig Peter, "Artificial Intelligence Modern Approach", Pearson Education series in AI, 3rd Edition, 2010.

Reference Books

- Dan.W.Patterson, "Introduction to Artificial Intelligence and Expert Systems", PHI Learning, 2009.
- Donald.A.Waterman, "A guide to Expert Systems", Pearson, 2002.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	2	1	2	1	--	--	--	--	--	--	--	-	2	3	-
CO2	1	1	2	1	1	--	--	--	--	--	--	--	1	--	2	-
CO3	1	2	1	1	1	--	--	--	--	--	--	--	-	2	3	-
CO4	1	2	2	2	3	--	--	--	--	--	--	--	1	--	2	3

1: strongly related, 2: moderately related and 3: weakly related

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Course Code : AIE4335	SUMMER INTERNSHIP EVALUATION	L	T	P	C
Version 2020.1	Date of Approval: 19 July 2020	0	0	0	6
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

The objective of this course is to provide practical training on some live projects that will increase capability to work on actual problem in industry. This training may undergo in an industrial environment or may be an in-house training on some latest software which is in high demand in market. This training will be designed such that it will useful for their future employment in industry.

Course Objectives

The objective of this course is to

1. Provide practical training on live projects
2. Increase technical capabilities on solving real life problems in company environment

Course Outcomes

On completion of this summer internship, the students will be able to:

CO1: Develop communication, interpersonal and other critical skills in the job interview process.

CO2: Design and develop software and hardware projects

CO3: Assess interests and abilities in their field of study.

CO4: Demonstrate excellent technical and communication skills to acquire employment contacts leading directly to a full-time job following graduation from college.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	2	1	2	2	--	--	--	1	--	--	--	1	1	1	1
CO2	1	1	2	2	2	--	--	--	1	--	--	--	1	1	1	1
CO3	1	1	2	3	2	--	--	--	1	--	--	--	1	1	1	1
CO4	1	1	2	2	2	--	--	--	1	--	--	--	1	1	1	1

1: strongly related, 2: moderately related and 3: weakly related

Course Code :- AIE4337	PROJECT DISSERTATION-I	L	T	P	C
Version 2020.1	Date of Approval: 19 July 2020	0	0	0	5
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

The objective of this course is to provide practical training on some live/demo projects that will increase capability to work on actual problem in industry. It will be an in house training on some latest software which is in high demand in market. This training will be designed such that it will be useful for their future employment in industry.

Course Objectives

The objective of this course is to

1. Provide practical training on live projects
2. Increase technical capabilities on solving real life problems in company environment

Course Outcomes

On completion of this summer internship, the students will be able to:

CO1: Demonstrate a sound technical knowledge of their selected project topic.

CO2: Design and develop engineering solutions to complex problems utilising a systems approach.

CO3: Analyse various approaches for solving a complex engineering problem using different tools and techniques

CO4: Demonstrate the knowledge, skills and attitudes of a professional engineer.

CO5: Apply technical skills and knowledge in completing the project.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	2	--	--	--	--	--	--	1	--	--	--	--	--	1	1
CO2	1	1	--	--	--	--	--	--	1	--	--	--	--	--	1	1
CO3	1	1	--	--	--	--	--	--	1	--	--	--	--	--	1	1
CO4	1	1	--	--	--	--	--	--	1	--	--	--	--	--	1	1
CO5	1	1	--	--	--	--	--	--	1	-	-	-	--	--	1	1

1: strongly related, 2: moderately related and 3: weakly related

Course Code: RBE4301	AUTOMATION IN MANUFACTURING SYSTEMS	L	T	P	C
Version 2020.1	Date of Approval: 19 July 2020	3	0	0	3
Pre-requisites/Exposure	Production system, Manufacturing System				
Co-requisites	Automation in production and manufacturing system				

Catalog Description:

In this course the concepts and procedure for Automation of Manufacturing systems and the technology behind the automation of a manufacturing system and concepts of computer aided manufacturing are discussed in detail. The concepts of computer aided process planning (CAPP), Hardware components for automation, group technology (GT), cellular manufacturing, automated guided vehicle system, flexible manufacturing system (FMS), Automated inspection and just in time are also discussed in detail.

Course Objectives:

The overall objective of this course is

1. To equip the students with basic and essential concepts of Automation in manufacturing system to usually increase production rate and labor productivity.
2. To provide high caliber engineering students with an in-depth understanding of cellular manufacturing, flexible manufacturing system (FMS) and computer aided process planning.

Course Outcomes (COs):

At the end of the course, the student shall be able to:

- CO1 - Define and describe the basic fundamentals of Automation in manufacturing system, computer aided manufacturing and computer integrated manufacturing.
- CO2 – State, explain and demonstrate computer aided process planning, automated production lines and assembly systems.
- CO3 – Outline, interpret and apply concepts of group technology and cellular manufacturing.
- CO4 – Define, explain and apply knowledge of flexible manufacturing systems and industrial robotics in industries.

Modules	Blooms level*	Number of hours
Module I Over view of Manufacturing and Automation: Production systems, Automation in production systems, Automation principles and strategies, Manufacturing operations, production facilities. Basic elements of an automated system, levels of automation; Hardware components for automation and process control, programmable logic controllers and personal computers.	L1 and L2	7
Module II Material Handling And Identification Technologies: Material handling, equipment, Analysis. Storage systems, performance and location strategies, Automated storage systems, AS/RS, types. Automatic identification methods, Barcode technology, RFID	L1, L2, and L3	6
Module III Manufacturing Systems And Automated Production Lines:	L1, L2 and L3	8

Manufacturing systems: components of a manufacturing system, Single station manufacturing cells; Manual Assembly lines, line balancing Algorithms, Mixed model Assembly lines, Alternative Assembly systems. Automated production lines, Applications, Analysis of transfer lines		
Module IV Automated Assembly Systems: Fundamentals, Analysis of Assembly systems. Cellular manufacturing, part families, cooling, production flow analysis. Group Technology and flexible Manufacturing systems, Quantitative Analysis.	L1, L2 and L3	9
Module V Quality Control And Support Systems: Quality in Design and manufacturing, inspection principles and strategies, Automated inspection, contact Vs non contact, CMM. Manufacturing support systems. Quality function deployment, computer aided process planning, concurrent engineering, shop floor control, just in time and lean production.	L1, L2 and L3	6

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text books:

1. Mikell.P.Groover (2008), Automation, Production Systems and Computer Integrated Manufacturing, Prentice Hall of India.
2. N. Viswanandham, Y. Narhari "Performance Modeling of Automated Manufacturing Systems" Prentice-Hall.

Reference books:

1. M. Groover (2003), CAD/CAM Pearson Education; 1 edition.
2. S J Martin (1974), Numerical control of Machine Tools, Butterworth-Heinemann.
3. P N Rao (2017), CAD/CAM: Principles and Applications, Tata McGraw Hill Education; 3 editions.
4. Chang, Wysk & Wang (2005), Computer Aided Manufacturing, Prentice Hall of India.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	2	--	--	--	--	--	--	--	--	--	--	--	1	2	--
CO2	1	2	--	--	--	--	--	--	--	--	--	--	--	1	2	--
CO3	1	2	--	--	--	--	--	--	--	--	--	--	--	1	2	--
CO4	1	2	--	--	--	--	--	--	--	--	--	--	--	1	2	--

1: strongly related, 2: moderately related and 3: weakly related

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Course Code: RBE4302	ROBOTIC SENSORS, VISIONS AND HARDWARE IMPLEMENTATION	L	T	P	C
Version 2020.1	Date of Approval: 19 July 2020	3	0	0	3
Pre-requisites/Exposure	Knowledge of basics of Artificial Intelligence concepts, Sensors and basic Robotics hardware required.				
Co-requisites	Nil				

Catalog Description

Robotics sensors find many applications in the areas of robotics, visions, Artificial Intelligence, pattern recognition, controls etc. Robotics sensors offer fundamentally different types of high capable sensors. Many image processing techniques are learnt. These robotics hardware design, architecture, mapping and localization can be applied to many complicated problems of Artificial Intelligence and other applications in Real World Computing. This course provides a comprehensive treatment of robotics sensors, visions and robotics hardware required.

Course Objectives:

The objective of this course is to

- Introduces the basics of Robot visions and image processing sensors.
- It deals with actual hardware implementation of robots

Course Outcomes:

On completion of this course, the students will be able to

CO1: Understand the principles of smart sensors and transducers, need and usage of sensors.

CO2: comparison various visions in robotics robotic functions, robotic views and robotic parts in simulations.

CO3: Understand concept of image processing techniques which can be applied to robotic perception, robotic movements, dynamics and controls of robotic movement, with which they can be able to apply the conceptual things to the robotic software architecture and applications.

CO4: Get thorough knowledge in robotics orientation and feature extraction.

CO5: Design multicontrolled sensors robot assembly.

Modules	Blooms level*	Number of hours
MODULE 1: SENSORS IN ROBOTICS An Introduction to sensors and Transducers, History and definitions, Smart Sensing, AI sensing, Need of sensors in Robotics. Position sensors – optical, non-optical, Velocity sensors, Accelerometers, Proximity Sensors – Contact, non-contact, Range Sensing, touch and Slip Sensors, Force and Torque Sensors. Different sensing variables – smell, Heat or Temperature, Humidity, Light, Speech or Voice recognition Systems, Tele-presence and related technologies.	L1, L2	4
MODULE 2: VISIONS IN ROBOTICS The Nature of Vision- Robot vision – Need, Applications - image acquisition –illumination techniques- Point sensor, line sensor, planar sensor, camera transfer characteristic, Raster scan, Image capture time, volume sensors, Image representation, picture coding techniques. Robot Control through Vision sensors, Robot vision locating position, Robot guidance with vision system, End effector camera Sensor.	L1, L2, L3 and L4	10
MODULE 3: ELEMENTS OF IMAGE PROCESSING TECHNIQUES Discretization, Neighbours of a pixel-connectivity- Distance measures - pre-	L1, L3, L4 and	5

processing Neighbourhood averaging, Median filtering. Smoothing of binary Images- Image Enhancement- Histogram Equalization-Histogram Specification –Local Enhancement-Edge detection- Gradient operator-Laplace operators-Thresholding-Morphological image processing.	L5	
MODULE 4:OBJECT ORIENTATION AND FEATURE EXTRACTION Image segmentation- Edge linking-Boundary detection-Region growing-Region splitting and merging- Boundary Descriptors-Freeman chain code-Regional Descriptors- recognition-structural methods- Recognition procedure, mahalanobic procedure.	L1, L2, L3, and L4	7
MODULE 5:COLLISIONS FRONTS ALGORITHM Introduction, skeleton of objects. Gradients, propagation, Definitions, propagation algorithm, Thinning Algorithm, Skeleton lengths of Top most objects.	L2, L3, L4 and L5	5
MODULE 6:MULTISENSORS CONTROLLED ROBOT ASSEMBLY Control Computer, Vision Sensor modules, Software Structure, Vision Sensor software, Robot programming, Handling, Gripper and Gripping methods, accuracy – A Case study.	L2, L3, L4 and L5	5

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text & References:-

1. Paul W Chapman, “Smart Sensors”, an Independent Learning Module Series, 1996.
2. Richard D. Klafter, Thomas .A, Chri Elewski, Michael Negin, Robotics Engineering an Integrated Approach, Phi Learning., 2009.
3. John Iovice, “Robots, Androids and Animatrons”, Mc Graw Hill, 2003.
4. K.S. Fu, R.C. Gonzalez, C.S.G. Lee, “Robotics – Control Sensing, Vision and Intelligence”, Tata McGraw-Hill Education, 2008.
5. Mikell P Groover & Nicholas G Odrey, Mitchel Weiss, Roger N Nagel, Ashish Dutta, Industrial Robotics, Technology programming and Applications, Tata McGraw-Hill Education, 2012.
6. Sabrie Soloman, Sensors and Control Systems in Manufacturing, McGraw-Hill Professional Publishing, 2nd Edition, 2009.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	3	--	1	--	--	--	--	--	--	--	--	1	--	2	--
CO2	1	3	--	2	--	--	--	2	--	--	--	--	1	2	--	1
CO3	1	2	2	4	--	--	--	--	--	--	--	--	1	1	--	--
CO4	1	2	2	2	--	--	--	--	--	--	--	--	1	2	--	--
CO5	1	3	2	1	--	--	--	--	--	--	--	--	1	1	--	4

Course Code: RBE4303	PATTERN RECOGNITION & IMAGE PROCESSING	L	T	P	C
Version 2020.1	Date of Approval: 19 July 2020	3	0	0	3
Pre-requisites/Exposure	Basics of Digital Image Processing				
Co-requisites	NIL				

Catalog Description

This course gives students an insight into the basics of Image Processing along with Pattern Recognition. Concepts covered would enable students to define and differentiate among various types of image refinement. Further they would be able to gain insights about various Image restoration and modification technique.

Course Objectives

This course covers the theory and methods for learning from data, with an emphasis on pattern classification. Digital Image Processing is designed to give professionals and students a powerful collection of fundamental and advanced image processing tools on the desktop.

Course Outcomes

On completion of this course, the students will be able to

CO1: Define and explain introductory part of Pattern recognition Concepts & Bayesian decision theory

CO2: List out the Univariate and Multivariate density

CO3: Explain concepts of Un-supervised learning and clustering

CO4: Describe the Image Fundamentals and Transforms

CO5: Explain the basics of Image Segmentation and Edge Detection

Modules	Blooms level*	Number of hours
MODULE 1: Introduction of Pattern recognition and Bayesian Decision Theory Machine perception, pattern recognition example, pattern recognition systems, the design cycle, learning and adaptation Introduction, continuous features – two categories classifications, minimum error-rate classification- zero-one loss function, classifiers, discriminant functions, and decision surfaces	L1 and L2	8
MODULE 2: Normal density Univariate and multivariate density, discriminant functions for the normal density-different cases, Bayes decision theory – discrete features, compound Bayesian decision theory and context	L2 and L3	8
MODULE 3: Un-supervised learning and clustering Introduction, mixture densities and Identifiability, maximum likelihood estimates, application to normal mixtures, K-means clustering. Data description and clustering, similarity measures, criteria function for clustering	L1 and L2	10
MODULE 4: Image Fundamentals and Transforms Elements of visual perception – Image sampling and quantization, Basic relationship between pixels, Some basic grayscale transformations, Introduction to Fourier Transform and DFT, Properties of 2D Fourier	L2 and L3	12

Transform, FFT, Separable Image Transforms, Walsh, Hadamard, Discrete Cosine Transform, Haar, Slant, Karhunen, Loeve transforms.		
MODULE 5: Image Segmentation and Edge Detection Region Operations, Crack Edge Detection, Edge Following, Gradient operators, Compass and laplace operators. Threshold detection methods, optimal thresholding, multispectral thresholding, thresholding in hierarchical data structures; edge based image segmentation- edge image thresholding, edge relaxation, border tracing, border detection,	L2 and L3	10

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text & References:

Text:

1. "Fundamentals of speech Recognition", Lawrence Rabiner, Biing – Hwang Juang Pearson education.
2. "Pattern classifications", Richard O. Duda, PeterE. Hart, David G. Stroke. Wiley student edition, Second Edition.
3. R.C Gonzalez and R.E. Woods, "Digital Image Processing", Addison Wesley.

References:

1. "Pattern Recognition and Image Analysis" – Earl Gose, Richard John baugh, Steve Jost
2. A.K.Jain, "Fundamentals of Digital Image Processing", Prentice Hall of India.
3. "Digital Image Processing"– M. Anji Reddy, BS Publications.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

A: Attendance, CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO 3	PSO 4
CO 1	1	2	--	--	--	--	--	--	--	--	--	--	1	--	--	--
CO 2	1	--	2	--	--	--	--	--	--	--	--	--	1	2	--	--
CO 3	3	--	1	--	2	--	--	--	--	--	--	--	1	3	2	--
CO 4	3	--	2	--	1	--	--	--	--	--	--	--	1	--	2	--
CO 5	3	--	2	--	1	--	--	--	--	--	--	--	1	--	2	--

1: strongly related, 2: moderately related and 3: weakly related

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Course Code: RBE4304	ROBOTICS SENSORS, VISION AND HARDWARE IMPLEMENTATION LAB	L	T	P	C
Version 2020.1	Date of Approval: 19 July 2020	0	0	4	2
Pre-requisites/Exposure	MATLAB and concepts of Artificial Intelligence				
Co-requisites	Nil				

Catalog Description

Robotics sensors find many applications in the areas of robotics, visions, Artificial Intelligence, pattern recognition, controls etc. Robotics sensors offer fundamentally different types of high capable sensors. Many image processing techniques are learnt. These robotics hardware design, architecture, mapping and localization can be applied to many complicated problems of Artificial Intelligence and other applications in Real World Computing. This course provides a comprehensive treatment of robotics sensors, visions and robotics hardware required.

Course Objectives

The objective of this course is to

1. To become familiar with basics of robot visions, image processing sensors.
2. Understand and analyse concepts of hardware implementations in robotics.

Course Outcomes

On completion of this course, the students will be able to

CO1: Understand the principles of smart sensors and transducers, need and usage of sensors.

CO2: comparison various visions in robotics robotic functions, robotic views and robotic parts in simulations.

CO3: Understand concept of image processing techniques which can be applied to robotic perception, robotic movements, dynamics and controls of robotic movement, with which they can be able to apply the conceptual things to the robotic software architecture and applications.

CO4: Get thorough knowledge in robotics orientation and feature extraction.

Modules	Blooms level*	Number of hours
Lab Session 1: Generation in robot languages Learning of robot language structure, on line and offline programming	L3 and L4	2
Lab Session 2: Cartesian Trajectories Study of Joint space planning, Cartesian trajectories, path primitives, coordinate systems used to determine the positions of TCP and direction of tools	L3 and L4	4
Lab Session 3: Basic Syntax Learning of RAPID i.e. data objects, expression, function. WAIT, SIGNAL AND DELAY command.	L3 and L4	6
Lab Session 4: Routine and subroutine Write subroutine, task module, input-output interrupts, priority interrupts, and task modules. Study of built-in subroutines in RAPID.	L1, L2, and L3	2
Lab Session 5: optical sensors To study Photodiodes, phototransistors and photo resistors based sensors, light-to-light detectors, Infrared sensors (thermal, PIR, AFIR, thermopiles).	L1, L2, and L3	4
Lab Session 6: Magnetic and Electromagnetic Sensors and Actuators	L3 and	2

Study on Motors as actuators (linear, rotational, stepping motors), magnetic valves, inductive sensors (eddy current, LVDT, RVDT, Proximity, switches), Hall Effect sensors, Magneto resistive sensors.	L4	
Lab Session 7: Mechanical Sensors Accelerometers, Force sensors (strain gauges, tactile sensors), Pressure sensors (semiconductor, piezo resistive, capacitive, VRP).	L3 and L4	2
Lab Session 8: Industrial Networks and Fields Bus Types of bus – DN, PB, ProfiNet, Eth/IP Interfacing to Controller: Connecting sensors to controller directly or through fieldbus. Configuration of digital, group, and analog IO. Use of instructions and logic. Strobing and handshaking with PLC as master, Encoder and Resolvers.	L1, L2, and L3	2
Lab Session 9: PLC Various hardware types of PLC (CPU and I/O modules). Centralized configuration of PLC. On-line with PLC (using serial port). Various languages and its over-view. Sample program down-load, Task configuration. Configuration of IP address & sample program download. Decentralized configuration of PLC (Profibus protocol). Configuration I/O modules on Profibus protocol. Mod-bus configuration (Master & Slave configuration). Mod-bus RTU (Remote Telemetry Unit) and Mod-bus TCP/IP communication with PC based software.	L2, L3, and L4	2

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text & References:-

1. Paul W Chapman, "Smart Sensors", an Independent Learning Module Series, 1996.
2. Richard D. Klafter, Thomas .A, Chri Elewski, Michael Negin, Robotics Engineering an Integrated Approach, Phi Learning., 2009.
3. John Iovice, "Robots, Androids and Animatrons", Mc Graw Hill, 2003.
4. K.S. Fu, R.C. Gonzalez, C.S.G. Lee, "Robotics – Control Sensing, Vision and Intelligence", Tata McGraw-Hill Education, 2008.
5. Mikell P Groover & Nicholas G Odrey, Mitchel Weiss, Roger N Nagel, Ashish Dutta, Industrial Robotics, Technology programming and Applications, Tata McGraw-Hill Education, 2012.
6. Sabrie Soloman, Sensors and Control Systems in Manufacturing, McGraw-Hill Professional Publishing, 2nd Edition, 2009.

Examination Scheme:

IA					EE
Components	A	PR	LR	V	70
Weightage (%)	5	10	10	5	

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	2	3	--	--	--	--	3	--	--	--	--	1	2	--	--
CO2	1	--	2	2	--	--	--	3	--	--	--	--	1	2	--	--
CO3	1	2	2	3	--	--	3	--	--	--	--	--	1	--	--	3

Course Code: RBE4305	PATTERN RECOGNITION AND IMAGE PROCESSING LAB	L	T	P	C
Version 2020.1	Date of Approval: 19 July 2020	0	0	2	1
Pre-requisites/Exposure	Basics of MATLAB				
Co-requisites	NIL				

Catalog Description

In this Lab course first student should learn about advanced level of software used for easy calculation and toolbox used for software like MATLAB.

Course Objectives

The objective of this course is to

- Make the students apply knowledge of various Image processing & pattern recognition required for solving complex problems.
- Provide a demonstration of different types of image processing techniques through MATLAB toolbox.

Course Outcomes

On completion of this course, the students will be able to

CO1: Acquiring knowledge of Basics of High-end calculation software and need in Computer Science & engineering

CO2: Demonstrate the All preliminary functions in MATLAB

CO3: Apply the knowledge of all the basics function and toolbox knowledge of MATLAB

CO4: Demonstrate the Use of MATLAB in image Processing

CO5: Demonstrate usage of applications involving with Image processing & Recognition Its Toolbox used by MATLAB

Modules/Topics Covered**	Blooms level*	Number of hours
1. Introduction of MATLAB (b) Basic Variable declaration & its operation (c) Function use & its application	L3, L5	4
2. Sample Programs in MATLAB (e) Basic use of Matrix and Graph Plotting (f) Different type of graph plotting with use of different -2 type of data	L3, L5	6
3. Sample Programs using MATLAB functions (a) Create a basic program MATLAB using functions (b) Use of basic function Image processing (c) Practice on Basic function of Image processing tool box.	L3, L5	6
4. Sample programs of ANN functions (a) Practice on Pattern Recognition functions in MATLAB (b) Write a program for training a small network in MATLAB	L3, L5	6
5. Sample Programs using ANN toolbox & Image processing toolbox (d) Demonstrate the use of ANN tool box & Image processing toolbox and write a program after combining it.	L3, L5	2

*Bloom's Level:

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

** Sample Programs provided are not limited to these only, can include others as desired.

Text Books**Text & References:**

- Rafael C. Gonzalez & Richard E. Woods, “Image Processing Using MATLAB”, 2nd edition, Pearson Education.
- “Pattern classifications”, Richard O. Duda, Peter E. Hart, David G. Stork. Wiley student edition, Second Edition

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination**Examination Scheme:**

IA					EE
Components	A	PR	LR	V	70
Weightage (%)	5	10	10	5	

Note: IA –Internal Assessment, A – Attendance, PR – Performance, LR – Lab Record, V – Viva, EE- External Exam

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	2	1	--	--	--	--	--	--	--	--	--	--	2	--	--	--
CO2	3	1	--	--	--	--	--	--	--	--	--	--	1	2	--	--
CO3	2	1	2	--	--	--	--	--	--	--	--	--	1	2	--	--
CO4	1	3	2	--	--	--	--	--	--	--	--	--	2	--	2	--
CO5	1	3	--	--	--	--	--	--	--	--	--	--	1	--	--	--

1: strongly related, 2: moderately related and 3: weakly related

Course Code: RBE4306	OPTIMIZATION TECHNIQUES	L	T	P	C
Version 2020.1	Date of Approval: 19 July 2020	3	0	0	3
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

The purpose of this course is to develop a knowledge in the field of optimization techniques their basic concepts, ,principles. linear programming and queuing theory.

Course Objectives

After successful completion of the course, student will be able to understand importance of optimization of industrial process management , apply basic concepts of mathematics to formulate an optimization problem , analyse and appreciate variety of performance measures for various optimization problems.

Course Outcomes

On completion of this course, the students will be able to

CO1: Understand importance of optimization of industrial process management.

CO2: Apply basic concepts of mathematics to formulate an optimization problem

CO3: Analyse and appreciate variety of performance measures for various optimization problems

CO4: Use classical optimization techniques and numerical methods of optimization

CO5: Apply knowledge of optimization to formulate and solve engineering problems

Modules	Blooms level*	Number of hours
MODULE 1: INTRODUCTION Introduction to optimization – adequate and optimum design – principles of optimization – statement of an optimization problem – classification – formulation of objective function, design constraints.	L1, L2	4
MODULE 2: CLASSICAL OPTIMIZATION TECHNIQUES Single variable optimization –multivariable optimization with no constraints – exhaustive search, Fibonacci method, golden selection, Random, pattern and gradient search methods – Interpolation methods: quadratic and cubic, direct root method.	L1, L2, L3 and L5 , L6	12
MODULE 3:MULTIVARIABLE – UNCONSTRAINED AND CONSTRAINED OPTIMIZATION Direct search methods – descent methods – conjugate gradient method. Indirect methods – Transformation techniques, penalty function method	L1, L3 and L4	8
MODULE 4:NON – TRADITIONAL OPTIMIZATION TECHNIQUES Genetic Algorithms -steady state algorithm, fitness scaling, inversion. Genetic programming:- Genetic Algorithm in problem solving, Implementing a Genetic Algorithm:- computer implementation, operator (reproduction, crossover and Mutation, Fitness Scaling, Coding, Discretization). Knowledge based techniques in Genetic Algorithm. Advanced operators and techniques in genetic search:-Dominance, Diploidy and Abeyance. Inversion and other reordering operators, Niche and speciation and Tabu search methods.	L1, L3, and L4	10
MODULE 5:OPTIMUM DESIGN OF MACHINE Desirable and undesirable effects – functional requirement – material and	L3 and L4	2

geometrical parameters – Design of simple axial, transverse loaded members for minimum cost and minimum weight.		
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**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text & References:

1. Rao, S.S., “*Optimization – Theory and Applications*”, Wiley Eastern, New Delhi, 1978
2. Fox, R.L., *Optimization Methods for Engineering Design*, Addition – Wesley, Reading, Mass, 1971.
3. Wilde, D.J., “*Optimum Seeking Methods*”, Prentice Hall, Englewood Cliffs, New Jersey, 1964

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	3	--	1	--	--	--	--	--	--	--	--	1	--	2	--
CO2	1	3	--	2	--	--	--	--	--	--	--	--	1	2	--	1
CO3	1	2	2	4	--	--	--	--	--	--	--	--	1	1	--	--
CO4	1	2	2	2	--	--	--	--	--	--	--	--	1	2	--	--
CO5	1	3	2	1	--	--	--	--	--	--	--	--	1	1	--	4

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COMPUTER NUMERICAL CONTROL (CNC) MACHINES AND ADAPTIVE CONTROL

Course Code: RBE4307

Credit Units: 03

Course Objective:

This course objective is to understand NC, CNC and DNC manufacturing and generate manual part program for CNC machining. Concept of adaptive control and its various applications

Module-I

Concepts of NC, CNC, DNC. Classification of CNC machines, Machine configurations, Types of control, CNC controllers characteristics, Interpolators. Cutting tool materials, carbide inserts classification, qualified, semi qualified and preset tooling, tooling system for Machining centre and Turning centre, work holding devices, of CNC Machines.

Module-II

Programming CNC machines, Part print analysis and Process planning, Advanced Programming features, Canned cycles, Subroutines, Macros, special cycles etc. APT part programming using CAD/CAM, Parametric Programming. Manual part programming for CNC turning, milling and machining center. Computer assisted part programming techniques, Conversational and Graphics based software, Solids based part programming. Freeform surface machining. Simulation and Verification of CNC programs.

Module-III

Robot anatomy, robot configuration, motions joint notation work volume, robot drive system, control system and dynamic performance, precision of movement. Robot activation and feedback components. MOTION ANALYSIS AND CONTROL: Manipulator kinematics, position representation forward transformation, homogeneous transformation, manipulator path control, robot dynamics, configuration of robot controller.

Module-IV

END EFFECTORS: Grippers-types, operation, mechanism, force analysis, tools as end effectors consideration in gripper selection and design. SENSORS: Desirable features, tactile, proximity and range sensors, uses sensors in robotics. Positions sensors, velocity sensors, actuators sensors, power transmission system.

MACHINE VISION: Functions, Sensing and Digitizing-imaging, Devices, Lighting techniques, Analog to digital single conversion, image storage, Image processing and Analysis-image

Module-V

Review of Lyapunov analysis, model Reference Adaptive Control, Composite Adaptation, Parameter Convergence: Persistency of Excitation /Uniform Complete Observe-ability, Adaptive Control in the Presence of Input Constraints, Direct MRAC for Nonlinear systems with Matched Structured Nonlinearities, Robustness of MRAC: Parameter Drift, Adaptive Control in the Presence of Uniformly Bounded Residual Nonlinearity, Disturbance Rejection, Input-to-State Stability, fast adaptation.

Examination Scheme:

Components	CT	H	V/S/Q	EE
Weightage (%)	10	07	08	70

Text & References:

1. Krar, S., and Gill, A., “CNC Technology and Programming”, McGraw Hill publ Co, 1990.
2. Gibbs, D., “An Introduction to CNC Machining”, Casell, 1987.
3. Seames, W.S., “Computer Numerical Control Concepts and Programming”, Delmar Publishers, 1986.
4. Lynch, M., “Computer Numerical Control for Machining”, McGraw Hill, 1992.
5. Koren Y, “Computer Control of Manufacturing Systems”, McGraw, 1986.



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Course Code: RBE4308	NEURAL NETWORK AND FUZZY LOGIC	L	T	P	C
Version 2020.1	Date of Approval: 19 July 2020	3	0	0	3
Pre-requisites/Exposure	Linear algebra, advanced calculus, discrete mathematics, Boolean algebra or equivalent.				
Co-requisites	Nil				

Catalog Description

Fuzzy sets and fuzzy logic find many applications in the areas of stability theory, pattern recognition, controls etc. Neural Networks offer fundamentally alternative approaches to procedural programming. These systems proved their applicability to the problems where there are missing data or information or the problems which could not be defined in an algorithm. The integration of fuzzy systems and neural networks gives a tremendous potential which can be applied to many complicated problems of Artificial Intelligence and other applications in Real World Computing. This course provides a comprehensive treatment of neural network architectures and learning algorithms, with an in-depth look at problems in data mining and in knowledge discovery.

Course Objectives

The objective of this course is to

1. Introduces the basics of Neural Networks and essentials of Artificial Neural Networks with Single Layer and Multilayer Feed Forward Networks.
2. It deals with Associate Memories and introduces Fuzzy sets and Fuzzy Logic system component

Course Outcomes

On completion of this course, the students will be able to

CO1: Understand the principles of neural networks and fuzzy Logic fundamentals.

CO2: compare analysis between human and computer, Artificial Neural Networks models, characteristics of ANN's learning strategies, learning rules and basics of fuzzy logic.

CO3: Understand concept of classical and fuzzy sets, fuzzification and defuzzification, with which they can be able to apply the conceptual things to the real world electrical and electronics problems and applications.

CO4: Get thorough knowledge in biological neuron and artificial neurons.

CO5: Design the required and related systems

Modules	Blooms level*	Number of hours
MODULE 1: Basic neural computation models: Network and node properties. Inference and learning algorithms. Unsupervised learning: Signal hebbian learning and competitive learning. Supervised learning: Back propagation algorithms.	L1, L2	4
MODULE 2: Self organizing networks: Kohonen algorithm, bi-directional associative memories. Hopfield Networks: Hopfield network algorithm. Adaptive resonance theory: Network and learning rules. Neural network applications.	L1, L2, L3 and L4	10
MODULE 3: Fuzzy Sets: Operations and properties. Fuzzy Relations: Cardinality, Operations and properties.	L1, L3, L4 and L5	6

Value Assignments: Cosine amplitude and max-min method. Fuzzy classification: Cluster analysis and validity, Fuzzy e-means clustering, hardening the Fuzzy e-partition.		
MODULE 4: Fuzzification, Membership value assignments: Inference, rank ordering and angular Fuzzy sets, defuzzification methods, fuzzy logic, approximate reasoning. Fuzzy –based systems: Canonical rule forms, decomposition of compound rules, likelihood and truth qualification, aggregation of Fuzzy rules, graphical techniques of inference.	L1, L2, L3, and L4	9
MODULE 5: OPTIMUM DESIGN OF MACHINE Non linear simulation using Fuzzy rule-based systems, Fuzzy associative memories. Decision making under Fuzzy states and Fuzzy actions. Fuzzy grammar and syntactic recognition. General Fuzzy logic controllers, special forms of Fuzzy logic control system models, examples of Fuzzy control system design and control problems, industrial applications.	L2, L3, L4 and L5	7

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text & References:

- Limin Fu. "Neural Networks in Computer Intelligence" McGraw Hill, 1995.
- Freeman J. A., and Skapura D. Mu. "Neural Networks Algorithms applications and Programming Techniques", Addison Wesley New York, 1991.
- Timoty J. Ross, "Fuzzy Logic with Engineering Applications", McGraw Hill 1997.
- Bart Kosko "Neural Network and Fuzzy Systems", Prentice Hall of India, 1994

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	3	--	1	--	--	--	--	--	--	--	--	1	--	2	--
CO2	1	3	--	2	--	--	--	2	--	--	--	--	1	2	--	1
CO3	1	2	2	4	--	--	--	--	--	--	--	--	1	1	--	--
CO4	1	2	2	2	--	--	--	--	--	--	--	--	1	2	--	--
CO5	1	3	2	1	--	--	--	--	--	--	--	--	1	1	--	4

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Course Code: RBE4309	NEURAL NETWORK AND FUZZY LOGIC LAB	L	T	P	C
Version 2020.1	Date of Approval: 20 July 2020	0	0	2	1
Pre-requisites/Exposure	C/C++/MATLAB				
Co-requisites	Nil				

Catalog Description

Neural Networks offer fundamentally alternative approaches to procedural programming. Fuzzy sets and fuzzy logic find many applications in the areas of stability theory, pattern recognition, controls etc. These systems proved their applicability to the problems where there are missing data or information or the problems which could not be defined in an algorithm.

Course Objectives

The objective of this course is to

To become familiar with neural networks learning algorithms from available examples and give design methodologies for artificial neural networks.

2. Understand and analyse concepts of fuzzy set and use fuzzy set operations to implement current computing techniques used in fuzzy computing.

Course Outcomes

On completion of this course, the students will be able to

CO1: Understand the difference between learning and programming and explore practical applications of Neural Networks (NN).

CO2: To analyse and appreciate the applications which can use fuzzy logic.

CO3: Understand the efficiency of a hybrid system and how Neural Network and fuzzy logic can be hybridized to form a Neuro-fuzzy network and its various applications and they will be able to design inference systems

Modules	Blooms level*	Number of hours
Lab Session 1: Write a program to implement single layer perception algorithm.	L3 and L4	2
Lab Session 2: Write a program to implement back propagation learning algorithm	L3 and L4	4
Lab Session 3: Design multilayer feed forward network using back-propagation algorithm	L3 and L4	6
Lab Session 4 Study of fuzzy inference system	L1, L2, and L3	2
Lab Session 5 To study fuzzy logic controller using fuzzy logic toolbox	L1, L2, and L3	4
Lab Session 6 Write a program to implement SDPTA	L3 and L4	2
Lab Session 7 Write a program to implement RDPTA	L3 and L4	2
Lab Session 8 To Study various defuzzification techniques	L1, L2, and L3	2
Lab Session 9 Write a program to implement of fuzzy set operation	L2, L3, and L4	2

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text & References:

1. Limin Fu. "Neural Networks in Computer Intelligence" McGraw Hill, 1995.
2. Freeman J. A., and Skapura D. Mu. "Neural Networks Algorithms applications and Programming Techniques", Addison Wesley New York, 1991.

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	2	3	--	--	--	--	3	--	--	--	--	1	2	--	--
CO2	1	--	2	2	--	--	--	3	--	--	--	--	1	2	--	--
CO3	1	2	2	3	--	--	3	--	--	--	--	--	1	--	--	3



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Course Code:RBE4310	DECISION MAKING SYSTEMS	L	T	P	C
Version 2020.1	Date of Approval: 19 July 2020	3	0	0	3
Pre-requisites/Exposure	Basic Networking Concepts				
Co-requisites	Nil				

Catalog Description

To develop semantic-based and context-aware systems to acquire, organize process, share and use the knowledge embedded in multimedia content. Research will aim to maximize automation of the complete knowledge lifecycle and achieve semantic interoperability between Web resources and services. The field of Robotics is a multi disciplinary as robots are amazingly complex system comprising mechanical, electrical, electronic H/W and S/W and issues germane to all these.

Course Objectives

The objective of this course is to

1. To provide an overview of problem solving skills methods using decision making systems .
2. To serve as a foundation for the study of programming languages that is used to develop an Intelligence System

Course Outcomes

On completion of this course, the students will be able to

CO1. Understand the concept of artificial intelligence.

CO2. Differentiate between linear and non-linear problems and Learn various problem solving techniques using neural networks

CO3. Understand the concept of fuzzy logic and apply to various problems

CO4. Able to learn concepts of genetic algorithm

Modules	Blooms level*	Number of hours
Module I: Soft Computing Introduction of soft computing, soft computing vs. hard computing, various types of soft computing techniques, applications of soft computing. Artificial Intelligence : Introduction, Various types of production systems, characteristics of production systems, breadth first search, depth first search techniques, other Search Techniques like hill Climbing, Best first Search, A* algorithm, AO* Algorithms and various types of control strategies. Knowledge representation issues, Prepositional and predicate logic, monotonic and non monotonic reasoning, forward Reasoning, backward reasoning, Weak & Strong Slot & filler structures, NLP.	L1, L2	12
Module II: Neural Network Structure and Function of a single neuron: Biological neuron, artificial neuron, definition of ANN, Taxonomy of neural net, Difference between ANN and human brain, characteristics and applications of ANN, single layer network, Perceptron training algorithm, Linear separability, Widrow & Hebb's learning rule/Delta rule, ADALINE, MADALINE, AI v/s ANN. Introduction of MLP, different activation functions, Error back propagation algorithm, derivation of BBPA, momentum, limitation, characteristics and application of EBPA	L2, L3 and L4	10

Module III Counter propagation network, architecture, functioning & characteristics of counter Propagation network, Hopfield/ Recurrent network, configuration, stability constraints, associative memory, and characteristics, limitations and applications. Hopfield v/s Boltzman machine. Adaptive Resonance Theory: Architecture, classifications, Implementation and training. Associative Memory.	L2, L3 and L4	8
Module IV: Fuzzy Logic Fuzzy set theory, Fuzzy set versus crisp set, Crisp relation & fuzzy relations, Fuzzy systems: crisp logic, fuzzy logic, introduction & features of membership functions, Fuzzy rule base system : fuzzy propositions, formation, decomposition & aggregation of fuzzy rules, fuzzy reasoning, fuzzy inference systems, fuzzy decision making & Applications of fuzzy logic.	L2, L3 and L4	7
Module V: Genetic algorithm Fundamentals, basic concepts, working principle, encoding, fitness function, reproduction, Genetic modeling: Inheritance operator, cross over, inversion & deletion, mutation operator, Bitwise operator, Generational Cycle, Convergence of GA, Applications & advances in GA, Differences & similarities between GA & other traditional methods.	L2, L4	3

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books & References:

1. S, Rajasekaran & G.A. Vijayalakshmi Pai, Neural Networks, Fuzzy Logic & Genetic Algorithms, Synthesis & Applications, PHI Publication.
2. S.N. Sivanandam & S.N. Deepa, Principles of Soft Computing, Wiley Publications
3. Rich E and Knight K, Artificial Intelligence, TMH, New Delhi.
4. Bose, Neural Network fundamental with Graph , Algo.& Appl, TMH
5. Kosko: Neural Network & Fuzzy System, PHI Publication
6. Klir & Yuan, Fuzzy sets & Fuzzy Logic: Theory & Appl., PHI Pub.
7. Hagen, Neural Network Design, Cengage Learning

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	--	--	3	--	--	--	--	--	--	2	--	--	2	--	--
CO2	1	--	1	2	--	--	--	--	--	--	--	--	1	--	1	2
CO3	1	--	1	2	--	--	--	--	--	--	--	--	--	--	--	3
CO4	1	--	--	2	--	--	--	--	--	--	--	--	1	--	2	--
CO5	1	--	2	3	--	--	--	--	--	--	--	--	1	2	--	--
CO6	1	--	--	--	2	3	--	--	--	--	--	--	--	--	2	--

1: strongly related, 2: moderately related and 3: weakly related

Course Code: RBE4311	DECISION MAKING SYSTEM LAB	L	T	P	C
Version 2020.1	Date of Approval: 19 July 2020	0	0	2	1
Pre-requisites/Exposure	C/C++/MATLAB				
Co-requisites	Nil				

Catalog Description

This lab course covers development and designing of implementing basic neural networks, fuzzy systems, and optimization algorithms concepts and their relations. It aims to develop the concepts and techniques and foster the students' abilities in designing and implementing soft computing based solutions for real-world and engineering problems.

Course Objectives

The objective of this course is to

1. Equip the students with concepts of Soft Computing which includes Neural networks, Fuzzy logic and genetic algorithms.
2. Provide knowledge to develop Soft computing programs in Matlab.

Course Outcomes

On completion of this course, the students will be able to

CO1: Implement various neural networks using MATLAB.

CO2: Illustrate use of fuzzy in real applications.

CO3: Apply genetic algorithm to basic problems.

Modules	Blooms level*	Number of hours
Lab Session 1: Study of Biological Neural Network	L1 , L2 and L3	2
Lab Session 2: Study of Artificial Neural Network	L1, L2 and L3	1
Lab Session 3: Write a program of Perceptron Training Algorithm.	L3 and L4	2
Lab Session 4 Write a program to implement Hebb's Rule	L3, and L4	2
Lab Session 5 Write a program to implement of Delta Rule.	L3, and L3	2
Lab Session 6 Write a program to implement back propagation learning algorithm.	L3 and L4	2
Lab Session 7 Study of fuzzy inference system	L1, L2 and L3	1
Lab Session 8 To study fuzzy logic controller using fuzzy logic toolbox	L1, L2, L3 and L4	2
Lab Session 9 Write a program to implement SDPTA	L3 and L4	2

Lab Session 10 Write a program to implement RDPTA	L3 and L4	2
Lab Session 11 To Study various defuzziification techniques	L1, L2, L3 and L4	1
Lab Session 12 Write a program to implement of fuzzy set operation	L3 and L4	2
Lab Session 13 Study of genetic algorithm	L1, L2, L3 and L4	1
Lab Session 14 Study of Genetic programming and solve a real life problem	L1, L2, L3, and L4	2

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text & References:

1. Limin Fu. "Neural Networks in Computer Intelligence" McGraw Hill, 1995.
2. Freeman J. A., and Skapura D. Mu. "Neural Networks Algorithms applications and Programming Techniques", Addison Wesley New York, 1991.
3. S, Rajasekaran & G.A. Vijayalakshmi Pai, Neural Networks, Fuzzy Logic & Genetic Algorithms, Synthesis & Applications, PHI Publication.
4. S.N. Sivanandam & S.N. Deepa, Principles of Soft Computing, Wiley Publications
5. Rich E and Knight K, Artificial Intelligence, TMH, New Delhi.

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	2	3	--	--	--	--	3	--	--	--	--	1	2	--	--
CO2	1	--	2	2	--	--	--	3	--	--	--	--	1	2	--	--
CO3	1	--	3	2	--	3	3	--	--	--	--	--	1	--	--	3

Anil

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Course Code: MLE4301	PATTERN RECOGNITION & IMAGE PROCESSING	L	T	P	C
Version 2020.1	Date of Approval: 19 July 2020	3	0	0	3
Pre-requisites/Exposure	Basics of Digital Image Processing				
Co-requisites	NIL				

Catalog Description

This course gives students an insight into the basics of Image Processing along with Pattern Recognition. Concepts covered would enable students to define and differentiate among various types of image refinement. Further they would be able to gain insights about various Image restoration and modification technique.

Course Objectives

This course covers the theory and methods for learning from data, with an emphasis on pattern classification. Digital Image Processing is designed to give professionals and students a powerful collection of fundamental and advanced image processing tools on the desktop.

Course Outcomes

On completion of this course, the students will be able to

CO1: Define and explain introductory part of Pattern recognition Concepts & Bayesian decision theory

CO2: List out the Univariate and Multivariate density

CO3: Explain concepts of Un-supervised learning and clustering

CO4: Describe the Image Fundamentals and Transforms

CO5: Explain the basics of Image Segmentation and Edge Detection

Modules	Blooms level*	Number of hours
MODULE 1: Introduction of Pattern recognition and Bayesian Decision Theory Machine perception, pattern recognition example, pattern recognition systems, the design cycle, learning and adaptation Introduction, continuous features – two categories classifications, minimum error-rate classification- zero-one loss function, classifiers, discriminant functions, and decision surfaces	L1 and L2	8
MODULE 2: Normal density Univariate and multivariate density, discriminant functions for the normal density-different cases, Bayes decision theory – discrete features, compound Bayesian decision theory and context	L2 and L3	8
MODULE 3: Un-supervised learning and clustering Introduction, mixture densities and Identifiability, maximum likelihood estimates, application to normal mixtures, K-means clustering. Data description and clustering, similarity measures, criteria function for clustering	L1 and L2	10
MODULE 4: Image Fundamentals and Transforms Elements of visual perception – Image sampling and quantization, Basic relationship between pixels, Some basic grayscale transformations,	L2 and L3	12

Introduction to Fourier Transform and DFT, Properties of 2D Fourier Transform, FFT, Separable Image Transforms, Walsh, Hadamard, Discrete Cosine Transform, Haar, Slant, Karhunen, Loeve transforms.		
MODULE 5: Image Segmentation and Edge Detection Region Operations, Crack Edge Detection, Edge Following, Gradient operators, Compass and laplace operators. Threshold detection methods, optimal thresholding, multispectral thresholding, thresholding in hierarchical data structures; edge based image segmentation- edge image thresholding, edge relaxation, border tracing, border detection,	L2 and L3	10

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

Text & References:

Text:

4. "Fundamentals of speech Recognition", Lawrence Rabiner, Biing – Hwang Juang Pearson education.
5. "Pattern classifications", Richard O. Duda, PeterE. Hart, David G. Stroke. Wiley student edition, Second Edition.
6. R.C Gonzalez and R.E. Woods, "Digital Image Processing", Addison Wesley.

References:

4. "Pattern Recognition and Image Analysis" – Earl Gose, Richard John baugh, Steve Jost
5. A.K.Jain, "Fundamentals of Digital Image Processing", Prentice Hall of India.
6. "Digital Image Processing"– M. Anji Reddy, BS Publications.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

A: Attendance, CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO 3	PSO 4
CO 1	1	2	--	--	--	--	--	--	--	--	--	--	1	--	--	--
CO 2	1	--	2	--	--	--	--	--	--	--	--	--	1	2	--	--
CO 3	3	--	1	--	2	--	--	--	--	--	--	--	1	3	2	--
CO 4	3	--	2	--	1	--	--	--	--	--	--	--	1	--	2	--
CO 5	3	--	2	--	1	--	--	--	--	--	--	--	1	--	2	--

1: strongly related, 2: moderately related and 3: weakly related

Course Code: MLE4302	NEURAL NETWORK AND FUZZY LOGIC	L	T	P	C
Version 2020.1	Date of Approval: 19 July 2020	3	0	0	3
Pre-requisites/Exposure	Linear algebra, advanced calculus, discrete mathematics, Boolean algebra or equivalent.				
Co-requisites	Nil				

Catalog Description

Fuzzy sets and fuzzy logic find many applications in the areas of stability theory, pattern recognition, controls etc. Neural Networks offer fundamentally alternative approaches to procedural programming. These systems proved their applicability to the problems where there are missing data or information or the problems which could not be defined in an algorithm. The integration of fuzzy systems and neural networks gives a tremendous potential which can be applied to many complicated problems of Artificial Intelligence and other applications in Real World Computing. This course provides a comprehensive treatment of neural network architectures and learning algorithms, with an in-depth look at problems in data mining and in knowledge discovery.

Course Objectives

The objective of this course is to

1. Introduces the basics of Neural Networks and essentials of Artificial Neural Networks with Single Layer and Multilayer Feed Forward Networks.
2. It deals with Associate Memories and introduces Fuzzy sets and Fuzzy Logic system component

Course Outcomes

On completion of this course, the students will be able to

CO1: Understand the principles of neural networks and fuzzy Logic fundamentals.

CO2: compare analysis between human and computer, Artificial Neural Networks models, characteristics of ANN's learning strategies, learning rules and basics of fuzzy logic.

CO3: Understand concept of classical and fuzzy sets, fuzzification and defuzzification, with which they can be able to apply the conceptual things to the real world electrical and electronics problems and applications.

CO4: Get thorough knowledge in biological neuron and artificial neurons.

CO5: Design the required and related systems

Modules	Blooms level*	Number of hours
MODULE 1: Basic neural computation models: Network and node properties. Inference and learning algorithms. Unsupervised learning: Signal hebbian learning and competitive learning. Supervised learning: Back propagation algorithms.	L1, L2	4
MODULE 2: Self organizing networks: Kohonen algorithm, bi-directional associative memories. Hopfield Networks: Hopfield network algorithm. Adaptive resonance theory: Network and learning rules. Neural network applications.	L1, L2, L3 and L4	10
MODULE 3: Fuzzy Sets: Operations and properties. Fuzzy Relations: Cardinality, Operations and properties. Value Assignments: Cosine amplitude and max-min method.	L1, L3, L4 and L5	6

Fuzzy classification: Cluster analysis and validity, Fuzzy e-means clustering, hardening the Fuzzy e-partition.		
MODULE 4: Fuzzification, Membership value assignments: Inference, rank ordering and angular Fuzzy sets, defuzzification methods, fuzzy logic, approximate reasoning. Fuzzy –based systems: Canonical rule forms, decomposition of compound rules, likelihood and truth qualification, aggregation of Fuzzy rules, graphical techniques of inference.	L1, L2, L3, and L4	9
MODULE 5: OPTIMUM DESIGN OF MACHINE Non linear simulation using Fuzzy rule-based systems, Fuzzy associative memories. Decision making under Fuzzy states and Fuzzy actions. Fuzzy grammar and syntactic recognition. General Fuzzy logic controllers, special forms of Fuzzy logic control system models, examples of Fuzzy control system design and control problems, industrial applications.	L2, L3, L4 and L5	7

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text & References:

- Limin Fu. "Neural Networks in Computer Intelligence" McGraw Hill, 1995.
- Freeman J. A., and Skapura D. Mu. "Neural Networks Algorithms applications and Programming Techniques", Addison Wesley New York, 1991.
- Timoty J. Ross, "Fuzzy Logic with Engineering Applications", McGraw Hill 1997.
- Bart Kosko "Neural Network and Fuzzy Systems", Prentice Hall of India, 1994

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	3	--	1	--	--	--	--	--	--	--	--	1	--	2	--
CO2	1	3	--	2	--	--	--	2	--	--	--	--	1	2	--	1
CO3	1	2	2	4	--	--	--	--	--	--	--	--	1	1	--	--
CO4	1	2	2	2	--	--	--	--	--	--	--	--	1	2	--	--
CO5	1	3	2	1	--	--	--	--	--	--	--	--	1	1	--	4

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Course Code: MLE4304	PATTERN RECOGNITION AND IMAGE PROCESSING LAB	L	T	P	C
Version 2020.1	Date of Approval: 19 July 2020	0	0	2	1
Pre-requisites/Exposure	Basics of MATLAB				
Co-requisites	NIL				

Catalog Description

In this Lab course first student should learn about advanced level of software used for easy calculation and toolbox used for software like MATLAB.

Course Objectives

The objective of this course is to

- Make the students apply knowledge of various Image processing & pattern recognition required for solving complex problems.
- Provide a demonstration of different types of image processing techniques through MATAB toolbox.

Course Outcomes

On completion of this course, the students will be able to

CO1: Acquiring knowledge of Basics of High-end calculation software and need in Computer Science & engineering

CO2: Demonstrate the All preliminary functions in MATLAB

CO3: Apply the knowledge of all the basics function and toolbox knowledge of MATLAB

CO4: Demonstrate the Use of MATLAB in image Processing

CO5: Demonstrate usage of applications involving with Image processing & Recognition Its Toolbox used by MATLAB

Modules/Topics Covered**	Blooms level*	Number of hours
6. Introduction of MATLAB (d) Basic Variable deceleration & its operation (e) Function use & its application	L3, L5	4
7. Sample Programs in MATLAB (g) Basic use of Matrix and Graph Plotting (h) Different type of graph plotting with use of different -2 type of data	L3, L5	6
8. Sample Programs using MATLAB functions (d) Create a basic program MATLAB using functions (e) Use of basic function Image processing (f) Practice on Basic function of Image processing tool box.	L3, L5	6
9. Sample programs of ANN functions (c) Practice on Pattern Recognition functions in MATLAB (d) Write a program for training a small network in MATLAB	L3, L5	6
10. Sample Programs using ANN toolbox & Image processing toolbox (e) Demonstrate the use of ANN tool box & Image processing toolbox and write a program after combining it.	L3, L5	2

*Bloom's Level:

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

** Sample Programs provided are not limited to these only, can include others as desired.

Text Books**Text & References:**

- Rafael C. Gonzalez & Richard E. Woods, “Image Processing Using MATLAB”, 2nd edition, Pearson Education.
- “Pattern classifications”, Richard O. Duda, Peter E. Hart, David G. Stork. Wiley student edition, Second Edition

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination**Examination Scheme:**

IA					EE
Components	A	PR	LR	V	70
Weightage (%)	5	10	10	5	

Note: IA –Internal Assessment, A – Attendance, PR – Performance, LR – Lab Record, V – Viva, EE- External Exam

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	2	1	--	--	--	--	--	--	--	--	--	--	2	--	--	--
CO2	3	1	--	--	--	--	--	--	--	--	--	--	1	2	--	--
CO3	2	1	2	--	--	--	--	--	--	--	--	--	1	2	--	--
CO4	1	3	2	--	--	--	--	--	--	--	--	--	2	--	2	--
CO5	1	3	--	--	--	--	--	--	--	--	--	--	1	--	--	--

1: strongly related, 2: moderately related and 3: weakly related

Course Code: MLE4305	NEURAL NETWORK AND FUZZY LOGIC LAB	L	T	P	C
Version 2020.1	Date of Approval: 20 July 2020	0	0	2	1
Pre-requisites/Exposure	C/C++/MATLAB				
Co-requisites	Nil				

Catalog Description

Neural Networks offer fundamentally alternative approaches to procedural programming. Fuzzy sets and fuzzy logic find many applications in the areas of stability theory, pattern recognition, controls etc. These systems proved their applicability to the problems where there are missing data or information or the problems which could not be defined in an algorithm.

Course Objectives

The objective of this course is to

- To become familiar with neural networks learning algorithms from available examples and give design methodologies for artificial neural networks.
- Understand and analyse concepts of fuzzy set and use fuzzy set operations to implement current computing techniques used in fuzzy computing.

Course Outcomes

On completion of this course, the students will be able to

CO1: Understand the difference between learning and programming and explore practical applications of Neural Networks (NN).

CO2: To analyse and appreciate the applications which can use fuzzy logic.

CO3: Understand the efficiency of a hybrid system and how Neural Network and fuzzy logic can be hybridized to form a Neuro-fuzzy network and its various applications and they will be able to design inference systems

Modules	Blooms level*	Number of hours
Lab Session 1: Write a program to implement single layer perception algorithm.	L3 and L4	2
Lab Session 2: Write a program to implement back propagation learning algorithm	L3 and L4	4
Lab Session 3: Design multilayer feed forward network using back-propagation algorithm	L3 and L4	6
Lab Session 4 Study of fuzzy inference system	L1, L2, and L3	2
Lab Session 5 To study fuzzy logic controller using fuzzy logic toolbox	L1, L2, and L3	4
Lab Session 6 Write a program to implement SDPTA	L3 and L4	2
Lab Session 7 Write a program to implement RDPTA	L3 and L4	2
Lab Session 8 To Study various defuzziification techniques	L1, L2, and L3	2
Lab Session 9 Write a program to implement of fuzzy set operation	L2, L3, and L4	2

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text & References:

3. Limin Fu. "Neural Networks in Computer Intelligence" McGraw Hill, 1995.
4. Freeman J. A., and Skapura D. Mu. "Neural Networks Algorithms applications and Programming Techniques", Addison Wesley New York, 1991.

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35


Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	2	3	--	--	--	--	3	--	--	--	--	1	2	--	--
CO2	1	--	2	2	--	--	--	3	--	--	--	--	1	2	--	--
CO3	1	2	2	3	--	--	3	--	--	--	--	--	1	--	--	3



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Course Code: MLE4306	HADOOP LAB	L	T	P	C
Version 2020.1	Date of Approval: 19 July 2020	0	0	4	2
Pre-requisites/Exposure	Basic Concepts of DBMS				
Co-requisites	Relational Algebra and Relational Calculus				

Catalog Description

This course brings together several key big data technologies used for storage, analysis and manipulation of data. It also introduces the students the key concepts of Hadoop framework, MapReduce, Pig, Hive, and No-SQL. Students will learn to work on Hadoop platform. The concepts learnt will make students capable of working on big data projects easier.

Course Objectives

The objective of this course is

- To make students familiar with big data technologies.
- Provide an overview of Hadoop architecture and its working with other open source technologies.

Course Outcomes

On completion of this course, the students will be able to

CO1. Install and configure Hadoop and various tools like Pig, Hive etc.

CO2. Explain concepts of files and directories in HDFS and apply them in real database applications.

CO3. Design and implement mapreduce programs for a given problem.

CO4. Solve queries using concepts of Hive and Pig.

CO5. Perform operations using HBase.

Modules	Blooms level*	Number of hours
Lab Session 1 1. Installation & Configuration steps of Hadoop	L1 and L2	2
Lab Session 2-3 1. Working with HDFS commands :mkdir, rmdir, rm, mv, ls, du, put, rm-r, cat, tail etc 2. Working with vi editor	L1and L3	4
Lab Session 4-5 Working with Java Map Reduce : Map Class, Reduce Class, Drier Class, map side joins, reduce side joins	L1 and L3	4
Lab Session 6-8 1. Working with Hive : Queries for Hive : Create table, describe database, describe table, describe extended table, describe formatted table, drop table, drop database, display table, where clause 2. Commands : Load Files on table : Load from HDFS, load from local 3. Command :CTAS Create table as select 4. Queries to create external tables 5. Working with commands like : Order by, group by, like, upper, lower, max, min	L1 and L3	6

Lab Session 9-10 1. Working with PIG : Order by, group by, co group, like, upper, lower, Joins, Union, Cartesian, Product, Pig Scripts	L1 and L3	4
Lab Session 11-12 Working with HBase : Start the hbase, data insert, modify, multiple version insertion, describe, delete truncate, drop etc. Working with Foreign Key and Check Constraint.	L1 and L3	6

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

- Jeffrey Aven, "SAMS Teach Yourself Hadoop in 24 Hours", 1st Ed., Pearson ,2017.
- Tom White, "Hadoop: The Definitive Guide", 3rd Edition, O'reilly, 2012.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.


CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	2	--	--	3	--	--	--	--	--	--	--	--	1	1	-
CO2	1	-	--	--	2	--	--	--	--	--	--	2	--	1	1	-
CO3	1	-	1	--	--	--	--	--	--	--	--	2	--	1	1	-
CO4	1	-	2	--	--	--	--	--	--	--	--	--	--	1	1	--
CO5	1	-	2	--	--	--	--	--	--	--	--	--	--	1	--	-

1: strongly related, 2: moderately related and 3: weakly related



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Course Code: MLE4308	OPTIMIZATION TECHNIQUES	L	T	P	C
Version 2020.1	Date of Approval: 19 July 2020	3	0	0	3
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

The purpose of this course is to develop a knowledge in the field of optimization techniques their basic concepts, ,principles. linear programming and queuing theory.

Course Objectives

After successful completion of the course, student will be able to understand importance of optimization of industrial process management , apply basic concepts of mathematics to formulate an optimization problem , analyse and appreciate variety of performance measures for various optimization problems.

Course Outcomes

On completion of this course, the students will be able to

CO1: Understand importance of optimization of industrial process management.

CO2: Apply basic concepts of mathematics to formulate an optimization problem

CO3: Analyse and appreciate variety of performance measures for various optimization problems

CO4: Use classical optimization techniques and numerical methods of optimization

CO5: Apply knowledge of optimization to formulate and solve engineering problems

Modules	Blooms level*	Number of hours
MODULE 1: INTRODUCTION Introduction to optimization – adequate and optimum design – principles of optimization – statement of an optimization problem – classification – formulation of objective function, design constraints.	L1, L2	4
MODULE 2: CLASSICAL OPTIMIZATION TECHNIQUES Single variable optimization –multivariable optimization with no constraints – exhaustive search, Fibonacci method, golden selection, Random, pattern and gradient search methods – Interpolation methods: quadratic and cubic, direct root method.	L1, L2, L3 and L5 , L6	12
MODULE 3:MULTIVARIABLE – UNCONSTRAINED AND CONSTRAINED OPTIMIZATION Direct search methods – descent methods – conjugate gradient method. Indirect methods – Transformation techniques, penalty function method	L1, L3 and L4	8
MODULE 4:NON – TRADITIONAL OPTIMIZATION TECHNIQUES Genetic Algorithms -steady state algorithm, fitness scaling, inversion. Genetic programming:- Genetic Algorithm in problem solving, Implementing a Genetic Algorithm:- computer implementation, operator (reproduction, crossover and Mutation, Fitness Scaling, Coding, Discretization). Knowledge based techniques in Genetic Algorithm. Advanced operators and techniques in genetic search:-Dominance, Diploidy and Abeyance. Inversion and other reordering operators, Niche and speciation and Tabu search methods.	L1, L3, and L4	10
MODULE 5:OPTIMUM DESIGN OF MACHINE	L3 and	2

Desirable and undesirable effects – functional requirement – material and geometrical parameters – Design of simple axial, transverse loaded members for minimum cost and minimum weight.	L4	
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**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text & References:

1. Rao, S.S., "Optimization – Theory and Applications", Wiley Eastern, New Delhi, 1978
2. Fox, R.L., Optimization Methods for Engineering Design, Addition – Wesley, Reading, Mass, 1971.
3. Wilde, D.J., "Optimum Seeking Methods", Prentice Hall, Englewood Cliffs, New Jersey, 1964

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	2	--	--	--	--	--	--	--	--	--	--	1	3	1	1
CO2	1	--	2	3	--	--	--	--	--	--	--	--	1	3	1	2
CO3	1	1	2	3	3	--	--	--	--	--	--	--	1	2	1	2
CO4	1	1	3	--	--	--	--	--	--	--	--	--	1	2	1	1
CO5	1	2	2	--	--	--	--	--	--	--	--	--	1	1	1	1

1: strongly related, 2: moderately related and 3: weakly related

Course Code: MLE4309	SOCIAL NETWORK DATA ANALYTICS	L	T	P	C
Version 2020.1	Date of Approval: 19 th July 2020	3	0	0	3
Pre-requisites/Exposure	Basis of Database and Networking				
Co-requisites					

Catalog Description

This course gives an introduction to social network analysis, with a focus on modelling. It provides an overview of research questions connected to social networks, and of descriptive measures, models, and methods of analysis that can be used to analyze empirical social network data. It helps to understand the online interactive demonstrations and hands-on analysis of real-world data sets.

Course Objectives

The objective of this course is to

- To provide students effective data-driven intelligence to improve their decisions making and systematically estimate the expected impact on relevant performance objectives
- To equip the students with data-driven intelligence tools, the basics of data mining techniques and develop a data-analytical approach to problem-solving with their application

Course Outcomes

On completion of this course, the students will be able to

CO1. Know the basic notation and terminology used in network science

CO2. Be able to visualize, summarize and compare networks.

CO3. Learn the basic principles behind network analysis algorithms

CO4. Develop practical skills of network analysis in R programming language

CO5: Be capable of analyzing real work networks

Course Content

Modules	Bloom's level	Number of Hours
Module I Introduction Overview: Social network data-Formal methods- Paths and Connectivity-Graphs to represent social relations-Working with network data- Network Datasets-Strong and weak ties - Closure, Structural Holes, and Social Capital.	L1, L2	6
Module II Community Discovery in Social Networks: Applications, Methods and Engineering Trends Introduction, Communities in Context, Core Methods, Quality Functions, The Kernighan-Lin (KL) Algorithm, Agglomerative/Divisive Algorithms, Spectral Algorithms, Multi-Level Graph Portioning, Markov Clustering. Other Approaches, Emerging Fields and Problems, Community Discovery in Dynamic Networks, Community Discovery in Heterogeneous Networks, Community Discovery in Directed Networks, Coupling Content and Relationship Information for Community Discovery,	L1, L2, L3	7

Module III Information Networks and the World Wide Web The Structure of the Web- World Wide Web- Information Networks, Hypertext, and Associative Memory- Web as a Directed Graph, Bow-Tie Structure of the Web-Link Analysis and Web Search, Searching the Web: Ranking, Link Analysis using Hubs and Authorities- Page Rank- Link Analysis in Modern Web Search, Applications, Spectral Analysis, Random Walks, and Web Search.	L1, L2, L3	5
Module IV Node Classifications in Social Networks Introduction, Problem Formulation, Representing Data As A Graph, The Node Classification Problem, Methods Using Local Classifiers, Iterative Classification Method, Random Walk Based Methods, Label Propagation, Graph Regularization, Adsorption, Applying Node Classification To Large Social Networks, Basic Approaches, Second-Order Methods, Implementation Within Map-Reduce, Inference Using Graphical Models, Metric Labelling, Spectral Partitioning, Graph Clustering, Variations on Node Classification	L1, L2, L3	6
Module V Data and Text Mining in Social Media Data Mining In Nutshell, Social Media, Motivations For Data Mining In Social Media, Data Mining Methods For Social Media, Data Representation, Data Mining- A Process, Social Networking Sites: Illustrative Examples, Related Efforts, Ethnography And Netnography, Event Maps, Text Mining: Keyword Search, Query Semantics And Answer Ranking, Keyword Search over Xmland Relational Data, Keyword Search Over Graph Data, Classification Algorithms, Clustering Algorithms, Transfer Learning in Heterogeneous Networks.	L1, L3, L4	6
Module VI Overview of Social Tagging Introduction, Problems With Metadata Generation and Fixed Taxonomies, Tags: Why And What?, Different User Tagging Motivations, Kinds Of Tags, Linguistic Classifications Of Tags, Game-Based Tagging, Tag Generation Models, Tagging System Design, Tag Analysis, Tagging Distributions ,Identifying Tag Semantics, Tags Versus Keywords, Visualization Of Tags, Tag Clouds For Browsing/Search, Tag Selection For Tag Clouds, Tag Hierarchy Generation, Tag Cloud Display Formats, Tag Evolution Visualization.	LI, L2	6

***Bloom's Level:**

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

1. Easley and Kleinberg, "Networks, Crowds, and Markets: Reasoning about a highly connected world", Cambridge Univ. Press, 2010.
2. Charu C. Aggarwal, "Social Network Data Analytics", Springer, 2011.
3. Robert A. Hanneman and Mark Riddle, "Introduction to social network methods", University of California, 2005.

Reference Books

1. Jure Leskovec, Anand Rajaraman, and Jeffrey D. Ullman, "Mining of Massive Datasets", Cambridge University Press, 2nd edition, 2014.
2. Wasserman, S., & Faust, K, "Social Network Analysis: Methods and Applications", Cambridge University Press; 1st edition, 1994.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	2	--	--	--	--	--	--	--	--	--	--	1	3	1	1
CO2	1	--	2	3	--	--	--	--	--	--	--	--	1	3	1	2
CO3	1	1	2	3	3	--	--	--	--	--	--	--	1	2	1	2
CO4	1	1	3	--	--	--	--	--	--	--	--	--	1	2	1	1
CO5	1	2	2	--	--	--	--	--	--	--	--	--	1	1	1	1

1: strongly related, 2: moderately related and 3: weakly related



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Course Code: MLE4310	AGENT BASED INTELLIGENT SYSTEMS	L	T	P	C
Version 2020.1	Date of Approval: 19 th July,2020	3	0	0	3
Pre-requisites/Exposure	Basics of Python				
Co-requisites	Nil				

Catalog Description

This course provides students basic knowledge of employing intelligent agents in solving complex problems and gives the awareness of the building blocks of agents and working of different types of agents. It also analyses the reasons for uncertainty and ability to design agents to handle them.

Course Objectives

The objective of this course is to

1. Equip the students with the knowledge of intelligent agents in solving complex problems.
2. Provide an overview of Building Agents, Knowledge Based Agents, Planning Agents and Higher Level Agents.

Course Outcomes

On completion of this course, the students will be able to

CO1: Explain the concept of knowledge intelligent agents and use in solving complex problems.

CO2: Describe the concept of **Concepts for Building Agents and Knowledge Based Agents.**

CO3: Explain the concept of **Planning Agents and Higher Level Agents.**

CO4:..Describe the concept of **Agents and Uncertainty and Higher Level Agents.**

Modules	Blooms level*	Number of hours
MODULE 1: Definitions – History – Hybrid Intelligent Agents – Agents vs Multi Agent Systems– Structure – Environment – Basic Problem Solving Agents – Complex Problem Solving Agents – Formulating Search Strategies – Intelligent Search.	L1, L2 ,L3	7
MODULE 2: Situated Agents: Actions and Percepts - Proactive and Reactive Agents: Goals and Events- Challenging Agent Environments: Plans and Beliefs - Social Agents - Agent Execution Cycle.	L1,L2, L3	8
MODULE 3: Knowledge Representation – Logic – First Order Logic – Reflex Agent – Building a Knowledge Base – General Ontology – Interference – Logical Recovery.	L1,L2, L3	7
MODULE 4: Situational Calculus – Representation of Planning – Partial Order Planning – Practical Planners– Conditional Planning - Preplanning Agents.	L1, L2 and L3	5
MODULE 5: Acting under uncertainty – Probability – Baye's Rule – Belief Networks – Utility Theory - Decision Network- Value of Information – Decision Theoretic Agent Design.	L1, L2,L3	5

MODULE 6: Learning Agents – General Model – Inductive Learning – Learning Decision Tree – Reinforcement Learning – Knowledge in Learning – Communicative Agents – Types of Communicative Agents – Future of AI.	L1, L2 and L3	4
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**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text & References:

1. Stuart Russell and Peter Norvig, "Artificial Intelligence: A Modern Approach", 3rd Edition, Prentice Hall, 2010.
2. Lin Padgham, Michael Winikoff, "Developing Intelligent Agent Systems: A Practical Guide", 1st Edition, John Wiley & Sons, 2004.
3. ZiliZhang, Chengqi Zhang, "Agent-Based Hybrid Intelligent Systems: An Agent- Based Framework for Complex Problem Solving", 1st Edition, Springer-Verlag New York, LLC , 2004.
4. Ngooc Thanh Nguyaaen, Lakhmi C. Jain, "Intelligent Agents in the Evolution of Web and Applications", 4th Edition, Springer, 2009.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance


CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	1	1	--	--	--	--	--	--	--	--	--	1	1	3	-
CO2	1	1	1	--	--	--	--	--	--	--	--	--	1	1	3	-
CO3	1	1	1	--	-	--	--	--	--	--	--	--	1	1	3	-
CO4	1	2	3	--	--	--	--	--	--	--	--	--	1	1	3	-
CO5	1	2	3	--	--	--	--	--	--	--	--	--	2	2	3	-

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Course Code :- AIE4437	PROJECT DISSERTATION-II	L	T	P	C
Version 2020.1	Date of Approval: 19 July 2020	0	0	0	15
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

The objective of this course is to provide practical training on some live/demo projects that will increase capability to work on actual problem in industry. It will be an in house training on some latest software which is in high demand in market. This training will be designed such that it will be useful for their future employment in industry.

Course Objectives

The objective of this course is to

1. Provide practical training on live projects
2. Increase technical capabilities on solving real life problems in company environment

Course Outcomes

On completion of this summer internship, the students will be able to:

CO1: Demonstrate a sound technical knowledge of their selected project topic.

CO2: Design and develop engineering solutions to complex problems utilising a systems approach.

CO3: Analyse various approaches for solving a complex engineering problem using different tools and techniques

CO4: Demonstrate the knowledge, skills and attitudes of a professional engineer.

CO5: Apply technical skills and knowledge in completing the project.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	2	--	--	--	--	--	--	1	--	--	--	--	--	1	1
CO2	1	1	--	--	--	--	--	--	1	--	--	--	--	--	1	1
CO3	1	1	--	--	--	--	--	--	1	--	--	--	--	--	1	1
CO4	1	1	--	--	--	--	--	--	1	--	--	--	--	--	1	1
CO5	1	1	--	--	--	--	--	--	1	-	-	-	--	--	1	1

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Master of Technology - Network & Cyber Security

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Curriculum & Scheme of Examination

2022

AMITY UNIVERSITY HARYANA

GURUGRAM

A handwritten signature in blue ink, appearing to read 'Anil'.

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A handwritten signature in blue ink, appearing to read 'Manesar'.

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Course Code: NCE4102	ADVANCED DATABASE MANAGEMENT SYSTEMS	L	T	P	C
Version 2020.1	Date of Approval: 19 July 2020	3	0	0	3
Pre-requisites/Exposure	Basic knowledge of DBMS				
Co-requisites	NIL				

Catalog Description

The objective of this course is to expose the students to the implementation techniques of database system. This course explains techniques for query processing and optimization with transaction and concurrency control techniques.

Course Objectives

The objective of this course is to

1. To understand the basic concepts and terminology related to DBMS and Relational Database Design
2. To design and understand Distributed, parallel and object oriented Databases.
3. To understand advanced DBMS techniques to handle and optimize queries in database.

Course Outcomes

On completion of this course, the students will be able to

- CO1. Understand the basics of database management system and implementation of relational database.
- CO2. Knowhow of the file organization, Query Optimization, Transaction management, and database administration techniques.
- CO3. Understand and design Distributed, parallel and object oriented Databases models and possible methods of proving them.

Modules	Blooms level*	Number of hours
MODULE 1: Relational Database Integrity Constraints revisited, Extended ER diagram, Relational Algebra & Calculus, Functional, Multivalued and Join Dependency, Normal Forms, Rules about functional dependencies.	L1, L2 and L3	8
MODULE 2: Query Processing and Optimization Valuation of Relational Operations, Transformation of Relational Expressions, Indexing and Query Optimization, Limitations of Relational Data Model, Null Values and Partial Information. Objected Oriented and Object Relational Databases Modeling Complex Data Semantics, Specialization, Generalization, Aggregation and Association, Objects, Object Identity, Equality and Object Reference, Architecture of Object Oriented and Object Relational Databases	L1,L2,l3	9
MODULE 3: Parallel and Distributed Databases Distributed Data Storage – Fragmentation & Replication, Location and Fragment Transparency Distributed Query Processing and Optimization,	L1, L2 and L3	10

Distributed Transaction Modeling and concurrency Control, Distributed Deadlock, Commit Protocols, Design of Parallel Databases, and Parallel Query Evaluation. Advanced Transaction Processing Nested and Multilevel Transactions, Compensating Transactions and Saga, Long Duration Transactions, Weak Levels of Consistency, Transaction Work Flows, Transaction Processing Monitors.		
MODULE 4: Multimedia databases, Databases on the Web and Semi-Structured Data , Case Study: Oracle Xi	L1, L2	9

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. Elmarsi, Navathe, Somayajulu, Gupta, "Fundamentals of Database Systems", 4th Edition, Pearson Education, 2007
2. Garcia, Ullman, Widom, "Database Systems, The complete book", Pearson Education, 2007
3. R. Ramakrishnan, "Database Management Systems", McGraw Hill International Editions, 1998

Reference Books

1. Date, Kannan, Swaminathan, "An Introduction to Database Systems", 8th Edition Pearson Education, 2007
2. Singh S.K., "Database System Concepts, design and application", Pearson Education, 2006.
3. Silberschatz, Korth, Sudarshan, "Database System Concepts", McGraw Hill, 6th Edition, 2006
4. W. Kim, "Modern Database Systems", 1995, ACM Press, Addison – Wesley,
5. D. Maier, "The Theory of Relational Databases", 1993, Computer Science Press, Rockville, Maryland
6. Ullman, J. D., "Principals of database systems", Galgotia publications, 1999
7. Oracle Xi Reference Manual
8. Dietrich, and Urban, "An Advanced Course in Database Systems", Pearson, 2008.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS O 1	PS O 2	PS O 3	PSO 4
CO 1	2	-	3	--	--	--	--	--	--	--	--	--	2	2	-	-
CO 2	2	2	3	-	--	--	--	--	--	--	--	--	2	1	-	-
CO 3	2	-	3	-	-	--	--	--	--	--	--	--	2	1	-	-

1: strongly related, 2: moderately related and 3: weakly related

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Course Code: NCE4103	DIGITAL COMPUTER ORGANIZATION	L	T	P	C
Version 2020.1	Date of Approval: 19 July2020	3	0	0	3
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

The Objective of this course is to expose the students to the fundamentals and the concepts of Digital & Computer Organization and Representation of Information and Basic Building Blocks, Basic Organization, Memory Organization, Input-Output Organization, Processor Organization etc. This course is designed to understand the concepts of Computer Organization for Research & Development as well as for application.

Course Objectives

The objective of this course is to

An understanding of a machine's instruction set architecture (ISA) including basic instruction fetch and execute cycles, instruction formats, control flow, and operand addressing modes.

Course Outcomes

On completion of this course, the students will be able to

- CO1. Understand and Interpret the functional architecture of computing systems.
- CO2. Identify, compare and assess issues related to ISA, memory, control and I/O functions.
- CO3. Understand the general concepts in digital logic design, including logic elements, and their use in combinational and sequential logic circuit design.
- CO4. Design and analyze solutions in the area of computer architecture.

Modules	Blooms level*	Number of hours
MODULE 1: Parallel computer models The state of computing, Multiprocessors and multicomputers, Multivector and SIMD computers, Architectural development tracks Program and network properties: Conditions of parallelism, Data and resource dependences, Hardware and software parallelism, Program partitioning and scheduling, Grain size and latency, Program flow mechanisms, Control flow versus data flow, Data flow architecture, Demand driven mechanisms, Comparisons of flow mechanisms	L1, L2 and L3	7
MODULE 2: System Interconnect Architectures Network properties and routing, Static interconnection networks, Dynamic interconnection Networks, Multiprocessor system interconnects, Hierarchical bus systems, Crossbar switch and multiport memory, Multistage and combining network.	L1,L2,L3	8
MODULE 3: Processors and Memory Hierarchy Advanced processor technology, Instruction-set Architectures, CISC Scalar Processors, RISC Scalar Processors, Superscalar Processors, VLIW Architectures, Vector and Symbolic processors Memory Technology: Hierarchical memory technology, Inclusion, Coherence and Locality, Memory capacity planning, Virtual Memory	L1, L2 and L3	8

Technology		
MODULE 4: Backplane Bus System Backplane bus specification, Addressing and timing protocols, Arbitration transaction and interrupt, Cache addressing models, Direct mapping and associative caches. Pipelining: Linear pipeline processor, Nonlinear pipeline processor, Instruction pipeline design, Mechanisms for instruction pipelining, Dynamic instruction scheduling, Branch handling techniques, Arithmetic Pipeline Design, Computer arithmetic principles, Static arithmetic pipeline, Multifunctional arithmetic pipelines	L1, L2	7
MODULE 5: Vector Processing Principles Vector instruction types, Vector-access memory schemes. Synchronous Parallel Processing: SIMD Architecture and Programming Principles, SIMD Parallel Algorithms, SIMD Computers and Performance Enhancement	L2,L4	6

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. M. Moris Mano, "Computer Systems Architecture", 4th Edition, Pearson/PHI, ISBN:10:0131755633
2. Carl Hamacher, Zvonko Vranesic, Safwat Zaky, "Computer Organization", 5 th Edition, McGraw Hill

Reference Books

1. J.P. Hayes, "computer Architecture and organization", MGH, 1998.
2. M.J Flynn, "Computer Architecture, Pipelined and Parallel Processor Design", Narosa Publishing, 1998.
3. D.A. Patterson, J.L. Hennessy, "Computer Architecture: A quantitative approach", Morgan Kauffmann, 2002.
4. Hwang and Briggs, "Computer Architecture and Parallel Processing"; MGH, 2000.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS O 1	PS O 2	PS O 3	PSO 4
CO 1	2	-	3	--	--	--	--	--	--	--	--	--	2	1	-	-
CO 2	2	2	3	-	--	--	--	--	--	--	--	--	2	1	2	-
CO 3	2	-	3	-	-	--	--	--	--	--	--	--	2	1	2	-
CO 4	2	-	3	-	-	--	--	--	--	--	--	--	2	1		-

1: strongly related, 2: moderately related and 3: weakly related

Course Code: NCE4104	ADVANCED COMPUTER NETWORKS	L	T	P	C
Version 2020.1	Date of Approval: 19 July 2020	3	0	0	3
Pre-requisites/Exposure	Basics of Computer Network				
Co-requisites	Nil				

Catalog Description

Advanced Computer Networks provides the knowledge of computer networks and related current research topics. This course illustrates the OSI and TCP-IP layers, services, devices, cables, protocols, network security, network performance parameters etc. This course focuses on advanced computer network concepts in theory as well as in real life applications in networking.

Course Objectives

The objective of this course is to

- Equip the students with the advanced networking concepts.
- Explain the different techniques of error detection and correction methods used at various layers.
- Provide an overview of various algorithms involved in advanced computer networks at OSI and TCP-IP Layers.

Course Outcomes

On completion of this course, the students will be able to

CO1: Explain the concept of reference model, wireless Ethernet standards, protocols and applications of networks.

CO2: Describe network Layer design issues, routing algorithms, IP addressing.

CO3: State Multicasting issues and multicast routing protocol. Describe mobile IP and its use in Multicasting.

CO4: State transport and application layers and explain services, protocols, performance parameters in these layers. Also describe DNS, Email and www with applications of each in computer network.

CO5: State network security and describe various types of computer network security, the digital signature, security algorithms. Explain the social issues related to network security and web security.

Modules	Blooms level*	Number of hours
MODULE 1: Uses computer networks, Reference Models, TCP/IP suite of protocols, MAC protocols for high-speed LANS, MANs, and wireless LANs. (For example, FDDI, DQDB, HIPPI, Gigabit Ethernet, Wireless Ethernet, etc.) Fast access technologies. (For example, ADSL, Cable Modem, etc.)	L1, L2	6
MODULE 2: Network Layer Design Issues, Routing Algorithms, Congestion Control Algorithms, Quality of Service, Internet Working, Network Layer in Internet. IPv6 basic protocol, extensions and options, support for QoS, security, etc., Changes to other protocols, Application Programming Interface for IPv6.	L2, L3	8
MODULE 3: Mobile IP, IP Multicasting. Multicast routing protocols, address assignments, session discovery, etc.	L1, L2	8
MODULE 4: The Transport Protocol: The Transport Service, Elements of transport	L1, L2, and L3	8

protocol, a simple Transport Protocol, Internet Transport Protocols UDP, Internet Transport Protocols TCP, TCP extensions for high-speed networks, transaction-oriented applications Performance Issues. The Application Layer: DNS-(Domain Name System), Electronic Mail, World Wide Web Multimedia.		
MODULE 5: Overview of network security, Secure-HTTP, SSL, ESP, Key distribution protocols. Digital signatures, digital certificates-mail Security, Web security, Social Issues..	L1, L2	6

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

- William Stallings, Cryptography & Network Security: Principles and Practices, Prentice Hall, 2005, (ISBN: 978-0131873162).

Reference Books

- Behrouz A. Forouzan, Cryptography & Network Security, McGraw-Hill, 2007, USA. (ISBN: 0073327530 9780073327532).
- Douglas R. Stinson, Chapman and Hall, Cryptography Theory & Practice, CRC Press, 2005.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	-	-	-	-	--	--	--	--	--	--	--	1	--	-	--
CO2	1	-	-	-	3	--	3	--	--	--	--	--	1	--	-	--
CO3	1	-	-	-	3	--	3	--	--	--	--	--	2	1	-	--
CO4	1	-	-	--	2	--	2	--	3	--	--	--	2	1	-	--
CO5	1	-	-	-	1	-	1	--	2	--	--	--	1	2	-	--

1: strongly related, 2: moderately related and 3: weakly related

Course Code: NCE4106	ADVANCED DATABASE MANAGEMENT SYSTEM LAB	L	T	P	C
Version 2020.1	Date of Approval: 19 July 2020	0	0	2	1
Pre-requisites/Exposure	Basic knowledge of DBMS				
Co-requisites	Nil				

Catalog Description

The objective of this course is to expose the students to the implementation techniques of database system. This course explains techniques for query processing and optimization with transaction and concurrency control techniques.

Course Objectives

The objective of this course is

1. Equip the students with the different issues involved in the design and implementation of a database system.
2. Provide a practical knowledge of implementation/demonstration of data manipulation language to query, update, and manage a database.

Course Outcomes

On completion of this course, the students will be able to

CO1. Demonstrate and analyze and apply common SQL statements including DDL, DML and DCL statements to perform different operations.

CO2. Demonstrate and Apply different types of constraints on the database.

CO3. Design different views of tables for different users and to apply embedded and nested queries.

CO4. Design and implement a database for a given problem according to well known design principles that balance data retrieval performance with data consistency.

Modules	Blooms level*	Number of hours
Module1: 1. Introduction to SQL and understand basic commands 2. Understand various DDL and DML commands. 3. To understand joins in SQL.	L1,L2 and L3	4
Module 2: 1. To understand constraints SQL 2. Wild cards and aggregate functions in SQL 3. To understand and execute procedures and views in SQL	L2 and L3	6
Module 3: 1. To understand and execute triggers in SQL 2. To develop a database application to demonstrate the representation of multi valued attributes and use of nested tables to represent complex objects. Write suitable queries	L2, L3, L4 and L5	4
Module 4: 1. To understand and execute Indexes in SQL	L2, L3 and L4	4
Module 5: 1. To understand the concept of Exception handling in SQL 2. Query Evaluation Plans 3. Concurrency and Transactions	L2, L3 and L4	1

*Bloom's Level:

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. Abraham Silberschatz, Henry F. Korth, S. Sudharshan, "Database System Concepts", 6th edition, Tata McGraw Hill, 2011
2. RamezElmasri, Shamkant B. Navathe, "Fundamentals of Database Systems", 4th Edition, Pearson/Addisionwesley, 2007

Reference Book

1. Database System Concepts by A. Silberschatz, H.F. Korth and S. Sudarshan, 3rd edition, 1997, McGrawHill, International Edition.
2. Introduction to Database Management system by Bipin Desai, 1991, Galgotia Pub.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/ Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS O 1	PS O 2	PS O 3	PS O 4
CO 1	2	1	--	--	--	--	--	--	--	--	--	--	1	2	--	--
CO 2	3	1	--	--	--	--	--	--	--	--	--	--	1	1	--	--
CO 3	1	3	2	--	--	--	--	--	--	--	--	--	1	2	3	--
CO 4	1	3	2	--	--	--	--	--	--	--	--	--	1	1	--	--
CO 5	1	3	--	--	--	--	--	--	--	--	--	--	1	2	--	1

1: strongly related, 2: moderately related and 3: weakly related

Course Code: NCE4107	ADVANCED COMPUTER NETWORKS LAB	L	T	P	C
Version 2020.1	Date of Approval: 19 July 2020	0	0	2	1
Pre-requisites/Exposure	Basics of Computer Networks				
Co-requisites	Nil				

Catalog Description

Advanced Computer Networks Lab provides the knowledge of various installations & connections of LAN, WAN, etc, study of Cisco Packet Tracer Tool and its implementations, simulation of flow-control protocols such as Sliding Window, Stop & Wait with help of programming languages. This course focuses on real-life applications in networking and its software implementation in the laboratory.

Course Objectives

The objective of this course is to

1. Equip the students with the advanced networking concepts.
2. Explain the different techniques of error detection and correction methods used at various layers.
3. Provide an overview of various algorithms involved in advanced computer networks at OSI and TCP-IP Layers.

Course Outcomes

On completion of this course, the students will be able to

- CO1: Understand fundamental underlying principles of computer networking
- CO2: Understand details and functionality of CISCO router
- CO3: Demonstrate and configure details and functionality of DHCP server
- CO4: Analyze performance of various communication protocols.
- CO5: Compare routing algorithms

Modules	Blooms level*	Number of hours
MODULE 1: 1. Configuration and logging to a CISCO Router and introduction to the basic user Interfaces. Introduction to the basic router configuration and basic commands. 2. Configuration of IP addressing for a given scenario for a given set of topologies.	L1, L2	2
MODULE 2: 1. Configure a DHCP Server to serve contiguous IP addresses to a pool of four IP devices with a default gateway and a default DNS address. Integrate the DHCP server with a BOOTP demon to automatically serve Windows and Linux OS Binaries based on client MAC address	L2, L3	2
MODULE 3: 1. Configure, implement and debug the following: Use open source tools for debugging and diagnostics. a. ARP/RARP protocols b. RIP routing protocols c. BGP routing d. OSPF routing protocols e. Static routes (check using netstat)	L1, L2	3
MODULE 4:	L1, L2,	3

<ol style="list-style-type: none"> 1. Configure DNS: Make a caching DNS client, and a DNS Proxy; implement reverse DNS and forward DNS, using TCP dump/Wireshark characterise traffic when the DNS server is up and when it is down. 2. Configure FTP Server on a Linux/Windows machine using a FTP client/SFTP client characterise file transfer rate for a cluster of small files 100k each and a video file of 700mb. Use a TFTP client and repeat the experiment 	and L3	
MODULE 5: <ol style="list-style-type: none"> 1. Configure a mail server for IMAP/POP protocols and write a simple SMTP client in C/C++/Java client to send and receive mails. 2. Implement Open NMS+ SNMPD for checking Device status of devices in community MIB of a linux PC. Using yellow pages and NIS/NFS protocols implement Network Attached Storage Controller (NAS). Extend this to serve a windows client using SMB. Characterise the NAS traffic using wireshark. 	L1, L2	3

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

- William Stallings, Cryptography & Network Security: Principles and Practices, Prentice Hall, 2005, (ISBN: 978-0131873162).

Reference Books

- Behrouz A. Forouzan, Cryptography & Network Security, McGraw-Hill, 2007, USA. (ISBN: 0073327530 9780073327532).
- Douglas R. Stinson, Chapman and Hall, Cryptography Theory & Practice, CRC Press, 2005.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	-	-	-	-	--	--	--	--	--	--	--	1	--	-	--
CO2	1	-	-	-	3	--	3	--	--	--	--	--	1	--	-	--
CO3	1	-	-	-	3	--	3	--	--	--	--	--	1	2	2	--
CO4	1	-	-	--	2	--	2	--	3	--	--	--	2	1	-	--
CO5	1	-	-	-	1	-	1	--	2	--	--	--	2	1	-	--

1: strongly related, 2: moderately related and 3: weakly related

Anil

Manesar

Course Code: NCE4108	MATLAB PROGRAMMING	L	T	P	C
Version 2020.1	Date of Approval: 19 July 2020	0	0	4	2
Pre-requisites/Exposure	C Programming				
Co-requisites	Basic knowledge of Programming				

Catalog Description

The objective of this course is to expose the students to the implementation techniques of Mat Lab Programming.

Course Objectives

The objective of this course is to

- To understand the basic concepts and terminology related to Mat Lab.
- Application of Mat Lab in field of Signal Processing and Control systems.

Course Outcomes

On completion of this course, the students will be able to

- CO1. Understand the basics of Matlab programming environment.
CO2. Analysis of given LTI System and verifying its physical reliability and stability properties.
CO3. Waveform synthesis using Laplace Transforms and z-transform of a given signal and system.

Modules	Blooms level*	Number of hours
1. To write a MATLAB program to perform some basic operation on matrices such as addition, subtraction, multiplication. 2. To write a "MATLAB" Program to generate various signals and sequences, such as unit impulse, unit step, unit ramp, sinusoidal, square, saw tooth, triangular, sinc signals. 3. To performs operations on signals and sequences such as addition, multiplication, scaling, shifting, folding, computation of energy and average power. 4. Write a program for finding even and odd parts of sequences Using MATLAB Software & program for finding real and imaginary parts of sequences Using MATLAB Software.	L1, L2 and L3	8
5. Write a program to find the out put with linear convolution operation Using MATLAB Software 6. Write a program to compute auto correlation and cross correlation between signals and Sequences. 7. Write a program to compute linearity and time invariance properties of a given continuous /discrete System.	L1,L2,L3	6
8. Write a program to Unit Step And Sinusoidal Response Of The Given LTI System And Verifying Its physical reliability and stability properties. 9. Write a program to demonstrate Gibbs Phenomenon using MATLAB. 10. Write a program to obtain Fourier Transform and Inverse Fourier Transform of a given signal / sequence and to plot its Magnitude and Phase Spectra 11. Write a program to perform waveform synthesis using Laplace	L1, L2 and L3	8

Transforms of a given signal.		
12. Write a program to locating the zeros and poles and plotting the pole zero maps in s-plane and z-plane 13. for the given transfer function. 14. Write a program to Generate Gaussian Noise and to Compute its Mean, M.S. Values, Skew, kurtosis, 15. PS and PDF 16. Write a program to demonstrate Sampling Theorem and aliasing effect using MATLAB. 17. Write a program for removal of noise by auto correlation/cross correlation.	L1, L4	12

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

4. Amos Gilat, "MATLAB: An Introduction with Applications", Wiley; Fourth edition (2012)4ed.

Reference Books

9. Bansal, Goel and Sharma, MATLAB and its Applications in Engineering" Pearson Education India; Second edition (1 March 2016).

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS O 1	PS O 2	PS O 3	PSO 4
CO 1	2	1	--	--	--	--	--	--	--	--	--	--	1	2	--	--
CO 2	3	1	--	--	--	--	--	--	--	--	--	--	1	1	--	--
CO 3	1	3	2	--	--	--	--	--	--	--	--	--	1	2	3	--

1: strongly related, 2: moderately related and 3: weakly related

Course Code: NCE4109	PYTHON PROGRAMMING LAB	L	T	P	C
Version 2020.1	Date of Approval: 19 July2020	0	0	2	1
Pre-requisites/Exposure	Hands on knowledge of C and C++ Programming				
Co-requisites	Basic concepts of OOP Programming				

Catalog Description

The course is designed to provide an introduction to the Python programming language. The focus of the course is to provide students with an introduction to programming, I/O, and visualization using the Python programming language.

Course Objectives

The objective of this course is

- Equip the students with the basic feature of python required in solving complex problems and build GUI applications
- Provide a practical knowledge of implementation/demonstration of python programming concepts like of lists, tuples, dictionaries, Object Oriented Programming concepts in Python, Strings and Files in Python.

Course Outcomes

On completion of this course, the students will be able to

- CO 1: Demonstrate the basics of python programming using if-else, loops and List, Dictionary, tuples.
- CO 2: Demonstrate the concept of inheritances, polymorphisms and other concepts and able to solve complex programming problems involving class objects.
- CO 3: Demonstrate the ability to write database applications in Python
- CO 4: Demonstrate Files Handling in Python.
- CO 5: Demonstrate database operation and GUI applications in python.

Modules	Blooms level*	Number of hours
4. Write a program which will find all such numbers which are divisible by 7 but are not a multiple of 5,between 2000 and 3200 (both included). The numbers obtained should be printed in a comma-separated sequence on a single line. 5. Create a program that asks the user to enter their name and their age. Print out a message addressed to them that tells them the year that they will turn 100 years old. 6. Define a function max() that takes two numbers as arguments and returns the largest of them. Use the if-then-else construct available in Python. (It is true that Python has the max() function built in, but writing it yourself is nevertheless a good exercise.) 7. Define a function max_of_three() that takes three numbers as arguments and returns the largest of them.	L1,L2 and L3	4
8. Define a function that computes the length of a given list or string. (It is true that Python has the len() function built in, but writing it yourself is nevertheless a good exercise.) 9. Write a function that takes a character (i.e. a string of length 1) and returns True if it is a vowel, False otherwise. 10. Write a function translate() that will translate a text into "rövarspråket" (Swedish for "robber's language"). That is, double	L2 and L3	6

<p>every consonant and place an occurrence of "o" in between. For example, translate("this is fun") should return the string "tothohisosisosfofunon".</p> <p>11. Define a function sum() and a function multiply() that sums and multiplies (respectively) all the numbers in a list of numbers. For example, sum([1, 2, 3, 4]) should return 10, and multiply([1, 2, 3, 4]) should return 24.</p> <p>12. Define a function reverse() that computes the reversal of a string. For example, reverse("I am testing") should return the string "gnitset ma I".</p>		
<p>13. Ask the user for a number. Depending on whether the number is even or odd, print out an appropriate message to the user</p> <p>14. Take a list, say for example this one: a = [1, 1, 2, 3, 5, 8, 13, 21, 34, 55, 89] and write a program that prints out all the elements of the list that are less than 5.</p> <p>15. Create a program that asks the user for a number and then prints out a list of all the divisors of that number. (If you don't know what a divisor is, it is a number that divides evenly into another number. For example, 13 is a divisor of 26 because 26 / 13 has no remainder.)</p> <p>16. Take two lists, say for example these two: a = [1, 1, 2, 3, 5, 8, 13, 21, 34, 55, 89] b = [1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13] and write a program that returns a list that contains only the elements that are common between the lists (without duplicates). Make sure your program works on two lists of different sizes.</p>	L2, L3, L4 and L5	4
<p>17. Ask the user for a string and print out whether this string is a palindrome or not. (A palindrome is a string that reads the same forwards and backwards.)</p> <p>18. Let's say I give you a list saved in a variable: a = [1, 4, 9, 16, 25, 36, 49, 64, 81, 100]. Write one line of Python that takes this list a and makes a new list that has only the even elements of this list in it.</p> <p>19. Make a two-player Rock-Paper-Scissors game. (Hint: Ask for player plays (using input), compare them, print out a message of congratulations to the winner, and ask if the players want to start a new game)</p> <p>Remember the rules:</p> <ul style="list-style-type: none"> • Rock beats scissors • Scissors beats paper • Paper beats rock 	L2, L3 and L4	4
<p>20. Write a program that asks the user how many Fibonnaci numbers to generate and then generates them. Take this opportunity to think about how you can use functions. Make sure to ask the user to enter the number of numbers in the sequence to generate.(Hint: The Fibonnacisequence is a sequence of numbers where the next number in the sequence is the sum of the previous two numbers in the sequence. The sequence looks like this: 1, 1, 2, 3, 5, 8, 13, ...)</p> <p>21. Write a program (function!) that takes a list and returns a new list that contains all the elements of the first list minus all the duplicates.</p> <p>22. Write a function that takes an ordered list of numbers (a list where the elements are in order from smallest to largest) and another number. The function decides whether or not the given number is inside the list and returns (then prints) an appropriate boolean.</p>	L2, L3 and L4	1

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. Michael Urban and Joel Murach, Python Programming, Shroff/Murach, 2016
2. Mark Lutz, Programming Python, O`Reilly, 4th Edition, 2010
3. Patrick Naughton & Herbert Schild ,”JAVA The Complete Reference”, 10thEdition , TMH

Reference Book

1. Daniel/Young , Introduction to JAVA Programming” , PHI.
2. Jeff Frentzen and Sobotka, “Java Script”, Tata McGraw Hill,1999.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/ Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance


CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS O 1	PS O 2	PS O 3	PS O 4
CO 1	2	1	--	--	--	--	--	--	--	--	--	--	1	2	--	--
CO 2	3	1	--	--	--	--	--	--	--	--	--	--	1	1	--	--
CO 3	1	3	2	--	--	--	--	--	--	--	--	--	1	2	3	--
CO 4	1	3	2	--	--	--	--	--	--	--	--	--	1	1	--	--
CO 5	1	3	--	--	--	--	--	--	--	--	--	--	1	2	--	1

1: strongly related, 2: moderately related and 3: weakly related



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Course Code: NCE4202	NETWORK AND WIRELESS SECURITY	L	T	P	C
Version 2020.1	Date of Approval: 19, July 2020	3	0	0	3
Pre-requisites/Exposure	Basics of Network				
Co-requisites	Nil				

Catalog Description

In this course the concepts of network and wireless security are discussed in detail. The wireless technologies, techniques and methodologies will be introduced. The studies will be made on impact of the thoughtfulness and longevity of implementations. The concepts learnt in the studies of wireless application protocols and other protocols will be applied in the studies and analysis of security issues in wireless networks.

Course Objectives

The objective of this course is to

- Equip the students with concepts of network wireless security.
- Provide an overview of spread spectrum, cellular network, WLAN, WAP, WTLS, SSH, Bluetooth security.

Course Outcomes

On completion of this course, the students will be able to

- CO1: Explain wireless security issues and its recent trends in wireless networks, cellular networks and all generations of wireless technologies.
- CO2: Describe wireless transmission media, spread spectrum and its techniques, wireless standards and various threats and countermeasures in network security. Write the steps of authentication techniques.
- CO3: Demonstrate the working of WAP Model and comparison with TCP/IP, OSI models; state the terminologies: viruses, authorization, non repudiation, secure sessions, security products; Construct WAP security architecture and elaborate its fields; determine issues related to marginal security.
- CO4: Describe secure socket layer and transport layer security; Design SSL in OSI reference model. Draw authentication header format and describe each field of AH; Distinguish SSL/TLS; Explain WTLS and fix vulnerabilities of WTLS; Discuss LEAP with reference to WTLS.
- CO5: Design and configure Bluetooth security technology; Designing its security architecture; determine security functions of the service discovery protocol. Discuss issues related encryption with ciphers. Compare threats to Bluetooth security. Write Bluetooth holes in Bluetooth technology.

Modules	Blooms level*	Number of hours
MODULE 1: Network concepts – Threats in networks – Network security controls – Importance of security – Threat models – Security concepts – Common mitigation methods Why is Wireless Different? Introduction ,Protecting the Means Of Communication Protecting Privacy, Promoting Safety ,The Personal and the Public ,Shaking Up the Status Quo ,Understanding Wireless Forecasts ,Reasonable Degrees of Security, Regulatory Environments and Issues, Security-Related Regulations ,Security Related Market Factors, Guidelines for Security Measures, Cellular Networks and Bearer	L1, L2 and L3	6

Technologies ,First-Generation Wireless (1G), Second-Generation Wireless (2G), Spread Spectrum, Code Division Multiple Access (CDMA) ,Time Division Multiple Sccess (TDMA) , Global System for Mobile Communications (GSM) ,Third-Generation Wireless (3G) ,Short Message Service (SMS) ,Fourth-Generation Wireless (4G)		
MODULE 2: The Wireless Local Area Network (WLAN) Wireless Transmission Media, Infrared Systems ,Narrowband Radio System, Wideband Radio Systems: Spread Spectrum, Frequency-Hopping Spread Spectrum (FHSS) ,Direct-Sequence Spread Spectrum (DSSS) ,WLAN Products and Standards—Today’s Leaders?,802.11 Security? IEEE 802.11b ,Securing WLANs ,Eavesdropping ,Unauthorized Access , Interference and Jamming ,Physical Threats ,Countermeasures, Frequency-Hopping Spread Spectrum (FHSS), Direct-Sequence Spread Spectrum (DSSS) ,Infrared (IR) ,Narrowband ,The Infamous WEP ,Encryption ,Authentication, Wired Equivalency Protocol Flaws Too Public , Other Authentication Techniques ,Physical Security	L1, L2 and L3	8
MODULE 3: Wireless Application Protocol(WAP) Comparison of the TCP/IP, OSI, and WAP Models, How WAP Works ,The Security Status of WAP , Viruses ,Authorization ,Non-repudiation ,Authentication, Secure Sessions ,Security Products ,Securant Technologies Clear Trust Control, WAP Security Architecture ,Marginal Security ,Wireless Access to the Internet, Wireless Middleware	L1, L2 and L3	8
MODULE 4: Wireless Transport Layer Security (WTLS) Secure Socket Layer, Record Protocol, SSL Handshake Protocol ,Transport Layer Security, Advantages and Disadvantages of SSL/TLS, Netscape ,Microsoft ,Entrust ,EAP-TLS ,Alternatives to SSL/TLS IP Security (IPSec) ,Authentication Header Protocol (AH) ,Encapsulating Security Payload (ESP) ,Transport and Tunnel Modes, Secure Shell (SSH) ,SSH Transport Layer Protocol ,SSH Versus TLS Implementations ,Light Extensible Authentication Protocol (LEAP) ,Wireless Transport Layer Security and WAP ,Understanding Wireless Transport Layer Security , WTLS Handshake Protocol ,WTLS Alert Protocol ,WTLS Change Cipher Protocol ,Pros and Cons of WTLS ,WTLS Vulnerabilities ,Implementations of WTLS	L2, L3 and L4	8
MODULE 5: Bluetooth Security Bluetooth Basic Specifications ,Bluetooth Technology, Bluetooth Specification Development ,Design Decisions ,Piconets ,Bluetooth Security Architecture ,Scatternets ,The Bluetooth stack, Security Functions at the Baseband Layer ,Security Functions of the Service Discovery Protocol ,Security Functions at the Link Layer, Frequency-Hopping , Channel Establishment ,Security Manager ,Authentication, Authentication with the SAFER1 Block Cipher ,Encryption ,Encryption Modes ,Key Length Negotiation ,Encryption With the E0 Stream Cipher ,Threats to Bluetooth Security ,Jamming ,Bluetooth holes.	L1, L2 and L3	6

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. Nichols and P. Lekka, Wireless Security Models, Threats and Solutions, Tata McGrawHill, Edition 2, 2006.
2. Charles P. Fleeger, Security in Computing, Prentice Hall, edition 2, 2009, New Delhi,

Reference Books

1. Behrouz A. Forouzan, Data Communication and Networking, Tata McGraw-Hill, Edition 4, 2007.
2. William Stallings, "Cryptography and Network security", Edition 6, 2013.
3. Behrouz A. Forouzan, "Cryptography and Network security", Edition 3, 6July 2015.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance


CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	2	2	--	--	--	--	--	--	--	--	--	1	--	-	-
CO2	1	2	2	-	--	--	--	--	--	--	--	--	1	--	-	-
CO3	1	2	3	--	--	--	--	--	--	--	--	--	1	2	-	3
CO4	1	1	2	--	--	--	--	--	--	--	--	--	1	2	-	3
CO5	1	3	2	--	--	--	--	--	--	--	--	--	1	--	-	2

1: strongly related, 2: moderately related and 3: weakly related



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Course Code: NCE4203	CYBER CRIME INVESTIGATIONS & IT LAW	L	T	P	C
Version 2020.1	Date of Approval: 19 July 2020	3	0	0	3
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

Level of security which is related to the safety of computer systems, data and network is very important in today era. If cyber-crime comes in the frame, how it detect, react and measure on our network and system. The police and law related to each cyber crime today. This course focuses on different types of attacks and its policies.

Course Objectives

The objective of this course is to

- Equip the students with the laws and its safety concepts used in cyber crime.
- Provide an overview of different attacks and prevention technique in a network.

Course Outcomes

On completion of this course, the students will be able to

CO1: Explain and Understand the Cyber Crime and its Investigations as a Profession.

CO2: Describe the different type of attacks and cyber crime.

CO3 : Conduct the computer investigations and implement the laws for its solution.

CO4: Processing cyber-crime in investigation according to the law.

CO5: Apply diverse viewpoints to ethical dilemmas in the information technology field and recommend appropriate actions.

Modules	Blooms level*	Number of hours
MODULE 1: POWER OF ARREST WITHOUT WARRANT UNDER THE IT ACT, 2000: A CRITIQUE Crimes of this Millennium, Section 80 of the IT Act, 2000 – A Weapon or a Farce, Forgetting the Line Between Cognizable and Non-Cognizable Offences, Necessity of Arrest without Warrant from Any Place, Public or Otherwise, Checks and Balances Against Arbitrary Arrests, Arrest for “About to Commit” an Offence Under the IT Act: A Tribute to Draco, Arrest, But No Punishment.	L1, L2 and L3	7
MODULE 2: CYBER CRIME AND CRIMINAL JUSTICE: PENALTIES, ADJUDICATION AND APPEALS UNDER THE IT ACT, 2000 Concept of ‘Cyber Crime’ and the IT Act, 2000, Hacking, Teenage Web vandals, Cyber Fraud and Cyber cheating, Virus on the Internet, Defamation, Harassment and E-mail Abuse, Cyber Pornography, Other IT Act Offences, Monetary Penalties, Adjudication and Appeals Under IT Act, 2000, Network Service Providers, Jurisdiction and cyber Crimes, Nature of Cyber Criminality, Strategies to Tackle Cyber Crime and Trends, Criminal Justice in India and Implications on Cyber Crime.	L1, L2 and L3	8
MODULE 3: JURISDICTION IN THE CYBER WORLD Questioning the Jurisdiction and Validity of the Present Law of Jurisdiction,	L1, L2 L3 and L4	9

Civil Law of Jurisdiction in India, Cause of Action, Jurisdiction and the Information Technology Act, 2000, Foreign Judgments in India, Place of Cause of Action in Contractual and IPR Disputes, Exclusion Clauses in Contracts, Abuse of Exclusion Clauses, Objection of Lack of Jurisdiction, Misuse of the Law of Jurisdiction, Legal Principles on Jurisdiction in the United States of America, Jurisdictional Disputes W.R.T. the Internet in the United States of America.		
MODULE 4: BATTLING CYBER SQUATTERS AND COPYRIGHT PROTECTION IN THE CYBER WORLD Concept of Domain Name and Reply to Cyber Squatters, Meta-Tagging, Legislative and Other Innovative Moves Against Cyber Squatting, The Battle Between Freedom and Control on the Internet, Works in Which Copyright Subsists and Meaning of Copyright, Copyright Ownership and Assignment, Licence of Copyright, Copyright Term and Respect for Foreign Works, Copyright Infringement, Remedies and Offences, Copyright Protection of Content on the Internet; Copyright Notice, Disclaimer and Acknowledgement, Downloading for Viewing Content on the Internet, Hyper-linking and Framing, Liability of ISPs for Copyright violations in the Cyber World: Legal Developments in the US, Napster and its Cousins: A Revolution on the Internet but a Crisis for Copyright Owners, Computer Software Piracy.	L1, L2, L3, L4, L5 and L6	7
MODULE 5: PROTECTION OF CYBER CONSUMERS IN INDIA Are Cyber consumers Covered Under the Consumer Protection Act, Goods and Services, Consumer Complaint, Defect in Goods and Deficiency in Services, Restrictive and Unfair Trade Practices, Instances of Unfair Trade Practices, Reliefs Under CPA, Beware Consumers, Consumer Foras, Jurisdiction and Implications on Cyber Consumers in India, Applicability of CPA to Manufacturers, Distributors, Retailers and Service Providers Based in Foreign Lands Whose Goods are Sold or Services Provided to a consumer in India	L1, L2, and L3	5

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

1. "Cyber Law Simplified", Vivek Sood, TMH, 2001

Reference Books

1. "Cyber Security, Cyber Crime and Cyber Forensics: Applications and Perspectives" Raghu Santanam, M. Sethumadhavan, Information Science Reference.
2. Cyberlaw – The Indian Perspective By Pavan Duggal, Saakshar Law Publications.
3. Jonathan Rosenoer, "Cyber Law: The law of the Internet", Springer-Verlag, 1997

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS O 1	PS O 2	PS O 3	PS O 4
CO 1	1	1	1	-	-	1	-	-	1	-	-	1	1	-	1	-
CO 2	1	2	-	-	-	-	-	-	-	-	-	1	-	-	1	2
CO 3	-	2	1	1	1	-	-	-	-	-	-	-	-	1	1	-
CO 4	1	-	-	-	2	-	1	-	-	2	-	-	-	-	1	2
CO 5	-	-	-	-	-	-	1	2	1	3	1	-	-	-	1	1

1: strongly related, 2: moderately related and 3: weakly related

Course Code: NCE4204	CYBER CRIME INVESTIGATIONS & FORENSICS	L	T	P	C
Version 2020.1	Date of Approval: 19 July 2020	3	0	0	3
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

Level of security which is related to the safety of computer systems, data and network is very important in today era. If cyber crime come in the frame, how it detect, react and measure on our network and system. The police and law related to each cyber crime today. This course focuses on different type attack and investigation level, police comes under the parameter of cyber law on network which can be applied in designing secure network applications in the modern computing environment.

Course Objectives

The objective of this course is to

- Equip the students with the investigation concepts used in cyber crime.
- Provide an overview of different attacks and prevention technique in a network.

Course Outcomes

On completion of this course, the students will be able to

CO1: Explain and Understand the Computer Forensics and Investigations as a Profession.

CO2: Describe the different type of attacks and cyber crime.

CO3 : Conduct the computer investigations and implement data acquisition concept in investigation.

CO4: Processing cyber crime and incident scenes in investigation according to the law.

CO5: Use the different -2 computer forensics tools in modern era according to the type of crime

Modules	Blooms level*	Number of hours
MODULE 1: COMPUTER FORENSICS AND INVESTIGATIONS AS A PROFESSION, UNDERSTANDING Computer Forensics ,Computer Forensics Versus Other Related Disciplines ,A Brief History of Computer Forensics, Understanding Case Law ,Developing Computer Forensics Resources ,Preparing for Computer Investigations, Understanding Law Enforcement Agency Investigations, Following the Legal Processes, Understanding Corporate Investigations, Establishing Company Policies, Displaying Warning Banners ,Designating an Authorized Requester, Conducting Security Investigations, Distinguishing Personal and Company Property ,Maintaining Professional Conduct.	L1, L2 and L3	7
MODULE 2: UNDERSTANDING COMPUTER INVESTIGATIONS Preparing a Computer Investigation, An Overview of a Computer Crime ,An Overview of a Company Policy Violation ,Taking a Systematic Approach ,Assessing the Case ,Planning Your Investigation ,Securing Your Evidence ,Procedures for Corporate High-Tech Investigations, Employee Termination	L1, L2 and L3	8

Cases, Internet Abuse Investigations-mail Abuse Investigations, Attorney-Client Privilege Investigations, Media Leak Investigations, Industrial Espionage Investigations, Interviews and Interrogations in High-Tech Investigations ,Understanding Data Recovery Workstations and Software, Setting Up Your Workstation for Computer Forensics ,Conducting an Investigation, Gathering the Evidence ,Understanding Bit-stream Copies ,Acquiring an Image of Evidence Media, Using Pro-Discovers Basic to Acquire a USB Drive ,Analyzing Your Digital Evidence, Completing the Case, Critiquing the Case		
<p>MODULE 3:</p> <p>DATA ACQUISITION</p> <p>Understanding Storage Formats for Digital Evidence, Raw Format, Proprietary Formats,Advanced Forensic Format ,Determining the Best Acquisition Method, Contingency Planning for Image Acquisitions ,Using Acquisition Tools ,Windows XP Write-Protection with USB Devices, Acquiring Data with a Linux Boot CD, Capturing an Image with Pro-Discovers Basic ,Capturing an Image with Access Data FTK Imager ,Validating Data Acquisitions ,Linux Validation Methods, Windows Validation Methods ,Performing RAID Data Acquisitions ,Understanding RAID ,Acquiring RAID Disks ,Using Remote Network Acquisition Tools ,Remote Acquisition with Pro Discover, Remote Acquisition with EnCase Enterprise , Remote Acquisition with R-Tools R-Studio ,Remote Acquisition with WetStone Livewire, Remote Acquisition with F-Response ,Remote Acquisition with Runtime Software ,Using Other Forensics Acquisition Tools, SnapBackDataArrest ,NTI Safe Back,DIBS USA RAID ,Look Investigator I imager ,ASR Data SMART ,Australian Department of DefencePyFlag,</p>	L1, L2 L3 and L4	9
<p>MODULE 4:</p> <p>PROCESSING CRIME AND INCIDENT SCENES</p> <p>Identifying Digital Evidence, Understanding Rules of Evidence ,Collecting Evidence in Private-Sector Incident Scenes, Processing Law Enforcement Crime Scenes ,Understanding Concepts and Terms Used in Warrants ,Preparing for a Search ,Identifying the Nature of the Case, Identifying the Type of Computing System, Determining Whether You Can Seize a Computer, Obtaining a Detailed Description of the Location, Determining Who Is in Charge, Using Additional Technical Expertise ,Determining the Tools You Need ,Preparing the Investigation Team, Securing a Computer Incident or Crime Scene ,Seizing Digital Evidence at the Scene ,Preparing to Acquire Digital Evidence, Processing an Incident or Crime Scene ,Processing Data Centers with RAID Systems ,Using a Technical Advisor, Documenting Evidence in the Lab, Processing and Handling Digital Evidence ,Storing Digital Evidence, Evidence Retention and Media Storage Needs, Documenting Evidence ,Obtaining a Digital Hash, Reviewing a Case ,Sample Civil Investigation ,Sample Criminal Investigation ,Reviewing Background Information for a Case ,Identifying the Case Requirements, Planning the Investigation ,Conducting the Investigation: Acquiring Evidence with AccessData FTK</p>	L1, L2, L3,L4,L5 and L6	7
<p>MODULE 5:</p> <p>CURRENT COMPUTER FORENSICS TOOLS</p>	L1, L2, and L3	5

Evaluating Computer Forensics Tool Needs ,Types of Computer Forensics Tools ,Tasks Performed by Computer Forensics Tools, Tool Comparisons ,Other Considerations for Tools ,Computer Forensics Software Tools, Command-Line Forensics Tools, UNIX/Linux Forensics Tools ,Other GUI Forensics Tools, Computer Forensics Hardware Tools, Forensic Workstations, Using a Write-Blocker, Recommendations for a Forensic Workstation,Validating and Testing Forensics Software ,Using National Institute of Standards and Technology (NIST) Tools ,Using Validation Protocols		
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**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

1. Nelson Phillips and EnfingerSteuart, "Computer Forensics and Investigations", Cengage Learning, New Delhi, 2009.

Reference Books

1. Kevin Mandia, Chris Proise, Matt Pepe, "Incident Response and Computer Forensics ", Tata McGraw -Hill, New Delhi, 2006.
2. Robert M Slade," Software Forensics", Tata McGraw - Hill, New Delhi, 2005.
3. Bernadette H Schell, Clemens Martin, "Cybercrime", ABC – CLIO Inc, California, 2004.
4. "Understanding Forensics in IT ", NIIT Ltd, 2005

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	2	1	2	1	--	--	--	--	--	--	--	1	--	3	
CO2	1	1	2	1	1	--	--	--	--	--	--	--	1	2	-	2
CO3	1	2	1	1	1	--	--	--	--	--	--	--	-	--	3	
CO4	1	2	2	2	3	--	--	--	--	--	--	--	1	2	3	
CO5	1	2	2	2	2	--	--	--	--	--	--	--	1	--	3	

1: strongly related, 2: moderately related and 3: weakly related

Anil

Manesar

Course Code: NCE4205	INTRUSION DETECTION AND PREVENTION SYSTEM	L	T	P	C
Version 2020.1	Date of Approval: 19 July 2020	3	0	0	3
Pre-requisites/Exposure	Basic Networking				
Co-requisites	Nil				

Catalog Description

Intrusion Detection System (IDS) is a rapidly growing field that deals with detecting and responding to malicious network traffic and computer misuse. Intrusion detection is the process of identifying and (possibly) responding to malicious activities targeted at computing and network resources. Any hardware or software automation that monitors, detects or responds to events occurring in a network or on a host computer is considered relevant to the intrusion detection approach. This course introduces various network malicious activities, detection techniques and evaluation criteria.

Course Objectives

The objective of this course is to

- Equip the students with various network attacks and their examples.
- Provide knowledge of various approaches to develop IDS and also to evaluate them.

Course Outcomes

On completion of this course, the students will be able to

CO1: Explain the network attacks and their possible reasons.

CO2: Compare currently available detection approaches to detect intrusion and anomalous activities.

CO3: Understand strengths and weaknesses of machine learning and data mining approached to choose the best approach to design and develop IDS.

CO4: Apply number of approaches to evaluate IDS using various evaluation criteria.

Modules	Blooms level*	Number of hours
MODULE 1: NETWORK ATTACKS Attack Taxonomies, Probes: IPSweep and PortSweep, NMap ,MScan, SAINT , Satan, Privilege Escalation Attacks: Buffer Overflow Attacks, Misconfiguration Attacks , Race-condition Attacks , Man-in-the-Middle Attacks. Social Engineering Attacks. Denial of Service (DoS) and Distributed Denial of Service (DDoS) Attacks: Detection Approaches for DoS and DDoS Attacks, Prevention and Response for DoS and DDoS Attacks, Examples of DoS and DDoS Attacks. Worms Attacks: Modeling and Analysis of Worm Behaviors, Detection and Monitoring of Worm Attacks, Worms Containment, Examples of Well Known Worm Attacks. Routing Attacks: OSPF Attacks, BGP Attacks.	L1 and L2	6
MODULE 2: DETECTION APPROACHES Misuse Detection: Pattern Matching, Rule-based Techniques, State-based Techniques, Techniques based on Data Mining Anomaly Detection: Advanced Statistical Models, Rule based Techniques, Biological Models, Learning Models Specification-based Detection, Hybrid Detection	L1 and L2	8
MODULE 3: THEORETICAL FOUNDATION OF DETECTION Taxonomy of Anomaly Detection Systems, Fuzzy Logic,	L1, L2 and L3	10

Bayes Theory, Artificial Neural Networks, Support Vector Machine (SVM), Evolutionary Computation, Association Rules, Clustering, Signal Processing Techniques Based Models, Comparative Study of Anomaly Detection Techniques		
MODULE 4: ARCHITECTURE AND IMPLEMENTATION Centralized, Distributed, Cooperative Intrusion Detection, Alert Management and Correlation: Data Fusion, Alert Correlation, Cooperative Intrusion Detection	L1 and L2	4
MODULE 5: EVALUATION CRITERIA & INTRUSION RESPONSE Accuracy, Performance, Completeness, Timely Response, Adaptation and Cost-Sensitivity, Intrusion Tolerance and Attack Resistance, Test, Evaluation and Data Sets. Response Type, Response Approach, Survivability and Intrusion Tolerance, Case study of any commercial IDS.	L2 and L4	4

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

- Ali A. Ghorbani, Wei Lu, "Network Intrusion Detection and Prevention: Concepts and Techniques", Springer, 2010.
- Matthew MacDonald, Beginning with ASP.NET 4.5 in C#, Apress Publications

Reference Books

1. Carl Enrolf, Eugene Schultz, Jim Mellander, "Intrusion detection and Prevention", McGraw Hill, 2004
2. Paul E. Proctor, "The Practical Intrusion Detection Handbook ", Prentice Hall , 2001.
3. Earl Carter, Jonathan Hogue, "Intrusion Prevention Fundamentals", Pearson Education, 2006.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS O 1	PS O 2	PS O 3	PS O 4
CO 1	--	2	--	--	--	--	--	--	--	--	--	--	1	--	3	--
CO 2	1	1	3	--	5	--	--	--	--	--	--	--	1	--	3	--
CO 3	1	1	2	--	5	--	--	--	--	--	--	--	1	--	3	--
CO 4	1	2	--	--	1	--	--	--	--	--	--	--	1	--	3	--

1: strongly related, 2: moderately related and 3: weakly related

Course Code: NCE4206	RESEARCH METHODOLOGY AND TECHNICAL REPORT WRITING	L	T	P	C
Version 2020.1	Date of Approval: 19 July 2020	2	0	0	2
Pre-requisites/Exposure	NIL				
Co-requisites	NIL				

Catalogue Description

This course deals with types of research, significance and characteristics and planning a research proposal, population and sample, parameter and statistic, sampling and data collection, sampling design: steps, types, sample size, sampling methods. It deals with univariate, bivariate and multivariate analysis, measure of dispersion of data, standard deviation, variance, coefficient of variation and degree of freedom. Hypothesis testing: parametric tests and non-parametric tests, regression analysis and curve fitting, method of least-squares, explained and unexplained variations, coefficient of correlation of determination. The course also deals with technical/scientific/research report writing: referencing and bibliography and footnotes. Publication of research papers, citations, intellectual property rights and copy rights, plagiarism, patent and patent laws, commercialization and ethical issues.

Course Objectives

The objective of this course is to:

- Deals with types of research, significance and characteristics and planning a research proposal and to enhance scientific and technical writing and research skills.
- Impart knowledge about various stages of research process, statistical analysis and tools & their applications in decision making by hypothesis testing and regression analysis.
- It also deals with intellectual property rights and copy rights, plagiarism, patent and patent laws, commercialization and ethical issues.

Course Outcomes

On completion of this course, the students will be able to:

- CO1. Classify different research types, explain steps in research process and planning research proposal.
- CO2. Describe sampling methods, sampling steps and design, carry out data processing and analysis.
- CO3. Explain hypothesis testing, parametric and non-parametric tests, carry out regression analysis, curve fitting.
- CO4. Demonstrate technical and scientific report writing skills, describe plagiarism, patent laws and intellectual property rights.

Course Content

Modules	Blooms level*	Number of hours
Module I: Introduction and Research Planning		
Introduction to research: Definition, motivation, need, objectives, significance and characteristics of research; types of research; steps in research process; planning a research proposal; literature review, web searching.	L1, L2	4
Module II: Sampling Methods	L1, L2, L3	5

Measurement scales, population and sample, parameter and statistic, sampling and data collection, sampling design: steps, types, sample size, sampling methods, data processing and analysis. Sampling surveys and questionnaire designing, primary and secondary data.		
Module III: Hypothesis Testing and Regression Analysis Univariate, bivariate and multivariate analysis, means-arithmetic, geometric and harmonic; measure of dispersion of data, standard deviation, variance, coefficient of variation and degree of freedom. Hypothesis testing: kinds errors in hypothesis testing, significance and confidence levels, parametric tests and non-parametric tests, one-tailed and two-tailed tests, analysis of variance. Regression analysis and curve fitting, method of least-squares, explained and unexplained variations, coefficient of correlation of determination.	L1, L3, L4	10
Module IV: Technical Report Writing and Plagiarism Technical/scientific/research report writing: structure and components of scientific reports, formats of dissertations, research report, report writing skills, report preparation, referencing and bibliography and footnotes. Publication of research papers, citations, making presentation-use of visual aids and PPTs. Intellectual property rights and copy rights, plagiarism, patent and patent laws, commercialization and ethical issues.	L1, L3, L4	5

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books:

1. Blake, G. and Bly, R.W. The Elements of Technical Writing. MacMillan, New York, 1993.
2. Chawla, D and Sondhi, N. Research Methodology- Concepts and Cases. Vikas Publishing House PVT LTD. New Delhi, 2016.
3. Kothari, C.R. Research Methodology- Methods and Techniques, 2nd.ed. New Age International Publishers, New Delhi. 2008.

Reference Books:

1. Montgomery, Douglas C, Design and Analysis of Experiments, 5th Ed, Wiley India.2005.
2. Panneerselvam, R.2009. Research Methodology, PHI Learning Pvt.Ltd., New Delhi, 2009
3. Ranjit Kumar 2009. Research Methodology- A step –by- step Guide for beginners; 2nd ed. Dorling Kindersley (India) Pvt. Ltd, Delhi, 2009.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO3	PSO4
CO1	1	1	2	2	3	-	-	-	-	-	-	1	3	1	2	-
CO2	1	3	1	3	3	-	-	-	-	-	-	1	3	1	2	-
CO3	1	3	1	-	-	-	-	-	-	-	-	1	3	3	2	-
CO4	1	3	2	-	3	-	-	-	-	-	-	1	3	1	2	3
CO5	2	1	1	-	-	-	-	-	-	-	-	1	3	1	2	-

1: strongly related, 2: moderately related and 3: weakly related

Course Code: NCE4207	CRYPTOGRAPHY FOUNDATION LAB	L	T	P	C
Version 2020.1	Date of Approval: 19 July 2020	0	0	2	1
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

Modern cryptography applies theory from mathematics and computer science to design and implement strong encryption methods which are so important to the safety of computer systems today. This course focuses on building strong mathematical foundations which can be applied in designing secure cryptographic applications in the modern computing environment.

Course Objectives

The objective of this course is to

- Equip the students with the mathematical concepts used in cryptography.
- Provide an overview of different mathematical structures used in designing cryptographic algorithms.

Course Outcomes

On completion of this course, the students will be able to

CO1: Explain and apply the concept of modular arithmetic in cryptographic applications.

CO2: State and apply the algorithms for primality testing and quadratic congruence.

CO3: Describe the different algebraic structures and apply them in cryptographic applications.

CO4: State the Shannon's Theory and explain its applications in cryptography.

CO5: Describe the concept of pseudorandom number generation and apply it in designing pseudorandom number generators.

Modules	Blooms level*	Number of hours
MODULE 1: 1. Program to implement division theorem 2. checking number is prime or composite using simple logic 3. Implement Miller Rabin Primality Algorithm	L1, L2 and L3	3
MODULE 2: 4. Implement Euclid and Extended Algorithm. 5. Implement Chinese Remainder Theorem 6. Implement Baby Step Giant Step Algorithm.	L1, L2, L3 and L4	3
MODULE 3: 7. Implement at least 2 algorithms for random number generation. One is Blum BlumShub. 8. Implement Modular Exponentiation Algorithm 9. Implement algorithm for modular linear equation solver.	L1, L2 and L3	3
10. Implement Fermat's and Euler's theorem. 11. Implement Fermat's Factorization method. 12. Few programs based on Probability Theory and theorems	L1, L2, and L3	3

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**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

- William Stallings, Cryptography & Network Security: Principles and Practices, Prentice Hall, 2005,(ISBN: 978-0131873162).

Reference Books

- Behrouz A. Forouzan, Cryptography & Network Security, McGraw-Hill, 2007, USA. (ISBN: 0073327530 9780073327532).
- Douglas R. Stinson, Chapman and Hall, Cryptography Theory & Practice, CRC Press, 2005.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS O 1	PS O 2	PS O 3	PS O 4
CO 1	1	2	1	2	1	--	--	--	--	--	--	--	1	--	3	--
CO 2	1	1	2	1	1	--	--	--	--	--	--	--	1	--	3	--
CO 3	1	2	1	1	1	--	--	--	--	--	--	--	1	--	3	--
CO 4	1	2	2	2	3	--	--	--	--	--	--	--	1	--	3	--
CO 5	1	2	2	2	2	--	--	--	--	--	--	--	1	--	3	--

1: strongly related, 2: moderately related and 3: weakly related

Course Code: NCE4208	WEB SECURITY LAB	L	T	P	C
Version 2020.1	Date of Approval: 19 July 2020	0	0	2	1
Pre-requisites/Exposure	Basics of Computer Networks				
Co-requisites	Nil				

Catalog Description

Web security is an important component of computer science. The objective of this course is to make students aware of various techniques and simulations used to understand building blocks of Web security.

Course Objectives

The objective of this course is to

- Equip the students with the practical aspects of concepts of web security.
- Provide an understanding of different techniques used in web security.
- Equip the students with the working knowledge of different tools and simulators used in web security.

Course Outcomes

On completion of this course, the students will be able to

CO1: State, explain, and apply SQL injection, XSS attacks.

CO2: State, explain, and write java script files for XSS attacks..

CO3: State, explain, and perform URL Interpretation, Input validation, Buffer overflow attacks.

CO4: Perform password based attacks.

CO5: Apply DoS and hijacking.

Modules	Blooms level*	Number of hours
MODULE 1: <ul style="list-style-type: none"> • Exercises related to SQL injection attacks, • XSS attacks 	L1, L2, and L3	3
MODULE 2: writing java script files <ul style="list-style-type: none"> • for launching and preventing XSS attacks • Stored and Reflected XSS Attacks, 	L1, L2, and L3	5
MODULE 3: <ul style="list-style-type: none"> • Perform URL Interpretation attack, • Perform input validation attack, • buffer overflow attacks 	L1, L2, and L3	6
MODULE 4: <ul style="list-style-type: none"> • Perform impersonation attacks • Perform password-based attacks 	L1, L2, and L3	6
MODULE 5: <ul style="list-style-type: none"> • Perform an experiment for denial of service attacks • Perform an experiment for session hijacking 	L1, L2, and L3	6

*Bloom's Level:

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS O 1	PS O 2	PS O 3	PS O 4
CO 1	1	1	1	1	1	1	--	--	1	--	--	--	1	1	3	2
CO 2	1	1	1	1	1	1	--	1	--	--	2	--	1	1	3	2
CO 3	1	1	1	1	1	1	--	--	--	2	--	--	1	1	3	2
CO 4	1	1	1	1	1	1	1	3	--	--	3	1	1	1	3	2
CO 5	1	1	2	2	3	3	--	--	2	--	1	--	1	1	3	2

1: strongly related, 2: moderately related and 3: weakly related

Course Code: NCE4209	NETWORK SECURITY LAB	L	T	P	C
Version 2020.1	Date of Approval: 19 July 2020	0	0	2	1
Pre-requisites/Exposure	Basics of Computer Networks				
Co-requisites	Nil				

Catalog Description

Network and wireless security is an important component of computer science. The objective of this course is to make students aware of various techniques and simulations used to understand building blocks of network and wireless security.

Course Objectives

The objective of this course is to

- Equip the students with the practical aspects of concepts of network and wireless security.
- Provide an understanding of different techniques used in network and wireless security.
- Equip the students with the working knowledge of different tools and simulators used in network security.

Course Outcomes

On completion of this course, the students will be able to

CO1: State, explain, and apply wine / virtual box/vmware in security simulations.

CO2: State, explain, and apply nmap, superscan, and nmap1 in security simulations.

CO3: State, explain, and apply xprobe2 and wireshark in security simulations.

CO4: State, explain, and apply dumpsec in security simulations.

CO5: State, explain, and apply arp poisoning and openssl in security simulations.

Modules	Blooms level*	Number of hours
MODULE 1: <ul style="list-style-type: none"> • Learn to install wine / virtual box/vmware or any other equivalent software on the host os. • Perform an experiment to grab a banner with telnet and perform the task using netcat utility. Banner grabbing is a technique to determine which application or service is running on the specified port by attempting to make a connection to this host. • 	L1, L2, and L3	3
MODULE 2: <ul style="list-style-type: none"> • Perform an experiment for port scanning with nmap, superscan or any other software. • Using nmap 1) find open ports on a system 2) find the machines which are active 3) find the version of remote os on other systems 4) find the version of s/w installed on other system 	L1, L2, and L3	5
MODULE 3: <ul style="list-style-type: none"> • Perform an experiment on active and passive fingerprinting using xprobe2 and nmap. 	L1, L2, and L3	6

<ul style="list-style-type: none"> Perform an experiment to demonstrate how to sniff for router traffic by using the tool Wireshark 		
MODULE 4: <ul style="list-style-type: none"> Perform an experiment how to use dumpsec. Perform an wireless audit of an access point / router and decrypt WEP and WPA. 	L1, L2, and L3	6
MODULE 5: <ul style="list-style-type: none"> Perform an experiment to sniff traffic using ARP poisoning. Generating password hashes with openssl 	L1, L2, and L3	6

**Bloom's Level:*

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO 1	1	1	1	1	1	1	--	--	--	--	--	--	1	1	3	2
CO 2	1	1	1	1	1	1	--	--	--	--	--	--	1	1	3	2
CO 3	1	1	1	1	1	1	--	--	--	--	--	--	1	1	3	2
CO 4	1	1	1	1	1	1	--	--	--	--	--	--	1	1	3	2
CO 5	1	1	2	2	3	3	--	--	--	--	--	--	1	1	3	2

1: strongly related, 2: moderately related and 3: weakly related

Anil

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Course Code: NCE4210	BIG DATA SYSTEMS	L	T	P	C
Version 2020.1	Date of Approval: 19, July 2020	3	0	0	3
Pre-requisites/Exposure	Data Base				
Co-requisites	Nil				

Catalog Description

This course brings together several key big data technologies used for storage, analysis and manipulation of data. It also introduces the students the key concepts of Hadoop framework, MapReduce, Pig, Hive, and No-SQL. Students will learn to work on Hadoop platform. The concepts learnt will make students capable of working on big data projects easier.

Course Objectives

The objective of this course is to:

- To make students familiar with big data technologies.
- Provide an overview of Hadoop architecture and its working with other open source technologies.

Course Outcomes

On completion of this course, the students will be able to:

CO1. Explain importance, applications and challenges of Big Data Analytics.

CO2. Different analytics technologies.

CO3. Demonstrate architecture of Hadoop and Mapreduce framework.

CO4. Illustrate Hadoop I/O commands.

CO5. Introduce concepts Distributed File systems.

Modules	Blooms level*	Number of hours
MODULE 1: A NEW PARADIGM FOR BIG DATA Scaling with a traditional database NoSQL is not a panacea, First principles, Desired properties of a Big Data system , The problems with fully incremental architectures, Lambda Architecture, Recent trends in technologyExample application: SuperWebAnalyticscom, data model for big data: , data model for big data: illustration	L1, L2 and L3	6
MODULE 2: Hadoop & MapReduce Data! ,Data Storage and Analysis ,Comparison with Other Systems ,RDBMS ,Grid Computing ,Volunteer Computing ,A Brief History of Hadoop ,Apache Hadoop and the Hadoop Ecosystem , Hadoop Releases ,A Weather Dataset, Data Format ,Analyzing the Data with Unix Tools , Analyzing the Data with Hadoop ,Map and Reduce ,Java MapReduce ,Scaling Out ,Data Flow , Combiner Functions ,Running a Distributed MapReduce Job , Hadoop Streaming ,Ruby ,Python, Hadoop Pipes ,Compiling and Running.	L1, L2 and L3	8
MODULE 3: The Hadoop Distributed Filesystem The Design of HDFS ,HDFS Concepts ,Blocks ,Namenodes and Datanodes	L1, L2 and L3	8

,HDFS Federation ,HDFS High-Availability ,The Command-Line Interface ,Basic Filesystem Operations ,HadoopFilesystems , Interfaces ,The Java Interface ,Reading Data from a Hadoop URL ,Reading Data Using the FileSystem API ,Writing Data ,Directories ,Querying the Filesystem ,Deleting Data ,Data Flow ,Anatomy of a File Read ,Anatomy of a File Write ,Coherency Model ,Parallel Copying with distcp ,Keeping an HDFS Cluster Balanced ,Hadoop Archives ,Using Hadoop Archives ,Limitations.		
MODULE 4: Hadoop I/O Data Integrity ,Data Integrity in HDFS ,Local Filesystem ,Checksum Filesystem ,Compression,Codecs ,Compression and Input Splits ,Using Compression in MapReduce, Serialization ,The Writable Interface ,Writable Classes ,Implementing a Custom Writable ,Serialization Frameworks ,Avro ,File-Based Data Structures ,Sequence File ,Map File.	L2, L3 and L4	8
MODULE 5: Developing a MapReduce Application The Configuration API ,Combining Resources ,Variable Expansion ,Configuring the Development Environment ,Managing Configuration ,GenericOptionsParser, Tool, and ToolRunner ,Writing a Unit Test ,Mapper ,Reducer ,Running Locally on Test Data ,Running a Job in a Local Job Runner , Testing the Driver ,Running on a Cluster ,Packaging ,Launching a Job ,The MapReduce Web UI ,Retrieving the Results ,Debugging a Job ,Hadoop Logs ,Remote Debugging ,Tuning a Job ,Profiling Tasks ,MapReduce Workflows ,Decomposing a Problem into MapReduce Jobs ,JobControl ,Apache Oozie.	L1, L2 and L3	6

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. Big Data: Principles and best practices of scalable realtime data systems”,NathanMatz, Manning Publications, 2015
2. “Hadoop: The Definitive Guide: Storage and Analysis at Internet Scale” Tom White, Oreilly.
3. “High-Performance Big-Data Analytics, Computing Systems and Approaches” Raj, P., Raman, A., Nagaraj, D., Duggirala, S.,Springer.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	2	2	--	--	--	1	--	2	--	--	--	1	--	2	-
CO2	1	2	2	-	3	3	--	--	--	--	--	--	1	--	2	-
CO3	1	2	3	1	2	--	--	--	2	--	--	--	1	2	2	3
CO4	1	1	2	--	--	--	--	1	--	--	3	--	-	2	2	3
CO5	1	3	2	--	--	--	--	--	--	--	3	--	1	--	-	2

1: strongly related, 2: moderately related and 3: weakly related

Course Code: NCE4211	DISTRIBUTED SYSTEMS SECURITY	L	T	P	C
Version 2020.1	Date of Approval: 19 July 2020	3	0	0	3
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

Distributed Systems Security serve as one of the most important courses for postgraduate students, since it provides an in-depth coverage of security threats and issues across the 4 tiers-Host, Application, Infrastructure, Service layers. Therefore, the students are supposed to study, practice and discuss on the major fields discussed in the course to ensure the success of the education process. The outcome of this course implicitly and explicitly affects the abilities the students to understand and analyze design and working of distributed systems security.

Course Objective

The objective of this course is to:

1. equip the students to identify the security issues and techniques to cope up with the threats.
2. provide the overview of various threats and vulnerabilities, also solutions to handle those threats.

Course Outcomes

After completing the course, the students will be able to,

CO 1: describe the distributed system security issues and techniques and build a secure system using security development lifecycle.

CO 2: apply the knowledge by doing practical work for the host and network level threats like worms, virus.

CO 3: explain the use cryptographic techniques. Also describe the application level threats such as cross site scripting, error handling.

CO 4: conclude the ways to handle host, network level threats with the help of sandboxing, resource management, etc.

CO 5: Design solutions after having knowledge of standards and policies for security. And also go through the case studies like cloud computing, IBE.

Modules	Blooms level*	Number of hours
MODULE 1: Introduction Distributed Systems, Distributed Systems Security. Security in Engineering: Secure Development Lifecycle Processes - A Typical Security Engineering Process – Security Engineering Guidelines and Resources. Common Security Issues and Technologies: Security Issues, Common Security Techniques	L1 and L2	5
MODULE 2: Host-level Threats and Vulnerabilities Transient code Vulnerabilities - Resident Code Vulnerabilities - Malware: Trojan Horse – Spyware - Worms/Viruses – Eavesdropping – Job Faults. Infrastructure-Level Threats and Vulnerabilities: Network-Level Threats and Vulnerabilities - Grid Computing Threats and Vulnerabilities – Storage Threats and Vulnerabilities – Overview of Infrastructure Threats and Vulnerabilities.	L1, L2, L3 and L6	7
MODULE 3:	L1, L2,	9

Application-Level Threats and Vulnerabilities Application-Layer Vulnerabilities –Injection Vulnerabilities - Cross-Site Scripting (XSS) - Improper Session Management - Improper Error Handling - Improper Use of Cryptography - Insecure Configuration Issues - Denial of Service - Canonical Representation Flaws - Overflow Issues. Service-Level Threats and Vulnerabilities: SOA and Role of Standards - Service-Level Security Requirements - Service-Level Threats and Vulnerabilities - Service-Level Attacks – Services Threat Profile	L3, L4 and L6	
MODULE 4: Host-Level Solutions Sandboxing – Virtualization - Resource Management - Proof-Carrying Code - Memory Firewall – Antimalware. Infrastructure-Level Solutions: Network-Level Solutions - Grid-Level Solutions - Storage-Level Solutions. Application-Level Solutions: Application-Level Security Solutions.	L2, L3, L5	7
MODULE 5: Service-Level Solutions Services Security Policy - SOA Security Standards Stack – Standards in Dept - Deployment Architectures for SOA Security - Managing Service-Level Threats - Compliance in Financial Services - SOX Compliance - SOX Security Solutions – Multilevel Policy-Driven Solution Architecture - Case Study: Grid - The Financial Application – Security Requirements Analysis. Future Directions – Cloud Computing Security – Security Appliances - Usercentric Identity Management - Identity-Based Encryption (IBE) - Virtualization in Host Security.	L3, L5 and L6	8

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Text Books

- Abhijit Belapurakar, AnirbanChakrabarti and et al.,“**Distributed Systems Security: Issues, Processes and solutions**”,1st Edition, Wiley, Ltd., Publications,New Delhi, 2009.
- S.S.Dara, “**AtextbookofEngineeringChemistry**”,10th Edition,SChand&Co.Ltd., New Delhi, 2014.

Reference Books

- RachidGuerraoui and Franck Petit, “**Stabilization, Safety, and Security of Distributed Systems**”, Springer, 2010.
- R Bengaluru, 2015.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	2	--	--	--	--	--	--	3	--	--	--	--	1	--	3	-
CO2	--	2	--	--	--	1	--	3	--	--	--	--	1	--	3	-
CO3	--	2	--	--	--	--	--	3	--	--	--	--	1	--	3	-
CO4	--	--	2	--	--	1	--	--	--	--	--	--	1	--	3	-
CO5	--	--	2	--	--	--	--	--	--	--	--	--	1	--	3	-

1: strongly related, 2: moderately related and 3: weakly related

Course Code: NCE4212	BLOCKCHAIN TECHNOLOGY	L	T	P	C
Version 2020.1	Date of Approval: 19 July 2020	3	0	0	3
Pre-requisites/Exposure	Basic Networking and Data Structure Concepts				
Co-requisites	Nil				

Catalog Description

Blockchain is an emerging technology platform for developing decentralized applications and data storage, over and beyond its role as the technology underlying the cryptocurrencies. The basic tenet of this platform is that it allows one to create a distributed and replicated ledger of events, transactions, and data generated through various IT processes with strong cryptographic guarantees of tamper resistance, immutability, and verifiability. This course will enable the graduate students to gain the knowledge of this emerging technology and will update them with the required employability skills.

Course Objectives

The objective of this course is to:

- Familiarise the functional/operational aspects of blockchain and cryptocurrency.
- Understand emerging abstract models for Blockchain Technology.
- Identify major research challenges and technical gaps existing between theory and practice in cryptocurrency domain.

Course Outcomes

On completion of this course, the students will be able to:

CO1. Understand and explain the mechanism of Blockchain Technology.

CO2. Identify and describe the cryptographic techniques used in blockchain technology.

CO3. Understand and explain the bitcoin blockchain.

CO4. Understand and apply the different models of blockchain.

CO5. Understand and explain the concept of Ethereum and Hyperledger.

Modules	Blooms level*	Number of hours
MODULE 1: INTRODUCTION Basic ideas behind blockchain, how it is changing the landscape of digitalization, peer-to-peer network, Blockchain Mechanism, Blockchain vs Distributed Systems, introduction to cryptographic concepts required, Hashing, public key cryptosystems, private vs public blockchain and use cases, Hash Puzzles, Introduction to Bitcoin Blockchain, Centralization vs. Decentralization, Security of Blockchain	L1, L2	8
MODULE 2: CRYPTOGRAPHIC BASICS FOR CRYPTOCURRENCY A short overview of Hashing, SHA 256, signature schemes, encryption schemes, Elliptic Curve Mathematics, Point Addition, Point Doubling, Elliptic Curve Cryptography, Security of Elliptic Curve Cryptography	L1, L2	7

MODULE 3: BITCOIN BLOCKCHAIN Distributed consensus, Consensus without identity using a block chain, Incentives and proof of work, Mining, Mechanics of Bitcoin, Bitcoin and blocks, Bitcoin Mining, Bitcoin and Anonymity, Bitcoin - Wallet - Blocks - Merkle Tree - hardness of mining - transaction verifiability - anonymity - forks - double spending - mathematical analysis of properties of Bitcoin.	L1, L2	8
MODULE 4: BLOCKCHAIN MODELS Abstract Models for BLOCKCHAIN - GARAY model - RLA Model - Proof of Work (PoW) as random oracle - formal treatment of consistency, liveness and fairness - Proof of Stake (PoS) based Chains - Hybrid models (PoW + PoS)	L1, L2, L3	7
MODULE 5: ETHEREUM AND HYPERLEDGER Ethereum - Ethereum Virtual Machine (EVM) - Wallets for Ethereum - Solidity - Smart Contracts - some attacks on smart contracts, Hyperledger, Zero Knowledge proofs and protocols in Blockchain	L1,L2	6

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. Arvind Narayanan, Joseph Bonneau, Edward Felten, Andrew Miller, and Steven Goldfeder. Bitcoin and cryptocurrency technologies: a comprehensive introduction. Princeton University Press, 2016. (Free download available).
2. Joseph Bonneau et al, SoK: Research perspectives and challenges for Bitcoin and cryptocurrency, IEEE Symposium on security and Privacy, 2015

Reference Books

1. R.Pass et al, Analysis of Blockchain protocol in Asynchronous networks , EUROCRYPT 2017, (eprint.iacr.org/2016/454).
2. R.Pass et al, Fruitchain, a fair blockchain, PODC 2017 (eprint.iacr.org/2016/916).
3. Eric Traub, Learn Blockchain Programming with JavaScript, Packt, 2018.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO 1	2	2	3	--	--	--	--	--	--	--	--	--	2	1	-	2
CO 2	2	2	3	-	--	--	--	--	--	--	--	--	2	1	-	2
CO 3	2	2	3	-	-	--	--	--	--	--	--	--	2	1	-	3
CO 4	1	2	3	-	2	--	--	--	--	--	--	--	2	1	1	2
CO 5	2	3	3	-	-	--	--	--	--	--	--	--	2	1	1	3

1: strongly related, 2: moderately related and 3: weakly related

Course Code: NCE4301	BIOMETRIC SYSTEMS AND BIOMETRIC IMAGE PROCESSING	L	T	P	C
Version 2020.1	Date of Approval: 19 July 2020	3	0	0	3
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

Biometric systems and biometric image processing aims at designing and implementing algorithms which are so important for the secure source of authentication today. This course focuses on building strong mathematical foundations which can be applied in designing a vast range of applications like broadcast monitoring, copy control.

Course Objectives

The objective of this course is to

1. Enable the students with the technical and non-technical concepts used in Biometric systems and biometric image processing
2. Provide an overview of different case studies used in designing biometrics.

Course Outcomes

On completion of this course, the students will be able to

CO1: Grasp the nontechnical but very important basics of Biometric systems and biometric image processing which will make their foundation for application creation.

CO2: Elaborate and apply the algorithms, by studying different examples of biometric systems.

CO3: Learn about essentials of image processing and the application areas of image processing

CO4: Build and study the models of fingerprint biometrics and learn all the concepts for building finger print based authentication system.

CO5: Build and study the models of iris biometrics and learn all the concepts for building iris based authentication system.

Modules	Blooms level*	Number of hours
MODULE 1: Introduction: Biometric fundamentals – Biometric technologies – Biometrics Vs traditional techniques – Characteristics of a good biometric system – Benefits of biometrics – Key biometric processes: verification, identification and biometric matching – Performance measures in biometric systems, FAR, FRR, FTE rate, EER and ATV rate, Applications of Biometric Systems, Security and Privacy Issues. Physiological Biometrics : Leading technologies : Finger-scan – Facial-scan – Iris-scan – Voice-scan – components, working principles, competing technologies, strengths and weaknesses – Other physiological biometrics : Hand-scan, Retina-scan – components, working principles, competing technologies, strengths and weaknesses – Automated fingerprint identification systems.	L1, L2 AND L3	8
MODULE 2: Behavioral Biometrics: Leading technologies: Signature-scan – Keystroke	L1, L2, L3	8

scan – components, working principles, strengths and weaknesses. Privacy and Standards in Biometrics: Assessing the Privacy Risks of Biometrics – Designing Privacy-Sympathetic Biometric Systems – Need for standards – different biometric standards.		
MODULE 3: Fundamentals of Image Processing: Digital Image representation - Fundamental steps in Image Processing Image Enhancement: The Spatial Domain Methods, The Frequency Domain Methods –Image Segmentation: Pixel Classification by Thresholding, Histogram Techniques, Smoothing and Thresholding- Gradient Based Segmentation: Gradient Image, Boundary Tracking, Laplacian Edge Detection.	L1, L2 and L3	8
MODULE 4: Fingerprint Biometrics: Fingerprint Patterns, Fingerprint Features, Fingerprint Image, width between two ridges - Fingerprint Image Processing - Minutiae Determination - Fingerprint Matching: Fingerprint Classification, Matching policies.	L1, L2, and L3	4
MODULE 5: Iris Biometrics: Iris System Architecture, Definitions and Notations - Iris Recognition: Iris location, Doubly Dimensionless Projection, Iris code, Comparison - Coordinate System: Head Tilting Problem, Basic Eye Model, Searching Algorithm, Texture Energy Feature.	L1, L2, and L3	4

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

Recommended Books:

- Anil K Jain, Patrick Flynn, Arun A Ross, "Handbook of Biometrics", Springer, 2008

Reference Books

- "2. Anil K Jain, Arun A Ross, Karthik Nandakumar, "Introduction to Biometrics", Springer, 2011
- Rafael C. Gonzalez, Richard E. Woods, Steven L. Eddins, "Digital Image Processing", Pearson Education, New Delhi, 2009

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;

Att: Attendance

CO, PO and PSO mapping

CO, PO and PSO mapping																	
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4	
CO1	2	2	1	1	--	--	--	--	--	--	--	--	3	3	2	2	
CO2	2	2	1	1	--	--	--	--	--	--	--	--	2	2	2	2	
CO3	2	2	1	1	--	--	--	--	--		--	--	2	2	2	2	
GO4	2	2	2	1	--	--	--	--	--	--	--	--	--	2	2	2	2
CO5	2	2	1	1	--	--	--	--	--	--	--	--	--	2	2	2	2

1: strongly related, 2: moderately related and 3: weakly related

Course Code: NCE4302	SOFTWARE VULNERABILITY ANALYSIS	L	T	P	C
Version 2020.1	Date of Approval: 19 July2020	3	1	0	4
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

This course focuses on the foundations of software security and considers important software vulnerabilities and attacks that exploit them such as buffer overflows, SQL injection, and session hijacking. This course helps to prevent or mitigate these attacks, including advanced testing and program analysis techniques.

Course Objectives

The purpose of this course is to provide understanding of the main issues related to security in modern software security systems. In addition, this course will present different domains of code exploitation and how they can be used together to test the security of an application.

Course Outcomes

On completion of this course, the students will be able to

CO1: Explain the concept of software security, goals of software security and management of software security risk.

CO2: Describe the principles of software security and methods of security violation in software system.

CO3: State and apply the knowledge of different types of overflow attack and access control in different operating system.

CO4: Explain the basic knowledge of network layers and various types of hijacking, flooding attacks.

CO5: Implement the concept of shell code.

Modules	Blooms level*	Number of hours
MODULE 1: Introduction to Software Security It's All about the Software, Dealing with Widespread Security Failures, Bugtraq, CERT Advisories, RISKS Digest, Technical Trends Affecting Software Security, The ilities, What is Security?, Isn't That Just Reliability?, Penetrate and Patch Is Bad, On Art and Engineering, Security Goals, Prevention, Traceability and Auditing, Monitoring, Privacy and Confidentiality, Multilevel Security, Anonymity, Authentication, Integrity, Know Your Enemy: Common Software Security Pitfalls, Software Project Goals, Conclusion. Managing Software Security Risk: An Overview of Software Risk Management for Security, The Role of Security Personnel, Software Security Personnel in the Life Cycle, Deriving Requirements, Risk Assessment, Design for Security, Implementation, Security Testing, A dose of Reality, Getting People to Think about Security, Software Risk management in Practice, When Development Goes Astray, When Security Analysis Goes Astray, The Common Criteria.	L1, L2 and L3	12
MODULE 2: On Open Source and Closed Source	L1, L2, L3 and	10

Security by Obscurity, Reverse Engineering, Code Obfuscation, Security for Shrink-Wrapped Software, Security by Obscurity Is No Panacea, The Flip Side: Open- Source Software, Is the “Many-Eyeballs Phenomenon” Real? Why Vulnerability Detection Is Hard, Other Worries, On Publishing Cryptographic Algorithms, Two More Open-Source Fallacies, The Microsoft Fallacy, The Java Fallacy, An Example: GNU Mailman Security, More Evidence: Trojan Horses, To Open Source or Not to Open Source, Another Security Lesson from Buffer Overflows, Beating the Drum. Guiding Principles for Software Security: Principle1: Secure the Weakest Link, Principle 2: Practice Defence in Depth, Principle 3: Fail Securely, Principle 4: Follow the Principle of Least Privilege, Principle 5: Compartmentalize, Principle 6: Keep It Simple, Principle 7: Promote Privacy, Principle 8: Remember That Hiding Secrets is Hard, Principle 9: Be Reluctant to Trust, Principle 10: Use Your Community Resources Conclusion.	L4	
MODULE 3: Buffer Overflows & Access Control What Is a Buffer Overflow?, Why Are Buffer Overflows a Security Problem?, Defending against Buffer Overflow, Major Gotchas, Internal Buffer Overflows, More Input Overflows, Other Risks, Tools That Can Help, Smashing Heaps and Stacks, Heap Overflows, Stack Overflows, Decoding the Stack, To Infinity ... and Beyond!, Attack Code, A UNIX Exploit, What About Windows?The UNIX Access Control Model, How UNIX Permissions Work, Modifying File Attributes, Modifying Ownership, The unask, The Programmatic Interface, Setuid Programming, Access Control in Windows NT, Compartmentalization, Fine-Grained Privileges.	L1, L3 and L4	8
MODULE 4: NETWORKING OSI Model, Sockets, Socket Functions, Socket Addresses, Network Byte Order, Internet Address Conversion, A Simple Server Example, A Web Client Example, A Tinyweb Server, Peeling Back the Lower Layers, Data-Link Layer, Network Layer, Transport Layer , Network Sniffing, Raw Socket Sniffer, libpcap Sniffer, Decoding the Layers, Active Sniffing, Denial of Service, SYN Flooding, The Ping of Death, Teardrop, Ping Flooding, Amplification Attacks, Distributed DoS Flooding, TCP/IP Hijacking, RST Hijacking, Continued Hijacking, Port Scanning, Stealth SYN Scan, FIN, X-mas, and Null Scans, Spoofing Decoys, Idle Scanning, Proactive Defense (shroud), Reach Out and Hack Someone, Analysis with GDB, Almost Only Counts with Hand Grenades, Port-Binding Shellcode.	L1, L3, and L4	10
MODULE 5: SHELLCODE Assembly vs. C, Linux System Calls in Assembly, The Path to Shellcode, Assembly Instructions Using the Stack, Investigating with GDB, Removing Null Bytes, Shell-Spawning Shellcode, A Matter of Privilege, And Smaller Still, Port-Binding Shellcode, Duplicating Standard File Descriptors, Branching Control Structures, Connect-Back Shellcode.	L1, L2, and L3	8

**Bloom’s Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Recommended Books:

1. “Building Secure Software: How to Avoid Security Problems the Right Way” John Viega, Gary R. Tata McGraw Hill
2. Michael Howard, David LeBlanc, John Viega: 19 Deadly Sins of Software Security: Programming Flaws and How to Fix Them (Security One-off) (Addison-Wesley Professional Computing Series)
3. Richard Sinn “ Software Security , Theory Programming and Practice” Cengage Learning

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70


CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	2	--	1	--	--	--	--	--	--	--	--	1	--	2	--
CO2	1	2	--	2	--	--	--	--	--	--	--	--	1	1	--	1
CO3	1	1	3	3	--	--	--	--	--	--	--	--	1	1	--	--
CO4	1	1	3	1	--	--	--	--	--	--	--	--	1	1	--	--
CO5	1	2	3	1	--	--	--	--	--	--	--	--	1	1	--	3



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Course Code: NCE4303	APPLIED CRYPTOGRAPHY	L	T	P	C
Version 2020.1	Date of Approval: 19 July2020	3	0	3	3
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

In this course the concepts of cryptography and network security are discussed in detail. Substitution and transposition techniques, symmetric and asymmetric cryptographic algorithms, their applications, differences will be introduced. As a precursor to the study of cryptography studies will be made on impact of various network and web security protocols. The concepts learnt in the studies of cryptography & network security will be applied in the studies and analysis of authentication, integrity and security related protocols.

Course Objectives

The objective of this course is to

- Equip the students with concepts of cryptography & network security through problem solving and analytical approach.
- Provide an overview of various network attacks and related security mechanism , various algorithms for modular arithmetic, symmetric and asymmetric cryptography and web and network security

Course Outcomes

On completion of this course, the students will be able to

CO1: Explain, describe and distinguish various security attacks; Describe and solve block and stream ciphers and its applications in cryptography; Solve problems based on substitution and transposition ciphers.

CO2: Explain the basic mathematics of cryptography; Solve problems of groups, modular arithmetic, gcd and inverse algorithm, chinese remainder theorem and its application in cryptography; Applying algorithms for solving problems in cryptography

CO3: Describing the concept of public key cryptosystems and its related algorithm; Explain and solve problems related to hash functions, digital signature and its applications in cryptography; Compare symmetric and asymmetric key cryptography.

CO4: Explain management, distribution, secure exchange of keys and authentication certificate and its applications in real life. Explain, compare various authentication protocols used in cryptography and network security, also solve problems based on these protocols.

CO5: Explain various security protocols :IPSec, SSL,TLS,SET; Describing malicious softwares and illustrating various design approaches to Firewall

Modules	Blooms level*	Number of hours
MODULE 1: Introduction to security attacks, services and mechanism, Classical encryption techniques: substitution ciphers and transposition ciphers, cryptanalysis, steganography, Stream and block ciphers. Modern Block Ciphers: Block ciphers principles, Shannon's theory of confusion and diffusion, fiestal structure, Data encryption standard (DES), Strength of DES, Idea of differential cryptanalysis, block cipher modes of operations, Triple DES	L1, L2 AND L3	8

MODULE 2: Advanced Encryption Standard (AES) encryption and decryption, Analysis, Principals of public key crypto systems, RSA algorithm, security of RSA. Rabin cryptosystem, Elgamal cryptosystem, Elliptical Curve cryptography,	L1, L2, L3	8
MODULE 3: Message Authentication Codes: Authentication requirements, authentication functions, message authentication code, Random Oracle Model , hash functions, birthday attacks, security of hash functions, Secure hash algorithm (SHA),SHA-512, Whirlpool, Digital Signatures: Digital Signatures, Elgamal Digital Signature Techniques, Digital signature standards (DSS).	L1, L2 and L3	8
MODULE 4: Key Management and distribution: Symmetric key distribution, Diffie-Hellman Key Exchange, Public key distribution, X.509 Certificates, Public key Infrastructure. Entity authentication, Authentication Applications: Kerberos,	L1, L2, and L3	4
MODULE 5: IP Security: Architecture, Authentication header, Encapsulating security payloads, combining security associations, key management. Introduction to Secure Socket Layer, Secure electronic transaction (SET).	L1, L2, and L3	4

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

1. William Stallings, "Cryptography & Network Security", 4th Edition, Pearson Education, New Delhi, 2017.
2. Behrouz A. Forouzan, "Cryptography & Network Security", 2nd Edition, Tata McgrawHills, New Delhi, 2015

Reference Books

1. Douglas R. Stinsons, "Cryptography Theory and Practice", 3rd Edition, McMillan Publications, London, 2003
2. Atul Kahate, "Cryptography & Network Security", 3rd Edition, Tata McgrawHills, New Delhi, 2017

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS O 1	PS O 2	PS O 3	PS O 4
CO 1	1	1	1	--	--	--	--	--	--	--	--	--	1	1	3	-
CO 2	1	1	1	--	--	--	--	--	--	--	--	--	1	1	3	-
CO 3	1	1	1	--	-	--	--	--	--	--	--	--	1	1	3	-
CO 4	1	2	3	--	--	--	--	--	--	--	--	--	1	1	3	-
CO 5	1	2	3	--	--	--	--	--	--	--	--	--	2	2	3	-

1: strongly related, 2: moderately related and 3: weakly related

NCE4304	BIOMETRIC IMAGE PROCESSING LAB	L	T	P	C
Version 2020.1	Date of Approval: 19 July 2020	0	0	2	1
Pre-requisites/Exposure	Basics of MATLAB				
Co-requisites					

Catalog Description

Biometric Image processing has become an important tool for research and investigation in many areas of science and engineering. This course is designed to provide the students an understanding of the basic concepts of digital image processing and various techniques used in it. Students will perform practical on hardware kit as well as on software. Students will do basic exercises on image loading, manipulation, edge finding, features extraction, face recognition, segmentation, fingerprint, iris, signature recognition.

Course Objectives

The objective of this course is to

1. Make students demonstrate the concepts of image processing.
2. Apply the different techniques to process image.

Course Outcomes

On completion of this course, the students will be able to

CO1. Explain the basic image processing tools and commands.

CO2. Apply the filters to remove noise in spatial & frequency domain.

CO3. Apply image processing techniques for compression, segmentation and restoration.

Modules	Blooms level*	Number of hours
Lab Session 1		
1. To study about the basic image processing tools.	L3	3
2. Write program for histogram processing.		
Lab Session 2		
3. Write program for filtering in frequency domain.	L3 and L4	3
4. Write program for filtering in spatial domain.		
Lab Session 3		
5. Write programs for different compression schemes.	L3 and L4	3
6. Write program image restoration.		
Lab Session 4		
7. Write program for performing different morphological operations.	L3 and L4	3

8. Write program for image segmentation.

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

- Rafael C. Gonzalez & Richard E. Woods, "Digital Image Processing", 2nd edition, Pearson Education.
- A. K. Jain, "Fundamental of Digital Image Processing", PHI.

References:

- Maher A. Sid-Ahmed, "Image Processing Theory, Algorithms and Architectures", McGraw-Hill, 1995.
- William K. Pratt, "Digital Image Processing", Wiley-Interscience publication, Second Edition, 1991.
- R. Arthyr, "Fundamentals of Electronic Image Processing", PHI.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	--	--	--	2	--	--	--	--	--	--	2	1	--	-	-
CO2	1	-	3	--	2	--	--	--	--	--	--	2	1	3	--	-
CO3	1	-	3	--	2	--	--	--	--	--	--	2	1	3	--	3

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Course Code: NCE4305	APPLIED CRYPTOGRAPHY LAB	L	T	P	C
Version 2020.1	Date of Approval: 19 July 2020	0	0	4	2
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

In this course the concepts of cryptography and network security are discussed in detail. Substitution and transposition techniques, symmetric and asymmetric cryptographic algorithms, their applications, differences will be introduced. As a precursor to the study of cryptography studies will be made on impact of various network and web security protocols. The concepts learnt in the studies of cryptography & network security will be applied in the studies and analysis of authentication, integrity and security related protocols.

Course Objectives

The objective of this course is to

- Equip the students with concepts of cryptography & network security through problem solving and analytical approach.
- Provide an overview of various network attacks and related security mechanism, various algorithms for modular arithmetic, symmetric and asymmetric cryptography and web and network security

Course Outcomes

On completion of this course, the students will be able to

CO1: Explain, describe and distinguish various security attacks; Describe and solve block and stream ciphers and its applications in cryptography; Solve problems based on substitution and transposition ciphers.

CO2: Explain the basic mathematics of cryptography; Solve problems of groups, modular arithmetic, gcd and inverse algorithm, Chinese remainder theorem and its application in cryptography; Applying algorithms for solving problems in cryptography

CO3: Describing the concept of public key cryptosystems and its related algorithm; Explain and solve problems related to hash functions, digital signature and its applications in cryptography; Compare symmetric and asymmetric key cryptography.

CO4: Explain management, distribution, secure exchange of keys and authentication certificate and its applications in real life. Explain, compare various authentication protocols used in cryptography and network security, also solve problems based on these protocols.

CO5: Explain various security protocols: IPSec, SSL, TLS, SET; Describing malicious softwares and illustrating various design approaches to Firewall

Modules	Blooms level*	Number of hours
MODULE 1: 1. Program to implement Caesar Cipher. 2. Program to implement Caesar Cipher for any value of shift parameter. 3. Programs to implement Playfair cipher, affine cipher, Vigenere cipher	L1, L2 and L3	3
MODULE 2:	L1, L2, L3 and	3

4. Program to implement Vernam Cipher. 5. Program to implement Hill Cipher. 6. Program to implement Rail fence and Columnar transposition cipher	L4	
MODULE 3: 7. Program to implement DES/AES/IDEA algorithm 8. Program to implement RSA algorithm 9. Program to implement Rabin Cryptosystem and Elgamal Cryptosystem.	L1, L2 and L3	3
10. Program to implement Digital Signature using RSA/Elgamal. 11. Implementation study of MD5/SHA-1. 12. Programs to implement ECB/CBC/OFB modes of operation.	L1, L2, and L3	3

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

- William Stallings, Cryptography & Network Security: Principles and Practices, Prentice Hall, 2005, (ISBN: 978-0131873162).

Reference Books

- Behrouz A. Forouzan, Cryptography & Network Security, McGraw-Hill, 2007, USA. (ISBN: 0073327530 9780073327532).
- Douglas R. Stinson, Chapman and Hall, Cryptography Theory & Practice, CRC Press, 2005.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS O 1	PS O 2	PS O 3	PS O 4
CO 1	1	2	1	2	1	--	--	--	--	--	--	--	1	--	3	--
CO 2	1	1	2	1	1	--	--	--	--	--	--	--	1	--	3	--
CO 3	1	2	1	1	1	--	--	--	--	--	--	--	1	--	3	--
CO 4	1	2	2	2	3	--	--	--	--	--	--	--	1	--	3	--
CO 5	1	2	2	2	2	--	--	--	--	--	--	--	1	--	3	--

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Course Code : NCE4335	SUMMER INTERNSHIP EVALUATION	L	T	P	C
Version: 2020.1	Date of Approval: 19 July 2020	0	0	0	6
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

The objective of this course is to provide practical training on some live projects that will increase capability to work on actual problem in industry. This training may undergo in an industrial environment or may be an in-house training on some latest software which is in high demand in market. This training will be designed such that it will useful for their future employment in industry.

Course Objectives

The objective of this course is to

1. Provide practical training on live projects
2. Increase technical capabilities on solving real life problems in company environment

Course Outcomes

On completion of this summer internship, the students will be able to:

CO1: Develop communication, interpersonal and other critical skills in the job interview process.

CO2: Design and develop software and hardware projects

CO3: Assess interests and abilities in their field of study.

CO4: Demonstrate excellent technical and communication skills to acquire employment contacts leading directly to a full-time job following graduation from college.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	2	1	2	2	--	--	--	1	--	--	--	1	1	1	1
CO2	1	1	2	2	2	--	--	--	1	--	--	--	1	1	1	1
CO3	1	1	2	3	2	--	--	--	1	--	--	--	1	1	1	1
CO4	1	1	2	2	2	--	--	--	1	--	--	--	1	1	1	1

1: strongly related, 2: moderately related and 3: weakly related

Course Code: NCE4337	PROJECT DISSERTATION-I	L	T	P	C
Version: 2020.1	Date of Approval: 19 July 2020	0	0	0	5
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

The objective of this course is to provide practical training on some live/demo projects that will increase capability to work on actual problem in industry. It will be an in house training on some latest software which is in high demand in market. This training will be designed such that it will be useful for their future employment in industry.

Course Objectives

The objective of this course is to

1. Provide practical training on live projects
2. Increase technical capabilities on solving real life problems in company environment

Course Outcomes

On completion of this summer internship, the students will be able to:

CO1: Demonstrate a sound technical knowledge of their selected project topic.

CO2: Design and develop engineering solutions to complex problems utilising a systems approach.

CO3: Analyse various approaches for solving a complex engineering problem using different tools and techniques

CO4: Demonstrate the knowledge, skills and attitudes of a professional engineer.

CO5: Apply technical skills and knowledge in completing the project.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	2	--	--	--	--	--	--	1	--	--	--	--	--	1	1
CO2	1	1	--	--	--	--	--	--	1	--	--	--	--	--	1	1
CO3	1	1	--	--	--	--	--	--	1	--	--	--	--	--	1	1
CO4	1	1	--	--	--	--	--	--	1	--	--	--	--	--	1	1
CO5	1	1	--	--	--	--	--	--	1	-	-	-	--	--	1	1

1: strongly related, 2: moderately related and 3: weakly related

Course Code: NCE4306	WEB APPLICATION & PENETRATION TESTING	L	T	P	C
Version 2020.1	Date of Approval: 19 July 2020	3	0	0	3
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

The Web Application and Penetration Testing course provides all the advanced skills necessary to carry out a thorough and professional penetration test against modern web applications.

Course Objectives

The objective of this course is to

1. help students move beyond push-button scanning to professional, thorough, high-value web application penetration testing.
2. enable students to assess a web application's security posture and convincingly demonstrate the impact of inadequate security that plagues most organizations

Course Outcomes

On completion of this course, the students will be able to

CO1: Grasp the nontechnical but very important basics of web application and penetration testing which will make their foundation for application creation.

CO2: Elaborate and apply the attacks, by studying different techniques of hacking.

CO3: Learn about essentials of web application structure, Apache, authentication mechanisms.

CO4: Learn IIS authentication, and various attacks and security issues.

CO5: Study the models input validation checks and associated case studies.

Modules	Blooms level*	Number of hours
MODULE 1: Introduction to Web Applications and Security The Web Application Architecture ,A Brief Word about HTML ,Transport: HTTP ,The Web Client ,The Web Server,The Web Application ,The Database ,Complications and Intermediaries ,The New Model: Web Services ,Potential Weak Spots ,The Methodology of Web Hacking ,Profile the Infrastructure ,Attack Web Servers ,Survey the Application,Attack the Authentication Mechanism ,Attack the Authorization Schemes , Perform a Functional Analysis,Exploit the Data Connectivity,Attack the Management Interfaces,Attack the Client,Launch a Denial-of-Service Attack Profiling: Server Discovery,Intuition ,Internet Footprinting, DNS Interrogation Ping,Discovery Using Port Scanning , Dealing with Virtual Servers, Service Discovery , Server Identification,Dealing with SSL.	L1, L2 AND L3	8
MODULE 2: Hacking Web Servers Common Vulnerabilities by Platform ,Apache,Microsoft Internet Information Server (IIS), Attacks Against IIS Components, Attacks Against IIS,	L1, L2, L3	8

Escalating Privileges on IIS, Netscape Enterprise Server , Other Web Server Vulnerabilities , Miscellaneous Web Server Hacking Techniques , Automated Vulnerability Scanning Software ,Whisker, Nikto , twwwwscan/arirang , Stealth HTTP Scanner, Typhon , WebInspect , AppScan, FoundScan Web Module , Denial of Service Against Web Servers,		
MODULE 3: Documenting Application Structure , Manually Inspecting the Application , Statically and Dynamically Generated Pages, Directory Structure , Helper Files , Java Classes and Applets , HTML Comments and Content ,Forms, Query Strings , Back-End Connectivity , Tools to Automate the Survey, lynx , Wget,TeleportPro,Black Widow, WebSleuth, Common Countermeasures , A Cautionary Note, Protecting Directories,Protecting Include Files, Miscellaneous Tips. Authentication: Authentication Mechanisms, HTTP Authentication: Basic and Digest, Forms-Based Authentication, Microsoft Passport, Attacking Web Authentication,Password Guessing, Session ID Prediction and Brute Forcing, Subverting Cookies,Bypassing SQL-Backed Login Forms,Bypassing Authentication.	L1, L2 and L3	8
MODULE 4: The Attacks, Role Matrix, The Methodology , Query String, POST Data , Hidden Tags, URI,HTTP Headers,Cookies, Final Notes,Case Study: Using Curl to Map Permissions, Apache Authorization, IIS AuthorizationAttacking Session State Management:Client-Side Techniques, Hidden Fields, The URL,HTTP Headers and Cookies, Server-Side Techniques, Server-Generated Session IDs, Session Database, SessionID Analysis, Content Analysis, Time Windows.	L1, L2, and L3	4
MODULE 5: Input Validation Attacks Expecting the Unexpected, Input Validation EndGame, Where to Find Potential Targets,Bypassing Client-Side Validation Routines , Common Input Validation Attacks , Buffer Overflow, Canonicalization (dot-dot-slash),Script Attacks , Boundary Checking, Manipulating the Application , SQL Injection and DatastoreAttacks,Command Execution, Common Side Effects,Common Countermeasures. Attacking Web Datastores: A SQL Primer,SQL Injection, Common Countermeasures. Web Client Hacking :The Problem of Client-Side Security,Attack Methodologies ,Active Content Attacks ,Java and JavaScript ,ActiveX,Cross-Site Scripting,Cookie Hijacking ,Case Study #: From the URL to the Command Line and Back,Case Study #: The Cross-Site Scripting Calendar	L1, L2, and L3	4


**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

Recommended Books:

1. Hacking Exposed Web Applications", 3rd edition, JOEL SCAMBRAY, VINCENT LIU, CALEB SIMA.
2. "The Web Application Hacker's Handbook Discovering and Exploiting Security Flaws" DafyddStuttard, Marcus Pinto
3. Rich Bowen, Ken Coar, "Apache Cookbook", O'Reilly


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Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination
Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

CO, PO and PSO mapping

CO, PO and PSO mapping																	
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4	
CO1	2	2	1	1	--	--	--	--	--	--	--	--	3	3	2	2	
CO2	2	2	1	1	--	--	--	--	--	--	--	--	2	2	2	2	
CO3	2	2	1	1	--	--	--	--	--		-- --		2	2	2	2	
CO4	2	2	2	1	--	--	--	--	--	--	--	--	--	2	2	2	2
CO5	2	2	1	1	--	--	--	--	--	--	--	--	--	2	2	2	2

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Course Code: NCE4307	MALWARE ANALYSIS IN NETWORK SECURITY	L	T	P	C
Version 2020.1	Date of Approval: 19 July2020	3	0	0	3
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

Malware Analysis in Network Security lays the Groundwork for the course by presenting the key tools and techniques malware analyst use to examine malicious programs. Students will learn how to save time by Exploring malware in two phases. Behavioral analysis focuses on the Specimen's interaction with its Environment such as Registry, Network, the File system. Code Analysis focuses on the specimen's code and make use of a disassembler and a debugger.

Course Objectives

The objective of this course is to

1. Enable the students how to extract host- and network-based indicators from a malicious program using dynamic and static analysis techniques.
2. Learn the basics of finding the functionality of a program by analyzing disassembly and by watching how it modifies a system as it runs in a debugger.

Course Outcomes

On completion of this course, the students will be able to

CO1: Grasp the nontechnical but very important basics of Malware analysis like antivirus scanning etc.

CO2: Elaborate virtual machines & dynamic analysis; study the structure of a virtual machine.

CO3: Recognizing C Code Constructs in Assembly and understanding function conventions

CO4: Study and Analyzing Malicious Windows Program, handling file systems.

CO5: Study Malware behavior & covert malware launching in network

Modules	Blooms level*	Number of hours
MODULE 1: BASIC STATIC TECHNIQUES Antivirus Scanning: A Useful First Step, Hashing: A Fingerprint for Malware, Finding Strings, Packed and Obfuscated Malware, Packing Files, Detecting Packers with PEiD, Portable Executable File Format, Linked Libraries and Functions, Static, Runtime, and Dynamic Linking, Exploring Dynamically Linked Functions with Dependency Walker, Imported Functions, Exported Functions, Static Analysis in Practice, Potential Keylogger.exe: An Unpacked Executable, PackedProgram.exe: A Dead End, The PE File Headers and Sections, Examining PE Files with PEview, Viewing the Resource Section with Resource Hacker, Using Other PE File Tools, PE Header Summary	L1, L2 AND L3	8
MODULE 2: VIRTUAL MACHINES & DYNAMIC ANALYSIS The Structure of a Virtual Machine, Creating Your Malware Analysis Machine, Configuring VMware, Using Your Malware Analysis Machine, Connecting Malware to the Internet, Connecting and Disconnecting Peripheral Devices, Taking Snapshots, Transferring Files from a Virtual Machine, The Risks of Using VMware for Malware Analysis, Record/Replay: Running Your Computer in Reverse,	L1, L2, L3	8

Sandboxes: The Quick-and-Dirty Approach Using a Malware Sandbox , Sandbox Drawbacks, Running Malware, Monitoring with Process Monitor, The Procmon Display, Filtering in Procmon, Viewing Processes with Process Explorer, The Process Explorer Display, Using the Verify Option, Comparing Strings, Using Dependency Walker, Analyzing Malicious Documents, Comparing Registry Snapshots with Regshot, Faking a Network, Using ApatDNS, Monitoring with Netcat, Packet Sniffing with Wireshark, Using INetSim, Basic Dynamic Tools in Practice		
MODULE 3:RECOGNIZING C CODE CONSTRUCTS IN ASSEMBLY Overview of working with IDA Pro, Global vs Local Variables, Disassembling Arithmetic Operations, Recognizing if Statements, Analyzing Functions Graphically with IDA Pro, Recognizing Nested if Statements, Recognizing Loops, Finding for Loops, Finding while Loops, Understanding Function Call Conventions, Cdecl, Stdcall, fastcall , Push vs Move ,Analyzing switch Statements ,If Style ,Jump Table ,Disassembling Arrays ,Identifying Strcuts ,Analyzing Linked List Traversal ,	L1, L2 and L3	8
MODULE 4:ANALYZING MALICIOUS WINDOWS PROGRAMS The Windows API, Types and Hungarian Notation, Handles, File System Functions, Special Files, The Windows Registry, Registry Root Keys, Regedit , Programs that Run Automatically, Common Registry Functions, Analyzing Registry Code in Practice, Registry Scripting with reg Files , Networking APIs , Berkeley Compatible Sockets, The Server and Client Sides of Networking, The WinINet API , Following Running Malware, DLLs , Processes, Threads ,Interprocess Coordination with Mutexes , Services , The Component Object Model , Exceptions: When Things Go Wrong ,Kernel vs User Mode , The Native API	L1, L2, and L3	4
MODULE 5:: MALWARE BEHAVIOR & COVERT MALWARE LAUNCHING Downloaders and Launchers, Backdoors, Reverse Shell, RATs, Botnets, RATs and Botnets Compared, Credential Stealers, GINA Interception, Hash Dumping, Keystroke Logging, Persistence Mechanisms, The Windows Registry, Trojanized System Binaries, DLL Load-Order Hijacking, Privilege Escalation, Using SeDebugPrivilege, Covering Its Tracks—User-Mode Rootkits, IAT Hooking, Inline Hooking, Launchers, Process Injection, DLL Injection, Direct Injection, Process Replacement, Hook Injection , Local and Remote Hooks, Keyloggers Using Hooks, Using SetWindowsHookEx, Thread Targeting, Detours, APC Injection, APC Injection from User Space, APC Injection from Kernel Space .	L1, L2, and L3	4


**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Recommended Books:

1. "Practical Malware Analysis" by Michael Sikorski and Andrew Honig
2. "The Rootkit Arsenal: Escape and Evasion in the Dark Corners of the System" Second Edition by Reverend Bill Blunden
3. "Rootkits: Subverting the Windows Kernel" by Jamie Butler and Greg Hoglund
4. "Practical Reverse Engineering" by Dang, Gazet, Bachaalany

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination


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Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	2	2	1	1	--	--	--	--	--	--	--	--	3	3	2	2
CO2	2	2	1	1	--	--	--	--	--	--	--	--	2	2	2	2
CO3	2	2	1	1	--	--	--	--	--	--	--	--	2	2	2	2
CO4	2	2	2	1	--	--	--	--	--	--	--	--	2	2	2	2
CO5	2	2	1	1	--	--	--	--	--	--	--	--	2	2	2	2

1: strongly related, 2: moderately related and 3: weakly related

Course Code: NCE4308	WEB SECURITY	L	T	P	C
Version 2020.1	Date of Approval: 19 July 2020	3	0	0	3
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

Modern cryptography applies theory from mathematics and computer science to design and implement strong encryption methods which are so important to the safety of computer systems today. This course focuses on introducing students to the issues of WEB security, especially in terms of business systems' dependence on communication. Acquisition of knowledge about dangers that threaten the Internet and how to protect oneself from them. Introduction to practical methods, measures and resources that can be applied in the construction and development of WWW security system

Course Objectives

The objective of this course is to

1. Identify domain space and security challenges of the web and information systems based on web technologies, classify threats and ways to deal with them for individuals and information systems.
2. Propose ways for technical and legal protection of systems based on web technologies.

Course Outcomes

On completion of this course, the students will be able to

CO1: Analyse and apply legal regulations in the field of electronic business, electronic trade, digital signature, protection of personal data, etc

CO2: Determine the most suitable security protocol to protect web applications

CO3: Identify domain space and security challenges of the web.

CO4: Explain the operating principles of web information systems.

CO5: Understand the technicalities of mails i.e. junk or spam mails.

Modules	Blooms level *	Number of hours
MODULE 1: The E-Commerce Playground Web Languages: The Babylon of the 21st Century, Languages of the Web, HTML, Dynamic HTML (DHTML).XML,XHTML,Perl,PHP,ColdFusion,Active Server Pages,CGI,Java. Web and Database Servers: Web Servers,Apache,Microsoft's Internet Information Server (IIS),Database Servers,Microsoft SQL Server,Oracle.	L1, L2 and L3	8
MODULE 2: Shopping Carts and Payment Gateways Evolution of the Storefront,Electronic Shopping,Shopping Cart Systems,Scope and Lifetime of an Electronic Shopping Cart,Collecting, Analyzing, and Comparing Selected Components,Keeping Track of the Total Cost,Change of Mind,Processing the Purchase,Implementation of a Shopping Cart Application,Product Catalog,Session Management,Database Interfacing,Integration with the Payment Gateway,Examples of Poorly Implemented Shopping Carts,Careello Shopping Cart,DCShop Shopping	L1, L2, L3 and L4	8

Cart,Hassan Consulting's Shopping Cart,Cart32 and Several Other Shopping Carts,ProcessingPayments,Finalizing the Order,Method of Payment,Verification and Fraud Protection,OrderFulfillment and Receipt Generation,Overview of the Payment Processing System,Innovative Ways to Combat Credit Card Fraud,Order Confirmation Page,Payment Gateway Interface,Transaction Database Interface,Interfacing with a Payment GatewayAnExample,PaymentSystemImplementationIssues,Integration,TemporaryInf ormation,SSL,Storing User Profiles,Vulnerabilities Caused by Poor Integration of Shopping Cart and Payment Gateway,PayPal—Enabling Individuals to Accept Electronic Payments,		
MODULE 3: HTTP and HTTPS: The Hacking Protocols,Protocols of the Web,HTTP,HTTPS (HTTP over SSL). URL: The Web Hacker's Sword: URL Structure,Web Hacker Psychology,URLs and Parameter Passing. URL Encoding, Meta-Characters,Specifying Special Characters on the URL String.,Meta-Characters and Input Validation,UnicodeEncoding,The Acme Art, Inc. Hack,Abusing URL Encoding,Unicode Encoding and Code Red's Shell Code,UnicodeVulnerability,The Double-Decode or Superfluous Decode Vulnerability,HTMLForms,Anatomy of an HTML Form,InputElements,Parameter Passing Via GET and POST,Case Study: Reconnaissance Leaks Corporate Assets.	L1, L2 and L3	8
MODULE 4: Web: Under (the) Cover. The Components of a Web Application,The Front-End Web Server,The Web Application ExecutioEnvironment. The Database Server,Wiring the Components,The Native Application Processing Environment.,Web Server APIs and Plug-Ins,URL Mapping and Internal Proxying,Proxying with a Back-End Application Server.Examples. Connecting with the Database,The Craftiest Hack of Them All,Using Native Database APIs.Examples.UsingODBC,UsingJDBC,Specialized Web Application Servers,Identifying Web Application Components from URLs,The Basics of Technology Identification,Examples,MoreExamples,Advanced Techniques for Technology Identification,Examples,Identifying Database Servers,Countermeasures, Rule 1: Minimize Information Leaked from the HTTP Header,Rule 2: Prevent Error Information from Being Sent to the Browser.	L1, L2, and L3	4
MODULE 5: Reading Between the Lines. Information Leakage Through HTML,What the Browsers Don't Show You,Netscape Navigator—View | Page Source,Internet Explorer—View | Source,Clues to Look For,HTMLComments,RevisionHistory,Developer or Author Details,Cross-References to Other Areas of the Web Application,Reminders and Placeholders, Comments Inserted by Web Application Servers,Old “Commented-Out” Code,Internal and External Hyperlinks,E-mail Addresses and Usernames,UBE, UCE, Junk Mail, and Spam,Keywords and Meta Tags,HiddenFields,Client-Side Scripts,Automated Source Sifting Techniques,Usingwget,Usinggrep,Sam Spade, Black Widow, and Teleport Pro.	L1, L2, and L3	4

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

- McClure, Stuart, Saumil Shah, and Shreeraj Shah. Web Hacking:attacks and defense. AddisonWesley. 2003.
- 2. Garms, Jess and Daniel Somerfield. Professional Java Security. Wrox. 2001.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination
Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance.


CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS O 1	PS O 2	PS O 3	PS O 4
CO 1	1	2	1	2	1	--	--	--	--	--	--	--	1	--	3	--
CO 2	1	1	2	1	1	--	--	--	--	--	--	--	1	--	3	--
CO 3	1	2	1	1	1	--	--	--	--	--	--	--	1	--	3	--
CO 4	1	2	2	2	3	--	--	--	--	--	--	--	1	--	3	--
CO 5	1	2	2	2	2	--	--	--	--	--	--	--	1	--	3	--

1: strongly related, 2: moderately related and 3: weakly related



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Course Code: NCE4309	DIGITAL WATERMARKING & STAGENOGRAPHY	L	T	P	C
Version 2020.1	Date of Approval: 19 July2020	3	0	0	3
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

Modern Digital watermarking and steganography apply theory from mathematics, digital signal processing, image processing and computer science to design and implement algorithms which are so important for the secure communication today. This course focuses on building strong mathematical foundations which can be applied in designing a vast range of applications like broadcast monitoring, copy control.

Course Objectives

The objective of this course is to

- Enable the students with the technical and non-technical concepts used in Digital Watermarking and Steganography.
- Provide an overview of different mathematical structures used in designing digital watermarking and steganographic algorithms.

Course Outcomes

On completion of this course, the students will be able to

CO1: grasp the nontechnical but very important basics of Digital Watermarking and Steganography which will make their foundation for application creation.

CO2: Elaborate and apply the algorithms, by studying different models of watermarking systems.

CO3: Learn about one of the main tools Dirty Paper Codes that are needed for optimal watermarking of Gaussian signals they will study about the different security techniques need and used in Watermarking systems.

CO4: Build and study the models of Steganography and how to optimize the use of embedding techniques.

CO5: Describe the concept of steganalysis, and applying steganographic algorithms to design the required application.

Modules	Blooms level*	Number of hours
MODULE 1: Introduction Applications and Properties Information Hiding, Steganography, and Watermarking , History of Watermarking , History of Steganography , Importance of Digital Watermarking , Importance of Steganography , Applications of Watermarking , Applications of Steganography Steganography for Dissidents, Steganography for Criminals, Properties of Watermarking Systems , Evaluating Watermarking Systems , Properties of Steganographic and Steganalysis Systems , Evaluating and Testing Steganographic Systems	L1, L2 AND L3	8
MODULE 2: MODELS OF WATERMARKING Notation, Communications , Communication-Based Models of Watermarking , Geometric Models of Watermarking , Modeling Watermark Detection by Correlation	L1, L2, L3	8

Watermarking with side information: Informed Embedding, Watermarking Using Side Information, Dirty-Paper Codes		
MODULE 3: PRACTICAL DIRTY-PAPER CODES Practical Considerations for Dirty-Paper Codes , Broad Approaches to Dirty-Paper Code Design	L1, L2 and L3	8
MODULE 4: STEGANOGRAPHYSteganographic Communication , The Channel , The Building Blocks , Notation and Terminology,Information-Theoretic Foundations of Steganography , Cachin's Definition of Steganographic Security , Practical Steganographic Methods , Statistics Preserving Steganography , Model-Based Steganography , Masking Embedding as Natural Processing , Minimizing the Embedding Impact , Matrix Embedding , Nonshared Selection Rule ,	L1, L2, and L3	4
MODULE 5: STEGANALYSIS Steganalysis Scenarios , Detection , Forensic Steganalysis , The Influence of the Cover Work on Steganalysis , Some Significant Steganalysis Algorithms , LSB Embedding and the Histogram Attack , Sample Pairs Analysis , Blind Steganalysis of JPEG Images Using Calibration , Blind Steganalysis in the Spatial Domain.	L1, L2, and L3	4

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

1. William Stallings, Cryptography & Network Security: Principles and Practices, Prentice Hall, 2005, (ISBN: 978-0131873162).

Reference Books

1. "Digital Watermarking and Steganography" Ingemar J. Cox, Matthew L. Miller, Jeffrey A. Bloom, Jessica Fridrich, Ton Kalker, ,Morgan Kaufmann Publishers, New York, 2008.
2. "Digital Watermarking", Ingemar J. Cox, Matthew L. Miller, Jeffrey A. Bloom, MorganKaufmannPublishers, New York, 2003.
3. "Techniques and Applications of Digital Watermarking and Content Protection", Michael Arnold, Martin Schmucker, Stephen D. Wolthusen, Artech House, London, 2003.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4	
CO1	2	2	1	1	--	--	--	--	--	--	--	--	3	3	2	2	
CO2	2	2	1	1	--	--	--	--	--	--	--	--	2	2	2	2	
CO3	2	2	1	1	--	--	--	--	--		--	--	2	2	2	2	
CO4	2	2	2	1	--	--	--	--	--	--	--	--	--	2	2	2	2
CO5	2	2	1	1	--	--	--	--	--	--	--	--	--	2	2	2	2

1: strongly related, 2: moderately related and 3: weakly related

Course Code: NCE4437	PROJECT DISSERTATION-II	L	T	P	C
Version: 2020.1	Date of Approval: 19 July 2020	0	0	0	15
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

The objective of this course is to provide practical training on some live/demo projects that will increase capability to work on actual problem in industry. It will be an in house training on some latest software which is in high demand in market. This training will be designed such that it will be useful for their future employment in industry.

Course Objectives

The objective of this course is to

1. Provide practical training on live projects
2. Increase technical capabilities on solving real life problems in company environment

Course Outcomes

On completion of this summer internship, the students will be able to:

CO1: Demonstrate a sound technical knowledge of their selected project topic.

CO2: Design and develop engineering solutions to complex problems utilising a systems approach.

CO3: Analyse various approaches for solving a complex engineering problem using different tools and techniques

CO4: Demonstrate the knowledge, skills and attitudes of a professional engineer.

CO5: Apply technical skills and knowledge in completing the project.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	2	--	--	--	--	--	--	1	--	--	--	--	--	1	1
CO2	1	1	--	--	--	--	--	--	1	--	--	--	--	--	1	1
CO3	1	1	--	--	--	--	--	--	1	--	--	--	--	--	1	1
CO4	1	1	--	--	--	--	--	--	1	--	--	--	--	--	1	1
CO5	1	1	--	--	--	--	--	--	1	--	--	--	--	--	1	1

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Curriculum & Scheme of Examination

2022

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CIV4101	APPLIED NUMERICAL METHODS	L	T	P	C
Version 2020.1	Date of Approval: 3 rd June, 2020	4	0	0	4
Pre-requisites/ Exposure	Nil				
Co-requisites	Nil				

Catalogue Description

The purpose of this course is to provide students with the skill, knowledge and attitude required to determine approximate numerical solutions to mathematical problems which cannot always be solved by conventional analytical technique, and to demonstrate the importance of selecting the right numerical technique for a particular application, and carefully analyzing and interpreting the results obtained.

Course Objectives

The objective of this course is to:

1. Demonstrate understanding of common numerical methods and how they are used to obtain approximate solutions to otherwise intractable mathematical problems.
2. Apply numerical methods to obtain approximate solutions to mathematical problems.
3. Derive numerical methods for various mathematical operations and tasks, such as interpolation, differentiation, integration, the solution of linear and nonlinear equations, and the solution of differential equations.

Course Outcomes

On completion of this course, the students will be able to

- CO1. Define and describe the Algebraic and Transcendental Equation and solve the problems using appropriate Numerical methods.
- CO2. Describe the interpolation methods to find intermediate values in given graphical or tabulated data.
- CO3. Describe and Define the sets of linear simultaneous equations and solve the problems using Cholesky's (Crout's) method, Gauss-Seidel iteration and relaxation methods.
- CO4. Describe and apply Trapezoidal and Simpson's Rule to solve given integration problems.
- CO5. Define and describe Runge-Kutta method and Euler's Method to solve differential equations

Course Content

Modules	Blooms level*	Number of hours
Module I: Solution of Algebraic & Transcendental Equations Newton-Raphson method including method of complex roots, Graeffe's root square method (Computer based algorithm and program for these methods)	L1, L2, L3	10
Module II: Interpolation & Approximation Lagrange's and Newton-divided difference formula, Newton interpolation formula for finite differences, Gauss's forward and backward interpolation formulae, Bessel's and Laplace-Everett's formulae, Cubic spline, least squares approximation using Chebyshev polynomial. Solution of partial differential equations of linear and non-linear nature with finite difference scheme and iteration techniques	L1, L2, L3	10
Module III: Solution of Linear Simultaneous Equations	L1, L2,	10

Cholesky's (Crout's) method, Gauss-Seidel iteration and relaxation methods, Solution of Eigen Value problems; Smallest, largest and intermediate Eigen values (Computer based algorithm and Programme for these methods)	L3	
Module IV: Numerical Differentiation & Integration Numerical differentiation using difference operators, Simpson's 1/3 and 3/8 rules, Boole's rule, Weddle's rule.	L1, L2, L3	8
Module V: Solution of Differential Equations Modified Euler's method, Runge-Kutta method of 2nd, 3rd and 4th orders, Predictor- Corrector method, Stability of Ordinary differential equation, Solution of Laplace's and Poisson's equations by Liebman's method, Relaxation method.	L1, L2, L3	10

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Text Books

- V. Rajaraman, Computer oriented Numerical Methods, PHI Learning, New Delhi, 1993.
- Gerald, Whealey, Applied Numerical Analysis, Pearson Education Limited, New Delhi, 2006.
- Grewal B S, Numerical methods in Engineering and Science, Khanna Publishers, Delhi, 2014.

Reference Books

- T Veerarajan, T Ramachandran, Theory and Problems in Numerical Methods, Tata Mcgraw Hill, New Delhi, 2002.
- Pradip Niyogi, Numerical Analysis and Algorithms, Tata Mcgraw Hill, New Delhi, 1984.
- Francis Scheld, Numerical Analysis, Tata Mcgraw Hill, New Delhi, 2000.
- Sastry S. S, Introductory Methods of Numerical Analysis, Prentice Hall India, New Delhi, 2012.
- Gupta C.B., Vijay Gupta, Introduction to Statistical Methods, Vikas Publishing, Noida, 2004.

Modes of Evaluation: Quiz/Assignment/Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O 1	PS O 2	PS O 3	PS O 4
CO 1	1	2	--	--	--	--	--	--	--	--	--	--	1	--	-	3
CO 2	1	2	--	-	--	--	--	--	--	--	--	--	1	-	-	3
CO 3	1	2	--	--	--	--	--	--	--	--	--	--	1	-	-	3
CO 4	1	2	--	--	--	--	--	--	--	--	--	--	1	-	-	3
CO 5	1	2	--	--	--	--	--	--	--	--	--	--	1	--	-	3

1: strongly related, 2: moderately related and 3: weakly related

CIV4102	SUSTAINABLE CONSTRUCTIONS	L	T	P	C
Version 2020.1	Date of Approval: 3rd June, 2020	4	0	0	4
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalogue Description

This course includes the concept of Sustainably, Sustainable construction materials and methodologies related to commercial construction, including LEED/Green certifications. It also includes the life cycle assessment with case studies.

Course Objectives:

The objective of this course is to:

1. Demonstrate an ability to evaluate and design whole or parts of projects, taking into account not only the financial and economic issues but also the social and environmental impacts affecting the sustainability of infrastructure.
2. Future challenges in sustainable development based on possible scenarios considering the level of success of current mitigation and adaptation measures.
3. Learn social sustainability in construction and development of built assets, and the roles of construction processes, outputs and outcomes on people and society.

Course Outcomes

On completion of this course, the students will be able to

- CO1. Describe the basic concepts of sustainability, sustainable development and sustainable construction, understand rating systems and compares key features such as cost, ease of use, and building Performance.
- CO2. Define and Differentiate rating systems in detail, including its evolution, objectives, criteria, levels of certification benefits, and shortcomings.
- CO3. Demonstrate a functional knowledge of formulating and specifying practical measures for environmental sustainability that can be implemented in design and construction.
- CO4. Explain the quality control monitoring in the project, project safety management and construction project information.

Course content

Modules	Blooms level*	Number of hours
Module I: Introduction and Sustainable Site Planning Principles of sustainability: Introduction to Course, Definition of sustainability, Major Environmental Challenges, Global Warming, Introduction to Green Buildings; LEED, Sustainable Urban Development, Sustainable Sites - LEED Credits., Case study	L1, L2, L3	12
Module II: Energy Conservation Energy Conservation in Buildings, HVAC Systems, Energy and Atmosphere - LEED Credits, Fossil Fuels vs. Renewable Energy, Case study	L2, L3	12
Module III: Water Conservation and Indoor Environment Quality	L2, L3	12

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Water Conservation in Buildings, Storm Water Harvesting and Management, Indoor Environmental Quality – Basic, parameters, do's and don'ts, LEED credits, calculations, compliances, important points to be considered, Case study		
Module IV: Green Building Construction Green Construction Materials, Materials and Resources - LEED Credits, Building Deconstruction, C&D Recycling, Building Commissioning, Economics of Green Buildings, LCC/LCA., Case study	L2, L3, L4	12

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

- C.J. Kibert, Sustainable Construction: Green Building Design and Delivery, 2nd Ed., John Wiley, New Jersey, 2008.
- J. K. Yates and Daniel Castro-Lacouture, Sustainability in Engineering Design and Construction, 1st Edition, CRC Press, Taylor and Francis group, New York, 2015.

Reference Books

- G.T. Miller Jr., Living in the Environment: Principles, Connections, and Solutions, 14th Ed., Brooks Cole, Pacific Grove, California, 2004.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance


CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	--	--	2	1	--	2	2	--	1	--	--	--	2	--	1	2
CO2	--	--	--	1	--	2	2	--	--	--	--	--	2	--	1	1
CO3	--	2	2	1	--	--	--	--	3	--	--	--	2	--	1	-
CO4	--	--	--	--	--	2	1	--	3	--	--	--	2	--	1	3

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CIV4103	DISASTER MITIGATION AND MANAGEMENT	L	T	P	C
Version 2020.1	Date of Approval: 3rd June, 2020	3	0	0	3
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalogue Description:

This course is intended to provide fundamental understanding of different aspects of Disaster Management. It will expose the students to the concept and functions of Disaster Management and to build competencies of Disaster Management professionals and development practitioners for effective supporting environment as put by the government in legislative manner. It would also provide basic knowledge, skills pertaining to Planning, Organizing and Decision-making process for Disaster Risk Reduction.

Course Objectives:

The objective of this course is to:

1. Ensure that students begin to understand the relationship between vulnerability, disasters, disaster prevention, risk reduction and the basic understanding of the research methodology for risk reduction measures.
2. Equipped with knowledge, concepts, and principles, skills pertaining to Planning, Organizing, Decision-making and problem solving methods for Disaster Management.
3. Develop rudimentary ability to respond to their surroundings with potential disaster response in areas where they live, with due sensitivity.

Course Outcomes:

On completion of this course, the students will be able to

CO1: Increase the knowledge and understanding of the disaster phenomenon and, its factors.

CO2: Understand the relationship of hazard, risk and vulnerability

CO3: Obtain the skills in role of education and training in disaster prevention.

CO4: Ensure skills in post disaster management activities

CO5: Get the knowledge in understanding various prone zones in India

Course Content

Modules	Blooms level*	Number of hours
Module I: UNDERSTANDING DISASTER Introduction – Types of Disaster (Rapid disaster – Natural, manmade disaster and slow disaster – Natural, manmade disaster) – Factors of Disaster, Geology and topography, Weather and climate, Ecosystems, Human factors, Earthquake: epicentres and scale of earthquake.	L1, L2 and L3	8
Module II HAZARD, RISK AND VULNERABILITY Hazard classification and assessment - Hazard evaluation and hazard control - Concept And Elements of disaster risk - Techniques of Risk Assessment - Vulnerability Concept and Parameters, Risk and Vulnerability Relationship, Observation and Perception Of Vulnerability, Vulnerability Identification, Socio-Economic Factors of Vulnerability, Vulnerability Analysis.	L2 and L3	9
Module III PRE-DISASTER MANAGEMENT ACTIVITIES Introduction - Institutional arrangements - Vulnerability and capacity assessment - Prevention and mitigation - Structural Mitigation And Non-	L2, L3 and L4	7

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Structural Mitigation - Preparedness and planning - Institutional learning and memory - Warning indicators - Public Awareness, Role Of Education And Training In Disaster Prevention.		
Module IV POST-DISASTER MANAGEMENT ACTIVATES Critical stress debriefing – Debriefing Checklist – Claims and follow-up of disaster - Insurance companies – Sale of debris – The relative risk of communicable disease after disaster – Persistence of many serious communicable disease	L2, L3 and L4	6
Module V DISASTER MANAGEMENT IN INDIA Study Of Seismic Zones; Areas Prone To Floods And Droughts, Landslides And Avalanches; Areas Prone To Cyclonic And Coastal Hazards With Special Reference To Tsunami - Rescue, Relief And Rehabilitation - National Disaster Policy Of India (Salient Features) - News Media In Disaster Management - Impact Of Media On Policy.	L2 and L3	6

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text Books:

- D.B.N. Murthy, Disaster Management: Text and Case Studies, Deep & Deep Publications Pvt. Ltd.
- Parag Diwan, “A Manual on Disaster Management”, Ritomate International, Noida Special Economic Zone, India.

Reference Books:

- White, Gilbert F. and J. Eugene Hass, 1975, Assessment of Research on Natural Hazards, Cambridge, the MIT Press, MA
- Alexander, D. Natural Disasters, ULC press Ltd, London, 1993.
- Carter, W. N. Disaster Management: A Disaster Management Handbook, Asian Development Bank, Bangkok, 1991.
- Chakrabarty, U. K. Industrial Disaster Management and Emergency Response, Asian Books Pvt. Ltd., New Delhi 2007.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	--	--	--	--	2	1	--	2	2	2	--	--	2	--	1
CO2	--	--	--	--	--	--	--	2	1	1	--	--	2	--	1
CO3	--	--	--	--	--	2	--	2	2	1	--	--	2	--	1
CO4	--	--	--	--	--	--	--	1	1	2	--	--	2	--	1
CO5	--	--	--	--	--	--	--	1	--	--	--	--	2	--	1

1: strongly related, 2: moderately related and 3: weakly related

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CIV4104	ENVIRONMENT IMPACT ASSESSMENT FOR CIVIL ENGINEERS	L	T	P	C
Version 2020.1	Date of Approval: 3rd June, 2020	3	1	0	4
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalogue Description:

This course introduces the methodology of environmental impact assessment (EIA) as a vital tool for sound environmental management and decision-making. The course provides an overview of the concepts, methods, issues and various forms and stages of the EIA process.

Course Objectives:

The objective of this course is to:

1. Explain the major principles of environmental impact assessment.
2. Understand the different steps within environmental impact assessment.
3. Different levels and systems of EIA are examined to highlight the diversity of approach and impact of the EIA process.

Course Outcomes:

On completion of this course, the students will be able to

CO1: Carry out scoping and screening of developmental projects for environmental and social assessments.

CO2: Explain different methodologies for environmental impact prediction and assessment.

CO3: Plan environmental impact assessments and environmental management plans.

CO4: Evaluate environmental impact assessment reports.

CO5: Able to access different case studies/examples of EIA in practice

Course Content

Modules	Blooms level*	Number of hours
Module I INTRODUCTION Impact of development projects under Civil Engineering on environment – Environmental Impact Assessment (EIA) - Environmental Impact Statement (EIS) – EIA capability and limitations – Legal provisions on EIA.	L1, L2 and L3	10
Module II METHODOLOGIES Methods of EIA – Check lists – Matrices – Networks – Cost-benefit analysis – Analysis of alternatives – Case studies.	L2 and L3	10
Module III PREDICTION AND ASSESSMENT Assessment of Impact on land, water and air, noise, social, cultural flora and fauna; Mathematical models; public participation – Rapid EIA.	L2, L3 and L4	10
Module IV ENVIRONMENTAL MANAGEMENT PLAN Plan for mitigation of adverse impact on environment – options for mitigation of impact on water, air and land, flora and fauna; Addressing the issues related to the Project Affected People – ISO 14000	L2, L3 and L4	10
Module V CASE STUDIES EIA for infrastructure projects – Bridges – Stadium – Highways – Dams – Multi-storey Buildings – Water Supply and Drainage Projects	L2 and L3	8

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text Books:

- Canter, R.L., “Environmental Impact Assessment”, McGraw Hill Inc., New Delhi, 1996.
- Shukla, S.K. and Srivastava, P.R., “Concepts in Environmental Impact Analysis”, Common Wealth Publishers, New Delhi, 1992.

Reference Books:

- John G. Rau and David C Hooten “Environmental Impact Analysis Handbook”, McGraw Hill Book Company, 1990.
- “Environmental Assessment Source book”, Vol. I, II & III. The World Bank, Washington, D.C., 1991.
- Judith Petts, “Handbook of Environmental Impact Assessment Vol. I & II”, Blackwell Science, 1999.


CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	1	--	1	1	--	--	--	--	--	--	--	2	3	--	1
CO2	--	--	--	2	--	1	1	2	--	--	--	--	3	--	1
CO3	2	--	--	--	--	--	--	--	--	--	--	--	3	--	1
CO4	--	--	1	1	--	--	--	2	--	1	1	--	3	--	1
CO5	--	--	--	1	--	--	--	2	--	1	1	--	3	--	1

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CIV4105	OPTIMIZATION AND QUANTITATIVE METHODS IN CIVIL ENGINEERING	L	T	P	C
Version 2020.1	Date of Approval: 3rd June, 2020	4	0	0	4
Pre-requisites/Exposure					
Co-requisites					

Catalogue Description

This course discusses about the basics of optimization, formulation of design problem and classification of optimization problems. It deals with various optimization techniques i.e. penalty function, Lagrange multipliers unconstrained minimization etc. and their applications in civil engineering. The different linear and Non-Linear programming techniques and their applications in civil engineering are also discussed.

Course Objectives

The objective of this course is to

1. Deal with different optimization methods Optimization to minimize the effort required or to maximize the desired benefit in design, construction and maintenance in civil engineering system.
2. Impart knowledge of Linear Programming, Non-Linear Programming and Dynamic Programming techniques with number of applications in civil engineering.

Course Outcomes

On completion of this course, the students will be able to

- CO1. Explain the concept of optimization and formulation of design problem.
CO2. Describe various optimization techniques and their application in civil engineering.
CO3. Analyze the problems related to Linear Programming and Algorithms.
CO4. Apply different Linear Programming applications in transportation, water resources, and structural and other optimization problems.

Course Content

Modules	Blooms level*	Number of hours
Module I: Introduction Introduction: Engineering application of Optimization, Formulation of design problems as mathematical programming problems, classification of optimization problems	L1, L2	10
Module II: Optimization Techniques Classical optimization, multivariable with no constraints, unconstrained minimization techniques, penalty function techniques, Lagrange multipliers and feasibility techniques. Linear Programming: Graphical method, Simplex method, Duality in linear programming (LP), Sensitivity analysis Applications in civil engineering;	L1, L2, L3	14
Module III: Non-Linear Programming Techniques/Method Unconstrained optimization, one dimensional minimization, golden section, elimination, quadratic and cubic, Fibonacci, interpolation, Direct search, Descent, Constrained optimization, Direct and indirect, Optimization with calculus, Khun-Tucker conditions.	L1, L2, L3, L4	14

Module IV: Applications Application of optimization techniques in Civil Engineering:	L1, L2, L3	10
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**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation*

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text Books

- S.S. Rao, Engineering Optimization: Theory and Practice, New Age International Pvt. Ltd., New Delhi, 2000.
- G. Hadley, Linear programming, Narosa Publishing House, New Delhi, 1990.

References

- H.A. Taha, Operations Research: An Introduction, 5th Edition, Macmillan, New York, 1992.
- K. Deb, Optimization for Engineering Design Algorithms and Examples, Prentice-Hall of India Pvt. Ltd., New Delhi, 1995.
- K. Srinivasa Raju and D. Nagesh Kumar, Multi criterion Analysis in Engineering and Management, PHI Learning Pvt. Ltd., New Delhi, India, 2010.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS O 1	PS O 2	PS O 3	PSO 4
CO 1	1	1	1	2	--	3	--	--	1	--	3	1	1	-	-	-
CO 2	1	--	1	--	--	--	3	--	2	-	3	1	1	-	-	-
CO 3	1	1	1	--	1	--	--	--	--	--	3	1	1	-	-	-
CO 4	1	1	1	2	1	--	--	--	--	--	3	1	1	-	-	-

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CIV4106	ADVANCED CIVIL ENGINEERING LAB	L	T	P	C
Version 2020.1	Date of Approval: 3rd June, 2020	0	0	2	1
Pre-requisites/Exposure					
Co-requisites					

Catalogue Description

In this lab course the various tests are conducted on different types of basic construction materials such as aggregate, sand, cement, admixtures. It also includes the tests on concrete design mix, different tests related to fresh and hardened state concrete with both destructive and non-destructive tests.

Course Objective

The objective of the course is to

1. Assure the quality and properties of materials that are to be used for the construction such as; sand, aggregates, cements, admixtures.
2. Strengthen the knowledge on construction materials, their utilization and related tests for concrete structure quality improvement, evaluation and its maintenance.

Course Outcomes

On the completion of this course, the student will be able to:

CO1. Perform the tests on various construction materials such as cement, aggregates, etc. to apply the results in the practical life.

CO2. Perform different tests on soil for knowing its properties & application construction for the quality assurance.

CO3. Convince on different tests required from environmental point of view.

CO4. Perform the various tests on which are non- destructive in nature.

Course Content

List of Experiments	Blooms level*	Number of hours
Module I: Specific gravity, Grain Size analysis, Crushing and Impact factor test	L1, L2, L3, L5, L6	6
Module II: Core cutter test and CBR	L1, L2, L3, L5, L6	6
Module III: Determination of pH value, conductivity, solids	L1, L2, L3, L5, L6	6
Module IV: Non -Destructive Testing of Concrete, Rebound Hammer, UPV Test, Rebar Locator	L1, L2, L3, L5, L6	6

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

References

- Relevant Indian Standards, ASTM Standards, BIS, ISO.
- IS: 456, IS: 383, IS: 2386, IS: 516, IS: 10262, etc.
- IS: 13311- part 1- 1992, IS: 13311- part 2- 1992

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Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination
Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	2	3	2	3	1	2	1	1	1	--	1	3	1	2	3
CO2	1	2	2	1	3	1	1	1	1	1	--	1	3	1	2	3
CO3	1	2	3	1	3	1	1	1	1	1	--	1	3	1	2	3
CO4	1	2	1	1	3	1	1	1	1	1	--	1	3	1	2	3

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CIV4201	RESEARCH METHODOLOGY AND TECHNICAL REPORT WRITING	L	T	P	C
Version 2020.1	Date of Approval: 3rd June, 2020	2	0	0	2
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalogue Description

This course deals with types of research, significance and characteristics and planning a research proposal, population and sample, parameter and statistic, sampling and data collection, sampling design: steps, types, sample size, sampling methods. It deals with univariate, bivariate and multivariate analysis, measure of dispersion of data, standard deviation, variance, coefficient of variation and degree of freedom. Hypothesis testing: parametric tests and non-parametric tests, regression analysis and curve fitting, method of least-squares, explained and unexplained variations, coefficient of correlation of determination. The course also deals with technical/scientific/research report writing referencing and bibliography and footnotes. Publication of research papers, citations, intellectual property rights and copy rights, plagiarism, patent and patent laws, commercialization and ethical issues.

Course Objectives

The objective of this course is to:

1. Deals with types of research, significance and characteristics and planning a research proposal and to enhance scientific and technical writing and research skills.
2. Impart knowledge about various stages of research process, statistical analysis and tools & their applications in decision making by hypothesis testing and regression analysis.
3. Deals with intellectual property rights and copy rights, plagiarism, patent and patent laws, commercialization and ethical issues.

Course Outcomes

On completion of this course, the students will be able to:

- CO1: Classify different research types; explain steps in research process and planning research proposal.
CO2: Describe sampling methods, sampling steps and design, carry out data processing and analysis.
CO3: Explain hypothesis testing, parametric and non-parametric tests, carry out regression analysis, curve fitting.
CO4: Demonstrate technical and scientific report writing skills, describe, plagiarism, patent laws and intellectual property rights.

Course Content

Modules	Blooms level*	Number of hours
Module I: Introduction and Research Planning Introduction to research: Definition, motivation, need, objectives, significance and characteristics of research; types of research; steps in research process; planning a research proposal; literature review, web searching.	L1, L2	4
Module II: Sampling Methods Measurement scales, population and sample, parameter and statistic, sampling and data collection, sampling design: steps, types, sample size, sampling methods, data processing and analysis. Sampling surveys and questionnaire designing, primary and secondary data.	L1, L2, L3	5
Module III: Hypothesis Testing and Regression Analysis Univariate, bivariate and multivariate analysis, means-arithmetic, geometric	L1, L3, L4	10

and harmonic; measure of dispersion of data, standard deviation, variance, coefficient of variation and degree of freedom. Hypothesis testing: kinds errors in hypothesis testing, significance and confidence levels, parametric tests and non-parametric tests, one-tailed and two-tailed tests, analysis of variance. Regression analysis and curve fitting, method of least-squares, explained and unexplained variations, coefficient of correlation of determination.		
Module IV: Technical Report Writing and Plagiarism Technical/scientific/research report writing: structure and components of scientific reports, formats of dissertations, research report, report writing skills, report preparation, referencing and bibliography and footnotes. Publication of research papers, citations, making presentation-use of visual aids and PPTs. Intellectual property rights and copy rights, plagiarism, patent and patent laws, commercialization and ethical issues.	L1, L3, L4	5

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books:

- Blake, G. and Bly, R.W. The Elements of Technical Writing. MacMillan, New York, 1993.
- Chawla, D and Sondhi, N. Research Methodology- Concepts and Cases. Vikas Publishing House PVT LTD. New Delhi, 2016.
- Kothari, C.R. Research Methodology- Methods and Techniques, 2nd.ed. New Age International Publishers, New Delhi. 2008.

Reference Books:

- Montgomery, Douglas C, Design and Analysis of Experiments, 5th Ed, Wiley India, 2005.
- Panneerselvam, R. 2009. Research Methodology, PHI Learning Pvt. Ltd., New Delhi, 2009.
- Ranjit Kumar 2009. Research Methodology- A step –by- step Guide for beginners, 2nd ed. Dorling Kindersley (India) Pvt. Ltd, Delhi, 2009.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance


CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO3	PSO4
CO1	1	1	2	2	3	-	-	-	-	-	-	1	3	1	2	-
CO2	1	3	1	3	3	-	-	-	-	-	-	1	3	1	2	-
CO3	1	3	1	-	-	-	-	-	-	-	-	1	3	3	2	-
CO4	1	3	2	-	3	-	-	-	-	-	-	1	3	1	2	3

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STE4201	STRUCTURAL DYNAMICS	L	T	P	C
Version 2020.1	Date of Approval: 3rd June, 2020	3	1	0	4
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalogue Description

Earthquake disaster is increasingly becoming global concern as it threatens the world's population, economy, and sustainable development. It is the responsibility of civil engineers to design and build earthquake resistant structures in order to minimize the risk due to earthquake. By reducing the losses of lives and properties, socio-economical sustainability can be easily achieved. This course offers the fundamental knowledge of the basic science of earthquakes and its effects on the natural and built environment. Concept and techniques of seismic analysis with respect to the various elements of the building would be discussed in detail along with the design principles and concept. The Indian code provisions will be kept in mind while considering the design aspects. To take all the above into consideration, the structural dynamics plays a very important role. Without understanding the dynamics of a structure, one cannot move further in designing for earthquake resistant structures.

Course Objectives

The objective of this course is to:

1. Analysis of structural members and systems subject to dynamic loads
2. Introduce the students with the deeper understanding of the dynamics of structures taking into consideration the single and multi-degree freedoms.
3. Understand and apply the knowledge of analysis on the basis of earthquake forces, wind forces and blast loading.

Course Outcomes

After completing the course, the students will be able to:

- CO1. Acquire the ability to analyze single and multi-degrees of freedom system of structures.
- CO2. Demonstrate in-depth knowledge of the discipline and build capability to apply that knowledge to structural dynamics
- CO3. Orient the students to high value research on structural dynamics and earthquake engineering so that they get impetus to pursue lifelong learning.
- CO4. Analyze earthquake generated forced on structures and evaluate their dynamical responses to earthquake.
- CO5. Comprehend and apply technical knowledge and leadership skills to structural dynamics related to building dynamics, wind loads, blast loads research and consultancy problems

Course Content

Modules	Blooms level*	Number of hours
Module I: Single Degree of Freedom Systems Differential equation of motion - D' Alembert's principle - Free vibration and forced vibration response - damped and undamped - evaluation of damping constants - vibration of machine foundation - vibration isolation - vibration measuring instruments. Response to general loading - pulse excitation - Duhamel Integral - Numerical methods - Newmark method.	L1, L2, L3, L4, L5	15
Module II: Multi-Degree of Freedom and Continuous Systems Two- and three-degree systems - solution of eigen value problem - Stodola's method - orthogonality conditions - Modal superposition method. Vibration analysis of continuous systems - simply supported	L1, L2, L3, L4, L5	9

beams - Effect of shear and rotary inertia - Timoshenko beam - Effect of axial loads.		
Module III: Analysis for Seismic Forces Concept of response spectrum - estimation of design forces of multistory buildings using Bureau of Indian Standards (BIS) codes - earthquake analysis of base isolated buildings.	L1, L2, L3, L4, L5	9
Module IV: Analysis for Wind Forces Wind effects on structures - static and dynamic - analysis for wind loads using BIS codes - quasi static method and gust factor method.	L1, L3, L4, L5	8
Module V: Blast Loading Blast loading - over ground and underground structures - design parameters - relevant BIS codes, case study.	L1, L2, L3	7

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

- Mario Paz, Structural Dynamics - Theory and Computations, 6th Edition, Pearson Education, New Delhi, 2005.
- Chopra A.K., Dynamics of Structures, 5th Edition, Pearson Education, Indian Branch, New Delhi, 2007.
- Clough & Penzien, Dynamics of Structures, 4th Edition, McGraw Hill, International Edition, New York, 2008.
- S. K. Duggal, Earthquake Resistant Design of structures, Oxford University Press, 1st edition, UK, 2012.
- Pankaj Agarwal and Manish Shrikhande, Earthquake Resistant Design of structures, Prentice Hall of India Pvt. Ltd, New Delhi, 2009.
- C.V.R. Murty, Earthquake Tips – Learning Earthquake Design and Construction, IIT Kanpur, Kanpur, 2009.
- IS: 1893 (Part-1) -2002. “Criteria for Earthquake Resistant – Design of structures.” B.I.S., New Delhi, 2002.
- IS:4326-1993, “Earthquake Resistant Design and Construction of Building”, Code of Practice B.I.S., New Delhi, 1993.
- IS:13920-1993, “Ductile detailing of concrete structures subjected to seismic force” – Guidelines, B.I.S., New Delhi, 1993.

Reference Books

- T. Paulay and M.J.N. Priestly, Masonry and Timber structures including earthquake Resistant Design –Anand S.Arya, Nemchand & Bros, Roorkee, 1999.
- Roy R Craig, Jr., Structural Dynamics, John Wiley & Sons, New York, 1981.
- Seismic Design of Reinforced Concrete and Masonry Building, John Wiley & Sons, New York, 2002.
- Earthquake –Resistant Design of Masonry Building –Miha Tomazevic, Imperial college Press, UK, 2009.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination


Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance



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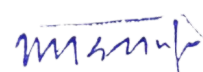
CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	2	2	3		--	--	--	--	--	--	1	1	2	1	2
CO2	1	2	1	3	2	--	--	--	--	--	--	1	2	2	1	1
CO3	1	2	---	3		--	--	--	--	--	--	1	1	2	1	2
CO4	1	2	--	3		--	--	--	--	--	--	1	--	2	1	3
CO5	2	3	--	1	2	--	--	--	--	--	--	1	1	2	1	2

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STE4202	ADVANCED STEEL DESIGN	L	T	P	C
Version 2020.1	Date of Approval: 3rd June, 2020	4	0	0	4
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

Advanced Steel Design includes the design of steel members and their connections. Different methods of design will be briefly described before introducing the limit states of collapse and serviceability. It also includes the fundamentals of the integrated systems of steel bridges, bunkers, silos. The design will be done as per IS 800:2007.

Course Objectives

The objectives of the course are

1. Provide design concept for steel as a structural member using Limit state Design.
2. Impart knowledge about connections of the steel members.

Course Outcomes

After completing the course, the students will be able to:

CO1: Explain the various types of connections and calculate the strength of connections.

CO2: Describe the different types of connections (shear and moment).

CO3: Explain different types of loads on roof trusses and design the roof supporting members.

CO4: Design for various components of truss bridges.

CO5: Explain the design of bunkers and silos.

Course Content

Modules	Blooms level*	Number of hours
Module I: Connections Riveted connections, Bolted Connections, Load Transfer Mechanism, Failure of Bolted Joints, Specifications for Bolted Joints, Bearing ,Type Connections, Tensile Strength of Plate ,Strength and Efficiency of the Joint, Combined Shear and Tension, Slip ,Critical Connections, Praying Action, Design of Groove welds, Design of Fillet Welds, Design of Intermittent fillet welds, Failure of Welds.	L1, L2, L3	10
Module II: Beam-Column Connections Introduction, Beams-Column Connections, Connections Subjected to Eccentric Shear, Bolted Framed Connections, Bolted Seat Connections, Bolted Bracket Connections. Bolted Moment Connections, Welded Framed Connections, Welded Bracket Connections, Moment Resistant Connections.	L1, L2, L3	10
Module III: Loads on Roof Structure. Dead loads, live loads and wind loads on roofs. Design wind speed and pressure, wind pressure on roofs; wind effect on cladding and louvers; Design of angular roof truss, tubular truss, truss for a railway platform. Design of purlins for roofs, design of built up purlins, Design of bracings.	L1, L2, L3	10
Module IV: Design of Truss Bridge Types of truss bridges, component parts of a truss bridge, economic proportions of trusses, self-weight of truss girders, design of bridge compression members, tension members; wind load on truss girder	L1, L2	10

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bridges; wind effect on top lateral bracing; bottom lateral bracing; portal Bracing; sway bracing.		
Module V: Bunkers and Silos Design of Steel Bunkers and Silos: Introduction, Jaisan's Theory Airy's Theory, Design of Parameters, Design Criteria, Analysis of Bins, Hopper Bottom, Design of Bins.	L1, L2, L3	08

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

- Duggal. S.K, Design of steel structures ,3rd Edition, Tata McGraw Hill, New Delhi, 2009.
- Subramanian.N, Design of Steel Structures, Oxford University Press, New Delhi, 2008.
- Negi,L S, Design Of Steel Structures, Tata McGraw Hill, New Delhi, 2003.

Reference Books

- Punmia, B C, Design of Steel Structures, Luxmi Publications, New Delhi, 2013.
- Dayaratnam.P, Design of Steel Structures, (Wheeler), New Delhi, 1998.
- Raghupathi.M, Design of Steel Structures, Tata McGraw Hill, New Delhi, 1985.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	1	1	2	--	3	--	--	1	--	1	2	2	1	1	2
CO2	1	--	1	--	--	--	3	--	2	2	1	2	2	1	1	2
CO3	1	1	1	--	1	--	--	--	--	--	1	1	2	1	1	2
CO4	1	1	1	2	1	--	--	--	--	--	1	1	2	1	1	2
CO5	1	2	1	3	2	--	--	--	--	--	--	1	2	1	1	2

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STE4204	DESIGN OF INDUSTRIAL STRUCTURES	L	T	P	C
Version 2020.1	Date of Approval: 3rd June, 2020	3	1	0	4
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

The course includes the analysis & design industrial structures. The special types of designs such as silos, bunkers, cooling towers, large span roofs, etc. are also part of this course.

Course Objectives

The objectives of this course to:

1. Provide concept for planning of industrial structures and types of loads acting on the industrial structures.
2. Impart knowledge of the design concepts applied for industrial building design.

Course Outcomes

After completing the course, the students will be able to:

CO1: Explain the planning of industrial structures & carry out plastic design of structural elements.

CO2: Explain the analysis and design concepts of industrial buildings and storage structures.

CO3: Analyze and design of space structures

CO4: Analyse earthquake and wind generated forces on Aluminium Structures and evaluate their responses.

Course Content

Modules	Blooms level*	Number of hours
Module I: Planning of Industrial Structures Review of Plastic Design: Concept of minimum weight design. Design of Industrial Building Planning of industrial structures. Crane girders & columns, Analysis of trussed bents, Design of industrial frame.	L1, L2, L3	12
Module II: Design of Storage Structures Bunkers and silos. Pressure vessels and chimneys.	L1, L2, L3	10
Module III: Design of Space Structures Transmission towers, Steel domes, Pre-cast building components. Design using Light Gauge Sections: Structural use of pressed sections and light gauge sections, Aluminum as a material of construction for industrial structures and design of such structures, Tubular structures and Sandwich plate construction.	L1, L2, L3	13
Module IV: Aluminum Structures Introduction, Permissible stresses, Tension members, Compression members, Design of beams, Local buckling of compression elements, Riveted and bolted construction, Design of chimneys, Load analysis, Design of steel supporting chimney, Chimney foundation. Construction Practices: Shop practice in steel construction, Fabrication erection and production, Case study based. Structural aspects of machine foundations.	L1, L2, L3	13

*Bloom's Level:

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

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Text Books

- Ajmani, A. L. and Arya, A.S., Design of Steel Structures, Nem Chand and Brothers, New Delhi, 2000.
- Dunham, C.W., Planning of Industrial Structures, John Wiley and Sons, New Delhi, 2001.

Reference Books

- Gary, W., Steel Designer's Manual, Prentice Hall, New Delhi, 2008.
- Glower, F., Structural Pre-cast Concrete, Oxford Publishers, New Delhi, 2008.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination**Examination Scheme**

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	2	2	3		--	--	--	--	--	--	1	2	1	1	2
CO2	1	2	1	3	2	--	--	--	--	--	--	1	2	1	1	2
CO3	1	2	---	3		--	--	--	--	--	--	1	2	1	1	2
CO4	1	2	--	3		--	--	--	--	--	--	1	2	1	1	2

1: strongly related, 2: moderately related and 3: weakly related



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STE4212	ADVANCED STRUCTURAL ANALYSIS	L	T	P	C
Version 2020.1	Date of Approval: 3rd June, 2020	3	1	0	4
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

Course extends the basic stiffness method of analysis developed in the pre-requisite courses. Fundamental principles of the stiffness method of analysis, with automatic assembly of the stiffness matrix for rigid jointed plane frames and space structures, are presented in some detail. Elastic instability of frames and the design of continuous steel beams and portal frames using plastic methods will be undertaken.

Course Objectives

The objective of this course is to:

1. Equip students with fundamental principles of the stiffness method of analysis
2. Impart knowledge of matrix methods to analysis grids, trusses and frames.

Course Outcomes

After completing the course, the students will be able to:

- CO1. Explain the basic concepts of matrix methods
- CO2. Describe the concept of stiffness matrix and their application to beams.
- CO3. Explain the analytical procedure for rigid frames using matrix methods.
- CO4. Determine the displacements in the grids using matrix methods.
- CO5. Explain the application of matrix approach on trusses.

Course Content

Modules	Blooms level*	Number of hours
Module I: Introduction to Matrix Method Introduction: Matrix Methods of Analysis of Structures, Degrees of freedom, Analysis of indeterminate structures: Force methods and Displacement Methods. Matrix concepts and Matrix analysis of structures: matrix, vectors, displacement and force transformation matrices, Element and structure flexibility matrices; equivalent joint loads; stiffness and flexibility approaches.	L1, L2, L3,	12
Module II: Stiffness Matrix The Matrix Displacement Approach: Beams- Introduction. Stiffness Matrix of a Bar Element subjected to Axial Force. Co-ordinate Transformations. Global Stiffness Matrix. Application to Pin-Jointed Frames. Stiffness Matrix of a Beam Element. Beam element stiffness. Application to Continuous Beams.	L1, L2, L3	10
Module III: Rigid Frames Matrix Analysis of Rigid Frames: Matrix displacement method vs slope deflection method, analysis of rigid frames with and without side sway, analysis of rigid framed for yielding of supports.	L1, L2, L3	8

Module IV: Grids Matrix Analysis of grillage or grid: Introduction, torsional stiffness of grid element and advantage of torsion release, Matrix Displacement Analysis of Grillage or Grid. Co-ordinate Transformations. Element Stiffness Matrix & its Application	L1, L2,	10
Module V: Trusses Matrix Analysis of Space Trusses & Frames: Co-ordinate Transformations. Application to Space Trusses & Space Frames, Analysis by conventional stiffness method (four degree of freedom per element) and reduced element stiffness method (single degree of freedom), Analysis by flexibility method	L1, L2, L3	8

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

- Pandit GS, Gupta SP, Structural Analysis: a matrix approach, Tata McGraw-Hill Publishing Co. New Delhi, 2011
- Menon D Advanced Structural Analysis, Narosa Publishing House, New Delhi 2009.
- Kanchi, Matrix Structural Analysis, Wiley Eastern Ltd., New Delhi 1981.

Reference Books

- Jain AK, Advanced Structural Analysis, New Channel Brothers, New Delhi, 2008.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O 1	PS O 2	PS O 3	PS O 4
CO 1	1	1	1	2	--	3	--	--	1	--	1	2	2	1	1	2
CO 2	1	--	1	--	--	--	3	--	2	2	1	2	2	1	1	2
CO 3	1	1	1	--	1	--	--	--	--	--	1	1	2	1	1	2
CO 4	1	1	1	2	1	--	--	--	--	--	1-	1	2	1	1	2
CO 5	1	1	1	--	1	--	--	--	--	--	1	1	2	1	1	2

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STE4208	ADVANCED BRIDGE DESIGN	L	T	P	C
Version 2020.1	Date of Approval: 3rd June, 2020	3	1	0	4
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalogue Description

Bridges are a very important part of a nation's transportation infrastructure. Proper planning, design and construction, as well maintenance, are of utmost importance. In general, engineers will benefit from exposure to sophisticated bridge typologies and construction practices, as well as the assessment of the existing bridges. This course will extend the concepts and methodologies given in bridge engineering courses to cover the design of medium- and long-span road bridges, which can be optimized in terms of load-carrying capacity, durability, and ease of construction and maintenance.

Course Objectives

The objective of this course is to:

1. Acquire knowledge about the purpose and design of the various kinds of bridges which are used in day-to-day life.
2. Study the loads, forces on bridges and design of several types of bridges.
3. Develop an understanding of and appreciation for basic concepts in proportioning and design of bridges in terms of aesthetics, geographical location and functionality, sizing of bridge elements, i.e. develop a clear understanding of conceptual design.
4. Exposure to the state-of-the-art practices in the international level expected to challenge the students to think beyond conventional design and implement optimized solutions that can compare with the best bridges in the world.

Course Outcomes

After completing the course, the students will be able to:

- CO1: Apply knowledge of mathematics, science and engineering to understand the various types of bridges and its loadings and forces.
- CO2: Design the bridges to meet desired needs such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.
- CO3: Design different types of RCC bridges, steel bridges, riveted and welded plate girder bridges and pre-stressed concrete bridges with the bearings and substructures.
- CO4: Design and analysis of slab culverts, T-beam and slab bridges
- CO5: Design and analysis of continuous, box girder and cantilever bridges

Course Content

Modules	Blooms level*	Number of hours
Module I: Concrete Bridges Introduction-types of Bridges-economic span length-Types of loading-Dead load live load-Impact Effect-Centrifugal force-wind loads-Lateral Loads-Longitudinal Forces-Seismic loads- Frictional resistance of expansion bearings-Secondary Stresses-Temperature Effect-Erection Forces and effects-Width of roadway and footway-General Design Requirements.	L1, L2, L3	10
Module II: Analysis and Design of Bridges Load distribution theories, analysis and design of slab culverts, tee beam and slab bridges.	L2, L3, L4, L5	9

Module III: Design of Continuous, Box Girder and Cantilever bridges Design principles of continuous bridges, box girder bridges, balanced cantilever bridges.	L2, L3, L4, L5, L6	9
Module IV: Design of Pre-Stressed Bridges: Flexural and torsional parameters – Courbon's theory – Distribution coefficient by exact analysis – Design of girder section – maximum and minimum pre-stressing forces – Eccentricity – Live load and dead load shear forces – Cable Zone in girder – check for stresses at various sections – check for diagonal tension – Diaphragms – End block – short term and long term deflections.	L1, L2, L3, L4	10
Module V: Design and Analysis of Plate Girder Bridges and Their Foundation Design of riveted and welded plate girder bridges for highway and railway loading – wind effects – main section, splicing, curtailment, stiffeners – Different types of bearings – Design of bearings – Design of masonry and concrete piers and abutments – Types of bridge foundations – Design of foundations.	L1, L2, L3, L4, L5, L6	10

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

- Johnson Victor, D. Essentials of Bridge Engineering, Oxford and IBH Publishing Co. New Delhi, 1990
- Jagadeesh. T.R. and Jayaram. M. A. Design of Bridge Structures, Prentice Hall of India Pvt. Ltd. New Delhi, 2004.
- Raina V.K. Concrete Bridge Practice, Tata McGraw Hill Publishing Company, New Delhi, 1991.
- Ponnuswamy, S., Bridge Engineering, Tata McGraw Hill, New Delhi, 2008.

Reference Books

- Derrick Beckett, An introduction to Structural Design of Concrete Bridges, Surrey University Press, Henley Thames, Oxford Shire, 1973.
- Taylor, F.W., Thomson, S.E., and Smulski E., Reinforced Concrete Bridges, John Wiley and Sons, New York, 1955.
- Bakht, B. and Jaegar, L.G., Bridge Analysis Simplified, McGraw Hill, New York, 1985.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	2	2	3		--	--	--	--	--	--	1	1	1	3	2
CO2	1	2	1	3	2	--	--	--	--	--	--	1	2	1	3	1
CO3	1	2	---	3		--	--	--	--	--	--	1	2	1	3	1
CO4	1	2	1	3	2	--	--	--	--	--	--	1	2	1	1	3
CO5	1	2	---	3	--	--	--	--	--	--	--	1	2	1	3	1

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STE4211	ADVANCED CONCRETE DESIGN	L	T	P	C
Version 2020.1	Date of Approval: 3rd June, 2020	4	0	0	4
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalogue Description

The course advanced concrete design is to introduce engineering students to the advanced methods used for concrete structural design in designing the large complex structural elements. With this the students will be able to design and analyse the various components/ members of the reinforced concrete structure. The principle is based on the development of student's ability to analyse and design involve in the construction of reinforced concrete structural members. This course involves the fundamentals of mathematics, physics, engineering mechanics and strengthen the basics of RCC structure design course also, so that to help in experiencing complex structural elements in the real construction field.

Course Objectives

The objective of this course is to:

1. Comprehend the knowledge in advanced concept of reinforced concrete structural design of different complex RCC structure.
2. Develop analytical and design skill in the field of design large RCC members construction projects.

Course Outcomes

On completion of this course, the students will be able to

CO1: Analyse and design the high-grade moment resisting complex structural RCC elements.

CO2: Apply various principal criteria, assumptions and design procedure followed in the concrete complex flat slab structural elements, their effect due to shear and moment distribution with columns.

CO3: Comprehend, Apply and Inculcate in dimensioning and designing of different types of load carrying sub-structure, their designing criteria and principles related to structural stability.

CO4: Develop the idea regarding the analysis and design of compression carrying member in different types of loading conditions which are mostly encountered in natural real scale construction.

CO5: Define the concept of yield-line theory of shear and moment carrying structural element which are mostly encountered in natural real situation regarding the behavior after yielding using different post-failure theories.

Course content

Modules	Blooms level*	Number of hours
Module I: Design of Deep Beams and Corbels Steps of Designing Deep Beams, Design by IS 456, Checking for Local Failures, Detailing of Deep Beams, Analysis of Forces in a Corbels, Design of Procedure of Corbels	L1, L2, L3, L4, L5, L6	9
Module II: Design of Flat Slabs Flat slabs: Direct design method – Distribution of moments in column strips and middle strip-moment and shear transfer from slabs to columns – Shear in Flat Slabs-Check for one way and two-way shears - Introduction to Equivalent frame method. Limitations of Direct design method, Distribution of moments in column strips and middle strip	L1, L2, L3, L4, L5, L6	10
Module III: Design of Foundations Basic philosophy of foundation design, raft foundations, pile foundations & well foundation, combined footings.	L1, L2, L3, L4, L5, L6	9

Module IV: Design of Compression Members and Shear Walls Estimation of effective length of a column-Code requirement on Slenderness Limits, Design of Short Columns under Axial Compression, Design of Short Columns with Uniaxial Bending, Design of Short Columns under Biaxial Bending, Design of Slender Columns. Design of shear walls and reinforcement in walls.	L1, L2, L3, L4, L5, L6	10
Module V: Yield Line Theory Introduction, assumptions, location of yield lines, method of analysis, analysis of one way and two-way slabs, effect of top corner steel in a square slab, examples.	L1, L2, L3, L4, L5, L6	10

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

- N. Krishna Raju, Pre-stressed concrete, Tata McGraw Hill, New Delhi, 2000
- T.Y. Lin, Ned H. Burns, Design of Pre-stressed Concrete Structures, John Wiley & Sons, New York, 2004.
- R. Rajagopalan, Pre-stressed Concrete, Narosa publishers, New Delhi, 2004.
- S.U. Pillai and D. Menon, Reinforced Concrete Design, Tata McGraw-Hill, 3rd Ed, New Delhi, 1999
- P.C. Varghese, Advanced Reinforced Concrete Design, Prentice Hall of India, 2nd Ed, New Delhi, 2000.
- B.C. Punmia, Ashok Kumar Jain and Arun Kumar Jain, Reinforced concrete structures, Vol.1, Laxmi Publications, New Delhi, 2004.

Reference Books

- IS 456: 2000 – Plain and Reinforced Concrete – Code of Practice, Bureau of Indian Standards, New Delhi, 2000.
- SP 16: 1987 – Handbook of Concrete reinforcement and Detailing, Bureau of Indian Standards, New Delhi, 1987.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	1	1	1	1	1	3	1	3	2	3	1	1	1	1	3
CO2	1	1	1	1	1	1	3	1	3	2	3	1	1	1-	1	3
CO3	1	1	2	1	1	1	3	1	3	2	3	1	1	1	1	3
CO4	1	1	1	1	1	1	3	1	3	2	3	1	1	1	1	3
CO5	1	1	1	1	1	1	3	1	3	2	3	1	1	1	1	3

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STE4213	FINITE ELEMENT METHOD	L	T	P	C
Version 2020.1	Date of Approval: 3rd June, 2020	3	1	0	4
Pre-requisites/Exposure					
Co-requisites					

Catalogue Description

The Finite Element Method (FEM) is widely used in industry for analyzing and modelling structures and continua, whose physical behaviour is described by ordinary and partial differential equations. The FEM is particularly useful for engineering problems that are too complicated to be solved by classical analytical methods. The main objective of this course is to introduce the mathematical concepts of the FEM for obtaining an approximate solution of ordinary and partial differential equations.

Course Objectives

The objective of this course is to:

1. Deal real world problem and try to describe it with partial differential equations which might not have an exact solution.
2. Comprehend a complex problem to break down the problem into smaller elements (discretization) and apply over these smaller finite domains.
3. Formulated into matrix form, collected together and solved for unknown values using boundary conditions. The unknown values are then further used to approximate other quantities.

Course Outcomes

On completion of this course, the students will be able to

- CO1. Define the various complex areas of complex engineering problems and different constitutive relation.
- CO2. Comprehend the energy relationship and finding numerical techniques by dividing the continuum in to elements to find the stress-strain relationship in elemental stiffness matrix. Realize the concept of nodes and elements.
- CO3. Comprehend and the problems of two dimensional isoperimetric elements four noded quadrilateral elements. Enlighten the fundamental ideas of FEM for such elements.
- CO4. Develop the finite element model concept for structures in assemblage of elements through direct stiffness method and special characteristics of stiffness matrix.
- CO5. Comprehend and define the concept for the analysis of framed structures, 2D truss element, 2D beam element, plate bending elements.

Course Contents

Modules	Blooms level*	Number of hours
Module I: Introduction to FEM Basic idea of FEM. Applications and importance of FEM. Differential equilibrium equations - strain displacement relation - linear constitutive relation - special cases- Principle of stationary potential energy - application to finite element methods. Some numerical techniques in finite element analysis	L1, L2	9
Module II: Displacement Models Displacement models - convergence requirements. Natural coordinate systems – Shape function. Interpolation function- Linear and quadratic elements - Lagrange & Serendipity elements- Strain displacement matrix -	L1, L2, L4	9

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element stiffness matrix and nodal load vector		
Module III: 2-D analysis and modeling Two dimensional isoparametric elements - Four noded quadrilateral elements – triangular elements- Computation of stiffness matrix for isoparametric elements - numerical integration (Gauss quadrature) - Convergence criteria for isoparametric elements.	L1, L2, L4	10
Module IV: Different methods in FEM Assemblage of elements –Direct stiffness method - Special characteristics of stiffness matrix - Boundary condition & reaction - Gauss elimination and LDLT decomposition- Basic steps in finite element analysis.	L1, L2, L3, L4, L5	10
Module V: Analysis of framed structures Analysis of framed Structures- 2D truss element - 2D beam element. Analysis of plate bending: Basic theory of plate bending - displacement functions - plate bending Elements. Plane stress and plane strain analysis: Triangular elements - Rectangular elements	L1, L2, L3, L4, L5, L6	10

Course Content

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

- Cook, R.D., Malkus, D.S. and Plesha, M. E., Concepts and Applications of Finite Element Analysis, John Wiley & Sons, 2015.
- Zienkiewicz, O.C., Finite element Methods, John Wiley & Sons, 2015.
- Krishnamoorthy, C.S., Finite element analysis, theory and programming, Tata McGraw Hill, New Delhi, 2016.

References

- Patila, T.C. and Belugunudu, Introduction to Finite element Method, Prentice hall, New York, 2011.
- Reddy, J.N., Introduction to Finite element Method, Tata McGraw Hill, New Delhi, 2016.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
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CO2	1	1	1	1	1	1	3	2	1	1	2	1	3	2	1	3
CO3	1	1	1	1	1	1	3	2	1	1	2	1	3	2	1	3
CO4	1	1	1	1	1	1	3	2	1	1	2	1	3	2	1	3
CO5	1	1	1	1	1	1	3	2	1	1	2	1	3	2	1	3

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CME4201	ADVANCES IN CONSTRUCTION PRACTICES AND MACHINERY	L	T	P	C
Version 2020.1	Date of Approval: 3rd June, 2020	3	1	0	4
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalogue Description

The course covers selection of equipment, factors affecting selection of equipment and methods technical and economic; Construction engineering fundamentals; Methods and equipment for Earthmoving, Pile driving and dewatering. This course would help to use new and improved technology in construction and therefore be economically benefiting the builders and contractors.

Course Objectives

The objective of this course is to:

1. Comprehend the proper selection of construction equipment used in the field of Civil engineering construction sectors.
2. Development of ideas regarding construction methods and equipment used in Civil engineering.

Course Outcomes

On completion of this course, the students will be able to:

- CO1: Develop the knowledge based on selection of appropriate construction equipment as per their construction activity.
- CO2: Describe the process of manufacturing of basic construction equipment.
- CO3: Explain the concept of pile driving and dewatering system.
- CO4: Comprehend the selection of construction equipment for the tunnel.

Course Content

Modules	Blooms level*	Number of hours
Module 1: Selection of Equipment Selection of equipment-factors affecting- relative advantages and disadvantages-technical and economic aspects.	L1, L2, L3	12
Module II: Construction Engineering Fundamentals Analysis of production outputs and costs. Characteristics and performance of various equipment used in construction practices. Uses, advantages and disadvantages of various construction equipment	L1, L2, L3	12
Module III: Erection and Material Transport Equipment Erection and material transport equipment's- their performance advantages-pile driving-dewatering.Low Strain Dynamic Pile Testing/ Pile Integrity Testing (PIT),High Strain Dynamic Pile Testing (HSDT) / Pile Driving Monitoring	L1, L2, L3	12
Module IV: Performance of Equipment Study of performance of equipment used for concrete construction including batching and mixing units-equipment used for tunneling.	L1, L2, L3	12

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

- Peurifoy, R.L., Ledbetter, W.B and Schexnayder, Construction planning and equipment methods, 5th Edition, McGraw Hill, Singapore, 1995.

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- Sharma S.C. Construction equipment and management, Khanna publishers, New Delhi, 2011.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

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Weightage (%)	5	10	8	7	70

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CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	1	--	2	--	--	--	--	--	--	--	--	-	1	2	3
CO2	1	1	1	1	2	-2	1	--	2	2	--	--	--	1	2	2
CO3	1	2	2	2	3	--	--	--	--	--	--	--	--	1	2	3
CO4	1	2	2	--	--	2	1	--	--	--	--	--	--	1	1	2

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CME4203	BUILDING SERVICES & MAINTENANCE MANAGEMENT	L	T	P	C
Version 2020.1	Date of Approval: 3rd June, 2020	3	1	0	4
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalogue Description

This course discusses about components of urban forms and their planning, Functional planning of buildings, optimization of space: Spatial Synthesis graphical techniques. Engineering services in a building as a system are also the part of this course.

Course Objectives

The objective of this course is to:

1. Impart knowledge about the various components of the urban planning, the services related to the buildings such as MEP.
2. Provide the understanding of the building maintenance and its management.

Course Outcomes

After completing the course, the students will be able to:

- CO1: Explain the various steps for planning of residential building.
CO2: Describe the applications of engineering services.
CO3: Explain the concept members of prefabrication systems in buildings.
CO4: Describe the maintenance processes for residential buildings economically.

Course Content

Modules	Blooms level*	Number of hours
Module I: Planning of Residential Building Components of urban forms and their planning. Concepts of neighborhood unit. Street system and layout in a neighborhood. Functional planning of buildings, optimization of space: Spatial Synthesis graphical techniques, heuristic procedures, formulation of linear and non-linear optimization problem. Space requirements and relationships for typical buildings, like residential offices, hospitals, etc.	L1, L2, L3	10
Module II: Engineering Services Standard fire, fire list, fire resistance, classification of buildings, means of escape, alarms, etc. Lightning protection of buildings, Engineering services in a building as a system. Lifts, escalators, cold and hot water systems, wastewater systems, and electrical systems	L1, L2	10
Module II: Prefabrication Prefabrication systems in residential buildings: Planning and modules and sizes of components in prefabrication, Earthquake resistant structures - Air-conditioning and heating - Acoustics and Sound insulation.	L1, L2, L3	8
Module IV: Maintenance Building Maintenance: Scheduled and contingency maintenance planning. M.I.S. for building maintenance. Maintenance standards. Economic maintenance decisions.	L1, L2	8

*Bloom's Level:

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

- R. G. Hopkinson and J. D. Kay, The Lighting of buildings, Faber and Faber, London, 1969
- Hand book for Building Engineers in Metric systems, NBC, New Delhi, 1968
- Philips Lighting in Architecture Designs, McGraw Hill, New York, 1964
- Time saver Standards for Architecture Design Data, Callendar JH, McGraw Hill, New Delhi, 1974
- William H. Severns and Julian R. Fellows, Air conditioning and refrigeration, John Wily and sons, New Delhi, 2011

Reference Books

- Arora and Bindra, Building Construction, Dhanpat Rai, New Delhi, 2012.
- Hand Book of Housing Statistics, NBO, New Delhi, 2003.
- National Building Code of India, Bureau of Indian Standards, New Delhi, 2005.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	1	1	2	--	3	--	--	1	--	1	2	2	1	1	2
CO2	1	--	1	--	--	--	3	--	2	2	1	2	2	1	1	2
CO3	1	1	1	--	1	--	--	--	--	--	1	1	2	1	1	2
CO4	1	1	1	2	1	--	--	--	--	--	1	1	2	1	1	2

1: strongly related, 2: moderately related and 3: weakly related



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CME4204	SYSTEMS DESIGN AND VALUE ANALYSIS	L	T	P	C
Version 2020.1	Date of Approval: 3rd June, 2020	3	1	0	4
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

This course introduces the students to the concepts and skills of system analysis and design. It includes expanded coverage of data flow diagrams, data dictionary, and process specifications.

Course Objectives

The objective of this course is to:

1. To impart the knowledge about the system design procedure and the value savings during the construction.
2. Provide a solid foundation of systems principles and an understanding of how business function, while heightening students to the issue's analysts face daily.
3. Help the students in management of various resources.

Course Outcomes

After completing the course, the students will be able to:

- CO1: Explain the principles and tools of systems analysis and design.
- CO2: Solve a wide range of problems related to the analysis, design and construction of information systems, value analysis and job plans.
- CO3: Explain the professional and ethical responsibilities of practicing the value management and valuation by understanding the need for quality.
- CO4: Plan and undertake a major individual project, prepare and deliver coherent and structured verbal and written technical valuation reports.

Course Content

Modules	Blooms level*	Number of hours
Module I: Analysis and Appraisal Analysis synthesis, Appraisal, System design procedure, objectives and constraints, application to buildings.	L1, L2, L3	12
Module II: Introduction to Value Analysis 10 Commandments of value analysis; value analysis team; principles of value analysis, elements of a job plan viz. orientation, Information, presentation. Implementation follow up action, benefits of value analysis, various applications; assessing effectiveness of value analysis, function analysis, Life cycle costing: Life cycle costing – Forecasting of capital as well as operating & maintenance costs, time value, present worth analysis, DCF methods, ROR analysis, sensitivity analysis. Different methods of performing value engineering.	L1, L2, L3, L4, L5	12
Module III: Value Management and Valuation Job plan. Value savings during construction. Value management. Valuation: Types of value, purposes of valuation factors affecting value. Different methods of valuation for different types of assets such as land and building, horticulture, historical places.	L1, L2, L3, L4	12
Module IV: Valuation Report Valuation Report, contents, standard formats, Case study of any one Report.	L1, L2, L5, L6	12

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

- Keith F. Potts, Construction Cost Management: Learning from Case Studies, Taylor & Francis, UK, 2007.
- Hojjat Adeli, Asim Karim, Asim Salimul Karim, Construction Scheduling, Cost Optimization and Management, Taylor & Francis, UK, 2001.
- K. K. Chitkara, Construction Project Management: Planning, Scheduling and Controlling, Tata McGraw-Hill Education, New Delhi, 2002.
- P.T. Joglekar, Practical Information for Quantity Surveyors, Property valuers, Architects Engineers and Builders, Pune Vidyarthi Griha Prakashan, Pune, 2008.

Reference Books

- Panagiota E. Paraoulaki, Value Engineering and Its Application to the Construction Industry, Massachusetts Institute of Technology, Department of Civil and Environmental Engineering, Massachusetts, 2000.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	2	2	3	--	--	--	--	--	--	--	1	1	2	--	3
CO2	1	2	1	3	2	--	--	--	--	--	--	1	2	1	--	1
CO3	1	2	--	3	--	--	--	--	--	--	--	1	2	--	1	3
CO4	1	2	--	3	--	--	--	--	--	--	--	1	3	1	2	1

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CME4207	RELIABILITY ANALYSIS IN CONSTRUCTION MANAGEMENT	L	T	P	C
Version 2020.1	Date of Approval: 3rd June, 2020	3	1	0	4
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalogue Description

This course is mainly focused to explain the theories and applications of reliability analysis of structural systems having uncertainty and/or exposed to random environment. The course introduces basic concepts of probability theory at the beginning which is followed by the Level-2 reliability methods. With these knowledges of reliability analysis in hand, the course then aims to explain the applications of these methods for code calibrations and reliability analysis under multiple failure modes (i.e. system reliability). Even the reliability-based design and structural detailing is discussed in this course.

Course Objectives

The objective of this course is to:

1. Ability to understand and learn the probability theories, the resistance distribution parameters and the reliability methods which can be put to use in construction engineering and management.
2. Explain the applications of various reliability methods for code calibrations and reliability analysis under multiple failure modes (i.e. system reliability).
3. Develop the skills of the students to take this subject for further research.
4. Help the practicing engineers to use the advanced design concepts in their profession, as major emphasis is given to the applications in this course.

Course Outcomes

After completing the course, the students will be able to:

CO1: Apply the statistical methods in construction and technology field.

CO2: Acquire knowledge about the concept of reliability, its methods and reliability-based design.

CO3: Use the mathematical models based on probabilistic and statistical methods, simulation in risk identification, analysis and mitigation of project risks.

CO4: Imbibe the knowledge and understanding of the system reliability, modeling of structural systems as well as the application of reliability analysis for R.C.C. and steel frames.

Course Content

Modules	Blooms level*	Number of hours
Module I: Probability Theory Mutually exclusive events, set theory, sample points and sample space, laws of probability, total probability theorem, Baye's rule, random variables-discrete and continuous, jointly distributed discrete variables, marginal distribution, conditional distribution, jointly distribution continuous variables, functions of random variables, moments and expectations, common probability distribution normal. Lognormal, Gamma and Beta distribution, external distribution	L1.L2, L3, L4	12
Module II: Resistance Distribution and Parameters Statistics of properties of concrete and steel, Statistics of strength of bricks and mortar, Characterization of variables, allowable stresses based on specified reliability. Monte Carlo Study of Reliability: Monte Carlo Method Inverse transformation technique. Application to columns beams and frames.	L2, L3, L4, L5	12
Module III: Reliability Methods	L2, L3,	12

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Basic variables and failure surface, first order second moment methods, Hasofer and Lind's method, Non-normal distributions; determination of reliability index B of structural elements.	L4	
Module IV: Reliability Based Design of Structural Systems Determination of partial safety checking formats. Development of reliability-based criteria, optimal safety factors, and calibration of IS 456 and IS 800. System reliability, modeling of structural systems, bounds on system reliability, automatic generation of a mechanism, generation of dominant mechanism, reliability analysis of R.C.C. and steel frames.	L2, L3, L4, L5, L6	12

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text books

- Ranganathan, R., Reliability Analysis and Design of Structures, Tata McGraw Hill, New Delhi, 1990.
- Rao, S.S. Reliability based Design, Tata McGraw Hill, New Delhi, 2013.
- Miller, Freund-Hall, Probability and Statistics for Engineers, Prentice India Ltd., New Delhi, 2009

Reference Books

- Ghosh, D.I. A Primer of Reliability Theory, John Wiley, New York, 1989.
- Lewis, E.E., Introduction to Reliability Engineering, John Wiley, New York, 1987.
- Rausand, M., and A. Hoyland. System Reliability Theory: Models, Statistical Methods, and Applications. 2nd ed., John Wiley & Sons, New York, 2003.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO4
CO1	1	2	2	3	--	--	--	--	--	--	--	1	1	2	--	1
CO2	1	2	1	3	2	--	--	--	--	--	--	1	2	3	--	1
CO3	1	2	--	3	--	--	--	--	--	--	--	1	1	2	3	1
CO4	1	2	--	3	--	--	--	--	--	--	--	1	2	1	3	--

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CME4212	PRE -ENGINEERED CONSTRUCTION TECHNOLOGY	L	T	P	C
Version 2020.1	Date of Approval: 3rd June, 2020	3	1	0	4
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalogue Description

This course discusses about basics of pre-engineered building, their necessity and applications. The design of Pre-Engineered Buildings (PEB), design cycle are also part of this course. The course also includes design software and its uses in design of pre-engineered buildings.

Course Objectives

The objective of this course is to:

1. Impart knowledge about modular construction and design of the prefabricated elements
2. Provide the understanding of dimensioning and detailing of Pre-engineered construction.

Course Outcomes

After completing the course, the students will be able to:

CO1: Define pre-engineered buildings & differentiate it with conventional building.

CO2: Describe the design process of pre-engineered buildings.

CO3: Explain the concept of dimensioning and detailing in buildings.

CO4: Describe the maintenance processes for pre-engineered buildings economically.

Course Content

Modules	Blooms level*	Number of hours
Module I: Introduction Introduction, definition of pre-engineered builds, need of prefabrication and pre engineering, advantages, applications, Concept of prefabrication, Pre-Engineered Buildings Vs Conventional Steel Buildings.	L1, L2, L3	12
Module II: PEB Introduction, advantages, Pre Engineered Buildings Vs. Conventional Steel Buildings, Design considerations, Design of Pre-Engineered Buildings (PEB), design cycle, frame geometry, frame loading, design codes.	L1, L2	12
Module II: Design Design criterion, dimensioning and detailing, design process, production, Case study based design.	L1, L2, L3	12
Module IV: Maintenance Planning and control (PPC), maintenance. Design software and its uses in design of pre-engineered buildings, Case study	L1, L2,	12

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

- CBRI, Building materials and components, CBRI, India, 1990.
- Gerostiza C.Z., Hendrikson C. and Rehat D.R., Knowledge based process planning for construction and manufacturing, Academic Press Inc., New York, 1994.

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Reference Books

- Koncz T., Manual of precast concrete construction, Vols. I, II and III, Bauverlag, 1971.
- Structural design manual, Precast concrete connection details, Society for the studies in the use of precast concrete, Netherland Betor Verlag, 1978

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance


CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	1	1	2	--	3	--	--	1	--	1	2	2	1	1	2
CO2	1	--	1	--	--	--	3	--	2	2	1	2	2	1	1	2
CO3	1	1	1	--	1	--	--	--	--	--	1	1	2	1	1	2
CO4	1	1	1	2	1	--	--	--	--	--	1-	1	2	1	1	2

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CME4213	CONSTRUCTION PLANNING AND MANAGEMENT	L	T	P	C
Version 2020.1	Date of Approval: 3rd June, 2020	3	1	0	4
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalogue Description

The course revolves around the various activities encountered during the life cycle of a civil engineering project. It introduces the basic learning requirements for the civil engineer project manager and makes the appreciation for the qualitative nature of the construction project management. The philosophy of the course is more on system approach contrary to majority of mechanics-based subjects. Also, the need for the construction industry has been emphasized. Construction today is an all-embracing term, covering all the activities from conception to physical realization of a project. For the project to be completed on time and with correct measures, it is important to use various planning and management techniques in the construction industry. This course will help the students understand the CPM/PERT, construction methods and other estimations required in a construction project. Apart from this the students will also learn about the contracts. Now-a-day building information modeling (BIM), plays a very important role in integration of the information for various stakeholders at the same platform, reducing the time and cost of completion of a project and increasing the efficiency and productivity of the project. Building Information Modeling (BIM) proposes a relatively new approach of designing, documenting, constructing and even maintaining buildings. It has a significant impact on most business processes taking place in building firms. This course will introduce the students with the BIM concepts and theory behind the same.

Course Objectives

The objective of this course is to

1. Study and understand the concept of planning, scheduling, cost and quality control, safety during construction, organization and use of project information necessary for construction projects.
2. Comprehend and apply the various tools of project planning and management software.
3. Train the students with the latest and the best in the rapidly changing fields of Construction Engineering, Technology and Management.
4. Continually work with industry to enhance the program's effectiveness and the opportunities for innovation in the construction industry.
5. Introduce and familiarize the students with the upcoming technology in the construction industry i.e. building information modeling or management (BIM)

Course Outcomes

After completing the course, the students will be able to:

- CO1: Analyze and apply theoretical and practical aspects of project management techniques, contracts as well as estimation and costing to achieve project goals.
- CO2: Comprehend and apply organizational and leadership capabilities for effective management of construction projects.
- CO3: Apply knowledge and skills of modern construction practices and techniques.
- CO4: Apply relevant software packages for planning, scheduling, executing and controlling of construction projects.
- CO5: Comprehend, define and understand the building information modeling (BIM) or management concept.

Course Content

Modules	Blooms level*	Number of hours
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Module I: Introduction to Construction Planning Introduction Construction as industry and its challenges, Role of construction management, Methods of construction managements, Basic requirements of construction management: Learning structures. Construction planning-Processes of project planning, Construction facilities, Schedules, Layout of Plant utilities, Examples of real projects and its learning requirements.	L1, L2, L3, L4	10
Module II: Project Scheduling and Monitoring Project Scheduling: Processes of project scheduling, Network Scheduling Techniques, CPM/PERT, Introduction to network based project management techniques: Defining activities and their interdependence, drawing of network, time and resource estimations, use of network as scheduling techniques, use of network as control techniques i.e. project monitoring, Use of computer based models, progress control – project planning and scheduling techniques.	L1, L2, L3, L4	10
Module III: Resource Management, Disputes and Claims Management Principles of Project management, Resource Management and Inventory, Implementation of Project Planning Management, Analysis and design of planning and control system, Dispute and claims management.	L1, L2, L4, L5	10
Module IV: Contracts and Estimation & Costing Stages of awarding contract, types of contract, contract documents, arbitration and settlement of disputes, contract laws and handling of contracts, commissioning of projects. Principles of estimation and analysis of rate.	L1, L2, L3, L4	10
Module V: Introduction to Building Information Modeling Introduction to BIM, Components of BIM, brief history, BIM software platforms and interfaces, Challenges of Building Industry and the necessity of BIM utilization, BIM Standards and BIM Implementation plans, BIM Capability Maturity Model, Different dimensions in BIM. BIM Compatible software- Revit.	L1, L2, L3, L4	8

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

- Jha, K.N., Construction Project Management: Theory and Practices, 2nd edition, Pearson Education India, New Delhi, 2015.
- Chitkara, K.K., Construction Project Management: Planning, Scheduling and Control, McGrawHill Publishing Company, New Delhi, 1998.
- Gajaria G.T., Laws Relating to Building and Engineering, Contracts in India, Lexis Nexis, New Delhi, 2000.
- Patil. B.S, Civil Engineering Contracts and Estimates, Universities Press (India) Private Limited, New Delhi, 2006.
- Eastman, C., Paul T., Rafael S., and Kathleen L., BIM Handbook, A Guide to Building Information Modeling for Owners, Managers, Designers, Engineers and Contractors, New Jersey, John Wiley & Sons, 2011.
- Kyrgiel, E., Green BIM: Successful Sustainable Design with Building Information Modeling, Sybex, 2008.
- Smith, D K, and Michael T., Building Information Modeling, A Strategic Implementation Guide, New Jersey, John Wiley & Sons, 2009.

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Reference Books

- Calin M. Popescu, Chotchai Charoenngam, Project Planning, Scheduling and Control in Construction: An Encyclopedia of terms and Applications, Wiley, New York, 1995.
- Halpin, D. W., Financial and Cost Concepts for Construction Management, John Wiley & Sons, New York, 1985.
- Willis, E. M., Scheduling Construction Projects, John Wiley & Sons, New York, 1986.
- Callahan, M. T., Quackenbush, D. G., and Rowings, J. E., Construction Project Scheduling, McGraw Hill, New York, 1992.
- Cleland, D. I. and Ireland, L. R., Project Management: Strategic Design and Implementation, 4th Edition, McGraw Hill, New York, 2002.
- Jimmie Hinze, Construction Contracts, McGraw Hill, New York, 2001.
- Joy, P.K.; Total Project Management- The Indian Context, MacMillan India Ltd., New Delhi, 1992.
- Peurifoy, R.L. and Ledbetter, W.B.; Construction Planning, Equipment and Methods, McGraw Hill, Singapore, 1986.
- Kymmel, W. Building Information Modeling: Planning and Managing Construction Projects with 4D CAD and Simulations, New York, Mc-Graw Hill, 2008.
- Eastman, C., Building Product Models: Computer Environments Supporting Design and Construction, Boca Raton, CRC Press, 1999.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O 1	PS O 2	PS O 3	PS O 4
CO 1	1	1	1	2	--	3	--	--	1	--	1	2	1	1	3	2
CO 2	1	--	1	--	--	--	3	--	2	2	1	2	3	1	1	2
CO 3	1	1	1	--	1	--	--	--	--	--	1	1	2	1	3	1
CO 4	1	1	--	2	1	--	--	--	--	--	1	1	3	1	--	1
CO 5	1	--	1	--	--	--	3	--	2	2	1	2	3	2	1	1

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TRE4201	TRANSPORTATION PLANNING	L	T	P	C
Version 2020.1	Date of Approval: 3rd June, 2020	3	1	0	4
Pre-requisites/Exposure					
Co-requisites					

Catalogue Description

The course contains basic principle approach towards analysis of travel behavior of household\individual. It deals with planning the future transportation need and expansion of existing services. It also contains different land use transportation models.

Course Objectives

The objective of this course is to

- Explain terminologies of transportation planning and analyse the practical problems related to traffic.
- Develop the methodology of travel demand behaviour for transportation system.

Course Outcomes

On completion of this course, the students will be able to

CO1: Describe the relation between travel demand and urbanization.

CO2: Comprehend and apply the different methods for deciding mode choices in different regions.

CO3: Explain and apply various methods to solve traffic problems.

CO4: Interpret different land use transportation models and apply solutions for transport problems.

Course Content

Modules	Blooms level*	Number of hours
Module I: Urban morphology Urbanization and travel demand – Urban activity systems and travel patterns – Systems approach – Trip based, and Activity based approach	L1, L2	10
Module II: Urban Transportation Planning Goals, Objectives and Constraints - Inventory, Model building, Forecasting and Evaluation - Study area delineation – Zoning - UTP survey Trip generation models – Trip classification - productions and attractions – Trip rate analysis - Multiple regression models - Category analysis - Trip distribution models – Growth factor models, Gravity model and Opportunity modes. Modal split models – Mode choice behavior – Trip end and trip interchange models - Probabilistic models - Utility functions - Logit models - Two stage model	L1, L2, L3	15
Module III: Traffic assignment Transportation networks – Minimum Path Algorithms - Assignment methods – All or Nothing assignment, Capacity restrained assignment and Multi path assignment - Route-choice behavior.	L1, L2, L3	10
Module IV: Landuse transportation models Urban forms and structures - Location models - Accessibility – Landuse models - Lowry derivative models - Quick response techniques - Non-Transport solutions for transport problems. Preparation of alternative plans - Evaluation techniques - Plan implementation - Monitoring - Financing of Project – urban development planning policy - Case studies.	L1, L2, L3	13

*Bloom's Level:

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text Books

- Chakraborty & Das, Principles of Transportation Engineering, PHI Learning, New Delhi, 2011.
- Papacostas, C.S, Transportation Engineering and Planning, 3rd edition, PHI, New Delhi, 2008.

References

- Geetam Tiwari, Transportation Planning and Traffic Safety, Taylor & Francis, 2016
- O' Flaherty Coleman. A., Transport Planning and Traffic Engineering, Elsevier Ltd, Oxford shire, 2008.


CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS O 1	PS O 2	PS O 3	PS O 4
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CO 2	1	--	2	--	--	--	3	--	-	-	-	-	-	-	1	-
CO 3	1	1	1	--	2	--	--	--	--	--	-	-	-	-	1	-
CO 4	1	1	1	2	1	--	--	--	--	--	-	-	-	-	1	-

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TRE4214	ACCIDENTS ANALYSIS & PREVENTION	L	T	P	C
Version 2020.1	Date of Approval: 3rd June, 2020	4	0	0	4
Pre-requisites/Exposure					
Co-requisites					

Catalogue Description

This course discusses about the basics of road safety, factors affecting and causes of accidents involving drivers & pedestrians. It deals with the 4 E's of prevention of accidents and basic concepts of vehicle safety, risk evaluation and human error control. Importance of guard rail and barrier along with the crashworthiness is also discussed.

Course Objectives

The objective of this course is to

1. Acquire knowledge and understanding of the road environment.
2. Identify the reasons for road accidents and scientific investigation.

Course Outcomes

On completion of this course, the students will be able to

- CO1: Explain the factors improving road safety and different motor vehicle acts.
CO2: Describe the relation between speed & fuel conservation and driver training program.
CO3: Explain the parameters affecting road and vehicle safety.
CO4: Define TREM & warning symbols and design the tanker Lorries.

Course Content

Modules	Blooms level*	Number of hours
Module I: Introduction Road Transport: factors for improving safety on roads – causes of accidents due to drivers and pedestrians-design, selection, operation and maintenance of motor trucks-preventive maintenance-check lists-motor vehicles act – motor vehicle insurance and surveys.	L1, L2	10
Module II: Driver and Safety Driver safety programme – selection of drivers – driver training tachograph-driving test driver's responsibility-accident reporting and investigation procedures-fleet accident frequency-safe driving incentives-slogans in driver cabin motor vehicle transport workers act-road transport act and rules – driver relaxation and rest pauses – speed and fuel conservation – emergency planning.	L1, L2	12
Module III: Road & Vehicle Safety Traffic control lines and guide posts-guard rails and barriers – street lighting and illumination-overloading-concentration of driver. E's of Accidents Prevention: 1. Engineering – by altering the environment 2. Enforcement - by imposing laws 3. Encouragement - by the use of publicity campaigns 4. Education - by gaining and using knowledge. Introduction to vehicle safety, Basic concepts of vehicle safety, Risk evaluation, Human error control, Risk communication, Universal design, Crash testing, Crashworthiness, Design of Vehicle Structures for Crash Energy Management, Accident Reconstruction, Future vehicle safety.	L1, L2, L3	14

Module IV: Transportation of Hazardous Goods: Transport emergency card (TREM) – driver training-parking of tankers on the highways speed of the vehicle – warning symbols – design of the tanker lorries – earth chains-static electricity-responsibilities of driver – inspection and maintenance of vehicles-check list – decanting procedures – communication. Transport precautions-safety on manual mechanical handling equipment operations-safe driving-movement of cranes conveyors etc.	L1, L2, L3	12
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**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation*

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text Books

- Popkes, C.A., Traffic Control and Road Accident Prevention, Chapman and Hall Limited, London, 1986
- Babkov, V.F, Road Conditions and Traffic Safety, MIR Publications, Moscow, 1986
- Evans, L, Traffic Safety & the Driver, Science Serving Society, Bloomfield MI, US, 1991.
- Evans, L, Traffic Safety, Science Serving Society, Bloomfield MI, US, 2004.

References

- Paul, D. B, Chou, C.C, Fileta, B.B, Khalil, T.B, King, A.I, Mahmood, H.F, Mertz, H.J, Wismans, J, Vehicle Crash Worthiness and Occupant Protection, American Iron and Steel Institute, Michigan 2004
- Huang, M., Vehicle Crash Mechanics, CRC Press, Boca Raton, New York, 2002.
- Peters, G.A. and Peters, B.J, Automotive Vehicle Safety, Taylor & Francis e-Library, 2003.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS O 1	PS O 2	PS O 3	PSO 4
CO 1	1	1	1	2	--	3	--	--	1	--	-	3	-	-	1	-
CO 2	1	--	1	--	--	--	3	--	2	-	-	3	-	-	1	-
CO 3	1	1	1	--	1	--	--	--	--	--	-	3	-	-	1	-
CO 4	1	1	1	2	1	--	--	--	--	--	--	3	-	-	1	-

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TRE4216	PAVEMENT MATERIALS & CONSTRUCTION	L	T	P	C
Version 2020.1	Date of Approval: 3rd June, 2020	3	0	0	3
Pre-requisites/Exposure					
Co-requisites					

Catalogue Description

The course deals with the origin, classification, requirements, properties and tests on fine aggregates, coarse aggregates and bitumen. It includes weathering and durability of bituminous materials & mixes and its mix design. It also includes joint filler and sealer materials used in the requirement for CC pavement construction and design mix for CC pavement.

Course Objectives

The objective of this course is to

1. Explain the characteristics, properties and testing procedures of highway materials such as soil, aggregate and bitumen.
2. Design the bituminous mix and the mix for cement concrete pavement.

Course Outcomes

On completion of this course, the students will be able to

- CO1. Explain the classification, requirements, properties and tests on fine and coarse aggregates used in road construction.
- CO2. Define properties, preparation, uses and tests on bituminous binders and figure out the dynamic modulus and fatigue behaviour of bituminous mixes.
- CO3. Explain weathering and durability of bituminous mixes and design the bituminous mix for flexible pavement & rigid pavement.
- CO4. Explain different construction methods of roads & identify different failures.

Course Content

Modules	Blooms level*	Number of hours
Module I: Subgrade Soil Soil composition and structure - Soil classification for engineering purposes - Origin, Classification, requirements, properties and tests on road aggregates.	L1, L2	8
Module II: Bitumen Origin, preparation, properties and tests, constitution of bituminous road binders, requirements - Bituminous Emulsions and Cutbacks Preparation, characteristics, uses and tests Bituminous Mixes Mechanical properties - Resilient modulus, dynamic modulus and fatigue characteristics of bituminous mixes.	L1, L2, L4	10
Module III: Design Mix of Bitumen & Cement Concrete Weathering and Durability of Bituminous Materials and Mixes - Performance based Bitumen Specifications - Superpave mix design method. Cement Concrete for Pavement Construction Requirements, design of mix for CC pavement, joint filler and sealer materials.	L1, L2, L3	10
Module IV: Pavement Construction and Maintenance Construction of earth roads, WBM roads, stabilized roads, bituminous pavements, cement concrete roads and joints in cement concrete roads - Types and causes of failures in flexible & rigid pavements.	L1, L2	8

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text Books

- Khanna & Justo, Highway Engineering, 10th ed., Nemchand & Brothers, Roorkee, 2018.
- RRL, DSIR, Bituminous Materials in Road Construction, HMSO Publication, 1955

References

- IS and IRC Publications on relevant topic.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS O 1	PS O 2	PS O 3	PS O 4
CO 1	1	1	1	2	--	3	--	--	1	--	-	-	-	1	-	2
CO 2	1	--	1	--	--	--	3	--	2	2	-	-	-	1	-	2
CO 3	1	1	1	--	1	--	--	--	--	--	-	-	-	1	-	2
CO 4	1	1	1	2	1	--	--	--	--	--	-	-	-	1	-	-

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TRE4217	PAVEMENT MATERIALS & CONSTRUCTION LAB	L	T	P	C
Version 2020.1	Date of Approval: 3rd June, 2020	0	0	2	1
Pre-requisites/Exposure	Pavement Materials & Construction				
Co-requisites					

Catalogue description

In this Lab course the various tests are there for different types of pavement materials such as Soil, Aggregate and Bitumen. It also includes the tests which are conducted for the pavement evaluation and their maintenance.

Course Objective

The objective of the course is to

1. Assure the quality of the materials that are to be used for the construction of pavements such as Soil, aggregates and Bitumen.
2. Strengthen the pavement by conducting different tests for pavement evaluation and its maintenance.

Course Outcomes

On the completion of this course, the student will be able to:

- CO1: Perform the tests on various type soils and apply the results in the practical life.
- CO2: Perform different tests on Aggregates that are to be used in the construction of highways and assure the quality of aggregates.
- CO3: Perform different tests on Bitumen that are to be used in the construction of highways and assure the quality of Bitumen.

Course Content

Modules	Blooms level*	Number of hours
Module I: Tests on Soil <ol style="list-style-type: none"> 1. Determination of Optimum Moisture Content (OMC) and Maximum Dry Density. 2. Determination of California Bearing Ratio (CBR) value for Subgrade. 	L3, L4	4
Module II: Tests on Aggregates <ol style="list-style-type: none"> 1. Impact Test and Abrasion Test of aggregates. 2. Elongation and Flakiness Index of aggregates. 3. Water Absorption Test of aggregates. 	L3, L4	6
Module III: Tests on Bitumen and Bituminous Mixes <ol style="list-style-type: none"> 1. Determination of Penetration value. 2. Determination of softening point value. 3. Determination of ductility. 4. Determination of viscosity. 5. Flash and Fire point Test. 6. Marshall Method of Mix Design 	L3, L4	10

*Bloom's Level:

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

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Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva
Text Books

- Khanna, S.K., Justo, C.E.G., and Veeraragavan, A., Highway Materials Laboratory Testing, Nem Chand & Brothers, Roorkee, 2013.
- Relevant IRC and AASHTO codes.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS O 1	PS O 2	PS O 3	PS O 4
CO 1	1	1	1	2	--	3	--	-	-	-	-	-	-	2	-	-
CO 2	1	1	1	2	--	2	-	-	-	-	-	-	-	2	-	-
CO 3	1	2	1	--	1	3	2	-	--	--	-	-	-	2	-	-

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TRE4218	GEOMETRIC DESIGN OF HIGHWAYS	L	T	P	C
Version 2020.1	Date of Approval: 3rd June, 2020	3	0	0	3
Pre-requisites/Exposure					
Co-requisites					

Catalogue Description

The course discusses about the geometric design of highways along with their elements. It deals with the design of vertical and horizontal alignment of the highways. It includes various interchanges and intersections along with their design features. The case studies on hill roads & snow bound roads are also discussed.

Course Objectives

The objective of this course is to

1. Explain the basic principles and techniques of geometric design of highways.
2. Design the alignment & intersections and evaluate earthwork requirements & safety considerations.

Course Outcomes

On completion of this course, the students will be able to

- CO1: Explain and design various elements of geometric design of the highways.
- CO2: Explain the factors affecting route layout and calculate the different sight distances.
- CO3: Design summit & valley curve along with cross sectional elements.
- CO4: Explain the design principles of interchanges & intersections along with case studies on hill & snow bound roads.

Course Content

Modules	Blooms level*	Number of hours
Module I: Introduction Importance of geometric design and roadway function, Design controls: vehicles and drivers, speed, volume and access, carriage way, traffic separators, kerb, road margin.	L1, L2, L3,	8
Module II: Route & Sight Distance Route layout, environmental considerations, and context sensitive solutions; Sight distance, horizontal alignment, sight distance at intersection.	L1, L2, L3	9
Module III: Alignment Vertical alignment – grades, crest and sag curves. Highway cross – sectional elements and their design for rural highways, Urban streets and hill roads	L1, L2, L3	8
Module IV: Intersection At grade intersections – principles of design, Channelization, mini round – about, layout of round – about, inter – Changes – major and minor interchanges, entrance and exit ramps, acceleration and deceleration lanes Earthwork, Safety assessment tools Case studies on hill roads and snow bound roads.	L1, L2, L3, L4	11

*Bloom's Level:

L1: Knowledge; L2: Comprehension; L3: Application; L4: Analysis; L5: Synthesis, L6: Evaluation

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Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text Books

- Khanna & Justo, 'Highway Engineering', 10th ed., Nemchand & Brothers, Roorkee, 2018.
- John Mason (ed.), Urban Street Geometric Design Handbook, Institute of Transportation Engineers, 2008.
- AASHTO, Roadside Design Guide, 3rd Edition, 2006 (revision).
- Transportation Research Board, Access Management Manual, 2003.

References

- Transportation Research Board, Evaluating Intersection Improvements: An Engineering Study Guide, National Cooperative Highway Research Program (NCHRP). On-line at: <http://www.trb.org/publications/nchrp/esg/esg.pdf>, Report 4572001
- Transportation Research Board, A Guide to Best Practices for Achieving Context Sensitive Solutions, National Cooperative Highway Research Program (NCHRP) Report 480, 2002.
- AASHTO, Highway Safety Manual, 2010.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO 1	1	1	1	2	--	3	--	--	1	--	-	-	-	1	-	-
CO 2	1	--	1	--	--	--	3	--	2	-	-	-	-	1	-	-
CO 3	1	1	1	--	1	--	--	--	--	--	-	-	-	1	-	-
CO 4	1	1	1	2	1	--	--	--	--	--	-	-	-	1	-	-

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TRE4211	PAVEMENT ANALYSIS AND DESIGN	L	T	P	C
Version 2020.1	Date of Approval: 3rd June, 2020	3	1	0	4
Pre-requisites/Exposure					
Co-requisites					

Catalogue Description

The course is focused on design of different pavement types along with the pavement management. It contains components of pavements, factors affecting design and performance. It includes empirical, semi-empirical and theoretical approaches for design and comparison between IRC & AASHTO method.

Course Objectives

The objective of this course is to

1. Explain various pavement types, factors affecting design, components and their failure.
2. Design the pavement for highway & Runway using different approaches and softwares.

Course Outcomes

On completion of this course, the students will be able to

- CO1: Define factors affecting the design of highway pavements and runway.
CO2: Explain different components of pavement and design both the surface and sub surface drainage systems for a highway.
CO3: Design flexible pavement for a highway by different methods like empirical, IRC and AASHTO methods.
CO4: Design rigid pavement for a highway by different methods like IRC and AASHTO methods.
CO5: Evaluate the condition of pavement both structurally and functionally.

Course Content

Modules	Blooms level*	Number of hours
Module I: Introduction Types and component parts of pavements, Factors affecting design and performance of pavements. Highway and airport pavements, functions of pavement components	L1, L2	7
Module II: Pavement Design Factors Design wheel load, strength characteristics of pavement materials, climatic variations, traffic - load equivalence factors and equivalent wheel loads, aircraft loading, gear configuration and tyre pressure. Drainage – Estimation of flow, surface drainage, sub-surface drainage systems, design of sub-surface drainage structures	L1, L2, L3	10
Module III: Flexible Pavement Design Empirical, semi-empirical and theoretical approaches, design of highway and airport pavements by IRC, AASHTO Methods, applications of pavement design software	L1, L2, L3 and L4	12
Module IV: Rigid Pavement Design: Types of joints and their functions, joint spacing; design of CC pavement for roads, highways and airports as per IRC, AASHTO, design of joints. Design of continuously reinforced concrete pavements. Reliability; Use of software for rigid pavement design	L1, L2, L3, L4	12

Module V: Pavement Management & Maintenance Pavement failures, maintenance of highways, structural and functional condition evaluation of pavements: Characteristic Deflection by Benkelman Beam method, Unevenness by Bump Integrator method, pavement management system.	L1, L2, L6	7
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**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation*

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text Books

- Khanna & Justo, 'Highway Engineering', 10th edition, Nemchand & Brothers, Roorkee, 2018.
- Yang. H. Huang, Pavement Analysis and Design, Second Edition, Prentice Hall Inc., New Delhi 2004.
- Relevant IRC Codes.

References

- Yoder and Witczak, Principles of Pavement Design, John Wiley and Sons, New Jersey, 1975.
- Rajib B. Mallick and Tahar El-Korchi, Pavement Engineering – Principles and Practice, CRC Press, Boca Raton, 2020.
- W.Ronald Hudson, Ralph Haas and Zeniswki, Modern Pavement Management, Krieger Pub Co, Florida, 1994.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS O 1	PS O 2	PS O 3	PS O 4
CO 1	1	1	1	2	--	3	--	--	1	--	-	-	-	1	-	-
CO 2	1	--	1	--	--	--	3	--	2	-	-	-	-	1	-	-
CO 3	1	1	1	--	1	--	--	--	--	--	-	-	-	1	-	-
CO 4	1	1	1	2	1	--	--	--	--	--	-	-	-	1	-	-
CO 5	-	-	1	2	1	-	-	-	-	-	-	-	-	1	-	-

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EVE4201	ENVIRONMENTAL POLICIES AND LEGISLATION	L	T	P	C
Version 2020.1	Month, Year of approval:	3	1	0	4
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalogue Description

This course is designed to acquaint the student with numerous ethical issues and perspectives confronting society and environmental scientists and their influence on the development of environmental policy and regulation. Existing and proposed policies and regulations are examined as to their ethical background.

Course Objective:

The objective of this course is to

1. Acquaint the students with the environmental issues, pollution and control and the measures taken for its protection along with the norms prevailing at international and national level.

Course Outcomes

On completion of this course, the students will be able to

CO1: Deal with the legal provisions of the water pollution act

CO2: Deal with the legal provisions of the air pollution act

CO3: Impart knowledge on of environment, pollution and various principles

CO4: Explain the concept of Hazardous Wastes act

Modules	Blooms level*	Number of hours
Module I : Water Pollution Act The water (prevention and control of pollution) Act-Definitions, Constitution of central and state boards, Constitution and composition of joint boards, functions, prevention and control of water pollution, Penalties, Central and state water laboratory, power of supersession, power to make rules. The water (P&CP) rules - power and duties of the chairman and member- secretary, Temporary association of persons with central board, Consulting engineer, Annual report, Report of central board analyst, central water lab,	L1, L2, L3	12
Module II: Air Pollution Act The Air (prevention and control of pollution) Act- Definition, powers and functions of boards, prevention and control of pollution, Penalties and procedure, Miscellaneous. The Air (P&CP) Rules- procedure of transaction of business of the board and its committees, Temporary Association of the board and its committees, Temporary association of the persons with the Central board, Annual Report of Central Board, persons with central boards.	L1, L2 L3	12
Module III: Environmental Act The Environmental (Protection) Act- Definition, General powers of the Central Govt., Prevention, Control and abatement of environmental pollution, miscellaneous. The E(P) Rules- recipient system, standards for emission or discharge of environmental pollutants, Prohibition and restriction on location of industries, Procedure for taking samples, notice and submission for analysis, functions of Env. Lab., furnishing information to authorities and	L2 and L3	12

agencies, prohibition and restriction on handling hazardous substances.		
Module IV: Hazardous Wastes Hazardous Wastes (Management and handling) Rules- Definition, esp, hazardous wastes, hazardous waste site. Transboundary movement, Responsibility of the occupier, grant of authorization, power to respond or cancel, packaging, labeling, transport, disposal or import, Accident reporting, appeal. Manufacture, storage and important of hazardous chemicals rules- Definitions- Mitigation of the major accident, safety reports.	L2, L3 and L4	12

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text Books & References:

1. The water (P& CP) Act and Rules.
2. The Air (P & CP) Rules.
3. The Env(Protection)Act and various rules.


CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	1	2	2	3	-	-	-	-	-	-	-	-	3	1	-
CO2	1	3	1	3	3	-	-	-	-	-	-	-	-	3	1	-
CO3	1	3	1	-	-	-	-	-	-	-	-	-	-	3	1	-
CO4	1	3	-	-	3	-	-	-	-	-	-	-	-	3	1	-

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EVE4208	SOLID AND HAZARDOUS WASTE MANAGEMENT	L	T	P	C
Version 2020.1	Month, Year of approval:	3	1	0	4
Pre-requisites/Exposure	NIL				
Co-requisites	NIL				

Catalogue Description

This course is designed to provide students with an understanding of technical issues and the management of solid wastes. This module includes solid waste policy, both domestic and international, and then examines appropriate methods of storage, collection, transfer, treatment and disposal appropriate for industrialized and developing countries. The module also provides the opportunity to visit recycling facilities and disposal sites to better understand links between theory and practice.

Course Objectives

The objective of this course is to:

1. To impart knowledge and skills in the collection, storage, transport, treatment, disposal and recycling options for solid wastes including the related engineering principles, design criteria, methods and equipment's.

Course Outcomes

On completion of this course, the students will be able to:

CO1: Understand the characteristics of different types of solid and hazardous wastes and the factors affecting variation

CO2: Define and explain important concepts in the field of solid waste management and suggest suitable technical solutions for treatment of municipal and industrial waste

CO3: Understand the role legislation and policy drivers play in stakeholders' response to the waste and apply the basic scientific principles for solving practical waste management challenges.

CO4: Design the different elements of waste management systems.

Course Contents

Modules	Blooms level*	Number of hours
Module I: Waste Management Scenario Legal and Organizational foundation: Definition of solid waste-waste generation in a technological society- major legislation, monitoring responsibilities, sources and types of solid waste- sampling and characterization- Determination of composition of MSW- storage and handling of solid waste- Future changes in waste composition. Collection and transport of solid waste: Collection of Solid waste: type of waste collection systems, analysis of collection system- alternative techniques for collection system.	L1, L2, L3	12
Module II: Collection & Transportation of wastes Separation and Processing and Transformation of Solid Waste: unit operations used for separation and processing, Materials Recovery facilities, Waste transformation through combustion and anaerobic composting, anaerobic methods for materials recovery and treatment- Recycling of plastic materials and metals. Energy recovery – Incinerators. Transfer and Transport: need for transfer operation, transport means and methods, transfer station types and design requirements. Landfills: Site selection, design and operation, drainage	L1, L2 L3	12

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and leachate collection systems – requirements and technical solutions, designated waste landfill remediation – Integrated waste management facilities.		
Module III: Hazardous waste management Hazardous waste management: Definition and identification of hazardous wastes- sources and characteristics- hazardous wastes in Municipal Waste- Hazardous waste regulations – minimization of Hazardous Waste – compatibility, handling and storage of hazardous waste- collection and transport.	L1, L2, L3	12
Module IV: Hazardous waste treatment Hazardous waste treatment and design: Hazardous waste treatment technologies – Design and operation of facilities for physical, chemical and thermal treatment of hazardous waste –Biomedical waste disposal. Solidification, chemical fixation and encapsulation, incineration. Hazardous waste landfills: Site selection, design and operation – remediation of hazardous waste disposal sites.	L1, L2, L3	12

*Bloom's Level:

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5:Synthesis, L6:Evaluation

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text Books:

- . George Tchobanoglous, Hilary Theisen and Samuel A, Vigil, "Integrated Solid Waste Management, Mc-Graw Hill International edition, New York, 1993.


References:

- . CPHEEO, "Manual on Municipal Solid waste management, Central Public Health and Environmental Engineering Organisation , Government of India, New Delhi, 2014.
- William A. Worrell, P. Aarne Vesilind, Solid Waste Engineering, Cengage Learning, 2012.
- Michael D. LaGrega, Philip L Buckingham, Jeffrey C. E vans and "Environmental Resources Management, Hazardous waste Management", Mc-Graw Hill International edition, New York,2010.
- John Pichtel,Waste Management Practices, CRC Press,Taylor and Francis Group,2014.
- Frank Kreith, George Tchobanoglous, Handbook of Solid Waste management, Mc Graw Hill, 2002.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO3	PSO4
CO1	1	1	2	2	3	-	-	-	-	-	-	1	3	2	1	-
CO2	1	3	1	3	3	-	-	-	-	-	-	1	3	2	1	-
CO3	1	3	1	-	-	-	-	-	-	-	-	1	3	2	1	-
CO4	1	3	2	-	3	-	-	-	-	-	-	1	3	2	1	-

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EVE4211	WATER TREATMENT PLANT DESIGN AND OPERATION	L	T	P	C
Version 2020.1	Date of Approval: 3rd June, 2020	3	1	0	4
Pre-requisites/Exposure					
Co-requisites					

Catalog Description:

This course introduces the students to know about the various water treatment processes, the design for their plants and how do they operate so that there is more availability of clean water which can be put to various uses. At the end of the course, students should have a thorough wastewater treatment processes treatment and disposal. They would be able to design various facilities for physical and chemical treatment of wastewater treatment system.

Course Objectives:

The objective of the course is to,

1. Become familiar with conventional and advanced physical and chemical processes used to purify water, wastewater and air emissions.
2. Understand the basic principles of design and operation of a variety of treatment processes;
3. Able to calculate basic process parameters such as needed disinfection contact times, sizing of sedimentation basins, filter flow rates, number of membrane modules needed for treatment of a given feed flow rate, etc.

Course Outcomes:

On completion of this course, the students will be able to

CO1: Describe various wastewater treatment unit operations.

CO2: Explain the working principle and design of wastewater treatment units.

CO3: Comprehend the importance of guidelines based on Indian Standard code of practice for the design of wastewater treatment units for different industries.

CO4: Apply the waste management process used in various industries.

CO5: Apply the waste disposal and management process in treatment system.

Course Contents

Modules	Blooms level*	Number of hours
Module I INTRODUCTION Pollutants in water and wastewater – characteristics, Standards for performance. Significance of physico-chemical treatment – Selection criteria-types of reactor- reactor selection-batch-continuous type-kinetics	L1, L2 and L3	8
Module II UNIT OPERATIONS Principles of Screening – Mixing, Equalization – Sedimentation – Filtration – Modeling back washing – Evaporation – Incineration – gas transfer – mass transfer coefficient. Adsorption – Isotherms – Principles, kinetics, regeneration membrane separation, Reverse Osmosis, nano filtration, ultra-filtration and hyper filtration electrodialysis, distillation – stripping and crystallization – Recent Advances.	L2 and L3	10
Module III TREATMENT SYSTEM Principles of Chemical treatment – Coagulation flocculation – Precipitation – flotation solidification and stabilization – Disinfection, Ion exchange, Electrolytic methods, Solvent extraction – advanced oxidation /reduction – Recent Trends	L2, L3 and L4	10

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Module IV DESIGN OF TREATMENT SYSTEM Selection of Treatment – Design of municipal water treatment plant units – Aerators – chemical feeding – Flocculation – clarifies – tube settling – filters – Rapid sand filters slow sand filter, pressure filter, Dual media inlets Displacement and gaseous type. Design of Industrial Water Treatment Units- Selection of process – Design of softeners – Demineralisers –Reverse osmosis plants –flow charts – Layouts – Hydraulic Profile PID, construction and O&M aspects – case studies, Residue and rejects management – Upgradation of existing plants – Recent Trends – Software application.	L2, L3 and L4	10
Module V ADVANCED TREATMENT SYSTEM Design of municipal wastewater treatment units-screens-detritors-grit chamber-settling tanks-sludge thickening-sludge dewatering systems-sludge drying beds - Design of Industrial Wastewater Treatment Units-Equalization- Neutralization-Chemical Feeding Devices-mixers-floatation units-oil skimmer- flow charts – Layouts –Hydraulic Profile PID construction and O&M aspects – case studies, Residue management – Upgradation of existing plants – Recent Trends – Software application.	L2, L3 and L4	10

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text Books:

- Metcalf and Eddy, “Wastewater Engineering- Treatment and reuse,” Tata McGraw Hill Publishing Company Ltd., New Delhi.
- Lee, C.C. and Shun dar Lin, Handbook of Environmental Engineering Calculations, Mc Graw Hill, New York, 1999.
- Hendricks, D. ‘Water Treatment Unit Processes – Physical and Chemical’ CRC Press, New York 2006
- Davis M.L., Cornwell D.A., “Introduction to Environmental Engineering”, Tata McGraw Hill Education (P) Ltd., New Delhi.

Reference Books:

- Droste R.L., “Theory and Practice of Water and Wastewater Treatment”, Wiley India (P) Ltd.
- Hammer M.J. and Hammer M.J., Jr., “Water and Wastewater Technology”, PHI (P) Ltd., New Delhi.
- Qasim, S.R., Motley, E.M. and Zhu.G. Water works Engineering – Planning, Design and Operation, Prentice Hall, New Delhi, 2002.
- Peavy H.S., Rowe D.R., Tchobanoglous G., “Environmental Engineering”, Tata McGraw Hill Education (P) Ltd., New Delhi.
- Venkateswarlu K.S., “Water Chemistry, Industrial and Power Station Water Treatment, New Age International Publishers, New Delhi.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	--	--	--	--	--	--	--	--	1	--	--	--	--	1	3	--
CO2	--	--	1	--	2	--	--	--	--	2	--	--	--	1	3	--
CO3	--	--	2	--	--	--	--	--	--	--	--	--	--	1	3	--
CO4	--	--	1	--	--	--	--	--	--	--	--	--	--	1	3	--
CO5	--	--	1	--	2	--	--	--	--	2	--	--	--	1	3	--

1: strongly related, 2: moderately related and 3: weakly related

EVE4212	AIR POLLUTION AND CONTROL	L	T	P	C
Version 2020.1	Date of Approval: 3rd June, 2020	3	1	0	4
Pre-requisites/Exposure					
Co-requisites					

Catalog Description:

This course designed to improve the understanding of the different air pollution: monitoring, modelling and control strategies and the skills of application of remediation techniques to combat pollution in three environmental compartments.

Course Objectives:

The objective of the course is to,

1. Impart knowledge on the principles and design of control of particulate and gaseous air pollutant and its emerging trends.
2. Introduce the fundamentals of mathematical models for water and air quality prediction and the importance of model building.

Course Outcomes:

On completion of this course, the students will be able to

CO1: Define general air pollution problems, meteorological definitions, air transport equations and pollution control matters and devices.

CO2: Explain the regulations pertinent to air pollutions (both indoor and outdoor environment).

CO3: Describe major problems in indoor air pollution control and regulations.

CO4: Apply the ability to learn from the mistakes ethically and increase the quality of design.

Course Contents

Modules	Blooms level*	Number of hours
Module I INTRODUCTION TO AIR POLLUTION Structure and composition of Atmosphere – Sources and classification of air pollutants - Effects of air pollutants on human health, vegetation & animals, Materials & Structures – Effects of air Pollutants on the atmosphere, Soil & Water bodies – Long- term effects on the planet – Global Climate Change, Ozone Holes – Ambient Air Quality and Emission Standards – Air Pollution Indices – Emission Inventories.	L1, L2 and L3	12
Module II AIR QUALITY MONITORING Ambient and Stack Sampling and Analysis of Particulate and Gaseous Pollutants -Effects of meteorology on Air Pollution - Fundamentals, Atmospheric stability, Inversion, Wind profiles and stack plume patterns-Transport & Dispersion of Air Pollutants	L2 and L3	12
Module III MODELLING Air Quality Modeling. Necessity, application and limitation of air quality modelling. Dispersion Modeling, Photochemical Modeling and Receptor Modeling. Different air quality Dispersion models and their limitations.	L2, L3 and L4	12
Module IV CONTROL OF AIR POLLUTANTS Primary considerations in designing effective control strategy: Environmental, Engineering and Economic Factor - Factors to be considered while selecting control equipment's - Various mechanisms to	L2, L3 and L4	12

control gaseous pollutants and particulate matter. Control Equipment design for particulate matter: Gravity chamber, Cyclone separator, Electrostatic precipitator, fabric filter, bag filter, Wet scrubber, Venturi-scrubber and absorption towers. Control Equipment design for gaseous pollutants: Absorption, Adsorption, Condensation and Incineration.		
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Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text Books:

- Noel de Nevers, Air Pollution Control Engg., McGraw-Hill, New York, 2000.
- Lawrence Kwan, Norman C Perelra, Yung-Tse Hung, Air Pollution Control Engineering, Tokyo, 2004.
- David H.F Liu, Bela G.Liptak, Air Pollution, Lewis Publishers, 2000.
- Singal, S.P., Noise Pollution and Control Strategy, Narosa Publishing House, New Delhi, 2005.
- Steven C. Chapra, Surface Water Quality Modeling, Tata McGraw-Hill Companies, Inc., New Delhi, 2008.
- Benedini, Marcello and Tsakiris, George, Water Quality Modelling for Rivers and Streams, Springer Netherlands, 2013.
- Zhen-Gang Ji, Hydrodynamics and Water Quality: Modeling Rivers, Lakes, and Estuaries, John Wiley & Sons, 2008.

Reference Books:

- Nelson Leonard Nemerow, Industrial waste Treatment, Elsevier, 2007.
- Paul L. Bishop, Pollution Prevention: - Fundamentals and Practice, McGraw-Hill International, 2000.


CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	--	--	1	--	--	--	--	--	--	--	--	--	--	--	1	--
CO2	2	1	--	--	2	--	--	--	--	--	--	--	--	--	1	--
CO3	1	--	--	--	--	--	--	--	--	--	--	--	--	--	1	--
CO4	--	--	2	1	--	--	--	--	--	--	--	--	--	--	1	--

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EVE4205	OPTIMIZATION OF WATER RESOURCES SYSTEM	L	T	P	C
Version 2020.1	Date of Approval: 3rd June, 2020	3	1	0	4
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalogue Description:

The course aims to introduce fundamentals and need for optimization techniques in engineering problems. Various techniques such as Linear Programming, Geometric Programming, Dynamic Programming and Non-Linear Programming are taught to students to solve various environmental engineering problems for optimal solutions.

Course Objectives:

The objective of the course is to,

1. Become familiar with conventional and advanced physical and chemical processes used to purify water, wastewater and air emissions.
2. Understand the basic principles of design and operation of a variety of treatment processes;
3. Able to calculate basic process parameters such as needed disinfection contact times, sizing of sedimentation basins, filter flow rates, number of membrane modules needed for treatment of a given feed flow rate, etc.

Course Outcomes:

On completion of this course, the students will be able to

CO1. Define the distribution system.

CO2. Able to design simple water treatment units.

CO3. Get thorough idea about functions of water supply systems.

CO4. Get complete understanding of water quality standards.

Course Contents

Modules	Blooms level*	Number of hours
Module I INTRODUCTION Engineering Applications of Optimization, Statement of an Optimization Problem, Design Constraints, Constraint Surface, Objective Function, Optimization Techniques, Single-Variable Optimization, Multivariable Optimization with no Constraints, Multivariable Optimization with Equality Constraints, Multivariable Optimization with Inequality Constraints, Convex Programming Problem.	L1, L2 and L3	12
Module II OPTIMIZATION OF WATER RESOURCE SYSTEM Principles of Screening – Mixing, Equalization – Sedimentation – Filtration – Modeling back washing – Evaporation – Incineration – gas transfer – mass transfer coefficient. Adsorption – Isotherms – Principles, kinetics, regeneration membrane separation, Reverse Osmosis, nano filtration, ultra-filtration and hyper filtration electrodialysis, distillation – stripping and crystallization – Recent Advances.	L2 and L3	12
Module III DESIGNING OF WATER RESOURCE SYSTEM Numerical methods for nonlinear unconstrained and constrained problems, sensitivity analysis, Linear post optimal analysis, sensitivity analysis of	L2, L3 and L4	12

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discrete and distributed systems. Introduction to variational methods of sensitivity analysis, shape sensitivity.		
Module IV PROGRAMMING OF TREATMENT SYSTEM Introduction to integer programming, dynamic programming, stochastic programming and geometric programming, Introduction to genetic algorithm and simulated annealing.	L2, L3 and L4	12

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text Books:

- Douglas A.H., “Environmental System Optimization”, John Wiley and Sons, New York.
- Vedula S. and Mujumdar P.P., “Water Resources Systems: Modeling Techniques and Analysis”, TMH.

Reference Books:

- Deb, K., Optimization for engineering design: Algorithms and examples, PHI Pvt Ltd, 1998.
- Arora, J.S., Introduction to optimum design, McGraw Hill International editions, 1989.
- Rao S.S., “Engineering Optimization- Theory and Optimization”, New Age International Publishers
- Haith D.A., “Environmental System Optimization”, Wiley and Sons, New York.
- Geem Z.W., “Optimization In Civil and Environmental Engineering”, Old City Publishing, USA.
- Sieniutycz S and Jezowski J., “Energy Optimization In Process Systems”, Elsevier, U.K.
- Floudas A and Pardalos M., “Encyclopedia of Optimization- Volume 2”, Springer, United States.


CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	2	--	--	--	--	--	--	1	--	--	--	--	--	1	--
CO2	--	1	2	2	2	--	--	2	--	2	--	--	--	--	1	--
CO3	--	--	3	--	1	--	--	--	3	--	--	--	--	--	1	--
CO4	--	--	1	--	1	1	--	--	--	--	--	--	--	--	1	--

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EVE4213	ENVIRONMENTAL CHEMISTRY	L	T	P	C
Version 2020.1	Date of Approval: 3rd June, 2020	3	1	0	4
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalogue Description:

This course emphasizes the method of protection of groundwater which is polluted by soil, dust, and the waste particles. It is useful for the protection of surface water from the contaminants through the process of sedimentation, bacteriological, and radiation.

Course Objectives:

The objective of the course is to,

1. Bring into focus those aspects of chemistry that are particularly valuable for solving environmental problems like water and wastewater analysis.

Course Outcomes:

On completion of this course, the students will be able to

CO1: Gain a broad theoretical understanding of Environmental Chemistry and microbiology.

CO2: Get accustomed with the measurement and analysis of various water characteristics.

CO3: To knowledge about the biological characteristics of drinking water and determination of the same.

CO4: Contemporary issues and developments.

CO5: Gain a broad theoretical understanding of atmospheric chemistry and analytical principles.

Course Contents

Modules	Blooms level*	Number of hours
Module I PRINCIPLES OF PHYSICAL CHEMISTRY Reversible reactions, equilibrium constant, Le-Chatelier principle. Reaction rate Order and molecularity, kinetic equations of different orders, reversible and consecutive reactions. Catalysis-type, characteristics, activation energy, mechanism of catalyst action, acid base catalysts. Photo catalysis. Adsorption-classification, adsorption of gases on solids, adsorption from solutions, ion exchange adsorption, applications, Longmuir theory	L1, L2 and L3	10
Module II PRINCIPLES OF AQUATIC CHEMISTRY AND BIOCHEMSITRY Water resources, sea water- composition, Ph of sea water. Humic substances. Aquatic chemical reactions- microbial redox reaction, iron and manganese bacteria, nitrogen transformation bacteria. Enzymes-mechanism and factors influencing enzyme action. Biodegradation-biodegradation of carbohydrates, proteins, fats and oils and detergents. Colloidal state- stability, kinetic, optical and electrical properties	L2 and L3	10
Module III ENVIRONMENTAL CHEMICALS Chemical speciation – speciation of lead, mercury, arsenic and chromium. Structure and property- activity relationship, fate of organics in the environment – transformation reactions hydrolysis, elimination, oxidation, reduction and photochemical transformation. Risk evaluation of environmental chemicals, Toxic chemicals in the environment, impact	L2, L3 and L4	10

on enzymes. Biochemical effects of arsenic, lead, mercury and pesticides		
Module IV ATMOSPHERIC CHEMISTRY		
Structure of atmosphere, chemical and photochemical reactions in the atmosphere. Ozone chemistry- formation and depletion of ozone layer, oxides of nitrogen and sulphur. Acid rain mechanism of formation and effects. Photochemical smog, and sulfurous smog. Greenhouse effect/global warming, greenhouse gases, effects	L2 and L3	10
MODULE V FUNDAMENTALS OF ANALYTICAL PRINCIPLES		
Analysis of water and water quality parameters -concept of pH, measurement of acidity, alkalinity, hardness, residual chlorine, chlorides, DO, BOD, COD, fluoride and nitrogen. Introduction to spectral analysis, colorimetry, fluorimetry, nephelometry, turbidimetry, absorption and emission spectral methods.		8

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text Books:

- Sawyer, C.N. and McCarty, P.L., and Parkin, G.F. Chemistry for Environmental Engineers, 4th Edition, McGraw Hill, New Delhi, 1994.
- Benefield, Judkins and Weand Process Chemistry for Water and Wastewater Treatment, Prentice Hall.


Reference Books:

- B.S Bhal, GD Tuli and Arun Bhal, Essentials of Physical Chemistry, S. Chand & Co Ltd.
- New Delhi, 2003
- Arun Kumar De, Environmental Chemistry, 5th ed, New Age International (P) Ltd, New Delhi
- Maier R. M., Pepper I. L., and Gerba C. P., Environmental Microbiology, Second Edition, Elsevier- AP, 2009.
- Pelczar, Jr, M.J., Chan, E.C.S., Krieg, R.N., and Pelczar M. F, Microbiology, 5thEdn., Tata McGraw-Hill Publishing Company Limited, New Delhi, 1996.
- Rittman B, McCarty P L McCarty P, Environmental Biotechnology: Principles and Applications, 2nd Edition, McGraw-Hill, 2000

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	--	--	1	--	--	--	--	--	--	--	--	--	2	--	1	-
CO2	2	1	--	--	2	--	--	--	--	--	--	--	2	--	1	-
CO3	1	--	--	--	--	--	--	--	--	--	--	--	2	--	1	-
CO4	--	--	2	1	--	--	--	--	--	--	--	--	2	--	1	-
CO5	2	--	--	--	--	1	--	--	--	1	--	--	2	--	1	-

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EVE4214	ENVIRONMENTAL ENGINEERING LAB	L	T	P	C
Version 2020.1	Date of Approval: 3rd June, 2020	0	0	2	1
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalogue Description:

Application of basic chemistry and chemical evaluations to measure physical, chemical, and bacteriological parameters of water and wastewater. Laboratory methods and interpretation of results with regard to environmental engineering applications such as design and operation of water and wastewater treatment processes, and to the control of the quality of natural water.

Course Objectives:

1. Understand the common environmental problems and its determination principles relating to water and wastewater quality are performed.
2. This course will help students know which tests are appropriate for given environmental problems, statistically interpret laboratorial results and write technical reports, and apply the laboratorial results to problem identification, quantification, and basic environmental design and technical solutions to real-world.

Course Outcomes:

On completion of this course, the students will be able to

CO1: Describe the knowledge in mathematics, science and engineering.

CO2: Design and conduct experiments, interpret and analyze data, and report results.

CO3: Analyze the ability to design of Civil Engineering systems or a process that meets desired specifications and requirements related to all fields of Civil Engineering.

CO4: Explain the ability to function on engineering and science laboratory teams, as well as on multidisciplinary design teams.

CO5: Explain to identify, formulate and solve environmental engineering problems.

Course Contents

Modules	Blooms level*	Number of hours
1. Introduction to Environmental Engineering laboratory	L1	1
2. Determination of pH of water	L1, L3 and L4	2
3. Determination of alkalinity	L1, L3 and L4	1
4. Determination of turbidity and the optimum coagulant dose	L1, L3 and L4	1
5. Determination of the optimum coagulant dose	L1, L3 and L4	1
6. Determination of hardness in water	L1, L3 and L4	1
7. Determination of chlorides in water	L1, L3 and L4	1
8. Determination of solids (total, dissolved, organic, inorganic and settleable) in water	L1, L3 and L4	1

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9. Determination of available chlorine in bleaching powder and the chlorine dose required to treat the given water sample	L1, L3 and L4	1
10. Determination of coliforms in water	L1, L3 and L4	1
11. Demonstration of Instrumental methods of pollutant analysis	L1, L3 and L4	1

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

Text Books:

- Garg, S.K., Environmental Engineering Vol. I & II, Khanna Publishers, New Delhi, 2000.
- Modi, P.N., Environmental Engineering Vol. I & II, Standard Book House, New Delhi, 2000.

Reference Books:

- Standard methods for the examination of water and wastewater, APHA, 20th Edition, Washington, 1998.


CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	2	--	--	--	--	--	--	--	1	--	2	1	1	--	3
CO2	2	--	--	--	--	--	--	--	1	1	--	1	1	--	3
CO3	--	--	--	--	--	--	--	--	1	1	1	1	1	--	3
CO4	2	--	--	--	--	--	--	--	--	1	--	1	1	--	3
CO5	2	--	--	--	--	--	--	--	--	1	--	1	1	--	3

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EVE4215	GIS AND REMOTE SENSING FOR LAND AND WATER MANAGEMENT	L	T	P	C
Version 2020.1	Date of Approval: 3rd June, 2020	3	1	0	4
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalogue Description

This course covers the remote sensing; Electromagnetic spectrum; Physics of remote sensing; Effects of atmosphere; Atmospheric windows, etc. Develop skills to use remote sensing for land cover classification, estimating evapotranspiration, water productivity, irrigation performance assessment & irrigation water accounting.

Objective:

The objective of the course is to,

1. Make the students understand the basics of emerging fields -remote sensing principles and Geographic Information System- so that they can utilize it for environmental system modeling

Course Outcomes

On completion of this course, the students will be able to:

CO1. Explain RS theory, technology, and typical applications of earth observation data

CO2. Understanding the basic principles of digital image processing & filtering

CO3. Determining the Geographic Information system

CO4. Understand the various techniques used for Data input and data editing-Input methods of GPS

Course Content

Modules	Blooms level*	Number of hours
Module I: Introduction to remote sensing – Electromagnetic spectrum – Physics of remote sensing – Effects of atmosphere – Atmospheric windows – Interaction of earth surface features with EMR – Spectral characteristics of vegetation, water, soil, etc. – Various types of platforms– Airborne and space-based platforms - Different types of aircraft – Manned and unmanned spacecraft used for data acquisition – Characteristics of different types of platforms – Characteristics of Remote Sensors –Multi spectral sensors – Multi Spectral Scanners – Microwave remote sensing- Factors affecting Microwave Measurement-Radar wave bands- SLAR and SAR.	L1, L2, L3	12
Module II: Sensors- Satellite system parameters- sensor parameters-spatial, spectral and radiometric resolution – False colour composite (FCC) – Multi spectral photographs – Thermal and microwave imaging system-Earth Resources satellite and Meteorological satellites Different types of data products and their characteristics – Image Interpretation - Basic principles of visual interpretation – Elements of image interpretation - Equipment for visual interpretation – Activities of image interpretation – Ground truth - Basic principles of digital image processing – filtering	L1, L2, L3	12
Module III : Geographic Information system – History and development of GIS – GIS definitions and Terminology -Architecture– System concepts – Coordinate	L1, L3, L4, L5	12

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systems – Standard GIS packages. Type of data – Spatial and non- spatial data – Data structure – Points – Lines – Polygon – Vector and raster – Files and data formats – Spatial data modeling –Raster GIS model and Vector GIS models. -GIS data file management and Database models		
Module IV: Data input and data editing-Input methods –GPS as data capture-data editing. Spatial analysis – Data retrieval – Query – Simple analysis – Record – Buffering and Overlay – Vector data analysis – Raster data analysis – Modelling in GIS – Digital elevation model – DTM – Modelling Networks. Integration of RS and GIS – Need and Facilities for integration. Application of these to water resources and environmental engg-Cadastral records and LIS	L1, L3, L4, L5	12

*Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text Books/References:

- Lillesand T.M. and Kiefer R.W., Remote sensing and Image Interpretation, Second Edition, John Wiley and Sons, 1987.
- AnjiReddy, M. Remote Sensing and Geographical Information System, BSP Publications., 2001.
- Chang, K (2005). Introduction to Geographic Information Systems, *Tata Mc Graw Hills Edition, NewDelhi.*
- Manual of Remote Sensing, American Society of Photogrammetry and Remote Sensing, 1993.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO3	PSO4
CO1	1	1	2	2	3	-	-	-	-	-	-	1	3	2	1	-
CO2	1	3	1	3	3	-	-	-	-	-	-	1	3	2	1	-
CO3	1	3	1	-	-	-	-	-	-	-	-	1	3	2	1	-
CO4	1	3	2	-	3	-	-	-	-	-	-	1	3	2	1	-

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STE4308	DESIGN OF TALL BUILDINGS	L	T	P	C
Version 2020.1	Date of Approval: 3rd June, 2020	3	1	0	4
Pre-requisites/Exposure					
Co-requisites					

Catalogue Description

The main aim is to learn and develop *design* criteria and guidance for the seismic *design* and review of tall buildings. The design philosophies and the factors affecting the height and structural form of tall buildings is discussed elaborately in this course.

Course Objectives

The objective of this course is to:

1. Impart knowledge about the tall structures and the elements associated with the same.
2. Gain knowledge about the different loading conditions, loads applied and techniques involved in the design of tall structures.

Course Outcomes

On completion of this course, the students will be able to

CO1: Define and describe the design philosophies, loadings and performance of various types of concretes used in tall buildings.

CO2: Define and describe the factors affecting the growth, height and structural form in high rise construction along with the various systems involved.

CO3: Model the various structural elements related to the tall structures.

CO4: Define and analyse the various movement of tall buildings and the effect on the same related to creep, shrinkage, prestressing, etc.

CO5: Evaluate different methods of analysis of frames in tall buildings.

Course Content

Modules	Blooms level*	Number of hours
Module I: Design philosophy, Loading, sequential loading, materials - high performance, concrete - Fibre reinforced Concrete - Light weight concrete - design mixes. Gravity loading Wind loading Earthquake loading .	L1, L2, L3, L4	9
Module II: Factors affecting growth, Height and Structural form. High rise behaviour, Rigid frames, braced frames, Infilled frames, shear walls, coupled shear walls, wall-frames, tubulars, cores, futrigger - braced and hybrid mega systems.	L1, L2, L3, L4	9
Module III: Modelling for approximate analysis, Accurate analysis and reduction techniques, Analysis of buildings as total structural system considering overall integrity and major subsystem interaction, Analysis for member forces, drift and twist, computerized general three dimensional analysis.	L1, L2, L3, L4, L5, L6	10

Module IV: Sectional shapes, properties and resisting capacity, design, deflection, cracking, prestressing, shear flow, Design for differential movement, creep and shrinkage effects, temperature effects and fire resistance, durability aspect of structures	L1, L2, L3, L4, L5, L6	10
Module V: Overall buckling analysis of frames, wall-frames, Approximate methods, second order effects of gravity of loading, P-Delta analysis, simultaneous first-order and PDelta analysis, Translational, Torsional instability, out of plumb effects, stiffness of member in stability, effect of foundation rotation.	L1, L2, L3, L4	10

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Textbooks:

- Bryan Stafford Smith and Alexcoull, Tall Building Structures - Analysis and Design, John Wiley and Sons, Inc., 1991.
- Taranath B.S., Structural Analysis and Design of Tall Buildings, McGraw Hill, New Delhi, 1988.
- Gupta.Y.P.,(Editor), Proceedings of National Seminar on High Rise Structures- Design and Construction Practices for Middle Level Cities, New Age International Limited, New Delhi,1995.

References:

- Lin T.Y and Stotes, B. D., Structural Concepts and systems for Architects and Engineers, John Wiley, 1988.
- Beedle.L.S., Advances in Tall Buildings, CBS Publishers and Distributors Delhi, 1986.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO4
CO1	1	1	--	--	2	1	--	2	2	2	2	3	3	1	2	3
CO2	1	1	--	--	--	--	--	2	1	1	2	3	3	1	2	3
CO3	1	1	--	--	--	2	--	2	2	1	2	3	3	1	2	3
CO4	1	1	--	--	--	--	--	1	1	2	2	3	3	1	2	3
CO5	1	1	--	--	--	--	--	1	1	2	2	3	3	1	2	3

1: strongly related, 2: moderately related and 3: weakly related



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STE4312	OFFSHORE STRUCTURES	L	T	P	C
Version 2020.1	Date of Approval: 3rd June, 2020	4	0	0	4
Pre-requisites/Exposure					
Co-requisites					

Catalogue Description

The Recent development and technological Advancement are moving into Offshore Structure. Unlike Ground Conditions, the Offshore Construction is Extreme. The course will give the introduction to the Offshore Structure and its components with major Loads acting on the Platform. How the Installation Process is carried out. The Introduction to Floating Structures gives the Idea about the construction in offshore industry.

Course Objectives

The objective of this course is to:

1. Define and comprehend offshore Structures, dedicated to the design, installation, management and maintenance of offshore and maritime structures
2. Evaluate the systems for the exploitation of fabrication techniques, structures assembling, conventional and renewable energies. In addition to the assessment and management of environmental.

Course Outcomes

On completion of this course, the students will be able to

- CO1. Define the concept on Simple Deck configurations for Lift and float-over installations.
- CO2. Comprehend importance of fixed and floating structures;
- CO3. Discuss different loads on offshore structure and their effect in environment
- CO4. Evaluate and estimate the hydrostatic Stability-Elastic plate theory; plated structures; stiffened plates-Buckling of plates.

Course content

Modules	Blooms level*	Number of hours
Module I Jacket concepts, redundant framing arrangement; Launch and Lift jackets; Simple Deck configurations for Lift and float-over installations; In-service and Pre-service Loads and analysis Jackup Rigs: Configuration and operation of jackups; Simplified analysis; Spud can penetration and extraction; Spud can – pile interaction.	L1, L2, L4	10
Module II Fixed and floating structures; Spars and TLP's; Modular topsides and integrated topsides; deck levels and jacket configurations; Spar and TLP hull arrangements; Load out: Fabrication yard, grillage and foundation conditions; Fabrication sequence of Launch jacket, lift jackets, topsides and modules; Weighing and weight control; Skidded, Trailer and lifted Load out methods Lifting and launch schemes for jackets, upending and setting, on bottom stability; Float-over installations; Dynamics of barge – cargo system.	L1, L2, L3, L4	14
Module III Loads on offshore Structure, Environmental Loads, Marine Growth, Force	L1, L2, L5, L6	12

On Large Dia. members. Accidental Loads, durability aspect of offshore structures and design life of structures		
Module IV Semi-submersible, TLPs, FPSOs, Spars and others-General concepts on estimation of loads and Hydrostatic Stability-Elastic plate theory; plated structures; stiffened plates-Buckling of plates; Semi-submersible; column.	L1, L4, L6 L2, L5,	12

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

- Ltd Oilfield Publications , Floating Structures: A Guide for the Design and Analysis, Oilfield Pubns Inc., June 1998.
- James F. Wilson , Dynamics of Offshore Structures, Wileys, 2nd Edition, October 2002.

Reference

- El-Reedy, M.A., Offshore Structures: Design, Construction and Maintenance, 1st Edition, Gulf Professional Publishing, July 2012.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	1	1	1	1	1	1	2	2	1	3	3	3	1	2	3
CO2	1	1	1	1	1	1	1	2	2	1	3	3	3	1	2	3
CO3	1	1	1	1	1	1	1	2	2	1	3	3	3	1	2	3
CO4	1	1	1	1	1	1	1	2	2	1	3	3	3	1	2	3

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STE4314	PRESTRESSED CONCRETE DESIGN	L	T	P	C
Version 2020.1	Date of Approval: 3rd June, 2020	3	1	0	4
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalogue Description

The course prestress concrete provides the knowledge of advanced concrete structure design in the Civil Engineering constructions. This subject pave the path in developing advanced science, mathematics, engineering solutions and technological advancement in a broader perspective leading to produce quality engineers and researchers in various ways. This programme based on concepts, analysis and design of prestressed concrete structural members and their behavior in the application of loadings. This unique combination paves the path to embroil students in modern high-grade structural engineering advancement in long term infrastructural growth in a sustainable manner in different Civil engineering project.

Course Objectives

The objective of this course is to:

1. Apply the advanced concept of structural concrete design that has come over the time to overcome the possibility of excessive cracks and deformation compare to normal RCC Structure.
2. Explain in skill gaining in the design of field of pre-stressed concrete members, behavior in adverse loading and their utility in large construction projects.

Course Outcomes

On completion of this course, the students will be able to

- CO1.Explain the basic requirements of pre-stressed structural design by understanding its principles and methods adopted in structural elements to overcome the weakness of concrete behavior.
- CO2.Develop the idea of pre-stressing to analysis of pre-stressed concrete sections, its behavior in case of external loadings and also to understand the pre-stressing loading effects in members with time and different losses associated to this.
- CO3.Describe the important behavior of pre-stressing structural units towards external loading and its effect on shear and torsion.
- CO4.Analyze and design of pre-stressed structural members to estimate its execution in large span structural systems.

Course Content

Modules	Blooms level*	Number of hours
Module 1: Materials for Pre-stressed Concrete and Pre-stressing Systems High strength concrete and high tensile steel – tensioning devices – pre-tensioning systems – post tensioning systems	L1, L2	12
Module II: Analysis of Pre-stress and Bending Stresses Analysis of pre-stress – resultant stresses at a sector – pressure line or thrust line and internal resisting couple – concept of load balancing – losses of pre-stress – deflection of beams.	L1, L2, L3, L4	12
Module III: Strength of Pre-stressed Concrete Sections in Flexure, Shear and Torsion Types of flexural failure – strain compatibility method – IS code procedure – design for limit state of shear and torsion, Design problems.	L1, L3, L4, L6	12

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Module IV: Design of Pre-stressed Concrete Beams and Slabs Transfer of pre-stress in pre tensioned and post tensioned members – design of anchorage zone reinforcement – design of simple beams – cable profiles – design of slabs, design problems.	L1, L3, L4, L5	12
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**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

- N. Krishna Raju, Pre-stressed concrete, Tata McGraw Hill, New Delhi, 2000.
- T.Y. Lin, Ned H. Burns, Design of Pre-stressed Concrete Structures, Wiley India Private Limited, New Delhi, 2004.
- R. Rajagopalan, Pre-stressed Concrete, Narosa publishers, New Delhi, 2004.

Reference Books

- P. Dayaratnam, Pre-stressed Concrete, Oxford & IBH, UK, 1982.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance


CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	2	-2	2	3	1	1	1	2	3	3	1	1	1	1	3
CO2	1	1	1	2	3	1	1	1	2	3	3	1	1	1	1	3
CO3	1	1	1	2	3	1	1	1	2	3	3	1	1	1	1	2
CO4	1	1	1	2	3	1	1	1	2	3	3	1	1	1	1	2

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STE4302	ADVANCED CONCRETE TECHNOLOGY	L	T	P	C
Version 2020.1	Date of Approval: 3rd June, 2020	3	1	0	4
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalogue Description

The course will define the concrete making material materials, their significance, uses, and their properties in different situations and design based on standard specifications. This will also enable the students to understand the manufacturing process of concrete and the precautions, various properties of concrete and different types of concrete and their application. This course illustrates about the use of different industrial wastes for the production of sustainable concrete also gives the description for the high strength concrete production.

Course Objectives

The objective of this course is to

1. Comprehend the proper selection of construction materials used in the field of Civil engineering construction sectors by knowing the material's properties, availability, strength and durability.
2. Research development in the field of advancement construction materials and their proper selection as per need and performance requirements on different situations.

Course Outcomes

On completion of this course, the students will be able to

- CO1: Judge the appropriate construction materials as per the construction activities concerned, knowing its performance, properties and criteria through different standardized tests.
- CO2: Quantifying, processing and Performance of concrete works for its quality assurance as per the standard guidelines.
- CO3: Describe the concrete behavior in fresh state and its behavior in different environmental condition and towards external loading agencies.
- CO4: Comprehend the selection of advanced concrete material for sustainable constructional applications and incorporating repair and rehabilitation process of concrete material.
- CO5: Selection and requirement of Form Work their importance in the field of construction.

Course Content

Modules	Blooms level*	Number of hours
Module 1: Materials Concrete Making Materials: Cement- Bogue compounds – Hydration Process– Types of cement – Aggregates – Gradation Charts – Combined Aggregate-Alkali Silica Reaction -Admixtures – Chemical and Mineral admixtures.	L1, L2	10
Module II: Fresh and Hardened Concrete Fresh Concrete - workability tests on Concrete Setting times of Fresh Concrete - Segregation and bleeding. Hardened Concrete: Abram's law- Gel space ratios, Maturity Concept – Stress Behaviour – Creep and Shrinkage – Durability tests on concrete – Non-destructive testing of concrete.	L1, L2	10
Module III: High Strength and High Performance Concrete High Strength Concrete – Micro structure – Manufacturing and Properties- Design of HSC Using Erintroy Shaklok Method- Ultra High Strength Concrete. High Performance Concrete- Requirements and properties of	L1, L2, L3, L4	9

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High-Performance Concrete- Design Considerations.		
Module IV: Special Concrete Self Compacting concrete- Introduction, Advantages, disadvantages, materials, mixed design procedure, tests, and standards, Rheology and workability of SCC, strength properties, applications – Polymer concrete – Fiber reinforced concrete –Reactive Powder concrete – Requirements and Guidelines – Advantages and Applications. Light weight concrete. Concrete mix design, Quality Control - Quality assurance - Quality audit- Mix Design method – BIS method, ACI method, DOE method.	L1, L2, L3, L4	10
Module V: Form Work Form work – materials – structural requirements – form work systems – connections – specifications – design of form work – shores – removal for forms – reshoring – failure of form work.	L1, L2, L3, L6	9

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

- Neville A.M., Properties of Concrete, Tata McGraw hill, New Delhi, 2013
- Shetty M.S., Concrete Technology, S Chand & Company, New Delhi, 1993.
- A.K. Sathakumar, Concrete Technology, Oxford Press, New Delhi, 2010
- Rajat Siddique, Special Structural concretes, Galgotia Publications, New Delhi, 2000
- P.K.Mehta, Concrete: Micro Structure, McGraw Hill Publication, New Delhi, 2009.
- Gambhir M.L., Concrete Technology, Tata McGraw Hill, New Delhi, 1995.

Reference Books

- Krishna Raju N., Design of Concrete Mixes, CBS publishers, New Delhi, 1988.
- Raina V.K., Concrete for Construction-Facts & Practices, Tata McGraw Hill publishing co., New Delhi, 1988.
- Murdock L.J., Concrete: Materials & Practice, Oxford University Press, Canada, 1991.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O 1	PS O 2	PS O 3	PS O 4
CO 1	1	3	3	3	3	1	32	3	3	3	3	1	1	1	2	3
CO 2	1	2	2	2	1	1	2	1	2	2	3	1	1	1	-1	2
CO 3	1	2	1	2	1	1	2	1	2	3	3	1	1	2	1	3
CO 4	1	2	1	2	2	1	3	1	1	3	2	1	1	2	1	2
CO 5	1	2	2	2	1	1	2	1	2	2	3	1	1	1	1	2

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STE4307	SOIL STRUCTURE INTERACTION	L	T	P	C
Version 2020.1	Date of Approval: 3rd June, 2020	3	1	0	4
Pre-requisites/Exposure					
Co-requisites					

Catalogue Description

To impart knowledge about the critical study of the foundation design , its nature in accordance with the soil structure interaction and applying the techniques to analyze it.

Course Objectives

The objective of this course is to:

1. Impart knowledge about the importance and usage of soil structure interaction.
2. Understand the various methods and parameters involved in SSI.
3. Impart knowledge about the behavior of soil under various circumstances related to the changes in structural behavior.

Course Outcomes

On completion of this course, the students will be able to

CO1: Define and describe soil structure interaction, understand its importance and evaluate soil structure interaction problems.

CO2: Define, describe and evaluate the various parameters and methods related to soil structure interaction.

CO3: Analyse the responses and behavior of soil in different conditions.

CO4: Evaluate and analyse the soil structure interaction in retaining structures.

Course Content

Modules	Blooms level*	Number of hours
Module I: Introduction, Importance and Applications of Soil Structure Interaction (SSI) Introduction to SSI, Importance of SSI, Applications and examples of SSI for structural engineer, Effects of structure roughness/smoothness on soil behaviour. General soil-structure interaction problems – Shallow Foundations, Sheet piles, Mat/Raft foundations etc., Contact pressures and soil-structure interaction for shallow Foundations, Fixed/Flexible Base.	L1, L2, L3, L4	12
Module II: Soil Structure Interaction Parameters Concept of sub grade modulus, effects/parameters influencing sub grade modulus, Flexible and Rigid Foundations – Rigidity calculations, Static and Dynamic Spring Constants – Winkler Model, Estimation of soil spring constants/stiffness for foundations design. SSI Models - Elastic Continuum, Winkler Model, Multi-Parameter Models, Hybrid Model. Structure Contact Interface.	L1, L2, L3, L4, L5, L6	12
Module III: Soil Behavior Arching in soils. Elastic and plastic analysis of stress distribution on yielding bases. Analysis of conduits/pipes in soils. Beams on elastic foundation concept, introduction to the solution of beam problems. Seismic Soil-Structure Interaction - Dynamic response of soil, strain-compatibility, and damping characteristics of soil-structure. Shake-	L1, L2, L3, L4	12

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table tests.		
Module IV: SSI in Retaining Structures Curved failure surfaces, their utility and analytical/graphical predictions from Mohr-Coulomb envelope and circle of stresses. Earth pressure computations by friction circle method. Earth pressure distribution on walls with limited/restrained deformations, Dubravo's analysis. Earth pressures on sheet piles, braced excavations. Design of supporting system for excavations. Soil-Pile Behaviour: Introduction, axial and laterally loaded piles, load-displacement behaviour, Modified Ramberg Osgood Model, pile group, interaction effect in pile group, soil-pile modelling in FEM, Elastic continuum and elasto-plastic analysis of piles and pile groups. Non-linear load-deflection response.	L1, L2, L3, L4	12

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Textbooks:

- Bowels J.E., "Analytical and Computer Methods in Foundation", McGraw Hill Book Co., New York, 2013.
- Desai C.S. and Christian J.T., "Numerical Methods in Geotechnical Engineering" McGraw Hill Book Co. New York, 2000.
- Soil Structure Interaction, the real behaviour of structures, Institution of Structural Engineers, 1989.
- Structure Soil Interaction- State of Art Report, Institution of Structural Engineers, 1978.

References:

- Elastic Analysis of Soil Foundation Interaction, Developments in Geotechnical Engg.vol-17, Elsevier Scientific Publishing Co., 2000.
- Prakash, S., and Sharma, H. D., Pile Foundations in Engineering Practice. John Wiley & Sons, New York, 1990.
- Foundation Engineering Handbook, H.-Y. Fang, Editor, Van Nostrand Reinhold, 2nd Ed., New York, USA. 1999.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO4
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CO2	1	1	--	--	--	--	--	2	1	1	2	3	3	2	1	3
CO3	1	1	--	--	--	2	--	2	2	1	2	3	3	2	1	3
CO4	1	1	--	--	--	--	--	1	1	2	2	3	3	2	1	3

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STE4304	ADVANCED CONSTRUCTION MATERIALS	L	T	P	C
Version 2020.1	Date of Approval: 3rd June, 2020	3	1	0	4
Pre-requisites/Exposure					
Co-requisites					

Catalogue Description

The course will define the concrete making material materials, their significance, uses, and their properties in different situations and design based on standard specifications. This will also enable the students to understand the manufacturing process of concrete and the precautions, various properties of concrete and different types of concrete and their application. This course illustrates the use of different industrial wastes for the production of sustainable concrete also gives the description for the high strength concrete production. The course will also give an insight into forensic civil engineering and its importance.

Course Objectives

The objective of the course is to

1. Impart knowledge about the various construction materials that can be used in construction work ranging from the cement, aggregates, admixtures and other waste materials that can be put to use in construction.
2. Impart knowledge about the Forensic Structural Engineering

Course outcomes

After completing the course, the students will be able to:

CO1: Define, describe and evaluate the fresh concrete properties and other tests on concrete along with the analysis of mix design of concrete.

CO2: Comprehend the various industrial waste materials in concrete, their influence on the properties of concrete along with the understanding of the high strength concrete in detail.

CO3: Define, describe and evaluate the various foams, fibres and light-weight materials used in concrete making. Also, describe the properties and usage of fibre reinforced concrete and geopolymer concrete.

CO4: Defining and comprehending various materials such as bearings, adhesives, sealants, polymer concrete composites, etc.

CO5: Comprehend, describe and evaluate the importance and use of forensic engineering in the construction industry.

Course Content

Modules	Blooms level*	Number of hours
Module I: Properties of Concrete Fresh concrete and its rheology. Mechanical, deformational behavior and microstructure of hardened concrete. Creep and shrinkage. Testing of concrete. mix design and properties of concrete; High strength concrete; High density and lightweight concretes; admixtures.	L1, L2, L3, L4	10
Module II: Industrial Waste Materials Industrial waste materials in concrete, their influence on physical and mechanical properties and durability of concrete, Concreting under extreme weather conditions, High strength concrete. Changes in	L1, L2, L3, L4	9

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concrete with time, Corrosion of concrete in various environments. Corrosion of reinforcing steel. Ferro-cement, material and properties.		
Module III: Various types of Concrete Foams and lightweight materials, fibre reinforced concrete. Types of fibres, workability, mechanical and physical properties of fibre reinforced concrete. Polymers in Civil Engineering, Polymers, geopolymer concrete, fibres and composites, Polymer concrete composites.	L1, L2, L3, L4	9
Module IV: Miscellaneous materials Fibre reinforced plastic in sandwich panels, modeling. Architectural use and aesthetics of composites. Adhesives and sealants. Structural elastomeric bearings and resilient seating. Moisture barriers, Polymer foams and polymers in Building	L1, L2, L3, L4	9
Module IV: Forensic Civil Engineering Introduction to forensic engineering, Importance of forensic engineering, Forensic investigations-tools and techniques, Failures types, causes and mechanisms, Structural failures, various structural failure mechanisms, causes of distress in structural members, removal of failures, retrofitting, rehabilitation, seismic failures, Diagnosis and Assessment of Distress: Visual inspection, non-destructive tests, ultrasonic pulse velocity method, rebound hammer technique, pull-out tests, Windsor probe test, crack detection techniques.	L1, L2, L3, L4	11

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books:

- Neville A.M., Properties of Concrete, Tata McGraw hill, New Delhi, 2013
- Shetty M.S., Concrete Technology, S Chand & Company, New Delhi, 1993.
- A.K. Sathakumar, Concrete Technology, Oxford Press, New Delhi, 2010
- Rajat Siddique, Special Structural concretes, Galgotia Publications, New Delhi, 2000
- P.K.Mehta, Concrete: Micro Structure, McGraw Hill Publication, New Delhi, 2009.
- Gambhir M.L., Concrete Technology, Tata McGraw Hill, New Delhi, 1995.
- Ratay, R.T., Forensic Structural Engineering Handbook. Second Edition, McGraw-Hill New York, 2001.
- Dovkaminetzky, Design and Construction Failures, Galgotia Publication, New Delhi, 2009.

References:

- Krishna Raju N., Design of Concrete Mixes, CBS publishers, New Delhi, 1988.
- Raina V.K., Concrete for Construction-Facts & Practices, Tata McGraw Hill publishing co., New Delhi, 1988.
- Murdock L.J., Concrete: Materials & Practice, Oxford University Press, Canada, 1991.
- Douglas, J. and Ransom, B., Understanding Building Failures,, Taylor and Francis Group, 2007.
- Emmons, P.H., Concrete Repair and Maintenance, Galgotia Publications, 2010.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

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CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	3	3	3	3	1	3	3	3	3	3	1	3	1	2	3
CO2	1	2	2	2	1	1	2	1	2	2	3	1	3	1	2	3
CO3	1	2	1	2	1	1	2	1	2	3	3	1	3	1	2	3
CO4	1	2	1	2	2	1	3	1	1	3	2	1	2	1	2	2
CO5	1	2	1	2	1	1	2	1	2	3	3	1	2	1	2	2

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STE4305	ADVANCED CONSTRUCTION MATERIALS LAB	L	T	P	C
Version 2020.1	Date of Approval: 3rd June, 2020	0	0	2	1
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

In this lab course the various tests are conducted on different types of basic construction materials such as aggregate, sand, cement, admixtures. It also includes the tests on concrete design mix, different tests related to fresh and hardened state concrete with both destructive and non-destructive tests.

Course Objective

The objective of the course is to

1. Assure the quality and properties of materials that are to be used for the construction such as; sand, aggregates, cements, admixtures.
2. Strengthen the knowledge on construction materials, their utilization and related tests for concrete structure quality improvement, evaluation and its maintenance.

Course Outcomes

On the completion of this course, the student will be able to:

CO1. Perform the tests on various construction materials such as cement, aggregates, etc. to apply the results in the practical life.

CO2. Perform different tests such as workability and hardened concrete tests used in the construction for the quality assurance.

CO3. Convince on different tests required on concrete, its non-destructive test in its harden states.

CO4. Perform the various tests on lightweight materials used in concrete.

Course Content

List of Experiments	Blooms level*	Number of hours
Module I: Tests on cement - Consistency, Setting times, Soundness, Compressive Strength; Tests on aggregates: Gradation Charts of Aggregates, Bulking of fine Aggregate, Aggregate Crushing and Impact value	L1, L2, L3, L5, L6	6
Module II: Workability Tests on Fresh self compacting concrete; Test the compressive strength of concrete cubes by adding the industrial waste products in replacement of cement/ aggregates, permeability and durability tests on concrete	L1, L2, L3, L5, L6	8
Module III: Non Destructive Testing of Concrete: Rebound hammer test, Pull out test, Ultrasonic pulse velocity test.	L1, L2, L3, L5, L6	4
Module IV: Use of light weight materials in concrete, fibre reinforced concrete design, design of mixes for SCC (self compacting concrete)	L1, L2, L3, L5, L6	6

*Bloom's Level:

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

References

- Relevant Indian Standards, ASTM Standards, BIS, ISO.
- IS: 456, IS: 383, IS: 2386, IS: 516, IS: 10262, etc.
- IS: 13311- part 1- 1992, IS: 13311- part 2- 1992

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Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination
Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva


CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	2	3	2	3	1	2	1	1	1	--	1	3	1	2	3
CO2	1	2	2	1	3	1	1	1	1	1	--	1	3	1	2	3
CO3	1	2	3	1	3	1	1	1	1	1	--	1	3	1	2	3
CO4	1	2	1	1	3	1	1	1	1	1	--	1	3	1	2	3

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STE4309	ADVANCED STEEL AND CONCRETE COMPOSITE STRUCTURES	L	T	P	C
Version 2020.1	Date of Approval: 3rd June, 2020	3	1	0	4
Pre-requisites/Exposure					
Co-requisites					

Catalogue Description

To impart knowledge and carry out the analysis and design of steel and concrete composite structural components. Steel and concrete composite structures are a structurally efficient, fast-to-erect and economically competitive solution for buildings. In this course, the general modelling principles and design criteria for these structures are discussed.

Course Objectives

The objective of this course is to:

1. Design composite beams, columns, trusses and box-girder bridges including the related connections.
2. Expose the students on case studies related to steel-concrete constructions of buildings

Course Outcomes

On completion of this course, the students will be able to

CO1: Define and describe the fibre reinforced composites and their allied materials.

CO2: Evaluate the behaviour of unidirectional lamina and transformation of stress strain and other parameters.

CO3: Evaluate and analyze the elastic behaviour of multidirectional laminates.

CO4: Evaluate and analyze the bending of laminated composite plates

Course Content

Modules	Blooms level*	Number of hours
Module I: Introduction: definition and characteristics, fibres, matrices, fibre reinforced composites, advantages and limitations, basic concepts and characteristics: isotropy, orthotropy, classification, lamina and laminate, micromechanics and macromechanics, constituent materials and properties.	L1, L2, L3, L5	12
Module II: Elastic behaviour of unidirectional lamina: specially orthotropic and transversely isotropic material, relation between mathematical and engineering constants, stress strain relations for thin lamina, transformation of stress and strain, transformation of elastic parameters, transformation of stress-strain relations in terms of engineering constants.	L1, L2, L3	12
Module III: Elastic behaviour of multidirectional laminates, symmetric and balanced laminates, design considerations, computational procedure for finding engineering elastic properties, stress and failure analysis of multidirectional laminates.	L1, L2, L3,	12
Module IV: Bending of laminated composite plates, thin laminated plate theory, deflection of all edges simply supported rectangular symmetric cross-ply laminate, two opposite edges simply supported.	L1, L2, L3, L4	12

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**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Textbooks

- I.M. Daniel & O. Ishai, Engineering Mechanics of Composite Materials, Oxford Press, Oxford, 1999.
- S.W.Tsai & H.T.Hahn, Introduction to Composite Materials: Technomic Pub. Co. Inc., USA., 2000.
- Johnson R.P., Composite Structures of Steel and Concrete Beams, Slabs, Columns and Frames for Buildings, Vol. I, Blackwell Scientific Publications, 2004.

References

- Oehlers D.J. and Bradford M.A., Composite Steel and Concrete Structural Members, Fundamental behaviour, Pergamon press, Oxford, 1995.
- Owens G.W and Knowles. P, Steel Designers Manual, Steel Concrete Institute(UK), Oxford Blackwell Scientific Publications, 1992.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance


CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO4
CO1	1	1	--	--	2	1	--	2	2	2	2	3	3	1	2	3
CO2	1	1	--	--	--	--	--	2	1	1	2	3	3	1	2	3
CO3	1	1	--	--	--	2	--	2	2	1	2	3	3	1	2	3
CO4	1	1	--	--	--	--	--	1	1	2	2	3	3	1	2	3

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STE4310	ADVANCED STRUCTURAL ENGINEERING LAB	L	T	P	C
Version 2020.1	Date of Approval: 3rd June, 2020	0	0	4	2
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

This course contains the basic and advanced testing procedures for the different materials in construction such as sand, aggregates, cement, concrete, etc. and analysis of building using software. The tests which are practically used at site in the construction field will be discussed in details in this course.

Course Objectives

The objective of the course is to

1. Assure the quality and properties of materials that are to be used for the construction such as; sand, aggregates, cements, admixtures.
2. Strengthen the knowledge on construction materials, their utilization and related tests for concrete structure quality improvement, evaluation and its maintenance & Analysis of Buildings.

Course Outcomes

On the completion of this course, the student will be able to:

CO1. Perform different tests on cement, sand, aggregates used in the construction for the quality assurance.

CO2. Carry out the mix design for high strength concrete and evaluate the use of admixtures in concrete.

CO3. Convince on different tests required on concrete, its destructive and non-destructive test in its harden states.

CO4. Analyse and Design a building using Software.

Course Content

Modules	Blooms level*	Number of hours
Module I: Basic tests for materials: cement, aggregates, flyash, GGBS etc.	L1, L2, L3, L5	6
Module II: Mix design for high strength concrete, use of admixture, Marsh Cone Test	L1, L2, L3	6
Module III: Non-destructive evaluation of strength of concrete/steel specimens Testing of beams for compressive strength, Testing of beams for flexural strength	L1, L2, L3,	6
Module IV: Analyse and Design a building using STAAD Pro/Etabs. Design of Industrial Roof Truss	L1, L2, L3, L4	6

*Bloom's Level:

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

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Text Books

- P.C. Aitcin, High-Performance Concrete, E & FN SPON, 1998.
- E. Bray and R. K. Stanley, Non Destructive Evaluation, CRC Press, USA, 2002.

References:

- Relevant Indian Standards, ASTM Standards, BIS, ISO.
- IS: 456, IS: 383, IS: 2386, IS: 516, IS: 10262, etc.
- IS: 13311- part 1- 1992, IS: 13311- part 2- 1992.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination**Examination Scheme:**

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO4
CO1	1	2	3	2	3	1	2	1	1	1	--	1	3	2	1	3
CO2	1	2	2	1	3	1	1	1	1	1	--	1	3	2	1	3
CO3	1	2	3	1	3	1	1	1	1	1	--	1	3	2	1	3
CO4	1	2	1	1	3	1	1	1	1	1	--	1	3	2	1	3

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CME4307	GIS IN CONSTRUCTION ENGINEERING	L	T	P	C
Version 2020.1	Date of Approval: 3rd June, 2020	3	1	0	4
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalogue Description

This course will help the students to understand and introduce the elements of GIS as applied to construction management and achieve an awareness on application techniques.

Course Objectives

The objective of the course is to

1. Comprehend the various types of data, data analysis methods and data quality requirements.
2. Develop the means of getting suitable data output and to use the data output for construction management using GIS tools.

Course Outcomes

On completion of this course, the students will be able to

CO1: Define and describe the basic concepts of GIS, its components and types of maps.

CO2: Evaluate the different data in the GIS software.

CO3: Study and comprehend the topology related factors, modelling and other data interpretation.

CO4: Apply the knowledge of GIS into the field application.

Course Content

Modules	Blooms level*	Number of hours
Module I: GIS Basic Concepts Definition - Components of GIS -Maps - Definition - Types of Maps - Characteristics of Maps -Map Projections -- Hardware, Software and Organizational Context.	L1, L2, L3	12
Module II: GIS software. Data Types - Spatial and Non-Spatial - Spatial Data - Points, Lines and areas- Non-spatial data - Nominal, Ordinal, Interval and Ratio - Digitizer - Scanner - Editing and Cleaning - Geo reference data. Raster and Vector Data Structure - Raster data storage - Run length, Chain and Block Coding - Vector Data Storage	L1, L2, L3	12
Module III: Topology – Topological Models - Arc Node Structure - Surface Data - DEM - Grid DEM and TIN structure- Applications of DEM. Reclassification - Measurement - Buffering - Overlaying - SQL for Queries - Neighborhood and zonal operations - Data Quality - Components of data quality - Sources of errors in GIS - Meta data. Output - Maps, Graphs, Charts, Plots, Reports - Printers – Plotters.	L1, L2, L3	12
Module IV: Fields of application - Natural Resource Management, construction management-Parcel based, AM/FM applications examples	L1, L2, L3, L4	12

*Bloom's Level:

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text books

- Robert Laurini and Derek Thompson, Fundamentals of Spatial Information Systems, Academic Press, New Delhi, 1996.
- Anji Reddy, Remote Sensing and Geographical Information Systems , BS Publications, New Delhi, 2001.
- Srinivas M.G. (Edited by), Remote Sensing Applications, Narosa Publishing House, New Delhi, 2001.

References

- Burrough P.A., Principles of GIS for Land Resources Assessment, Oxford Publication, Oxford, 1998.
- Rhind, D., Understanding of GIS, The ARC / INFO Method, ESRI Press, New York, 1990.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination**Examination Scheme:**

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance


CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	2	2	3	-	--	3	--	3	3	3	1	3	1	2	3
CO2	1	2	1	3	2	--	2	--	3	3	3	1	2	1	2	3
CO3	1	2	---	3	-	2	3-	--	3	3	3	1	3	1	2	3
CO4	1	2	--	3	-	--	--	--	3	3	3	1	3	1	2	3

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CME4310	CONSTRUCTION QUALITY & SAFETY MANAGEMENT	L	T	P	C
Version 2020.1	Date of Approval: 3rd June, 2020	3	1	0	4
Pre-requisites/Exposure	-				
Co-requisites	-				

Catalogue Description

The course covers the construction quality management aspect related to Total quality management (TOC), various concepts of quality, etc. This course will help the students to understand the importance of quality in construction industry and the aspects of completing the projects on time. This will also impart knowledge about the safety measures required during construction work and the management of the same.

Course Objectives

The objective of this course is to:

1. Comprehend the importance of quality in construction industry related to various aspects of quality.
2. Development of idea related to specification, standardization, bid, environmental safety and management.

Course Outcomes

On completion of this course, the students will be able to:

- CO1: Define and describe the quality policy in Indian construction industry and their effect on economy.
CO2: Evaluate and comprehend the concept of quality and apply the procedure in the practical use.
CO3: Comprehend the quality assurance and control programmes to be utilized in practical applications.
CO4: Define and describe the various aspects of quality and various modes of analysis of the same.
CO5: Comprehend the ideas related to specification, standardization, bid, environmental safety and management.

Course Content

Modules	Blooms level*	Number of hours
Module I: Quality policy in construction industry-Consumer satisfaction-Ergonomics-Time of completion, Statistical tolerance.	L1, L2 and L3	10
Module II: Taguchi's concept of quality-contract and construction programming-inspection procedures.	L1, L2 and L3	10
Module III: Quality assurance/Quality control Programme and cost implication.	L1, L2, and L3	8
Module IV: Different aspects of quality-appraisals-failure mode analysis-stability methods and tools-Influence of drawings-detailing.	L1, L2 and L3	8
Module V: Specifications- standardization- Bid preparation-construction activity-Environmental safety-social and environmental factors.Basic construction safety: Hazards, human factors in construction safety, introduction to occupational health and safety, problem areas in construction safety, elements of an effective safety program, job-site safety assessment, safety planning, safety audit	L1, L2 and L3	12

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation


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Text Books

- Clarkson H. Oglesby, Productivity improvement in construction, McGraw Hill, New York, 2000.
- James, J.O Brain, Construction inspection handbook-quality assurance and quality control, Van Nostrand, New York, 1989.

References

- Juran Frank, J.M.and Gryana,F.M. Quality planning and analysis ,Tata McGraw Hill, New Delhi, 1982.
- Kwaku A., Tenah and Jose M. Guevera, Fundamental of construction management and organization PHI, USA, 1995.

Modes of Evaluation: Quiz/Assignment/Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance


CO, PO and PSO mapping

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CO1	3	2	3	3	-	2	3	-	3	3	2	1	3	1	2	3
CO2	3	2	-	3	-	-	-	3	-	3	2	1	3	1	1	3
CO3	3	2	-	3	-	2	-	-	3	3	2	1	3	1	1	3
CO4	3	2	3	3	-	-	3	-	-	3	2	1	3	1	1	3
CO5	3	2	-	3	-	-	-	-	3	3	2	1	3	1	2	3

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CME4308	OPERATIONS STRATEGY	L	T	P	C
Version 2020.1	Date of Approval: 3rd June, 2020	4	0	0	4
Pre-requisites/ Exposure					
Co-requisites					

Catalogue Description

In this course the concepts of planning, strategizing the management tools and techniques are discussed. A clear understanding of various practical aspects of operations strategy, selection of process and infrastructure development will be explained. The aim of this course is to make the students familiar with the changes required in the operational strategy with rapidly changing environment in workplace and to adapt oneself according the changes.

Course Objectives

The objective of this course is to:

1. Equip the students with concepts of developing and implementing the operation strategy.
2. Provide an outline for implementing the operation strategy and to calculate the various financial and accounting perspectives in restructuring any organization.

Course Outcomes

On completion of this course, the students will be able to

CO1: Define, describe the role and importance of operation strategy, its dynamics and its implications on manufacturing industry.

CO2: Identify the principles and concepts of developing the operation strategy and its implications in infrastructure development.

CO3: Identifying the principles and concepts of Focused Manufacturing demonstrating the importance of human aspects and categorizing the advantages and disadvantages of technology in use.

CO4: Calculating and describing the various financial and accounting perspectives in improving, redefining and restructuring any organization.

Course Content

Modules	Blooms level*	Number of hours
Module I: Introduction Introduction, Role and Objectives of Operations Strategy, Incorporating Operations Strategy in the Corporate Strategy, Dynamics of process-product life cycles, Defining a Operations Strategy in Overall Environment, Manufacturing Implications of Corporate Marketing Decisions.	L1, L2	12
Module II: Developing Operations Strategy Principles and Concepts of Developing a Operations Strategy, Process of Operations Strategy Formulation, Methodology of Developing Operations Strategy, Business Implication of Process Choice, Product Profiling, Manufacturing Audit Approach, Manufacturing Restructuring, Infrastructure Development.	L1, L2	12
Module III: Implementation Of Operations Strategy Principles and Concepts of Focused Manufacturing, Involvement of Human Aspects, Effect of Technology Advancement and Technology Management, Integration of Operations Strategy Planning and Technology Planning, Pre-requisites of Organized and Focused Manufacturing Strategy & Unit.	L1, L2, L3	12

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Module IV: Redefining Operations Strategy Value of Response Time and Product Variety in Operations Strategy, Management of Quality, Planning and Controlling System, Accounting & Financial Perspectives and Manufacturing System, Improving Manufacturing Process by Redefining & Restructuring Process Positioning	L3, L4	12
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**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

- Hill, T., Operation Management, Palgrave Macmillan; Third edition, New York, 2012.
- Mittal, A., Strategic Management: Formulation, Implementation and Control, TMH, New Delhi, 2017.
- Slack, N., Operation Strategy, Financial Times/ Prentice Hall; 2 edition, New York, 1997

References

- Hayes, R.H, Strategic Operations: Competing Through Capabilities, Free Press, USA, 1996.
- Soni, S. K, Construction management and Equipment, S.K. Kataria and Sons, New Delhi, 2016.
- Nicholas, Competitive Manufacturing Management, Tata McGraw-Hill, New Delhi, 2008.

Modes of Evaluation: Quiz/Assignment/Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
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CO2	1	2	3	-	--	--	--	--	--	--	--	--	2	1	2	-
CO3	1	2	3	3	3	--	--	--	--	--	--	3	2	1	2	-
CO4	1	1		2	--	--	--	--	--	--	--	--	2	1	2	-

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CME4315	ADVANCED CONCRETE TECHNOLOGY	L	T	P	C
Version 2020.1	Date of Approval: 3rd June, 2020	3	1	0	4
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalogue Description

The course will define the concrete making material materials, their significance, uses, and their properties in different situations and design based on standard specifications. This will also enable the students to understand the manufacturing process of concrete and the precautions, various properties of concrete and different types of concrete and their application. This course illustrates about the use of different industrial wastes for the production of sustainable concrete also gives the description for the high strength concrete production.

Course Objectives

The objective of this course is to

1. Comprehend the proper selection of construction materials used in the field of Civil engineering construction sectors by knowing the material's properties, availability, strength and durability.
2. Research development in the field of advancement construction materials and their proper selection as per need and performance requirements on different situations.

Course Outcomes

On completion of this course, the students will be able to

CO1 Judge the appropriate construction materials as per the construction activities concerned, knowing its performance, properties and criteria through different standardized tests.

CO2 Quantifying, processing and Performance of concrete works for its quality assurance as per the standard guidelines.

CO3. Describe the concrete behavior in fresh state and its behavior in different environmental condition and towards external loading agencies.

CO4. Comprehend the selection of advanced concrete material for sustainable constructional applications and incorporating repair and rehabilitation process of concrete material.

CO5 Selection and requirement of Form Work their importance in the field of construction.

Course Content

Modules	Blooms level*	Number of hours
Module 1: Materials Concrete Making Materials: Cement- Bogue compounds – Hydration Process– Types of cement – Aggregates – Gradation Charts – Combined Aggregate-Alkali Silica Reaction -Admixtures – Chemical and Mineral admixtures.	L1, L2	10
Module II: Fresh and Hardened Concrete Fresh Concrete - workability tests on Concrete Setting times of Fresh Concrete - Segregation and bleeding. Hardened Concrete: Abram's law- Gel space ratios, Maturity Concept – Stress Behaviour – Creep and Shrinkage – Durability tests on concrete – Non-destructive testing of concrete.	L1, L2	10
Module III: High Strength and High Performance Concrete High Strength Concrete – Micro structure – Manufacturing and Properties- Design of HSC Using Erintroy Shaklok Method- Ultra High Strength Concrete. High Performance Concrete- Requirements and properties of	L1, L2, L3, L4	9

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High-Performance Concrete- Design Considerations.		
Module IV: Special Concrete Special Concrete: Self Compacting concrete – Polymer concrete – Fiber reinforced concrete –Reactive Powder concrete – Requirements and Guidelines – Advantages and Applications. Light weight concrete. Concrete mix design, Quality Control - Quality assurance - Quality audit- Mix Design method – BIS method, ACI method, DOE method.	L1, L2, L3, L4	10
Module V: Form Work Form work – materials – structural requirements – form work systems – connections – specifications – design of form work – shores – removal for forms – reshoring – failure of form work.	L1, L2, L3, L6	9

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

- Neville A.M., Properties of Concrete, Tata McGraw hill, New Delhi, 2013
- Shetty M.S., Concrete Technology, S Chand & Company, New Delhi, 1993.
- A.K. Sathakumar, Concrete Technology, Oxford Press, New Delhi, 2010
- Rajat Siddique, Special Structural concretes, Galgotia Publications, New Delhi, 2000
- P.K.Mehta, Concrete: Micro Structure, McGraw Hill Publication, New Delhi, 2009.
- Gambhir M.L., Concrete Technology, Tata McGraw Hill, New Delhi, 1995.

Reference Books

- Krishna Raju N., Design of Concrete Mixes, CBS publishers, New Delhi, 1988.
- Raina V.K., Concrete for Construction-Facts & Practices, Tata McGraw Hill publishing co., New Delhi, 1988.
- Murdock L.J., Concrete: Materials & Practice, Oxford University Press, Canada, 1991.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O 1	PS O 2	PS O 3	PS O 4
CO 1	1	3	3	3	3	1	32	3	3	3	3	1	1	1	2	3
CO 2	1	2	2	2	1	1	2	1	2	2	3	1	1	1	-1	2
CO 3	1	2	1	2	1	1	2	1	2	3	3	1	1	2	1	3
CO 4	1	2	1	2	2	1	3	1	1	3	2	1	1	2	1	2
CO 5	1	2	2	2	1	1	2	1	2	2	3	1	1	1	1	2

1: strongly related, 2: moderately related and 3: weakly related

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CME4302	HIGHWAY CONSTRUCTION AND MAINTENANCE	L	T	P	C
Version 2020.1	Date of Approval: 3rd June, 2020	3	1	0	4
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

This course deals with the advanced knowledge of the transportation engineering. The aspects related to highway construction such as embankment construction, bituminous construction, rigid pavement construction (concrete road), hill road construction, etc. are dealt with in this course. The maintenance management related to highways have also been discussed elaborately in this course.

Course Objectives

The objectives of this course are:

1. Impart knowledge about the highway construction techniques related to embankment, flexible and rigid pavements as well as hill roads.
2. Understanding the maintenance management related to road construction.

Course outcomes

After completing the course, the students will be able to:

CO1: Define, describe and evaluate the construction of embankments along with their maintenance management.

CO2: Describe and analyze the bituminous construction techniques along with their maintenance management.

CO3: Describe and analyze the concrete road construction techniques along with their maintenance management.

CO4: Describe and analyze the hill road construction techniques along with their maintenance management.

Course Content

Modules	Blooms level*	Number of hours
Module I: Embankment Construction: Formation cutting in Soil and hard rock, Preparation of Subgrade, Ground improvement, Retaining and Breast walls on hill roads, Granular and Stabilized, Sub – bases / bases, Water Bound Macadam (WBM), Wet Mix Macadam (WMM), Cement treated bases, Dry Lean Concrete (DLC). Maintenance of each of the Bituminous construction.	L1, L2, L3, L4	12
Module II: Bituminous Constructions: Types of Bituminous Constructions, Interface Treatments, Bituminous Surfacing and wearing Courses for roads and bridge deck slabs and their maintenance , Selection of wearing Course under different Climatic and Traffic conditions, IRC specifications, Construction techniques and Quality Control.	L1, L2, L3, L4	12
Module III: Concrete road construction: Test on Concrete mixes, Construction equipment, Method of construction of joints in concrete pavements, Quality Control in Construction of Concrete pavements, Construction of Continuously reinforced, Prestressed, Steel Fibre Reinforced	L1, L2, L3, L4	12

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(SFRC) Pavements, IRC, MORT&H, ACI Specifications, AASHTO Specifications, Recycled pavements, Non – Conventional Pavements, Overlay Construction. Maintenance of paved and unpaved roads.		
Module IV: Hill Roads Construction: Stability of Slopes, Landslides – Causes and Control measures, Construction of Bituminous and Cement Concrete roads at high altitudes, Hill road drainage, Construction and maintenance problems and remedial measures.	L1, L2, L3, L4	12

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

- Kadiyali, L. R., Traffic Engineering and Transportation Planning, Khanna Publishers, New Delhi, 2011.
- Pignataro, L. J., Traffic Engineering: Theory and Practice, Prentice Hall, Inc., New York, 1973.
- Roess, R. P., Prassas, E. S., and McShane, W. R., Traffic Engineering, 4th Edition, Prentice Hall, New York, 2010.

References

- Institute of Transportation Engineers, Traffic Engineering Hand Book, 4th Edition, Prentice Hall, New York, 1999.
- Khanna and Justo, Highway Engineering. Nem Chand & Bros, New Delhi, 2003.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO4
CO1	1	-	2	3	2	3	-	3	-	3	-	3	2	1	3	-
CO2	1	2	-	3	-	2	-	3	-	-	3	3	2	1	3	-
CO3	1	3	2	-	2	3	-	-	2	3	-	3	2	1	3	-
CO4	1	-	2	3	-	-	3	-	-	3	3	3	2	1	3	-

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CME4303	HIGHWAY CONSTRUCTION AND MAINTENANCE LAB	L	T	P	C
Version 2020.1	Date of Approval: 3rd June, 2020	0	0	2	1
Pre-requisites/Exposure					
Co-requisites					

Catalog description

In this lab course the various tests are conducted on different types of basic construction materials such as aggregate, sand, cement, admixtures. It also includes the tests on bituminous design mix, different tests related to fresh and hardened state concrete with both destructive and non-destructive tests.

Course Objective:

The objective of the course is to

1. Assure the quality and properties of materials that are to be used for the construction such as; sand, aggregates, cements, admixtures.
2. Strengthen the knowledge on construction materials especially used in construction of roads and pavements, their utilization and related tests for concrete structure quality improvement, evaluation and its maintenance.

Course Outcomes:

On the completion of this course, the student will be able to:

CO1. Perform the tests on various construction materials to apply the results in the practical life.

CO2. Perform different tests on cement, sand, aggregates, bitumen and bituminous mixes used in the construction for the quality assurance.

CO3. Carry out the bituminous mix design

CO4. Evaluate and maintain the quality of materials based constructions and perform the tests to evaluate the pavements.

Course Content

List of Experiments	Blooms level*	Number of hours
Module I: Laboratory tests on soils 1. Moisture Content Test 2. Proctor Test 3. CBR Test	L1, L2, L3, L5, L6	6
Module II: Tests on aggregate; Tests on bitumen 1. Crushing Value Test 2. Impact Value Test 3. Los Angeles Abrasion Test 4. Shape Test 5. Specific Gravity & Water Absorption Test 6. Penetration Test 7. Softening Point Test 8. Flash & Fire Test 9. Ductility Test 10. Viscosity Test	L1, L2, L3, L5, L6	6
Module III: Bituminous mix design 1. Marshall Method of Mix Design	L1, L2, L3, L5, L6	6
Module IV: Pavement evaluation tests 1. Bump Integrator Test 2. Benkelman Beam Test	L1, L2, L3, L5, L6	6

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**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

- Khanna, S. K., Justo, C. E. G., and Veeraragavan, A., Highway Material Testing, New Chand Publications, New Delhi, 2009.

References

- Relevant Indian Standards, ASTM Standards, BIS, ISO.
- IS: 456, IS: 383, IS: 2386, IS: 516, IS: 10262, etc.
- IS: 13311- part 1- 1992, IS: 13311- part 2- 1992

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva


CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O 1	PS O 2	PS O 3	PS O 4
CO 1	1	2	3	2	3	1	2	1	1	1	--	1	2	1	2	3
CO 2	1	2	2	1	3	1	1	1	1	1	--	1	2	1	2	3
CO 3	1	2	3	1	3	1	1	1	1	1	--	1	2	1	2	3
CO 4	1	2	1	1	3	1	1	1	1	1	--	1	2	1	2	3

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CME4304	GEOTECHNICS IN CONSTRUCTION	L	T	P	C
Version 2020.1	Date of Approval: 3rd June, 2020	3	1	0	4
Pre-requisites/ Exposure					
Co-requisites					

Catalogue Description

This course deals with the advanced knowledge of the geotechnical engineering. The aspects related to the various constructions required in geotechnical engineering ranging from the foundations to various grouting processes and earth reinforcement.

Course Objectives

The objectives of this course are:

1. Impart knowledge about the geotechnical construction techniques.
2. Impart knowledge about the various constructions required in geotechnical engineering ranging from the foundations to various grouting processes and earth reinforcement.

Course outcomes

After completing the course, the students will be able to:

CO1: Define and describe the shallow foundation and the analysis of the same for practical use.

CO2: Evaluate and analyze the deep foundation especially the pile and pile cap design.

CO3: Define earth reinforcement techniques and comprehend the principals behind it for practical applications.

CO4: Apply the knowledge of grouting and other stabilizing techniques for practical applications.

Course Content

Modules	Blooms level*	Number of hours
Module I: Shallow Foundation: need of foundation engineering, shallow foundation, construction methods in shallow foundation , analysis of foundation, Foundation design in relation to ground movements - Foundation on recent refuse fills - Design of Foundation for seismic forces – Codal recommendations - Introduction to theory of vibration - Design of Block foundation – Codal Recommendations.	L1, L2, L3, L4	12
Module II: Deep foundation: design of pile foundation, pile cap analysis, pile – raft system basic interactive analysis – pile and pile groups subjected to vibrations – fundamental solutions. design of caissons.	L1, L2, L3, L4	12
Module III: Earth reinforcement – Principles and basis mechanism of reinforced earth-reinforced soil retaining structures-simple design, Synthetic and natural fibre based Geotextiles and their applications. Filtration, drainage, separation, erosion control – case studies.	L1, L2, L3, L4	12
Module IV: Grouting techniques – Types of grout – Suspension and solution grouts – Basic requirements of grout. Grouting equipment – principle of injection-injection methods – properties of treated ground-application of jet grouting-grout monitoring – Electro – chemical stabilization – Stabilization with cement, lime etc. –	L1, L2, L3, L4	12

Stabilization of expansive clays.		
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**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

- Donald P. Coduto, Foundation Design Principles and Practices - Prentice Hall, Inc., Englewood Cliffs, New Jersey, 1996.
- Winterkorn, H.F. and Fang, Y.F., Foundation Engineering Handbook, Van Nostrand Reinhold, New York, 1994.
- Peck, R.B., Hansen, W.E., and Thornburn, W.H., Foundation Engineering, John Wiley, 1974.
- Robert Wade Brown, Practical Foundation Engineering Handbook, McGraw Hill, New York, 1996.
- Bowles, J.E., Foundation Analysis and Design, McGraw Hill, New York, 1996.

References

- Tomlinson, M.J. Foundation Engineering, ELBS, Long man Group, UK Ltd., England, 1995.
- Swami Saran, Soil Dynamics and Machine Foundation, Galgottia Publications Pvt. Ltd., NewDelhi-110002, 1999.
- Vargheese, P.C. Limit State Design of Reinforced concrete, Prentice-Hall of India, 1994.
- Day, R.W., Geotechnical and Foundation Engineering, Design and Construction, McGrawHill 1999.
- Grigorian, Pile Foundation for Buildings and Structures in collapsible Soil, Oxford & IBH Publishing Co, Pvt. Ltd., New Delhi, 1999.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO4
CO1	1	-	2	3	2	3	-	3	-	3	-	3	2	1	3	-
CO2	1	2	-	3	-	2	-	3	-	-	3	3	2	1	3	-
CO3	1	3	2	-	2	3	-	-	2	3	-	3	2	1	3	-
CO4	1	-	2	3	-	-	3	-	-	3	3	3	2	1	3	-

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CME4305	GEOTECHNICAL LAB FOR CONSTRUCTION ENGINEERS	L	T	P	C
Version 2020.1	Date of Approval: 3rd June, 2020	0	0	2	1
Pre-requisites/Exposure					
Co-requisites					

Catalogue Description

In this lab course the various tests are conducted on the soil and its engineering properties. The various tests related with the soil will be conducted such as CBR, direct shear, triaxial, pile load test, SPT, etc.

Course Objectives

The objective of the course is to

1. Assure the quality and properties of materials that are to be used for the construction such as; sand, aggregates, cements, admixtures.
2. Strengthen the knowledge on construction materials especially used in construction of roads and pavements, their utilization and related tests for concrete structure quality improvement, evaluation and its maintenance.

Course Outcomes

On the completion of this course, the student will be able to:

CO1. Perform the tests on soils to apply the results in the practical life.

CO2. Perform different tests such as triaxial test, direct shear test, CBR test, SPT test, etc. for the quality assurance.

CO3. Carry out the various consolidated and unconsolidated tests.

CO4. Evaluate and maintain the quality of materials-based constructions and perform the tests to evaluate the geotechnical aspects.

Course Content

List of Experiments	Blooms level*	Number of hours
Module I: Review of index and engineering properties of soil	L1, L2, L3, L5, L6	6
Module II: CBR Test; Direct Shear Test - Drained direct shear test on Cohesionless Soil	L1, L2, L3, L5, L6	6
Module III: Triaxial Compression Test - Unconsolidated - Undrained Tests, Consolidated Undrained Tests with Pore pressure measurement, Consolidated Drained Tests	L1, L2, L3, L5, L6	6
Module IV: Standard Penetration Test, Plate load Test, Pile Load Test and Large Direct Shear Test.	L1, L2, L3, L5, L6	6

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

- Bishop, A. W. and Henkel, D. J., Measurement of Soil Properties in Triaxial Test, Edward Arnold Ltd., New York, 1962.
- Head, K. H., Manual of Soil Laboratory Testing, CRC Press, New Delhi, 2006.

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References

- Mittal, S. and Shukla, J. P., Soil Testing For Engineers, Khanna Pub., New Delhi, 2003.

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva


CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O 1	PS O 2	PS O 3	PS O 4
CO1	1	2	3	2	3	1	2	1	1	1	--	1	2	1	2	3
CO2	1	2	2	1	3	1	1	1	1	1	--	1	2	1	2	3
CO3	1	2	3	1	3	1	1	1	1	1	--	1	2	1	2	3
CO4	1	2	1	1	3	1	1	1	1	1	--	1	2	1	2	3

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CME4316	SOFT COMPUTING TECHNIQUES IN CIVIL ENGINEERING	L	T	P	C
Version 2020.1	Date of Approval: 3rd June, 2020	3	1	0	4
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalogue Description

Soft computing is the foundation of conceptual intelligence in machines. Unlike hard computing, soft computing is tolerant of imprecision, uncertainty, partial truth, and approximation. Soft computing algorithms are becoming important classes of efficient tools for developing intelligent systems and providing solutions to complicated civil engineering problems. Domains of applications include structural engineering, design, diagnostics, and health monitoring, hydraulic engineering, geotechnical engineering, transportation engineering, environmental engineering, coastal and ocean engineering and construction management. The course gives basic knowledge about the key algorithms and theory that form the foundation of machine learning and computational intelligence and a practical knowledge of machine learning algorithms and methods in civil engineering.

Course Objectives

The objective of this course is to:

1. Introduce the concept of soft computing in Civil Engineering.
2. Identify and select a suitable soft computing technique to solve the problem, construct a solution and implement a soft computing solution.

Course Outcomes

On completion of this course, the students will be able to

CO1: Comprehend the soft computing techniques and their application in civil engineering

CO2: Analyse various neural networks architectures and their practical applications.

CO3: Define the fuzzy logic modelling technique and its application.

CO4: Comprehend and Understand the genetic algorithm concepts and their applications in civil engineering.

CO5: Identify and select a suitable soft computing technique to solve the problem, construct a solution and implement a soft computing solution.

Course Content

Modules	Blooms level*	Number of hours
Module 1: Introduction to Soft Computing Introduction, soft computing vs hard computing, requirement of soft computing, major areas of soft computing, applications of soft computing	L1, L2	4
Module II: Artificial Neural Networks(ANN) Biological neurons, basic models of ANN, learning, activation function, perceptron, learning rule, training and testing, back propagation, research paper study related to civil engineering.	L1, L2, L3, L4	11
Module III: Fuzzy Logic(FL) Fuzzy sets, properties, operations on Fuzzy sets, fuzzy relations, fuzzy membership functions, inference, methods of member value assignment, rank ordering, defuzzification, fuzzy inference systems, research paper study related to civil engineering.	L1, L2, L3, L4	11
Module IV: Genetic Algorithm (GA) Introduction to GA, operators in GA, coding, selection, cross over, mutation, stopping condition, Convergence of GA, Bit wise operation in	L1, L2, L3, L4	11

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GA, Multi-level Optimization, research paper study related to civil engineering.		
Module V: Application of the techniques in Civil Engineering Collection of data, input of data, Weka software for ANN technique – basics theory related to software use and techniques.	L1, L2, L3, L4	11

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

- Sivanandam, S.N. and Deepa, S.N., Principles of Soft Computing, Wiley India, 2nd Edition, 2011.
- Ross, T.J. , Fuzzy Logic with engineering applications, Wiley India, 4th Edition, 2016.
- Sinha, N K and Gupta, M M , Soft Computing & Intelligent Systems: Theory & applications, Academic Press, Elsevier, 2009.

Reference Books

- Haykin, S., Neural Network and Machine Learning- A Comprehensive Foundation, Pearson Canada, 3rd Edition, 2011.
- Ross, T.J. , Fuzzy Logic with engineering applications, McGrawHill, New York, 2011.
- Affenzeller, M., Wagner, S., Winkler, S. and Beham, A. Genetic Algorithms and Genetic Programming: Modern Concepts and Practical Applications (Numerical Insights), Chapman and Hall/CRC; 1st edition, 2009.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance


CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O 1	PS O 2	PS O 3	PS O 4
CO 1	1	2	--	2	--	--	--	--	--	--	--	--	1	3	-	2
CO 2	1	2	3	-	--	--	--	--	--	--	--	--	1	3	-	2
CO 3	1	2	3	3	3	--	--	--	--	--	--	3	1	3	-	2
CO 4	1	1		2	--	--	--	--	--	--	--	--	1	3	-	2
CO 5	1	1		2	--	--	--	--	--	--	--	--	1	3	3	2

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CME4317	SOFT COMPUTING TECHNIQUES IN CIVIL ENGINEERING LAB	L	T	P	C
Version 2020.1	Date of Approval: 3rd June, 2020	0	0	2	1
Pre-requisites/Exposure					
Co-requisites					

Catalogue description

Soft computing is the foundation of conceptual intelligence in machines. Unlike hard computing, soft computing is tolerant of imprecision, uncertainty, partial truth, and approximation. Soft computing algorithms are becoming important classes of efficient tools for developing intelligent systems and providing solutions to complicated civil engineering problems. Domains of applications include structural engineering, design, diagnostics, and health monitoring, hydraulic engineering, geotechnical engineering, transportation engineering, environmental engineering, coastal and ocean engineering and construction management. The course gives basic knowledge about the key algorithms and theory that form the foundation of machine learning and computational intelligence and a practical knowledge of machine learning algorithms and methods in civil engineering.

Course Objectives

The objective of this course is to:

1. Introduce the concept of soft computing in Civil Engineering by learning the softwares Weka and MATLAB.
2. Identify and select a suitable soft computing technique to solve the problem, construct a solution and implement a soft computing solution.

Course Outcomes

On completion of this course, the students will be able to

CO1: Comprehend ANN technique and creating a programme for the same related with the applications in civil engineering

CO2: Apply the ANN technique and analyse a model using the software.

CO3: Apply a suitable problem statement and solve the problem, construct a solution and implement a fuzzy logic toolbox.

CO4: Evaluate the utilization of MATLAB software for fuzzy logic analysis.

Course Content

List of Experiments	Blooms level*	Number of hours
Module I: Create a perceptron with appropriate no. of inputs and outputs. Train it using fixed increment learning algorithm until no change in weights is required. Output the final weights.	L1, L2, L3, L4, L5, L6	6
Module II: Create a model using back propagation method using Weka	L1, L2, L3, L4, L5, L6	6
Module III: Creating a small programme using MATLAB Fuzzy logic toolbox.	L1, L2, L3, L4, L5, L6	6
Module IV: Implementing MATLAB Fuzzy logic toolbox for a problem related to the application in the area of civil engineering	L1, L2, L3, L4, L5, L6	6

*Bloom's Level:

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

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Text Books

- Sivanandam, S.N. and Deepa, S.N., Principles of Soft Computing, Wiley India, 2nd Edition, 2011.
- Ross, T.J. , Fuzzy Logic with engineering applications, Wiley India, 4th Edition, 2016.
- Sinha, N K and Gupta, M M , Soft Computing & Intelligent Systems: Theory & applications, Academic Press, Elsevier, 2009.

Reference Books

- Haykin, S., Neural Network and Machine Learning- A Comprehensive Foundation, Pearson Canada, 3rd Edition, 2011.
- Ross, T.J. , Fuzzy Logic with engineering applications, McGrawHill, New York, 2011.
- Affenzeller, M., Wagner, S., Winkler, S. and Beham, A. Genetic Algorithms and Genetic Programming: Modern Concepts and Practical Applications (Numerical Insights), Chapman and Hall/CRC; 1st edition, 2009.

Examination Scheme:


IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O 1	PS O 2	PS O 3	PS O 4
CO 1	1	2	--	2	--	--	--	--	--	--	--	--	1	3	-	2
CO 2	1	2	3	-	--	--	--	--	--	--	--	--	1	3	-	2
CO 3	1	2	3	3	3	--	--	--	--	--	--	3	1	3	-	2
CO 4	1	1		2	--	--	--	--	--	--	--	--	1	3	-	2

1: strongly related, 2: moderately related and 3: weakly related


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TRE4305	TRANSPORTATION INFRASTRUCTURE DESIGN	L	T	P	C
Version 2020.1	Date of Approval: 3rd June, 2020	4	0	0	4
Pre-requisites/Exposure					
Co-requisites					

Catalogue Description

The course deals with the geometric design provisions for various transportation facilities as per IRC guidelines. It includes design of different intersections and interchanges of expressways and high-speed corridors. It also includes the design of runways and taxiways as per the airport design standards along with design of surface and sub surface drainage facilities.

Course Objectives

The objective of this course is to

1. Explain the principles of geometric design for various transportation facilities.
2. Design the At-Grade and Grade separated intersections along with the design of drainage facilities.

Course Outcomes

On completion of this course, the students will be able to

- CO1: Design the expressway/high speed corridors along with their alignment.
CO2: Explain the principles of traffic operations along with the design of intersections.
CO3: Explain the different interchanges and geometric design for non-motorized traffic.
CO4: Design runways and taxiways along with the design of drainage facilities.

Course Content

Modules	Blooms level*	Number of hours
Module I Introduction : Geometric design provision for various transportation facilities as per IRC guidelines, geometric design of horizontal and vertical alignment, design of expressways/ high speed corridors	L1, L2, L3	10
Module II Design of at grade intersections : Principles of design, channelization, roundabouts, staggered intersections	L1, L2, L3	10
Module III Design of interchanges: Major and minor interchanges, entrance and exit ramps, acceleration and deceleration lanes Geometric design of facilities for non motorized traffic: Bicycles and pedestrian facility design, slow carriageways	L1, L2, L3	14
Module IV Introduction to Geometric design of air fields: Airport design standards, runways, taxiways Design of drainage facilities: Importance, Principles, drainage of various geometric elements, surface and subsurface drainage	L1, L2, L3	14

*Bloom's Level:

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

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Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text Books

- Khanna & Justo, Highway Engineering, 10th ed., Nemchand & Brothers, Roorkee, 2018.
- C. Jotin Khistya and B. Kent Lall, “Transportation Engineering”, 5TH edition, Prentice Hall of India Private Limited, 2006.
- Khanna S.K., Arora M.G. and S.S. Jain; “Airport Planning and Design”, Nem Chand & Brothers, Roorkee, 1999.
- Relevant IRC Codes.

References

- AASHTO, Roadside Design Guide, 3rd Edition, 2006 (revision).
- AASHTO, Highway Safety Manual, 2010.
- Transportation Research Board, Access Management Manual, 2003.
- Transportation Research Board, A Guide to Best Practices for Achieving Context Sensitive Solutions, National Cooperative Highway Research Program (NCHRP) Report 480, 2002.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS O 1	PS O 2	PS O 3	PS O 4
CO 1	1	1	1	2	--	3	--	--	1	--	-	-	-	1	-	-
CO 2	1	--	1	--	--	--	3	--	2	2	-	-	-	1	-	-
CO 3	1	1	1	--	1	--	--	--	--	--	-	-	-	1	-	-
CO 4	1	1	1	2	1	--	--	--	--	--	-	-	-	1	-	-

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TRE4306	AIRPORT INFRASTRUCTURE, PLANNING AND DESIGN	L	T	P	C
Version 2020.1	Date of Approval: 3rd June, 2020	4	0	0	4
Pre-requisites/Exposure					
Co-requisites					

Catalogue Description

The course deals with the airport planning and geometric design for runways and taxiways. It includes airport visibility such as day time markings and lightings for night time. It also includes mathematical models for airside capacity and delay and the importance of air traffic control. It includes the design of runways and taxiways as per the airport design standards along with design of surface and sub surface drainage facilities.

Course Objectives

The objective of this course is to

1. Familiarize various techniques related to airport planning and design.
2. Design run off, surface and sub surface drainage facilities.

Course Outcomes

On completion of this course, the students will be able to

- CO1: Analyze the air traffic demand and design the geometrical features of runways, taxiways and exit taxiways.
- CO2: Design the airport pavements and analyze different markings and lightings for the terminal areas.
- CO3: Design the mathematical models for airside capacity & delay and understands the concept of air traffic control.
- CO4: Design runways along with the design of drainage facilities.

Course Content

Modules	Blooms level*	Number of hours
Module I Airport Planning: Airport master plan, aircraft characteristics related to airport planning, air traffic demand analysis, planning surveys, airport zoning. Geometric Design: Airport classification, runway and taxiway geometric standards, exit taxiways, separation and clearances.	L1, L2, L3	15
Module II Terminal Areas: Facilities, space requirement, number and size of gate positions, aircraft parking system. Visual Aids : Airport day time markings, airport lighting, visibility, visual aids Structural design of airport pavements: Design Factors, Design of flexible and rigid Pavements	L1, L2, L3	14
Module III Airside capacity and delay: mathematical models for capacity and delay, space time concept, models for mixed traffic. Air Traffic Control: Importance of flight rules, navigational aids, air traffic controls, obstruction and clearance requirements	L1, L2, L3	11
Module IV Airport Drainage : Design run-off, inlet size and location design, surface and subsurface design	L1, L2, L3	8

*Bloom's Level:

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L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text Books

- Robert Horonjeff and Francis X. McKelvey, "Planning & Design of Airports, McGraw Hill, Inc, 1993
- S. K. Khanna, M. G. Arora and S. S. Jain, "Airport Planning & Design", Nem Chand and Bros. Roorkee 2004
- Ashford, N. and Wright, P. H., "Airport Engineering", John Wiley & Sons, NY., 1992

References

- Khanna & Justo, Highway Engineering, 10th ed., Nemchand & Brothers, Roorkee, 2018.
- ICAO, "Aerodrome Design Manual", International Civil Aviation Organization, Montreal, Canada 1983

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS O 1	PS O 2	PS O 3	PS O 4
CO 1	1	1	1	2	--	3	--	--	1	--	-	-	-	1	2	-
CO 2	1	--	1	--	--	--	3	--	2	2	-	-	-	1	2	-
CO 3	1	1	1	--	1	--	--	--	--	--	-	-	-	1	2	-
CO 4	1	1	1	2	1	--	--	--	--	--	-	-	-	1	2	-

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TRE4303	PUBLIC TRANSPORTATION SYSTEMS	L	T	P	C
Version 2020.1	Date of Approval: 3rd June, 2020	3	1	0	4
Pre-requisites/Exposure					
Co-requisites					

Catalogue Description

The course discuss the evolution and role of urban public transportation modes, systems and services, focusing on bus and rail. It includes various topics including current practice and new methods for data collection and analysis, performance monitoring, road design, frequency determination, effect of pricing policy and service quality on ridership.

Course Objectives

The objective of this course is to

1. Provide knowledge regarding public transportation systems, their operation, planning and economics.
2. Familiarize with the problems of transit routing, scheduling, infrastructure facilities, fare structures and management.

Course Outcomes

On completion of this course, the students will be able to

- CO1: Describes the important concepts about public transportation systems.
CO2: Collect data about travel behaviour and analyzing the data for use in transport planning.
CO3: Explain and describes the various parameters of rapid transit systems.
CO4: Apply optimization technique for transport planning and pricing.

Course Content

Modules	Blooms level*	Number of hours
Module I: Modes of public transportation and application of each to urban travel needs.	L1, L2, L3	7
Module II: Transit system operations, para-transit systems, street transit systems, rapid transit systems, estimation of transit demand. Route development, properties of a good route set, determination of a good route set, stop location and stopping policy, schedule development, properties of a good schedule, determination of a good schedule.	L1, L2	16
Module III: Capacity of rapid transit systems, line capacity of RTS, capacity of street transit systems. Transit corridor, identification and planning, mass transport management measures, integration of public transportation modes. Public transport infrastructure, case studies, multi mode transportation system.	L1, L2	16
Module IV: Planning for public transport, fares and subsidies. Intermediate public transport in Indian cities, types of IPT vehicles. Characteristics of IPT modes.	L1, L2, L3	9

*Bloom's Level:

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

- Traffic Engg. And Transport Planning by L.R.Kadiyali, Khanna Publishers, Delhi.
- Introduction to Transport Planning by Bruton, M.J., Hutchinson Technical Education, London.

References

- Principles of Transportation Engineering by Chakroborty & Das, Prentice Hall, India.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS O 1	PS O 2	PS O 3	PS O 4
CO1	1	1	1	2	--	3	--	--	1	--	2	-	-	-	1	-
CO2	1	--	1	--	--	--	3	--	2	-	2	-	-	-	1	-
CO3	1	1	1	--	1	--	--	--	--	--	2	-	-	-	1	-
CO4	1	1	1	2	1	--	--	--	--	--	2	-	-	-	1	-

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TRE4307	INTELLIGENT TRANSPORTATION SYSTEMS	L	T	P	C
Version 2020.1	Date of Approval: 3rd June, 2020	3	1	0	4
Pre-requisites/Exposure					
Co-requisites					

Catalogue Description

Intelligent transportation systems represent the major transition in transportation in many dimensions. This course considers ITS as a lens through which one can view many transportation and societal issues. This course is intended to improve the effectiveness and efficiency of surface transportation systems through advanced technology in information system, communications and sensors.

Course Objectives

The objective of this course is to

1. Familiarize ITS conceptually as a macro traffic management systems.
2. Explain the enabling role of technology i.e. vehicular technology, infrastructure, information and communication technology and data processing.

Course Outcomes

On completion of this course, the students will be able to

- CO1: Discuss the fundamentals of traffic flow theory in the management and operations of road traffic.
- CO2: Describe the range of technology involved in the delivery of traveller information system.
- CO3: Assess the range of options available for the management of freeway and arterial traffic.
- CO4: Investigate and analyze current application and trend in developed and developing countries.
- CO5: Investigate the contemporary issues in the application of advanced technology in transport.

Course Content

Modules	Blooms level*	Number of hours
Module I Introduction to ITS: History of ITS, ITS Legislation and Financing, User Services, Roles and Responsibilities ITS Components : Advanced Traveler Information Systems (ATIS), Advanced Transportation Management Systems (ATMS), including network operations, incident detection; congestion pricing, tolling, Fleet-oriented ITS services,	L1, L2, L3	15
Module II Advanced Public Transportation Systems (APTS); BRT; Commercial Vehicle Operations (CVO); Intermodal Freight, including International Operations and Supply Chains; Automated Highway Systems (AHS), Sensors, Electronic Toll Collection (ETC), Dedicated Short Range Communication; Standards.	L1, L2, L3	14
Module III Communication and Related Techniques: Radio Propagation and Antennas for Wireless Communications; Technologies and Applications of Communication Principles for Transportation. Information & Related Technologies : Intelligent Control Theory, Transportation Information; Vehicle Monitoring & Dispatching System; Advanced Web Pages Programming, Transportation Safety	L1, L2, L3	11

Module IV Traffic Control & Chip Design : Traffic Control; Traffic Control System Design on Chip. Regionally –scaled ITS deployment, including regional architecture; organization and institutional issues; standards; developed vs. developing countries; ITS and strategic regional transportation planning; integrating infrastructure and operations planning.	L1, L2, L3	8
MODULE V Critical ITS issues, including (as time permits) ITS and security; safety; human factors; privacy; sustainability; funding (as contrasted with conventional infrastructure); technology deployment/R&D/policy; other institutional issues Conclusion, including regional ITS planning and architecture presentation; the future of ITS		

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

- Chowdhury, M. A. and Sadek, A. W., "Fundamentals of Intelligent Transportation Systems Planning", Artech House. 2003
- McQueen, B. and McQueen, J., "Intelligent Transportation System Architectures", Artech House. 2003.

References

- Ghosh, S. and Lee, T., "Intelligent Transportation System - New Principles & Architectures", CRC Press. 2000.
- Williams, B., "Intelligent Transportation Systems Standards", Artech House. 2008

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance


CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O 1	PS O 2	PS O 3	PS O 4
CO 1	1	1	1	2	--	3	--	--	1	--	-	-	-	-	1	-
CO 2	1	--	1	--	--	--	3	--	2	2	-	-	-	-	1	-
CO 3	1	1	1	--	1	--	--	--	--	--	-	-	-	-	1	-
CO 4	1	1	1	2	1	--	--	--	--	--	-	-	-	-	1	-
CO 5	1	-	2	1	-	3	1	-	-	-	-	-	-	-	1	-

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TRE4308	RAILWAY INFRASTRUCTURE, PLANNING AND DESIGN	L	T	P	C
Version 2020.1	Date of Approval: 3rd June, 2020	3	1	0	4
Pre-requisites/Exposure					
Co-requisites					

Catalogue Description

The course deals with the geometric design provisions for railway engineering which includes horizontal & vertical alignment, track elements and turnouts & crossing. It includes track management system, and planning of railway activities and project management for railways. It also includes the computation of various costs related to railways and disaster management for the accidents in the railways.

Course Objectives

The objective of this course is to

1. Enhance the knowledge of Railway Engineering in the context of regional mass transportation systems.
2. Familiarize the techniques of planning, modelling and designing the transportation systems along with infrastructures required for Railways.

Course Outcomes

On completion of this course, the students will be able to

- CO1: Design the geometrics of railway and explain the different rail operations along with their management.
- CO2: Explain the track maintenance management and social and economic effect on environment.
- CO3: Understand the concept of high speed & magnetic levitation and different track characteristics.
- CO4: Compute the different costs associated with the rail transport services such as construction & maintenance cost, fixed & variable cost etc..
- CO5: Analyse the railway accidents & disaster management and understands the parameters affecting the rail demand.

Course Content

Modules	Blooms level*	Number of hours
Module I Railway Geometric Design: Alignment and Surveys, Geometry of Track, Horizontal & Vertical curves, Track elements, Turnouts & Crossings. Rail Operations Management: Crowd control Passenger Flow management; Timetabling & Inter-running, Managing a Heavy Capacity Light Rail system, Productivity Management, Outsourcing & contractor Management.	L1, L2, L3	10
Module II Track Maintenance Management: Items of track maintenance, Packing & Overhauling of racks, Maintenance Planning, Mechanical Track Maintenance, directed maintenance of track, Modern Track Management System. Planning, Financial Management & Investment : Railways Social & Economic environment, competition & Impact on Railway Management, Feasibility Studies & method of Financing, Planning the railway activity, Project Management for Railways, Human Resources & their revalorization, Privatization of Railways.	L1, L2	12
Module III High Speed & Magnetic Levitation: High Speed trains: Application of high-speed, Impact of high-speed on reduction of rail travel time, Track	L1, L2, L3	8

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Characteristics, Rollingstock for high speeds, Power supply at high-speeds, Tilting trains, Aero trains, Magnetic Levitation.		
Module IV Costing and Pricing of Rail Transport Services: Construction & Maintenance Cost, Fixed & Variable cost, Marginal Cost, Generalized cost, Cost of Operation of Railway company, Ratifications of infrastructure: Principles, Objectives, Financial consequences, commercial applications, of infrastructure Pricing, Infrastructure pricing models in some countries.	L1, L2, L3	8
Module V Railway Accidents and Disaster Management Suburban Railways Dedicated Freight Corridor – Construction parameters & Track Structure Forecast of Rail demand: Purposes, Needs, Methods for forecasting, Parameter affecting, Various categories of rail demand, Qualitative methods, Statistical Projections, Econometric models, Gravity models, Fuzzy models, Time-Series models.	L1, L2, L3	10

*Bloom's Level:

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text Books

- Mundrey, J.S., "Railway Track Engineering", Tata McGraw Hill, New Delhi, 2007
- Profillidis, V.A., "Railway Management & Engineering", Ashgate Publishing Limited, England, 2006.
- Saxena S.C and Arora, S.P., "A Text book of Railway Engineering", Dhanpat Rai Publications, New Delhi, 2011.

References

- Robin H. and Harris, N., "Managing Railway Operations & Maintenance", University of Birmingham Press, 2007
- William, H., "Railroad Engineering", John Wiley & Sons, United States, 1982
- Chandra S. and Agarwal M.M., "Railway Engineering", Oxford University Press, United Kingdom, 2013.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS O 1	PS O 2	PS O 3	PS O 4
CO 1	1	1	1	2	--	3	--	--	1	--	-	-	-	1	2	-
CO 2	1	--	1	--	--	--	3	--	2	2	-	-	-	1	2	-
CO 3	1	1	1	--	1	--	--	--	--	--	-	-	-	1	2	-
CO 4	1	1	1	2	1	--	--	--	--	--	-	-	-	1	2	-
CO 5	1	1	1	2	1	--	--	--	--	--	-	-	-	1	2	-

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TRE4301	GIS & ITS APPLICATION IN TRANSPORTATION ENGINEERING	L	T	P	C
Version 2020.1	Date of Approval: 3rd June, 2020	4	0	0	4
Pre-requisites/Exposure					
Co-requisites					

Catalogue Description

The course contains basic geographic perspectives on accessibility and transportation, topics covered in the course includes is GIS based visualization of transport network and flow, network data set construction and different methods for network analysis for transportation planning.

Course Objectives

The objective of this course is to

1. Discuss the elementary concept of GIS such as definitions, benefits and urban application of GIS.
2. Familiarize the practical application of GIS in transportation field through case studies.

Course Outcomes

On completion of this course, the students will be able to

CO1: Define and describe the basic concepts and terminologies of GIS.

CO2: Acquire, manipulate and save the data IN GIS.

CO3: Demonstrate the concept of transport geography into practice by means of network analysis in GIS.

CO4: Identify an appropriate GIS work flow for analyzing transport flows between demand point locations and supply facilities.

Course Content

Modules	Blooms level*	Number of hours
Module I: Introduction: Definition and components of GIS, Types of data, Mapping process, Coordinate systems, Transformations, Map projections, Geo-referencing, Standard GIS packages.	L1, L2, L3	10
Module II: Data Acquisition: Scanners, Digitizers, Digital representation of data, Data structure-Raster and vector data, Data storage. Data Processing: Format conversion, Data Compression and reduction techniques run length coding, block coding, quadtree, Spatial and non- spatial data, Topology creation.	L1, L2	12
Module III: Data Management: Database Structure-Hierarchical, Network, Relational, Database Management Systems. Data Manipulation & Analysis: Reclassification and Aggregation, Analysis of spatial and non spatial data, Modelling in GIS.	L1, L2	10
Module IV: Implementing in Transportation: Database in terms of link, nodes, point of interest; GIS database design for transport planning, Traffic Analysis Zone (TAZ), Integration of field data with GIS data. GIS Applications (A) Transportation Systems: Accidents and safety analysis, Traffic & Transport analysis, Traffic monitoring systems, Transport infrastructures, environmental impact assessment, congestion management, In-vehicle navigation.	L1, L2, L3	16

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(B) Transport Planning: Travel Demand Analysis, Network alignment, Dynamic vehicle routing and scheduling, interchange analysis, Multimodal network planning, Decision Support System for transport planning. Case Studies		
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**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text Books

- Baurrough, P.A. "Principles of Geographic Information Systems for Land Resources Assessment", Oxford University Press, 1986.
- Aromoff, S. "Geographic Information Systems: A Management Perspective", WDL Publications, 1991.
- Scholten & Stillwen, "GIS for Urban & Regional Planning", Kulwer Academie Publisher, 1990.
- DeMers, M.N. "Fundamentals of GIS", Johan Wiley & Sons, 2000.

References

- Clarke, K. "Getting Started with GIS", Prentice Hall, 2001.
- Lo, C.P. & Yenung, A. K.W. "Concept and Techniques of GIS", Prentice Hall of India, 2002.


CO, PO and PSO mapping

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CO2	1	--	1	--	--	--	3	--	2	-	2	-	-	-	1	-
CO3	1	1	1	--	1	--	--	--	--	--	2	-	-	-	1	-
CO4	1	1	1	2	1	--	--	--	--	--	2	-	-	-	1	-

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TRE4302	GIS & ITS APPLICATION IN TRANSPORTATION ENGINEERING LAB	L	T	P	C
Version 2020.1	Date of Approval: 3rd June, 2020	0	0	2	1
Pre-requisites/Exposure					
Co-requisites					

Catalogue Description

The course contains basic geographic perspectives on accessibility and transportation, topics covered in the course includes is GIS based visualization of transport network and flow, network data set construction and different methods for network analysis for transportation planning.

Course Objectives

The objective of this course is to

1. Discuss the elementary concept of GIS such as definitions, benefits and urban application of GIS.
2. Familiarize the practical application of GIS in transportation field through case studies.

Course Outcomes

On completion of this course, the students will be able to

- CO1: Demonstrate the concept of transport geography into practice by means of network analysis in GIS.
- CO2: Identify an appropriate GIS work flow for analyzing transport flows between demand point locations and supply facilities.

Course Content

Modules	Blooms level*	Number of hours
Module I: <ul style="list-style-type: none"> • Study of various types of maps, Maps reading, Measurement from Maps, Datum and Coordinate System. • Study of various satellite images, Hard copy Digital Images, Colour and B&W Images and their characteristics. • Scanning and digitization of maps. Creation of Point, Line and Polygon data. • Creation and Editing of spatial and non-spatial data. 	L1, L2, L3	10
Module II: <ul style="list-style-type: none"> • Basic functionalities of GIS - Buffer analysis, Union, Intersection, Assigning Weights, Computation of Length, Area and Perimeter. • Creation of Digital Elevation Model in 3D, slope map. • Spatial Modeling for Traffic and Accident studies. • Spatial Modeling for Transport Planning in GIS. 	L1, L2	12

*Bloom's Level:

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

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CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1	1	1	2	--	3	--	--	1	--	2	-	-	-	1	-
CO2	1	--	1	--	--	--	3	--	2	-	2	-	-	-	1	-

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EVE4302	INDUSTRIAL WASTEWATER TREATMENT AND DESIGN	L	T	P	C
Version 2020.1	Date of Approval: 3rd June, 2020	3	1	0	4
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalogue Description:

Industrial Waste Engineering curriculum will provide the principles of industrial wastewater treatment, disposal and reuse in order to minimize pollution in a sustainable manner. The subject focuses on the principles and mechanisms of pollutant removal, the processes and design of conventional (primary, secondary and tertiary) and advanced (post-treatment) technologies applied in the treatment of industrial effluents.

Course Objectives:

The objective of the course is to,

1. Provide the knowledge on the wastewater characteristics from industries.
2. Define the principles of pollution prevention and mechanism of industrial processes, and suggest the suitable technologies for the treatment of wastewater from various industries.

Course Outcomes:

On completion of this course, the students will be able to

CO1: Describe various industrial wastewater treatment unit operations.

CO2: Explain the working principle and design of industrial wastewater treatment units.

CO3: Comprehend the importance of guidelines based on Indian Standard code of practice for the design of wastewater treatment units for different industries.

CO4: Apply the waste management process used in various industries.

CO5: Analyze unit operations and estimation of environmental impact assessment due to industrial pollutions in sustainable manner.

Modules	Blooms level*	Number of hours
Module I INTRODUCTION Industrial activity and Environment – Sources and types of industrial wastewater – Industrial wastewater and environmental impacts – Industrial waste survey – Industrial wastewater generation rates, characterization and variables – Population equivalent – Toxicity of industrial effluents and Bioassay tests.	L1, L2 and L3	9
Module II INDUSTRIAL POLLUTION PREVENTION Prevention vs Control of Industrial Pollution – Benefits and Barriers – Source reduction techniques – Waste Audit – Evaluation of Pollution prevention options – Environmental statement as a tool for pollution prevention – Waste minimization.	L2 and L3	10
Module III INDUSTRIAL WASTEWATER TREATMENT Equalization - Neutralization – Oil separation – Flotation – Precipitation – Aerobic and anaerobic biological treatment – Wet Air Oxidation – Evaporation – Ion Exchange – Membrane Technologies.	L2, L3 and L4	10

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Module IV WASTEWATER REUSE AND RESIDUAL MANAGEMENT Individual and Common Effluent Treatment Plants – Joint treatment of industrial wastewater - Quality requirements for Wastewater reuse – Industrial reuse – Disposal on water and land – Residuals of industrial wastewater treatment – Quantification and characteristics of Sludge – management.	L2, L3 and L4	10
Module V CASE STUDIES Industrial manufacturing process description, wastewater characteristics, source reduction options and waste treatment flow sheet for Textiles – Tanneries – Pulp and paper – metal finishing – Oil Refining– Pharmaceuticals–Sugar and Distilleries.	L2, L3 and L4	9

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text Books:

- Eckenfelder, W.W., Industrial Water Pollution Control, McGraw-Hill, 1999.
- Arceivala, S.J., Wastewater Treatment for Pollution Control, Tata McGraw-Hill, New Delhi, 1998.
- Frank Woodard Industrial waste treatment Handbook, Butterworth Heinemann, New Delhi, 2001.
- World Bank Group Pollution Prevention and Abatement Handbook – Towards Cleaner Production, World Bank and UNEP, Washington D.C.1998.
- Lawrance K.Wang, Yung Tse Hung, Howard H.Lo and Constantine Yapijakis “Handbook of Industrial and Hazardous waste Treatment”, Second Edition, 2004.
- Metcalf & Eddy/ AECOM, "water reuse Issues, Technologies and Applications", The Mc Graw-Hill companies, 2007.
- Industrial wastewater management, treatment & disposal, Water Environment, Federation Alexandria Virginia, Third Edition, 2008.

Reference Books:

Nelson Leonard Nemerow, “Industrial waste Treatment”, Elsevier, 2007.
Wesley Eckenfelder W., “Industrial Water Pollution Control”, Second Edition, Mc Graw Hill, 1989.
Paul L. Bishop Pollution Prevention: - Fundamentals and Practice, McGraw-Hill International, 2000.
J. Arceivala, Shyam. R. Asolekar, Waste water Treatment for pollution control and reuse by Soli, Tata McGraw Hill, 2007.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	--	--	--	--	--	--	--	--	1	--	--	--	--	1	3	--
CO2	--	--	1	--	2	--	--	--	--	2	--	--	--	1	3	--
CO3	--	--	--	--	--	--	--	--	--	--	--	--	--	1	3	--
CO4	--	--	1	--	--	--	--	--	--	--	--	--	--	1	3	--
CO5	--	--	--	--	2	--	--	--	--	--	--	--	--	1	3	--

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EVE4303	WATER RESOURCE PLANNING AND MANAGEMENT	L	T	P	C
Version 2020.1	Date of Approval: 3rd June, 2020	3	1	0	4
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalogue Description

This course covers the reservoir planning; dams designs; draught analysis; linear programming, etc. The overall aim of the course is to develop the skills of the students to know how to plan, develop and manage water resources

Objective:

The objective of the course is to,

1. Comprehend how to develop suitable plans for water resource development and management.
2. Develop how to estimate sustainable yield of the water resources and how to determine the needed storage of water reservoirs.
3. Understand the principles of integrated water resources management.
4. Learn the optimization techniques in water resources planning and management

Course Outcomes

On completion of this course, the students will be able to:

CO1. Able to start developing master and strategic water resources planning.

CO2. Understanding the basic principles of dam design

CO3. Determining the direct and indirect losses of water resources

CO4. Understand the Monte Carlo simulation.

Course Contents

Modules	Blooms level*	Number of hours
Module I: Reservoir planning Reservoir planning, Management, Multi reservoir systems, Real time operation, River basin planning, water logging, soil salinity, salinity control	L1, L2, L3	12
Module II: Dams Design Design of Dams, Non gravity dams, Weirs and Barrages, Conjunctive use of Irrigation water, Quality of Irrigation water, Contaminants and their effects on various crops Rainwater Harvesting and Management – Different Types and Methods of Harvesting in urban and agricultural areas.	L1, L2, L3	12
Module III : Draught analysis Draught analysis, NCA classification, Direct and Indirect losses, Drought severity assessment, Drought Monitoring, Drought Management	L1, L3, L4, L5	12
Module IV: Programming Introduction to systems approach, Linear programming, Problem formulation, Solution by simplex method, Application to design and operation of reservoir, Non Linear Programming, Sensitivity analysis, Monte Carlo simulation.	L1, L3, L4, L5	12

*Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5:Synthesis, L6:Evaluation

Text Books/References:

1. Dilip Kumar Majumdar, "Irrigation Water Management (Principles & Practices)", Prentice Hall of India (P), Ltd, 2004
2. Water Resources Systems, "Vedula & Mujumdar", McGrawHill, 2005.
3. Daniel P. Loucks "Water Resources systems Planning and Management (Studies and Reports in Hydrology) ", 2006

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance


CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO3	PSO4
CO1	1	1	2	2	3	-	-	-	-	-	-	1	3	2	1	-
CO2	1	3	1	3	3	-	-	-	-	-	-	1	3	2	1	-
CO3	1	3	1	-	-	-	-	-	-	-	-	1	3	2	1	-
CO4	1	3	2	-	3	-	-	-	-	-	-	1	3	2	1	-

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EVE4309	BIOLOGICAL PROCESS OF WASTE WATER TREATMENT	L	T	P	C
Version 2020.1	Date of Approval: 3rd June, 2020	3	1	0	4
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description:

This course introduces the students to the principles of biochemical processes in wastewater treatment and pollution control, with particular emphasis on municipal wastewater treatment. At the end of the course, students should have a thorough understanding of wastewater treatment processes as well as biosolids handling, treatment and disposal. They would be able to design various facilities for biological treatment of wastewater.

Course Objectives:

The objective of the course is to,

1. Provide the knowledge on the advances wastewater treatment.
2. Define the principles and design criteria of wastewater pollution and mechanism of industrial processes, and suggest the suitable technologies for the treatment of wastewater from various industries.

Course Outcomes:

On completion of this course, the students will be able to

CO1: Describe various wastewater treatment unit operations.

CO2: Explain the working principle and design of wastewater treatment units.

CO3: Comprehend the importance of guidelines based on Indian Standard code of practice for the design of wastewater treatment units for different industries.

CO4: Apply the waste management process used in various industries.

Course Contents

Modules	Blooms level*	Number of hours
Module I INTRODUCTION Objectives of biological treatment – Role of microorganisms in waste water treatment – Types of biological processes for waste water treatment – Different microbial metabolisms – Bacterial growth patterns – Microbiological treatment kinetics and flow regimes – Michaelis-Menten and Monod models – Rate of biomass growth with soluble substrates – Kinetic coefficients – Effect of temperature – Oxygen requirements – Biomass yield – Observed yield – Kinetic constants evaluation of biological treatment.	L1, L2 and L3	12
Module II WASTEWATER PROCESS DESIGN Aerobic biological treatment – Attached growth and suspended growth treatment systems – Modeling suspended growth treatment process – Activated sludge process – Description – Various types – Methods of aeration – Microbiology – Process analysis – Process design considerations – Operational difficulties – Modifications. Sequencing Batch Reactor – Process description and operation. Trickling filter – Filter classifications – Microbiology – Process design considerations – Design of physical facilities – Recirculation – NRC Equation – Operational difficulties.	L2 and L3	12

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Module III DESIGN OF TREATMENT SYSTEM Aerated lagoons – Types – Process design considerations. Stabilisation ponds – Classification – Design considerations. Sludge treatment and disposal – Characteristics of sludge – Sludge processing – Preliminary operations – Thickening – Stabilization – Aerobic digestion – Anaerobic digestion – Composting – Conditioning – Dewatering – Heat drying – Incineration- Wet air oxidation – Land application	L2, L3 and L4	12
Module IV CASE STUDIES Advanced biological treatment processes – Nitrogen removal – Nitrification and Denitrification -Stoichiometry – Process analysis – Operational and environmental variables. Economics of biological treatment – Constructional cost, capital cost, operational cost – Total cost.	L2, L3 and L4	12

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text Books:

- Metcalf and Eddy, “Wastewater Engineering- Treatment and reuse,” Tata McGraw Hill Publishing Company Ltd., New Delhi.
- Davis M.L., Cornwell D.A., “Introduction to Environmental Engineering”, Tata McGraw Hill
- Education (P) Ltd., New Delhi.

Reference Books:

- Droste R.L., “Theory and Practice of Water and Wastewater Treatment”, Wiley India (P) Ltd.
- Hammer M.J. and Hammer M.J., Jr., “Water and Wastewater Technology”, PHI (P) Ltd., New Delhi.
- Benefield L.D. and Randall C.W., “ Biological Process Design for Waste water Treatment”, PHI Learning (P) Ltd., New Delhi.
- CPHEEO Manual.
- Peavy H.S., Rowe D.R., Tchobanoglous G., “Environmental Engineering”, Tata McGraw Hill
- Education (P) Ltd., New Delhi.
- Venkateswarlu K.S., “Water Chemistry, Industrial and Power Station Water Treatment, New Age International Publishers, New Delhi.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	--	--	--	--	--	--	--	--	1	--	--	--	--	1	3	--
CO2	--	--	1	--	2	--	--	--	--	2	--	--	--	1	3	--
CO3	--	--	2	--	--	--	--	--	--	--	--	--	--	1	3	--
CO4	--	--	1	--	--	--	--	--	--	--	--	--	--	1	3	--

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EVE4310	TRANSPORT PHENOMENON OF WASTE WATER	L	T	P	C
Version 2020.1	Date of Approval: 3rd June, 2020	4	0	0	4
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalogue Description:

This course introduces the students to the principles of transport processes in wastewater treatment and pollution control, with particular emphasis on municipal wastewater treatment. At the end of the course, students should have a thorough understanding of wastewater treatment processes as well as treatment and disposal. They would be able to design various facilities for biological treatment of wastewater.

Course Objectives:

The objective of the course is to,

1. To educate the students in detailed design concepts related to water transmission mains, water distribution system, sewer networks and storm water drain and computer application on design.

Course Outcomes:

On completion of this course, the students will be able to

CO1: Be able to select various pipe materials for water supply main, distribution network and sewer.

CO2: Be able to design water supply main, distribution network and sewer for various field conditions.

CO3: Troubleshooting in water and sewage transmission be able to use various computer software for the design of water and sewage network.

CO4: Comprehend the importance of guidelines based on Indian Standard code of practice for the design of wastewater treatment units for different industries.

CO5: Apply the waste management process used in various industries.

Modules	Blooms level*	Number of hours
Module I GENERAL HYDRAULICS AND FLOW MEASUREMENT Fluid properties; fluid flow – continuity principle, energy principle and momentum principle; frictional head loss in free and pressure flow, minor heads losses, Carrying Capacity–Flow measurement.	L1, L2 and L3	8
Module II WATER TRANSMISSION AND DISTRIBUTION Need for Transport of water and wastewater-Planning of Water System – Selection of pipe materials, Water transmission main design- gravity and pumping main; Selection of Pumps- characteristics- economics; Specials, Jointing, laying and maintenance, water hammer analysis; water distribution pipe networks Design, analysis and optimization – appurtenances – corrosion prevention – minimization of water losses – leak detection Storage reservoirs.	L2 and L3	12
Module III WASTEWATER COLLECTION AND CONVEYANCE Planning factors – Design of sanitary sewer; partial flow in sewers, economics of sewer design; Wastewater pumps and pumping stations-sewer appurtenances; material, construction, inspection and maintenance	L2, L3 and L4	10

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of sewers; Design of sewer outfalls-mixing conditions; conveyance of corrosive wastewaters.		
Module IV STORM WATER DRAINAGE Necessity- - combined and separate system; Estimation of storm water run-off Formulation of rainfall intensity duration and frequency relationships- Rational methods.	L2, L3 and L4	8
Module V CASE STUDIES AND SOFTWARE APPLICATIONS Use of computer software in water transmission, water distribution and sewer design – EPANET 2.0, LOOP version 4.0, SEWER, BRANCH, Canal ++ and GIS based software's.	L2, L3 and L4	7

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text Books:

- Metcalf and Eddy, "Wastewater Engineering- Treatment and reuse," Tata McGraw Hill Publishing Company Ltd., New Delhi.
- Davis M.L., Cornwell D.A., "Introduction to Environmental Engineering", Tata McGraw Hill Education (P) Ltd., New Delhi.


Reference Books:

- Benefield L.D. and Randall C.W., "Biological Process Design for Waste water Treatment", PHI Learning (P) Ltd., New Delhi.
- Bajwa, G.S. "Practical Handbook on Public Health Engineering", Deep Publishers, Shimla, 2003.
- Manual on water supply and Treatment, CPHEEO, Ministry of Urban Development, Government of India, New Delhi, 1999.
- Manual on Sewerage and Sewage Treatment, CPHEEO, Ministry of Urban Development, Government of India, New Delhi, 1993.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	--	--	--	--	--	--	--	--	1	--	--	--	--	1	3	--
CO2	--	--	1	--	2	--	--	--	--	2	--	--	--	1	3	--
CO3	--	--	2	--	--	--	--	--	--	--	--	--	--	1	3	--
CO4	--	--	1	--	--	--	--	--	--	--	--	--	--	1	3	--
CO5	--	--	1	--	--	--	--	--	--	--	--	--	--	1	3	--

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EVE4311	WATER RECLAMATION AND REUSE	L	T	P	C
Version 2020.1	Month, Year of approval:	4	0	0	4
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalogue Description

This course has emphasized on the use of treated wastewater for beneficial purposes including irrigation, industrial uses, and drinking water augmentation could significantly increase the nation's total available water resources.

Course Objective:

The objective of the course is to,

1. Impart knowledge about the potential reuse applications and sources of water for reuse.
2. Determining the feasibility and planning of water reuse systems as well as the management structure of reuse projects.

Course Outcomes:

On completion of this course, the students will be able to:

CO1: Explain the concept and principles of water reclamation

CO2: Describe various factors affecting water reclamation

CO3: Determining the feasibility and planning of water reuse systems as well as the Management structure of reuse projects

CO4: Understand the various techniques for water reclamation

Course Contents

Modules	Blooms level*	Number of hours
Module I: Water reclamation Introduction: definitions of terms related to water reclamation and reuse; potential uses of reclaimed water; benefits of water reuse; reasons for the growing use of reclaimed water; examples of water reuse in different parts of the world.	L1, L2, L3	12
Module II: Reuse Criteria Water Reclamation and Reuse Criteria: factors affecting the development of water reclamation and reuse criteria; elements/components of water reclamation and reuse criteria / guidelines; water reclamation and reuse criteria in different countries and assessment.	L1, L2, L3	12
Module III : Irrigation Agricultural and Landscape Irrigation, Industrial Water Reuse, Groundwater Recharge with Reclaimed Water, Recreational/Environmental Enhancement, Water Reclamation Inside Buildings.	L1, L3, L4, L5	12
Module IV: Treatment Treatment Requirements for Water Reuse: constituents of municipal and industrial wastewater; health assessment of water reuse; treatment and reclamation technologies, Reuse and Disposal of Wastewater Sludges and Biosolids: characteristics and composition of wastewater sludge/biosolids; sludge/biosolids processing; reuse and disposal of	L1, L3, L4, L5	12

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sludge/biosolids; land application of biosolids; regulations and methods of application, Planning and Managing Water Reuse Projects: planning procedures; management and operation procedures.		
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*Bloom's Level:

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text Books:

1. Metcalf & Eddy, Inc. An AECOM Company, "Water Reuse: Issues, Technology and Applications" 1st Ed . 2007.
2. Metcalf & Eddy, Inc. "Wastewater Engineering: Treatment, Disposal, and Reuse, Chapters 13 & 14", Fourth edition, McGraw-Hill Companies, Inc., New York, NY, 2003.

References:

1. Water Pollution Control Federation "Water Reuse, Manual of Practice SM-3, Ch. 4", 2nd edition, Water Pollution Control Federation, Alexandria, 1989.
2. U.S. Environmental Protection Agency (EPA) "Guidelines for Water Reuse, Ch. Two", EPA/625/R-92/004, U.S. Environmental Protection Agency and U.S. Agency for International Development, Washington, DC, 1992.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO3	PSO4
CO1	1	1	2	2	3	-	-	-	-	-	-	1	-	1	1	-
CO2	1	3	1	3	3	-	-	-	-	-	-	1	-	1	1	-
CO3	1	3	1	-	-	-	-	-	-	-	-	1	-	2	1	-
CO4	1	3	2	-	3	-	-	-	-	-	-	1	-	2	1	-

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EVE4312	AIR AND WATER QUALITY MODELLING	L	T	P	C
Version 2020.1	Date of Approval: 3rd June, 2020	4	0	2	5
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalogue Description:

This course designed to improve the understanding of the different pollution control strategies and the skills of application of remediation techniques to combat pollution in three environmental compartments i.e. air, water and soil.

Course Objectives:

The objective of the course is to,

1. Impart knowledge on the principles and design of control of particulate and gaseous air pollutant and its emerging trends.
2. Introduce the fundamentals of mathematical models for water and air quality prediction and the importance of model building.

Course Outcomes:

On completion of this course, the students will be able to

CO1: Define general air pollution problems, meteorological definitions, air transport equations and pollution control matters and devices.

CO2: Explain the regulations pertinent to air pollutions (both indoor and outdoor environment).

CO3: Describe major problems in indoor air pollution control and regulations.

CO4: Analyze the results of pollution data as a report and its observations.

Course contents

Modules	Blooms level*	Number of hours
Module I INTRODUCTION TO AIR POLLUTION Structure and composition of Atmosphere – Sources and classification of air pollutants - Effects of air pollutants on human health, vegetation & animals, Materials & Structures – Effects of air Pollutants on the atmosphere, Soil & Water bodies – Long- term effects on the planet – Global Climate Change, Ozone Holes – Ambient Air Quality and Emission Standards – Air Pollution Indices – Emission Inventories.	L1, L2 and L3	12
Module II AIR QUALITY MONITORING AND MODELLING Ambient and Stack Sampling and Analysis of Particulate and Gaseous Pollutants -Effects of meteorology on Air Pollution - Fundamentals, Atmospheric stability, Inversion, Wind profiles and stack plume patterns-Transport & Dispersion of Air Pollutants -Air Quality Modeling. Necessity, application and limitation of air quality modelling. Dispersion Modeling, Photochemical Modeling and Receptor Modeling. Different air quality Dispersion models and their limitations.	L2 and L3	12
Module III CONTROL OF AIR POLLUTANTS Primary considerations in designing effective control strategy:	L2, L3 and L4	12

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Environmental, Engineering and Economic Factor - Factors to be considered while selecting control equipment's - Various mechanisms to control gaseous pollutants and particulate matter. Control Equipment design for particulate matter: Gravity chamber, Cyclone separator, Electrostatic precipitator, fabric filter, bag filter, Wet scrubber, Venturi-scrubber and absorption towers. Control Equipment design for gaseous pollutants: Absorption, Adsorption, Condensation and Incineration.		
Module IV SURFACE AND SUB-SURFACE WATER QUALITY MODELLING Water quality modeling of Streams, Lakes and impoundments and Estuaries – Water quality– model sensitivity – assessing model performance; Models for dissolved oxygen, pathogens and BOD-Streeter Phelps model for point and distributed sources - Modified Streeter Phelps equations -Toxicant modeling in flowing water - Groundwater flow and mass transport of solutes, Degradation of organic compounds, application of concepts to predict groundwater contaminant movement, seawater intrusion – basic concepts and modeling.	L2 and L3	12

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text Books:

- Noel de Nevers, Air Pollution Control Engg., McGraw-Hill, New York, 2000.
- Lawrence Kwan, Norman C Perelra, Yung-Tse Hung, Air Pollution Control Engineering, Tokyo, 2004.
- David H.F Liu, Bela G.Liptak, Air Pollution, Lewis Publishers, 2000.
- Singal, S.P., Noise Pollution and Control Strategy, Narosa Publishing House, New Delhi, 2005.
- Steven C. Chapra, Surface Water Quality Modeling, Tata McGraw-Hill Companies, Inc., New Delhi, 2008.
- Benedini, Marcello and Tsakiris, George, Water Quality Modelling for Rivers and Streams, Springer Netherlands, 2013.
- Zhen-Gang Ji, Hydrodynamics and Water Quality: Modeling Rivers, Lakes, and Estuaries, John Wiley & Sons, 2008.

Reference Books:

- Nelson Leonard Nemerow, Industrial waste Treatment, Elsevier, 2007.
- Paul L. Bishop, Pollution Prevention: - Fundamentals and Practice, McGraw-Hill International, 2000.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	--	--	1	--	--	--	--	--	--	--	--	--	--	1	3	--
CO2	2	1	--	--	2	--	--	--	--	--	--	--	--	1	3	--
CO3	1	--	--	--	--	--	--	--	--	--	--	--	--	1	3	--
CO4	--	--	2	1	--	--	--	--	--	--	--	--	--	1	3	--
CO5	--	--	2	2	1	--	--	--	--	--	--	--	--	1	3	--

1: strongly related, 2: moderately related and 3: weakly related

EVE4314	ADVANCED WASTEWATER ENGINEERING	L	T	P	C
Version 2020.1	Date of Approval: 3rd June, 2020	4	0	2	5
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalogue Description:

This course introduces the students to the principles of biochemical processes in wastewater treatment and pollution control, with particular emphasis on municipal wastewater treatment. At the end of the course, students should have a thorough understanding of wastewater treatment processes as well as biosolids handling, treatment and disposal. They would be able to design various facilities for biological treatment of wastewater.

Course Objectives:

The objective of the course is to,

1. Provide the knowledge on the wastewater characteristics.
2. Define the principles and design criteria of wastewater pollution and mechanism of industrial processes, and suggest the suitable technologies for the treatment of wastewater from various industries.

Course Outcomes:

On completion of this course, the students will be able to

CO1: Describe various wastewater treatment unit operations.

CO2: Explain the working principle and design of wastewater treatment units.

CO3: Comprehend the importance of guidelines based on Indian Standard code of practice for the design of wastewater treatment units for different industries.

CO4: Apply the waste management process used in various industries.

Modules	Blooms level*	Number of hours
Module I INTRODUCTION Anaerobic treatment- Fundamental concepts, Applications	L1, L2 and L3	10
Module II WASTEWATER PROCESS DESIGN Process Monitoring and Control, Anaerobic treatment of wastewaters in suspended growth and fixed film processes, Process design.	L2 and L3	12
Module III DESIGN OF TREATMENT SYSTEM UASB Process design for various types of wastewaters	L2, L3 and L4	14
Module IV CASE STUDIES Anaerobic sludge digestion, Selected case studies	L2, L3 and L4	12

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text Books:

- Nemerow N. L and Dasgupta A., Industrial and Hazardous Waste Treatment, Van Nostarnd Reinhold (New York).
- Arceivala S.J. and Asolekar S.R., Wastewater Treatment for Pollution Control and Reuse, Tata McGraw Hill.
- Eckenfelder, W. W., Industrial Water Pollution Control, McGraw-Hill.
- Nemerow, N. L., Zero Pollution for Industry: Waste Minimization through Industrial Complexes, John Wiley & Sons.
- Cites R W., Middlebrooks E J., Reed S C., Natural wastewater Treatment Systems, CRC Taylor and Francis.
- Patwardhan A.D., Industrial Wastewater Treatment, PHI Learning
- S.R. Qasim, Edward and Motley and Zhu, H., Water Works Engineering: Planning, Design and Operation, Prentice Hall, India.
- S. Vigneswaran and C. Visvanathan, Water Treatment Processes: Simple Options, CRC Press.

Reference Books:

- Metcalf & Eddy., Wastewater Engineering- Treatment and Reuse (Revised by G. Tchobanoglous, F. L. Burton and H. D. Stensel), Tata McGraw Hill.
- Peavy H. S., Rowe D. R., and Tchobanoglous G., Environmental Engineering, McGraw-Hill International Edition.


CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	--	--	--	--	--	--	--	--	1	--	--	--	--	1	3	--
CO2	--	--	1	--	2	--	--	--	--	2	--	--	--	1	3	--
CO3	--	--	--	--	--	--	--	--	--	--	--	--	--	1	3	--
CO4	--	--	1	--	--	--	--	--	--	--	--	--	--	1	3	--

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EVE4315	ADVANCED WASTEWATER ENGINEERING LAB	L	T	P	C
Version 2020.1	Date of Approval: 3rd June, 2020	1	0	2	1
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalogue Description:

Application of basic chemistry and chemical evaluations to measure physical, chemical, and bacteriological parameters of wastewater. Laboratory methods and interpretation of results with regard to environmental engineering applications such as design and operation of wastewater treatment processes, and to the control of the quality of natural water.

Course Objectives:

1. Understand the common environmental problems and its determination principles relating to water and wastewater quality are performed.
2. This course will help students know which tests are appropriate for given environmental problems, statistically interpret laboratorial results and write technical reports, and apply the laboratorial results to problem identification, quantification, and basic environmental design and technical solutions to real-world.

Course Outcomes:

On completion of this course, the students will be able to

CO1: Describe the knowledge in mathematics, science and engineering.

CO2: Design and conduct experiments, interpret and analyze data, and report results.

CO3: Analyze the ability to design of Civil Engineering systems or a process that meets desired specifications and requirements related to all fields of Civil Engineering.

CO4: Explain the ability to function on engineering and science laboratory teams, as well as on multidisciplinary design teams.

CO5: Explain to identify, formulate and solve environmental engineering problems.

Modules	Blooms level*	Number of hours
1. Introduction to Advanced Wastewater Engineering laboratory	L1	1
2. Determination of D.O of wastewater	L1, L3 and L4	2
3. Determination of B.O.D of wastewater	L1, L3 and L4	1
4. Determination of C.O.D of wastewater	L1, L3 and L4	1
5. Jar Test	L1, L3 and L4	1
6. Determination of iron and fluoride	L1, L3 and L4	1
7. Determination of sulphates and sulphides in water	L1, L3 and L4	1
8. Determination of Residual Chlorine	L1, L3 and L4	1

9. Determination of Optimum Coagulant Dosage	L1, L3 and L4	1
10. Determination of Sludge Volume Index	L1, L3 and L4	1
11. Determination of Ammonia Nitrogen and Sulphates	L1, L3 and L4	1

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

Text Books:

- Garg, S.K., Environmental Engineering Vol. I & II, Khanna Publishers, New Delhi, 2000.
- Modi, P.N., Environmental Engineering Vol. I & II, Standard Book House, New Delhi, 2000.

Reference Books:

- Standard methods for the examination of water and wastewater, APHA, 20th Edition, Washington, 1998.


CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	2	--	--	--	--	--	--	--	1	--	2	1	1	--	3
CO2	2	--	--	--	--	--	--	--	1	1	--	1	1	--	3
CO3	--	--	--	--	--	--	--	--	1	1	1	1	1	--	3
CO4	2	--	--	--	--	--	--	--	--	1	--	1	1	--	3
CO5	2	--	--	--	--	--	--	--	--	1	--	1	1	--	3

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2022

AMITY UNIVERSITY HARYANA

GURUGRAM

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MAE4101	ADVANCED SOLID MECHANICS	L	T	P	C
Version 2017.1	Date of Approval: 26 June,2020	3	1	0	4
Pre-requisites/Exposure	Simple stress, strain, beam, column, bending				
Co-requisites	Perform advanced analysis of solid components and understanding of the behavior of solids under two or three dimensional stress fields				

Catalog Description

In this course the concepts of stress and strain, Mohr's circle for 3-D state of stress, Mohr's stress plane of maximum shear, rectangular strain component are discussed in detail. The Advanced Solid Mechanics deals with unsymmetrical bending, shear center, torsion of circular, elliptical, equilateral triangular, rectangular bar, contact stresses and beams.

Course Objectives

The objective of this course is to

1. Equip the student with fundamental knowledge of transformation of stresses and strains in 3D.
2. Acquaint with the solution of advanced bending problems.
3. Develop understanding of torsion in bars of different cross-sectional areas.
4. Solve for stresses and deflections of beams under unsymmetrical loading and to locate the shear center of thin wall beams;

Course Outcomes

On completion of this course, the students will be able to

- CO1. State Mohr's circle for 3-D state of stress.
CO2. Determination of principle axis and deflection of beams due to unsymmetrical bending
CO3. Explain torsion in bars of different area of cross-section
CO4. Explain contact stresses in spherical, cylindrical and curved surfaces in contact
CO5. Explain Beams and columns under various loading conditions

Modules	Blooms level*	Number of hours
MODULE 1: Analysis of stress and strain Principal stresses, stress invariant, Mohr's circle for 3-D state of stress, Mohr's stress plane of maximum shear, rectangular strain component, principle axis of strain and principle strain, theory of failure.	L1, L2, L3, L4	10
MODULE 2: Unsymmetrical Bending and Shear centre Principle axis, parallel axis theorem for product of inertia, determination of principle axis, shear due to unsymmetrical bending, deflection of beams due to unsymmetrical bending, calculation of shear centre.	L1, L2, L3 and L4	10
MODULE 3: Torsion Torsion of general prismatic bar solid section, torsion of circular and elliptical bar, torsion of equilateral triangular bar, torsion of rectangular bar, torsion of thin walled tube, torsion of bar with thin rectangular section.	L1, L2, L3 and L4	10
MODULE 4: Contact Stresses Contact stresses due to spherical surfaces in contact, due to two parallel cylindrical rollers in contact, due to two curved surfaces of different radius.	L1, L3 and L4	8
MODULE 5: Beams and Columns Euler buckling load, beam column equations, beam column with a concentrated load, beam column with several concentrated load, continuous lateral load, beam	L1, L3 and L4	10

couple with end couple.		
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**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

1. L.S. Srinath, Advanced Mechanics of Solids, Tata McGraw Hill, 2009, New-Delhi
2. E. P. Popov, Engineering mechanics of Solid, Second edition, Prentice Hall, 1998
3. I.H. Shames, Introduction to Solid Mechanics, Printice Hall Inc., 1975

Reference Books

1. U.C. Jindal, Advanced Topics of Strength of Materials, Galgotia Publication, 2001
2. A.P. Boresi, R.J. Schmidt, O.M. Sidebottom, "Advanced Mechanics of Materials", 5th Edition, John Wiley&Sons, 1993

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO 1	1	2	2	--	--	--	--	--	--	--	--	--	1	--	--	--
CO 2	1	2	2	--	--	--	--	--	--	--	--	--	1	--	--	--
CO 3	1	2	2	--	--	--	--	--	--	--	--	--	1	--	3	--
CO 4	1	2	1	--	--	--	--	--	--	--	--	--	1	--	--	--
CO 5	1	2	3	--	--	--	--	--	--	--	--	--	1	--	--	--

1: strongly related, 2: moderately related and 3: weakly related

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MAE4104	ADVANCED MACHINING PROCESSES	L	T	P	C
Version 1.1	Date of Approval: 26 June,2020	3	1	0	4
Pre-requisites/Exposure	Basics of manufacturing Engineering				
Co-requisites	-				

Catalog Description

In this course the concepts of advanced machining processes are discussed in detail. The main objective of this course is to learn about various unconventional machining processes, the various process parameters and their influence on performance and their applications. It also aims to learn the various non destructive testing (NDT) techniques and working procedures of various Non Destructive Testing (NDT) techniques.

Course Objectives

The objective of this course is

1. To familiarize the students with unconventional modern machine tools and manufacturing processes.
2. To prepare the students understand various non-conventional machining processes.
3. To prepare the students understand nondestructive testing (NDT) techniques and learn working procedures of various Non Destructive Testing (NDT) techniques.

Course Outcomes

On completion of this course, the students will be able to

CO1: Illustrate the fundamentals of various non-conventional machining processes, capabilities with their application areas.

CO2: Demonstrate the knowledge of mechanical metal removal processes.

CO3: Illustrate the concepts of various advances thermal machining processes.

CO4: Demonstrate the basic knowledge of chemical and electro-chemical metal removal processes

CO5: Demonstrate the basic knowledge of non-destructive testing with their applications.

Modules	Blooms level*	Number of hours
Module 1: Introduction Concept of advanced machining processes, Sources of metal removal Classification on the basis of energy sources -Parameters influencing selection of process, Limitations of Conventional machining processes, Comparison of conventional and non-conventional machining, Need of advanced machining processes.	L1, L2 and L3	10
Module 2: Mechanical Type Metal Removal Processes Ultrasonic machining; Elements of the process, Tool design and economic considerations, Applications and limitations, Abrasive jet and Abrasive water jet machining principles; Mechanics of metal removal; Design of nozzles, applications, Abrasive finishing process, Magnetic abrasive finishing process	L1, L2 and L3	10
Module 3: Advanced Thermal Machining Processes Classification, General principles and applications of Electro discharge, Plasma arc, Ion beam, Laser beam, Electron beam machining, Mechanics of metal removal in EDM, selection of EDM pulse generator, machining accuracy, surface finish and surface damage in EDM, Generation and control of electron beam for machining applications, advantages and limitations	L1, L2 and L3	10

Module 4: Electro Chemical Metal Removal Processes Working principle, advantages, disadvantages and applications of Electrochemical, Chemical machining, Economy aspects of ECM, Electro-chemical deburring and honing, Hybrid Unconventional Machining Processes: Introduction to ECDM, ECAM and abrasive EDM etc.	L1, L2 and L3	9
Module 5: Non Destructive Testing Overview of the Non Destructive Testing Methods for the detection of manufacturing defects as well as material characterization. Relative merits and limitations, Liquid Penetrate Testing – Principles, types and properties of liquid penetrates, developers, advantages and limitations of various methods, Testing Procedure. Magnetic Particle Testing- Theory of magnetism, inspection materials Magnetization methods, Ultrasonic Testing and radiography.	L1, L2 and L3	9

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation*

Text & References:

Text:

1. Advance Machining Processes V.K. Jain Allied Publishers Pvt. Ltd.; 1 edition 2007.
2. Modern Machining Processes P.C. Pandey, McGraw Hill Education; New edition 2017.
3. Manufacturing processes for engineering material spearson education; sixth edition, 2018
- 4.Charles, J. Hellier,“ Handbook of Nondestructive evaluation”, McGraw Hill, New York 2001.

References:

1. Baldev Raj, T.Jayakumar, M.Thavasimuthu “Practical Non-Destructive Testing”, Narosa Publishing House, 2009.
2. Ravi Prakash, “Non-Destructive Testing Techniques”, 1st revised edition, New Age International Publishers, 2010

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO1	1	--	2	--	--	--	--	--	--	--	--	--	1	--	--
CO2	1	2	--	--	--	--	--	--	--	--	--	--	1	--	--
CO3	1	--	2	--	--	--	--	--	--	--	--	--	1	--	--
CO4	1	1	2	--	--	--	--	--	--	--	--	--	1	--	--
CO5	1	2	3	--	--	--	--	--	--	--	--	--	1	--	--

1: strongly related, 2: moderately related and 3: weakly related

MAE4105	COMPUTER INTEGRATED MANUFACTURING	L	T	P	C
Version X.X	Date of Approval: 26 June,2020	3	1	0	4
Pre-requisites/Exposure					
Co-requisites					

Catalog Description:

In this course the concepts of computer aided design, computer aided manufacturing and computer integrated manufacturing are discussed in detail. The concepts of computer aided process planning (CAPP), inventory control, manufacturing resource planning-II (MRP-II) & enterprise resource planning (ERP), group technology (GT), cellular manufacturing, automated guided vehicle system, flexible manufacturing system (FMS) and industrial robotics are also discussed in detail.

Course Objectives:

The overall objective of this course is

1. To equip the students with basic and essential concepts of computer aided design, computer aided manufacturing and computer integrated manufacturing.
2. To provide high caliber engineering students with an in-depth understanding of cellular manufacturing, flexible manufacturing system (FMS) and industrial robotics.

Course Outcomes (COs):

At the end of the course, the student shall be able to:

- CO1 - Define and describe the basic fundamentals of computer aided designing, computer aided manufacturing and computer integrated manufacturing.
- CO2 – State, explain and demonstrate computer aided process planning, manufacturing resource planning and enterprise resource planning.
- CO3 – Outline, interpret and apply concepts of group technology and cellular manufacturing.
- CO4 – Define, explain and apply knowledge of flexible manufacturing systems and industrial robotics in industries.

Modules	Blooms level*	Number of hours
Module I Introduction Brief introduction to CAD and CAM, Manufacturing Planning, Manufacturing control, Concurrent Engineering, CIM concepts, elements of CIM system, Basic Elements of an Automated system , Levels of Automation, Lean Production and Just-In Time Production.	L1 and L2	9
Module II Computer Aided Process Planning: Process planning, Computer Aided Process Planning (CAPP), Logical steps in Computer Aided Process Planning, Aggregate Production Planning and the Master Production Schedule, Material Requirement planning, Capacity Planning, Control Systems, Shop Floor Control, Inventory Control, Brief on Manufacturing Resource Planning-II (MRP-II) & Enterprise Resource Planning (ERP).	L1, L2, and L3	8
Module III Cellular Manufacturing: Group Technology (GT), Part Families, Parts Classification and coding, Simple Problems in Part Coding system, Production flow Analysis, Cellular Manufacturing, Composite part concept, Machine cell design and layout, Quantitative analysis in Cellular Manufacturing, Rank Order Clustering Method, Arranging of Machines in a GT cell , Hollier Method.	L1, L2 and L3	10
Module IV Flexible manufacturing system (FMS): Types of Flexibility, FMS, FMS	L1, L2 and L3	12

Components, FMS Application & Benefits, FMS Planning and Control, Quantitative analysis in FMS, Automated Guided Vehicle System (AGVS), AGVS Application, Vehicle Guidance technology, Vehicle Management & Safety.		
Module V Industrial Robotics: Robot Anatomy and Related Attributes, Classification of Robots, Robot Control systems, End Effectors, Sensors in Robotics, Robot Accuracy and Repeatability, Industrial Robot Applications.	L1, L2 and L3	9

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

Text books:

1. Mikell.P.Groover, Automation, Production Systems and Computer Integrated Manufacturing, Prentice Hall of India, 2008.
2. Radhakrishnan P, SubramanyanS.andRaju V., CAD/CAM/CIM, 2nd Edition, New Age International (P) Ltd, New Delhi, 2000.

Reference books:

1. M. Groover, CAD/CAM Pearson Education; 1 edition, 2003.
2. S J Martin, Numerical control of Machine Tools, Butterworth-Heinemann, 1974.
3. P N Rao, CAD/CAM: Principles and Applications, Tata McGraw Hill Education; 3 editions, 2017.
4. Chang, Wysk& Wang, Computer Aided Manufacturing, Prentice Hall of India, 2005.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO 3	PSO 4
CO 1	1	2	--	--	--	--	--	--	--	--	--	--	--	1	2	--
CO 2	1	2	--	--	--	--	--	--	--	--	--	--	--	1	2	--
CO 3	1	2	--	--	--	--	--	--	--	--	--	--	--	1	2	--
CO 4	1	2	--	--	--	--	--	--	--	--	--	--	--	1	2	--

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MAE4107	ADVANCED MACHINING PROCESSES LAB	L	T	P	C
Version 2017.1	Date of Approval: 26 June,2020	0	0	2	1
Pre-requisites/Exposure					
Co-requisites					

Catalog Description:

The main objective of the advanced machining processes lab is to demonstrate the basic principles in the area of advance manufacturing to the postgraduate students through a series of experiments. The students will learn about the laboratory methods and interpretation of results with regard to metal removal processes such as USM, WJM, EDM etc. and to give final shape and size to components. Students also learn about the various non destructive evaluation and testing methods.

Course Objectives:

- To understand the working of advanced machining processes and various non-destructive evaluation and testing methods.
- To make the students understand the different types of non-conventional manufacturing processes. This course will help students know which operations are appropriate for given specimen.

Course Outcomes:

On completion of this course, the students will be able to

CO1: Apply the knowledge to calculate parameters involved in various non destructive testing methods.

CO2: Measure the cutting forces in turning, drilling and grinding operations.

CO3: Demonstrate the principle of various non destructive evaluation and testing methods.

CO4: Perform magnetic particle inspection test and liquid (dye) penetrate test on a given specimen.

CO5: Demonstrate the various ultrasonic machining processes.

CO6: Demonstrate the working of advanced manufacturing system.

Modules	Blooms level*	Number of hours
1. To study the working of EDM.	L1, L2 and L3	1
2. To determine the effects of process variables of EDM on surface finish of parts.	L1, L2 and L3	2
3. To determine the effects of process variables on dimensional accuracy of parts in EDM process.	L1, L2 and L3	2
4. To measure the cutting forces in turning operation on lathe machine tool.	L1, L2 and L3	2
5. To measure the cutting forces in drilling operation on radial drilling machine tool.	L1, L2 and L3	2
6. To measure the cutting forces in grinding operation on surface grinding machine tool.	L1, L2 and L3	3
7. To study the working of Ultrasonic machining process.	L1, L2 and L3	1
8. To study the working of Advanced Manufacturing System.	L1, L2 and L3	1

9. To study and understand the various Non Destructive Evaluation and Testing methods.	L1, L2 and L3	2
10. To perform Magnetic Particle Inspection test on a given specimen.	L1, L2 and L3	2
11. To perform Liquid (Dye) Penetrate test on a given specimen.	L1, L2 and L3	2
12. To study Ultrasonic Inspection test on a given specimen.	L1, L2 and L3	2

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V –

Text Books:

1. Modern Machining Processes P.C. Pandey, McGraw Hill Education; New edition 2017.
2. Manufacturing processes for engineering materials pearson education; sixth edition, 2018

Reference Books:

1. Baldev Raj, T.Jayakumar, M.Thavasimuthu “Practical Non-Destructive Testing”, Narosa Publishing House, 2009.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO1	1	2	--	--	--	--	--	--	--	--	--	--	1	--	--
CO2	1	2	--	--	--	--	--	--	--	--	--	--	1	--	--
CO3	1	2	--	--	--	--	--	--	--	--	--	--	1	--	--
CO4	1	2	--	--	--	--	--	--	--	--	--	--	1	--	--
CO5	1	2	--	--	--	--	--	--	--	--	--	--	1	--	--
CO6	1	2	--	--	--	--	--	--	--	--	--	--	1	--	--

1: strongly related, 2: moderately related and 3: weakly related

MAE4108	COMPUTER INTEGRATED MANUFACTURING LAB	L	T	P	C
Version X.X	Date of Approval: 26 June,2020	0	0	2	1
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

In this course the concepts of numerical control machines, computer numerical control machines axis designation, kinematic diagrams and automatic tool changers are discussed in detail. The concepts of machine control unit, G&M codes, manual part programming, interpolation cycles, simulation and machining operations on CNC's are also discussed in detail.

Course Objectives

The overall objective of this course is

1. To equip the students with basic and essential concepts of computer aided manufacturing (CAM) and computer numerical control (CNC) machines.
2. To provide high caliber engineering students with an in-depth understanding of G&M codes to write CNC programs, simulate and machining on CNC machines.

Course Outcomes:

At the end of course the students will be able to:

- CO1 - Define and describe the CNC lathe kinematic diagram, major assemblies, sub assemblies, machine control system and axes designation.
- CO2 - Define and describe the CNC milling machine kinematic diagram, major assemblies, sub assemblies, machine control system and axes designation.
- CO3 - State and explain work holding and tool holding devices for the CNC lathe and CNC milling machine.
- CO4 - Describe and apply G&M codes in manual part programming on CNC lathe.
- CO5 - Describe and apply G&M codes in manual part programming on CNC milling machine.

Modules	Blooms level*	Number of hours	
1. Make a sketch of CNC lathe showing major assemblies and indicate the CNC axes with designations. Make a sketch of the conventional lathe and if it is considered as a CNC lathe, show the axes with designations.	L1 and L2	2	
2. Make a Kinematics diagram of CNC Lathe showing all machine sub-assemblies. Indicate bearing arrangements, ball screw arrangements with sizes, wherever available.	L1 and L2	2	
3. Make a sketch of CNC machining centre showing major assemblies and indicate the CNC axes with designations. Make a sketch of the conventional machining centre and, if it is considered as a CNC machining centre, show the axes with designations.	L1 and L2	2	
4. Make a Kinematics diagram of CNC machining centre showing all machine sub-assemblies. Indicate bearing arrangements, ball screw arrangements with sizes wherever available.	L1 and L2	2	
5. Study the CNC lathe. Prepare a block diagram of controls. Identify location and type of transducers and indicate on an outline of the machine. Describe how they function.	L1 and L2	2	
6. Study the CNC machining centre. Prepare a block diagram of controls. Identify location and type of transducers and indicate on an outline of the machine. Describe how they function.	L1 and L2	2	
7. Study the work holding and tool holding devices in the CNC	L1 and	2	

lathe and draw up their specifications and capacities.	L2		
8. Study the work holding and tool holding devices in the CNC machining centre and draw up their specifications and capacities.	L1 and L2	2	
9. Prepare part programs for two specified components for CNC lathe by manual part programming. First write the machining technology in full; then prepare part program and then enter in the machine. Test the program in dry run and by tool path graphic simulation. Machine the component.	L2 and L3	2	
10. Prepare part programs for two specified components for CNC machining centre by manual part programming. First write the machining technology in full; then prepare part program and then enter in the machine. Test the program in dry run and by tool path graphic simulation. Machine the component.	L2 and L3	2	
11. To study 3D printing machine tool and its application in modern manufacturing industries	L1 and L2	1	

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

Text Books:

1. Mikell P. Groover, "Automation, Production Systems and Computer-Integrated Manufacturing", 2nd Edition, Pentice Hall, 2001.
2. Rao, Kundra&Tiwari, "Computer aided Manufacturing" Tata McGraw Hill, 2007.
3. Numerical Control: by Koren, Khanna Publisher.

References Books:

1. Mikell P. Groover, Emory W. Zimmers, "CAD/CAM", Pearson Education, 2006.
2. P.N. Rao, "CAD/CAM Principles and Applications", Tata McGraw Hill, 2006.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO 3	PSO 4
CO 1	1	2	3	--	--	3	--	--	--	--	--	--	--	1	2	--
CO 2	1	2	3	--	--	3	--	--	--	--	--	--	--	1	2	--
CO 3	1	2	3	--	--	3	--	--	--	--	--	--	--	1	2	--
CO 4	1	2	3	--	--	3	--	--	--	--	--	--	--	1	2	--
CO 5	1	2	3	--	--	3	--	--	--	--	--	--	--	1	2	--

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MAE4201	OPTIMIZATION TECHNIQUES	L	T	P	C
Version 1.1	Date of Approval: 26 June,2020	3	1	0	4
Pre-requisites/Exposure					
Co-requisites	-				

Catalog Description

In this course the concepts of optimization techniques are discussed in detail. The main objective of this course is to provide the basic concepts of optimization techniques and to educate them on the advancements in optimization techniques. It also provides knowledge of multi-Objective Programming and Genetic algorithms.

Course Objectives

The objective of this course is

1. To familiarize the students with various tools of optimization for management of various resources.
2. To acquaint the students with various advance techniques of optimization like multi-Objective Programming and Genetic algorithms etc.

Course Outcomes

On completion of this course, the students will be able to

CO1: Define optimization technique and explain its various techniques.

CO2: Apply the concept of classical optimization techniques for solving problems on single-variable and multi-variable optimization.

CO3: Apply non-linear programming and solve problems on one-dimensional optimization methods, unconstrained and constrained optimization techniques.

CO4: demonstrate the concept of other optimization techniques like geometric programming, dynamic programming, integer programming, stochastic programming, and solving problems.

CO5: Illustrate different types of advance topics in optimization

Modules	Blooms level*	Number of hours
Module 1: Introduction Need of Optimization and Historical Development, Engineering Applications, Classification and Formulation of Optimization Problem	L1, L2 and L3	6
Module 2: Classical Optimization Techniques Single-Variable and Multi-Variable Optimization, With and Without Constraints, Kuhn-Tucker Conditions.	L1, L2 and L3	10
Module 3: Non-Linear Programming Introduction, One-Dimensional Optimization Methods, Unconstrained and Constrained Optimization Techniques; Elimination Methods, Exhaustive Search, Interval Halving, Fibonacci, Golden Section Methods; Random Search Methods, Hooke and Jeeves Method, Powell's Method; Indirect Search Methods: Steepest Descent, Fletcher-Reeves, Newton's Method, DFP, BFGS Method; Internal and External Penalty Approach.	L1, L2 and L3	12
Module 4: Other Optimization Techniques Introduction and Basic Concepts of Geometric Programming, Dynamic Programming, Integer Programming, Stochastic Programming, Their Applications	L1, L2 and L3	10
Module 5: Advance Topics in Optimization		10

Multi-Objective Programming, Introduction to Genetic Algorithms, Simulated Annealing and ANN Based Optimization.	L1, L2 and L3	
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**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation*

Text & References:

Text:

- Engineering Optimization Theory and Practice by S.S. Rao, New Age International, 1996
- Hillier and Lieberman "Introduction to Operations Research", TMH, 2000.
- Hamdy ATaha, "Operations Research –An Introduction", Prentice Hall India, 2003.

References:

- Philips, Ravindran and Solberg, "Operations Research", John Wiley, 2002.
- Ronald L.Rardin, "Optimization in Operation Research" Pearson Education Pvt. Ltd. New Delhi, 2005.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO1	1	--	2	--	--	--	--	--	--	--	--	--	1	--	--
CO2	1	2	--	--	--	--	--	--	--	--	--	--	1	--	--
CO3	1	--	2	--	--	--	--	--	--	--	--	--	1	--	--
CO4	1	1	2	--	--	--	--	--	--	--	--	--	1	--	--
CO5	1	2	3	--	--	--	--	--	--	--	--	--	1	--	--

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MAE4202	DESIGN OF EXPERIMENTS	L	T	P	C
Version 2017.1	Date of Approval: 26 June,2020	3	1	0	4
Pre-requisites/Exposure	Probability, Engineering statics, data analysis, hypothesis testing and ANOVA				
Co-requisites	Apply basic principles in the design of simple experiments.				

Catalog Description

In this course the concepts of experimental design, steps of experimental design, types of experimental design and six sigma are discussed in details. The design of experiments includes completely randomized design, latin square design, factorial design, full factorial design, fractional factorial design, robust design and Taguchi's approach for experimental design.

Course Objectives

The objective of this course is to

1. Explain the issues and principles of Design of Experiments (DOE),
2. Providing an understanding of interactions among causative factors
3. Determining the levels at which to set the controllable factors.
4. Minimizing experimental error (noise) and improving the robustness of the design or process to variation.

Course Outcomes

On completion of this course, the students will be able to

CO1. Learn how to plan, design and conduct experiments efficiently and effectively, and analyze the resulting data to obtain objective conclusions..

CO2. Given a description of an experiment, determine whether it is a factorial experiment, a fractional factorial experiment, or neither

CO3. Determine whether the design appropriately deals with extraneous variables via controlling, blocking, randomization or replication.

CO4. Explain robust design and taguchi's approach for design of experiments.

Modules	Blooms level*	Number of hours
MODULE 1: Introduction A brief history of statistical design, Objectives for experimental designs. Basic design concepts. Steps and guidelines for the design of experiments, Some typical applications of experimental design, Types of experimental designs, Analysis of means, Experimental designs and six sigma, Problems	L1, L2 and L3	10
MODULE 2: Completely Randomized Design Model for a completely randomized design with a single factor. ANOM for a completely randomized design, ANOM with unequal variances, randomized block design, incomplete block designs, latin square design, Graeco – Latin square design.	L1, L2, L3 and L4	12
MODULE 3: Full Factorial and Fractional Factorial Designs with Two Levels Nature of factorial designs, deleterious effects of interactions, effect estimates the 2^3 Design, built-in –replication, role of expected mean squares in experimental design, $2k-1$ Designs. Effect estimates and regression coefficients, $2k-2$ Designs. basic concepts; design efficiency, John's $3/4$ designs	L1, L2, L3 and L4	14
MODULE 4: Robust Design DOE and Taguchi approach; experimental design using orthogonal arrays; experimental design with two-level factors only; experimental designs with	L1, L3 and L4	12

three and four level factors; ANOVA ; analysis using signal- to- noise ratios.		
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*Bloom's Level:

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. Douglas C. Montgomery , Design and Analysis of Experiments, Wiley International Student Edition (8), 2014.
- 2 Jiju Antony, Design of experiments for engineers and scientists, Elsevier, 2014
1. J P Holman, Experimental Methods for Engineers – (Southern Methodist University, USA) Tata McGraw Hill, 2001

Reference Books

1. Howard J. Seltman, Experimental design and Analysis; 2013
2. N.C. Barford (Imperial College of Sic & Tech), Experimental Measurements, Precision, Error and Truth –, Addison-Wesley Publication Company, London, 1967

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1	1	2	--	--	--	--	--	--	--	--	--	1	--	2	--
CO2	1	2	1	--	--	--	--	--	--	--	--	--	1	--	2	--
CO3	2	1	1	3	--	--	--	--	--	--	--	--	1	--	2	--
CO4	1	2	1	2	--	--	--	--	--	--	--	--	1	--	2	--

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MAE4203	RESEARCH METHODOLOGY AND TECHNICAL REPORT WRITING	L	T	P	C
Version 2019.1	Date of Approval: 26 June,2020	2	0	0	2
Pre-requisites/Exposure	NIL				
Co-requisites	NIL				

Catalogue Description

This course deals with types of research, significance and characteristics and planning a research proposal, population and sample, parameter and statistic, sampling and data collection, sampling design: steps, types, sample size, sampling methods. It deals with univariate, bivariate and multivariate analysis, measure of dispersion of data, standard deviation, variance, coefficient of variation and degree of freedom. Hypothesis testing: parametric tests and non-parametric tests, regression analysis and curve fitting, method of least-squares, explained and unexplained variations, coefficient of correlation of determination. The course also deals with technical/scientific/research report writing: referencing and bibliography and footnotes. Publication of research papers, citations, intellectual property rights and copy rights, plagiarism, patent and patent laws, commercialization and ethical issues.

Course Objectives

The objective of this course is to:

- Deals with types of research, significance and characteristics and planning a research proposal and to enhance scientific and technical writing and research skills.
- Impart knowledge about various stages of research process, statistical analysis and tools & their applications in decision making by hypothesis testing and regression analysis.
- It also deals with intellectual property rights and copy rights, plagiarism, patent and patent laws, commercialization and ethical issues.

Course Outcomes

On completion of this course, the students will be able to:

CO1: Classify different research types; explain steps in research process and planning research proposal.

CO2: Describe sampling methods, sampling steps and design, carry out data processing and analysis.

CO3: Explain hypothesis testing, parametric and non-parametric tests, carry out regression analysis, curve fitting.

CO4: Demonstrate technical and scientific report writing skills; describe plagiarism, patent laws and intellectual property rights.

Modules	Blooms level*	Number of hours
Module I: Introduction and Research Planning Introduction to research: Definition, motivation, need, objectives, significance and characteristics of research; types of research; steps in research process; planning a research proposal; literature review, web searching.	L1, L2	4
Module II: Sampling Methods Measurement scales, population and sample, parameter and statistic, sampling and data collection, sampling design: steps, types, sample size, sampling methods, data processing and analysis. Sampling surveys and questionnaire designing, primary and secondary data.	L1, L2, L3	5
Module III: Hypothesis Testing and Regression Analysis Univariate, bivariate and multivariate analysis, means-arithmetic, geometric and	L1, L3, L4	10

harmonic; measure of dispersion of data, standard deviation, variance, coefficient of variation and degree of freedom. Hypothesis testing: kinds errors in hypothesis testing, significance and confidence levels, parametric tests and non-parametric tests, one-tailed and two-tailed tests, analysis of variance. Regression analysis and curve fitting, method of least-squares, explained and unexplained variations, coefficient of correlation of determination.		
Module IV: Technical Report Writing and Plagiarism Technical/scientific/research report writing: structure and components of scientific reports, formats of dissertations, research report, report writing skills, report preparation, referencing and bibliography and footnotes. Publication of research papers, citations, making presentation-use of visual aids and PPTs. Intellectual property rights and copy rights, plagiarism, patent and patent laws, commercialization and ethical issues.	L1, L3, L4	5

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books:

1. Blake, G. and Bly, R.W. The Elements of Technical Writing. MacMillan, New York, 1993.
2. Chawla, D and Sondhi, N. Research Methodology- Concepts and Cases. Vikas Publishing House PVT LTD. New Delhi, 2016.
3. Kothari, C.R. Research Methodology- Methods and Techniques, 2nd.ed. New Age International Publishers, New Delhi. 2008.

Reference Books:

1. Montgomery, Douglas C, Design and Analysis of Experiments, 5th Ed, Wiley India.2005.
2. Panneerselvam, R.2009. Research Methodology, PHI Learning Pvt.Ltd., New Delhi, 2009
3. Ranjit Kumar 2009. Research Methodology- A step –by- step Guide for beginners; 2nd ed. Dorling Kindersley (India) Pvt. Ltd, Delhi, 2009.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1	1	2	2	3	-	-	-	-	-	-	1	3	1	2	-
CO2	1	3	1	3	3	-	-	-	-	-	-	1	3	1	2	-
CO3	1	3	1	-	-	-	-	-	-	-	-	1	3	3	2	-
CO4	1	3	2	-	3	-	-	-	-	-	-	1	3	1	2	3

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THE4211	CONCEPTS OF COMBUSTION	L	T	P	C
VERSION	Date of Approval: 26 June,2020	3	1	0	4
Pre-requisites/ Exposure	Internal combustion engines				
Co-requisites					

Catalog Description

In this course the concept of combustion, its physical and chemical kinetics will be discussed in detail. The pre-mixed and diffusion flames will be studied in detail with the effects of emissions in the environment.

Course Objectives

The objective of this course is to:

1. Equip the students with physical and chemical kinetics of the combustion and its pre-mixed and diffused flame.
2. Provide an outline for the techniques to be used for controlling the harmful emissions from the combustion of fuel and its harmful effects.

Course Outcomes

On completion of this course, the students will be able to

CO1: Define and describe the basic laws of physics, chemistry and thermodynamics and derive the various equations to support the combustion processes.

CO2: Define and describe the principles of pre-mixed flame and outline their characteristics. Applying the effects of physics and chemistry on the variables of flame.

CO3: Define and describe the principles of diffusional flame and outline their characteristics. Describe the combustion of carbon sphere.

CO4: Outline the harmful emissions from the combustion of fuel and its harmful effects.

Modules	Blooms level*	Number of hours
MODULE 1: Physics and Chemistry of Combustion Combustion, modes of combustion, Laws of thermodynamics, stoichiometry, Hess's law, adiabatic flame temperature, laws of transport phenomena, conservation, energy transport equation; Basic reaction kinetics: collision theory; elementary reactions: first, second, third and reverse order reactions, QSSA and PEA method.	L1, L2 and L3	14
MODULE 2: Premixed flame One-Dimensional combustion wave, laminar premixed flame, propagation method, stationary flame method, effects of chemistry and physics variables on burning velocity, flame quenching, flammability limits, flame stabilization, turbulent pre-mixed flame.	L1, L2, L3	13
MODULE 3: Diffusion flame Gaseous jet flame, liquid fuel combustion: droplet burning time, spray combustion model; Solid fuel combustion: diffusional theory for a single coal particle combustion, combustion of carbon sphere with CO burning gas phase.	L1, L2	12
MODULE 4: Combustion and Environment Atmosphere, chemicals from combustion: emissions of CO, CO ₂ , O ₂ , H ₂ O, NO _x , N ₂ O, H-C, volatile organic, SO ₂ , sulphate aerosols, soot particles, emission control methods.	L1, L2	9

*Bloom's Level:

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. Fundamentals of combustion by D.P.Mishra, PHI learning pvt. Ltd., 2010.
2. Fundamentals of Combustion Processes, Sara McAllister, Jyh-Yuan Chen, A. Carlos , Fernandez-Pello, Springer.

Reference Books

1. Fundamentals of Combustion Engineering by AchintyaMukhopadhyay, SwarnenduSen, 1st Edition (2019), CRC Press
2. Heywood.J, Internal combustion engine, Mc Graw Hill, 2017

Modes of Evaluation: Quiz/Assignment/Seminar/Written Examination**Examination Scheme:**

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO 3	PSO 4
CO 1	1	3	3	-	--	-	-	--	--	--	--	3	1	-	-	-
CO 2	1	3	3	-	-	-	--	--	--	--	--	-	1	-	-	-
CO 3	1	3	3	--	-	-	-	-	--	--	--	-	1	-	-	-
CO 4	1	1	-	3	-	-	2	-	-	-	-	3	1	-	3	-

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THE4212	ENERGY MANAGEMENT & AUDITING	L	T	P	C
VERSION	Date of Approval: 26 June,2020	3	1	0	4
Pre-requisites/ Exposure					
Co-requisites					

Catalog Description:

In this course the current energy scenario, energy conservation, audit and management is discussed. To calculate the energy efficiency and identify the areas deserving strict control to save energy.

Course Objectives:

The objective of this course is to

1. Equip the students with the in-depth knowledge of the functioning of energy management techniques and processes.
2. To provide basic calculations and methods for harnessing energy and also to identify the energy auditing methods adopted in many industries.

Course Outcomes

On completion of this course, the students will be able to

CO1: Describe, define and identify the energy management and energy conservation terminologies like supply, demand, economic analysis terminologies.

CO2: Define; describe the energy performance, energy acts and duties of auditors.

CO3: Explain, prepare and apply energy balance diagrams and energy action plans in an organization.

CO4: Identify and describe the ways in which energy is conserved in electrical and thermal equipment.

Modules	Blooms level*	Number of hours
MODULE 1: Energy Management Concept of energy management, energy demand and supply, economic analysis; Duties and responsibilities of energy managers. Energy Conservation: Basic concept, energy conservation in Household, Transportation, Agricultural, service and Industrial sectors, Lighting, HAVC.	L1, L2	8
MODULE 2: Energy Audit Definition, need and types of energy audit; Energy management (Audit) approach: energy cost, bench marking, energy performance, matching energy use to requirement, maximizing system efficiencies, optimizing the input energy requirement; Fuel & energy substitution; Energy audit instruments; Energy conservation Act; Duties and responsibilities of energy manager and auditors	L1, L2	10
MODULE 3: Material energy balance Facility as an energy system; Method for preparing process flow; material and energy balance diagrams. Energy Action Planning: Key elements, force field analysis; Energy policy purpose, perspective, content, formulation, rectification.	L2, L3, L4	10
MODULE 4: Monitoring and Targeting Definition monitoring & targeting; Data and information analysis. Electrical Energy Management: energy conservation in motors, pumps and	L1, L2	9

fan systems; energy efficient motors.		
MODULE 5: Thermal energy management Energy conservation in boilers, steam turbine and industrial heating system; Application of FBC; Cogeneration and waste heat recovery; Thermal insulation; Heat exchangers and heat pump; Power plant's Renovation and modernization– Reactive power management and energy management, Building Energy Management and its ISO standards.	L1, L2	11

Bloom's Level:

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books:

1. Murphy & McKay, Energy Management, BSP Books Pvt. Ltd, 2014.
2. Smith CB; Energy Management Principle, Pergamon Press, New York, 2015.
3. Rajan GG, Optimising Energy Efficiency in Industry, TMH, 2001.
4. Callaghan P O, Energy Management, McGraw-Hill Book Company, 1993.
5. Amit Kumar Tyagi, Handbook on Energy Audit and Management, Tata Energy Research Institute, 2001.

Reference Books:

1. Bureau of Energy Efficiency, Study material for energy Managers and Auditors: Paper I to V, 2001.
2. Hamies; Energy Auditing and Conservation: Method, Measurement, Hemisphere, Washington, 2001.
3. Witty, Larry C, Industrial Energy Management Utilisation, Hemisphere Publishers, Washington, 2013.
4. Kreith & Goswami, Energy Management and Conservation Handbook, CRC Press, 2016.

Modes of Evaluation: Quiz/Assignment/Seminar/Written Examination

Examination Scheme

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO 1	--	--	--	--	--	--	-	-	-	-	1	3	--	--	1	-
CO 2	--	3	-	--	3	-	--	3	--	--	2	2	--	--	1	3
CO 3	--	--	-	--	2	--	--	2	3	-	3	2	--	--	1	-
CO 4	--	-	2	--	2	3	--	--	--	-	2	3	--	--	1	-

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THE4213	REFRIGERATION AND AIRCONDITIONING	L	T	P	C
Version1.1	DateofApproval:July14,2017	3	0	0	3
Pre-requisites/Exposure	Basics of Thermodynamics				
Co-requisites	-				

Catalog Description

The aim of this course is to provide the students with the understanding of the basic principles of Refrigeration and Air Conditioning such that they could build simple mathematical models representing the conditioned space and its components used to control environmental conditions. The application of thermodynamics, heat transfer, and fluid mechanics includes an understanding of refrigerants and refrigeration systems, psychometrics, human comfort and air quality, calculation of heating and cooling loads, and heat and mass transfer processes and associated R&AC components and systems.

Course Objectives

The objective of this course is to

Equip the students with concepts of air refrigeration, vapour compression refrigeration, different types of refrigerants, vapour absorption and steam jet refrigeration system.

Provide an overview of Psychrometry, HVAC systems and different expansion and control devices.

Course Outcomes

After completing the course, the students will be able to

CO1. Explain air refrigeration, vapour compression refrigeration, different types of refrigerants, vapour absorption and steam jet refrigeration system.

CO2. Describe the working of Refrigerant in multistage, cascade refrigeration.

CO3. Apply the knowledge of psychrometry to various psychrometric processes.

CO4. Evaluate cooling and heating load and design of HVAC system.

CO5. Develop and design RAC system and evaluate different expansion and control devices.

Modules	Bloom level*	Number of hours
MODULE-1: Analysis of refrigeration cycles Analysis of vapour compression refrigeration cycle Subcooled liquid and superheated vapour refrigeration cycles, their effect on performance. Compound compression Multi vapour-Cascade system, Vapour Absorption System: Simple vapour Absorption system- Actual vapour absorption cycle representation on enthalpy concentration h-c diagram, Enthalpy Concentration Diagram, Aircraft Refrigeration: Thermodynamic Cycle-Different systems-Analysis- Comparison UnConventional Refrigeration, Industrial Refrigeration: Chemical and process industries, Dairy plants, Petroleum Refineries.	L1, L2 and L3	8

MODULE-2: Refrigerants Primary and secondary refrigerants. Designation of refrigerants, Desirable properties of refrigerants such as solubility in water and lubricating oil. Material compatibility, Toxicity, Flammability, Thermodynamic properties of refrigerants, Inorganic, Halocarbon refrigerants. Secondary refrigerants. Refrigerant mixtures, Need for Alternate refrigerants–Retrofitting aspects.	L1, L2, and L3	8
MODULE-3: Applied Psychrometry Psychrometric processes in air conditioning equipment, Mixing, Bypass factor, Heating and dehumidifying coils, Air washers. Cooling by dry and wet coils, Use of hygroscopic solution in air washers, Adiabatic dehumidifiers. Humidifiers, Water injection. Steam injection.	L2 and L3	7
MODULE 4: Comfort Air Conditioning and Cooling Load Calculations: Sensible and Latent Heat Loads—sensible heat factor. Use of Effective and grand sensible heat factor, Relationship between ESHF, ADP and BF. Representation of All Fresh Air, Recirculated air, Bypassed Air and High Latent Heat Load systems on Psychrometric Chart, Air Conditioning Systems: Summer, winter, Hot and dry outdoor conditions.	L2, L3 and L4	7
MODULE 5: Selection of outside and inside design conditions: Thermodynamics of human body. Body regulation process against heat and cold. Comfort & Comfort chart, Effective temperature, Factors governing optimum effective temperature, Design considerations. Air conditioning control systems: Basic elements of the control system, Temperature, Humidity & Pressure controls, Refrigeration, Room thermostat.	L2, L3 and L4	6

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis; L6:Evaluation

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

Text Book

Refrigeration and Air Conditioning/C.P. Arora./TMG, 2008
 Refrigeration and Air Conditioning/Manohar Prasad, 2003
 Refrigeration & Air Conditioning/Arora & Domkundwar/Dhanpat Rai & Co. 2010
 Refrigeration & Air Conditioning/R.C. Arora/PHI/2012
 Refrigeration & Air Conditioning/S.C. Jain/Chand and Co. 2016

References Book

Principles of Refrigeration/Roy. J. Dossat 1996
 Refrigeration and Air Conditioning/F. Stoecker & Jerold. W. Jones./MGH Intl 1982
 Handbook of Air Conditioning System Design/Carrier, 2006
 ASHRAE Handbook/Volume 1 & 2, 2000



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CO,PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO 3	PSO 4
CO 1	1	--	--	--	--	--	--	--	--	--	--	--	--	1	2	--
CO 2	1	--	--	--	--	--	--	--	--	--	--	--	--	1	2	--
CO 3	1	--	--	--	--	--	--	--	--	--	--	--	--	1	2	--
CO 4	1	--	--	--	--	--	--	--	--	--	--	--	--	1	2	--
CO 5	1	--	--	--	--	--	--	--	--	--	--	--	--	1	2	--

1:stronglyrelated,2:moderatelyrelatedand3:weaklyrelated

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THE4214	REFRIGERATION & AIRCONDITIONING LAB	L	T	P	C
Version 1.1	Date of Approval: 08 May, 2019	0	0	2	1
Pre-requisites/Exposure	Thermodynamics				
Co-requisites	Nil				

Catalog Description

In this course study will be made on the practical aspects of refrigeration & air conditioning. Experiments will be performed in the laboratory to find the COP of heat pump and refrigeration system. This course is intended to provide an overview of practical aspects of vapour compression refrigeration systems and compressors.

Course Objectives

The objective of this course is to

Equip the students with practical concepts of refrigeration & air conditioning.

To provide students with the necessary skills to conduct experiments on heat pump and air refrigeration system; collect data, perform analysis and interpret results to draw valid conclusions through standard test procedures.

Demonstrate the concepts discussed in the Refrigeration & Air conditioning course.

Experimentally determine COP of Vapour absorption refrigeration system.

Course Outcomes

On completion of this course, the students will be able to

CO1: Determine COP of Refrigeration system, heat pump and vapour compression refrigeration system.

CO2: Demonstrate and explain hermetically sealed compressor, effect of superheating.

CO3: Determine efficiency of compressor.

CO4: Determine total Heat Load for Air-Conditioning unit.

Modules	Blooms level *	Number of hours
Module 1 Study and Performance of Vapor Compression Refrigeration Cycle To find Performance of refrigeration test rig by using different expansion devices To find performance Parameters of cooling Towers	L1, L2, L3	6
Module 2 To find performance parameters of an Ice Plant To find performance parameters of Vapor Absorption Refrigeration system Performance analysis of Vortex tube Apparatus Performance analysis of Mechanical heat pump	L1, L2, L3	6

Module3 Performance analysis of air conditioning law limit Study of pull down characteristics of domestic refrigerator.	L1,L2,L3	6
Module4: Study of performance parameters using ventilation trainer.	L1,L2 and L3	6

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis; L6-Evaluation

Text References:

- CPArora, Refrigeration and Conditioning, Tata McGraw Hill, 2019.
- Manohar Prasad, Refrigeration and Conditioning, Wiley Eastern Limited, 2018.
- Jordan and Priester, Refrigeration and Conditioning, Prentice Hall of India, 2019.
- WFStoecker, Refrigeration and Conditioning, McGraw Hill, 2017.
- Refrigeration and air conditioning by Ahmad Ul Ameen, PHI publication, 2014.
- Handbook of air conditioning and Refrigeration by Shan K. Wang, Tata McGraw Hill, 2008.
- Refrigeration and Air Conditioning by Arora & Domkundwar, Dhanpat Rai and Sons, 2013.

Modes of Evaluation: Quiz/Assignment/Seminar/Written Examination

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA–Internal Assessment, EE-External Exam, PR-Performance, LR–Lab Record, V–Viva. A-Attendance

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1	3	-	--	--	--	--	--	--	--	--	--	1	2	--	-
CO2	1	-	-	-	--	--	--	--	--	--	--	--	1	2	--	-
CO3	1	2	-	-	-	--	--	--	--	--	--	--	1	2	--	-
CO4	1	3	-	--	--	--	--	--	--	--	--	--	1	2	--	-

1:strongly related, 2:moderately related and 3:weakly related



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MDE4204	ADVANCED TRIBOLOGY	L	T	P	C
VERSION	Date of Approval: 26 June,2020	3	1	0	4
Pre-requisites/ Exposure	Physics				
Co-requisites					

Catalog Description

Advanced Tribology is a cross-disciplinary course based on the basic principles of the science and engineering. The course focuses on theories of friction, wear, lubrication, basic model approaches of tribological elements/systems, and methods to simulate tribological processes.

Course Objectives

The objective of this course is to:

1. Introduce students with the field of Tribology i.e. friction, wear and lubrication.
2. Enhance students' awareness of Tribological issues in the design of machine components, such as rolling element bearing, journal bearing, thrust bearings, seals and braking system.

Course Outcomes

On completion of this course, the students will be able to

CO1: State and explain different types of engineering surfaces, their properties and measurement methods.

CO2: Describe and explain different contact between surfaces, Hertzian and Non-Hertzian contact. Explain different methods of measurement.

CO3: Define wear, lubrication and their type and will be able to explain different wear mechanism and lubrication regime.

CO4: Define, describe and analyze Hydrodynamic Journal Bearing, thrust bearing and air lubricated journal bearing.

CO5: Explain and describe the Nanotribology and its measurement methods.

Modules	Blooms level*	Number of hours
MODULE 1: INTRODUCTION Introduction to Tribology and its historical background Industrial importance, Factors Influencing Tribological phenomena ENGINEERING SURFACES, PROPERTIES AND MEASUREMENT Engineering surfaces -surface characterization computation of surface parameters. Surface measurement techniques. Apparent and real area of contact, Contact of engineering surfaces.	L1, L2 and L3	8
MODULE 2: SURFACE CONTACT Hertzian and Non-Hertzian contact. Contact pressure and deformation in non-conformal contacts. SURFACE CONTACT Genesis of friction, friction in contacting rough surfaces, sliding and rolling friction, Various laws and theory of friction. Stick slip friction behavior, frictional heating and temperature rise. Friction Measurement techniques.	L1, L2, L3	8
MODULE 3: WEAR Wear and Wear types. Mechanisms of wear -Adhesive, abrasive, corrosive, erosion, fatigue, fretting, etc., wear of metals and non-metals. Wear models – asperity contact, constant and variable wear rate, geometrical influence in wear models, wear damage. Wear in various mechanical components, wear controlling techniques.	L1, L2, L3	8
MODULE 4: LUBRICATION	L1, L2,	7

Introduction to Lubrication, Lubrication regimes, Lubricants and their properties. Solid Lubricants.	L3	
MODULE 5: HYDRODYNAMIC BEARING Mechanism of pressure development, Classification, Idealized Journal Bearing, Pressure Distribution. ANTIFRICTION BEARING Ball and Roller Bearing, Geometry of ball bearing, Stresses and Deformation, Lubrication of ball bearing. GAS LUBRICATED BEARING Introduction, Governing Equation, Finite Journal Bearings.	L1, L2, L3, L4	10
MODULE 6: NANOTRIBOLOGY Introduction to micro and NanoTribology. Measurement tools used in Nanotribology: SFA, STM, AFM Micro scale and Nanoscale Wear Nanofabrication/NanomachiningNanohydrodynamicsNanolubricationTribological issues in MEMS.	L1, L2, L3	7

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Text Books

1. "Engineering Tribology" by PrasantaSahoo, PHI, 2005
2. "Engineering Tribology" by Stachowiak&Batchelor, Elsevier, 2013

References Books

1. "Nanotribology and Nanomechanics: An Introduction" by Bharat Bhushan, Springer, 2009
2. "Nanotribology" by Hsu & Ying, Springer, 2003

Modes of Evaluation: Quiz/Assignment/Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO 3	PSO 4
CO 1	1	2	--	-	--	--	--	--	--	--	--	--	1	-	-	-
CO 2	1	2	-	-	--	--	--	--	--	--	--	--	1	-	-	-
CO 3	1	2	-	-	-	--	--	--	--	--	--	-	1	-	-	-
CO 4	1	2	2	-	--	--	--	--	--	--	--	--	1	-	-	-
CO 5	1	2	-	--	-	--	--	--	--	--	--	-	1	-	-	-

1: strongly related, 2: moderately related and 3: weakly related

MDE4205	INDUSTRIAL ROBOTICS	L	T	P	C
Version X.X	Date of Approval: 26 June,2020	3	1	0	4
Pre-requisites/Exposure	Kinematics of Machines				
Co-requisites	Nil				

Catalog Description

This subject covers the fundamental concept of Robotics used in industrial application including motors, controllers, and sensors etc. This course includes Robot anatomy, coordinate frames, manipulator control, Robot sensors, language, applications, kinematics and dynamic modeling etc.

Course Objectives

The objective of this course is to

1. Equip the students with concepts of Robotics, coordinate frames, mapping, Robot language sensors and applications.
2. Provide an overview of manipulator control, kinematic and dynamic modeling of different types of robot.

Course Outcomes

On completion of this course, the students will be able to

- CO1. Describe evolution, history and progressive advancement in Robotics and explain fundamental of coordinate frame, mapping and transforms.
- CO2. Explain the kinematic model and inverse kinematics of robot arm configuration.
- CO3. Describe the manipulator differential motion and explain dynamic behavior of manipulator.
- CO4. Explain the manipulators control and various sensors used in robot.
- CO5. Explain various robot applications and methods of robot programming.

Modules	Blooms level*	Number of hours
MODULE 1: INTRODUCTION TO ROBOTICS Evolution of Robots and Robotics, Laws of Robotics, Progressive advancement in Robots Robot anatomy, Human Arm Characteristics, Design and Control issue, Manipulation and Control, Programming Robots.	L1, L2 and L3	8
COORDINATE FRAMES, MAPPING AND TRANSFORMS Coordinate Frames, Description of objects in space, Transformation of Vectors, Inverting a Homogeneous Transform, Fundamental Rotation matrix.		
MODULE 2: DIRECT KINEMATIC MODEL Mechanical structure and notations Kinematic modeling of the manipulate or Denavit Hardenbergs Notation Manipulator Transformation Matrix	L2 and L3	10
THE INVERSE KINEMATICS Manipulator workspace, solvability of Inverse kinematics model, solution techniques, closed form solution.		
MODULE 3: MANIPULATOR DIFFERENTIAL MOTION AND STATICS Linear and angular velocity of a rigid body, relationship between transformation	L1, L2	10

matrix and angular velocity, manipulator Jacobian, Jacobian Inverse, Jacobian Singularities, Static Analysis. DYNAMIC MODELING Lagrangian Mechanics, Two Degree of Freedom manipulator-Dynamic Model, Lagrange-Euler formulation Newton-Euler formulation, Inverse Dynamics.	and L3	
MODULE 4: CONTROL OF MANIPULATORS Open and Close loop control, linear control schemes, linear second order SISO model of a manipulator joint. Joint Actuators, Computed Torque Control, force control of Robotics, Manipulators, Hybrid position/force control, Impedance Force/Torque Control. ROBOTIC SENSORS Sensors in Robotics, classification of Robotic sensors, kinds of sensors used in robotics-Acoustic sensors optic, Pneumatic, force/Torque sensors.	L2 and L3	10
MODULE 5: ROBOT APPLICATIONS Industrial Applications-Material Handling, Processing Applications, Assembly applications, inspection application, Principles for Robot application and application planning, Robot safety, Non-Industrial Application. ROBOT LANGUAGES AND PROGRAMMING The Textual Robot Languages, Generations of Robot Programming Languages, Methods of Robot Programming.	L1, L2 and L3	8

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. Robert J. Sehillig, Fundamental of Robotics, Prentice Hall of India.
2. Saeed B. Niku, Introduction to Robotics by Pearson Education Asia.

References Books

1. RachidManseur, Robot Modeling and kinematics, Luxmi Publications
2. Robotics and Control by R K Mittal Tata McGraw Hill Publishers

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO 3	PSO 4
CO 1	1	2	--	--	--	--	--	--	--	--	--	--	1	--	3	--
CO 2	1	--	2	3	--	--	--	--	--	--	--	--	1	--	3	--
CO 3	1	2	3	3	3	--	--	--	--	--	--	--	1	--	3	--
CO 4	1	1	2	--	--	--	--	--	--	--	--	--	1	--	3	--
CO 5	1	1	2	--	--	--	--	--	--	--	--	--	1	--	3	--

1: strongly related, 2: moderately related and 3: weakly related

MDE4213	EXPERIMENTAL STRESS ANALYSIS	L	T	P	C
VERSION	Date of Approval: 26 June,2020	3	1	0	4
Pre-requisites/ Exposure	Strength of Materials				
Co-requisites					

Catalog Description

The course introduces the physical principle used by various experimental techniques and also provides a guideline to select an experimental technique for a given application. The role of analytical, numerical, experimental methods in solving a problem in solid mechanics and different types of non-destructive methods are discussed.

Course Objectives

The objective of this course is to:

1. Recognize the various techniques available to measure the stress and Strains using different sources.
2. Realize the working of recording instruments and data logging methods
3. Distinguish the principles of photo elasticity in two dimensional stress analyses.

Course Outcomes

On completion of this course, the students will be able to

CO1: Define, describe and analyze the measurements techniques, accuracy of measurement and error analysis.

CO2: Explain and describe the theory Mechanical Strain Gauges, Optical Strain Gauges, Electrical Strain Gauge and Acoustical Strain Gauge.

CO3: Acquire the knowledge on Brittle and Bi-Refrigerant coatings and analyze the working of strain gauges.

CO4: Describe and explain the overall concepts of stress/strain analysis by experimental means.

CO5: Explain and analyze the theory and practice of common experimental stress analysis Methods including Moir methods, non destructive testing.

Modules	Blooms level*	Number of hours
MODULE 1: MEASUREMENTS Principles of measurements, Range and Accuracy of measurements, Sensitivity of Measurements, Error Analysis	L1, L2 and L4	9
MODULE 2: EXTENSOMETERS Mechanical Strain Gauges, Optical Strain Gauges, Electrical Strain Gauge, Acoustical Strain Gauge.	L1, L2, L3	10
MODULE 3: ELECTRICAL RESISTANCE STRAIN GAUGES Principle of Operation and Requirements, Types and their uses, Materials for strain gage, Calibration and Temperature Compensation, Cross Sensitivity, Circuits for Static and Dynamic Strain Measurements, Strain Indicators , Rosette Analysis	L1, L2, L3, L4	11
MODULE 4: PHOTOELASTICITY Concepts of light, Photoelastic effects, stress optic law, Interpretation of fringe pattern, Compensation and Separation Techniques, Photoelastic materials	L1, L2, L3	8
MODULE 5: NON-DESTRUCTIVE TESTING Fundamental of NDT, Radiography, Magnetic Particle Inspection, Ultrasonic Testing, Fluorescent Penetrate Technique, Eddy Current Testing,	L1, L2, L3, L4	10

Acoustic Emission Technique, Thermography , Fundamentals of brittle coating methods, Introduction to Moir Techniques, Holography.		
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**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Text Books

1. Experimental Stress Analysis by Dally, J. W. & Riley, W. F, 2009.
2. Experimental Stress Analysis by L.N. Srinath, 2013.

References Books

1. Strain Gauges by Lissner, H.R and Perry, C. C, 2005..
2. Photo elastic Separation of Principle Stress by Drucker, D.C, 2006.
3. Work on General B-D Photoelasticity by Froncht, M. M, 2004.
4. Similarities between Stress & Flow Patterns by Hetenye, M, 2013.

Modes of Evaluation: Quiz/Assignment/Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO 3	PSO 4
CO 1	1	3	--	--	--	--	--	--	--	--	--	--	1	--	-	-
CO 2	1	2	--	-	--	--	--	--	--	--	--	--	1	-	-	-
CO 3	1	1	--	--	--	--	--	--	--	--	--	--	1	-	-	-
CO 4	1	1	--	--	--	--	--	--	--	--	--	--	1	-	-	-
CO 5	1	1	--	--	--	--	--	--	--	--	--	--	1	--	-	-

1: strongly related, 2: moderately related and 3: weakly related



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MDE4211	ADVANCED COMPUTER AIDED DESIGN	L	T	P	C
Version X.X	Date of Approval: 26 June,2020	3	0	0	3
Pre-requisites/Exposure	CAD Modeling, Solid works				
Co-requisites	Nil				

Catalog Description

In this course the concepts of solid modeling in computer aided design are discussed in detail. This course includes transformation of point, line and projection of an object. Introduction to the principles of curve, surface and solid representations; mathematical representations of curves, surfaces, solids and application to mechanical design problems are discussed in details.

Course Objectives

The objective of this course is to

1. Learn about the geometric issues concerned solid modeling, geometric transformation and projection of object.
2. Impart the parametric fundamentals to create and manipulate geometric models using curves, surfaces and solids.

Course Outcomes

On completion of this course, the students will be able to

CO 1: Describe the concept of solid modeling and explain the parametric equation in CAD

CO 2: Solve the problem on 2 D transformation and 3 D in CAD and explain the orthographic, axonometric, oblique and perspective projections

CO 3: Explain the topology of geometry and determine the equation of Hermit curve, Bezier curves and B-spline curves.

CO 4: Explain the geometric form of surface, blending function and determine the equation of bi-cubic surface, bezier surface and B-spline surfaces

CO 5: Describe the solid representation scheme and demonstrate the constructive solid geometry, sweep representation and cell decomposition in solids.

CO 6: Summaries the analytical properties of curve and surface.

Modules	Blooms level*	Number of hours
MODULE 1:INTRODUCTION Introduction, Review of vectors & Matrices, Basics of geometric and solid modeling, explicit, implicit, intrinsic and parametric equations, coordinate systems	L1, L2 and L3	4
MODULE 2:TRANSFORMATIONS Introduction, transformation of points and line, 2-D translation, shearing, rotation, reflection, scaling and combined transformation, homogeneous coordinates, 3-D scaling, shearing, rotation, reflection and translation, combined transformations, orthographic, axonometric, oblique and perspective projections.	L1, L2 and L3	6
MODULE 3:CURVES Geometry and topology, algebraic and geometric forms of straight lines, circles, conics, cubic splines, Ferguson curve, Hermit curve, Bezier curves and B-spline curves, NURBS, composite curves, tangents and normal, blending functions, reparametrization.	L1, L2 and L3	8

MODULE 4: SURFACES Algebraic and geometric forms, tangents and twist vectors, normal, blending functions, reparametrization. Plane surface, sixteen point form, four curve form, ruled surface, surface of revolution, tabulated cylinder, lofted surface, bi-cubic surface, bezier surface, B-spline surfaces, Coons' patch, blending surface, offset surface, rational surface.	L1, L2 and L3	8
MODULE 5: SOLIDS Solid models and representation schemes, their properties, boundary representation, constructive solid geometry, sweep representation, cell decomposition, octree encoding, spatial occupancy enumeration.	L1, L2 and L3	7
MODULE 6: ANALYTICAL PROPERTIES Analytical properties (Intersection & development) of curves and surfaces	L1, L2 and L3	5

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Text Books

- Grover and Zimmer, CAD/CAM, Prentice Hall, 1984, New Delhi.
- I. Zeid, CAD/CAM: Theory and Practice, McGraw Hill, 2009, New Delhi.
- M.E. Mortenson, Geometric Modeling, Industrial Press, 2006.
- Computer Aided Design by Jayanta Sarkar, CRC Press

Reference Books

- Mikell Grover, CAD/CAM, Pearson Publication, 2003, New Delhi
- Michael E. Mortenson, Geometric Modelling, Wiley Publication, 1997, USA
- G.K. Vijayaraghavan & dr.S.Sundaravalli, Computer Aided Design, Lakshmi Publications, New Delhi.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	2	--	--	--	--	--	--	--	--	--	--	--	1	3	--
CO2	1	1	2	--	--	--	--	--	--	--	--	--	--	1	3	--
CO3	1	1	3	--	--	--	--	--	--	--	--	--	--	1	3	--
CO4	1	1	2	--	--	--	--	--	--	--	--	--	--	1	3	--
CO5	1	1	2	--	--	--	--	--	--	--	--	--	--	1	3	--
CO6	1	1	2	--	--	--	--	--	--	--	--	--	--	1	3	--

1: strongly related, 2: moderately related and 3: weakly related

MDE4212	ADVANCED COMPUTER AIDED DESIGN LAB	L	T	P	C
Version X.X	Date of Approval: 26 June,2020	-	-	2	1
Pre-requisites/Exposure	CAD Modeling, Solid works				
Co-requisites	Nil				

Catalog Description

In this course the concepts of solid modeling in computer aided design are discussed in detail. This course includes the different types of features in part modeling, assembly of parts and projection of an object. Moreover the syllabus also covers the principles of curve, surface and solid representations; surfaces, solids and application to mechanical design problems.

Course Objectives

The objective of this course is to

1. Learn about the geometric issues concerned solid modeling and projection of object.
2. Impart the parametric fundamentals to create and manipulate geometric models using curves, surfaces and solids.

Course Outcomes

On completion of this course, the students will be able to

CO 1: Demonstrate the fundamentals of modeling software features and capabilities. Prepare the sketch of simple mechanical components. Explain different types of features in part modeling & assembly of parts.

CO 2: Identify the mass properties & sectional properties of part & assembly and validate the assembly with interference detection.

CO 3: Construct machine elements in sketcher, part and assembly mode such as crankshaft, connecting rod, piston etc.

CO 4: Develop codes for analytical and synthetic curves.

CO 5: Construct the model using surface modeling tool.

List of Experiment	Blooms level*	Number of hours
1) Drawing sketches in the sketcher workbench, Constraints sketches and creating base features, Reference elements and sketch-based features.	L1, L2	2
2) Creating dress-up, hole features and Editing features.	L1, L2	2
3) To draw the detail view of the flange coupling and assemble the parts by using the CAD software and obtain its respective views.	L1, L2	2
4) To draw the detail view of the – crankshaft and assemble the parts by using the CAD software and obtain its respective views.	L1, L2 and L3	2
5) To draw the detail view of the connecting rod and assemble the parts by using the CAD software and obtain its respective views.	L1, L2 and L3	2
6) To draw the detail view of the piston and assemble the parts by using the CAD software and obtain its respective views.	L1, L2 and L3	2
7) Develop the computer program to generate the Bezier curve	L1, L2 and L3	2
8) Develop the computer program to generate the B-spline curve	L1, L2 and L3	2
9) Working with wireframe and surface design workbench.	L1, L2	2

10) To develop the mouse model by surface modeling using CAD software.	L1,L2 and L3	3
11) To develop the spoon model by surface modeling using CAD software.	L1,L2 and L3	3

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

- 1) Grover and Zimmer, CAD/CAM, Prentice Hall, 1984, New Delhi.
- 2) Zeid, CAD/CAM: Theory and Practice, McGraw Hill, 2009, New Delhi.
- 3) M.E. Mortenson, Geometric Modeling, Industrial Press, 2006.
- 4) Computer Aided Design by JayantaSarkar, CRC Press.

Reference Books

- 1) Mikell Grover, CAD/CAM, Pearson Publication, 2003, New Delhi
- 2) Michael E. Mortenson, Geometric Modelling, Wiley Publication, 1997, USA
- 3) G.K. Vijayaraghavan & dr.S.Sundaravalli, Computer Aided Design, Lakshmi Publications, New Delhi.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	--	--	--	--	--	--	--	--	--	--	--	--	1	3	--
CO2	1	--	--	--	--	--	--	--	--	--	--	--	--	1	3	--
CO3	1	--	--	--	--	--	--	--	--	--	--	--	--	1	3	--
CO4	1	--	--	--	--	--	--	--	--	--	--	--	--	1	3	--
CO5	1	--	--	--	--	--	--	--	--	--	--	--	--	1	3	--

Course Code: IPE4211	ADVANCED COMPUTER AIDED MANUFACTURING	L	T	P	C
Version	Date of Approval: 26 th June 2020	3	0	0	3
Pre-requisites/Exposure	Industrial Engineering, CAD				
Co-requisites					

Catalog Description:

In this course the concepts of numerical control machines, programmed automation, axis designation and automatic tool changers are discussed in detail. The concepts of machine control unit, G&M codes, manual part programming, processes planning, interpolation cycles, computer aided part programming, computer aided process planning, computer integrated manufacturing and artificial intelligence in manufacturing are also discussed in detail.

Course Objectives

The overall objective of this course is

- 1) To equip with various concepts and practices of computer aided manufacturing (CAM) and computer numerical control (CNC) machines.
- 2) To provide high calibre engineering students with an in-depth understanding of manual part programming and simulation on CNC machines.

Course Outcomes (COs):

At the end of the course, the student shall be able to:

CO1 - Define and describe the basic concepts of numerical control machines and systems.

CO2 – Explain and demonstrate about the computer numerical control, direct numerical control and adaptive control systems

CO3 – Outline, interpret and apply the manual part programming of various operations on CNC's.

CO4 – State and explain the manual process planning versus computer aided process planning.

CO5 –Outline and describe the computer integrated manufacturing and artificial intelligence in manufacturing.

Modules	Blooms level*	Number of hours
Module I Introduction: Introduction to Automation, Need and future of NC Systems and CAM, Advantages and Disadvantages, Open and Closed loop systems, Historical developments and future trends. Future of NC Machines, Difference between ordinary and NC Machine tools, Methods for improving accuracy and productivity.	L1 and L2	5
Module II Control of NC Systems: Types of CNC Machine Tools systems devices, e.g. encoders and interpolators, Features of CNC Systems, Direct Numerical Control (DNC), Standard Controllers and General Programming features available in CNC Systems, Computer Process monitoring and Control. Adaptive control systems.	L2 and L3	6
Module III NC Part Programming: Manual Programming for simple parts, e.g., turning, milling, drilling, etc., Computer aided NC Programming in APT language, use of canned cycles, Generation of NC Programmer through CAD/CAM systems, Design and implementation of post processors.	L1, L2 and L3	7
Module IV Computer Aided Process Planning: Introduction, Manual process planning vs. Computer aided process planning; Basics of variant and generative process are planning methods, Examples of	L1 and L2	7

automated process planning systems.		
Module V Computer Integrated Manufacturing: Introduction, features and applications of CIM, key elements, advantages and disadvantages of CIM.	L1 and L2	6
Module VI Artificial Intelligence in Manufacturing: Introduction, Elements of Expert Systems, Introduction to Neural Networks, Expert Systems application in manufacturing, Case studies.	L1 and L2	5

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text Books:

1. S K Sinha (2011), CNC Programming, Galgotia Publications 9th edition.
2. P N Rao (2017), CAD/CAM : Principles and Applications, Tata McGraw Hill Education; 3 edition.

Reference Books:

1. S J Martin (1974), Numerical control of Machine Tools, Butterworth-Heinemann.
2. Chang, Wysk & Wang (2005), Computer Aided Manufacturing, Prentice Hall of India.
3. M. Groover (2003), CAD/CAM Pearson Education; 1 edition.
4. Radhakrishnan P, Subramanyan S. and Raju V. (2000), CAD/CAM/CIM, 2nd Edition, New Age International (P) Ltd, New Delhi, 2000
5. Groover M.P. (2016), Automation, Production Systems, and Computer-Integrated Manufacturing”, Pearson Education 4th edition.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO 1	1	--	--	--	--	--	--	--	--	--	--	--	--	1	2	--
CO 2	1	--	--	--	--	--	--	--	--	--	--	--	--	1	2	--
CO 3	1	--	--	--	--	--	--	--	--	--	--	--	--	1	2	--
CO 4	1	--	--	--	--	--	--	--	--	--	--	--	--	1	2	--
CO 5	1	--	--	--	--	--	--	--	--	--	--	--	--	1	2	--

1: strongly related, 2: moderately related and 3: weakly related

Course Code: IPE4212	ADVANCED COMPUTER AIDED MANUFACTURING LAB	L	T	P	C
Version	Date of Approval: 26 th June 2020	0	0	2	1
Pre-requisites/Exposure					
Co-requisites					

Catalog Description:

In this course the concepts of numerical control machines, computer numerical control machines, automatic tool changers, axis designation and CAM software are discussed in detail. The concepts of machine control unit, G&M codes, manual part programming, interpolation cycles, computer aided part programming using CAM software, simulation, dry run and machining operations on CNC's are also discussed in detail.

Course Objectives:

The overall objective of this course is

1. To equip the students with basic and essential concepts of computer aided manufacturing (CAM) and computer numerical control (CNC) machines.
2. To provide high caliber engineering students with an in-depth understanding of G&M codes to write CNC programs, part programming using CAM software, simulation and machining on CNC machines.

Course Outcomes:

At the end of course the students will be able to:

- CO1 – State and explain the CNC lathe and CNC milling machine with their major assemblies, sub assemblies, machine control system and axes designation.
- CO2 - Describe and apply G&M codes in manual part programming on CNC lathe and CNC milling machine.
- CO3- Explain and apply computer aided programming for different turning operations with the help of CAM software on CNC lathe machine.
- CO4 – Explain and apply computer aided programming for milling and drilling operations with the help of CAM software on CNC milling machine.

Modules	Blooms level*	Number of hours
1. Practice programming on manual part programming.	L1, L2 and L3	2
2. To write the CNC programme for the given operation.	L2 and L3	2
3. To perform step-turning operation using CAM software on CNC lathe.	L2 and L3	2
4. To perform plain turning operation using CAM software on CNC lathe.	L2 and L3	2
5. To perform the side milling, face milling operation using CAM software on CNC milling machine.	L2 and L3	2
6. Simulation of manufacturing system using CAM Software	L2 and L3	2
7. Practice in APT based NC programming.	L2 and L3	2
8. To perform the drilling operation using CAM software on CNC milling machine.	L2 and L3	2

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

Text Books:

1. S K Sinha (2011), CNC Programming, Galgotia Publications 9th edition.
2. P N Rao (2017), CAD/CAM : Principles and Applications, Tata McGraw Hill Education; 3 edition.

Reference Books:

S J Martin (1974), Numerical control of Machine Tools, Butterworth-Heinemann.

1. Chang, Wysk & Wang (2005), Computer Aided Manufacturing, Prentice Hall of India.
2. M. Groover (2003), CAD/CAM Pearson Education; 1 edition.
3. Radhakrishnan P, Subramanyan S. and Raju V. (2000), CAD/CAM/CIM, 2nd Edition, New Age International (P) Ltd, New Delhi, 2000
4. Groover M.P. (2016), Automation, Production Systems, and Computer-Integrated Manufacturing”, Pearson Education 4th edition.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO 3	PSO 4
CO 1	1	2	--	--	--	--	--	--	--	--	--	--	--	1	2	--
CO 2	1	2	3	--	--	--	--	--	--	--	--	--	--	1	2	--
CO 3	1	2	3	--	--	--	--	--	--	--	--	--	--	1	2	--
CO 4	1	2	3	--	--	--	--	--	--	--	--	--	--	1	2	--

1: strongly related, 2: moderately related and 3: weakly related



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Course Code: IPE4204	MECHATRONICS	L	T	P	C
Version	Date of Approval: 26 th June 2020	3	0	0	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description:

In this course the concepts of measurement systems, control systems, microprocessor, micro controller and mechatronics system are discussed in detail. The concepts of sensors and transducers, signal conditioning, multiplexers, pneumatic actuation systems, hydraulic actuation systems, mechanical actuation systems and electrical actuation systems are also discussed in detail.

Course Objectives:

The overall objective of this course is

1. To equip the students with mix skills of mechanical engineering, electronics engineering and computer engineering.
2. To provide high caliber engineering students with an in-depth understanding of pneumatic actuation systems, hydraulic actuation systems, mechanical actuation systems and electrical actuation systems.

Course Outcome (COs)

At the end of the course, the student shall be able to:

CO1 - Define and describe key elements of mechatronics systems and measurement systems.

CO2 – State, explain and apply sensors, sensors terminology and transducers.

CO3 –Outline, interpret and apply the concept of signal processing and interfacing systems.

CO4 –Define, describe and demonstrate pneumatic actuation systems and hydraulic actuation systems.

CO5 -Define, describe and demonstrate mechanical actuation systems and electrical actuation systems.

Modules	Blooms level*	Number of hours
Module I Introduction: Definitions, mechatronics system, measurement systems, control systems, microprocessor / micro controller based controllers, response of systems, mechatronics approach, applications: robot, CNC machine.	L1 and L2	6
Module II Sensor Technology: Sensor and transducers, terminology, displacement, position, proximity – encoders, velocity sensors – tacho-generators, force - strain gauges, pressure gauge, temperature – thermocouples, RTDs, thermistors, light sensors – photoelectric sensors, IR sensors, sensors selection.	L1, L2, and L3	6
Module III Signal Conditioning: Introduction, operational amplifier, protection, filtering, Wheatstone bridge, digital signals, multiplexers, data acquisition, digital signal processing, pulse – modulation, problems.	L1, L2 and L3	6
Module IV Pneumatic & Hydraulic Actuation Systems: Actuation systems, Pneumatic actuation systems, electro-pneumatic actuation systems, hydraulic actuation systems, electro-hydraulic actuation systems, directional control valves, pressure control valves, process control valves, rotary actuators, problems.	L1, L2 and L3	6
Module V Mechanical Actuation Systems: Mechanical systems, types of motion, kinematics chains, cams, gear trains, belt and chain drives, bearings, mechanical	L1, L2 and L3	6

aspects of motor selection, problems.		
Module VI Electrical Actuation Systems: Electrical systems, mechanical switches, solid state switches, solenoids, D.C. motor, A.C. motors, stepper motors, problems.	L1, L2 and L3	6

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text Books:

1. W. Bolton (2010), Mechatronics: Electronic Control Systems in Mechanical and Electrical Engineering by published by Pearson Education Asia.
2. David G. Alciatore and Michael B. Hstand (2012), Introduction to Mechatronics and Measurement Systems, Published by Tata McGraw-Hill Publishing company Limited, 3rd edition.
3. DevdasShetty and Richard A. Kolk (2011), Mechatronics System Design Published by Global Engineering, USA, 2nd edition.

Reference Books:

1. A. Smaili& F. Mrad (2008), Mechatronics: Integrated Technologies for Intelligent Machines published by Oxford University Press.
2. AppuuKuttan K. K.(2007), Introduction to Mechatronics Published by Oxford University Press.
3. Kamm Understanding Electro-Mechanical Engineering – An Introduction to Mechatronics by, Prentice-Hall of India

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO 3	PSO 4
CO 1	1	--	--	--	--	--	--	--	--	--	--	--	--	1	2	--
CO 2	1	--	--	--	--	--	--	--	--	--	--	--	--	1	2	--
CO 3	1	--	--	--	--	--	--	--	--	--	--	--	--	1	2	--
CO 4	1	--	--	--	--	--	--	--	--	--	--	--	--	1	2	--
CO 5	1	--	--	--	--	--	--	--	--	--	--	--	--	1	2	--

1: strongly related, 2: moderately related and 3: weakly related

IPE4213	MECHATRONICS LAB	L	T	P	C
Version	Date of Approval: 26 th June 2020	0	0	2	1
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

In this course the concepts of sensors and transducers, signal conditioning, pneumatic actuation systems, hydraulic actuation systems, mechanical actuation systems and electrical actuation systems are also discussed in detail. The aim of this course is to make the students familiar with the basic of mechatronics.

Course Objectives:

1. Equip the students with practical concepts of pneumatic actuation systems and hydraulic actuation systems.
2. Understand the application of PLC by working models and experiments.

Course Outcomes (COs): After studying this course the students will be able to:

CO 1- Define the key elements of mechatronics system and measurement systems.

CO 2- Explain and demonstrate the pneumatic actuation systems.

CO 3- Explain and demonstrate the hydraulic actuation systems.

CO 4 – Show the uses of PLC.

List of Experiments	Blooms level*	Number of hours
1. To extend and retract a double acting cylinder using 5/3 hand lever valve or 5/2 Two way Solenoid valve.	L1, L2 and L3	2
2. To study the sequencing of two double acting cylinders (Pneumatic).	L1, L2 and L3	2
3. To study the movement of double acting cylinder using the hand lever valve or solenoid operated valve.	L1, L2 and L3	2
4. To study the sequencing of two double acting cylinders (Hydraulic).	L1, L2 and L3	2
5. To study the movement of piston of cylinder using solenoid operated valve or programmable logic controller.	L1, L2 and L3	2
6. Mini Project	L2, L3 and L4	14

Text Books:

- 1) Bolton, W. (2010), *Mechatronics*. Delhi : Pearson.
- 2) Alciatore, D. G. and Hiestand, M. B. (2012), *Introduction to Mechatronics and Measurement Systems*, Delhi: Tata McGraw-Hill.
- 3) Shetty, D. and Kolk, R.A. (2011). *Mechatronics System Design* USA: Global Engineering.

Reference Books:

- 1) Smaili, A. and Mrad, F. (2008). *Mechatronics: Integrated Technologies for Intelligent Machines*, USA: Oxford University Press.
- 2) Appukuttan, K. K.(2007). *Introduction to Mechatronics*, India: Oxford University Press.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO 3	PSO 4
CO 1	1	--	--	--	--	--	--	--	--	--	--	--	1	1	--	--
CO 2	1	--	--	--	--	--	--	--	--	--	--	--	1	1	--	--
CO 3	1	--	--	--	--	--	--	--	--	--	--	--	1	1	--	--
CO 4	1	--	--	--	--	--	--	--	--	--	--	--	1	1	--	--

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IPE4205	WELDING AND AIDED PROCESSES	L	T	P	C
Version 1.1	Date of Approval: 26 June,2020	3	1	0	4
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

To study essential concepts for welding parameters and welding processes. To study various types of defect, advance welding processes. To study the various techniques of welding automation and Non destructive testing of welds.

Course Objectives:

The objective of this course is to

1. Equip the students with concept of welding processes, types of defect, advance welding processes and welding automation.
2. Provide an overview of Non destructive testing of welds.

Course Outcomes:

At the end of the course, students will demonstrate their ability to:

1. Define the welding processes, weld ability and welding defects.
2. Analyze methods of advanced welding processes like Ultrasonic welding.
3. Develop concept and techniques of welding automation.
4. Analyze the soldering and brazing process.
5. Define the Non destructive testing of welds.

Modules	Blooms level*	Number of hours
MODULE 1: Welding Metallurgy Introduction: Classification of welding processes, Review of welding processes like gas, arc and resistance welding. Weld bead geometry and shape factors, Weld dilution. Heat affected zone and its characteristics; Effects of alloying elements on weld ability, Weld ability of steels, stainless steel, cast iron, and aluminium.	L1, L2, and L3	08
MODULE 2: Weld Design & Quality Control: Principles of sound weld design, Welding joint design, Welding defects; Testing of weldment, Material joining characteristics, Welding positions, Allowable strength of welds under steady loads, Weld throat thickness; Weld quality, Discontinuities in welds, their causes and remedies and quality conflicts. Numerical.	L1, L2, and L3	10
MODULE 3: Advanced welding processes: Introduction, main features and applications of Microwave welding, Friction welding, Electron beam welding, Plasma arc welding, Laser welding and Explosive welding.	L1, L2, and L3	08
MODULE 4: Automation in Welding: Introduction, Manual Welding, Semi-Automatic Welding, Automatic Welding, Welding Mechanization, Flexible Automated Welding, Robotic Welding, Types of Welding Robots, Robot Selection Mechanics, Joint tracking system,	L1, L2, and L3	08
MODULE 5:		06

Soldering: Techniques of soldering, solders, phase diagram, composition, applications. Brazing: Wetting and spreading characteristics, surface tension and contact angle concepts, brazing fillers, role of flux and characteristics, atmospheres for brazing, adhesive bonding.	L1, L2, and L3	
MODULE 6: Non Destructive Testing of Welds: Non Destructive Tests: their Advantages and Limitations, Comparison with Destructive Tests, Visual Examination, Dye Penetrate Inspection, Magnetic Particle Inspection, X-Rays and Gamma Rays Inspection and Ultrasonic Inspection of Welds. ASME Standards/ codes for welding.	L1, L2, and L3	08

Text Book

1. Parmer, R. S. *Welding Engineering and Technology*. Khanna Publishers, Delhi 2003.
2. Rao, P.N. *Manufacturing Technology (Foundry, Forming and Welding)*. Tata McGraw, Delhi 2018.

Reference Book

1. Khanna, O.P. *Welding Technology*. Dhanpat Rai Publication, Delhi 2015.
2. Hoffman, D. J. and Dahle, K. R. *Welding*. Pearson Education, Delhi 2017.
3. Jain, R.K. *Production Technology: Manufacturing Processes, Technology and Automation*. Khanna Publishers, Delhi 2004

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	1	1	--	--	--	--	--	--	--	--	--	--	1	2	--
CO2	1	1	--	--	--	--	--	--	--	--	--	--	1	2	--
CO3	1	1	--	--	--	--	--	--	--	--	--	--	1	2	--
CO4	1	1	--	--	--	--	--	--	--	--	--	--	1	2	--
CO5	1	1	--	--	--	--	--	--	--	--	--	--	1	2	--

1: strongly related, 2: moderately related and 3: weakly related

Anil

Manesar

IPE4214	QUALITY AND RELIABILITY MANAGEMENT	L	T	P	C
Version	Date of Approval: 26 th June 2020	3	1	0	4
Pre-requisites/Exposure	Quality Control				
Co-requisites	-				

Catalog Description

In this course approaches and techniques to assess and improve process and product quality, Reliability are discussed in detail. The basic concepts and techniques of modern reliability Engineering tools will be introduced. The concepts learnt will be applied to design methods Failure analysis and system safety.

Course Objectives

The objective of this course is to

1. Equip the students with problem oriented in depth knowledge of Quality and Reliability Engineering
2. Provide an overview of concepts, methods and application of Quality and Reliability Engineering.

Course Outcomes

On completion of this course, the students will be able to

CO1: Describe Quality Control, Quality Assurance and Quality Management.

CO2: Explain Tools and Techniques of quality management.

CO3: Explain reliability function and conditional reliability.

CO4: Describe system structure functions and reliability specification and system measurements.

Modules	Blooms level*	Number of hours
MODULE 1: Quality – Concept, Different Definitions and Dimensions, Inspection, Quality Control, Quality Assurance and Quality Management, Quality as Wining Strategy, Views of different Quality Gurus.	L1and L2	6
MODULE 2: Introduction, Definitions and Principles of Operation, Tools and Techniques, such as, Quality Circles, 5 S Practice, Total Quality Control (TQC), Total Employee Involvement (TEI), Problem Solving Process, Quality Function Deployment (QFD), Failure Mode and Effect analysis (FMEA), Fault Tree Analysis (FTA), Kizen, Poka-Yoke, QC Tools, PDCA Cycle, Quality Improvement Tools, TQM Implementation and Limitations.	L1and L2	8
MODULE 3: Definition of reliability – reliability vs. quality, the failure distribution, the reliability function, mean time to failure, Hazard rate function, bathtub curve, conditional reliability - constant failure rate model - time-dependent failure models - exponential and normal distribution.	L1 and L2	10
MODULE 4: Serial configuration, parallel configuration, combined series parallel systems, system structure function, minimal cuts and minimal paths – load sharing systems – standby systems – degraded systems, three state devices – physical	L1and L2	14

reliability models - covariate models, static models , dynamic models, physics of failure models.		
MODULE 5: Reliability specification and system measurements - reliability allocation - design methods failure analysis – system safety and fault tree analysis – analysis of down time – the repair time distribution, reliability under preventive maintenance, maintenance requirements.	L1and L2	10

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. Prasad L M, "Principles and Practice of Management", S Chand& Company Ltd., New Delhi, 2008.
2. Quality Control & Application by B. L. Hanson & P. M. Ghare, Prentice Hall of India Delhi, 2015
3. Competitive Manufacturing Management by John M. Nicholas, Mcgraw Hill. Delhi, 2001.

Reference Books

1. Statistical Quality Control by M. Mahajan, DhanpatRai& Co. (P) Ltd, Delhi, 2018.
2. Reliability Engineering, by E.BalaGuruswamy, Tata McGraw Hill, 1994.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO 3	PSO 4
CO 1	1	2	--	--	--	--	--	--	--	--	--	3	1	--	--	--
CO 2	1	2	--	--	--	--	--	--	--	--	--	--	2	1	--	--
CO 3	1	3	3	--	--	--	--	--	--	--	--	--	1	--	2	--
CO 4	1	--	--	3	2	--	--	--	--	--	--	--	--	1	--	--

1: strongly related, 2: moderately related and 3: weakly related

MAE4301	TOTAL QUALITY MANAGEMENT & QUALITY ASSURANCE	L	T	P	C
Version 1.1	Date of Approval: 26 June,2020	3	1	0	4
Pre-requisites/Exposure					
Co-requisites	-				

Catalog Description

In this course the concepts of quality improvement in manufacturing are discussed in detail. Various quality management tools, improvement cycles, quality circles and audit procedures will be introduced. The concepts learnt will be applied to improve quality in manufacturing.

Course Objectives

The objective of this course is to

1. Equip the students with concepts of quality improvement in manufacturing.
2. Provide an overview of quality management tools, improvement cycles, quality circles and audit procedures.

Course Outcomes

On completion of this course, the students will be able to

CO1: Define components of quality, innovation, design and explain Product quality characteristics and dimensions.

CO2: Explain various key aspects of the quality system standards.

CO3: Describe total quality management tools, improvement cycle and quality organization.

CO4: Define quality assurance, inspection, quality circles and explain quality audits.

Modules	Blooms level*	Number of hours
MODULE 1: The Foundations of Total Quality Management: Components of quality, The total quality management approach, Innovation, design and improvement, Product quality characteristics and service quality characteristics, Quality parameters and specific dimensions of quality.	L1 and L2	8
MODULE 2: Key Aspects of the Quality System: Planning for quality, Flowcharting, Detailed flow process charts and flow diagrams, planning for just-in-time (JIT) management, System design and contents, System documentation, implementation and assessment.	L1 and L2	8
MODULE 3: TQM Tools and the Improvement Cycle: Measurement of quality, Costs of quality, Tools and techniques for quality improvement, Statistical process control, Quality improvement techniques in service industries, Specific techniques for design, reliability, maintenance and process improvement.	L1 and L2	10
MODULE 4: The Quality Organization Within an Organization: People and the organizational structure, Responsibilities and performance management, The relationship between the quality organization and top management, Culture change through teamwork for quality improvement, Implementing teamwork for quality improvement: the DRIVE model.	L1 and L2	10
MODULE 5: Internal Quality Audits: Scope of requirements and audit procedures, the audit programme and planning of quality audits, Verifying compliance with planned arrangements, determining the effectiveness of the system, reporting the results of quality audits, Follow-up audits Quality and Business Process Re-engineering: Beyond tools to total quality management, Stages in the development of quality and related activities:	L1 and L2	12

inspection, quality assurance, company-wide quality control, total quality management, Quality circles.		
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**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. Prasad L M, "Principles and Practice of Management", S Chand & Company Ltd., New Delhi, 2008.
2. Quality Control & Application by B. L. Hanson & P. M. Ghare, Prentice Hall of India Delhi, 2015
3. Competitive Manufacturing Management by John M. Nicholas, McGraw Hill. Delhi, 2001.

Reference Books

1. Statistical Quality Control by M. Mahajan, Dhanpat Rai & Co. (P) Ltd, Delhi, 2018.
2. Reliability Engineering, by E. Bala Guruswamy, Tata McGraw Hill, 1994.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO 3	PSO 4
CO 1	1	2	--	--	--	--	--	--	--	--	--	--	1	--	--	--
CO 2	1	1	--	--	--	--	--	--	--	--	--	--	2	1	--	--
CO 3	1	2	2	--	--	--	--	--	--	--	--	--	1	--	2	--
CO 4	1	--	--	--	2	--	--	--	--	--	--	--	--	1	--	--

1: strongly related, 2: moderately related and 3: weakly related



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THE4304	CRYOGENICS	L	T	P	C
Version1.1	DateofApproval:Date,Month2017	3	1	0	4
Pre-requisites/Exposure	RAC				
Co-requisites					

Course Objectives

Illustratethefundamentalprinciplesandapplicationsofdeeprefrigerationsystem
Presenttheproperties,applicationsandenvironmentalissuesofdifferentrefrigerants

Course Outcomes

Oncompletionofthiscourse,thestudentswillbeableto

CO1.ToexplainanddescribetheeffectofNeon,hydrogenandheliumcomponentefficienciesonsystemperformance

CO2.TodescribeandanalysestheGas separationandpurificationprinciplesandplantcalculation

CO3.Describetheideal and practical systems of Cryogenic refrigerations systems

CO4.DescribetheIntroductionto vacuum technology, low temperature properties of materials and application of cryo genics systems.

CO5.DescribetheSpacetechnology, Cryogenic industry, Biology and application of Medicine.

Modules	Bloom level*	Numbe rofhou rs
MODULE1:IntroductiontoCryogenicSystems: MechanicalPropertiesatlowtemperatures.PropertiesofCryogenicFluids. GasLiquefaction:Minimumworkforliquefaction.Methodstoprotectlowtemperature.Liquef actionsystemsfor gases other than Neon.HydrogenandHelium.	L1,L2, L3	12
MODULE2:LiquefactionSystemsforNeon,HydrogenandHelium: ComponentsofLiquefactionsystems.Heatexchangers.Compressorsandexpanders.Expansi onvalve, Lossesinreal machines.	L1,L2, L3and L4	12
MODULE3:GasSeparationandPurificationSystems: Propertiesofmixtures,Principlesofmixtures,Principlesofgasseparation,Airseparationsyste ms.	L1,L2, L3	12
MODULE4:CryogenicRefrigerationSystems: WorkingMedium,Solids,Liquids,Gases,Cryogenicfluidstorage&transfer,Cryogenicstora gesystems,Insulation,LowTemperaturematerial,Fluidtransfermechanisms,Cryostat,Cryo Coolers.	L1,L2, L3	12
MODULE5:Applications: Spacetechnology,In-FlightairseparationandcollectionofLOX,Gasindustry,Biology,Medicine,Electronics.		

**Bloom'sLevel:*

L1-Knowledge;L2-Comprehension;L3-Application;L4:Analysis;L5:Synthesis,L6:Evaluation

Text Books

Barron, R., Cryogenic Systems, McGraw-Hill, 1966 New-Delhi, India
 Timmerhaus, K.D. and Flynn, T.M., Cryogenic Process Engineering, Plenum Press, 1989.
 Scott, R.B., Cryogenic Engineering, D'Van-Nostrand 1996,

Reference Books

Vance, R.W. and Duke, W.M., Applied Cryogenic Engineering, John Wiley, 1962.
 Sitting, M. Cryogenic, D'Van-Nostrand, 1963
 Barron, R., Cryogenic Systems, McGraw-Hill, 1966.

Modes of Evaluation: Quiz/Assignment/Seminar/Written Examination**Examination Scheme:**

Components	A	CT	S/V/Q	HA	EE
Weightage(%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	1	--	--	--	--	--	--	--	--	--	--	1	2	--
CO2	1	1	--	--	--	--	--	--	--	--	--	--	1	2	--
CO3	1	1	--	--	--	--	--	--	--	--	--	--	1	2	--
CO4	1	1	--	--	--	--	--	--	--	--	--	--	1	2	--
CO5	1	1											1	2	

1: strongly related, 2: moderately related and 3: weakly related

THE4309	ADVANCED COMPUTATIONAL FLUID DYNAMICS	L	T	P	C
Version 1.1	Date of Approval: 26 June,2020	3	0	0	3
Pre-requisites/Exposure	Fluid Mechanics				
Co-requisites	Nil				

Catalog Description

Computational Fluid Dynamics (CFD) is a branch of fluid mechanics that uses algorithms to analyze and solve problems that involves fluid flow. This design tool has been developed over the years. The software simplifies complex simulations and can be applied in a varied range of transonic or turbulent flows, for biological, physical, chemical and medical applications. CFD is being increasingly employed by many industries either to reduce manufacturing design cycles or to provide an insight into existing technologies so that they may be analyzed and improved. Examples of such industries include power generation, aerospace, process industries, automotive, chemical engineering and construction.

Course Objectives

The objective of this course is to

1. Equip the students with concepts of computational fluid dynamics and models of flow.
2. Provide an overview of continuity, momentum and energy equations and basic aspects of Discretization.

Course Outcomes

On completion of this course, the students will be able

CO1: To define and explain the concept of CFD and its applications; finite control volume; infinitesimal fluid element, substantial derivative, divergence of velocity.

CO2: To state and describe continuity, momentum and energy equations of fluid Dynamics.

CO3: To explain the classification of quasi linear partial differential equations and general behavior of the different classes of partial differential equations

CO4: To define and distinguish different aspects of Discretization and computational fluid Dynamics techniques.

CO5: To explain the concept of Pressure correction Technique & Incompressible Couette Flow

Modules	Blooms level*	Number of hours
Module 1 Introduction Introduction to CFD, CFD as a research tool, CFD as a design tool, applications of CFD: automobile and engine applications; industrial manufacturing applications; civil engineering applications; environmental engineering applications, models of flow: finite control volume; infinitesimal fluid element, substantial derivative, divergence of velocity: its physical meaning.	L1, L2	7
Module 2 Governing Equations of Fluid Dynamics The continuity equation: model of finite control volume fixed in space; model of finite control volume moving with the fluid; model of infinitesimally small element fixed in space, model of infinitesimally moving with the flow, momentum equation, energy equation, summary of the governing equations for fluid dynamics with comments: equations for viscous and non viscous flow, physical boundary conditions	L1, L2	7
Module 3 Mathematical Behavior of partial differential equations	L1, L2	7

Introduction, classification of quasi linear partial differential equations, a general method of determining the classification of partial differential equations: Eigen value method, general behavior of the different classes of partial differential equations: hyperbolic equations; steady in viscous supersonic flow; unsteady in viscous flow, parabolic equations: steady boundary layer flow, elliptic equations.		
Module 4 Discretization & CFD Techniques Introduction, Introduction to finite differences, difference equations, Explicit and implicit approaches, errors and stability analysis, some simple CFD Techniques: Introduction, Lax Wendroff technique and Maccormack's technique, some comments: viscous flows, conservative form, space marching, Relaxation technique, Alternating Direction implicit technique.	L1, L2	7
Module 5 Pressure correction Technique & Incompressible Couette Flow Introduction, some comments on the incompressible Navier – Stokes equations, need for a staggered grid, philosophy of pressure correction method, pressure correction formula, boundary conditions, some computer graphic techniques used in CFD: xy plots, contour plots, vector and streamline plots, scatter plots, mesh plots, composite plots, Incompressible Couette Flow: introduction, physical problem and its exact analytical solution, numerical approach. Introduction to Finite element method in Computational fluid Dynamics	L1, L2	8

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4- Analysis; L5- Synthesis, L6- Evaluation

Text Books

1. Anderson, John D., Computational Fluid Dynamics: The basics with applications, Tata McGraw Hill, 2012, New-Delhi
2. Chung, T.J., Computational Fluid Dynamics, Cambridge University Press, 2002, UK.

Reference Books

1. Ferziger, Joel H. and Peric, Computational Methods for Fluid Dynamics, Springer, 2002, USA.
2. Blazek, Jiri, Computational Fluid Dynamics: Principles and Applications, Elsevier, 2005, UK.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	3	-	--	--	--	--	--	--	--	--	--	1	--	-	-
CO2	1	-	-	-	--	--	--	--	--	--	--	--	1	--	-	-
CO3	1	2	-	-	-	--	--	--	--	--	--	--	1	--	-	-
CO4	1	3	-	--	--	--	--	--	--	--	--	--	1	--	-	-
CO5	1	2	-	--	--	--	--	--	--	--	--	--	1	--	-	-

1: strongly related, 2: moderately related and 3: weakly related

THE4310	ADVANCED COMPUTATIONAL FLUID DYNAMICS LAB	L	T	P	C
Version 1.1	Date of Approval: 26 June,2020	0	0	2	1
Pre-requisites/Exposure	Fluid Mechanics, Computational Fluid Dynamics				
Co-requisites	Nil				

Catalog Description

In this course study will be made on the Numerical solution of laminar and turbulent pipe flow problem in ANSYS Fluent. This course is intended to carry out numerical simulation for Plate Boundary Layer and Flow in a nozzle problem in ANSYS Fluent. Numerical simulation will be carried out for conduction as well as Steady flow past a cylinder and sphere problems.

Course Objectives

The objective of this course is to

1. Provide students with the necessary skills to carry out numerical simulation.
2. Equip the students with basic concepts of Ansys to develop numerical simulation for different types of problems.

Course Outcomes

On completion of this course, the students will be able

CO1: To develop the numerical solution to a laminar and turbulent pipe flow problem in ANSYS Fluent.

CO2: To develop the numerical solution to a Flat Plate Boundary Layer and Flow in a nozzle problem.

CO3: To develop numerical simulation of the Steady flow past a cylinder and sphere in ANSYS Fluent.

CO4: To develop numerical simulation of the flow over an airfoil and heat conduction problem in ANSYS Fluent.

CO5: To develop numerical simulation of the heat conduction through a composite wall and cylinder in ANSYS Fluent.

Modules	Blooms level*	Number of hours
Module 1 To develop the numerical solution to a laminar pipe flow problem in ANSYS Fluent. To develop the numerical solution to a turbulent pipe flow problem in ANSYS Fluent.	L1, L2 and L6	5
Module 2 To develop the numerical solution to Flat Plate Boundary Layer problem in ANSYS Fluent. To develop the numerical solution to Flow in a nozzle problem in ANSYS Fluent.	L1, L2 and L6	5
Module 3 To develop the numerical solution to Steady flow past a cylinder problem in ANSYS Fluent. To develop the numerical solution to Steady flow past a sphere problem in ANSYS Fluent.	L1, L2 and L6	5
Module 4: To develop the numerical solution to flow over an airfoil problem in ANSYS Fluent.	L1, L2 and L6	5

To develop the numerical solution for heat conduction problem through a rectangular plate in ANSYS Fluent.		
Module 5 To develop the numerical solution for heat conduction problem through a composite wall in ANSYS Fluent. To develop the numerical solution for heat conduction problem through a cylinder in ANSYS Fluent	L1, L2 and L6	5

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4- Analysis; L5- Synthesis, L6- Evaluation

Text Books

1. Anderson, John D., Computational Fluid Dynamics: The basics with applications, Tata McGraw Hill, 2012, New-Delhi
2. Chung, T.J., Computational Fluid Dynamics, Cambridge University Press, 2002, UK.

Reference Books

1. Ferziger, Joel H. and Peric, Computational Methods for Fluid Dynamics, Springer, 2002, USA.
2. Blazek, Jiri, Computational Fluid Dynamics: Principles and Applications, Elsevier, 2005, UK.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.A- Attendance

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	3	-	--	--	--	--	--	--	--	--	--	1	--	-	-
CO2	1	-	-	-	--	--	--	--	--	--	--	--	1	--	-	-
CO3	1	2	-	-	-	--	--	--	--	--	--	--	1	--	-	-
CO4	1	3	-	--	--	--	--	--	--	--	--	--	1	--	-	-
CO5	1	2	-	--	--	--	--	--	--	--	--	--	1	--	-	-

1: strongly related, 2: moderately related and 3: weakly related

THE4311	MICRO FLUIDICS & NANO FLUIDIC	L	T	P	C
Version 1.1	Date of Approval: 26 June,2020	3	1	0	4
Pre-requisites/Exposure	Fluid Mechanics				
Co-requisites	Nil				

Catalog Description

In this course studies will be made on General properties of micro and nano scale flows, fluid statistics, kinematics of a fluid velocity fluid. This course is intended to provide an overview of Basic Principles of Micro fluidics and Governing Equations. This course will be helpful in understanding the concepts of unidirectional flow, hydraulic circuit analysis. Also the studies will be made on the basic concepts of nano fluidics.

Course Objectives

The objective of this course is to

1. Equip the students with concepts of micro Fluidics and nano fluidics.
2. Provide an overview of governing equations, unidirectional flow and hydraulic circuit analysis.

Course Outcomes

On completion of this course, the students will be able

CO1: To define and explain the basic concepts of micro and nano scale flows and micro fluidics.

CO2: To describe basic principles of micro fluidics and governing equations.

CO3: To explain unidirectional flow and hydraulic circuit analysis

CO4: To summarize the basic concepts of nano fluidics.

CO5: To define and distinguish micro fluidics and nano fluidics.

Modules	Blooms level*	Number of hours
Module 1 Introduction and Micro fluidics Introduction: General properties of micro and nano scale flows, fluid statistics, kinematics of a fluid velocity fluid, important geometric definitions: streamline, streak line, path line, and material line, strain rate and rotation rate tensors. Micro fluidics: Definition, objectives of micro fluidic systems, components of micro fluidic device: micro scale fuel handling system, sample loading and injection device, Electro osmotic pumping system, small volume transport, variable pressure delivery chamber, applications.	L1, L2	13
Module 2 Basic Principles of Micro fluidics and Governing Equations Basic Principles: Introduction, basic principles: laminar flow, Peclet number, pressure driven flow, electro osmotic flow, micro pumps: mechanical, non mechanical micro pumps, electro kinetic pump, MHD pump, Micro mixers: active and passive micro mixers, applications. Governing Equations for incompressible flow : Conservation of mass and momentum equations, constitutive relations, non Newtonian fluids, interfacial energy, contact angle, velocity and stress boundary conditions at interfaces, kinematic boundary conditions for continuity of normal velocity, dynamic boundary conditions for continuity of tangential velocity, flow regimes, Navier slip boundary condition.	L1, L2	13
Module 3 Unidirectional Flow and Hydraulic circuit Analysis Unidirectional Flow: Introduction, steady pressure and boundary driven flow through long channels, coquette flow, physical interpretation, Reynolds number, Poiseuille flow, physical interpretation, startup and development of unidirectional	L1, L2	13

flow Hydraulic circuit Analysis: Introduction, hydraulic circuit analysis, hydraulic circuit equivalent for micro channels, introduction to potential fluid flow, introduction to stokes flow		
Module 4 Nano fluidics Introduction to nano fluidics, advantages of nano fluidics, comparison of micro fluidics and nano fluidics, nano scale forces, phenomena in nano fluidics, applications of nano fluidics, lab on chip, gene expression studies	L1, L2	9

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4- Analysis; L5- Synthesis, L6- Evaluation

Text Books

1. Brian J Kirby, Micro and Nano Scale Fluid Mechanics, Cambridge University Press, 2010, New York.
2. ShauryaPrakash and JunghoonYeom, Nan fluidics and Micro fluidics: Systems and Applications, Elsevier Publications, 2014, UK.

Reference Books

1. Sushanta K. Mitra, Microfluidics and Nanofluidics Handbook: Fabrication, Implementation, and Applications, CRC Press, 2011, New York
2. C. Kleinstreue, Microfluidics and Nanofluidics: Theory and Selected Applications, John Wiley and Sons, 2013, USA

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO 3	PSO 4
CO 1	1	3	-	--	--	--	--	--	--	--	--	--	1	--	-	-
CO 2	1	-	-	-	--	--	--	--	--	--	--	--	1	--	-	-
CO 3	1	2	-	-	-	--	--	--	--	--	--	--	1	--	-	-
CO 4	1	3	-	--	--	--	--	--	--	--	--	--	1	--	-	-
CO 5	1	2	-	--	--	--	--	--	--	--	--	--	1	--	-	-

1: strongly related, 2: moderately related and 3: weakly related

THE4312	TURBO MACHINES	L	T	P	C
VERSION	Date of Approval: 26 June,2020	3	1	0	4
Pre-requisites/ Exposure	Internal combustion engines				
Co-requisites					

Catalog Description

In this course the concept of Thermo-fluid dynamics aspects of fluid flow, Kinematic relations and efficiencies of turbomachines, axial Turbines Centrifugal, Compressors and Fans, Radial Flow Turbines, and preliminary design fundamentals of turbo machines will be discussed in detail. It will focus on applications in power generation, transport, refrigeration and the built environment.

Course Objectives

The objective of this course is to:

1. Equip the students with different types of turbomachines and their applications.
2. Provide an outline for the derivations to be used for finding out work done and efficiencies of various turbomachines.

Course Outcomes

On completion of this course, the students will be able to

CO1: Define; describe turbo machines and its components. Categorize them on the basis of their working and outcome.

CO2: Derive turbine equations, construct velocity triangles and list the effect of blade discharge angle of performance parameters of turbo machines.

CO3: Define and describe and categorize the impulse and reaction turbines. Derive conditions for maximum utilization factor.

CO4: Classify the hydraulic turbines, derive and analyze its design parameters for maximum efficiency.

CO4: Categorize different types of pumps and compressors. Derive an expression for pressure ratio, work done and efficiency.

Modules	Blooms level*	Number of hours
MODULE 1: INTRODUCTION Introduction: Definition of turbo machine, parts of turbo machines, Comparison with positive displacement machines, Classification, Application of first and second law of thermodynamics to turbo machines, Efficiencies of turbo machines, Static and Stagnation states, overall isentropic efficiency, stage efficiency, Reheat factor for expansion process	L1, L2 and L4	8
MODULE 2: ENERGY EXCHANGE IN TURBO MACHINES Euler's turbine equation, Alternate form of Euler's turbine equation, Velocity triangles for different values of degree of reaction, Components of energy transfer, Degree of Reaction, utilization factor, Relation between degree of reaction and Utilization factor, Problems. Radial flow compressors and pumps – general analysis, Expression for degree of reaction, velocity triangles, Effect of blade discharge angle on energy transfer and degree of reaction, Effect of blade discharge angle on performance, degree of reaction, velocity triangles, Problems.	L1 and L3	10
MODULE 3: STEAM TURBINES AND REACTION TURBINES Classification, Single stage impulse turbine, condition for maximum blade efficiency, stage efficiency, Need and methods of compounding, Multi-stage impulse turbine, expression for maximum utilization factor. Reaction turbine – Parsons's turbine, condition for maximum utilization	L1, L2, L3 and L4	10

factor, reaction staging. Problems.		
MODULE 4:HYDRAULIC TURBINES Classification, various efficiencies. Pelton turbine – velocity triangles, design parameters, Maximum efficiency. Francis turbine - velocity triangles, design parameters, Kaplan and Propeller turbines – velocity triangles, design parameters. Problems.AnsysTurboGrid.	L2, L3 and L4	12
MODULE 5: PUMPS AND COMPRESSORS Classification and parts of centrifugal pump, different heads and efficiencies of centrifugal pump, Minimum speed for starting the flow, Cavitation, Need for priming. Problems Centrifugal Compressors: Stage velocity triangles, slip factor, power input factor, Stage work, Pressure developed, efficiency and problems. Axial flow Compressors: Expression for pressure ratio developed in a stage, work done factor, efficiencies. Problems.	L2 and L3	8

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books:

1. An Introduction to Energy Conversion, Volume III, Turbo machinery, V. Kadambi and Manohar Prasad, New Age International Publishers, reprint 2008.
2. Turbines, Compressors & Fans, S. M. Yahya, Tata McGraw Hill Co. Ltd., 2nd edition, 2002 .
3. Turbomachines, B. U Pai , Wiley First Edition 2013.

Reference Books

1. Turbomachines, B. U Pai , Wiley First Edition 2013.
2. Fluid Mechanics & Thermodynamics of Turbo machines, S. L. Dixon, Elsevier (2005)

Modes of Evaluation: Quiz/Assignment/Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO 3	PSO 4
CO 1	1	-	3	-	--	--	-	--	--	--	--	-	1	-	-	-
CO 2	1	3	3	-	--	-	-	--	--	--	--	-	1	-	-	-
CO 3	1	3	3	-	3	-	--	--	--	--	--	-	1	-	-	-
CO 4	1	3	3	--	-	-	-	-	--	--	--	3	1	-	-	-
CO 5	1	2	2	-	-	-	-	-	-	-	-	3	1	-	-	-

1: strongly related, 2: moderately related and 3: weakly related

MDE4302	ADVANCED MECHANICAL VIBRATIONS	L	T	P	C
Version 1.1	Date of Approval: 26 June,2020	3	0	0	3
Pre-requisites/Exposure	Physics, Engineering Mathematics				
Co-requisites					

Catalog Description

This subject will cover the fundamental concepts on the vibration of mechanical systems one degree of freedom, Lagrange's equations of motion and multiple degree of freedom systems. This course includes introduction to matrix methods, influence coefficient, forced vibration, principle mode of vibration, Rayleigh method, measuring instruments, isolation, torsional systems and balancing of machines.

Course Objectives

The objective of this course is to

1. Provide adequate knowledge to analyse one-degree and multi-degree of freedom systems of vibrations using different methods.
2. Find out natural frequencies and amplitude responses of different systems.

Course Outcomes

On completion of this course, the students will be able to

- CO 1: Explain and determine the equation of motion for free vibration and forced vibration for damped and undamped conditions
- CO 2: Explain and determine the equation of motion continuous system i.e. rod, cable and beam.
- CO3: Determine the equation of motion in reciprocating and rotary balancing of machine and explain the vibration isolation.
- CO4: Explain vibration measuring instruments and its application and determine the equation of motion for vibration exciter.
- CO 5: Describe and determine the equation of motion for non linear vibration by exact and approximate method.

Modules	Blooms level*	Number of hours
MODULE 1:Introduction to vibrations Brief introduction to vibrations, its causes, advantages and disadvantages, classification: un-damped and damped vibrations, single and two degree of freedom models. Introduction to lateral, torsional and bending vibrations. Harmonic and harmonic analysis. Free and harmonically excited vibrations. Vibrations under general forcing conditions.	L1, L2 and L3	7
MODULE 2:Vibrations of continuous system Transverse vibrations of a cable, longitudinal and torsional vibrations of a rod, lateral vibrations of a beam, vibrations of membranes. Rayleigh's method,	L1, L2 and L3	7

Rayleigh-Ritz method.		
MODULE 3:Vibration Control Introduction, vibration nomograph and vibration criteria, reduction of vibration at the source, balancing of rotating machines, whirling of rotating shafts, balancing of reciprocating engines, control of vibrations, control of natural frequencies, vibration isolation, vibration absorbers.	L1, L2 and L3	8
MODULE 4:Vibration measurement and applications Introduction, transducers, vibration pickups, frequency measuring instruments, vibration exciters, signal analysis, dynamic test of machines an structures, experimental modal analysis, machine condition monitoring and diagnosis.	L1, L2 and L3	7
MODULE 5:Non linear vibration Introduction, examples of non-linear vibration problems, exact methods, approximate analysis methods, subharmonic and superharmonic oscillations, systems with time-dependent coefficients (Mathieu equations), graphical methods, stability of equilibrium states, limit cycles, chaos.	L1, L2 and L3	7

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

- 1) Mechanical Vibrations by S.S. Rao, Pear and on Publication.
- 2) Mechanical Vibration by Thomson, Print ice Hall.
- 3) Mechanical Vibration by Den Hartog, McGraw-Hill

Reference Books

1. S. Graham Kelly, "Mechanical Vibrations", McGraw-Hill, New Delhi.
2. G K Grover, "Mechanical Vibrations",NemChand, 1977,New Delhi
3. V P Singh, "Mechanical Vibrations",DhanpatRai Publications.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:


Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO 3	PSO 4
CO 1	1	2	--	--	--	--	--	--	--	--	--	--	--	1	3	--
CO 2	1	1	2	--	--	--	--	--	--	--	--	--	--	1	3	--
CO 3	1	2	3	--	--	--	--	--	--	--	--	--	--	1	3	--
CO 4	1	1	2	--	--	--	--	--	--	--	--	--	--	1	3	--
CO 5	1	1	2	--	--	--	--	--	--	--	--	--	--	1	3	--

1: strongly related, 2: moderately related and 3: weakly related


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MDE4307	ADVANCED MECHANICAL VIBRATIONS LAB	L	T	P	C
Version 1.1	Date of Approval: 26 June,2020	0	0	2	1
Pre-requisites/Exposure	Physics, Engineering Mathematics				
Co-requisites	Nil				

Catalog Description

The vibration engineering lab will cover the fundamental concepts on the vibration of mechanical systems of free vibration for simple, compound pendulum and torsional vibration of rotor. An Interpretation of results is to find out the natural frequency of different mechanical systems.

Course Objectives

The objective of this course is to

1. Provide adequate knowledge to analyze one-degree and multi-degree of freedom systems of vibrations using different methods.
2. Find out natural frequencies and amplitude responses of different systems.

Course outcomes

On completion of this course, the students will be able to

CO 1: Explain and determine the natural frequency of torsional vibration and damping coefficient of free vibration.

CO 2: Explain the equation of motion of longitudinal vibration and determine the natural frequency of spring mass system.

CO3: Explain the Dunkerley,s rule and determine the natural frequency of beam.

CO4: Explain and determine the natural frequency of forced vibration of the system with its magnification factor

CO 5: Describe the beat motion analysis and determine the harmonic component of compressor and also measure the characteristics of coupled drive apparatus.

Experiment	Blooms level*	Number of hours
1. To study the Torsional vibration (undamped) of single rotor shaft system	L2,L3	1
2. To study the damped Torsional oscillations and determine the damping coefficient	L2,L3	1
3. To study the longitudinal vibration of spring and to determine the frequency theoretically and actually by experiment	L2,L3	1
4. To study the undamped free vibration of equivalent spring mass system.	L2,L3	1
5. To verify the Dunkerley,s rule on simply supported beam and compare it with actually by experiment .	L2,L3	1
6. To study the free vibrations of the system for different damper settings. Draw the decay Curve and determine the log decrement and damping factor. For also the natural frequency.	L2,L3	1
7. To determine analytically the natural frequency of the main system (fixed- fixed beam with motor fixed at its centre) and verity it by observation.	L2,L3	1
8. To study the forced vibrations of the system with damping. Plot	L2,L3	1

magnification factor us frequency and phase angle us. Frequency curves. Also determine the damping factor.		
9. Find the natural frequencies and modes of vibration of three-rotor system analytically and compare the same experimentally.	L2,L3	1
10. Investigation of the node and anti-node position for the cantilever beam.	L2,L3	1
11. To find the natural frequencies of the box supported on four experimentally and verify the same and analytically.	L2,L3	1
12. Find the period of beat motion analytically and check the same observation.	L2,L3	1
13. To determine harmonic components of Vibrations of a compressor bed.	L2,L3	1
14. Measurement of system characteristics of coupled drive apparatus in open loop-mode.	L2,L3	1

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

Text Books

- 1) Mechanical Vibrations by S.S. Rao, Pear and on Publication.
- 2) Mechanical Vibration by Thomson, Print ice Hall.
- 3) Mechanical Vibration by Den Hartog, McGraw-Hill

Reference Books

- 1) S. Graham Kelly, “Mechanical Vibrations”, McGraw-Hill, New Delhi.
- 2) G K Grover, “Mechanical Vibrations”, NemChand, 1977, New Delhi
- 3) V P Singh, “Mechanical Vibrations”, DhanpatRai Publications.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO 3	PSO 4
CO 1	1	--	--	--	--	--	--	--	--	--	--	1	--	1	3	--
CO 2	1	--	--	--	--	--	--	--	--	--	--	1	--	1	3	--
CO 3	1	--	--	--	--	--	--	--	--	--	--	1	--	1	3	--
CO 4	1	--	--	--	--	--	--	--	--	--	--	1	--	1	3	--
CO 5	1	--	--	--	--	--	--	--	--	--	--	1	--	1	3	--

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MDE4303	FINITE ELEMENTS METHOD	L	T	P	C
Version X.X	Date of Approval: 26 June,2020	3	0	0	3
Pre-requisites/Exposure	Applied Numerical Methods				
Co-requisites	Nil				

Catalog Description

In this course, the concepts of finite element method and solutions to structural, heat transfer and fluid flow problems are discussed in details. To master this course, students should have a background in basic knowledge of applied numerical methods.

Course Objectives

The objective of this course is to

1. Equip the students with the concepts of theory and characteristics of finite elements methods.
2. Provide an overview to learn and apply finite element solutions to structural, heat transfer and fluid flow problems.

Course Outcomes

On completion of this course, the students will be able to

- CO1. Describe history, applications and comparison of FEM with other methods.
CO2. List and explain the methods to solve the boundary value problems and partial differential equations.
CO3. State and explain various finite element techniques to carry out finite element solution.
CO4. Explain and apply application of FEM to solid and structural mechanics problems.
CO5. Demonstrate and analyze application of FEM to heat transfer and fluid flow problems.

Modules	Blooms level*	Number of hours
MODULE 1:Introduction to Finite Element Method: Basic Concept, Historical background, Engineering applications, general description Comparison with other methods	L2	6
MODULE 2:Integral Formulations And Variation Methods: Need for weighted-integral forms, relevant mathematical concepts and formulae, weak formulation of boundary value problems, variation methods, Rayleigh-Ritz method, and weighted residual approach.	L1 and L2	6
MODULE 3:Finite Element Techniques: Model boundary value problem, finite element discretization, element shapes, sizes and node locations, interpolation functions, derivation of element equations, connectivity, boundary conditions, FEM solution, post-processing, compatibility and completeness requirements, convergence criteria, higher order and isoparametric elements, natural coordinates, Langrange and Hermit polynomials.	L1 and L2	8

MODULE 4: Applications To Solid and Structural Mechanics Problems: External and internal equilibrium equations, one-dimensional stress-strain relations, plane stress and strain problems, axis-symmetric and three dimensional stress-strain problems, strain displacement relations, boundary conditions, compatibility equations, Analysis of trusses and frames	L2 and L3	8
MODULE 5: Applications To Heat Transfer and Fluid flow Problems: Applications in heat transfer: Finite element solution of one-dimensional, two-dimensional and three-dimensional steady state heat conduction problems by using Galerkin approach. Applications in fluid mechanics: Finite element solution of incompressible and compressible fluid film lubrication problems by using Galerkin approach.	L3 and L4	8

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. The Finite Element Method by Zienkiewicz, Tata McGraw Hill
2. The Finite Element Method for Engineers by Huebner, John Wiley

References Books

1. An Introduction to the Finite Element Method by J.N.Reddy, McGraw Hill
2. The Finite Element Method in Engineering by S.S. Rao, Pergamum Press

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1	2	3	--	--	--	--	--	--	--	--	--	1	2	-	--
CO2	1	2	2	3	--	--	--	--	--	--	--	--	1	2	-	--
CO3	2	1	1	3	--	--	--	--	--	--	--	--	2	1	3	--
CO4	2	1	1	--	--	--	--	--	--	--	--	--	1	2	-	--
CO5	2	1	1	3	--	--	--	--	--	--	--	--	1	2	-	--

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MDE4308	FINITE ELEMENTS METHOD LAB	L	T	P	C
Version X.X	Date of Approval: 26 June,2020	0	0	2	1
Pre-requisites/Exposure	Applied Numerical Methods				
Co-requisites	Nil				

Catalog Description

In this course, the concepts of finite element method and solutions to structural, heat transfer and fluid flow problems are discussed in details. To master this course, students should have a background in basic knowledge of applied numerical methods.

Course Objectives

The objective of this course is to

1. Equip the students with the concepts of theory and characteristics of finite elements methods.
2. Provide an overview to learn and apply finite element solutions to structural, heat transfer and fluid flow problems.

Course Outcomes

On completion of this course, the students will be able to

- CO1. Predict the stresses in cantilever beam and stepped bar by applying FEA software.
CO2. Calculate the stresses in connecting rod, piston and crankshaft using FEA software.
CO3. Determine the mode shape using FEA software.
CO4. Solve and analyze the heat transfer problem through fin and composite wall.
CO5. Construct and analyze the fluid flow problem through pipe and nozzle.

Modules	Blooms level*	Number of hours
1. Stress analysis of a cantilever beam using FEA software.	L1,L2 and L3	1
2. Stress analysis of a stepped bar using FEA software.	L2 and L3	1
3. Stress analysis of connecting rod using FEA software.	L2 and L3	1
4. Stress analysis of piston using FEA software.	L2 and L3	1
5. Stress analysis of crankshaft using FEA software.	L2 and L3	1
6. To determine different mode shape in a structural member by modal analysis using FEA software.	L2 and L3	1
7. To develop numerical simulation for the heat conduction problem in a fin using FEA software.	L2 and L3	1
8. To develop numerical simulation for the heat conduction problem in a composite wall using FEA software.	L2 and L3	1
9. To develop numerical simulation for laminar/turbulent flow in a pipe using FEA software.	L2 and L3	1
10. To develop numerical simulation for laminar/turbulent flow in a nozzle using FEA software.	L2 and L3	1

*Bloom's Level:

L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Text Books:

1. The Finite Element Method by Zienkiewicz, Tata McGraw Hill
2. The Finite Element Method for Engineers by Huebner, John Wiley

References Books

1. An Introduction to the Finite Element Method by J.N.Reddy, McGraw Hill
2. The Finite Element Method in Engineering by S.S. Rao, Pergamum Press

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	1	1	2	--	--	--	--	--	--	--	--	2	1	--	--
CO2	1	1	2	3	--	--	--	--	--	--	--	--	2	1	--	--
CO3	1	1	1	2	--	--	--	--	--	--	--	--	2	1	--	--
CO4	1	1	2	2	--	--	--	--	--	--	--	--	1	2	--	--
CO5	1	1	2	3	--	--	--	--	--	--	--	--	1	2	--	--

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MDE4309	PRODUCT DESIGN AND DEVELOPMENT	L	T	P	C
Version X.X	Date of Approval: 26 June,2020	3	1	0	4
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

Product Design and Development is a project-based course that covers modern tools and methods for product design and development. Topics include identifying customer needs, concept generation, product architecture, industrial design, and design-for-manufacturing.

Course Objectives:

The objective of this course is to:

1. Equip the students with the basic concepts of product design and development process.
2. Provide an overview of applicability of product design and development in industrial applications

Course Outcomes:

On completion of this course, the students will be able to

CO1: Define and describe appropriate product lifecycle, product design, modern product development process and Morphology of design.

CO2: Describe and explain conceptual design and the design of manufacturing assemble.

CO3: Define and explain Value engineering and Value analysis.

CO4: Describe the application of ergonomics and explain the concurrent engineering and rapid prototyping.

Modules	Blooms level*	Number of hours
MODULE 1: Introduction: Classification/Specifications of Products, Product lifecycle, Product mix, Introduction to product design, Modern product development process, Innovative thinking Morphology of design	L1, L2 and L3	6
MODULE 2: Conceptual Design: Generation, selection& embodiment of concept, Product architecture, Industrial design: process, need, Robust Design: Taguchi Designs & DOE Design Optimization.	L1, L2, L3 and L4	6
MODULE 3: Design for Manufacturing Assembly: Methods of designing for Manufacturing and assembly, Designs for Maintainability, Designs for Environment, Product costing, legal factors and social issues, Engineering ethics and issues of society related to design of products.	L2 and L3	6
MODULE 4: Value Engineering and Value Analysis. : Definition. Methodology, Case studies, Economic analysis: Qualitative & Quantitative.	L1, L2 and L3	6
MODULE 5: Ergonomics/ Aesthetics: Gross human autonomy, Anthropometry, Man-Machine interaction. Concepts of size and texture color, Comfort criteria, Psychological and Physiological considerations Creativity Techniques: Creative thinking, conceptualization, brainstorming, primary design, drawing, simulation, detail design.	L1, L2 and L3	6
MODULE 6: Concurrent Engineering, Rapid prototyping, Tools for product design– Drafting/ Modeling software. CAM Interface, Patents and IP Acts. Overview, Disclosure	L2 and L3	6

preparation.		
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*Bloom's Level:

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

References:

1. Karl T Ulrich, Steven D Eppinger, "Product Design & Development." Tata McGrawhill New Delhi 2003
2. N J M Roozenberg, J Ekels, N F M Roozenberg "Product Design Fundamentals and Methods." John Wiley & Sons 1995

Text Books:

1. David G Ullman, "The Mechanical Design Process." McGrawhill Inc Singapore 1992
2. Product Design and Manufacturing - A C Chitale and R C Gupta, PH1, - 3 rd Edition, 2003.
3. New Product Development - Timjones. Butterworth Heinmann -Oxford. UCI -1997

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO 3	PSO 4
CO 1	1	2	-	--	--	--	--	--	--	--	--	--	2	--	-	-
CO 2	1	2	-	-	--	--	--	--	--	--	--	--	2	--	-	-
CO 3	1	2	-	-	-	--	--	--	--	--	--	--	2	--	-	-
CO 4	1	2	-	--	--	--	--	--	--	--	--	--	2	--	-	-
CO 5	1	2	-	--	--	--	--	--	--	--	--	--	2	--	-	-

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MDE4310	ADVANCED MECHANICAL DESIGN	L	T	P	C
Version 1.1	Date of Approval: 26 June,2020	3	1	0	4
Pre-requisites/Exposure	Machine Design				
Co-requisites					

Catalog Description

This subject will cover the fundamental concepts of the design of mechanical systems and different types of failures present in the mechanical component. This course includes material selection, fundamental concepts, fracture, fatigue, creep and design for failure prevention required for the design of mechanical system.

Course Objectives

The objective of this course is to

- 1) Equip the students with concepts of mechanical design and behavior of mechanical components under fatigue and creep
- 2) Provide an overview of various failures present in mechanical system caused by different loading conditions

Course Outcomes

On completion of this course, the students will be able to

CO 1: Design the mechanical components by selecting a suitable material

CO 2: Describe the concept of static, impact and cyclic loading on mechanical system.

CO 3: Evaluate the fatigue life of mechanical components for ductile and brittle materials

CO4: Analyze and predict the fracture strength of mechanical components under different Fracture modes.

CO5: Design the mechanical components involving contacts avoiding the surface failures.

Modules	Blooms level*	Number of hours
Module 1 Material selection for design: Engineering Design process and the role of materials; materials classification and their properties; Materials Selection, Examples of material selection for typical applications, Elasticity, Plasticity, Bauschinger effect.	L1, L2 and L3	9
Module 2 Review of fundamental concepts: Overview of mechanical design, Free body diagram, Load analysis - 2D and 3D static load analysis, Case studies of static load analysis – Bicycle hand brake lever, Bicycle with pedal arm, Plier-wrench, Cyclic loading, Impact loading, Beam loading, Understanding of static failure for ductile and brittle materials, Comparison of experimental data with failure theories, Significance of the theories of failure, importance of factor of safety in design, Design case studies - Bracket, Bicycle hand brake lever, Bicycle with pedal arm, Plier-wrench.	L1, L2 and L3	9
Module 3 Fatigue Failure theories: Introduction to fatigue, Fatigue failure models, Fatigue life, Estimation of theoretical fatigue strength, Correction factors to the theoretical fatigue strength, stress concentration, Cumulative damage and life exhaustion, effect of mean stress, Designing for fully reversed uniaxial stresses, Designing for	L1, L2 and L3	11

fluctuating uniaxial stresses, Designing for multi-axial stresses in fatigue.		
Module 4 Introduction to Fracture and Creep: Fundamentals of Fracture mechanics, Mechanism of fracture - Cleavage fracture, Ductile fracture and Inter-granular fracture, Griffiths theory, Orowan theory, theoretical fracture strength, Irwin's fracture analysis, Linear Elastic Fracture Mechanics (LEFM) - Crack propagation with plasticity, Fracture toughness, hypothesis of LEFM, stress field in an isotropic material in the vicinity of crack tip, Elasto Plastic Fracture Mechanics (EPFM) - Crack opening displacement, J-Integral, Creep mechanisms, temperature dependence of creep.	L1, L2 and L3	10
Module 5 Design for failure prevention: Fracture mechanics in Design, Design case studies – Bicycle with pedal arm, Plier-wrench. Surface failures - Adhesive wear, Abrasive wear, Corrosion wear, Surface fatigue wear, Contacts - Spherical contact, Cylindrical contact and General contact, Failure modes and effects analysis (FMEA).	L1, L2 and L3	9

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6: Evaluation

Text Books:

1. Robert L Norton, Machine Design- an integrated approach, Pearson Education, Second edition, 2009.
2. Richard G. Budynas, J Keith Nisbett, Shigley's Mechanical Engineering Design, McGraw Hill, Ninth edition, 2011.
3. Marc Meyers and KrishanChawla, Mechanical Behavior of materials, Cambridge University Press, 2nd Edition, 2009.

References Books

1. WoléSoboyejo, Mechanical properties of engineered materials, Marcel Dekker, Inc., 2002.
2. Prashant Kumar, Elements of Fracture Mechanics, McGraw Hill Education (India) Private Limited, 2014.
3. Ashby, M.F., Materials Selection in Design, Butterworth-Heinemann, 4/e, 2010.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO 3	PSO 4
CO 1	1	2	--	--	--	--	--	--	--	--	--	--	--	1	3	--
CO 2	1	1	2	--	--	--	--	--	--	--	--	--	--	1	3	--
CO 3	1	2	3	--	--	--	--	--	--	--	--	--	--	1	3	--
CO 4	1	1	2	--	--	--	--	--	--	--	--	--	--	1	3	--
CO 5	1	1	2	--	--	--	--	--	--	--	--	--	--	1	3	--

1: strongly related, 2: moderately related and 3: weakly related

Course Code: IPE4302	COMPUTER AIDED METROLOGY AND INSPECTION	L	T	P	C
Version 1.1	Date of Approval: 26 June,2020	3	0	0	3
Pre-requisites/Exposure	Mechanical Measurements				
Co-requisites	-				

Catalog Description

In this course the concepts of errors in measurement, surface characteristics, measurement standards and gauging assembly are discussed in detail. Comparators, soft metrology and image processing techniques will be introduced. The concepts learnt will be applied to make mechanical measurements.

Course Objectives

The objective of this course is to

1. Equip the students with concepts of metrology, comparators and measurement standards.
2. Provide an overview of tools and techniques used for measurement and coordinate measuring machine.

Course Outcomes

On completion of this course, the students will be able to

CO1: Define concept of metrology and explain methods of improving accuracy in measurements.

CO2: Explain various standards of measurements and gauges.

CO3: Explain working of comparators.

CO4: Describe computer aided metrology and coordinate measuring machine.

Modules	Blooms level*	Number of hours
MODULE 1: Principles of measurement Metrological concepts -Definition, objectives and concept of metrology, Concept of accuracy and precision, Inaccuracy due to thermal aspects, Detailed surface roughness concept, Surface and form metrology , flatness, roughness, waviness, Methods of improving accuracy & surface finish, Influence of vibrations on accuracy.	L1 and L2	6
MODULE 2: Standards for Measurement- Line standards, End standards, wavelength standards, Subdivision of standards, Errors in measurement, Linear and angular measurement, Use of sine bar and bevel protractor for angular measurements, System of Limits, Fits and Tolerance, Principle of interchangeability, Gauging assembly, Classification of gauges, brief concept of design of gauges (Taylor's principles), Wear allowance on gauges, Types of gauges-plain plug gauge, ring gauge, snap gauge, limit gauge.	L1 and L2	7
MODULE 3: Comparators -Definition, Functions of Comparator, Classification of comparator, working of various mechanical comparators- Dial Indicator, Reed type Mechanical Comparator, Sigma Comparator, Advantages and disadvantages of mechanical comparators, Optical comparator.	L1 and L2	8
MODULE 4: Computer Aided Metrology Computer Aided Metrology - Principles and interfacing, soft metrology - Application of lasers in Precision measurements- laser interface, laser scanners,	L1 and L2	7

Image processing. Acoustical measurements, Digital techniques in mechanical measurements.		
MODULE 5: Coordinate measurement machine (CMM) Type of CMM & applications, non-contact CMM, contact CMM, Electro optical sensors for dimension, surface finish measurements. Tool maker's microscope-working and its applications. Profile projector- working and its applications.	L1 and L2	8

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

1. R.K. Jain, "Engineering Metrology", Khanna Publishers, Delhi, 2009.
2. I.C. Gupta, "Engineering Metrology", Dhanpat Rai Publications, Delhi, 2019.
3. Metrology of Measurements by Bewoor and Kulkarni, Mcgraw Hill India, Delhi, 2017.

Reference Books

1. F.W. Galyer & C.R. Shotbolt, "Metrology for Engineers", ELBS edition, 2017.
2. Experimental Methods for Engineers by Holman, Mcgraw Hill India, Delhi, 2011.
3. Principles of Measurement Systems by Bentley, Pearson, 2005.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO 3	PSO 4
CO 1	1	2	--	--	--	--	--	--	--	--	--	--	1	--	--	--
CO 2	1	1	--	--	--	--	--	--	--	--	--	--	2	1	--	--
CO 3	1	2	2	--	--	--	--	--	--	--	--	--	1	--	2	--
CO 4	1	--	--	--	2	--	--	--	--	--	--	--	--	1	--	--

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Course Code : IPE4307	COMPUTER AIDED METROLOGY AND INSPECTION LAB	L	T	P	C
Version 2017.1	Date of Approval: 26 June,2020	0	0	2	1
Pre-requisites/Exposure					
Co-requisites					

Catalog Description:

The main objective of computer aided metrology and inspection lab is to demonstrate the basic concepts in the area of measurement to the postgraduate students through a series of experiments. Students learn about laboratory methods and interpretation of results with regard to errors in measurement, surface characteristics, measurement standards and gauging assembly.

The concepts learnt will be applied to make mechanical measurements.

Course Objectives:

1. Equip the students with concepts of metrology, comparators and measurement standards.
2. Provide an overview of tools and techniques used for measurement and coordinate measuring machine.

Course Outcomes:

On completion of this course, the students will be able to

CO1: Apply the knowledge of mathematics and manufacturing science to calculate angle of inclination and roundness using sine bar and dial gauge.

CO2: Determine surface irregularities and inclination angle of given specimen.

CO3: Describe and measure the geometry of a screw and roughness characteristics.

CO4: Measure inner diameter of hole by using bore indicator and explain use of contact sensors for surface finish measurements

CO5: Demonstrate the coordinate measurement machine and screw thread parameters.

CO6: Determine the screw thread parameters of a given specimen using Profile projector and diameter of the holes drilled in a plate.

Modules	Blooms level*	Number of hours
1. To check the roundness of a circular bar with the help of dial gauge.	L1, L2 and L3	1
2. To check angle of inclined surface by using sine bar in combination with slip gauges.	L1, L2 and L3	1
3. To measure the surface irregularities of lathe guide ways by using dial indicator.	L1, L2 and L3	1
4. To measure the inclination angle by using different set of slip gauges and height gauges.	L1, L2 and L3	1
5. To study and measure the geometry of a screw using profile projector.	L1, L2 and L3	1
6. To machine a given surface on milling machine tool and study its roughness characteristics.	L1, L2 and L3	1
7. To measure inner diameter of hole by using bore indicator.	L1, L2 and L3	1

8. To study the contact sensors for surface finish measurements.	L1, L2 and L3	1
9. To study the coordinate measurement machine.	L1, L2 and L3	1
10. To measure the screw thread parameters of a given specimen using Tool Maker's Microscope.	L1, L2 and L3	1
11. To measure the screw thread parameters of a given specimen using Profile projector.	L1, L2 and L3	1
12. To determine the diameter of the holes drilled in a plate and to measure the center distance between them.	L1, L2 and L3	1

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

Text Books

1. R.K. Jain, "Engineering Metrology", Khanna Publishers, Delhi, 2009.
2. I.C. Gupta, "Engineering Metrology", Dhanpat Rai Publications, Delhi, 2019.
3. Metrology of Measurements by Bewoor and Kulkarni, Mcgraw Hill India, Delhi, 2017.

Reference Books

1. F.W. Galyer & C.R. Shotbolt, "Metrology for Engineers", ELBS edition, 2017.
2. Experimental Methods for Engineers by Holman, Mcgraw Hill India, Delhi, 2011.
3. Principles of Measurement Systems by Bentley, Pearson, 2005.

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO ₉	PO10	PO11	PO12	PSO ₁	PSO ₂	PSO3
CO1	1	2	--	--	--	--	--	--	--	--	--	--	1	1	--
CO2	1	2	--	--	--	--	--	--	--	--	--	--	1	1	--
CO3	1	2	--	--	--	--	--	--	--	--	--	--	1	1	--
CO4	1	2	--	--	--	--	--	--	--	--	--	--	1	1	--
CO5	1	2	--	--	--	--	--	--	--	--	--	--	1	1	--
CO6	1	2	--	--	--	--	--	--	--	--	--	--	1	1	--

1: strongly related, 2: moderately related and 3: weakly related

Course Code: IPE4303	METAL CUTTING AND TOOL DESIGN	L	T	P	C
Version 1.1	Date of Approval: 26 June,2020	3	0	0	3
Pre-requisites/Exposure					
Co-requisites	-				

Catalog Description

In this course to study the essential concepts of metal cutting and tool design. To study concept and applications of modern machining processes. To study jig fixtures and economic analysis of Jigs and fixtures. To provide knowledge to the students on the principles that guides production of cutting tool materials and processes.

Course Objectives

The objective of this course is

1. To familiarize the students with shapes of machining tools and chip formation.
2. To prepare the students understand various machine tool design.
3. To prepare the students understand the concept of jig and fixture.

Course Outcomes

On completion of this course, the students will be able to

CO1: Illustrate the fundamentals of basic shapes of machining tools and explain different types of chip formation.

CO2: Explain the design of single point and multi point cutting tools, analyze economics of metal machining.

CO3: Analyze parameters of grinding wheel

CO4: Explain and describe the design of press tools.

CO5: Develop the applications of jig and fixture for enhancing productivity.

Modules	Blooms level*	Number of hours
Module 1: Basic shapes of machining tools: Wedge action, function of different angles of cutting tools, tool geometry and Nomenclatures-ASA, ORS, NRS systems. Geometry of twist drill & slab milling cutter, Mechanism of chip formation, modes of failure under stress, fracture & yielding mechanism, types of chips, factors involved in chip formation, shear plane, effect of cutting variables on chip reduction coefficient, chip formation in drilling and milling	L1, L2 and L3	5
Module 2: Design of single point and multi point cutting tools: Design of flat and circular form tools and tool holding devices. Design of multi point cutting tools: Milling cutter; Major types, design and manufacturing of peripheral, end and face milling cutters. Forces and power estimation. Grinding of milling cutters. Broaches: Pull and Push types. Internal and External broaches, geometry and design and manufacturing of Pull type and push type broaches.	L1, L2 and L3	8
Module 3: Parameters of Grinding wheel: Types of Grinding, Shapes and Size of a Grinding Wheel, Various Elements of	L1, L2 and L3	8

a Grinding Wheel, Parameters of Grinding Operation, Grinding Fluids, Defects and Remedies in Grinding, Balancing of Grinding Wheel, Grinding of single point cutting tool, Tool materials, Vibration & chatter in machining. Economics of metal machining.		
Module 4: Design of Press tools: Die set elements. Design of Die Set for simple components in blanking, Piercing, bending, drawing, forging and spinning. Plastic Tools: Plastic Dies for simple components.	L1, L2 and L3	7
Module 5: Jigs & Fixtures: Design principles and construction features. Type of locating pins. Requirements and choice of locating systems, Setting blocks, types of clamping devices and their basic elements. Quick action clamps and nuts, Hydraulic, magnetic, electrical and vacuum clamping. Types of drill jigs and their classification. Types of jig bushes, jig feet, Design of Fixtures for Turning, grinding, welding and milling. Economic analysis of Jigs and Fixtures.	L1, L2 and L3	8

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation*

Text & References:

Text:

1. Production Engineering Sciences, P.C. Pandey & C.K. Singh, "Standard Publisher Distributors, 2006.
2. Metal Cutting & Tool Design, B.J. Ranganath, Vikas Publishing House Pvt. Ltd. Second edition, 1999.
3. Manufacturing processes for engineering material Pearson Education; sixth edition, 2018

References:

1. Fundamentals of Metal Machining & Machine Tools, Geoffrey Boothroyd, Tata McGraw Hill Kogakusha Ltd. 1987
2. Manufacturing Technology, P.N. Rao, Tata McGraw Hill Publication Ltd. IV edition, 1993

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	--	2	--	--	--	--	--	--	--	--	--	1	--	--
CO2	1	2	--	--	--	--	--	--	--	--	--	--	1	--	--
CO3	1	--	2	--	--	--	--	--	--	--	--	--	1	--	--
CO4	1	1	2	--	--	--	--	--	--	--	--	--	1	--	--
CO5	1	2	3	--	--	--	--	--	--	--	--	--	1	--	--

1: strongly related, 2: moderately related and 3: weakly related

Course Code: IPE4308	METAL CUTTING AND TOOL DESIGN LAB	L	T	P	C
Version 2017.1	Date of Approval: 26 June,2020	0	0	2	1
Pre-requisites/Exposure					
Co-requisites					

Catalog Description:

The main objective of the metal cutting and tool design Laboratory is to demonstrate the basic principles in the area of metal cutting and tool design to the post graduate students through a series of experiments. The student will learn about the laboratory methods and interpretation of results with regard to metal removal processes and to give final shape and size to components students also learn about the jig & fixture and their applications.

Course Objectives:

1. To understand the working of metal cutting and tool design.
2. To prepare the students understand the concept of jig and fixture.
3. To provide knowledge to the students on the principles that guides production of cutting tool materials and processes.

Course Outcomes:

On completion of this course, the students will be able to

CO1: Explain and define various cutting tool materials and their applications

CO2: Demonstrate on angles and parameters of various single point and multipoint cutting tools.

CO3: Analyze the formation of chip under different cutting conditions.

CO4: Demonstrate on the nomenclature of single point tool and twist drill geometry.

CO5: Demonstrate on resultant force act on the tool during turning operation.

Modules	Blooms level*	Number of hours
1. To study various cutting tool materials and their applications	L1, L2 and L3	1
2. To identify various angles and parameters of various single point cutting tools.	L1, L2 and L3	2
3. To identify various angles and parameters of various multipoint cutting tools.	L1, L2 and L3	2
4. Measurement of cutting forces in oblique cutting	L1, L2 and L3	1
5. To analyse the formation of chip under different cutting conditions.	L1, L2, L3 and L4	2
6. To perform blanking, Piercing, bending, and drawing operation on a given sheet metal specimen.	L1, L2 and L3	2
7. To study twist drill geometry.	L1, L2 and L3	1
8. To determine the resultant force act on the tool during turning operation and also estimate the force and thrust required to perform drilling operation.	L1, L2 and L3	1
9. Study of surface conditions during grinding process	L1, L2 and L3	1

10. Calculation of tool life during machining process	L1, L2 and L3	1
11. To study single point tool nomenclature using tool maker's microscope	L1, L2 and L3	1

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva

Text Books:

1. Production Engineering Sciences, P.C. Pandey& C.K. Singh, “Standard Publisher Distributors, 2006.
2. Metal Cutting & Tool Design, B.J. Ranganath, Vikas Publishing House Pvt. Ltd. Second edition 1999.

Reference Books:

1. Manufacturing Technology, P.N. Rao, Tata McGraw Hill Publication Ltd IV edition, 1993

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	2	--	--	--	--	--	--	--	--	--	--	1	1	--
CO2	1	2	--	--	--	--	--	--	--	--	--	--	1	1	--
CO3	1	2	--	--	--	--	--	--	--	--	--	--	1	1	--
CO4	1	2	--	--	--	--	--	--	--	--	--	--	1	1	--
CO5	1	2	--	--	--	--	--	--	--	--	--	--	1	1	--

1: strongly related, 2: moderately related and 3: weakly related

Course Code IPE4304	PRODUCTION PLANNING AND CONTROL	L	T	P	C
Version 1.1	Date of Approval: 26 June,2020	3	1	0	4
Pre-requisites/Exposure	Basics of Industrial Engineering				
Co-requisites	-				

Catalog Description

In this course the concepts of production planning and control are discussed in detail. The main objective of this course is to understand the various components and functions of production planning and control such as, product planning, process planning, production scheduling, Inventory Control. To know the recent techniques of Production Planning Techniques like JIT, Kaizen, Kanban and pull system Kaizen and Six Sigma etc.

Course Objectives

The objective of this course is

1. To understanding the role of production and operations management in the overall business strategy of the firm.
2. To get familiarize the students with the application of production planning and control tools and techniques to the service sector as well as manufacturing firms.

Course Outcomes

On completion of this course, the students will be able to

CO1: Define production planning and control, explain objectives and functions of production planning and control.

CO2: Explain various production related activities.

CO3: Illustrate various inventory management procedures with the tools employed there in.

CO4: Explain the new techniques for evaluation of material and processes and various production related activities.

CO5: Demonstrate the role of routing, loading and scheduling in manufacturing and service.

CO6: Demonstrate role of JIT, Kaizen, and PDCA with their contribution towards production and planning and control.

Modules	Blooms level*	Number of hours
Module 1: Introduction Objectives and benefits of planning and control, Functions of production planning and control, preplanning, Steps in production planning and control, plant layout, Types of production-job- batch and continuous-Product development.	L1, L2 and L3	4
Module 2: Product Development and Design Effect of competition on design, Long-range Planning, Company policy, product analysis, marketing aspects, the product characteristics, functional aspect, operational aspect, durability and dependability, Economic analysis, Profit and competitiveness, The three S's:- Standardization, Simplification and Specialization. Break Even Analysis.	L1, L2 and L3	7
Module 3: Inventory Control Definition, classification, objectives of inventory control, functions, economic order quantity various inventory models. Numerical on inventory control.	L1, L2 and L3	7

Inventory carrying costs, factors affecting inventory costs. V.E.D. analysis, S-D-E analysis, F-S-N analysis H-M-L analysis and ABC analysis. Safety stocks, their objectives safety stocks and service levels.		
Module 4: Evaluation of Material and Processes Introduction, value analysis, consideration of new techniques and materials, value analysis tests, material utilization of a product or assembly. Numerical problems on material utilization of a product. Value engineering job plan and various phases of job plan in systematic value engineering approach	L1, L2 and L3	6
Module 5: Routing, Loading and Scheduling Introduction, Scheduling Procedure, Master Schedule, its objectives, Order scheduling, Loading by scheduled period, Dispatching, Job card, Job order. Commercial Loading & Scheduling Devices.	L1, L2 and L3	6
Module 6: Advance Production Planning Techniques Just in time in production system, Pull system vs Push system, Kanban and pull system, Benefits of JIT, Requirements for implementing JIT, Evaluation of JIT production. Introduction to Kaizen, Main Aspects of Kaizen, Kaizen and Six Sigma, Element and Factors of Kaizen, Hierarchy of Kaizen, The Plan-Do-Check-Act (PDCA) Cycle, Kaizen Implementation, Kaizen Tools and Standards – 7 Quality Control Tools.	L1, L2 and L3	6

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation*

Text & References:

Text:

- Production Planning and control: Samuel Eilon, Collier Macmillan Ltd, 2006.
- Production Planning and Control: K.C. Aggarwal and K.C. Jain, Khanna Publishers, 1999.
- Industrial Engineering and Operation Management by S.K. Sharma & Savita Sharma, 2017

References:

- Production Planning and Control: Sharma, HariRaghu Rama, Deep & Deep Publications, 1998.
- Production Planning and Control: Narasimhan Seetha-rama L. Prentice Hall India Learning Private Limited; 2 edition 1996.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO1	1	2	2	--	--	--	--	--	--	--	--	--	1	--	--
CO2	1	2	--	--	--	--	--	--	--	--	--	--	1	--	--
CO3	1	2	2	--	--	--	--	--	--	--	--	--	1	--	--
CO4	1	2	2	--	--	--	--	--	--	--	--	--	1	--	--
CO5	1	2	3	--	--	--	--	--	--	--	--	--	1	--	--
CO6	1	2	3	--	--	--	--	--	--	--	--	--	1	--	--

1: strongly related, 2: moderately related and 3: weakly related

IPE4309	MATERIAL MANAGEMENT	L	T	P	C
Version	Date of Approval: 26 th June 2020	3	1	0	4
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

In this course basic concept of materials management like productivity, techniques of materials management, purchasing in production process and cost reduction techniques. Illustrate the material requirement planning process like JIT, production planning, economic analysis and break even analysis.

Course Objectives:

The objective of this course is to

1. Equip the students with concept of material management, material planning, purchasing, and cost reduction.
2. Provide an overview of order quantities.

Course Outcomes: At the end of the course, students will demonstrate their ability to:

1. Identify materials management techniques for productivity improvement.
2. Apply the concept of materials planning with the theoretical concepts like break even analysis, JIT etc.
3. Apply different concepts of Purchasing while purchasing a material for the company.
4. Demonstrate mathematical model the cost reduction techniques for reducing the cost & enhancing the profits of an organization.
5. Apply inventory management techniques like EOQ for the efficient Inventory management of production plant.

Modules	Blooms level*	Number of hours
MODULE 1: Introduction: Introduction to material management and productivity, functions of material management, organization structures in material management, role of material management techniques in improved material productivity.	L1, L2 and L3	7
MODULE 2: Material planning: objectives, material requirement planning, manufacturing resource planning, JIT production planning, strategic material planning, material control: acceptance, sampling, inspection, make or buy decision, simple cost analysis, economic analysis, break even analysis, break-even point theory, whether to add or drop a product line store management and warehousing, product explosion.	L1, L2 and L3	7
MODULE 3: Purchasing: Importance of good purchasing system, organization of purchasing functions, purchase policy and procedures, responsibility and limitations, purchasing decisions, purchasing role in new product development, role of purchasing in cost reduction, negotiations and purchase, purchasing research: identification of right sources of supply, vendor rating, standardization, vendor certification plans, vendor and supply reliability, developing new source of supply.	L1, L2 and L3	7

MODULE 4: Cost reduction: cost control v/s cost reduction, price analysis, material cost reduction techniques, variety reduction, cost reduction and value improvement, techniques of cost control, standard costing, cost effectiveness, cost analysis for material management, material flow cost control.	L1, L2 and L3	7
MODULE 5: Order Quantities: Introduction, types of inventory, inventory control, inventory build –up, EOQ, various inventory models, inventory models with quantity discount, exchange curve concept, coverage analysis, optimal stocking and issuing policies, inventory management of perishable commodities, ABC – VED analysis, design of inventory distribution systems, surplus management, information system for inventory management, case studies.	L1, L2 and L3	8

Text Books

1. Chapman Stephen, N. and Arnold J. R. T. (2017). *Introduction to Materials Management*. Delhi: Pearson Education.
2. Gopalakrishnan, P. and Sundaresan, M. (1977). *Materials Management: An Integrated Approach*. Delhi : PHI

Reference Books:

1. Vrat, P. (2014). *Materials Management: An Integrated Systems Approach*. India: Springer.
2. Datta, A. K. (2008). *Materials Management: Procedures, Text and Cases*. Delhi : PHI.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1	1	--	--	--	--	--	--	--	--	--	--	1	1	--	--
CO2	1	1	--	--	--	--	--	--	--	--	--	--	1	1	--	--
CO3	1	1	--	--	--	--	--	--	--	--	--	--	1	1	--	--
CO4	1	1	--	--	--	--	--	--	--	--	--	--	2	1	--	--
CO5	1	1	--	--	--	--	--	--	--	--	--	--	2	1	--	--

1: strongly related, 2: moderately related and 3: weakly related

Master of Computer Application

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Curriculum & Scheme of Examination

2022

AMITY UNIVERSITY HARYANA

GURUGRAM

A handwritten signature in blue ink, appearing to read 'Anil', written over a light blue circular stamp.

Prof. (Dr.) Anil Kumar
Deputy Dean Academics
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Haryana-122413

A handwritten signature in blue ink, appearing to read 'Manesar', written over a light blue circular stamp.

Registrar
Amity University Haryana
Manesar Gurgaon-122413

IFT4101	DATA COMMUNICATION AND COMPUTER NETWORKS	L	T	P	C
Version: 2020.1	Date of Approval: 19, July 2020	3	0	0	3
Pre-requisites/Exposure	Basics of Computer Network				
Co-requisites	Nil				

Catalog Description

In this course the concepts of basic data communication and networking concepts are discussed in details. The concepts related to routing/switching hardware, security, distributed client/server applications and architecture, intranets and intranet servers and browsers, networks and network servers, LANs/WANs, internetworking technologies will be introduced. The studies will be made on impact of the OSI reference model for networking protocols, CSMA/CD, TCP/IP implementation, frame relay, FDDI, X-25, ISDN services. This course will assist in developing the skills in basics of computer networks. The outcome of this course implicitly and explicitly affects the abilities to understand and analyze the networking concepts.

Course Objectives

The objective of this course is to

- Equip the students with concepts of data communication and computer network.
- Provide an overview of networking OSI, TCP/IP models, devices, media, protocols and layer concepts.

Course Outcomes

On completion of this course, the students will be able to

CO1: Explain OSI model, Layers in OSI model and TCP/IP protocol suit. Describe topologies with their advantages and disadvantages and transmission media.

CO2: Describe data transmission and data encoding schemes. Elaborate multiplexing and types of spread spectrum.

CO3: Demonstrate various switching techniques. Also explain Frame Relay, ATM, Error Detection Correction techniques, Flow Control- Stop and Wait mechanisms..

CO4: Describe the meaning of routers and issues in designing Routing Algorithms; Discuss logical addressing, Ipv4 and IPv6.

CO5: Describe Transport Services, TCP, UDP, SCTP. Explain Congestion control and Quality of Service.

Modules	Blooms level*	Number of hours
MODULE 1: Introduction Computer Network, Advantages and Disadvantages of Computer Network, Communication system, Classification of networks, Network models- OSI model, Layers in OSI model, TCP/IP protocol suite, Transmission mode, LAN Architecture, LAN topologies-Bus, Tree, Ring, Star, Mesh, Wireless LAN, Transmission Media- Twisted pair cable, Coaxial cable, Optical Fiber, Wireless transmission media.	L1 and L2	6

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MODULE 2: Data Transmission: Analog and Digital Signals, Periodic and Aperiodic Signals, Transmission impairments, Data rate limits-noiseless channel and noisy channel, Performance characteristics. Data Encoding: Digital data-digital signals, Digital data-Analog signals, Analog data- Digital signals, Analog data- Analog signals. Multiplexing: Frequency Division Multiplexing, Wavelength Division Multiplexing, Synchronous Time Division Multiplexing, Statistical Time Division Multiplexing. Spread Spectrum: Frequency Hopping Spread Spectrum (FHSS), Direct Sequence Spread Spectrum (DSSS).	L1, L2	8
MODULE 3: Data Link Layer Switching- Circuit switching Vs Packet Switching, Virtual Circuits- Permanent Virtual Circuit Vs Switched Virtual Circuit, Frame Relay, ATM, Error Detection and Correction, Flow Control- Stop and Wait, Sliding Window, Error Detection, Error Control, HDLC, PPP	L1, L2	8
MODULE 4: Network Layer Routers, Routing Algorithms-Unicast routing algorithms-Distance vector routing, Link state routing, Path vector routing, multicast routing algorithms, Logical addressing- IPv4, IPv6, transition from IPv4 to IPv6, Address mapping, ICMP, IGMP.	L1, L2	8
Module V: Transport layer Transport Services, TCP, UDP, SCTP, Congestion control, Quality of Service (QoS).	L1, L2	6

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text :

1. B.Forouzan, Data Communications and Computer Networks, TH McGraw-Hill, 4th edition, 2006.

References:

1. K. Feher, Wireless Digital Communication, Jochen Schiller, Mobile Communication, Pearson Education, PH 1995.
2. Data and Computer Communications, William Stallings Publisher: Prentice Hall, Seventh Edition, 2005.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	CT1	A/C/Q	Attd	EE
Weightage (%)	15	10	5	70



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CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO 3	PSO 4
CO 1	1	2	2	--	--	--	--	--	--	--	--	--	1	1	-	-
CO 2	1	2	2	-	--	--	--	--	--	--	--	--	1	2	-	-
CO 3	1	2	-	--	--	--	--	--	--	--	--	--	1	2	-	--
CO 4	1	2	3	--	--	--	--	--	--	--	--	--	1	2	-	-
CO 5	1	2	2	--	--	--	--	--	--	--	--	--	1	2	-	-

1: strongly related, 2: moderately related and 3: weakly related



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IFT4105	DATA COMMUNICATION AND COMPUTER NETWORKS LAB	L	T	P	C
Version: 2020.1	Date of Approval : 19, July 2020	0	0	2	1
Pre-requisites/Exposure	Basics of CISCO router				
Co-requisites	NIL				

Catalog Description

The course familiarizes with the equipment applications and protocols installed in enterprise networks, with a focus on switched networks, IP Telephony requirements, and security. It also introduces advanced routing protocols such as Enhanced Interior Gateway Routing Protocol (EIGRP) and Open Shortest Path First (OSPF) Protocol. Hands-on exercises include configuration, installation, and troubleshooting.

Course Objectives

The objective of this course is to

1. Make the students understand configuration of routing protocols.
2. Provide a demonstration of troubleshooting of different protocols.

Course Outcomes

On completion of this course, the students will be able to

CO1. Apply the knowledge of CISCO router to understand its basic configuration, Enterprise network and implement inter-VLAN routing.

CO2. Demonstrate the configuration of OSPF and RIP protocol.

CO3. Demonstrate the configuration of EIGRP and BGP protocol.

CO4. Apply the knowledge of basic WAN connections using HDLC and PPP protocol.

CO5. Demonstrate the standard and extended ACL on router.

Modules	Blooms level*	Number of hours
1. Drawing an Enterprise Network for Amity University showing its different campuses across the country. 2. Configuring all the devices (PCs, Servers, Switches) to create a LAN within campuses of the Enterprise Network. 3. Configuring Virtual LANs (VLANs) in an Enterprise Network. 4. Configuring Trunking and Inter-VLAN Routing in an Enterprise Network.	L3, L5	4
5. Implementing RIP (Routing Information Protocol) to enable communication between different LANs. 6. Implementing OSPF (Open Shortest Path First) to enable communication between different LANs.	L3, L5	2
7. Implement EIGRP (Interior Routing Protocol) to establish connectivity within domestic campuses of the Enterprise Network. 8. Implement BGP (Border Gateway Protocol) and Redistribution to establish connectivity between different campuses of the Enterprise Network.	L3, L5	2

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9. Configuring WAN connectivity using protocols-HDLC and PPP. 10. Implementing Frame-Relay to configure WAN service provider cloud.	L3, L5	2
11. Configuring Standard and Extended ACLs on a Router. 12. Troubleshooting Switching, Routing and ACL issues.	L3, L5	2

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. Data Communication and Networking by BehrouzForouzan,FourthEdition,TMH.
2. Computer Networks by A.S. Tanenbaum, Fifth Edition, Prentice Hall.

References Books

1. Data and Computer Communications by W. Stallings, Prentice Hall.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA –InternalAssessment, EE- ExternalExam, PR- Performance, LR – Lab Record, V – Viva.

Software : Packet tracer.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO 3	PSO 4
CO 1	1	2	--	--	--	--	--	--	--	--	--	--	1	3	--	--
CO 2	1	2	3	--	--	--	--	--	--	--	--	--	1	1	--	--
CO 3	1	1	2	3	3	--	--	--	--	--	--	--	1	2	--	--
CO 4	1	1	2	3	--	--	--	--	--	--	--	--	1	1	2	--
CO 5	1	1	2	3	--	--	--	--	--	--	--	--	1	2	1	--

1: strongly related, 2: moderately related and 3: weakly related



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IFT4103	SOFTWARE ENGINEERING	L	T	P	C
Version: 2020.1	Date of Approval: 19, July 2020	3	-	-	3
Pre-requisites/Exposure	Basic Knowledge of software development				
Co-requisites	Nil				

Catalog Description

In this course the concepts of Software development are discussed in detail. Various models of SDLC are introduced along with its application. Students will be able to apply these concepts in real time software project development.

Course Objectives

The objective of this course is to

- Gain the knowledge of how Analysis, Design, Implementation, Testing and Maintenance processes are conducted in a software project.
- Apply their foundations in software engineering to adapt to readily changing environments using the appropriate theory, principles and processes

Course Outcomes

On completion of this course, the students will be able to

CO1: Apply current theories, models, and techniques that provide a basis for the software Lifecycle.

CO2: Enable the students to apply a systematic application of scientific knowledge in creating and building cost effective software solutions to business and other types of problems.

CO3: Be able to elicit, analyze and specify software requirements through a productive Working relationship with various stakeholders of a software development

CO4: Be able to evaluate the impact of potential solutions to software engineering problems in a global society, using the knowledge of contemporary issues and emerging software engineering trends, models, tools, and techniques.

CO5: Work as an individual and as part of a multidisciplinary team to design, develop and deliver quality software

Modules	Blooms level*	Number of hours
MODULE 1: Introduction Software life cycle models: Waterfall, Prototype, Evolutionary and Spiral models, Overview of Quality Standards like ISO 9001, SEI-CMM	L1, L2 and L4	5
MODULE 2: Software Metrics and Project Planning Size Metrics like LOC, Token Count, Function Count, Design Metrics, Data Structure Metrics, Information Flow Metrics. Cost estimation, static, Single and multivariate models, COCOMO model, Putnam Resource Allocation Model, Risk management	L2, L3 and L6	7
MODULE 3: Software Requirement Analysis, design and coding Problem Analysis, Software Requirement and Specifications, Behavioural and non-behavioural requirements, Software Prototyping Cohesion & Coupling, Classification of Cohesiveness &	L2, L3 and L5	8

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Coupling, Function Oriented Design, Object Oriented Design, User Interface Design Top-down and bottom-up Structured programming, Information hiding		
MODULE 4: Software Reliability, Testing and Maintenance Failure and Faults, Reliability Models: Basic Model, Logarithmic Poisson Model, Software process, Functional testing: Boundary value analysis, Equivalence class testing, Structural testing: path testing, Data flow and mutation testing, unit testing, integration and system testing, Debugging, Testing Tools, & Standards. Management of maintenance, Maintenance Process, Maintenance Models, Reverse Engineering, Software RE-engineering	L2, L3 and L4, L6	10
MODULE 5: UML Introduction to UML, Use Case Diagrams, Class Diagram: State Diagram in UML Activity Diagram in UML Sequence Diagram in UML Collaboration Diagram in UML, Domain, Component Diagram and Deployment Diagram	L3, L4, L5	6

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Text Books:

1. K. K. Aggarwal & Yogesh Singh, "Software Engineering", 2nd Ed, New Age International, 2005.
2. R. S. Pressman, "Software Engineering – A practitioner's approach", 5th Ed., McGraw Hill Int. Ed., 2001.

Reference Books:

- R. Fairley, "Software Engineering Concepts", Tata McGraw Hill, 1997.
- P. Jalote, "An Integrated approach to Software Engineering", Narosa, 1991.
- Stephen R. Schach, "Classical & Object Oriented Software Engineering", IRWIN, 1996.
- James Peter, W. Pedrycz, "Software Engineering", John Wiley & Sons.
- Sommerville, "Software Engineering", Addison Wesley, 1999.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance



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CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO 3	PSO 4
CO 1	--	1	2	--	--	--	--	--	--	--	--	--	1	--	--	--
CO 2	1	--	2	3	--	--	--	--	--	--	4	--	1	2	--	--
CO 3	--	1	--	--	--	--	--	--	--	2	3	--	-	1	2	--
CO 4	-	1	-	--	2	--	--	--	--	--	--	--	2	1	--	--
CO 5	--	--	1	--	--	--	--	--	2	--	--	--	--	--	--	1

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IFT4104	COMPUTER GRAPHICS & MULTIMEDIA SYSTEMS	L	T	P	C
Version: 2020.1	Date of Approval: 19, July 2020	3	-	-	3
Pre-requisites/Exposure	Basic Knowledge of C Programming				
Co-requisites	NIL				

Catalog Description

This course presents basic principles for the design, use and understanding of computer graphics systems. This course includes various algorithms and their complexity to draw graphics objects. This course also teaches the students about different algorithms for 2D /3D transformation, clipping operations on objects, hidden surface removal and detection. This course is intended to describe technical characteristics and performance of multimedia system and terminals.

Course Objectives

The objective of this course is to

- Equip the students with mathematical concepts of graphics algorithm and their implementation to draw objects using C language.
- Provide an overview of various color filling algorithms, 2D & 3D transformation, clipping operations, algorithms related to hidden surface detection and elimination and their implementation.
- Provide an overview of different multimedia technologies like audio and video including multimedia devices. The course also includes some practical sessions on these technologies.

Course Outcomes

On completion of this course, the students will be able to

CO1: Define various standards and components in development of computer graphics.

CO2: Explain generation of graphics primitives and analyse their problems and solutions.

CO3: Demonstrate solid filling using polygon fill algorithm with interior region testing methods.

CO4: Apply 2D geometric transformations on 2D graphics objects with their practical implementation.

CO5: Illustrate use of coordinate mapping and their transformation and analyse use of line and polygon clipping algorithms.

CO6: Apply 3D geometric transformations on 3D objects with their practical implementation and assess logic behind visible surface detection algorithms with practical implementation of 3D transformations.

CO7: Describe basic principles of multimedia systems, animation and graphics library functions used in animation design.

Modules/Topics Covered**	Blooms level*	Number of hours
Module I: Overview of Graphics System Application of computer graphics, Video Display Devices, Raster Scan Display, Random Scan Display, Input Devices, Graphic Software and graphics standards, Numerical based on Raster and Random scan display, Frame buffer, Display processor, picture construction technique in interactive computer graphics.	L1, L2 and L3	5
Module II: Output Primitives Scan-conversion, Points and Lines, Line-Drawing Algorithm, Circle Generation Algorithms, Ellipse Generation Algorithm, Area fill algorithms for various graphics primitives: Scan line fill algorithm, boundary fill algorithm, flood fill	L1, L2 and L3	5

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algorithm, Polygon representation, various method of Polygon Inside test: Even-Odd method, winding number method, Various techniques for character generation.		
Module III: Two Dimensional Geometric Transformations Basic Transformations, Composite Transformation, Translation, Rotation, Scaling, General Pivot-Point Rotation, General Fixed Point Scaling, General Scaling Directions, Reflection, Shear, Raster Methods for Transformations.	L2, L3 and L4	5
Module IV: Two-Dimensional Viewing Window to view Port Co-ordinate Transformation, Anti aliasing and filtering techniques, Clipping Operations, Cohen Sutherland Line Clipping algorithm, Sutherland Hodgeman Polygon Clipping algorithm, fractal geometry methods, fractal dimensions, Geometric construction of deterministic self-similar fractals, Iterated function system to generate fractals.	L2, L3 and L4	6
Module V: Three Dimensional Geometric and Modeling Transformations 3D viewing: 3 dimensional viewing parameters, Homogeneous coordinate representation, Advantages and disadvantages of homogeneous coordinate system, Translation, Rotation, Scaling, Other 3DTransformations, Composite Transformation, and Projections: Parallel projections, perspective projections, and oblique projection.	L2, L3 and L4	6
Module VI: Visible- Surface Detection Methods Bezier curves and Bezier surfaces, B-spline curves and surfaces, Overview of Visible Surface Detection Algorithm, Concept of light source, specular and diffuse reflection, Illumination through light source, Shadow and its types, Depth-Buffer Method, A Buffer Method, Scan-Line Method, Binary search partition method, painter's algorithm or depth sorting method.	L2, L3 and L4	6
Module VII: Introduction to multimedia Elementary image processing techniques, Introduction to Animation, software used in animation, Design of animation sequence, graphics library functions used in animation design.	L1, L2 and L3	3

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

*** Sample Programs provided are not limited to these only, can include others as desired.*

Text Books

- Computer Graphics, Donald Hearn, M Pauline Baker, 2nd Edition, PHI 1999
- Schaum Series, Computer Graphics

Reference Books

- Computer Graphics, N. Krishnamurthy, TMH

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	CT1	PR.	ATTD.	EE
Weightage (%)	15	10	5	70

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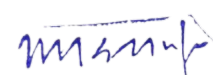
CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO 3	PSO 4
CO 1	1	3	1	--	--	--	--	--	--	--	--	--	2	--	--	--
CO 2	1	1	1	--	--	--	--	--	--	--	--	--	2	2	3	--
CO 3	1	1	1	3	2	--	--	--	--	--	--	--	3	2	2	--
CO 4	1	1	2	2	2	--	--	--	--	--	--	--	2	2	2	--
CO 5	1	3	2	1	1	--	--	--	--	--	--	--	3	2	2	--
CO 6	1	3	2	1	1	--	--	--	--	--	--	--	2	2	2	
CO 7	1	3	1	--	--	--	--	--	--	--	--	--	2	--	--	--

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IFT4107	COMPUTER GRAPHICS & MULTIMEDIA SYSTEMS LAB	L	T	P	C
Version: 2020.1	Date of Approval: 19, July 2020	-	-	2	1
Pre-requisites/Exposure	Basic Knowledge of C Programming				
Co-requisites	Nil				

Catalog Description

This course presents basic principles for the design, use and understanding of computer graphics and multimedia systems. This course includes various algorithms and their complexity to draw graphics objects. This course also teaches the students about different algorithms for 2D /3D transformation, clipping operations on objects, hidden surface removal and detection.

Course Objectives

The objective of this course is to

- Equip the students with mathematical concepts of graphics algorithm to draw objects using C language.
- Provide an overview of various 2D & 3D transformation, clipping operations, algorithms related to hidden surface detection and elimination and their implementation.

Course Outcomes

On completion of this course, the students will be able to

CO 1: Define various standards and components in development of computer graphics.

CO 2: Explain generation of graphics primitives and analyze their problems and solutions. Demonstrate solid filling using polygon fill algorithm with interior region testing methods.

CO 3: Apply 2D geometric transformations on 2D graphics objects with their practical implementation.

CO4: Illustrate use of coordinate mapping and their transformation and analyze use of line and polygon clipping algorithms.

CO 5: Apply 3D geometric transformations on 3D objects with their practical implementation and assess logic behind spline curves and surfaces.

Modules	Blooms level*	Number of hours
Module I: Introduction of Graphics 1. Demonstrate the use of graphics library functions to draw various graphics objects. 2. Demonstrate the use of graphics library functions to draw pie chart. 3. Demonstrate the use of graphics library functions to draw bar chart on screen.	L3,L5	2



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<p>Module II: Graphics Primitives</p> <ol style="list-style-type: none"> 1. Demonstrate the use of DDA line drawing algorithm to draw line on the screen when $m \leq 1$ and $m > 1$. 2. Demonstrate the use of DDA line drawing algorithm to draw line on the screen when $m \leq 1$ and $m > 1$. 3. Demonstrate the use of Bresenham's line drawing algorithm to draw line on the screen when $m \leq 1$ and $m > 1$. 4. Demonstrate the use of circle drawing algorithm to draw circle on the screen. 5. Write a program to draw characters on screen using bitmap character generation method. 6. Write a program to fill a polygon using boundary fill algorithm. 7. Write a program to fill a polygon using flood fill algorithm. 	L3,L5	6
<p>Module III: Transformation</p> <ol style="list-style-type: none"> 1. Write a program to translate a triangle where translation factors are $t_x=20$ and $t_y=30$. 2. Write a program to rotate a triangle in clock-wise and anti-clock-wise direction where rotation angle is 300. 3. Write a program to scale a square where scaling factors are $S_x=2$ and $S_y=3$. 4. Write a program to reflect a triangle about X axis. 5. Demonstrate combine 2D transformation after applying translation, rotation and scaling transformations. 6. Write a program to demonstrate fix point scaling where scaling factors are $S_x=2$ and $S_y=3$. 	L3,L5	6
<p>Module IV: Segment</p> <ol style="list-style-type: none"> 1. Write a program to demonstrate line clipping algorithm to clip a line where line slope is $m \leq 1$. 2. Write a program to demonstrate window to viewport transformation and linear mapping of the object coordinates in viewport where size of viewport is half to the size of window. 3. Write a program to clip a polygon using Sutherland hodgeman polygon clipping algorithm. 	L3,L5	4
<p>Module V: 3-D Transformation and Visible surface detection</p> <ol style="list-style-type: none"> 1. Write a program to translate a 3D triangle where translation factors are $t_x=20$ and $t_y=30$. 2. Write a program to rotate a 3D triangle in clock-wise and anti-clock-wise direction where rotation angle is 300. 3. Write a program to scale a 3D square where scaling factors are $S_x=2$ and $S_y=3$. 	L3,L5	6

4. Demonstrate combine 3D transformation after applying translation, rotation and scaling transformations.		
5. Write a program to draw Bezier curve and spline curve on the screen with 4 control points.		

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

1. Computer Graphics, Donald Hearn, M Pauline Baker, 2nd Edition, PHI 1999
2. Schaum Series, Computer Graphics

Reference Books

1. Computer Graphics, N. Krishnamurthy, TMH

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.


CO, PO and PSO mapping

1: strongly related, 2: moderately related and 3: weakly related

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO1 1	PO1 2	PO1 3	PSO 1	PSO 2	PSO 3	PSO 4
CO 1	1	3	1	--	--	--	--	--	--	--	--	--	--	1	2	--	--
CO 2	1	1	1	--	--	--	--	--	--	--	--	--	--	2	1	--	--
CO 3	1	1	1	3	2	--	--	--	--	--	--	--	--	1	2	1	--
CO 4	1	1	2	2	2	--	--	--	--	--	--	--	--	2	--	1	--
CO 5	1	3	2	1	1	--	--	--	--	--	--	--	--	2	3	2	--



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IFT4201	MOBILE COMPUTING	L	T	P	C
Version: 2020.1	Date of Approval: 19, July 2020	3	0	0	3
Pre-requisites/Exposure	Basic knowledge of Computer Networks				
Co-requisites	Nil				

Catalog Description

The objective of this consortium is to shape and expand a full-scale and sound mobile computing system market. To achieve this, cooperation is required of interests related to communication (network), computer hardware/software, system integrators (including service providers), and the media.

Course Objectives

The objective of this course is to

- Give a general overview of the cellular technology and the associated terms and discuss the generations of the mobile technologies starting from 1G to 3G techniques.
- Illustrate the GPRS and WAP model for 2G internet connectivity in detail.
- Elaborate the third-generation mobile services
- Describe the Global Mobile Satellite Systems in detail and basic architecture of Bluetooth technology and advanced topics in mobile computing.

Course Outcomes

On completion of this course, the students will be able to

CO1: Explain the basic concepts mobile technology, computing and basic architecture of PCS and GSM.

CO2: Describe the mobile networking Infrastructure through 2G technologies (GSM, GPRS, WAP).

CO3: Explain the basic concepts of 3G technologies (WCDMA, CDMA 2000) and WLL.

CO4: Discuss the working of mobile satellite systems like IRIDIUM and GLOBALSTAR.

CO5: Explain the concepts of Bluetooth technology, its working and protocols, virtual networks and enterprise networks.

Modules	Blooms level*	Number of hours
Module I: Introduction to Personal Communications Services (PCS) PCS Architecture, Mobility management, Networks signaling. Global System for Mobile Communication (GSM) system overview: GSM Architecture, Mobility management, Network signaling.	L1, L2 and L3	8
Module II: General Packet Radio Services (GPRS) & Wireless Application Protocol (WAP) GPRS Architecture, GPRS Network Nodes. Mobile Data Communication: WLANs (Wireless LANs) IEEE 802.11 standard, Mobile IP. Wireless Application Protocol (WAP): The Mobile Internet standard, WAP Gateway and Protocols, wireless mark up Languages (WML).	L1 and L2	10
Module III: Third Generation (3G) Mobile Services Introduction to International Mobile Telecommunications 2000 (IMT 2000) vision, Wideband Code Division Multiple Access (W-CDMA), and CDMA 2000, Quality of services in 3G. Wireless Local Loop(WLL): Introduction to WLL Architecture, wireless Local	L1 and L2	7

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Loop Technologies.		
Module IV: Global Mobile Satellite Systems Global Mobile Satellite Systems; case studies of the IRIDIUM and GLOBALSTAR systems.	L1 and L2	7
Module V: Enterprise Networks Introduction to Virtual Networks, Blue tooth technology, Blue tooth Protocols. Advanced techniques in mobile computing.	L1 and L2	4

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5:Synthesis, L6:Evaullluation

Text Books

1. "Wireless and Mobile Networks Architectures", by Yi-Bing Lin & Imrich Chlamtac, John Wiley & Sons, 2001.
2. "Mobile and Personal Communication systems and services", by Raj Pandya, Prentice Hall of India, 2001.

Reference Books

1. "Wireless Web Development", Ray Rischpater, Springer Publishing, 2000.
2. "The Wireless Application Protocol", by Sandeep Singhal, Pearson Education Asia, 2000.
3. "Third Generation Mobile Telecommunication systems", by P.Stavronlakis, Springer Publishers, 2001.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	15	5	5	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO 3	PSO 4
CO 1	1	2	2	--	--	--	--	--	--	--	--	--	1	--	3	--
CO 2	1	1	2	--	--	--	--	--	--	--	--	--	1	--	1	--
CO 3	1	2	--	--	--	--	--	--	--	--	--	--	1	--	2	--
CO 4	1	2	--	--	--	--	--	--	--	--	--	--	1	--	1	--
CO 5	1	2	--	--	--	--	--	--	--	--	--	--	1	--	1	--

1: strongly related, 2: moderately related and 3: weakly related



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IFT4202	PROGRAMMING WITH JAVA	L	T	P	C
Version: 2020.1	Date of Approval: 19, July 2020	3	0	-	3
Pre-requisites/Exposure	Hands on Knowledge of C Programming				
Co-requisites	Basic concepts of C Programming				

Catalog Description

The objective is to impart programming skills used in this object oriented language java. The course explores all the basic concepts of core java programming like object, classes, data types, features, operators, control structures, interfaces, packages, applets, awt, swings and socket programming. The students are expected to learn it enough so that they can develop the basic applications as well as web solutions like creating applets etc.

Course Objectives

The objective of this course is to

1. Equip the students with the basic feature of contemporary java required in solving complex problems.
2. Provide a practical knowhow and implementation of java programming concepts like classes, objects, packages, swings.

Course Outcomes

On completion of this course, the students will be able to

CO1: Define and explain concept of byte code and platform independence, demonstrate basic java based application development using operators, if-else, loops and arrays. Distinguish between various types of inheritances, polymorphisms and other concepts and able to solve complex programming problems involving class objects, inheritances, and packages.

CO2: Explain event delegation model and describe AWT class hierarchy; Apply knowledge of event handling and AWT controls create some new dynamic graphical applications.

CO3: Describe hierarchy of exception classes and thread life cycle along with demonstrate and design solutions for some simple and complex applications using exception and multithreading concepts.

CO4: Explain the JDBC architecture, ODBC and JDBC Drivers, Connecting to Database with the java.sql Package, Using JDBC Terminology.

CO5: Explain the steps of user defined packages; Explain the concept of swings, swing package. Demonstrate applications based on java applets and swings. Describe Servlets, Servlet Life Cycle, Servlet based Applications, jdbc with servlets.

Modules/Topics Covered**	Blooms level*	Number of hours
Module I: Overview of Java Introduction to Java, Java features, An Overview of Java, Data Types, Variables, Arrays, Operators, and Control Statements, Introducing Classes, A Closer look at Methods and Classes, Inheritance, Packages and Interfaces, Exception Handling, Multithreaded Programming, I/O, and Applets, Creating threads, implementing threads, threads priorities, suspending, stopping & resuming threads, String Handling.	L1, L2 and L3	7

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Module II: Java AWT and Swings Introducing the AWT: AWT Controls, Working with Windows, Layout Managers, and working with Swing, Event Handling Mechanism, Events, classes, sources of events, Networking, and Event Handling.	L1, L2 and L3	7
Module III: Collections and Generics What are Generics? A Generic Class with Two Type Parameters, The General Form of a Generic Class, Bounded Types, Creating a Generic Method, Generic Constructors, Generic Interfaces, Generic Class Hierarchies, Collections Overview, The Collection Interfaces, The Collection Classes, Accessing a Collection via an Iterator, The Random access Interface.	L2, L3 and L4	8
Module IV: JDBC Overview of JDBC architecture, ODBC and JDBC Drivers, Connecting to Database with the java.sql Package, Using JDBC Terminology.	L2, L3 and L4	7
Module V: JSP and servlets Introduction to Servlets, Servlet Life Cycle, Servlet based Applications, jdbc with servlets, session Management techniques in detail, JSP: Introduction to JSP, JSP implicit objects, JSP based Applications, Java. Net. Login & Logout Example, jdbc with jsp.	L2, L3 and L4	7

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

*** Sample Programs provided are not limited to these only, can include others as desired.*

Text Books

1. Patrick Naughtan and Herbert Scheldt The Complete Reference, Java 2, TMH

Reference Books

1. Java 2 Unleashed (Techmedia – SAMS), Jamie Jaworski
2. Developing Java Servlets (Techmedia – SAMS), James Goodwill sing Java 1.2 Special Edition (PHI), Webber

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	CT1	PR.	ATTD.	EE
Weightage (%)	15	10	5	70

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3	PS O4
C O1	2	1	3	--	--	--	--	--	--	--	--	--	2	--	--	--
C O2	1	3	2	--	--	--	--	--	--	--	--	--	2	2	--	--
C O3	1	3	3	--	--	--	--	--	--	--	--	--	2	2	1	--
C O4	1	3	2	--	--	--	--	--	--	--	--	--	2	2	2	--
C O5	1	3	--	--	--	--	--	--	--	--	--	--	1	1	--	--

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IFT4205	PROGRAMMING WITH JAVA LAB	L	T	P	C
2017.1	—	0	-	4	2
Pre-requisites/Exposure	Hands on knowledge of C and C++ Programming				
Co-requisites	Basic concepts of OOP Programming				

Catalog Description

The objective is to impart programming skills used in this object oriented language java. The course explores all the basic concepts of core java programming like object, classes, data types, features, operators, control structures, interfaces, packages, applets, awt, swings and socket programming. The students are expected to learn it enough so that they can develop the basic applications as well as web solutions like creating applets etc.

Course Objectives

The objective of this course is to

- Equip the students with the basic feature of contemporary java required in solving complex problems.
- Provide a practical knowledge of implementation/demonstration of java programming concepts like classes, objects, packages, swings.

Course Outcomes


On completion of this course, the students will be able to

- CO1: Demonstrate the basic java based application development using operators, if-else, loops and arrays.
- CO2: Demonstrate the concept of inheritances, polymorphisms and other concepts and able to solve complex programming problems involving class objects.
- CO3: Apply knowledge of event handling and AWT controls create some new dynamic graphical applications.
- CO4: Demonstrate and design solutions for some simple and complex applications using exception and multithreading concepts, Database connectivity.
- CO 5: Apply the knowledge of swing, io packages to implement various application programs. Demonstrate applications based on java applets and swings.

Modules	Blooms level*	Number of hours
1. Sample programs of basic java a) Write a program & execute to display “hello java” in java. b) Write a program & execute to demonstrate command line arguments in java. c) Write a program & execute to find maximum of command line arguments in java. d) Write a program & execute to find sum of two numbers in java, take input from user.	L1, L2 and L3	4



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2. Sample programs of Inheritance, String classes, abstract function and interface a) Write a program & execute in java to perform area and volume calculations in java using concept of inheritance. b) Write a program & execute in java to demonstrate abstract class in java c) Write a program & execute in java to perform complex number arithmetic using class and object. d) Write a program & execute to make use of interface in java Write a program & execute in java to sort an array of strings using string class functions.	L2, L3 and L4	4
3. Sample programs of AWT and event handling a) Write your first applet in java b) Write a program & execute to find maximum of two numbers in java using applet. c) Write a program & execute to draw basic shapes in java using graphics d) Write a program & execute to handle various mouse events	L2, L3, L4 and L5	4
4. Sample programs of exception handling, multithreading and JDBC Connectivity a) Write a program & execute to demonstrate threads in java b) Write a program & execute to demonstrate synchronization in threads in java. c) Write a program & execute to create your own exception and use it in java d) WAP to connecting a database using user-id and password. c) WAP to insert data into the database using the prepared statement	L2, L3 and L4	6
5. Sample programs on java packages and Servlets a) Create your own package to create two simple functions in different/same classes and access them in and outside the package. b) Write a program to create servlets based applications. c) WAP for authentication, which validate the login-id and password by the servlet code d) WAP to include a HTML page into a JSP page, WAP to handle the JSPEException	L2, L3 and L4	6

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

3. Computer Graphics, Donald Hearn, M Pauline Baker, 2nd Edition, PHI 1999
4. Schaum Series, Computer Graphics

Reference Books

2. Computer Graphics, N. Krishnamurthy, TMH

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

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CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3	PS O4
C O1	1	3	1	--	--	--	--	--	--	--	--	--	1	2	--	--
C O2	1	1	1	--	--	--	--	--	--	--	--	--	2	1	--	---
C O3	1	1	1	3	2	--	--	--	--	--	--	--	1	2	1	---
C O4	1	1	2	2	2	--	--	--	--	--	--	--	2	--	1	---
C O5	1	3	2	1	1	--	--	--	--	--	--	--	2	3	2	--

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IFT4203	SOFTWARE PROJECT MANAGEMENT	L	T	P	C
Version: 2020.1	Date of Approval: 19, July 2020	3	0	0	3
Pre-requisites/Exposure	Software Engineering Concepts				
Co-requisites	Nil				

Catalog Description

This course introduces the concepts to understand the fundamental principles of Software Project management & provides a good knowledge of responsibilities of project manager and how to handle these. It also discusses the different methods and techniques/tools used for project management.

Course Objectives

The objective of this course is to

- To understand the working and functioning of the process of the software development so that the project can be managed accordingly.
- To understand the engineering activities in the project life cycle
- To implement the management tools and quality standards

Course Outcomes

On completion of this course, the students will be able to

CO1: Describe fundamental principles of Software project management

CO2: Identify the key activities in managing a software project

CO3: evaluate and relate different software processes, system models

CO4: Plan software projects, including risk and quality management

CO5: Utilize technology tools for communication, collaboration, information management, and decision support.

CO6: Apply software quality practices in software project.

Modules	Blooms level*	Number of hours
MODULE 1: INTRODUCTION TO SOFTWARE PROJECT MANAGEMENT Definition of a Software Project (SP), SP Vs. other types of projects activities covered by SPM, categorizing SPs, project as a system, management control, requirement specification, information and control in organization.	L1, L2	6
MODULE 2: STEPWISE PROJECT PLANNING Introduction, selecting a project, identifying project scope and objectives, identifying project infrastructure, analyzing project characteristics, identifying project products and activities, estimate efforts each activity, identifying activity risk, allocate resources, review/ publicize plan.	L1, L2 and L3	8
MODULE 3: PROJECT EVALUATION & ESTIMATION	L3, L4, and	9

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Cost benefit analysis, cash flow forecasting, cost benefit evaluation techniques, risk evaluation. Selection of an appropriate project report; Choosing technologies, choice of process model, structured methods, rapid application development, water fall-, V-process-, spiral- models, Prototyping, delivery. Albrecht function point analysis.	L6	
MODULE 4: ACTIVITY PLANNING & RISK MANAGEMENT Objectives of activity planning, project schedule, projects and activities, sequencing and scheduling activities, network planning model, representation of lagged activities, adding the time dimension, backward and forward pass, identifying critical path, activity throat, shortening project , precedence networks. Risk Management: Introduction, the nature of risk, managing risk, risk identification, risk analysis, reducing the risks, evaluating risks to the schedule, calculating the z values.	L2, L3 and L5	10
MODULE 5: RESOURCE ALLOCATION & MONITORING THE CONTROL Introduction, the nature of resources, identifying resource requirements, scheduling resources creating critical paths, counting the cost, being specific, publishing the resource schedule, cost schedules, the scheduling sequence. Monitoring the control: Introduction, creating the frame work, collecting the data, visualizing progress, cost monitoring, earned value, prioritizing monitoring, getting the project back to target, and change control.	L2, L3 and L5	10
MODULE 6: SOFTWARE QUALITY Introduction, the place of software quality in project planning, the importance of software quality, defining software quality, ISO 9126, Practical software quality measures, product versus process quality management, external standards, techniques to help enhance software quality.	L2,L3 and L6	5

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. Software Project Management (2nd Edition), by Bob Hughes and Mike Cotterell, 1999, TMH
2. Software Engineering – A Practitioner's approach, Roger S. Pressman (5th edi), 2001, MGH
3. Software Project Management, Walker Royce, 1998, Addison Wesley.

Reference Books

1. Nasib Singh Gill, "Software Engineering", Khanna Book Publishing Co. (P) Ltd.
2. Jumpstart to Software Quality Assurance by Vishnuvarthanan Moorthy - Smashwords , 2013

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

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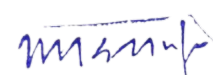
CO, PO, PSO mapping

	P O 1	P O 2	P O 3	P O 4	P O 5	P O 6	P O 7	P O 8	P O 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO 3	PSO 4
CO 1	1	-	--	--	--	--	--	--	--	--	--	--	1	-	--	-
CO 2	-	1	2	-	--	--	--	--	--	--	--	--	--	2	--	--
CO 3	--	-	1	2	-	--	--	--	--	--	--	--	--	2	--	----
CO 4	-	1	-	2	--	--	--	--	--	--	--	--	--	--	3	--
CO 5	-	-	-	--	--	--	--	--	--	1	1	2	----	--	--	4
CO 6	--	-	-	-	-	-	-	2	-	-	-	-	--	--	--	4

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IFT4206	SOFTWARE PROJECT MANAGEMENT LAB	L	T	P	C
Version: 2020.1	Date of Approval: 19, July 2020	0	0	2	1
Pre-requisites/Exposure	Software Engineering Concepts				
Co-requisites	NIL				

Catalog Description

Study practical approaches for managing, planning, organizing and implementing Information Systems projects using modern management techniques. Complete hands-on projects requiring management of project resources, scope, time-line, cost, scheduling, human and other resources. Use Microsoft Project and other project monitoring tools. In this Lab course MS Project tool is used

Course Objectives

The objective of this course is to

- Demonstrate students to Manage the phases and infrastructure of IT projects
- Use project management software to control the design, implementation, closure, and evaluation of IT projects
- Estimate, plan, calculate, and adjust project variables

Course Outcomes

On completion of this course, the students will be able to

CO1: Create plans at the level of detail that is appropriate for software project

CO2: Create and manage tasks, costs, work, and resources in a software project

CO3: Track and monitor project performance throughout its life-cycle

CO4: Explain quality management and process improvement in the context of software development projects.

Modules/Topics Covered**	Blooms level*	Number of hours
1. Introduction of tool including creating project (a) Set file properties and calendar settings (b) Create Gantt Chart for SDLC process. (c) Create Pert chart for SDLC process	L3, L4	8
2. Key activities of software Project Management (a) Create a Gantt chart of wedding planning event management which includes minimum of 12 activities.. (b) In the same Gantt chart split the tasks,copy ,move and paste tasks.	L3, L4	4
3. Checkpoints , milestones and Critical path concepts (a) Create Gantt Chart of all testing activities which includes checkpoints and milestones (b) In the same project review critical path.	L3, L4,L5	4
4. Work Breakdown Structure (a) Create Gantt chart of Agile approaches, also create work breakdown structure of same	L3, L5,L6	8

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(b) Add different type of resources in same project		
(c) Perform the time estimations of tasks and set task dependencies.		

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

**** Sample Programs provided are not limited to these only, can include others as desired.**

Text Books

- Software Project Management (2nd Edition), by Bob Hughes and Mike Cotterell, 1999, TMH
- Software Engineering – A Practitioner's approach, Roger S. Pressman (5th edi), 2001, MGH
- Software Project Management, Walker Royce, 1998, Addison Wesley.

Reference Books

- Step By Step Microsoft Project 2010 by Carl S. Chatfield, Timothy D. Johnson, 2002
- Jumpstart to Software Quality Assurance by Vishnuvarthanan Moorthy - Smashwords , 2013

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

IA					EE
Components	A	PR	LR	V	70
Weightage (%)	5	10	10	5	

Note: IA –Internal Assessment, A – Attendance, PR – Performance, LR – Lab Record, V – Viva, EE- External Exam


CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO 3	PSO 4
CO 1	-	1	2	3	--	--	--	--	--	--	4	--	1	--	--	--
CO 2	1	--	3	--	2	--	--	--	3	--	2	--	--	1	2	--
CO 3	--	--	--	1	2	--	--	--	--	3	--	--	--	1	2	--
CO 4	-	2	--	--	--	--	--	--	--	--	1	--	--	--	1	3

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IFT4204	ARTIFICIAL INTELLIGENCE	L	T	P	C
Version: 2020.1	Date of Approval: 19, July 2020	3	0	0	3
Pre-requisites/Exposure	Basic Knowledge of Searching Techniques				
Co-requisites	Nil				

Catalog Description

In this course the concepts of basic principles, techniques, and applications of Artificial Intelligence are discussed in detail. As a precursor to the study of the course it provide an in depth understanding of basic areas of artificial intelligence, search techniques, knowledge representation, learning and their applications in design and implementation of intelligent agents for a variety of task. The concepts further enhances the understanding of key components of intelligent agents of moderate complexity in Prolog and evaluate their performance.

Course Objectives

The objective of this course is to

1. Equip the students with concepts of Artificial Intelligence, its application, importance and characteristics.
2. It Provide an overview of different concepts such as searching, knowledge, Learning, Robotics, Expert System and Prolog

Course Outcomes

On completion of this course, the students will be able to

CO1: Explain the concept of Artificial Intelligence, its application, importance of Artificial Intelligence.

CO2: Analyze the different searching technique and understanding their applications.

CO 3: Explain the concept of knowledge representation, the different techniques, handling uncertainty in knowledge and making different types of decisions.

CO4: Explain the concept of Expert System and its application areas.

CO5: Explain the concept of NLP and the functionality of Robots

Modules	Blooms level*	Number of hours
MODULE 1: Problem solving and Scope of AI: Introduction to Artificial Intelligence. AI-Applications- Games, theorem proving, natural language processing (NLP), vision and speech processing, robotics, expert systems. Solving Problems by Searching, beyond classical search, adversarial Search, constraint satisfaction problems	L1 and L2	8
MODULE 2: Knowledge and Representation: Logical Agents, First-Order Logic, Inference in First-Order Logic, Classical Planning, Planning and Acting in the Real World, Knowledge Representation. Uncertain Knowledge and Reasoning- Quantifying Uncertainty, Probabilistic Reasoning , Probabilistic Reasoning over Time , Making Simple Decisions, Making Complex Decisions.	L2, L3 and L4	14
MODULE 3:	L2, L3	10

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Expert System: Need and justification for expert systems, knowledge acquisition, Case studies: MYCIN, RI. Learning:- Learning from Examples, Knowledge in Learning, Learning Probabilistic Models, Reinforcement Learning.	and L4	
MODULE 4: Module IV: Communicating, Perceiving, and Acting NLP-Natural Language Processing, Natural Language for Communication, Perception. Robotics:- Fundamentals of Robotics, Sensors and vision system, Robot Programming languages & systems	L3,L4 and L5	10

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books:

1. Stuart Russell, Peter Norvig "Artificial Intelligence: A Modern Approach", 3rd Edition, Pearson Publication, Edinburgh, 2014.
2. E. Rich and K. Knight, "Artificial intelligence", 3rd Edition, McGraw-Hill Education Publication, Delhi, 2009

Reference Books:

1. P. H. Winston, "Artificial Intelligence", 3rd Edition, Pearson Education Publication, 2002.
2. R. J. Schalkoff, "Artificial Intelligence – An Engineering Approach", 1st Edition, McGraw Hill Int. Ed. Publication, Singapore, 1992.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1	2	2	--	--	--	--	--	--	--	--	--	2	1	3	--
CO2	1	1	2	--	--	--	--	--	--	--	--	--	2	1	3	--
CO3	1	2	3	--	--	--	--	--	--	--	--	--	2	1	3	--
CO4	1	1	2	--	--	--	2	--	--	--	--	--	2	1	3	--
CO5	1	1	2	--	--	--	2	--	--	--	--	--	3	1	3	--

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IFT4207	ARTIFICIAL INTELLIGENCE LAB	L	T	P	C
Version: 2020.1	Date of Approval: 19, July 2020	0	0	2	1
Pre-requisites/Exposure	Basics of C Concepts				
Co-requisites	NIL				

Catalog Description

In this Lab course Prolog programs are implemented and demonstrated. The Concepts that are covered would enable them to achieve the desired goal by creating facts and rules. Programs will be related to concepts of creating facts, facts with argument, backtracking, arithmetic operations in prolog, nesting condition, looping condition and List handling.

Course Objectives

The objective of this course is to

1. Make the students apply knowledge of Prolog to attain goal by creating and matching rules and facts developed in the knowledge base.
2. Provide a demonstration of Prolog programming concepts like facts with arguments, Backtracking

Course Outcomes

On completion of this course, the students will be able to

CO1: Apply the knowledge of Prolog programming to provide solution to the given AI problem.

CO2: Demonstrate the use of List handling in Prolog by performing various functions which are based on finding the element, replacing an element and appending the two lists.

CO3: Apply the knowledge of Facts and Rules in Prolog to reach a particular goal by implementing different concepts such as facts with arguments, backtracking, and looping conditions.

Modules/Topics Covered**	Blooms level*	Number of hours
5. Sample Programs using Basic of Prolog Programming (d) Write a program to understand the basic structure of Prolog programming. (e) Write a program to create simple facts using prolog. (f) Demonstrate an application of facts with arguments by showcasing the use of facts to reach a particular goal.	L1, L3, L5	4
6. Sample Programs using Rules based Programming in Prolog (c) Create an rule based programs in Prolog (d) Write a program to implement the concept of backtracking which matches each rules with a query	L3, L5	4
7. Sample Programs to implement the concept of input/output operation in Prolog (c) Create a Prolog program which accept a user input and display back the result. (d) Design an application to fetch data in the form of numeric data and display the given result (e) Demonstrate the process of arithmetic operations in Prolog Programming. (f) Demonstrate the working of menu driven calculator to perform different	L3, L5	6

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arithmetic operations.		
8. Sample Programs to implement the concept of nesting and looping condition in Prolog (d) Write a prolog program to demonstrate the looping condition by implementing the concept of finding out the factorial of a given number. (e) Write a prolog program to demonstrate the conditional statement in Prolog by implementing the concept of finding out the maximum of three numbers, to calculate the area of a cube.	L3, L5	6
9. Sample Programs using List Handling in Prolog (a) Demonstrate the use of List handling in Prolog which include finding an element, replacing an element (b) Write a program to append two given list created in Prolog Programming.	L3, L5	4

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

*** Sample Programs provided are not limited to these only, can include others as desired.*

Text Books:

1. Stuart Russell, Peter Norvig "Artificial Intelligence: A Modern Approach", 3rd Edition, Pearson Publication, Edinburgh, 2014.
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Reference Books:

1. P. H. Winston, "Artificial Intelligence", 3rd Edition, Pearson Education Publication, 2002.
2. R. J. Schalkoff, "Artificial Intelligence – An Engineering Approach", 1st Edition, McGraw Hill Int. Ed. Publication, Singapore, 1992.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

IA					EE
Components	A	PR	LR	V	70
Weightage (%)	5	10	10	5	

Note: IA –Internal Assessment, A – Attendance, PR – Performance, LR – Lab Record, V – Viva, EE- External Exam

CO, PO and PSO mapping

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CO 1	2	1	3	--	--	--	--	--	--	--	--	--	2	1	--	--
CO 2	3	1	3	--	--	--	--	--	--	--	--	--	2	1	--	--
CO 3	2	1	2	--	--	--	--	--	--	--	--	--	2	1	--	--

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IFT4238	SEMINAR	L	T	P	C
Version: 2020.1	Date of Approval: 19, July 2020	0	0	0	3
Pre-requisites/Exposure	Basics of Networks				
Co-requisites	Nil				

Catalog Description

The educational process in the internship course seeks out and focuses attention on many latent attributes, which do not surface in the normal classroom situations. These attributes are intellectual ability, professional judgment and decision-making ability, inter-disciplinary approach, skills for data handling, ability in written and oral presentation, sense of responsibility etc. In this course the concepts of different new ideas will be explored by the seminar presentation.

Course Objectives

The objective of this course is to

1. Equip the students with concepts of new technologies.
2. Equip students with Report writing and Presentation skills.

Course Outcomes

On completion of this course, the students will be able to

CO1: Make a report on relevant topic by the study of literatures.

CO2: Demonstrate the topic of seminar by use of power presentation.

CO3: Demonstrate the challenges and applications of the topic of the seminar.

Text Books

As per topic of seminar.

Reference Books

As per topic of seminar.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	V	PPT	R	IM
Weightage (%)	20	20	30	30

V – Viva, PPT-Power Point Presentation, R – Report, IM-Internal Marks

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	2	1	2	--	--	--	--	--	2	--	--	--	2	2	2	2
CO2	--	--	--	--	--	--	--	--	2	--	--	--	2	2	1	2
CO3	2	2	2	--	--	--	--	--	2	1	--	--	2	2	2	2

1: strongly related, 2: moderately related and 3: weakly related



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IFT4301	DATA WAREHOUSING AND DATA MINING	L	T	P	C
Version: 2020.1	Date of Approval: 19, July 2020	3	0	0	3
Pre-requisites/Exposure	Basic Knowledge on Database				
Co-requisites	Nil				

Catalog Description

In this course the concepts of Data warehouse and Data Mining are discussed in detail. The different data mining techniques such as clustering, classification, association are introduced. As a precursor to the study of data warehouse its architecture, types of OLAP Servers, and usage of OLAP are studied in detail. The concepts further enhances the concept of different attributes supported by data mining process, application of data mining in marketing, banking, retail sector and other areas are analyzed. .

Course Objectives

The objective of this course is to

- Equip the students with concepts of data mining techniques namely classification, clustering and association.
- Provide an overview of data warehouse which include the usage of OLAP, its characteristics, OLAP architecture.

Course Outcomes

On completion of this course, the students will be able to

CO1: Explain the concept of Datawarehouse, its characteristics, Metadata concepts and its importance, The schemas of Data warehouse with their application areas.

CO2: Explain the architectural components of data warehouse and the challenges the data warehousing is facing.

CO3: Explain the indexing of OLAP, the different OLAP operations performed on the data cube.

CO4: Explain the concept of different data mining techniques like association, clustering and classification and analyze these techniques on the different data sets.

CO5: Explain the concept of Web Mining and understanding the features of different types of database.

Modules	Blooms level*	Number of hours
MODULE 1: Data Warehousing: Data Warehouse definition & Characteristics, The need for data ware housing, Operational and Informational Data Stores, Difference between Data warehouse and DBMS, Benefits of Data warehousing, Data mart, Meta Data, Conceptual Modeling of Data Warehouses: star schemas, Snowflake, Fact Constellations with example each.	L1, L2 and L3	8
MODULE 2: On Line Analytical Processing (OLAP) Definition: OLAP, Difference between OLTP and OLAP, OLAP Server Architecture, OLAP Operations, Multi Relational & Multi Dimensional: MOLAP, ROLAP, OLAP Tools, Metadata Repository, Data Warehouse Back-End Tools and Utilities.	L2, L3 and L4	10

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MODULE 3: Data Mining Introduction to Data Mining, Applications, Limitations, Techniques, Association Rules: Priori Algorithm, Direct Hashing and Pruning (DHP), Classification: Decision Tree, Split Algorithm based on Information Theory, Bayes Method.	L2, L3 and L4	10
Module 4: Cluster Analysis: Concepts and Methods Cluster Analysis: Features, Types of Cluster Analysis Methods: Partitional, Hierarchical, Density Based, Grid based Methods, , Web Data Mining, Search Engine, Case Study, Limitations.		8
Module 5: Web Mining Introduction, Classifying Web pages, extracting knowledge from the web. Multidimensional Analysis and Descriptive Mining of Complex Data Objects, Spatial Databases, Multimedia Databases, Time Series and Sequence Data, Text Databases, World Wide Web, Applications and Trends in Data Mining		6

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books:

1. Jiawei Han & Micheline Kamber, "Data Mining Concepts And Techniques", 3rd Edition, Morgan Kaufmann Publication, An Imprint of Elsevier, 2015.
2. Vipin Kumar, Pang Ning "Introduction to Data Mining", 3rd Edition, Pearson Publication, Chennai, 2016.
3. Mohammed, Wagner "Data Mining and Analysis", 4th Edition, Cambridge University Press, Brazil, 2018.

Reference Books:

1. Daneil, D. Larose "Data Mining and Predictive Analytics", 2nd Edition, John Wiley and Sons, Canada, 2015.
2. Paulraj "Data Warehousing Fundamental for IT Professional", 2nd Edition, John Wiley and Sons, Canada, 2010.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance



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CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3	PS O4
C O1	1	2	--	--	--	--	--	--	--	--	--	--	1	--	--	--
C O2	1	2	3	--	--	--	--	--	--	--	--	--	1	--	--	--
C O3	1	2	3	--	--	--	--	--	--	--	--	--	1	--	--	--
C O4	1	1	2	--	--	--	--	--	--	--	--	--	1	3	--	1
C O5	1	1	2	--	--	--	--	--	--	--	--	--	1	3	--	1

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IFT4305	DATA WAREHOUSING & DATA MINING LAB	L	T	P	C
Version: 2020.1	Date of Approval: 19, July 2020	0	0	2	1
Pre-requisites/Exposure	Basics of Statistics Concepts				
Co-requisites	NIL				

Catalog Description

In this Lab course Data Mining programs are implemented and demonstrated using a Weka Tool. The Concepts that are covered would enable them to analyze the working of different data mining techniques namely clustering, association, regression. Programs will be related to concepts of understanding the architecture of data warehouse ,creating a knowledge base in Weka and apply preprocessing on the dataset, developing programs to specify the different types of attributes supported by Weka tool, Performing the implementation of clustering, association techniques.

Course Objectives

The objective of this course is to

- Make the students apply knowledge of Data Mining by analyzing the different data mining techniques.
- Provide a demonstration of Preprocessing technique on the data set by removing noisy data

Course Outcomes

On completion of this course, the students will be able to

CO1: Apply the knowledge of Data Mining to gain analysis on different data sets and their related attributes.

CO2: Demonstrate the use of Data preprocessing technique by handling the data efficiently by removing noise and outliers from the given data sets.

CO3: To implement the different data mining concepts namely binning, histogram analysis, numeric transform and discretization.

CO4: Demonstrate the working of different data mining techniques namely clustering, association analysis, regression, classification techniques.

Modules/Topics Covered**	Blooms level*	Number of hours
1. To understand the basic feature of Data warehouse and Introduction to Weka Tool a) Understanding the concept of importance of data warehouse and its characteristics b) Applications of Data warehouse and 3-tier Architecture of Data warehouse c) Weka tool installation and basic introduction	L1,L2	4
2.Sample Programs to apply Pre-Processing technique on the data set a) Apply a pre-processing technique on the weather.arff dataset b) Create a student data set into arff format and then apply pre-processing on the data set.	L3, L4,L5	4
3. Sample Programs to implement the concept of Numeric transform and Discretization (a) Create a Weka program to apply a numeric transform on Iris dataset. (b) Design an application program to apply a feature selection method for game	L3, L4,L5	6

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playing. arff dataset. (c) Write a program to implement the concept of Equal frequency and Equal width binning for the given dataset.		
4. Sample Programs to implement the concept of Training and Validating the dataset (a) Write a prolog program to demonstrate the concept of validation in Weka dataset. (b) Design an CSV dataset using Weka.	L3,L4, L5	6
5. Sample Programs to analyze the different data mining techniques a) Write a program to implement the concept of clustering in Weka. b) Write a program to apply Apriori technique on the dataset and to generate association rules. c) Write a program to apply classification technique on the given dataset.	L3, L4,L5	4

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

**** Sample Programs provided are not limited to these only, can include others as desired.**

Text Books:

1. Jiawei Han & Micheline Kamber, "Data Mining Concepts And Techniques", 3rd Edition, Morgan Kaufmann Publication, An Imprint of Elsevier, 2015.
2. Vipin Kumar, Pang Ning "Introduction to Data Mining", 3rd Edition, Pearson Publication, Chennai, 2016.
3. Mohammed, Wagner "Data Mining and Analysis", 4th Edition, Cambridge University Press, Brazil, 2018.

Reference Books:

1. Daneil, D. Larose "Data Mining and Predictive Analytics", 2nd Edition, John Wiley and Sons, Canada, 2015.
2. Paulraj "Data Warehousing Fundamental for IT Professional", 2nd Edition, John Wiley and Sons, Canada, 2010.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3	PS O4
C O1	2	1	3	--	--	--	--	--	--	--	--	--	2	1	--	--
C O2	2	1	3	--	--	--	--	--	--	--	--	--	2	1	--	--
C O3	2	1	2	--	--	--	--	--	--	--	--	--	2	1	--	--
C O4	2	1	3	--	--	--	--	--	--	--	--	--	2	1	--	--

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IFT4302	PROGRAMMING WITH DOT NET FRAMEWORK	L	T	P	C
Version: 2020.1	Date of Approval: 19, July 2020	4	0	0	4
Pre-requisites/Exposure	Basic Programming, HTML and CSS				
Co-requisites	Nil				

Catalog Description

.NET framework is most commonly used framework for developing various applications and it supports many languages. C#.NET is one of the most commonly used languages in the software industries. Students in this course will study to develop; Console and GUI based applications using C#.NET. The course also provides knowledge regarding Creating Dynamic Web Pages with the help of ASP.NET framework. Various topics included in this course impart the knowledge of ASP.NET framework concepts at implementation level. The major topic covered includes theme, state management, web controls, AJAX, database connectivity using ADO.NET, web services and deploying web applications.

Course Objectives

The objective of this course is to

- Equip the students with .NET framework and its programming constructs.
- Provide knowledge to develop to console based and GUI based applications using C#.NET language.
- Equip the students with concepts of ASP.NET web applications including State management, Web Controls and ADO.NET.
- Provide knowledge to develop, configure and deploy secure ASP.NET web applications using C#.NET programming language.

Course Outcomes

On completion of this course, the students will be able to

CO1: Understand the components of .NET framework.

CO2: Use object-oriented concepts to write programs using C#.NET programming language.

CO3: Develop GUI based applications.

CO4: Use various standard and advance web controls for developing ASP.NET dynamic web pages and also create custom controls.

CO5: Establish database connectivity and perform various operations on database through ASP.NET web pages.

Modules	Blooms level*	Number of hours
MODULE I: NET FRAMEWORK: Overview of .NET and .NET Framework, .NET Compliant Languages, Common Language Specification (CLS), Common Type System (CTS), Framework Class Library (FCL), Base Class Library (BCL), Common Language Runtime (CLR) Visual Studio IDE, Microsoft Intermediate Language (MSIL), Understanding CLR and Execution of .NET Application, Components of CLR. C#.NET BASICS C# Programming Language Features, Hello World Program, General Structure	L1, L2	4

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of a C# Program, Conceptual Overview of C#.Net, Data Types, Modifiers (Access Modifiers), Casting and Type Conversion, Boxing and Unboxing Modifiers, Selection Statements, Looping Statement, Array- Single Dimensional and Multi-Dimensional, Declaring Arrays, Initializing Arrays, Accessing Array Members, Arrays are Objects, Using for each with Arrays, Jagged Arrays		
MODULE II: OOP: Class, Interfaces: Defining and Implementing Single & Multiple Interfaces, Abstract Class, Delegates, Exception Handling, Reflection, Assembly, Types of Assemblies, Components of Assemblies. COLLECTIONS: Non-Generic Collection: Array List, Stack, Queue, Hash Table. Generic Collection: List, Dictionary, Queue, Stack.	L2 and L3	14
Module III: WINDOWS FORMS Create and populate Windows Forms, controls in a Windows Forms application, Menus in a Windows Forms application, Multiple Document Interface (MDI) applications, User input validation in a Windows Forms application ASP.NET FRAMEWORK & WEB FORMS Introduction to Microsoft ASP.NET, ASP.NET execution model, Themes, Creating an ASP.NET Web application user interface, Implementing event handlers by using code-behind files, Client-side and Server-side controls, events, Using Controls, Validating Data, Navigating Between Forms, Custom and User Controls, Implementing Master Pages	L2 and L3	7
MODULE IV: AJAX: Introduction to AJAX, AJAX Toolkit, Partial page update using AJAX, Extending an ASP.NET Web Forms Application by Using the Ajax Control Toolkit. STATE MANAGEMENT: The Various Means to Manage State, Request object, Application object, Cache object, Session object, Server-side state management, using session for server-side and client-side state management. XML WEB SERVICES: Need of XML Web services, Understanding the Web Service Model, Creating an ASP.NET Web Service, Creating & Consuming Web Services with Visual Studio .NET.	L2 and L3	2
MODULE V: ADO.NET Architecture of ADO.NET: Connected, Disconnected, Sql Connection class, SqlCommand class, Data Reader class, Sql Data Adapter class, Data Set class, Data grid view with DML Operations like sorting, paging etc.	L2, L3 and L4	5

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

- Professional C#.NET 4.5, Wrox Publications
- Stephen Walther, ASP.NET Unleashed, SAMS Publication

Reference Books

- Andrew Stellman and Jennifer Greene, Head First C#, O'Reilly
- E. Balagurusamy, Programming in C#.Net, Tata McGraw-Hill Publisher
- Matthew MacDonald, Beginning with ASP.NET 4.5 in C#, Apress Publications

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- Imar Spaanjaars, Beginning with ASP.NET 4.5.1 in C# and VB, Worx Publication
- Jesse Liberty, Dan Hurwitz, Programming ASP.NET, O'Reilly.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3	PS O4
C O1	3	--	--	--	--	--	--	--	--	--	--	--	2	3	--	--
C O2	2	2	1	2	1	--	--	--	--	--	--	--	--	1	2	--
C O3	2	2	1	2	2	--	--	--	--	--	--	--	--	1	2	--
C O4	2	1	1	2	1	--	--	--	--	--	--	--	--	1	1	--
C O5	2	1	1	2	2	--	--	--	--	--	--	--	--	1	1	--
C O6	2	2	2	2	1	---	--	--	--	--	--	--	--	2	1	--

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IFT4306	PROGRAMMING WITH DOT NET FRAMEWORK LAB	L	T	P	C
Version: 2020.1	Date of Approval: 19, July 2020	-	-	4	2
Pre-requisites/Exposure	Basic Programming, HTML and CSS				
Co-requisites	Nil				

Catalog Description

.NET framework is most commonly used framework for developing various applications and it supports many languages. C#.NET is one of the most commonly used languages in the software industries. Students in this course will study to develop; Console and GUI based applications using C#.NET. The course also provides knowledge regarding Creating Dynamic Web Pages with the help of ASP.NET framework. Various topics included in this course impart the knowledge of ASP.NET framework concepts at implementation level. The major topic covered includes theme, state management, web controls, AJAX, database connectivity using ADO.NET, web services and deploying web applications.

Course Objectives

The objective of this course is to

- Equip the students with .NET framework and its programming constructs.
- Provide knowledge to develop to console based and GUI based applications using C#.NET language.
- Equip the students with concepts of ASP.NET web applications including State management, Web Controls and ADO.NET.
- Provide knowledge to develop, configure and deploy secure ASP.NET web applications using C#.NET programming language.

Course Outcomes

On completion of this course, the students will be able to

CO1: Understand the components of .NET framework.

CO2: Use object-oriented concepts to write programs using C#.NET programming language.

CO3: Develop GUI based applications.

CO4: Use various standard and advance web controls for developing ASP.NET dynamic web pages and also create custom controls.

CO5: Establish database connectivity and perform various operations on database through ASP.NET web pages.

Modules/Topics Covered**	Blooms level*	Number of hours
Module-I: I/O, Selection and Looping Statements Sample Programs a) Program to get a number and display the number with its reverse b) Program to check inputted no. is prime or composite. 1. Array, Jagged Array, String & Command Line Arguments Sample Programs a) Write a program to sort an array of n strings in ascending order. b) Program to find out sum of numbers passed through command line arguments. c) Program to Demonstrate Jagged Arrays	L2, L3 and L4	4

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d) Program to Search an element from an Array. e) Program to find the frequency of alphabet in a string.		
Module-II: Class & Properties, Overloading Sample Programs a) Define a class student with MarksofCS, MarksofJava, MarksofDBMS, name as its data member. Enter the marks, find average and percentage for that. Use appropriate properties. b) Define a class 'Number' and define overloaded method add () with one, two and three arguments to implement method overloading. c) Define a class with two datamembers: num1 as constant and num2 as readonly. Display the values of both on the console and state the difference between them. Constructor, Garbage Collector, Static Members Sample Programs a) Create a class distance have km and m as its data members and create various constructors to initialize the data members. b) Program to demonstrate static data members. Operator Overloading , Delegates Sample Programs a) Create a class ComplexNumber with two data members real and imaginary. Overload +,-,>,<,>=,<= and == operators for it. b) Program to implement delegate. Inheritance, Interface, Abstract class Dynamic Polymorphism Sample Programs a) Create a class Student and inherit two classes UgStudent and Pgstudent from it to illustrate the concept of inheritance. Use appropriate data members, constructors, methods and properties. b) Write a program to implement the concept of dynamic binding using appropriate classes. Exception Handling, Custom Exceptions Sample Programs a) Write a program to find out square root of number. Handel all exceptions that may occur in this program. b) Create a 'NegativeValueException' that should be raised when a function received negative value in parameter. Generic Class, Collections (Non Generic & Generic) Sample Programs a) Create a generic class with an array of n elements. Write the method to find out greatest and average of elements of array. b) Write a program to store the City name and its temperature. Access the temperature using city name. Use appropriate collection. Assembly, Reflection Sample Programs a) Program to create and use private and shared assembly. b) Program to display methods of a class at runtime.	L2, L3 and L4	6
Module-III: Developing GUI Applications & Controls Sample Programs a) Design a calculator and implement its operations. b) Program to move the contents of a list box to another list box. Also write code to add and delete elements from any list box. c) To display message box for confirmation while closing a form. ASP.NET Forms Sample Programs a) Design a Login Page, which displays a Welcome Page on successful Login and an error message in case of invalid Id/Password. b) Design a form and apply themes (design time and dynamically). c) Design any web form and apply various validation controls. d) Create a web form which can work in Hindi and English language both.	L2, L3 and L4	6

e) Design a web form to upload an image to server. f) Design a custom control, Numeric Textbox, which should accept only integer value for a particular range. The range should be customizable.		
Module-IV: a) Implement state management for Login page which move to welcome page when credentials are correct. The welcome page displays a welcome message along with the user Id. b) Implement various state management methods using a suitable web form. c) Create a web service and demonstrate its use in any web application. d) Design a Web form and implement partial refreshing using AJAX.	L2, L3 and L4	4
Module-V: a) Create a database table and design appropriate form for it. Implement basic operations like insert, delete and update using ADO.NET. b) Implement various methods of execution of SQL command. c) Display data in a Grid and perform basic database operations. d) Develop any web application to illustrate SQL Injection attack and redesign it to prevent the attack. e) Develop a web application to illustrate XSS attack and redesign it to prevent the attack	L2, L3 and L4	4

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

- Professional C#.NET 4.5 , Wrox Publications
- Stephen Walther, ASP.NET Unleashed, SAMS Publication

Reference Books

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- E. Balagurusamy, Programming in C#.Net, Tata McGraw-Hill Publisher
- Matthew MacDonald, Beginning with ASP.NET 4.5 in C#, Apress Publications
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- Jesse Liberty, Dan Hurwitz, Programming ASP.NET, O'Reilly.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
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CO, PO and PSO mapping

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C O1	3	--	--	--	--	--	--	--	--	--	--	--	2	3	--	--
C O2	2	2	1	2	1	--	--	--	--	--	--	--	--	1	2	--
C O3	2	2	1	2	2	--	--	--	--	--	--	--	--	1	2	--
C O4	2	1	1	2	1	--	--	--	--	--	--	--	--	1	1	--
C O5	2	1	1	2	2	--	--	--	--	--	--	--	--	1	1	--
C O6	2	2	2	2	1	---	--	--	--	--	--	--	--	2	1	--

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IFT4303	NETWORK SECURITY & CRYPTOGRAPHY	L	T	P	C
Version: 2020.1	Date of Approval: 19, July 2020	3	1	0	4
Pre-requisites/Exposure	Basic Mathematics				
Co-requisites	Nil				

Catalog Description

In this course the concepts of cryptography and network security are discussed in detail. Substitution and transposition techniques, symmetric and asymmetric cryptographic algorithms, their applications, differences will be introduced. As a precursor to the study of cryptography studies will be made on impact of various network and web security protocols. The concepts learnt in the studies of cryptography & network security will be applied in the studies and analysis of authentication, integrity and security related protocols.

Course Objectives

The objective of this course is to

- Equip the students with concepts of cryptography & network security through problem solving and analytical approach.
- Provide an overview of various network attacks and related security mechanism, various algorithms for modular arithmetic, symmetric and asymmetric cryptography and web and network security

Course Outcomes

On completion of this course, the students will be able to

CO1: Explain, describe and distinguish various security attacks; Describe and solve block and stream ciphers and its applications in cryptography; Solve problems based on substitution and transposition ciphers.

CO2: Explain the basic mathematics of cryptography; Solve problems of groups, modular arithmetic, gcd and inverse algorithm, chinese remainder theorem and its application in cryptography; Applying algorithms for solving problems in cryptography

CO3: Describing the concept of public key cryptosystems and its related algorithm; Explain and solve problems related to hash functions, digital signature and its applications in cryptography; Compare symmetric and asymmetric key cryptography.

CO4: Explain management, distribution, secure exchange of keys and authentication certificate and its applications in real life. Explain, compare various authentication protocols used in cryptography and network security, also solve problems based on these protocols.

CO5: Explain various security protocols: IPSec, SSL, TLS, SET; Describing malicious softwares and illustrating various design approaches to Firewall

Modules	Blooms level*	Number of hours
MODULE 1: Introduction to security attacks, services and mechanism, Classical encryption techniques: substitution ciphers and transposition ciphers, cryptanalysis, steganography, Stream and block ciphers. Modern Block Ciphers: Block ciphers principles, Shannon's theory of confusion and diffusion, feistel structure, Data encryption standard (DES), Strength of DES, Idea of differential cryptanalysis,	L1, L2 and L3	9

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block cipher modes of operations, Triple DES		
MODULE 2: Introduction to group, field, finite field of the form $GF(p)$, modular arithmetic, prime and relative prime numbers, Extended Euclidean Algorithm, Advanced Encryption Standard (AES) encryption and decryption, Fermat's and Euler's theorem, Primality testing, Chinese Remainder theorem, Discrete Logarithmic Problem, Principles of public key crypto systems, RSA algorithm, security of RSA, ECC	L1, L2, L3	9
MODULE 3: Message Authentication Codes: Authentication requirements, authentication functions, message authentication code, hash functions, birthday attacks, security of hash functions, Secure hash algorithm (SHA) Digital Signatures: Digital Signatures, Elgamal Digital Signature Techniques, Digital signature standards (DSS).	L1, L2, L3 and L5	9
MODULE 4: Key Management and distribution: Symmetric key distribution, Diffie-Hellman Key Exchange, Public key distribution, X.509 Certificates, Public key Infrastructure. Authentication Applications: Kerberos, Needham Schroeder protocol	L1, L2 and L3	9
MODULE 5: IP Security: Architecture, Authentication header, Encapsulating security payloads, SSL, HTTPS, SET, 3-D Secure, Viruses, Worms, Malware, Botnets, Firewall and its types.	L1, L2	12

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Text Books

1. William Stallings, "Cryptography & Network Security", 4th Edition, Pearson Education, New Delhi, 2017.
2. Behrouz A. Forouzan, "Cryptography & Network Security", 2nd Edition, Tata McgrawHills, New Delhi, 2015

Reference Books

1. Douglas R. Stinsons, "Cryptography Theory and Practice", 3rd Edition, McMillan Publications, London, 2003
2. Atul Kahate, "Cryptography & Network Security", 3rd Edition, Tata McgrawHills, New Delhi, 2017

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

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CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS O 1	PS O 2	PS O 3	PS O 4
CO 1	1	1	1	--	--	--	--	--	--	--	--	--	1	1	3	-
CO 2	1	1	1	--	--	--	--	--	--	--	--	--	1	1	3	-
CO 3	1	1	1	--	-	--	--	--	--	--	--	--	1	1	3	-
CO 4	1	2	3	--	--	--	--	--	--	--	--	--	1	1	3	-
CO 5	1	2	3	--	--	--	--	--	--	--	--	--	2	2	3	-

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IFT4304	SOFT COMPUTING	L	T	P	C
Version: 2020.1	Date of Approval: 19, July 2020	3	0	0	3
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

To develop semantic-based and context-aware systems to acquire, organize process, share and use the knowledge embedded in multimedia content. Research will aim to maximize automation of the complete knowledge lifecycle and achieve semantic interoperability between Web resources and services. The field of Robotics is a multi disciplinary as robots are amazingly complex system comprising mechanical, electrical, electronic H/W and S/W and issues germane to all these

Course Objectives

The objective of this course is to

1. To provide an overview of problem solving skills methods using Soft Computing.
2. To serve as a foundation for the study of programming languages that is used to develop an Intelligence System

Course Outcomes

On completion of this course, the students will be able to

CO1. Understand the concept of artificial intelligence.

CO2. Differentiate between linear and non-linear problems and Learn various problem solving techniques using neural networks

CO3. Understand the concept of fuzzy logic and apply to various problems

CO4. Illustrate concepts of genetic algorithm

Modules	Blooms level*	Number of hours
Module I: Soft Computing Introduction of soft computing, soft computing vs. hard computing, various types of soft computing techniques, applications of soft computing. Artificial Intelligence : Introduction, Various types of production systems, characteristics of production systems, breadth first search, depth first search techniques, other Search Techniques like hill Climbing, Best first Search, A* algorithm, AO* Algorithms and various types of control strategies. Knowledge representation issues, Propositional and predicate logic, monotonic and non monotonic reasoning, forward Reasoning, backward reasoning, Weak & Strong Slot & filler structures, NLP.	L1, L2	12
Module II: Neural Network Structure and Function of a single neuron: Biological neuron, artificial neuron, definition of ANN, Taxonomy of neural net, Difference between ANN and human brain, characteristics and applications of ANN, single layer network, Perceptron training algorithm, Linear separability, Widrow & Hebb's learning rule/Delta rule, ADALINE, MADALINE, AI v/s ANN. Introduction of MLP, different activation functions, Error back propagation algorithm, derivation of BBPA, momentum, limitation, characteristics and application of EBPA	L2, L3 and L4	10

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Module III Counter propagation network, architecture, functioning & characteristics of counter Propagation network, Hopfield/ Recurrent network, configuration, stability constraints, associative memory, and characteristics, limitations and applications. Hopfield v/s Boltzman machine. Adaptive Resonance Theory: Architecture, classifications, Implementation and training. Associative Memory.	L2, L3 and L4	8
Module IV: Fuzzy Logic Fuzzy set theory, Fuzzy set versus crisp set, Crisp relation & fuzzy relations, Fuzzy systems: crisp logic, fuzzy logic, introduction & features of membership functions, Fuzzy rule base system : fuzzy propositions, formation, decomposition & aggregation of fuzzy rules, fuzzy reasoning, fuzzy inference systems, fuzzy decision making & Applications of fuzzy logic.	L2, L3 and L4	7
Module V: Genetic algorithm Fundamentals, basic concepts, working principle, encoding, fitness function, reproduction, Genetic modeling: Inheritance operator, cross over, inversion & deletion, mutation operator, Bitwise operator, Generational Cycle, Convergence of GA, Applications & advances in GA, Differences & similarities between GA & other traditional methods.	L2, L4	3

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

- S, Rajasekaran& G.A. VijayalakshmiPai, Neural Networks, Fuzzy Logic & GeneticAlgorithms, Synthesis & applications, PHI Publication.

Reference Books :

- Rich E and Knight K, Artificial Intelligence, TMH, New Delhi.
- Bose, Neural Network fundamental with Graph , Algo.&Appl, TMH
- Kosko: Neural Network & Fuzzy System, PHI Publication

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO 3	PSO 4
CO 1	1	--	--	3	--	--	--	--	--	--	2	--	1	-	1	-
CO 2	1	--	1	2	--	--	--	--	--	--	--	--	1	-	1	-
CO 3	1	--	1	2	--	--	--	--	--	--	--	--	1	-	1	-
CO 4	1	--	--	2	--	--	--	--	--	--	--	--	1	-	1	-

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IFT4307	SOFT COMPUTING LAB	L	T	P	C
Version: 2020.1	Date of Approval: 19, July 2020	0	0	2	1
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

This lab course covers development and designing of implementing basic neural networks, fuzzy systems, and optimization algorithms concepts and their relations. It aims to develop the concepts and techniques and foster the students' abilities in designing and implementing soft computing based solutions for real-world and engineering problems.

Course Objectives

The objective of this course is to

- Equip the students with concepts of Soft Computing which includes Neural networks, Fuzzy logic and genetic algorithms.
- Provide knowledge to develop Soft computing programs in Matlab.

Course Outcomes

On completion of this course, the students will be able to

CO1: Explain and apply concepts of MATLAB.

CO2: Implement various neural networks using MATLAB.

CO3: Illustrate use of fuzzy in real applications.

CO4: Apply genetic algorithm to basic problems.

Modules	Blooms level*	Number of hours
Fuzzy Logic a) Write a program in MATLAB to perform Union, Intersection and Complement operations. b) Write a program in MATLAB to implement De-Morgan's Law. c) Write a program in MATLAB to plot various membership functions. d) Generate XOR function using McCulloch-Pitts neural net by MATLAB program.	L1, L2,L3	4
Neural Network a) Write a MATLAB program for Hebb Net to classify two dimensional input patterns in bipolar with targets. b) Generate ANDNOT function using McCulloch-Pitts neural net by MATLAB program. c) Write a MATLAB program for Perceptron net for an AND function with bipolar inputs and targets. d) Write a M-file to calculate the weights for the following patterns using hetero-associative neural net for mapping e) Write an M-file to store the vector, find the weight matrix with no self-connection. Test this using a discrete Hopfield net.	L2,L3and L4	2
Genetic Algorithm	L2, L3	6

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a) Solve travelling salesman problem using Genetic algorithm.	and L4	
b) Solve clustering problem using GA.		
c) Solve classification using GA.		

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

Text Book.

- S.N. Sivanandam & S.N. Deepa, Principles of Soft Computing, Wiley Publications
- Matthew MacDonald, Beginning with MATLAB, Apress Publications

Reference Books

- S, Rajasekaran & G.A. Vijayalakshmi Pai, Neural Networks, Fuzzy Logic & Genetic Algorithms, Synthesis & Applications, PHI Publication.
- Bose, Neural Network fundamental with Graph , Algo.& Appl, TMH
- Kosko: Neural Network & Fuzzy System, PHI Publication
- Klir & Yuan, Fuzzy sets & Fuzzy Logic: Theory & Appli., PHI Pub.
- Hagen, Neural Network Design, Cengage Learning

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3	PS O4
C O1	2	1	--	--	--	--	--	--	--	--	--	--	2	2	1	--
C O2	2	1	--	--	--	--	--	--	--	--	--	--	2	2	1	--
C O3	1	1	--	--	--	--	--	--	--	--	--	--	2	1	1	--
C O4	1	1	--	--	--	--	--	--	--	--	--	--	2	1	1	--

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IFT4335	SUMMER INTERNSHIP EVALUATION	L	T	P	C
Version: 2020.1	Date of Approval: 19, July 2020	0	0	0	5
Pre-requisites/Exposure	Basics of Networks				
Co-requisites	Nil				

Catalog Description

There are certain phases of every Intern's professional development that cannot be effectively taught in the academic environment. These facets can only be learned through direct, on-the-job experience working with successful professionals and experts in the field. The internship program can best be described as an attempt to institutionalize efforts to bridge the gap between the professional world and the academic institutions. Entire effort in internship is in terms of extending the program of education and evaluation beyond the classroom of a university or institution. The educational process in the internship course seeks out and focuses attention on many latent attributes, which do not surface in the normal classroom situations. These attributes are intellectual ability, professional judgment and decision-making ability, inter-disciplinary approach, skills for data handling, ability in written and oral presentation, sense of responsibility etc. In order to achieve these objectives, each student will maintain a file (**Internship File**). The Internship File aims to encourage students to keep a personal record of their learning and achievement throughout the Programme. It can be used as the basis for lifelong learning and for job applications. Items can be drawn from activities completed in the course modules and from the workplace to demonstrate learning and personal development. The report will assess the student's analytical skills and ability to present supportive evidence, whilst demonstrating understanding of their organization, its needs and their own personal contribution to the organization.

Course Objectives

The objective of this course is to

1. Equip the students with concepts of new technologies.
2. Provide project management and presentation skills.

Course Outcomes

On completion of this course, the students will be able to

CO1: Make a report on relevant topic by the study of literatures.

CO2: Demonstrate the topic of summer project topic by use of power presentation.

CO3: Demonstrate the aim, challenges, applications, literatures, result and analysis of the topic of project report

CO4: Explain the meaning of references/Bibliography.

Text Books

As per topic of summer internship project.

Reference Books

As per topic of summer internship project.



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Examination Scheme:

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Components	V	PPT	R	Exe	IM
Weightage (%)	12	15	18	15	40

V – Viva, PPT-Power Point Presentation, R – Report, IP-Internal Marks, Exe-Execution, IM: Internal Marks by Guide

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	2	2	--	--	--	--	--	--	--	--	--	-		1	1
CO2	1	2	2	-	--	--	--	--	--	--	--	--	-	-	1	1
CO3	1	2	-	--	--	--	--	--	--	--	--	--	-	-	1	1
CO4	1	2	3	--	--	--	--	--	--	--	--	--	-	-	1	2

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IFT4308	ANDROID PROGRAMMING	L	T	P	C
Version: 2020.1	Date of Approval: 19, July 2020	3	0	0	3
Pre-requisites/Exposure	Java Programming				
Co-requisites	Database concepts				

Catalog Description

This course introduces mobile application development for the Android platform. Android is a software stack for mobile devices that includes an operating system, middleware and key applications. The Android SDK provides the tools and APIs necessary to begin developing applications on the Android platform using the Java programming language. Students will learn skills for creating and deploying Android applications.

Course Objectives

The objective of this course is to

1. To introduce Android platform and its architecture.
2. Provide the knowledge of mobile apps development.

Course Outcomes

On completion of this course, the students will be able to

CO1: Describe Android platform, Architecture and features.

CO2: Design User Interface and develop activity for Android App.

CO3: Design and implement Database Application and Content providers.

CO4: Use Intent, Broadcast receivers and Internet services in Android App.

CO5: Use Internet, multimedia, camera and Location based, SMS services etc, in Android App.

CO6: Manage, Develop and Implement Mobile app project.



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Modules	Blooms Level	Number of hours
<u>MODULE 1: Introduction to Android</u> Introduction to Android Platform, Android Stack Android Versions and Installing Android SDK and updating SDK components, Eclipse, IDEs and ADT plug-in Using the Emulator, Android vs. Other mobile platforms Your First Android Application: Application Life Cycle, Application Components, Activity life cycle, Manifest File, Layout XML Code Strings, The R File, Java Source Code, Java based layout vs. xml based layout Eclipse Visual Layout Editor, Logging.	L1 and L2	4
<u>MODULE 2: UI Design for Android</u> Using different layouts – LinearLayout, TableLayout and others, Drawable Resources Resolution and density independence, Working with common widgets, Working with ListView and Adapters, Creating and using option menu, Working with preferences Working with Dialogs and Toasts, Working with Graphics and Animation, Intents ,Intent filters, Invoking activities by class name and URI, Sharing data using Extras Bundle and URI parameters,Working with Tabs and Fragments,	L1,L2and L3	8
<u>MODULE 3: Files, Database & Working in Background</u> Using File System, Introducing SQLite on Android, Database Connectivity, Cursors and content values, Using ContentProvider to share data,Understanding Security model, Introducing Service and its life cycle,Creating and starting a service, Types of services, Working with multi-threading and AsyncTask,Broadcast receivers,Triggering receivers with intents,Responding to system events using Broadcast receivers,Using Alarm.	L1, L2 and L3	8
<u>MODULE 4: Using System Services and Web Services</u> Using Location based Services,Telephony and SMS services,Bluetooth, Network and WiFi, Multimedia and Camera,Accessing Internet and Web Services from Android Applications.	L1, L2 and L3	6
<u>MODULE 5: Project</u> Understanding the requirement, Designing the interface and architecture, Best practices regarding application design and development, Writing code and testing it, Preparing application for Publishing, Publishing to Play Store and Physical device.	L3, L4 and L5	6

Bloom's Level:

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. "Android Programming: The Big Nerd Ranch Guide" By Bill Phillips & Brian Hardy, Big Nerd Ranch, Inc. Pearson Technology Group.
2. "Head First Android Development", By Anthony J.F. Griffiths and David Griffiths, Oreilly.

Reference Books

1. "Android Programming for Beginners", By John Horton, Packt Publishing



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Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination**Examination Scheme:**

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

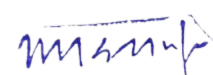
CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O 1	PS O 2	PS O 3	PS O 4
CO 1	3	--	--	--	--	--	--	--	--	--	--	--	2	1	1	--
CO 2	1	2	1	--	--	--	--	--	--	--	--	--	2	1	1	--
CO 3	1	2	1	--	--	--	--	--	--	--	--	--	2	1	1	--
CO 4	1	2	1	--	--	--	--	--	--	--	--	--	--	--	--	--
CO 5	1	2	1	--	--	--	--	--	--	--	--	--	--	--	--	--
CO 6	1	1	1	2	--	--	--	--	--	--	--	--	--	--	--	--

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IFT4309	ANDROID PROGRAMMING LAB	L	T	P	C
Version: 2020.1	Date of Approval: 19, July 2020	0	0	2	1
Pre-requisites/Exposure	Java Programming				
Co-requisites	Nil				

Catalog Description

This lab course provides a platform to the students for understanding the basic concepts of Android. This practical background will help students to gain confidence in creating /developing Android Applications.

Course Objectives

The objective of this course is to

- Equip the students with concepts of Android Programming UI Design, Database connectivity, File System, System Services and Web Services
- Provide knowledge to develop secure Android Mobile applications.

Course Outcomes

On completion of this course, the students will be able to

On completion of this course, the students will be able to

CO1: Describe Android platform, Architecture and features.

CO2: Design User Interface and develop activity for Android App.

CO3: Design and implement Database Application and Content providers.

CO4: Use Intent, Broadcast receivers and Internet services in Android App.

CO5: Use Internet, multimedia, camera and Location based, SMS services etc, in Android App.

CO6: Manage, Develop and Implement Mobile app project.



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Modules	Blooms level*	Number of hours
<u>MODULE 1: Introduction to Android</u> g) Introduction to Android Operating System h) <u>Hello world program using android</u> i) <u>Program to demonstrate Activity life cycle of android.</u>	L1, L2 and L3	4
<u>MODULE 2: UI Design for Android</u> e) Working with different layouts – LinearLayout, TableLayout and others. programs related to Drawable Resources. f) Working with common widgets g) Working with ListView and Adapters, Creating and using option menu, Working with preferences h) Working with Dialogs and Toasts, i) Working with Graphics and Animation, Intents ,Intent filters,	L2 and L3	4
<u>MODULE 3: Files, Database & Working in Background</u> a) Database programming in android	L2 and L3	6
<u>MODULE 4: Using System Services and Web Services</u> a) Program related to Service and its life cycle b) Programs Using Location based Services,Telephony and SMS services,Bluetooth, Network and WiFi, c) Programs related to Multimedia and Camera, a) Programs related to Accessing Internet and Web Services from Android Applications.	L2 and L3	4
<u>MODULE 5: Project</u> a) Small application to understand complete application development and management based on specific requirements.	L2, L3 and L4	6

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. "Android Programming: The Big Nerd Ranch Guide" By Bill Phillips & Brian Hardy, Big Nerd Ranch, Inc. Pearson Technology Group.
2. "Head First Android Development", By Anthony J.F. Griffiths and David Griffiths, Oreilly.

Reference Books

1. "Android Programming for Beginners", By John Horton, Packt Publishing

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70



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CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O 1	PS O 2	PS O 3	PS O4
CO 1	3	--	--	--	--	--	--	--	--	--	--	--	2	1	1	--
CO 2	1	2	1	--	--	--	--	--	--	--	--	--	2	1	1	--
CO 3	1	2	1	--	--	--	--	--	--	--	--	--	2	1	1	--
CO 4	1	2	1	--	--	--	--	--	--	--	--	--	2	1	1	--
CO 5	1	2	1	--	--	--	--	--	--	--	--	--	2	1	1	--
CO 6	1	1	1	2	--	--	--	--	--	--	--	--	2	1	1	1

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IFT4310	DIGITAL IMAGE PROCESSING	L	T	P	C
Version: 2020.1	Date of Approval: 19, July 2020	3	0	0	3
Pre-requisites/Exposure	Basics of Computer Graphics				
Co-requisites	NIL				

Catalog Description

This course gives students an insight into the basics of Image Processing along with visualization of real concept of Image processing. Concepts covered would enable students to define and differentiate among various types of image refinement. Further they would be able to gain insights about various Image restoration and modification technique.

Course Objectives

The objective of this course is to

Give provide knowledge of powerful collection of fundamental and advanced image processing tools on the desktop by taking advantage of the computational technology of Mathematics.

Course Outcomes

On completion of this course, the students will be able to

CO1: Define and explain Digital Image Processing.

CO2: Apply Image Enhancement techniques in the Spatial Domain.

CO3: Use the concepts of Image Enhancement in the Frequency Domain.

CO4: Understand the architecture Image Compression.

CO5: Apply algorithms of Image Representation and Description and Object Recognition.

Modules	Blooms level*	Number of hours
MODULE 1: Introduction and Digital Image Fundamentals The origins of Digital Image Processing, Examples of Fields that Use Digital Image Processing, Fundamentals Steps in Image Processing, Elements of Digital Image Processing Systems, Image Sampling and Quantization, Some basic relationships like Neighbors, Connectivity, Distance Measures between pixels, Linear and Non Linear Operations.	L1 and L2	4
MODULE 2: Image Enhancement in the Spatial Domain Some basic Gray Level Transformations, Histogram Processing, Enhancement Using Arithmetic and Logic operations, Basics of Spatial Filters, Smoothing and Sharpening Spatial Filters, Combining Spatial Enhancement Methods.	L2 and L3	6
MODULE 3: Image Enhancement in the Frequency Domain Introduction to Fourier Transform and the frequency Domain, Smoothing and Sharpening Frequency Domain Filters, Homomorphism Filtering.	L1 and L2	8
MODULE 4:	L2 and	10

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Image Compression Coding, Interpixel and Psychovisual Redundancy, Image Compression models, Elements of Information Theory, Error free comparison, Lossy compression, Image compression standards. Image Segmentation Detection of Discontinuities, Edge linking and boundary detection, Threshold, Region Oriented Segmentation, Motion based segmentation.	L3	
MODULE 5: Representation and Description Representation, Boundary Descriptors, Regional Descriptors, Use of Principal Components for Description, Introduction to Morphology, Some basic Morphological Algorithms. Object Recognition Patterns and Pattern Classes, Decision-Theoretic Methods, Structural Methods.	L2 and L3	8

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. Rafael C. Gonzalez & Richard E. Woods, "Digital Image Processing", 2nd edition, Pearson Education.
2. A. K. Jain, "Fundamental of Digital Image Processing", PHI.

References:

1. Rosefield Kak, "Digital Picture Processing",
2. W.K. Pratt, "Digital Image Processing",

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

A: Attendance, CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3	PS O4
C O1	1	--	--	--	--	--	--	--	--	--	--	--	2	3	--	--
C O2	1	1	1	2	1	--	--	--	--	--	--	--	1	1	1	--
C O3	1	1	1	2	1	--	--	--	--	--	--	--	1	1	1	--
C O4	1	2	2	--	1	--	--	--	--	--	--	--	1	2	2	--
C O5	1	1	1	1	1	--	--	--	--	--	--	--	1	1	1	--

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IFT4311	DIGITAL IMAGE PROCESSING LAB	L	T	P	C
Version 2020.1	Date of Approval: 19, July 2020	0	0	2	1
Pre-requisites/Exposure	Basics of MATLAB				
Co-requisites	NIL				

Catalog Description

This course gives students an insight into the basics of Image Processing along with visualization of real concept of Image processing. In this Lab course student will learn practicals of image processing using MATLAB programming.

Course Objectives

The objective of this course is to

1. Make the students apply knowledge of various Image processing techniques & pattern recognition required for solving complex problems.
2. Provide demonstration of different types of image processing techniques through MATAB toolbox.

Course Outcomes

On completion of this course, the students will be able to

CO1: Acquiring knowledge of Basics of High-end calculation software and need in Computer Science & engineering

CO2: Demonstrate the All preliminary functions in MATLAB

CO3: Apply the knowledge of all the basics function and toolbox knowledge of MATLAB

CO4: Demonstrate the Use of MATLAB in image Processing

Modules/Topics Covered**	Blooms level*	Number of hours
Introduction of MATLAB (g) Basic Variable deceleration & its operation (h) Function use & its application	L3, L5	4
Sample Programs in MATLAB a) Basic use of Matrix and Graph Plotting b) Different type of graph plotting with use of different -2 type of data	L3, L5	6
Sample Programs using MATLAB functions a) Create a basic program MATLAB using functions b) Use of basic function Image processing c) Practice on Basic function of Image processing tool box.	L3, L5	6
Programs of ANN functions a) Practice on Pattern Recognition functions in MATLAB b) Write a program for training a small network in MATLAB	L3, L5	6
Programs using ANN toolbox& Image processing toolbox a) Demonstrate the useof ANN tool box& Image processing toolbox and write a program after combining it.	L3, L5	2

*Bloom's Level:

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L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

** Sample Programs provided are not limited to these only, can include others as desired.

Text Books

- 1.Rafael C. Conzalez & Richard E. Woods, “Digital Image Processing”, 2nd edition, Pearson Education.
- 2.K. Jain, “Fundamental of Digital Image Processing”, PHI.

References:

- 1.Rosefield Kak, “Digital Picture Processing”,
- 2.W.K. Pratt, “Digital Image Processing”,

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

IA					EE
Components	A	PR	LR	V	70
Weightage (%)	5	10	10	5	

Note: IA –Internal Assessment, A – Attendance, PR – Performance, LR – Lab Record, V – Viva, EE- External Exam

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS O 1	PS O 2	PS O 3	PS O 4
CO 1	2	1	--	--	--	--	--	--	--	--	--	--	2	--	--	--
CO 2	3	1	--	--	--	--	--	--	--	--	--	--	1	2	--	--
CO 3	2	1	2	--	--	--	--	--	--	--	--	--	1	2	--	--
CO 4	1	3	2	--	--	--	--	--	--	--	--	--	2	--	2	--
CO 5	1	3	--	--	--	--	--	--	--	--	--	--	1	--	--	--

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IFT4312	BIG DATA	L	T	P	C
Version: 2020.1	Date of Approval: 19, July 2020	3	0	0	3
Pre-requisites/Exposure	Basics of DBMS				
Co-requisites	SQL				

Catalog Description

This course brings together several key big data technologies used for storage, analysis and manipulation of data. It also introduces the students the key concepts of Hadoop framework, MapReduce, Pig, Hive, and No-SQL. Students will learn to work on Hadoop platform. The concepts learnt will make students capable of working on big data projects easier.

Course Objectives

The objective of this course is

- To make students familiar with big data technologies.
- Provide an overview of Hadoop architecture and its working with other open source technologies.

Course Outcomes

On completion of this course, the students will be able to

CO1. Explain importance, applications and challenges of Big Data Analytics.

CO2. Differentiate among various analytics technologies.

CO3. Demonstrate architecture of Hadoop and MapReduce framework.

CO4. Illustrate Hadoop commands.

CO5. Introduce concepts of Hive, HBase and Pig.

Modules	Blooms level*	Number of hours
Module I: Introduction to Big Data Big Data : Definition, Sources, Importance & Applications, 5 V's of Big Data, Complexity of Big Data, Big data processing architecture, Big Data Analytics, Big data problems & challenges.	L1 and L2	5
Module II: Working with Hadoop Hadoop concepts : History, comparison with other systems : RDBMS, Grid computing, Cluster Computing, Cloud Computing, Hadoop Architecture, Hadoop Distributed file system : Data node, Name node, job tracker, task tracker, Moving data in and out of Hadoop, Common Hadoop shell commands.	L2and L5	4
Module III: Working with Map Reduce Map Reduce framework, Working of MapReduce: Job Scheduling, Shuffle and Sort, Task Execution, MapReduce Types, Formats and Features.	L1 and L3	8
Module IV: Working with Hive, HBase, PIG Working with Pig: Pig Latin, User Defined Functions and Operators Hive: Architecture, Comparison with traditional database, Hive QL- querying data, sorting & aggregation, joins & subqueries HBase : Fundamentals of HBase, HBase Versus RDBMS, Schema design	L2and L3	9

*Bloom's Level:

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

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Text Books

1. Michael Minelli, Michehe Chambers, Ambiga Dhiraj, “Big Data, Big Analytics: Emerging Business Intelligence and Analytic Trends for Today’s Business”, 1st Edition, Wiley CIO Series, 2013.
2. Tom White, “Hadoop: The Definitive Guide”, 3rd Edition, O’reilly, 2012.
3. Arvind Sathi, “Big Data Analytics: Disruptive Technologies for Changing the Game”, 1st Edition, IBM Corporation, 2012.
4. Bill Franks, “Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with Advanced Analytics”, 1st Edition, Wiley and SAS Business Series, 2012.

Reference Books

1. Anil Maheshwari, “Big Data”, McGraw Hill
2. Mayank Bhushan, “Big Data and Hadoop- Learn by Example”, BPB Publications

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination**Examination Scheme:**

Components	CT1	A/C/Q	Attd	EE
Weightage (%)	15	10	5	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance


CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3	PS O4
C O1	1	--	2	--	--	--	--	--	--	--	--	--	1	--	2	-
C O2	1	2	--	3	3	--	--	--	--	--	--	--	1	--	2	-
C O3	1	--	1	2	--	--	--	--	--	--	--	--	1	--	2	-
C O4	1	1	2	--	--	2	--	--	--	--	3	--	-	--	1	3
C O5	1	--	1	--	1	3	--	--	--	--	3	--	1	-	-	-

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IFT4313	BIG DATA LAB	L	T	P	C
Version: 2020.1	Date of Approval: 19, July 2020	0	0	2	1
Pre-requisites/Exposure	Basic Concepts of DBMS				
Co-requisites	Relational Algebra and Relational Calculus				

Catalog Description

This course brings together several key big data technologies used for storage, analysis and manipulation of data. It also introduces the students the key concepts of Hadoop framework, MapReduce, Pig, Hive, and No-SQL. Students will learn to work on Hadoop platform. The concepts learnt will make students capable of working on big data projects easier.

Course Objectives

The objective of this course is

- To make students familiar with big data technologies.
- Provide an overview of Hadoop architecture and its working with other open source technologies.

Course Outcomes

On completion of this course, the students will be able to

CO1. Install and configure Hadoop and various tools like Pig, Hive etc.

CO2. Explain concepts of files and directories in HDFS and apply them in real database applications.

CO3. Design and implement mapreduce programs for a given problem.

CO4. Solve queries using concepts of Hive and Pig.

CO5. Perform operations using HBase.

Modules	Blooms level*	Number of hours
Lab Session 1 1. Installation & Configuration steps of Hadoop	L1 and L2	2
Lab Session 2-3 1. Working with HDFS commands :mkdir, rmdir, rm, mv, ls, du, put, rm-r, cat, tail etc 2. Working with vi editor	L1 and L3	4
Lab Session 4-5 1. Working with Java Map Reduce : Map Class, Reduce Class, Driver Class, map side joins, reduce side joins	L1 and L3	4
Lab Session 6-8 Working with Hive : Queries for Hive : Create table, describe database, describe table, describe extended table, describe formatted table, drop table, drop database, display table, where clause 1. Commands : Load Files on table : Load from HDFS, load from local 2. Command :CTAS Create table as select 3. Queries to create external tables 4. Working with commands like : Order by, group by, like, upper, lower, max, min	L1 and L3	4

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Lab Session 9-10 1. Working with PIG : Order by, group by, co group, like, upper, lower, Joins, Union, Cartesian, Product, Pig Scripts	L1 and L3	6
Lab Session 11-12 Working with HBase : Start the hbase, data insert, modify, multiple version insertion, describe, delete truncate, drop etc. Working with Foreign Key and Check Constraint.	L1 and L3	4

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

- Jeffrey Aven, "SAMS Teach Yourself Hadoop in 24 Hours", 1stEd., Pearson ,2017.
- Tom White, "Hadoop: The Definitive Guide", 3rd Edition, O'reilly, 2012.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

CO, PO and PSO mapping

	P O 1	P O 2	P O 3	P O 4	P O 5	P O 6	P O 7	P O 8	P O 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO 3	PSO 4
CO 1	1	2	--	--	3	--	--	--	--	--	--	--	--	1	1	-
CO 2	1	-	--	--	2	--	--	--	--	--	--	2	--	1	1	-
CO 3	1	-	1	--	--	--	--	--	--	--	--	2	--	1	1	-
CO 4	1	-	2	--	--	--	--	--	--	--	--	--	---	1	1	--
CO 5	1	-	2	--	--	--	--	--	--	--	--	--	--	1	--	-

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IFT4331	TERM PAPER	L	T	P	C
Version: 2020.1	Date of Approval: 19, July 2020	0	0	0	3
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

Term paper evaluation course requires the students to study about the current technology topic in detail. The students have to read research papers, books and other study sources and finalize the topics for their presentation. Student has to prepare it in detail research paper mentioning all the content related to the topic. The evaluation is later done and a presentation is also to be prepared.

Course Objectives

The objective of this course is to

1. To increase the knowledge and the understanding of a particular phenomenon/topic.
2. To introduce student about how to write technical papers/research papers.

Course Outcomes

On completion of this course, the students will be able to

CO1: Study the literature and identify the current technical topic

CO2: Study the identified topic in detail

CO3: Prepare a detailed report including the introduction, architecture, advantages, disadvantages etc

CO4: Prepare a brief presentation of the concerned topic

Text Books

As per topic of summer internship project is chosen and discussion with guide.

Reference Books

As per topic of summer internship project is chosen and discussion with guide.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	V	PPT	R	IM	EM
Weightage (%)	20	20	30	30	70

V – Viva, PPT-Power Point Presentation, R – Report, IP-Internal Marks, EM-External Marks

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	2	2	--	--	--	--	--	--	--	--	--	-		1	2
CO2	1	2	2	-	--	--	--	--	--	--	--	--	-	-	1	1
CO3	1	2	-	--	--	--	--	--	--	--	--	--	-	-	1	1
CO4	1	2	3	--	--	--	--	--	--	--	--	--	-	-	1	1

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IFT4401	MACHINE LEARNING USING PYTHON	L	T	P	C
Version: 2020.1	Date of Approval: 19, July 2020	3	-	-	3
Pre-requisites/Exposure	Basic Knowledge of Programming				
Co-requisites	Nil				

Catalog Description

Python is a general-purpose high level programming language that is being increasingly used in data science and in designing machine learning algorithms. This course provides an introduction to Python and its libraries like numpy, pandas, matplotlib and explains how it can be applied to develop machine learning algorithms that solve real world problems.

This course starts with Python language followed by machine learning and covers concepts of python and all important concepts such as exploratory data analysis, data preprocessing, data visualization and clustering, classification, regression and model performance evaluation etc. This course covers all three types of machine learning algorithms including Supervise, Unsupervised and Reinforcement learning.

Course Objectives

The objective of this course is to

- Equip the students with concepts of programming and problem solving and develop proficiency in creating applications using the Python Programming Language.
- Provide knowledge of various types of machine learning models, its algorithms and development of the models using Python programming language.

Course Outcomes

On completion of this course, the students will be able to

CO1: Develop programs in Python to develop algorithmic solutions to computational problems.

CO2: Manage data in python using available data structures such as string, list, and dictionary and file handling operations.

CO3: Apply functions to decompose python program and develop modules and packages.

CO4: Preprocess and analyze data before applying suitable machine learning models.

CO5: Understand basic concepts and techniques of Machine Learning and apply machine learning algorithms to develop machine learning models for solving real word problems.

Modules	Blooms level*	Number of hours
Module-I Python basis: Installing Python; basic syntax, interactive shell, editing, saving, and running a script. The concept of data types; variables, assignments; immutable variables; numerical types; arithmetic operators and expressions; comments in the program; understanding error messages Conditions, boolean logic, logical operators; ranges; Control statements: if-else, loops (for, while); short-circuit (lazy) evaluation Data handling: String, Lists, tuples, and dictionaries; basic list operators, replacing, inserting, removing an element; searching and sorting lists; dictionary literals, adding and removing keys, accessing and replacing values; traversing dictionaries.	L1, L2 and L3	6

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Module-II Files Handling: manipulating files and directories, os and sys modules; text files: reading/writing text and numbers from/to a file; creating and reading a formatted file (csv or tab-separated). Design with functions: hiding redundancy, complexity; arguments and return values; formal vs actual arguments, named arguments. Program structure and design. Recursive functions. Python Modules and Packages: designing modules and package, Different ways to import Packages. OOP: classes, objects, attributes and methods, persistent storage of objects , constructor, inheritance, polymorphism, operator overloading (_eq_, _str_, etc); abstract classes, exception handling	L1, L2 and L3	7
Module-III Arrays and Matrices: The NumPy Module, Creating Arrays and Matrices, Copying, Arithmetic Operations, Cross product & Dot product , Saving and Restoring, Matrix inversion, Vectorized Functions Data Visualization: The Matplotlib Module, Histograms, Bar charts Density Plots, Box Plots, Scatter Plots, Heat Maps etc. DataFrames: Pandas , Loading data from different sources, Concept of DataFrames, Working with Dataframes such as selecting, filtering, grouping, joining etc. Dealing with missing values	L2, L3 and L4	6
Module-IV Introduction to Machine Learning: Introduction, Applications, Framework for developing machine learning models Supervised Learning: Linear regression, Multiple linear regression, logistic regression, classification and regression trees, Support Vector Machines, K-nearest neighbors Preprocessing and Scaling , Different Kinds of Preprocessing ,Applying Data Transformations Overfitting, underfitting, bias-variance tradeoff.	L2, L3 and L4	7
Module-V Unsupervised Learning: Introduction to Clustering, k-means clustering Hierarchical clustering, Dimensionality Reduction, Feature Selection, PCA, factor analysis, manifold learning. Reinforcement Learning: Value iteration; policy iteration; TD learning; Q learning; actor-critic	L2, L3 and L4	6

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

1. Pilgrim, Dive, "Introduction to Python", 3rd Edition, Apress, 2009.
2. Allen Downey, Jeffrey Elkner, Chris Meyers, "How to Think Like a Computer Scientist Learning with Python" 2nd Edition Green Tea Press, 2002.
3. Manaranjan Pradhan and U Dinesh Kumar, "Machine Learning using Python" , Wiley Publication

Reference Books

1. John V. Guttag, "Introduction to Computation and Programming using Python", Prentice Hall of India, 2014.
2. Mark Lutz, "Learning Python: Powerful Object-Oriented Programming", Fifth Edition, O'Reilly, Shroff Publishers and Distributors, 2013.
3. Michale Bowles "Machine Learning in Python: Essential Techniques for Predictive Analysis" Wiley Publication.

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Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination
Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

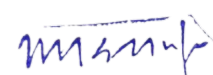
CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3	PS O4
C O1	1	3	2	2	--	--	--	--	--	--	--	--	1	1	2	--
C O2	1	3	2	2	--	--	--	--	--	--	--	--	1	1	2	--
C O3	1	3	2	1	2	--	--	--	--	--	--	--	1	1	2	--
C O4	1	1	1	1	1	2	--	--	--	--	--	--	1	--	1	--
C O5	1	1	1	1	1	2	--	--	--	--	--	--	1	--	1	---

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IFT4403	MACHINE LEARNING USING PYTHON LAB	L	T	P	C
Version: 2020.1	Date of Approval: 19, July 2020	0	-	4	2
Pre-requisites/Exposure	Basic Knowledge of Programming				
Co-requisites	Nil				

Catalog Description

Python is a language with a simple syntax, and a powerful set of libraries. It is an interpreted language, with a rich programming environment, including a robust debugger and profiler. While it is easy for beginners to learn, it is widely used in many scientific areas for data exploration. This course is an introduction to the Python programming language for students without prior programming experience. We cover data types, control flow, object-oriented programming, and graphical user interface-driven applications. The examples and problems used in this course are drawn from diverse areas such as text processing, simple graphics creation and image manipulation, HTML and web programming.

Course Objectives

The objective of this course is to

- Equip the students with concepts of programming and problem solving and develop proficiency in creating applications using the Python Programming Language.
- Provide an overview of various control statements, data structures, object oriented programming, packages related to image processing, graphics, event driven programming, socket applications.

Course Outcomes

On completion of this course, the students will be able to

CO1: Explain various operators and control structures in python and their uses to develop algorithmic solutions to simple computational problems.

CO2: Describe string, python packages and related functions for various file handling operations.

CO3: Apply functions to decompose python program and represent compound data using Python lists, tuples, and dictionaries.

CO4: Analyze graphics, image processing and object oriented programming concept to create applications and analyze exceptions during program execution.

CO5: Create GUI based applications using python packages and network client/server programming.

Modules	Blooms level*	Number of hours
Module-I <ol style="list-style-type: none"> 1. Write a program to read and store the name of three different cities in three different variables and print all the contents of variables on the console. 2. Write a program to read the radius of a circle and print the area of circle. 3. Write a program to calculate the distance between two points using distance formula. 4. Write a program to reverse a four digit number using % and // operators. 5. Apply control statements of python to create following pattern. 	L3,L5	4

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1 2
1 2 3
1 2 3 4
1 2 3 4 5

6. Apply control statement in python to construct a program to prompt a user to read the marks of five different subjects. Calculate the total marks and percentage of the marks and display the message according to the range of percentage given table.

Percentage	Message
Per>=90	Distinction
Per>=80 && per<90	First Class
Per>=70 && per<80	Second Class
Per>=60 && per<70	Third Class
Per<60	Fail

Module-II

1. Write the function replacevowels(word) which removes all the vowels ('a','e','i','o','u') in a word and returns the remaining letters in the word.
2. Write a function Eliminate_Letter (Word, Letter) which takes a word and a letter as arguments and removes all the occurrence of that particular letter from the word. The function will return the remaining letters in the word.
3. Write a program to count number of characters from a file.
4. Generate 50 random numbers within a range 500 to 1000 and write them to file using function.
5. Write a program to insert a string like "1, 2, 3, 4" and print sum of all the numbers of the list using split function.
6. Write a program to write in excel file in following format using python.

L3,L5

6

	A	B	C	D	E	F
1		ISBT DEHRADUN	SHASTRADHARA	CLEMEN TOWN	RAJPUR ROAD	CLOCK TOWER
2	ISBT DEHRADUN					
3	SHASTRADHARA					
4	CLEMEN TOWN					
5	RAJPUR ROAD					
6	CLOCK TOWER					
7						
8						
9						
10						
11						
12						
13						
14						
15						

Module-III

1. Creating 1-D, 2-D , 3-D numpy arrays and performing arithmetic on them.
2. Program on Boolean arrays and conditional selecting items from array.
3. Stacking and reshaping array

L3,L5

6

4. Selecting common items between two arrays 5. Plotting simple plots in matplotlib: line, scatter, boxplot, bar, 6. Working with various parameters available in plot function 7. Using magic commands in jupyter notebook 8. Working with series and data frames in pandas 9. Reading and writing CSV and excel files 10. Conditional selection and indexing in DataFrame 11. Adding and removing columns in DataFrame 12. Cleaning data columns using regular expressions		
Module-IV 1. Write python program for following image processing operations <ul style="list-style-type: none"> ➤ Convert image in to grayscale image ➤ Display size of image ➤ Rotate an image ➤ Paste one image on another image. ➤ Crop an image. 2. Implement logistic regression and knn classification on iris dataset using scikit-learn 3. Perform linear regression and multiple feature linear regression on any dataset using scikit-learn 4. Implement gradient descent algorithm to optimize linear regression and logistic regression algorithm 5. Apply various evaluation metrics on breast cancer data set from scikit learn after performing logistic regression. 6. In exercise 5 plot decision boundary using matplotlib 7. Implement RandomForest and Decision tree algorithms on external and internal data sets 8. Show use of Scalars techniques available in scikit-learn	L3,L5	4
Module V 1. Implement feature scaling in scikit learn 2. Implement PCA on breast cancer dataset using scikit learn 3. Draw two-dimensional scatter plot of the Breast Cancer dataset using the first twoprincipal components as done in exercise 2. 4. Apply TSNE algorithm to mnist dataset (manifold learning) 5. Implement MDP and Q-learning in python.	L3,L5	4

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

1. Pilgrim, Dive, "Introduction to Python", 3rd Edition, Apress, 2009.
2. Allen Downey, Jeffrey Elkner, Chris Meyers, "How to Think Like a Computer Scientist Learning with Python" 2nd Edition Green Tea Press,2002.
3. Manaranjan Pradhan and U Dinesh Kumar, "Machine Learning using Python" , Wiley Publication

Reference Books

1. John V. Guttag, "Introduction to Computation and Programming using Python", Prentice Hall of India, 2014.

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2. Mark Lutz, “Learning Python: Powerful Object-Oriented Programming”, Fifth Edition, O’Reilly, Shroff Publishers and Distributors, 2013.
3. Michale Bowles “Machine Learning in Python: Essential Techniques for Predictive Analysis” Wiley Publication.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

IA					EE
Components	A	PR	LR	V	70
Weightage (%)	5	10	10	5	

Note: IA –Internal Assessment, A – Attendance, PR – Performance, LR – Lab Record, V – Viva, EE- External Exam

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3	PS O4
C O1	1	3	2	2	--	--	--	--	--	--	--	--	1	1	2	--
C O2	1	3	2	2	--	--	--	--	--	--	--	--	1	1	2	--
C O3	1	3	2	1	2	--	--	--	--	--	--	--	1	1	2	--
C O4	1	1	1	1	1	2	--	--	--	--	--	--	1	--	1	--
C O5	1	1	1	1	1	2	--	--	--	--	--	--	1	--	1	---

1: strongly related, 2: moderately related and 3: weakly related



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IFT4402	CLOUD COMPUTING	L	T	P	C
Version: 2020.1	Date of Approval: 19, July 2020	3	0	0	3
Pre-requisites/Exposure	Basics of Distributed Computing				
Co-requisites	NIL				

Catalog Description

This course gives students an insight into the basics of cloud computing along with virtualization. Concepts covered would enable students to define and differentiate among various distributed computing platforms. Further they would be able to gain insights about various cloud simulators like CloudSim, Green Cloud and VMWare for simulating cloud and virtualization based environments.

Course Objectives

The objective of this course is to

- Equip the students with the features and concepts of Virtualization and Cloud Computing.
- Provide basic knowhow about cloud implementation, deployment models or layers and about cloud simulators like CloudSim, GreenCloud and VMWare.

Course Outcomes

On completion of this course, the students will be able to

CO1: Define and explain Cloud Computing with its characteristics, benefits and limitations.

CO2: List and distinguish among various cloud deployment models along with service delivery layers.

CO3: Explain concepts of Virtualization with its need and limitations, distinguish between types of hardware virtualization and list types of desktop virtualization.

CO4: Describe the architecture and demonstrate working mechanism for CloudSim and Green Cloud simulators.

CO5: Explain the basics of VMWare Simulator and demonstrate implementation of Virtual machines.

Modules	Blooms level*	Number of hours
MODULE 1: CLOUD COMPUTING OVERVIEW Origins of Cloud computing – Cloud components - Essential characteristics – On-demand self-service, Broad network access, Location independent resource pooling, Rapid elasticity, measured service, Roots of cloud computing, Architectural influences – High-performance computing, Utility and Enterprise grid computing, Cloud scenarios – Benefits: scalability, simplicity, vendors, security, Limitations	L1 and L2	8
MODULE 2: CLOUD ARCHITECTURE- LAYERS AND MODELS The cloud reference model: Architecture, Software as a Service (SaaS), features of SaaS and benefits, Platform as a Service (PaaS), features of PaaS and benefits, Infrastructure as a Service (IaaS), features and benefits of IaaS, Service providers, challenges and risks in cloud adoption, Cloud deployment model: Public clouds – Private clouds – Community clouds - Hybrid clouds - Advantages of Cloud computing .	L1 and L2	8
MODULE 3: VIRTUALIZATION Virtualization and cloud computing - Need of virtualization – cost,	L1 and L2	10

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administration, fast deployment, reduce infrastructure cost – limitations, Characteristics of virtualized environments Types of hardware virtualization: Full virtualization - partial virtualization - para virtualization. Desktop virtualization: Software virtualization – Memory virtualization – Storage virtualization – Data virtualization – Network virtualization		
MODULE 4: CLOUD SIMULATORS- CLOUDSIM AND GREENCLOUD Introduction to Simulator, understanding CloudSim simulator, CloudSim Architecture(User code, CloudSim, GridSim, SimJava) Understanding Working platform for CloudSim, Introduction to GreenCloud.	L2 and L3	12
MODULE 5: INTRODUCTION TO VMWARE SIMULATOR Basics of VMWare, advantages of VMware virtualization, using Vmware workstation, creating virtualmachines-understanding virtual machines, create a new virtual machine on local host, cloning virtual machines, virtualize a physical machine, starting and stopping a virtual machine.	L2 and L3	10

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

- Cloud computing a practical approach - Anthony T.Velte , Toby J. Velte Robert Elsenpeter, TATA McGraw- Hill , New Delhi – 2010
- Mastering Cloud Computing- Foundations and Applications Programming - RajkumarBuyya , Christian Vecchiola and S. ThamaraiSelvi, Tata McGraw Hill, New Delhi, India, 2013
- Cloud Computing: Web-Based Applications That Change the Way You Work and Collaborate Online - Michael Miller - Que 2008

Reference Books

- Cloud computing for dummies- Judith Hurwitz , Robin Bloor , Marcia Kaufman ,Fern Halper, Wiley Publishing, Inc, 2010
- Cloud Computing (Principles and Paradigms), Edited by RajkumarBuyya, James Broberg, AndrzejGoscinski, John Wiley & Sons, Inc. 2011

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

A: Attendance, CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination



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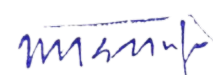
CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3	PS O4
C O1	1	2	--	--	--	--	--	--	--	--	--	--	1	--	--	--
C O2	1	--	2	--	--	--	--	--	--	--	--	--	1	2	--	--
C O3	3	--	1	--	2	--	--	--	--	--	--	--	1	3	2	--
C O4	3	--	2	--	1	--	--	--	--	--	--	--	1	--	2	--
C O5	3	--	2	--	1	--	--	--	--	--	--	--	1	--	2	--

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IFT4437	MAJOR PROJECT/ DISSERTATION	L	T	P	C
Version: 2020.1	Date of Approval: 19, July 2020	0	0	0	30
Pre-requisites/Exposure	Programming/Networking/Testing etc.				
Co-requisites	Nil				

Catalog Description

There are certain phases of every Intern's professional development that cannot be effectively taught in the academic environment. These facets can only be learned through direct, on-the-job experience working with successful professionals and experts in the field. The internship program can best be described as an attempt to institutionalize efforts to bridge the gap between the professional world and the academic institutions. Entire effort in internship is in terms of extending the program of education and evaluation beyond the classroom of a university or institution. The educational process in the internship course seeks out and focuses attention on many latent attributes, which do not surface in the normal classroom situations. These attributes are intellectual ability, professional judgment and decision-making ability, inter-disciplinary approach, skills for data handling, ability in written and oral presentation, sense of responsibility etc. In order to achieve these objectives, each student will maintain a file . The Report aims to encourage students to keep a personal record of their learning and achievement throughout the Programme. It can be used as the basis for lifelong learning and for job applications. Items can be drawn from activities completed in the course modules and from the workplace to demonstrate learning and personal development. The report will assess the student's analytical skills and ability to present supportive evidence, whilst demonstrating understanding of their organization, its needs and their own personal contribution to the organization.

Course Objectives

The objective of this course is to

1. Equip the students with new technologies and industrial requirements.
2. Equip students with Project Management, Documentation and Presentation skills.

Course Outcomes

On completion of this course, the students will be able to

CO1: Demonstrate skill and knowledge of current information and technological tools and techniques specific to the field of study.

CO2: Identify, analyze, and solve problems creatively through sustained critical investigation.

CO3: Use effectively oral, written and visual communication.

CO4: Understand Project management and team work skills.

Text Books

As per topic of major project.

Reference Books

As per topic of major project.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination



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Examination Scheme:

Components	V	PPT	R	Exe	IM
Weightage (%)	16	8	12	14	50

V – Viva, PPT-Power Point Presentation, R – Report, IM-Internal Marks, Exe-Execution

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO 1	1	1	1	1	1	--	--	--	--	--	--	--	-	--	1	2
CO 2	2	2	2	2	1	--	--	--	--	--	--	--	-	-	1	2
CO 3	2	2	2	--	--	--	--	--	1	1	--	--	-	-	1	2
CO 4	1	2	3	--	--	--	--	--	1	1	--	--	-	-	1	1

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MECHANICAL ENGINEERING

Programme Structure

Course Code	Course Title	Lecture (L) Hours Per Week	Tutorial (T) Hours Per Week	Practical (P) Hours Per Week	Total Credits
MAE2352	Thermodynamics	3	-	-	3
MAE2452	Fluid Power Systems	3	-	-	3
MAE2552	KOM	3	-	-	3
MAE2652	DOM	3	-	-	3
MAE2752	Meteorology	3	-	-	3
MAE2852	Project (Mechanical Engineering)	3	-	-	3
	TOTAL				18



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MECHANICAL ENGINEERING

Syllabus

THERMODYNAMICS

Course Code: MAE2352

Credit Units: 03

Course Objective:

Objective of this course is to impart in depth understanding of the principles of thermodynamics and heat transfer. This course also helps students understand the application of basic fluid mechanics, thermodynamic, and heat transfer principles and techniques, including the use of empirical data, to the analysis of representative fluid and thermal energy components and systems encountered in the practice of electrical, electronic, industrial, and related disciplines of engineering.

Course Contents:

Module I: Basic concepts

Thermodynamic system, intensive and extensive properties, cyclic process, Zeroth Law of Thermodynamics, Work and heat, Flow work

Module II: First Law of Thermodynamics

Mechanical equivalent of heat, internal energy, Analysis of non-flow system, flow process and control volume, steady flow, energy equation, flow processes

Module III: Second Law of Thermodynamics and Entropy

Heat Engine, heat pump, Kelvin Planck and Clausius statement of Second Law of Thermodynamics, Perpetual motion machine, Reversible cycle- Carnot Cycle, Clausius inequality, entropy, Principle of entropy increase, concepts of availability, irreversibility.

Module IV: Air-Cycles

Carnot cycle, Otto cycle, Diesel cycle, Dual cycle, Stirling cycle, Ericsson cycle, Brayton cycle; Reversed Carnot cycle.

Module V: Properties of Steam

Use of steam tables, wet steam, superheat steam, different processes of vapour, Mollier Diagram.

Module VI: Reciprocating Air compressors

Single stage compressor, Isothermal efficiency, adiabatic efficiency, clearance volume, volumetric efficiency, and multi-stage compression with intercooling.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

Text & References:

Text:

- P.K. Nag, "Engineering Thermodynamics", Tata McGraw Hill
- Incropera, "Engineering Thermodynamics", John Wiley


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References:

- Engel, T. and Reid, P., Thermodynamics, Statistical Thermodynamics & Kinetics, Pearson Education, 2006
- Cengel & Boles, "Thermodynamics", Tata McGraw Hill.
- Sonntag/Vanhyllene, Fundamentals of Thermodynamics, Wiley
- Rahul Gupta, Engineering Thermodynamics, Asian Books P. Ltd.
- Y.V.C. Rao, Engineering Thermodynamics, Khanna Publications
- Onkar Singh, Applied Thermodynamics, New Age Publications.
- Dhomkundwar Kothandaraman, "A Course in Thermal Engineering", Dhanpat Rai Publications



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FLUID POWER SYSTEMS

Course Code: MAE2452

Credit Units: 03

Course Objective:

Fluid power systems cover generation, transmission, and control applications of power by using pressurized fluids. This course imparts the knowledge of different fluid power systems (pneumatic and hydraulic) which are used in industries and hydropower plants.

Course Contents:

Module I: Introduction

Euler's equations for turbo machines; impulse and reaction forces due to fluid systems on stationary and moving system of vanes; jet propulsion.

Module II: Water Turbines

Classification: Pelton, Francis, Propeller and Kaplan turbines; velocity triangles; efficiency; draft tubes, governing.

Module III: Pumps

Centrifugal pumps, velocity triangles, efficiency, turbine pumps, axial and mixed flow pumps.

Module IV: Performance of Fluid Machines

Similarity laws applied to rotodynamic machines; specific speed, unit quantities; characteristic curves; use of models; cavitations and attendant problems in turbo machines; selection of turbines hydroelectric plants.

Module V: Hydraulic Power Transmission

Transmission of hydraulic power through pipe lines; water hammer; precautions against water hammer in turbine and pump installations: hydraulic ram.

Module VI: Power Hydraulics

Positive pumps: gear, vane, screw, pump, variable delivery valves: flow control, pressure control, direction control, solenoid operated valve, hydraulic circuits, fluid coupling and torque converter. Pneumatic Power: Basic principles, comparison of pneumatic and hydraulic Systems.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

Text:

- Gupta, S. C., Fluid Mechanics and Hydraulic Machines, Pearson Education, 2007
- R.K. Bansal, "Fluid Mechanics & Hydraulic Machines", Laxmi Publications (P) Ltd., 2002.

References:

- Dr. D.S. Kumar, "Fluid Mechanics & Fluid Power Engineering", S.K. Kataria & Sons, 2001
- D.R. Malhotra & N.K. Malhotra, "The Fluid Mech. & Hydraulics", Satya Prakashan, 2001
- V.P. Gupta, Alam Singh, Manish Gupta, "Fluid Mechanics, Fluid Mechanics & Hydraulics", CBS Publishers; 1999.


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BASICS OF KINEMATICS OF MACHINE

Course Code: MAE2552

Credit Units: 04

Module-I

Introduction

Links-types, Kinematics pairs-classification, Constraints-types, Degrees of freedom of planar mechanism, Grubler's equation, linkage mechanisms, inversions of four bar chain, slider crank chain and double slider crank chain

Velocity in Mechanisms

Velocity of point in mechanism, relative velocity method, Velocities in four bar mechanism, slider crank mechanism and quick return motion mechanism, Rubbing velocity at a pin joint, Instantaneous center method, Types & location of instantaneous centers, Kennedy's theorem, Velocities in four bar mechanism & slider crank mechanism

Module-II

Acceleration in Mechanisms

Acceleration of a point on a link, Acceleration diagram, Coriolis component of acceleration, Crank and slotted lever mechanism, Klein's construction for Slider Crank mechanism and Four Bar mechanism, Analytical method for slider crank mechanism

Mechanisms with Lower Pairs

Pantograph, Exact straight line motion mechanisms-Peaucellier's, Hart and Scott Russell mechanisms, Approximate straight line motion mechanisms-Grass-Hopper, Watt and Tchebicheff mechanisms, Analysis of Hooke's joint, Davis and Ackermann steering gear mechanisms.

Module-III

FRICTION

Laws of friction, Friction on inclined plane, Efficiency on inclined plane, Friction in journal bearing-friction circle, Pivots and collar friction-uniform pressure and uniform wear, Belt and pulley drive, Length of open and cross belt drive, Ratio of driving tensions for flat belt drive, centrifugal tension, condition for maximum power transmission, V belt drive

Brakes & Dynamometers

Shoe brake, Band brake, Band and Block brake, Absorption and transmission type dynamometers

Module-IV

CAMS

Cams and Followers - Classification & terminology, Cam profile by graphical methods with knife edge and radial roller follower for uniform velocity, simple harmonic and parabolic motion of followers, Analytical methods of cam design – tangent cam with roller follower and circular cams with flat faced follower

Module-V

Gears & Gear Trains

Classification & terminology, law of gearing, tooth forms & comparisons, Systems of gear teeth, Length of path of contact, contact ratio, interference & under cutting in involute gear teeth, minimum number of teeth on gear and pinion to avoid interference, simple, compound, reverted and planetary gear trains, Sun and planet gear.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance


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Books and References:

1. Theory of Machines - Thomas Bevan
2. Theory of Machines and Mechanisms- Shigley
3. Theory of Machines and Mechanisms-Ghosh & Mallik
4. Theory of Machines and Mechanisms- Rao & Duggipati
5. Theory of Machines-S.S. Rattan
6. Kinematics of Machines-Dr. Sadhu singh
7. Mechanics of Machines – V. Ramamurti
8. Theory of Machines – Khurmi & Gupta
9. Theory of Machines – R. K. Bansal
10. Theory of Machines – V. P. Singh
11. Theory of Machines – Malhotra & Gupta



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BASICS OF DYNAMICS OF MACHINES

Course Code: MAE2652

Credit Units: 04

Module 1.

Static Force Analysis: Static force analysis of planer mechanisms, Free body diagrams, dynamic force analysis including inertia and frictional forces of planer mechanisms

Inertia forces: D'Alembert's Principle, Velocity and acceleration of piston, Torque exerted on the crank shaft when friction and inertia of moving parts are neglected, Forces on the reciprocating parts of an engine considering friction and inertia of moving parts, Turning moment on crank shaft, Dynamically equivalent system, Torque exerted on the crank shaft, considering the weight of the connecting rod.

Module 2.

Balancing of rotating masses: Balancing of single rotating mass, Balancing of several masses rotating in the same plane, Balancing of several masses rotating in different planes.

Balancing of reciprocating masses: Balancing of reciprocating engine, Partial balancing of primary force, Partial balancing of locomotives, Variation of tractive force, swaying couple, hammer blow, coupled locomotive, primary balance of multi-cylinder inline engine, Secondary balance of multi-cylinder in line engines, Method of direct and reverse cranks, V-engines balancing.

Module 3.

Governors: Types of Governor, Watt Governor, Porter governor, Proell Governor, Hartnell Governor, Wilson-Hartnell governor, Sensitivity, Stability, Isochronism, Hunting, Governor Effort and Power, controlling force

Module 4.

Gyroscopic effect and Gyroscope: Spinning and precession, gyroscopic couple, Effect of gyroscopic couple on the stability of automotive vehicles: Stability of four wheelers, Stability of two wheelers, Gyroscopic effects on ships and aero planes.

Module 5.

Vibration: Vibration analysis of SDOF systems, natural, damped, forced vibrations, base-excited vibrations, transmissibility ratio

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70


CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

Text & References:

- PL Ballaney, Theory of Machines,
- Hams Crone and Roggers, Theory of Machines
- Shigley, Theory of Machines
- J. Lal, Theory of Machines
- SS Rattan, Theory of Machines
- Ghosh and Mallick, Mechanisms and Machines, EWP publication.
- R.S. Khurmi, Theory of Machine, S. Chand.



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METEOROLOGY

Course Code: MAE2752

Credit Units: 03

Course Objective:

The main objective of this course is to give the student: a basic understanding of the physical loss governing metrology and tolerance design. Gain and appreciation for the capabilities and applications of metrology through hands own experiences.

Course Contents:

Module I: Principles of measurement

Definition of Metrology, difference between precision and accuracy. Sources of errors: Controllable and Random Errors, Effects of Environment and Temperature, Effects of support, alignment errors.

Length Standards: Line standards, end standards and wavelength standards, transfer from line standards to end standards. Numerical based on line standards. Slip gauges – its use and care, methods of building different heights using different sets of slip gauges.

Limits, fits and tolerances: Various definitions, different types of fits and methods to provide these fits. Numerical to calculate the limits, fits and tolerances, ISO system of limits and fits; Gauges and its types, limit gauges – plug and ring gauges. Gauge Design – Taylor's Principle, wear allowance on gauges.

Module II: Comparators

Principles and working of Mechanical, Electrical, Optical and Pneumatic Comparators.

Angular Measurement: Sine Bar – different types of sine bars, use of sine bars in conjunction with slip gauges, Use of angle gauges, spirit level, errors in use of sine bars. Numericals. Principle and working of autocollimator.

Module III: Straightness and flatness

Definition of Straightness and Flatness error. Numericals based on determination of straightness error of straight edge with the help of spirit level and auto collimator

Screw Thread Measurement: Errors in threads, Measurement of elements of screw threads –major diameter, minor diameter, pitch, flank angle and effective diameter (Two and three wire methods). Effect of errors in pitch and flank angles

Gear Measurement: Measurement of tooth thickness – Gear tooth vernier caliper, Constant chord method, base tangent method and derivation of mathematical formulae for each method. Parkinson Gear Tester.

Module IV

Machine Tool Alignment: Machine tool tests and alignment tests on lathe. Alignment tests on milling machine. Alignment tests on a radial drilling machine, Interferometry.

Surface texture: Introduction, types of irregularities, Elements of surface Texture, Measurement of surface finish, Examination of surface Roughness.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

Text & References:

Text:

- R.K. Jain, "Engineering Metrology", Khanna Publishers, Delhi
- I.C. Gupta, "Engineering Metrology", Dhanpat Rai Publications, Delhi

References:

- F.W. Galyer & C.R. Shotbolt, "Metrology for Engineers", ELBS edition.

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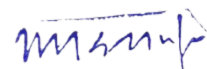
NANOTECHNOLOGY

Programme Structure-2022

Course Code	Course Title	Lecture (L) Hours Per Week	Tutorial (T) Hours Per Week	Practical (P) Hours Per Week	Total Credits
NAT2152	Basics of Nanoscience	3	-	-	3
NAT2251	Properties of Nanomaterials	3	-	-	3
NAT2353	Synthesis of Nanomaterials	2	-	2	3
NAT2453	Characterization Techniques	3	-	-	3
NAT2553	Vacuum Science & Clean Room Technology	2	-	2	3
NAT2652	Industrial Applications of Nanomaterials	3	-	-	3
	TOTAL				18



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NANOTECHNOLOGY

Syllabus - Semester First

BASICS OF NANOSCIENCE

Course Code: NAT2152

Credit Units: 03

Course Objective:

To enable the students to understand the science of nanomaterials.

Module I: Introduction to Quantum Mechanics & Crystal structure

De-Broglie hypothesis, Uncertainty Principle, Schrödinger Equation, Operator, Particle in a 1D box, Particle in a 3D box (qualitative), Crystal structure, Crystal orientation, Crystal planes, Bravais lattice, Miller Indices, Atomic Packing Density, crystal symmetry, ZnS, Diamond and NaCl crystal structure, Melting point, Coordination number, Atomic Bonding.

Module II: Introduction to Nanoscience

Emergence of Nanoscience with special reference to Feynman and Drexler, Role of particle size, Spatial and temporal scale, Exciton, Concept of confinement, strong and weak confinement with suitable examples, Development of quantum structures, Basic concept of quantum well, quantum wire and quantum dot. Density of states of 1D, 2D & 3D structure, surface effect,

Module III: Types of Nanomaterials

Nanoclusters, Solid solutions, Thin film, Nanocomposites (Metal Oxide and Polymer based), Core Shell Nanostructure, Buckyballs, Carbon nano tubes and, Zeolites minerals, Dendrimers, Micelles, Liposomes, Block Copolymers, Porous Materials, Metal Nanocrystals, Semiconductor nanomaterials, Hydrogels

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage(%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

Text & References:

- Material Science & Engineering—An Introduction by William D. Callister Jr.
- Grain growth and control of microstructure and lecture in polycrystalline materials by V. Lu. Novikov & Vladimir Novikov
- Nanoscale Materials—Liz Marzan & Kamat
- Introduction to Nanotechnology by Charles P. Poole, Jr., Frank J. Owens



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Syllabus - Semester Second

PROPERTIES OF NANOMATERIALS

Course Code: NAT2251

Credit Units: 03

Course Objective:

To enable students to understand properties of bulk and nanomaterials

Course Contents:

Module I: Electronic & Magnetic

Classification of materials: Metal, Semiconductor, Insulator, B and structures, Brillouin zones, Mobility, resistivity, relaxation time, and recombination centers, Hall effect Quantum Hall effect. Quantum Tunneling, Coulomb Blockade, single electron transistor. Origin of magnetic Moment in materials, Revisit to Different kind of magnetism in nature: Dia, para, ferro magnetic, Domain structure, antiferro, ferri & super paramagnetism, nanomagnetic materials: Fe, Fe₃O₄, Ferrites, Ferro-fluids

Module II: Optical & Thermal

Photo-conductivity, Photovoltaic effect, optical absorption & transmission, photoluminescence, fluorescence, phosphorescence, electroluminescence, LED, Concept of phonon, thermal conductivity, specific heat, exothermic & endothermic heat, Thermoelectric effect, Thermoelectric material (TEM) properties.

Module III: Mechanical

Stress- Strain curve, True Stress True strain, Hardness, compressive & tensile strengths, Fracture toughness Fatigue, Creep and other lastic properties of materials, Deformation behavior of Nanomaterials

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage(%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

Text & References:

- Processing & properties of structural nanomaterials by Leon L. Shaw (editor)
- Chemistry of nanomaterials: Synthesis, properties and applications by CNR Rao et al. Wiley VCH Verlag GmbH & Co, Weinheim
- Nanostructure and Nanomaterials: Synthesis, Properties and Application by G. Cao, Imperial College Press, 2004



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Syllabus - Semester Third

SYNTHESIS OF NANOMATERIALS

Course Code: NAT2353

Credit Units: 03

Course Objective:

To enable students to understand the different methods of synthesis of nonmaterial

Course Contents:

Module I: Physical Methods:

Physical Vapour Deposition (PVD), Inertgascondensation, Arcdischarge, DCsputtering, Ionsputtering, RF & Magnetron sputtering , Pulse Laser Deposition (PLD), Ball Milling, Molecular beamepitaxy, Electrodeposition, Fundamentals of film growth. Physical vapour Deposition (PVD): Evaporation molecular beamepitaxy (MBE), Sputtering, Comparison of Evaporation and sputtering. Chemical Vapour Deposition (CVD) : Typical chemical reactions, Reaction kinetics, transport phenomena, CVD methods, diamond films by CVD

Module II: Chemical Methods:

Metal nanocrystals by reduction, Sol-gel, Solvothermal synthesis, Photochemical synthesis, Electrochemical synthesis, Nanocrystals of semiconductors and other materials by arrested precipitation, Thermolysis routes, Liquid-liquid interface.

Module III: Features of nanoscale growth

Specific Features of Nanoscale Growth – Introduction - Thermodynamics of Phase Transitions Dynamics of Phase Transitions - Thermodynamics of Spinodal Decomposition Thermodynamics of Nucleation – Growth - Size Control - Triggering the Phase Transition- Application to Solid Nanoparticles - Controlling Nucleation - Controlling Growth - Controlling Aggregation. Stability of Colloidal Dispersions - Breaking Matter into Pieces.

Examination Scheme:

Components	CT	HA	A	S/V/Q	EE
Weightage(%)	15	5	5	5	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

Text & References:

- Handbook of nanoscience, Eng. & Technology by W.Gaddand, D.Bernner, S.L.Solnki & G.J.Infrate (Eds), CRC press 2002
- Nanostructure and Nanomaterials: Synthesis, Properties and Application by G.Cao, Imperial College Press, 2004
- Nanoscience & Technology: Novel structure and phenomena by Ping Sheng (Editor)
- Nano Engineering in Science & Technology: An introduction to the world of nanodesign by Michael Rieth.


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Syllabus - Semester Fourth

CHARACTERIZATION TECHNIQUES

Course Code: NAT2453

Credit Units: 03

Course Objective:

To enable students to understand the instrumental techniques for characterization of nanomaterials

Course Contents:

Module I: Structural characterization techniques

X-ray diffraction (XRD) technique, particle size determination using XRD, Applications of XRD, Electron diffraction and its application, neutron diffraction and its applications

Module II: Optical and Electron Microscopy

Introduction to Optical microscopy, Scanning Electron Microscopy, Transmission Electron Microscopy, Scanning Tunneling Microscopy, Atomic Force Microscopy, Confocal Microscopy, SPR

Module III: Spectroscopic Techniques

UV visible spectroscopy, Infrared Spectroscopy and Fourier Transform Infrared Spectroscopy, Raman Spectroscopy, Photoluminescence (PL), Photoelectron Spectroscopy (X-Ray Photoelectron Spectroscopy, Auger Electron Spectroscopy & Ultra Violet Photoelectron Spectroscopy)

Examination Scheme:

Components	CT	HA	A	S/V/Q	EE
Weightage(%)	15	5	5	5	70


CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

Text & References:

- Elements of X-ray diffraction, BDCullity- Addison-Wesley Publishing Company, Inc.
- Encyclopedia of Materials Characterization, C.Richard Brundle and Charles A.Evans, Jr
- Web based different sources
- Willard, Merritt, Dean, Settle-Instrumental Methods of Analysis, 7th edition



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Syllabus - Semester Fifth

VACUUM SCIENCE AND CLEAN ROOM TECHNOLOGY

Course Code: NAT2553

Credit Units: 03

Course Objective:

To enable students to understand vacuum science, their production, measurement, about clean room technology

Course Contents:

Module I: Vacuum Science and Technology

Vacuum and its different units, Kinetic Theory of Gases, Gas flow in vacuum systems, Physical Parameters at low pressure, classification of vacuum ranges, Application of Vacuum technology, Through put & pumping speed, flow rate & conductance in vacuum system

Module II: Production & Measurement of Vacuum

Types of Vacuum Pumps (Rotary, diffusion, Turbo, Cryo & Ion) - Basic Principles and applications, Production of low, medium high and ultrahigh vacuum, Vacuum gauges, Leak detection techniques

Module III: Clean Room Technology

Clean rooms: Introduction, needs and Types, Basics of clean room standards, design of clean room & clean air devices, High efficiency air filtration, Clean room disciplines, Cleaning of clean room, Quality control, Industrial and Scientific application of clean room

Examination Scheme:

Components	CT	HA	A	S/V/Q	EE
Weightage(%)	15	5	5	5	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

Text & References:

- Vacuum Science and Technology, VV Rao, TB Ghosh, KL Chopra-Allied Publishers Pvt. Ltd.
- Handbook of Vacuum Science and Technology, Dorothy M.H off man, Academic Press, An Imprint of Elsevier
- Clean Room Technology: Fundamental of Design, testing & operation by William Whyte; John Wiley & Sons 2002


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Syllabus - Semester Sixth

INDUSTRIAL APPLICATION OF NANOMATERIALS

Course Code: NAT2652

Credit Units: 03

Course Objective:

To enable students to understand the applications of nano materials and associated technology in industrial sector

Course Contents:

Module I: Nano-Electronic Technologies

Nanolithography, Data storage, Nano-photonics, Nano electronic and Magnetic devices, Spintronic, Carbon based materials: Carbon Nano-tube (CNC), Graphene. Sensors & Nano-sensors, NEMS.

Module II: Sustainable energy technologies

Solar energy, Hydrogen energy and Nano-materials, Carbon nanotube fuel cells, Hydrogen storage, Thermoelectricity, Re-chargeable batteries, Energy savings, Nano-lubricants, Nano-composites and Nano-catalysts. power semiconductor chips, fuel cells, superconductors, solar cells, energy storage and other alternative power sources. Solar cells, Thin film Si solar cells, Chemical semiconductor solar cells, Dye sensitized solar cells, Polymer solar cells, Nano quantum dot solar cells, Hybrid nano-polymer solar Cells

Module III: Applications of Nanotechnology in industrial, environmental and medical

Nano-biosensors in food and agriculture Industry, biological and environmental applications, drug delivery

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage(%)	5	15	5	5	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

Text & References:

- Bharat Bhushan: Handbook of Nanotechnology, Springer
- Jurgen Schulte: Nanotechnology: Global Strategies, Industry Trends and Applications Graham
- TSmith: Industrial Metrology, BingZhou: Nanotechnology in Catalysis
- Luisa Filippini and Duncan Sutherland: Nanotechnologies: principles, applications, implications and hands on activities
- JoséA. Rodríguez and Marcos Fernández-García: Synthesis, properties and applications of oxidenano particles wiley
- Mick Wilson: Nanotechnology: Basic Science and Emerging Technologies, Chapman and hall/ CRC Press
- <http://www.nano.gov/you/nanotechnology-benefits>

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RENEWABLE ENERGY

Programme Structure-2022

Course Code	Course Title	Lectures (L) Hours per week	Tutorial (T) Hours per week	Practical (P) Hours per week	Total Credits
SAE2152	Fundamental of Solar Photovoltaic, Battery & Inverter	2	-	2	3
SAE2252	Solar PV Installation	2	-	2	3
SAE2352	Solar PV Design	2	-	2	3
SAE2452	Solid Waste Management and Power Generation	3	-	-	3
SAE2552	Solar Thermal Systems	3	-	-	3
SAE2651	Energy Audit and Energy Management	3	-	-	3
	TOTAL				18



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Overview

India's growing energy needs mixed with world's order for reducing environmental emissions by fossil energy sources require the use of environmentally friendly new and renewable energy sources having no environmental emissions. The thrust given by the Govt. of India under National Climate Plan and Jawahar Lal Nehru National Solar Mission has suddenly created the need to train large human resource in the field of new and renewable energy especially with expertise in solar energy.

Renewable Energy open track is designed to equip under graduates and working professionals in understanding of energy flow from Solar and biomass and the ways to harness the renewable forms of energy and its optimal usage. The curriculum gives an overall knowledge of solar PV fundamentals, battery, inverters, cables, solar PV designing, energy from wastes and waste management, environmental impact and energy audit and management. The course is especially designed to enhance the skills of the students and make them industry ready.

Programme Objectives (PO's)

The students will

- PO1. Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
- PO2. Problem analysis:** Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
- PO3. Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
- PO4. Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
- PO5. Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
- PO6. The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
- PO7. Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
- PO8. Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
- PO9. Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
- PO10. Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
- PO11. Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

- PO12. Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and lifelong learning in the broadest context of technological change.

Programme Specific Outcomes (PSOs)

On completion of the Renewable Energy Track, the student will be able to:

PSO1: Apply knowledge and understanding of the electrical engineering in dealing with the renewable energy systems. The students will learn to relate the electrical engineering concepts to design a solar PV system.


PSO2: Understand the working of solar PV cells, modules, battery, inverters and cables. They will be able to design and install an off grid solar PV power plant for meeting the demands of a household.

PSO3: Ability to understand the energy generation in a solar thermal system and its application in industry. They will also learn the role of these systems for sustainable energy development. They will also learn the techniques to manage the solid wastes and how energy can be generated from solid wastes and the associated challenges.

PSO4: Understanding the need of high level professional, management techniques including project management which can be used in technological and management practices in construction following the ethical code of conduct as well as understanding the impact of engineering practices on societal, global, commercial and economic scenario.



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RENEWABLE ENERGY

Syllabus

SAE2152	FUNDAMENTAL OF SOLAR PHOTOVOLTAIC, BATTERY & INVERTER	L	T	P	C
Version 1.1	Date of Approval:	2	0	2	3
Pre-requisites/Exposure					
Co-requisites					

Course Description

This course covers the concepts of basic engineering project related to energy supply using solar photovoltaic technology. Also, to make students understand the practical applications that use solar photovoltaic systems and be able to do specify, analyze and design.

Course Objectives

The objective of this course are as follows

- This course covers the fundamental concepts of electrical engineering that is required for solar PV system designing.
- To understand the physical principles of the photovoltaic (PV) solar cell and modules. The parameters used to measure the performance of solar PV cells and modules. The course also covers the sources of losses.
- To understand the different types of batteries and inverters used for solar applications and the working of these systems.

Course Outcomes

On completion of this course, the students will be able to

CO1. To compute the current, voltage and power in a circuit. Have understanding about resistance, power and energy.

CO2. To do the IV characteristic of solar PV cells and PV modules. They will be able to connect modules in series and parallel.

CO3. Identify the different types of batteries and inverters available in the market. They will be able to judge the performance of the battery and inverters based on their specifications.

Course Content:

Modules	Blooms level*	Number of hours
Module I: Basics of Electricity Introduction to Electricity, current, voltage, danger with high voltage and current levels, resistance, power and energy.	L1, L2	12


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Module II: Basics of Solar Photovoltaics Cells Solar Cells, types of solar cells, electricity generation from solar cells, parameters of solar cells, factors affecting electricity generation from solar cells.	L1, L2	12
Module III: Solar PV Modules Solar PV module, Standard PV module parameters, factors affecting electricity generation from solar PV modules, measuring module parameters, series and parallel connection.	L1, L2	12
Module IV: Batteries & Inverters Basics about batteries, charging and discharging of batteries, components of battery, types of battery, parameters of batteries. Inverters, types of inverters, Inverter specifications, working principle.	L1, L2, L3	12

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation*

Text Books

- Solar Photovoltaics (Fundamentals, Technologies and Application) by Chetan Singh Solanki; 3rd edition 2015.
- Handbook of Photovoltaic Science and Engineering by Antonio Luque & Steven Hegedus - Wiley; Lecture notes, 2003.

Lab Syllabus

List of Experiments	Blooms level*	Number of hours
1. Measure the V-I characteristics of a Photovoltaic cell	L1, L2	1
2. To study the illumination characteristics, power load characteristics, areal characteristics of a solar cell.	L1, L2	1
3. Measure the V-I characteristics of a Photovoltaic Panel subjected to variable load.	L1, L2	1
4. To study the effect of angle of the panel on V-I characteristic of a Photovoltaic Panel.	L1, L2	1
5. Measure the V-I characteristics of a Photovoltaic Panels connected in series and parallel without load.	L1, L2	1
6. Measure the V-I characteristics of a Photovoltaic Panels connected in series and parallel with load.	L1, L2	1
7. To understand the Safety norms and its importance, PPEs, Safety Signs, Safety Slogans, Safety Rules, Fire Extinguishers	L1, L2	1
8. Charging and discharging of battery	L1, L2	1

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

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Examination Scheme:

	IA				EE	
Components	CT	Assignment	LR	Attendance	Theory	Practical
Weightage (%)	10	5	10	5	40	30

Note: IA –Internal Assessment, EE- External Exam, CT- Class Test, LR – Lab Record.

Relationship between the Course Outcomes (COs), Programme Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO3	PSO4
CO1	1	3	2	3	-	-	-	-	-	-	-		1	1	-	-
CO2	1	3	2	3									2	1	-	-
CO3	1	2	2	-									1	2	-	-



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SAE2252	SOLAR PV INSTALLATION	L	T	P	C
Version 1.1	Date of Approval:	2	0	2	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

This course covers the concepts of basic concepts of installation of standalone solar PV systems. The students will be able to learn and understand the requirement of charge controllers, MPPT and different cables, structures in designing and installation of standalone PV system.

Course Objectives

The objective of this course are as follows

- To understand and apply the basic concepts of solar radiation necessary for sizing solar PV systems installation.
- To learn the different types of solar PV systems and their characteristics.
- To learn the need of balance of systems, charge controllers and MPPT in solar PV systems.
- To learn the different types of wires and cables used in solar PV installation and the losses through these cables.
- To learn to design and installation of standalone PV system based on the energy requirement.

Course Outcomes

On completion of this course, the students will be able to

CO1. To know some practical applications that use solar photovoltaic systems and be able to do specify, analyze and design.

CO2. To know and be able to analyze the behavior of a self-consumption demand and the measurement of network management.

CO3. To carry out a basic engineering project related to energy supply using solar photovoltaic technology.

Course Content:

Modules	Blooms level*	Number of hours
Module I:- Solar Radiation & solar PV systems Solar radiation, Peak sun hours, sun earth angles, site survey, shading, Types of Solar PV systems, standalone systems, grid connected systems, hybrid systems.	L1, L2	12
Module I-I: Charge controller, MPPT & Inverters Need of Balance of System, charge controllers, working of charge controllers, features of charge controllers, it's specifications. Power output from PV module, need of MPPT, MPPT chargecontroller, specifications.	L1, L2	12

Module III: Wires Importance of choice of wires, Ohm's law, resistance & resistivity, types of wire, wire sizing	L1, L2	12
Module IV: Fundamentals of solar PV design and Installation of standalone system- case study System description under study, energy flow diagram, load estimation, sizing and choice of electronics components. Structures used for installation, site requirements, installation of the system.	L1, L2, L3	12

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation*

Lab Syllabus

List of Experiment	Blooms level*	Number of hours
Sun Earth Angles 1.Find the declination angle for all the days of the year. Find the variation of declination angle over the year. 2. Find solar altitude angle, azimuth angle and zenith angle for a location at a given time.	L2, L3	2
3. Conduct Site survey	L1, L2, L3	2
Maximum Power Point Tracking 4. Finding MPP by varying the resistive load across the PV panel. 5.Finding MPP by varying the duty cycle of DC-DC converter.	L1, L2, L3	4
6. Cable sizing for standalone PV system	L1, L2, L3	2
7. Demonstration of installation of standalone PV system	L1, L2	2

Text Books

- Solar Photovoltaics (Fundamentals, Technologies and Application) by Chetan Singh Solanki;2015.
- Handbook of Photovoltaic Science and Engineering by Antonio Luque & Steven Hegedus - Wiley; Lecture notes, 2003.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination Examination Scheme:

Components	IA				EE	
	CT	Assignment	LR	Attendance	Theory	Practical
Weightage (%)	10	5	10	5	40	30

Note: IA –Internal Assessment, EE- External Exam, CT- Class Test, LR – Lab Record.

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Relationship between the Course Outcomes (COs), Programme Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO3	PSO4
CO1	1	3	2	3	-	-	-	-	-	-	-		1	1	-	-
CO2	1	3	2	3									2	1	-	-
CO3	1	2	2	-									1	2	-	-



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SAE2352	SOLAR PHOTOVOLTAIC DESIGN	L	T	P	C
Version 1.1	Date of Approval:	2	0	2	3
Pre-requisites/Exposure					
Co-requisites					

Course Objectives

The objective of the course is to demonstrate an understanding of how solar photovoltaic system designing can be effectively carried out with PVSYST software

Course Outcomes

On completion of this course, the students will be able to:

CO1: Illustrate the effective application of PVSYST software in capability design of practical SPV plants.

CO2: Demonstrate an understanding of how PVSYST software can impact on the development of practical SPV plants along with all the aspects of design analysis.

CO3. To carry out a basic practical solar photovoltaic power plant designing projects using PVSYST software.

Catalog Description

This course aims to make the students understand the importance of solar photovoltaic power plant designing with the help of PVSYST software.

Course Content:

Modules	Blooms level*	Number of hours
Module I: Introduction to PVSYST software Creating a new site, Understanding the design flow, generation of PV installation site report, Basics of designing aspects	L1, L2	7
Module II: Understanding of losses in the PV system Definition, calculation, and application of all losses, engineering logic behind thumb rules, understanding the loss diagram.	L1, L2	8
Module III: Performing a Site Assessment Prerequisites of a site visit, studying obstructions & electrical diagrams, creating rough sketches of the site and SLD, and unforeseen scenarios.	L1, L2	7
Module IV: Understanding Sub-Arrays and Report Analysis Definition of sub-arrays, designing a detailed sub-array system, and report analysis.	L1, L2	7

*Bloom's Level:

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L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation
Lab Syllabus

List of Experiments	Blooms level*	Number of hours
1. Design a solar photovoltaic power plant understanding geographical location and the meteorological data. 2. Design a solar photovoltaic power plant understanding orientation of the PV modules, the required power or available area and the type of PV modules and inverters.	L1, L2	4
3. Designing of SPV plants with the shading analysis.	L2, L3	2
4. Design the loss diagram of SPV plant with various loss parameters. 5. Carry out the economic evaluation of SPV plant.	L1, L2, L3	4

Text Books

- Srivastava JP; Step by Step Guide to Solar Simulation Software PVsyst: Practical Approach to Solar Simulation Kindle Edition, 2021
- PVSYST tutorials: <https://www.pvsyst.com/pdf-tutorials>

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination


Examination Scheme:

	IA				EE	
Components	CT	Assignment	LR	Attendance	Theory	Practical
Weightage (%)	10	5	10	5	40	30

Note: IA –Internal Assessment, EE- External Exam, CT- Class Test, LR – Lab Record.

Relationship between the Course Outcomes (COs), Programme Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO3	PSO4
CO1	1	2	2	3	-	-	-	-	-	-	-		1	1	-	-
CO2	1	3	2	3									2	1	-	-
CO3	1	2	2	-									1	2	-	-


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SAE2452	SOLID WASTE MANAGEMENT AND POWER GENERATION	L	T	P	C
Version 1.1	Date of Approval:	3	0	0	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

The objective of the course is to provide insights into waste management options by reducing the waste destined for disposal and encouraging the use of waste as a resource for alternate energy production. This course is designed to provide an understanding of the various aspects of Waste to Energy. The various sources of waste generation is analysed with a focus on its potential for energy production. The need for characterization of wastes will be discussed along with the existing norms for waste utilization for alternate energy source. Various Technological options available for the production of energy from waste will delineated along with economics of using alternate sources.

Course Objectives

- To enable students to understand of the concept of Waste to Energy.
- To link legal, technical and management principles for production of energy from waste.
- To learn about the best available technologies for waste to energy.

Course Outcomes

On successful completion of this course the students will be able to:

CO1: Apply the knowledge about the operations of Waste to Energy Plants.

CO2: Analyse the various aspects of Waste to Energy Management Systems.

CO3: Learn the various methods for harnessing energy from waste.

Course Content:

Modules	Blooms level*	Number of hours
Module I: Introduction The Principles of Waste Management and Waste Utilization. Waste Management Hierarchy and 3R Principle of Reduce, Reuse and Recycle. Waste as a Resource and Alternate Energy source. Rules for solid waste management in India.	L1, L2	7
Module II: Waste Sources & Characterization Waste production in different sectors such as domestic, industrial, agriculture, postconsumer, waste etc. Classification of waste – agro based, forest residues, domestic waste, industrial waste (hazardous and non-hazardous). Characterization of waste for energy utilization. Waste Selection criteria.	L1, L2	8

Module III: Technologies for Waste to Energy Biochemical Conversion – Energy production from organic waste through anaerobic digestion and fermentation. Thermo-chemical Conversion – Combustion, Incineration and heat recovery, Pyrolysis, Gasification	L1, L2	7
Module IV: Waste to Energy Options Landfill gas, collection and recovery. Refuse Derived Fuel (RDF) – fluff, briquettes, pellets. Alternate Fuel Resource (AFR) – production and use in Cement plants, Thermal power plants and Industrial boilers. Conversion of wastes to fuel resources for other useful energy applications, Hydrogen production from wastes, algae as a source of energy	L1, L2	7

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books, Reference Books & Journals

- Industrial and Urban Waste Management in India, TERI Press.
- Wealth from Waste: Trends and Technologies by Banwari Lal and Patwardhan, TERI Press.
- Fundamentals of waste and Environmental Engineering, S.N Mukhopadhyay, TERI Press.
- Gazette Notification on Waste Management Rules 2016.
- CPCB Guidelines for Co-processing in Cement/Power/Steel Industry
- Waste-to-Energy in Austria – White Book – Figures, Data Facts, 2nd edition , May 2010
- Report of the task Force on Waste to Energy, NitiAyog (Formerly Planning Commission) 2014.
- Municipal Solid Waste Management Manual, CPHEEO, 2016
- Biomass for renewable energy, fuels and chemicals by Donald L. Klass
- Biorenewable Resources: Engineering New Products from Agriculture. Robert C. Brown. Wiley-Blackwell Publishing (2003).
- <https://nptel.ac.in/courses/103107125>

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination


Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance



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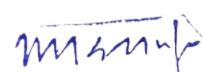
Relationship between the Course Outcomes (COs), Programme Outcomes (POs) and Program Specific Outcomes

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO3	PSO4
CO1	1	3	2	3	-	-	-	-	-	-	-		-	-	1	2
CO2	1	3	2	3										-	1	2
CO3	1	2	2	-											1	2

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SAE2552	SOLAR THERMAL SYSTEMS	L	T	P	C
Version 1.1	Date of Approval:	3	0	0	3
Pre-requisites/Exposure					
Co-requisites					

Course Objectives

The objective of this course is to introduce materials relevant to the engineering of solar thermal systems. Students will develop the skills to analysis the thermal performance of solar thermal systems. Many of these calculations will be based on solar applications in different area. Finally the concepts of engineering economics applied to solar energy will also be introduced.

Course Outcomes

On completion of this course, the students will be able to

CO1. Conduct thermal Analysis of solar thermal collectors (FPC & CPCs).

CO2. Explain working mechanism of solar thermal collectors

CO3. To understand the working mechanism of solar air heater, solar crop drying, solar distillation, solar house, solar water heating systems, swimming pool heating by solar.

Catalog Description

In this course, the various modes of heat transfer shall be discussed. The different types of errors, accuracy of the numerical methods are also discussed in detail. Students will taught to calculate the amount of incident solar flux on horizontal and tilted surfaces. Thermal analysis of flat plate collector and concentrating collectors will be taught. The energy storage systems and the different components of solar systems will be discussed. The various water heating, air heating systems and its application to space heating and cooling and other solar devices will be discussed. Solar thermal power generation will be taught in this course.

Course Content:

Modules	Blooms level*	Number of hours
Module I: Introduction: Solar spectrum, solar radiation, instruments (pyrheliometers, pyranometers), solar radiation on horizontal surface, solar thermal energy conversion.	L1, L2	7
Module II: Flat plate collector Flat plate collector (FPC) (glazing material, collector plates), classification (evacuated tubular collectors, Types of FPCs), testing of collectors, heat losses, thermal analysis of FPC.	L1, L2	9
Module III: Solar Concentrator Concentrating Collector Designs: Classification, design and performance parameters; Tracking systems; Compound parabolic concentrators; Parabolic trough concentrators; Concentrators with point focus; Heliostats; Comparison of various designs: Central receiver systems, parabolic trough systems, Solar power plant;	L1, L2	9

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Solar furnaces.		
Module IV: Applications Solar air heater, solar crop drying, solar distillation, Solar Energy for Industrial Process Heat: Industrial process heat: Temperature requirements, consumption pattern; Applications of solar flat plate water heater & air heater for industrial process heat. Hybridization of systems	L1, L2,L3	11

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation*

Text Books

- Solar Energy: Fundamentals, design, modeling and applications, Authored by G. N. Tiwari, 2013
- Renewable Energy Engineering and Technology, Edited by V.V. N. Kishore, 2010.

Reference Books

- Solar Engineering of Thermal Processes, Duffie and Beckmann, 4th Edition. 2013.
- Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:


Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Relationship between the Course Outcomes (COs) ,Programme Outcomes (POs) and Program Specific Outcomes

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO3	PSO4
CO1	1	3	2	3	-	-	-	-	-	-	-		-	-	1	2
CO2	1	3	2	3										-	1	2
CO3	1	2	2	-											1	2

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SAE2651	ENERGY AUDIT AND ENERGY MANAGEMENT	L	T	P	C
Version 1.1	Date of Approval: 2014	3	0	0	3
Pre-requisites/Exposure					
Co-requisites					

Course Objectives

The objective of this course is to

- To develop the knowledge and understanding of renewable energy economics both rural and urban including energy management, auditing and policies.
- To demonstrate a comprehensive knowledge and understanding of the Economic Benefits of Solar Energy, cost effectiveness including concepts of solar panels, solar cooling etc. To understand the concept of Solar Industrial Economics and as an alternative source of future energy including integration with industrial process as well as with grid, storage of energy, economics.
- To develop the knowledge and understanding of Planning of Energy Efficient Building with the concept of solar heating systems.

Course Outcomes

On completion of this course, the students will be able to

CO1. Demonstrate a critical understanding of Energy economics including both rural and urban, environmental and energy policies.

CO2. Address the desirable features of Energy management and auditing (energy audit instruments, energy audit report writing).

CO3. Demonstrate the ability to investigate critically the knowledge about economic Benefits of Solar Energy and cost effectiveness as well as to understand the concept of Solar Industrial Economics

CO4. To develop the concept of Planning of Energy Efficient Building and its design with the understanding of both active and passive solar heating systems.

Catalog Description

This course covers the basic principles of energy management, economics of solar energy and design of energy efficient building.

Course Content:

Modules	Blooms level*	Number of hours
Module I:- Renewable Energy Economics Energy scenario, environmental policies, energy policies, economics of energy infrastructure, rural renewable energy economics.	L1, L2	5
Module II: Energy Management Energy management: objectives, necessary steps and general principles of energy management, Energy Manager: functions, qualities, duties and guidelines.	L1, L2	9

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Module III: Energy Auditing Energy Auditing: Surveying, Audit: Purpose, Definition and Objectives, types of energy audit-preliminary and detailed; questionnaire, energy audit instruments, energy audit report writing. Energy conservation schemes, energy index, cost index, pie charts, Sankey diagrams, load profiles (histograms)	L1, L2	11
Module IV: Energy Audit of Building- Case study Electrical Energy Management: Methods to minimize supply demand gap; renovation and modernization of power plants, reactive power management, HVDC and FACTS; Conservation in motors, pumps and fan systems; energy efficient motors Thermal Energy Management: Energy conservation in boilers, steam turbines and industrial heating systems; Application of FBC; Cogeneration and waste heat recovery; thermal insulation; heat exchangers and heatpumps; building energy management.	L1, L2, L3	11

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation*

Examination Scheme:

Components	CT(2)	Assignment	V(1)	Attendance	EE(1)
Weightage (%)	15	5	5	5	70

Text & References:

- Renewable Energy: Power For A Sustainable Future, Second Ed. Edited By Godfrey Boyle
- Solar Engineering Of Thermal Processes - J. A. Duffie, W. A. Beckman, Solar Energy Laboratory Lecture Notes
- Handbook on Energy Audit and Environment Management: YP Abbi and Shashank Jain, (TERI Press, 2006)


Relationship between the Course Outcomes (COs), Programme Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO3	PSO4
CO1	1	3	2	3	2	-	-	-	-	-	-			3	2	1
CO2	1	3	2	3	2									3	2	1
CO3	1	2	2	-	2									3	2	1
CO4	1	2	2	-	2									3	2	1

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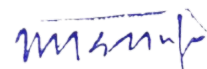
UNMANNED AERIAL VEHICLES

Programme Structure-2021

Course Code	Course Title	Lecture (L) Hours Per Week	Tutorial (T) Hours Per Week	Practical (P) Hours Per Week	Total Credits
ASE2352	Introduction to UAVs and Applications	2	1	-	3
ASE2452	Principles of UAV's Flight	2	1	-	3
ASE2552	Aerial Imagery: Hardware and Software	2	1	-	3
ASE2652	Embedded Systems for UAVs	2	1	-	3
ASE2752	Research Project-I Drone Development	-	-	-	3
ASE2852	Research Project-II Drone Troubleshooting, Testing and Deployment	-	-	-	3
	TOTAL				18



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Prerequisites

- The course is offered to both engineering and non-engineering students. Knowledge of Intermediate (Class 12) level science is a prerequisite to comprehend the contents of this course.
- The course can be taken up by the students of B. Tech. (Aerospace Engineering) as it will increase their knowledge and employability in this domain.

S. No.	Course	Course Prerequisites
1	Introduction to UAVs and Applications	Basic Physics, Mathematics
2	Principles of UAV's Flight	Basic Physics, Mathematics, Introduction to UAVs and Applications
3	Aerial Imagery: Hardware and Software	Basic Physics, Mathematics
4	Embedded Systems for UAVs	Basic Physics, Mathematics, Basics of Computer Languages
5	Research Project 1- Drone Development	Courses of Semester 1-4
6	Research Project 2- Drone Troubleshooting, Testing and Deployment	Courses of Semester 1-5



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UNMANNED AERIAL VEHICLES

Syllabus

ASE2352	Introduction to UAVs and Applications	L	T	P	C
Version 2021-1	Date of Approval: June 2021	2	1	0	3
Pre-requisites/ Exposure	Basic Physics, Mathematics				
Co-requisites					

Course Catalog

This course provides basic knowledge and understanding of various kinds of UAVs and their classifications based on various aspects. Knowledge of basic physics is crucial to comprehend the contents of this course. This course also provides introductory knowledge to the students about various components and systems of UAVs which serve as a foundation for better understanding of the advanced course.

Course Objectives

The objective of this course is to

- Provide introductory knowledge to the students regarding the basic science and principles as applicable to UAVs and their structure.
- Provide education to the students about the construction, payload, and safe operations of UAVs.

Course Outcomes

On completion of this course, the students will be able to

- CO1.** List, explain, and categorize amongst various kinds of UAVs, their classifications and application areas.
- CO2.** List, explain, and describe basics of flight, structure, and control of UAVs.
- CO3.** List, explain, categorize, and apply the basic concepts of payloads and payload controls of UAVs.
- CO4.** List, explain, and apply the fundamental concepts of safe operation of UAVs.
- CO5.** Explain and apply the engineering fundamentals and principles to practical design and testing UAVs.

Course Content

Modules	Blooms level*	Number of hours
Module 1: Introduction to UAVs Overview of UAVs and their Systems; Examples of UAV Systems; Nano UAVs; Micro UAVs, Small UAVs; Medium UAVs; Large UAVs; Different types of drones and their applications.	L1, L2, L4	6
Module 2: Concepts of Flight and UAV Construction and Control Basics of flight: lift, drag, thrust and weight balance. Basic structure and loads; construction materials; propulsion systems for UAVs; modes of control; UAV piloting; remote piloting; autopilot-assisted control; complete autonomous flights.	L1, L2, L3	6
Module 3: Payloads and Payload Control Types of payloads; payload capacity and control, imaging sensors; target detection, recognition, and identification; atmospheric, radiological, and	L1, L2, L4	6

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environmental monitoring; armed utility UAVs, controlling payloads; signal relay payloads.		
Module 4: Safe UAV Operations Regulating authority; homeland regulatory agencies and foreign regulatory agencies, general safety regulations and guidelines; restricted airspace; risk assessment; severity classifications; risk mitigation; do's and don'ts of UAV flying.	L1, L2, L3	6

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation*

Tutorial/Laboratory/Field Experiences			
1	Drone Systems and Assembly	L2, L3, L5	6
2	Demo Flying, Test Flight	L2, L3, L5	6

Text & Reference Books:

Text:

- P. Fahlstorm, T. Gleason, "Introduction to UAV Systems", 4th Edition, John Wiley & Sons, Inc., 2012.
- "DGCA RPAS Guidance Manual", Director General of Civil Aviation, Revision-1, 2019.
- Handbook of Unmanned Aerial Vehicles, Editors: Valavanis, K., Vachtsevanos, George J. (Eds.), Springer, 2015

Reference:

- K. P. Valavanis, G. J. Vachtsevanos, "Handbook of Unmanned Aerial Vehicles", 1st Edition, Springer, 2015.
- R. E. Weibel, R. J. Hansman, "Safety Considerations for Operation of Unmanned Aerial Vehicles in the National Airspace System", Report No. ICAT-2005-1, MIT International Center for Air Transportation, 2005.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

A: Attendance, CT: Class Test, S/V/Q: Seminar/Viva/Quiz, HA: Home Assignment, EE: End Semester Examination


CO, PO, PSO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	3	3	-	-	-	-	-	2	2	3	3	1	1	1	2
CO2	1	3	3	-	-	-	-	-	2	2	3	3	1	1	1	2
CO3	1	3	3	-	-	-	-	-	2	2	3	3	1	1	1	2
CO4	1	3	3	-	-	-	-	-	2	2	3	3	1	1	1	2
CO5	1	3	3	-	-	-	-	-	2	2	3	3	1	1	1	2

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ASE2452	Principles of UAV's Flight	L	T	P	C
Version 2021-1	Date of Approval: June 2021	2	1	0	3
Pre-requisites/ Exposure	Basic Physics, Mathematics, Introduction to UAVsand Applications				
Co-requisites					

Course Catalog

This course provides basic knowledge and understanding of aerodynamics, propulsion, stability and control of the UAVs. Knowledge of basic physics and engineering mechanics is crucial to comprehend the contents of this course. This course also provides essential knowledge to the students about the efficient and stable flight of the UAVs.

Course Objectives

The objective of this course is to

- Provide fundamental knowledge to the students regarding the aerodynamics and propulsion systems of the UAVs.
- Provide education to the students about the stability and control of UAVs.

Course Outcomes

On completion of this course, the students will be able to

- CO1.** List, explain, and apply the governing equations to the operation of UAVs.
- CO2.** List, explain, and describe basics of UAVs aerodynamics.
- CO3.** List, explain, and apply the basic concepts of propulsion and propulsion systems to UAVs.
- CO4.** List, explain, and apply the fundamental concepts of stability and control of UAVs.
- CO5.** Explain and apply the engineering fundamentals and principles to design and test UAVs.

Course Content

Modules	Blooms level*	Number of hours
Module 1: Introduction Introduction to incompressible flow, Continuity, momentum, energy and other governing equations; pitot-static tube, pressure coefficient, Mach number their significance.	L1, L2, L4	6
Module 2: UAV Aerodynamics Symmetric and cambered airfoils; Airfoil nomenclature and characteristics; aerodynamic forces and moments; calculations for airfoil lift and drag; center of pressure; aerodynamic center; Modern low-speed airfoils; characteristics of low speed airfoils; Finite and infinite wings; Flow Separation; Stall.	L1, L2, L3	6
Module 3: Propulsion Systems Propulsive thrust; nomenclature and geometry; thrust to weight ratio; types and classifications; propeller and basic principles; different type of propellers; propeller safety; propeller lift and angle of attack; propeller pitch; fixed pitch propellers; propeller materials; propeller installations and operation; battery of a drone; motors; different types of engines; fuel, hybrid, fuel cells; solar powered UAVs.	L1, L2, L4	6
Module 4: Stability and Control Overview of standard atmosphere; static and dynamic stability; principal axes and rotation of aerial systems; equilibrium; flight control and control surfaces;	L1, L2, L3	6

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their significance and autopilot usage.		
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**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation*

Tutorial/Laboratory/Field Experiences			
1	Simulator-based flying training	L2, L3, L5	6
2	Drone pilot training on field	L2, L3, L5	6

Text & Reference Books:

Text:

- Anderson, J. D., Jr., "Fundamentals of Aerodynamics", 2nd Edition, McGraw Hill, 1990.
- Houghton, E. L. and Carpenter, P. W., "Aerodynamics of Engineering Students", 4th Edition, CBS Publishers & Distributors, 2005.
- Kermode, A. C., "Mechanics of Flight", 10th Edition, Pearson Education, 2006.

Reference:

- Bertin, J. G. and Cummings, R. M., "Aerodynamics for Engineers", 6th Edition, Pearson, 2013.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

A: Attendance, CT: Class Test, S/V/Q: Seminar/Viva/Quiz, HA: Home Assignment, EE: End Semester Examination


CO, PO, PSO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	3	3	-	-	-	-	-	2	2	3	3	1	1	1	2
CO2	1	3	3	-	-	-	-	-	2	2	3	3	1	1	1	2
CO3	1	3	3	-	-	-	-	-	2	2	3	3	1	1	1	2
CO4	1	3	3	-	-	-	-	-	2	2	3	3	1	1	1	2
CO5	1	3	3	-	-	-	-	-	2	2	3	3	1	1	1	2

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ASE2552	Aerial Imagery: Hardware and Software	L	T	P	C
Version 2021-1	Date of Approval: June 2021	2	1	0	3
Pre-requisites/ Exposure	Basic Physics, Basic Electronics				
Co-requisites					

Course Catalog

This course provides basic knowledge and understanding of aerial imagery, remote sensing and AI using UAVs. Knowledge of basic physics and basic electronics is crucial to comprehend the contents of this course. This course also provides essential knowledge to the students about the efficient and effective aerial imagery and remote observations using UAVs and image processing using software.

Course Objectives

The objective of this course is to

- Provide fundamental knowledge to the students regarding the basics of imagery and remote sensing using UAVs.
- Provide education and practice to the students about image processing, AI and global positioning.

Course Outcomes

On completion of this course, the students will be able to

- CO1.** List, explain, and apply the basics of aerial imagery using UAVs.
- CO2.** List, explain, and apply the basics of image processing using fundamental principles and relevant software.
- CO3.** List, explain, and apply the basic concepts of remote sensing, GIS and GPs in operation of UAVs.
- CO4.** List, explain, and apply the fundamental concepts of image enhancement and AI.
- CO5.** Explain and apply the engineering fundamentals and principles to practical applications of remote sensing using UAVs.

Course Content

Modules	Blooms level*	Number of hours
Module 1: Basics of Aerial Imagery Introduction to aerial image acquisition; types of cameras; payload weight; consumption of battery with different payloads; manual and autonomous capture of pictures and videos by UAVs; limitation with aerial photography; image distortion; FOV; lighting; understanding of aerial views and flight planning.	L1, L2, L4	5
Module 2: Introduction to Image Processing Various steps involved in image processing; concepts of digital image; some basic relationships like neighborhoods; connectivity; distance measure between pixels; histogram: definition; decision of contrast based on histogram; operations based on histograms like image stretching.	L1, L2, L3	5
Module 3: Remote Sensing, GIS and GPS Introduction to remote sensing technology; satellite vs drone imagery; Geographical Information System; Global Positioning System; Introduction to measurement and measuring systems; functional elements of a measuring system; errors and uncertainty in measurements; methods of minimization of the errors.	L1, L2, L4	5
Module 4: Image Enhancement, Morphology and Segmentation	L1, L2,	5

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Image enhancement techniques (spatial and frequency domain); Morphological operations; Image segmentation techniques.	L3	
Module 5. Artificial Intelligence General introduction to AI; application of AI for guidance & control; image processing.	L1, L2, L3	4

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation*

Tutorial/Laboratory/Field Experiences			
1	Analysis of aerial images of various terrains	L2, L3, L5	4
2	Image processing using suitable software applications	L2, L3, L5	4
3	Analysis of GIS and GPS mark embedded aerial images	L2, L3, L5	4

Text & References:

Text:

- Drone Photography Basics: Your Guide to the Camera in the Sky, Justin Moore, SBN:9781682034088, 1682034089, Page count:128, Published:2019, Format:Paperback, Publisher: Amherst Media,
- Remote Sensing Technology, Imaging, Image Processing, Geographical Information System, Global Positioning System, acquiring information for civil & military applications
- Rafael C. Gonzalez and Richard E. Woods, "Digital Image Processing", Pearson Reprint, 2001.

Reference:

- Drone Photography: Art and techniques, Jake Sugden · 2020, ISBN:9781785006906, 1785006908 24th February 2020, Format:E-book, Publisher: Crowood
- Anil K. Jain, "Fundamentals of Digital Image Processing", Prentice-Hall of India, New Delhi, 2001.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

A: Attendance, CT: Class Test, S/V/Q: Seminar/Viva/Quiz, HA: Home Assignment, EE: End Semester Examination

CO, PO, PSO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	3	3	-	-	-	-	-	2	2	3	3	1	1	1	2
CO2	1	3	3	-	-	-	-	-	2	2	3	3	1	1	1	2
CO3	1	3	3	-	-	-	-	-	2	2	3	3	1	1	1	2
CO4	1	3	3	-	-	-	-	-	2	2	3	3	1	1	1	2
CO5	1	3	3	-	-	-	-	-	2	2	3	3	1	1	1	2

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ASE2652	Embedded Systems for UAVs	L	T	P	C
Version 2021-1	Date of Approval: June 2021	2	1	0	3
Pre-requisites/ Exposure	Basic of Computer, Basic Electronics				
Co-requisites					

Course Catalog

This course provides basic knowledge and understanding of digital electronics and embedded systems in application in UAVs. Knowledge of computer fundamentals and basic electronics is crucial to comprehend the contents of this course. This course also provides essential knowledge to the students about the involvement of sensors and actuators and IOT in the application of UAVs.

Course Objectives

The objective of this course is to

- Provide fundamental knowledge to the students regarding the basics of digital electronics and control boards for UAV applications.
- Provide education and practice to the students about Sensors, actuators and IoT as applicable in UAV operations.

Course Outcomes

On completion of this course, the students will be able to

- CO1.** List, explain, and apply the basics of digital electronics in UAV applications.
- CO2.** List, explain, and apply the basics of embedded systems and programming of control boards.
- CO3.** List, explain, and apply the basic concepts of sensors and actuators interfacing in UAVs.
- CO4.** List, explain, and apply the fundamental concepts of using IoT in UAV applications.
- CO5.** Explain and apply the engineering fundamentals and principles to practical applications of embedded systems in UAVs.

Course Content

Modules	Blooms level*	Number of hours
Module1: Basics of Digital Electronics Introduction to digital electronics; logic gates; basic laws and theorems of Boolean algebra; introduction to combinational circuits; concept of memory cell and introduction to Flip-flops.	L1, L2, L4	6
Module 2: Introduction to Arduino, Raspberry Pi Introduction to embedded systems; introduction to various Arduino boards; introduction to Arduino IDE; 3DR PixHawk; introduction to Python programming language; introduction to Raspberry Pi development boards.	L1, L2, L3	6
Module 3: Interfacing with Sensors and Actuators Interfacing of temperature sensor; LIDAR; pressure sensors; humidity sensor; vision sensor with Arduino/Raspberry Pi; Interfacing of various actuators like DC motor; servo motor; stepper motor; ESC programming.	L1, L2, L4	6
Module 4: Introduction to IOT IoT definition; characteristics; IoT functional blocks; physical design of IoT; implementation of IoT with Arduino and Raspberry Pi; cloud computing; fog computing; surveillance applications; other IoT applications.	L1, L2, L3	6

*Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

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Tutorial/Laboratory/Field Experiences			
1	Programming Arduino/Raspberry Pi	L2, L3, L5	3
2	Sensor/Actuator interfacing	L2, L3, L5	3
3	Design of IoT applications	L2, L3, L5	3
4	Drone programming and control	L2, L3, L5	3

Text & References:

Text:

- R.P. Jain, “Modern Digital Electronics”, 2nd Edition, Tata Mcgraw Hill, 2003
- D. Norris, Arduino and Raspberry Pi Sensor Projects for the Evil Genius, McGraw-Hill Education, 2014
- V.Madisetti and A.Bahga, “Internet of Things (A Hands-onApproach)”, 1st Edition, VPT, 2014

Reference:

- M. Mano, “Digital Design”, 2nd Edition, Pearson Education,2007.
- S. Monk, Hacking Electronics: Learning Electronics with Arduino and Raspberry Pi, 2nd Edition

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

A: Attendance, CT: Class Test, S/V/Q: Seminar/Viva/Quiz, HA: Home Assignment, EE: End Semester Examination


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CO4	1	3	3	-	-	-	-	-	2	2	3	3	1	1	1	2
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ASE2752	Research Project-I Drone Development	L	T	P	C
Version 2021-1	Date of Approval: June 2021	0	0	0	3
Pre-requisites/ Exposure					
Co-requisites					

Course Catalog

The minor project provides the student with an opportunity to apply knowledge and skills learned in the classroom in carrying out a project. The research project 1 is an in-house training on real-time project or on latest software. The experience and skills that come with carrying out research project 1 build a foundation and aptitude in students to conduct meaningful research towards a practical outcome. The research project 1 aims to impart necessary training to the students that is a value addition for their employability.

Course Objectives

The objective of this course is to

- Provide practical training on small-scale projects that will increase the capability of the students to work individually or in teams on actual problems in industry.
- Provide students with capabilities to design systems, analyze results, write technical reports and engage in life-long learning practices.

Course Outcomes

On completion of this course, the students will be able to

- CO1.** Relate and apply the acquired classroom knowledge with technical and real-time environment.
- CO2.** Relate and demonstrate capabilities to create and review technological solutions to complex engineering problems of relevant domains.
- CO3.** Apply the acquired knowledge to demonstrate the skills to create and compile technical reports pertaining to a given project.
- CO4.** Demonstrate the skills to work ethically and professionally in a team and engage in life-long learning.

Course Content

Guidelines

In order to achieve the objectives:

- Each student will be allotted a supervisor for proper guidance.
- Student will first submit details of company, external guide, project title to coordinator/supervisor as per given schedule.
- For internal assessment purpose, students will submit an industry feedback and a progress report.
- Student will maintain a file (Internship File/Project Report) which he/she will submit after completion of internship. Further, coordinator will provide Non-Teaching Credit Course project guidelines and sample to help in preparation of file. The Internship File aims to encourage students to keep a personal record of their learning and achievement throughout the Programme. It can be used as the basis for lifelong learning and for job applications. Items can be drawn from activities completed in the course modules and from the workplace to demonstrate learning and personal development. The file will assess the student's analytical skills and ability to present supportive evidence, whilst demonstrating understanding of their organization, its needs and their own personal contribution to the organization.

The layout guidelines for the Project Report

1. File should be in the following specification

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Amity University Haryana
Manesar Gurgaon-122413

- A4 size paper
- Spiral Binding

- **Font**

For normal text Font Type and Size must be- Times New Roman, 12 pt. The minimum font size of materials within a table or a figure can be 10 point.

- **Margins**

A margin of 3.75 cm (1½ inch) is to be given on the binding edge while on the other sides it is to be 2.5 cm (1 inch). The text of the report, including headings, figures, tables, and notes, but excluding page numbers, must be accommodated within the page area.

- **Line Spacing**

The line spacing in the main text must be between one-and-a-half (1.5). Single line spacing should be given for figure captions, table titles, figure legends, and footnotes. Equations, tables, figures, and quotations should be set off from the main text with adequate space (not less than the normal line spacing adopted for the main text). Two consecutive paragraphs should be separated by a spacing which must be larger than the line spacing adopted for the text.

- **Tables and Figures**

Each sketch, drawing, graph and photograph should have a figure number and title below the figure etc. Numbering should be sequential, chapter wise. For instance, if there are 24 figures chapter 3 spread over all of its sections the figure numbers run from Figure 3.1 through Figure 3.24. In figures experimental data should typically be represented by centered symbols, and theoretical data by continuous curves.

Each table should have a table number and caption above the table. Numbering should be sequential, chapter wise, as in the case of Figure numbers. For instance, if there are 18 tables in chapter 3 the table numbers run from Figure 3.1 through Figure 3.18.

Make sure that figures and tables are complete in other respects such as legends, references (if any) and coordinate labels with units. Each figure and table must be explicitly referred to in the text and located where its first reference occurs, preferably after the reference.

- **Drawings**

All engineering drawings must conform to relevant Standards and should include a title block. If drawings are large they should be included at the back of the report in a separate pocket. In case drawings are made using CAD packages, a CD ROM should be included which contains all the files and details of the packages used.

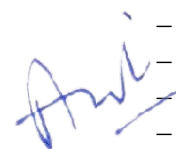
- **Equations**

The numbering of equations should be sequential, chapter wise. Numbered equations must be explicitly referred to in the text.

2. Report Size: The maximum number of pages of the Report should be preferably between 40-70 pages.

3. Report Layout: The report should contain the following components

- Front Page
- Declaration
- Student Certificate (University)
- Certificate(Company)
- Acknowledgement
- Abstract
- Contents
- List of Figures
- List of Tables
- Company Profile (optional)
- Chapters
- Appendices(optional)
- References / Bibliography


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The above components are described below:

- **Title Page** - Format will be given by coordinator/supervisor.
- **Declaration by the Students** - This is page number (i), the beginning of the small case Roman numeral page numbers. The student has to give a declaration to the effect that the data used for the work, the work depicted in the report, and the written material contained in the report are not copied from others and that due permission has been taken from, and due credit has been given to, the sources whenever they are used.
- **Certificate** - This is page number (ii). It is given by the Institute. The certificate will be signed by the Faculty Supervisor(s) before the viva-voce after verifying the format and by the Head of the Department after review with the Supervisor(s).
- **Company Certificate** - This is a certificate, which the company gives to the students.
- **Contents** - This is page number (iii). The table of Contents should be titled just *Contents* (not Table of Contents). Try to fit it into one or two pages.
- **Acknowledgement** - This is page number (iv). Keep this brief and avoid using informal language. This page must be signed by the candidate.
- **Abstract and Keywords** - This is page number (v). The abstract (preferably one page) should contain the context/relevance of the problem at hand, a description of what was done and a gist of the significant observations/results.
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Modes of Evaluation: Viva/Progress Report/Presentation/Final Report

Continuous Internal Assessment	Final Assessment
50 Marks	50 Marks

Examination Scheme

Internal and Final Assessment (50)													
S. No.	Name of the Student	Project Title	Guide	Co-guide	Well defined problem, objectives and methodology (5)	Individual Contribution by the student to the project work (5)	Subject Knowledge / skill related to project work (10)	Presentation skills (5)	Thesis Report (7)	Presentation (6)	Execution (6)	Viva Voce (6)	Total (50)



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CO, PO, PSO Mapping

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CO3	-	-	-	2	-	-	-	-	-	1	-	-	-	-	-	1
CO4	-	-	-	-	-	-	-	1	1	-	1	1	-	-	-	1

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ASE2852	Research Project-II Drone Troubleshooting, Testing and Deployment	L	T	P	C
Version 2021-1	Date of Approval: June 2021	0	0	0	3
Pre-requisites/ Exposure					
Co-requisites					

Course Catalog

The minor project provides the student with an opportunity to apply knowledge and skills learned in the classroom in carrying out a project. The research project 1 is an in-house training on real-time project or on latest software. The experience and skills that come with carrying out research project 1 build a foundation and aptitude in students to conduct meaningful research towards a practical outcome. The research project 1 aims to impart necessary training to the students that is a value addition for their employability.

Course Objectives

The objective of this course is to

- Provide practical training on small-scale projects that will increase the capability of the students to work individually or in teams on actual problems in industry.
- Provide students with capabilities to design systems, analyze results, write technical reports and engage in life-long learning practices.

Course Outcomes

On completion of this course, the students will be able to

- CO5.** Relate and apply the acquired classroom knowledge with technical and real-time environment.
- CO6.** Relate and demonstrate capabilities to create and review technological solutions to complex engineering problems of relevant domains.
- CO7.** Apply the acquired knowledge to demonstrate the skills to create and compile technical reports pertaining to a given project.
- CO8.** Demonstrate the skills to work ethically and professionally in a team and engage in life-long learning.

Course Content

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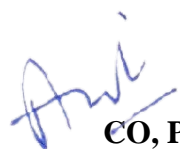
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CO, PO, PSO Mapping

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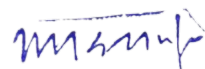
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